KARAKTERISTIK NYALA API PADA *MESO-SCALE COMBUSTOR* DENGAN *SUDDEN EXPANSION* DAN *WIRE MESH* SEBAGAI *FLAME HOLDER*

SKRIPSI

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PROGRAM STUDI STRATA SATU TEKNIK MESIN

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diajukan guna melengkapi tugas akhir dan memenuhi salah satu syarat
untuk menyelesaikan Program Studi Teknik Mesin (S1)
dan mencapai gelar Sarjana Teknik

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PERSEMBAHAN

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MOTTO

"*Once you stop learning, you start dying****.***
Life is like riding a bicycle. To keep your balance
*you must keep moving.****"***

(Albert Einstein)

(Solidarity Forever)

PERNYATAAN

Saya yang bertanda tangan di bawah ini:

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Menyatakan dengan sesugguhnya bahwa dalam tugas akhir yang berjudul "Karakteristik Nyala Api pada *Meso-Scale Combustor* dengan *Sudden Expansion* Dan *Wire Mesh* Sebagai *Flame Holder*" adalah benar-benar hasil karya sendiri, kecuali kutipan yang sudah saya sebutkan sumbernya, belum pernah diajukan pada institusi manapun, dan bukan karya jiplakan. Saya bertanggung jawab atas keabsahan dan kebenaran isinya sesuai dengan sikap ilmiah yang harus dijunjung tinggi.

Dengan pernyataan ini saya susun dengan sebenarnya, tanpa ada tekanan dan paksaan dari pihak manapun serta bersedia mendapat sanksi akademik jika ternyata di kemudian hari pernyataan ini tidak benar.

Jember, 19 Mei 2020

Yang menyatakan

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LAPORAN SKRIPSI

KARAKTERISTIK NYALA API PADA *MESO-SCALE COMBUSTOR* DENGAN *SUDDEN EXPANSION* DAN *WIRE MESH* SEBAGAI *FLAME HOLDER*

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PENGESAHAN

Skripsi berjudul "Karakteristik Nyala Api pada *Meso-Scale Combustor* dengan *Sudden Expansion* dan *Wire Mesh* sebagai *Flame Holder*" karya Trian Fahmi Nizar telah diuji dan disahkan oleh Fakultas Teknik Universitas Jember pada:

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RINGKASAN

Karakteristik Nyala Api pada *Meso-Scale Combustor* dengan *Sudden Expansion* Dan *Wire Mesh* Sebagai *Flame Holder*; Trian Fahmi Nizar, 181910101146; 2020; 319 halaman; Jurusan Teknik Mesin Fakultas Teknik Universitas Jember.

Jumlah penduduk yang terus bertambah dan meningkatnya laju pembangunan serta pola hidup masyarakat yang juga mengalami peningkatan mengakibatkan konsumsi energi di Indonesia terus meningkat dari tahun ke tahun. *Meso-scale combustor* merupakan salah satu wujud pengembangan teknologi pemanfaatan bahan bakar fosil. Pembakaran ini memiliki potensi untuk menghasilkan energi panas yang dapat dimanfaatkan sebagai sumber pembangkit listrik skala mikro atau disebut *Micro Power Generator* (MPG). Desain, dimensi dan jenis material *combustor* tentunya berpengaruh terhadap energi panas hasil proses pembakaran. Menurut Yang *et al*. (2002), penambahan saluran *sudden expansion* pada *combustor* dapat membantu pencampuran antara bahan bakar dan udara sebelum terjadi proses pembakaran, selain itu juga berguna untuk mengatur posisi nyala api. Sedangkan penelitian yang dilakukan Mikami *et al.* (2012) menunjukkan bahwa *mesh* berperan sebagai pengumpul tetesan bahan bakar cair dan sebagai penahan api. Hal tersebut terjadi karena bahan bakar yang melewati *wire mesh* langsung bereaksi dengan api sehingga menghasilkan kehilangan panas (*heat loss*) dan bentuk api yang asimetris untuk laju aliran bahan bakar yang relatif tinggi sehingga *wire mesh* dapat menjaga api tetap stabil tanpa pemanasan eksternal. Penelitian dilakukan dengan studi eksperimental dimana *meso-scale combustor* menggunakan *flame holder* berupa *wire mesh* 60 dan *sudden expansion* yang dikontrol dengan cara memvariasikan diameter *outlet* pada *combustor*. Dari ketiga variasi diameter *outlet*, yaitu 5 mm, 6 mm dan 7 mm, hasil penelitian menunjukkan bahwa pada kondisi rasio ekuivalen (Φ) = 1, *combustor* dengan diameter *outlet* 7 mm memiliki daerah rentang nyala api terluas, posisi api terbaik, serta bentuk nyala api paling pipih diantara kedua *combustor* lainnya.

SUMMARY

Flame Characteristics of Meso-Scale Combustor with Sudden Expansion and Wire Mesh as Flame Holders*; Trian Fahmi Nizar, 181910101146; 2020; 319 page; Department of Mechanical Engineering, Faculty of Engineering, University of Jember.*

The population that continues to grow and the increasing rate of development as well as people's lifestyles which also increased has resulted in energy consumption in Indonesia continues to increase from year to year. A mesoscale combustor is a form of technology development in the use of fossil fuels. This combustion has the potential to produce thermal energy that can be utilized as a source of micro-scale electricity generation or called a MicroPower Generator (MPG). The design, dimensions, and type of combustor material certainly affect the heat energy of the combustion process. According to Yang et al. (2002), the addition of a sudden expansion tunnel to the combustor can help mix the fuel and air before the combustion process occurs, but it is also useful for adjusting the position of the flame. While the research conducted by Mikami et al. (2012) showed that the mesh acts as a collector of liquid fuel droplets and as a fire retardant. This happens because the fuel that passes through the wire mesh reacts directly with the fire resulting in heat loss and an asymmetrical form of fire for a relatively high fuel flow rate so that the wire mesh can keep the fire stable without external heating. The study was conducted with an experimental study in which the mesoscale combustor uses a flame holder in the form of wire mesh 60 and sudden expansion which is controlled by varying the outlet diameter of the combustor. Of the three outlet diameter variations, namely 5 mm, 6 mm and 7 mm, the results of the study showed that at the equivalent ratio condition (Φ) = 1, the combustor with an outlet diameter of 7 mm had the widest flame's range, the best flame's position, and the shape of the flame the most symetric between the two other combustors.

PRAKATA

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Penulis

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BAB 1. PENDAHULUAN

1.1 Latar Belakang

Jumlah penduduk yang terus bertambah dan meningkatnya laju pembangunan serta pola hidup masyarakat yang juga mengalami peningkatan mengakibatkan konsumsi energi di Indonesia terus meningkat dari tahun ke tahun. Peningkatan ini terjadi hampir pada semua sektor yang mencakup sektor industri, transportasi, komersial, rumah tangga, pembangkit listrik dan sektor lainnya. Dengan demikian sumber daya alam yang mampu menghasilkan energi semakin terkuras, karena sebagaian besar sumber energi berasal dari sumber daya yang tidak terbarukan, misalnya minyak bumi, gas dan batubara (Ariwibowo, 2013).

Meso-scale combustor atau pembakaran pada saluran ruang bakar dengan diameter sebesar 1-10 mm merupakan salah satu wujud pengembangan teknologi pemanfaatan bahan bakar fosil. Pembakaran ini memiliki potensi untuk menghasilkan energi panas yang dapat dimanfaatkan sebagai sumber pembangkit listrik skala mikro atau disebut *Micro Power Generator* (MPG). Komponen utama MPG adalah ruang bakar atau disebut *combustor*, dalam *combustor* tersebut berlangsung proses pembakaran skala meso (Maruta dan Ju, 2011).

Desain, dimensi dan jenis material *combustor* tentunya berpengaruh terhadap energi panas hasil proses pembakaran. Menurut Yang *et al*. (2002), penambahan saluran *sudden expansion* pada *combustor* dapat membantu pencampuran antara bahan bakar dan udara sebelum terjadi proses pembakaran, selain itu juga berguna untuk mengatur posisi nyala api. Sedangkan penelitian yang dilakukan Pradika *et al*. (2014), membuktikan bahwa konduktivitas termal dinding *combustor* sangat berpengaruh terhadap visualisasi nyala api dan rentang nyala api.

Nyala api juga dapat distabilkan dengan cara menambahkan *wire mesh* pada ruang bakar *combustor*. Hasil penelitian yang dilakukan oleh Mikami *et al*. (2012) menunjukkan bahwa *mesh* berperan sebagai pengumpul tetesan bahan bakar cair dan sebagai penahan api. Hal tersebut terjadi karena bahan bakar yang

melewati *wire mesh* langsung bereaksi dengan api sehingga menghasilkan kehilangan panas (*heat loss*) dan bentuk api yang asimetris untuk laju aliran bahan bakar yang relatif tinggi. *Wire mesh* dapat menjaga api tetap stabil tanpa pemanasan eksternal (Mikami *et al.*, 2012).

Merujuk dari penelitian sebelumnya yang telah dilakukan oleh Yang *et al.* (2002) dan Mikami *et al.* (2012), pada tugas akhir ini dilakukan penelitian dengan menggabungkan antar keduanya. Pengamatan dilakukan terhadap visualisasi nyala api pada proses pembakaran skala meso (*meso-scale combustor*) dengan tambahan *sudden expansion* dan *wire mesh* sebagai *Flame Holder*.

1.2 Rumusan Masalah

Rumusan masalah yang digunakan sebagai acuan dalam penulisan karya tulis ilmiah ini ialah bagaimana pengaruh variasi diameter out pada *meso-scale combustor* dengan *sudden expansion* dan *wire mesh* sebagai *flame holder* pada proses pembakaran dengan bahan bakar butana pada ruang bakar skala meso dimana karakteristik yang diamati adalah visualisasi nyala api dan grafik peta nyala api.

1.3 Batasan Masalah

Batasan masalah dalam penelitian ini adalah sebagai berikut:

a. Skala *combustor* yang digunakan adalah skala meso.
b. Besar diameter *inlet combustor* skala meso adalah 4 mm dan diameter *outlet* yang digunakan 5 mm, 6 mm dan 7 mm sebagai fungsi *sudden expansion*.
c. Wire Mesh yang digunakan yaitu Mesh 60 berbahan *stainless steel.*
d. Bahan bakar yang digunakan adalah gas Butana.
e. Oksidator yang digunakan adalah udara atmosfer.

1.4 Tujuan dan Manfaat

1.4.1 Tujuan Penelitian

Adapun tujuan penelitian ini adalah

a. Untuk mengetahui batas nyala api yang dihasilkan pada *meso-scale combustor* dengan *sudden expansion* dan *wire mesh* sebagai *flame holder*.
b. Untuk mengetahui warna api yang dihasilkan pada *meso-scale combustor* dengan *sudden expansion* dan *wire mesh* sebagai *flame holder*.
c. Untuk mengetahui posisi api yang dihasilkan pada *meso-scale combustor* dengan *sudden expansion* dan *wire mesh* sebagai *flame holder*.
d. Untuk mengetahui bentuk api yang dihasilkan pada *meso-scale combustor* dengan *sudden expansion* dan *wire mesh* sebagai *flame holder*.

1.4.2 Manfaat Penelitian

Adapun manfaat penelitian ini adalah

a. Mampu mengetahui batas nyala api yang dihasilkan pada *meso-scale combustor* dengan *sudden expansion* dan *wire mesh* sebagai *flame holder*.
b. Mampu mengetahui warna api pada *meso-scale combustor* dengan sudden *expansion* dan *wire mesh* sebagai *flame holder*.
c. Mampu mengetahui posisi api pada *meso-scale combustor* dengan *sudden expansion* dan *wire mesh* sebagai *flame holder*.
d. Mampu mengetahui bentuk api pada *meso-scale combustor* dengan *sudden expansion* dan *wire mesh* sebagai *flame holder*.

BAB 2. TINJAUAN PUSTAKA

2.1 Pengertian Pembakaran

Pembakaran merupakan suatu reaksi kimia antara campuran bahan bakar dengan udara yang menghasilkan energi panas dan menyebabkan temperatur menjadi lebih tinggi pada kondisi tertentu. Apabila campuran bahan bakar dan reaktan semakin ideal, maka temperatur juga semakin tinggi. Pembakaran akan terjadi apabila campuran bahan bakar dengan oksidator berupa udara dipicu oleh energi *thermal* yang lebih besar dari panas yang hilang ke lingkungan. Bahan bakar yang paling umum digunakan pada proses pembakaran biasanya berupa hidrokarbon (Fernandez dan Pello, 2002; Maruta, 2011).

Pada dasarnya, bahan bakar melepaskan panas ketika dioksidasi dan mengandung unsur-unsur karbon (C), hidrogen (H), oksigen (O_2), nitrogen (N), dan sulfur (S). Sementara oksidator merupakan segala substansi yang mengandung oksigen (misal udara) yang akan bereaksi terhadap bahan bakar. Oksigen yang dibutuhkan untuk proses pembakaran diperoleh dari udara kering, dimana udara kering terdiri dari 21% oksigen dan 78% nitrogen, maka reaksi stoikiometrik pembakaran hidrokarbon murni C_xH_y dapat ditulis dengan persamaan:

$$C_xH_y + (x + \frac{y}{4})\ O_2 + 3{,}76\ x + \frac{y}{4}\ N_2 \rightarrow xCO_2 + \frac{y}{2}\ HO_2 + 3{,}76\ (x + \frac{y}{4})\ N_2 \quad (2.1)$$

Berdasarkan persamaan 2.1 diatas maka reaksi kimia pembakaran bahan bakar butana dan udara dapat ditulis sebagai berikut:

$$C_4H_{10(g)} + 6{,}5\ (O_2 + 3{,}76\ N_2)_{(g)} \rightarrow 4CO_{2(g)} + 5H_2O + 24{,}44\ N_2 \quad (2.2)$$

Persamaan reaksi pembakaran hidrokarbon disederhanakan untuk memastikan bahwa proses pembakaran dengan rasio ekivalen yang tepat dari udara cukup sulit untuk menciptakan pembakaran yang sempurna. Hasil

persamaan CO_2 dan H_2O tidak akan terjadi jika pembakaran yang terjadi adalah pembakaran tidak sempurna, akan tetapi terbentuk hasil oksidasi CO, CO_2 dan H_2O (Mahandri, 2010).

Tujuan dari pembakaran yang sempurna adalah untuk melepaskan seluruh panas yang terdapat dalam bahan bakar. Hal ini dilakukan dengan cara melakukan pengontrolan terhadap beberapa hal, yaitu:

a. Pengontrolan terhadap temperatur, dikarenakan temperatur yang digunakan dalam pembakaran yang baik harus cukup tinggi sehingga dapat menyebabkan terjadinya reaksi kimia.
b. Pengontrolan terhadap turbulensi. Dikarenakan turbulensi yang tinggi menyebabkan terjadinya pencampuran yang baik antara bahan bakar dan pengoksidasi.
c. Pengontrolan terhadap waktu yang cukup agar input panas dapat terserap oleh reaktan sehingga berlangsung proses termokimia.

2.1.1 Klasifikasi Pembakaran Berdasarkan Pencampuran Bahan Bakar

Pada dasarnya pembakaran diklasifikasikan menjadi dua seperti yang akan dijelaskan dibawah ini.

a. Pembakaran Difusi

   Pembakaran difusi merupakan proses pembakaran dimana bahan bakar dan udara sebagai pengoksida tidak bercampur secara mekanik, melainkan dibiarkan bercampur secara alami melalui proses difusi dalam ruang bakar/proses pembakaran (Wardana, 2008). Contoh dari *non premix* ialah korek api.

b. Pembakaran *Premixed*

   Pembakaran secara *premixed* merupakan pembakaran dimana bahan bakar dan udara dicampur terlebih dahulu secara mekanik sebelum terjadi pembakaran (Wardana, 2008). Pada penelitian ini digunakan sebuah alat pencampur bahan bakar (*mixer*). Pembakaran secara *premixed* ini membutuhkan perbandingan antara udara dan bahan bakar (AFR) dalam jumlah tertentu. Api yang ditimbulkan oleh pembakaran *premixed* sangatlah besar, karena disebabkan

adanya 2 api, yaitu api *premixed* sendiri dan terdapat juga api difusi. Kelemahan api *premixed* ini sering terjadi *flashback* yang mana api akan merambat ke dalam ruang pencampuran mekanik yang menyebabkan kebakaran, sehingga tipe api ini rawan terjadi kebakaran dan apabila terjadi kebakaran pada api tipe ini lebih susah untuk di padamkan (Fitriansyah, 2017).

2.1.2 Pembakaran Skala Meso

Pembakaran pada ruang mikro dan meso menjadi objek penelitian yang sangat menarik untuk diaplikasikan pada *micro-power generation*, *micro-propulsion*, dan *micro electro-mechanical system* (MEMS). *Micro combustor* adalah pembakaran bahan bakar pada skala mikro dengan dua jenis ukuran, yaitu *micro-scale* dengan besar skala kurang dari 1 mm sedangkan *meso-scale* dengan besar skala lebih dari 1 mm. Proses pembakaran mempunyai skala dimana masih banyak masyarakat yang belum mengetahui definisi dari pembakaran skala makro, meso dan mikro. Maruta dan Ju (2011) mengemukakan bahwa salah satu pembanding adalah dengan mengetahui ukuran diameter dalam combustor pada proses pembakaran tersebut. Pada skala meso ukuran fisik dari diameter dalam combustor antara 1 mm – 10mm.

Syarat ukuran *micro-scale combustor* itu sendiri yaitu harus lebih kecil dari 1 x 10-3m. Syarat *meso-scale combustor* yang digunakan untuk pembakaran ukurannya lebih dari 1 mm tetapi tetap memiliki ciri-ciri karateristik dari *micro-scale combustor* untuk skala mikro ukuran fisik diameter dalam *combustor* dibawah 1 mm. Perbedaan antara *meso-scale combustor* dan *micro-scale combustor* dapat kita lihat pada tabel dibawah ini (Maruta, 2011).

Tabel 2.1 Klasifikasi jenis pembakaran

Definisi berdasarkan	Rezim pembakaran	Skala panjang (diameter *combustor*)	Contoh	Aplikasi
Panjang fisik	Skala meso	1-10 mm	Mesin rotary (UCB)	Daya MEMS
	Skala mikro	1-1000 μm	Mikro reaktor (UIUC)	*Thruster*
Diameter *flame quenching*	Skala meso	Diameter *quenching* (equilibrium)	*Swiss-roll* kombustor (USC)	Pembangkit listrik
	Skala mikro	Diameter *quenching* ~*mean-free path* (non equilibrium)	Sel bahan bakar reaktor nano-partikel	Konversi energ
Skala Perangkat	Skala mikro	Lebih kecil dari ukuran mesin konvensional	*Microthrusters* (PSU), mikroturbin gas (MIT)	Mikro-satelit, mikro-pesawat

(Sumber: Maruta dan Ju, 2011).

Combustor terdiri dari dua komponen yaitu komponen *input* dan komponen *output* dimana kedua komponen tersebut disambungkan menggunakan lem tahan panas, selain penggunaan lem tahan panas terdapat beberapa penelitian yang menyambungkan dua komponen *combustor* menggunakan seal tape. Tujuan penggunaan seal tape yaitu agar memudahkan peneliti dalam bongkar pasang *input* dan *output combustor*. Selain memudahkan bongkar pasang komponen *combustor*, seal tape juga berperan mencegah kebocoran fluida gas diantara kedua sambungan.

Beberapa material yang sudah digunakan pada penelitian dapat dilihat pada tabel berikut

Tabel 2.2 Material *combustor*

Penulis	**Material *combustor***
Zamashchikov	Stainless steel
	Keramik
	Kuarsa
Mellish *et al.*	Stainless steel
	Alumina
	Kuarsa
Miesse *et al.*	Stainless steel
	Alumina
	Kuarsa
	Cordierite
Prakash *et al.*	Alumina
Maruta *et al.*	Kuarsa
Fan *et al.*	Kuarsa
Boyarko *et al.*	Platinum
Yang *et al.*	Silikon karbida dilapisi dengan platinum

(Sumber: Chou *et al.*, 2010).

Combustor dengan bahan kaca tahan panas sering digunakan beberapa peneliti karena strukturnya yang transparan serta sifat mekanisnya yang tahan terhadap panas memudahkan peneliti untuk mengamati pergerakan api dalam *combustor* dan juga dapat mengambil data berupa foto api.

2.2 Campuran Udara dan Bahan Bakar

Bahan bakar, udara, reaksi kimia dan kalor merupakan beberapa hal penting yang harus diperhatikan pada proses pembakaran. Selain itu perbandingan campuran bahan bakar dan udara juga penting untuk diperhatikan guna

menunjang hasil pembakaran yang sempurna. Metode yang digunakan untuk menghitung rasio campuran bahan bakar dan udara antara lain AFR (*Air Fuel Ratio*) dan Rasio Ekuivalen (ϕ).

2.2.1 *Air Fuel Ratio* (AFR)

Metode perhitungan rasio campuran bahan bakar dan udara ini merupakan metode yang sering digunakan dalam mendefinisikan suatu campuran dan merupakan perbandingan antara massa dari udara dengan bahan bakar pada titik tinjau tertentu. Menurut Mahandari dan Kartika (2010), Secara simbolis AFR dapat dihitung melalui persamaan berikut:

$$\text{AFR} = \frac{ma}{mf} = \frac{Ma\ Na}{Mf\ Nf} \tag{2.3}$$

Keterangan

$\dot{m}_a$ = Laju massa udara (kg/detik)

$\dot{m}_f$ = Laju massa bahan bakar (kg/detik)

Mα = Massa molar udara (g/mol)

Nf = Jumlah mol udara (mol)

Mf = Massa molar bahan bakar (g/mol)

Nα = jumlah mol udara bahan bakar (mol)

Nilai AFR aktual yang lebih besar dari nilai AFR stoikiometrik mengakibatkan adanya udara yang jumlahnya lebih banyak daripada yang dibutuhkan sistem dalam proses pembakaran dan dikatakan miskin bahan bakar, dan jika nilai aktual lebih kecil dari AFR stoikiometrik maka tidak cukup terdapat udara pada sistem dan dikatakan kaya bahan bakar (Taufiq, 2008).

2.2.2 Rasio Ekuivalen

Farizkaraja *et al*. (2014) mengatakan bahwa rasio ekuivalen merupakan rasio dari rasio aktual bahan bakar dan udara terhadap rasio bahan bakar dan udara untuk pembakaran dengan jumlah udara teoritis. Rasio ekuivalen dapat dirumuskan sebagai berikut :

$$\Phi = \frac{(\boldsymbol{AFR})\boldsymbol{s}}{(\boldsymbol{AFR})\boldsymbol{a}} \quad (2.4)$$

Keterangan

Φ = Rasio ekuivalen

(AFR)s = Rasio udara dan bahan bakar dalam kondisi stokiometrik

(AFR)a = Rasio udara dan bahan bakar dalam kondisi aktual

Berdasarkan nilai rasio, apabila nilai Φ > 1 maka mengindikasikan bahwa terdapat kelebihan bahan bakar dan campurannya atau sering juga disebut sebgai campuran yang kaya akan bahan bakar (*fuel-rich mixture*). Sedangkan nilai Φ < 1 menunjukkan bahwa campuran miskin bahan bakar (*fuel-lean mixture*), selain itu apabila nilai Φ = 1 berarti menyatakan bahwa campuran bersifat sempurna atau disebut campuran stokiometrik.

Menurut Farizkaraja *et al*. (2014), perbedaan warna api dapat terjadi karena adanya perbedaan perbandingan campuran udara dan bahan bakar. Perbedaan perbandingan campuran dapat diketahui dengan membandingkan *equivalent ratio* udara-bahan bakar (Φ), dimana jika Φ < 1 maka akan terbentuk api dengan campuran miskin, ketika Φ = 1 terbentuk api stoikiometri dan saat Φ > 1 akan terbentuk api dengan campuran kaya.

2.3 Batas Nyala Api

Bahan bakar yang bercampur dengan oksidator dengan penambahan energi luar dapat mengawali terjadinya reaksi pembakaran. Terbentuknya api dalam proses pembakaran merupakan hasil dari pelepasan energi panas pada reaksi pembakaran. Terdapat kisaran campuran antara bahan bakar dan oksidator yang dapat menyebabkan terbentuknya nyala api, kisaran tersebut dikenal sebagai *lower and upper flammability limits* (Taufiq, 2008).

Daerah batas atas stabilitas nyala api disebut dengan *upper flammability limit* sedangkan daerah batas bawah stabilitas nyala api disebut dengan *lower flammability limit*. Dua parameter ini dapat menunjukan sifat dari suatu reaksi

pembakaran yaitu reaksi pembakaran yang memiliki stabilitas nyala api tinggi atau stabilitas nyala api rendah. *Flammability limit* juga dapat digunakan untuk mengatur komposisi perbandingan antara bahan bakar dan udara sehingga menghasilkan reaksi pembakaran yang dapat terjaga kestabilannya (Farizka, 2014)

Api akan stabil apabila konsentrasi campuran bahan bakar dengan oksidator berada pada komposisi yang tepat. Komposisi yang tepat terjadi pada saat kecepatan reaktan (Vu) sama dengan kecepatan rambat nyala api (SL), (Vu = SL). *Flashback* terjadi ketika kecepatan pembakaran lebih besar daripada kecepatan campuran udara dan bahan bakar, sehingga nyala api masuk menuju ke dalam ruang *mixer*. *Lift-off* adalah kondisi dimana nyala api tidak menyentuh permukaan mulut tabung pembakar, tetapi stabil pada jarak dari ujung tabung pembakar. Kecepatan reaktan yang rendah membuat posisi api akan mendekati mulut tabung pembakaran dan menyentuhnya, apabila kecepatan reaktan ditingkatkan maka posisi hulu api sudah tidak lagi menempel melainkan menjauh dari mulut *combustor*. *Combustor* dengan densitas tinggi bisa didapatkan dengan kecepatan pembakaran yang lebih tinggi, sehingga nyala api tetap stabil pada kecepatan reaktan yang tinggi dan memperluas daerah reaksi dalam *combustor* (Sari, 2015).

2.4 Sifat Nyala Api (Rezim Api)

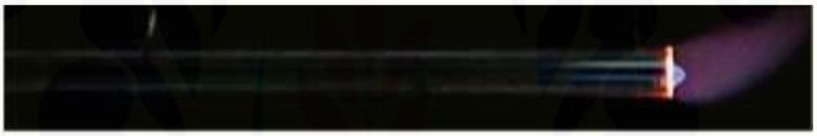
Api dalam reaksi pembakaran memiliki stabilitas nyala yang banyak dipengaruhi oleh besarnya komposisi campuran bahan bakar dan udara. Baigmohammadi *et al*. (2015) melakukan penelitian dengan hasil nyala api dapat dikategorikan menjadi tujuh sebagai akibat dari variasi geometri, bilangan reynold dan rasio ekuivalen antara lain *Blow-out, Marginal, Stationary (stable), Repetitive Extinction and Re-ignition (RERI), stationary (stable)-flashback, RERI-flashback* dan *Flashback*. Proses terjadinya rezim api tersebut akan dijelaskan sebagai berikut:

a. *Blow out*: Api yang terbentuk diluar *combustor* karena kecepatan aliran reaktif lebih tinggi dibandingkan dengan kecepatan nyala, sehingga api terdorong

keluar *combustor*. Api ini terjadi pada rasio ekuivalen yang tinggi pada bilangan reynolds konstan.

Gambar 2.1 Rezim api *Blow-out*
(Sumber: Baigmohammadi *et al*., 2015)

b. *Marginal*: Api yang terbentuk di saluran luar *combustor*, ciri utama adanya distorsi kecil pada api ini yang membuat nyala api tidak stabil. Nyala api *marginal* dipengaruhi oleh penurunan rasio ekuivalensi dari nilai bahan bakar kaya mendekati nilai stoikiometri. Api ini akan teramati jika menurunkan rasio ekuivalen dari kondisi nyala api *blow-out*.



Gambar 2.2 Rezim api *Marginal*
(Sumber: Baigmohammadi *et al*., 2015)

c. *Stationary* (stabil): Nyala api *stationary*, bagian depan api memiliki posisi yang stabil dalam *combustor* disebabkan penurunan rasio ekuivalen secara berkelanjutan sampai bahan bakar dan oksidator tercampur dengan ideal dimana nilai kecepatan reaktan dan kecepatan nyala api seimbang. Api stabil terbagi atas tiga kategori yaitu:
   1). Simetri
   2). Asimetri (dapat terbentuk miring keatas dan kebawah) dipengaruhi oleh *preheating zone* dan efek buoyancy.

Gambar 2.3 Rezim api *stationary* (asimetri)
(Sumber: Baigmohammadi *et al*., 2015)

3). *Spinning flame* terdiri dari api simetris atas dan bawah yang telah kehilangan stabilitas dan kemudian mulai berputar cepat di sekitar sumbu *combustor.* Interaksi antara bagian depan api, dinding *combustor*, pergerakan fluida sekitar *step,* dan nilai laju aliran yang mempengaruhi terjadinya nyala api *spinning*.

Gambar 2.4 Rezim api *spinning*
(Sumber: Baigmohammadi *et al*., 2015)

d. *Repetitive extinction and re-ignition* (RERI): Api depan tidak bisa mencapai posisi yang tetap dalam *combustor*, bagian api benar-benar tidak stabil dan terbentang sepanjang combustor secara berkala. Nyala campuran pada *combustor* luar akan padam oleh perambatannya menuju ujung reaktor disebabkan oleh kerugian panas yang luas pada dinding *combustor* dan campuran yang masuk. Setelah api padam pada ujung reaktor, campuran segar bisa dinyalakan lagi jika dinding reaktor dipanaskan atau ditambahkan sumber pengapian eksternal. Api ini terbentuk jika menurunkan rasio ekuivalen dari titik stabil sehingga meningkatkan kecepatan persebaran api.
Forced-RERI: RERI yang terbentuk dengan bantuan sumber pengapian (obor).
Self-RERI: Campuran reaktif yang padam dapat dinyalakan lagi dengan pemanasan pada dinding reaktor.

Gambar 2.5 Rezim api RERI
(Sumber: Baigmohammadi *et al*., 2015)

e. *Stationary* (stabil) – *Flashback*: rezim api ini terdiri dari api stabil dan *flashback* dimana rezim api yang awalnya stabil berubah menjadi *flashback* secara bertahap.
f. RERI-*Flashback*: Rezim api ini terdiri dari RERI dan *flashback* dimana Rezim api RERI berubah menjadi *flashback* secara bertahap.
g. *Flashback*: Rezim api ini terjadi ketika kecepatan perambatan api lebih tinggi dari kecepatan aliran. Api ini terjadi jika menurunkan rasio ekuivalen dari campuran kaya atau menaikkan rasio ekuivalen dari campuran miskin sampai titik kritis.

Gambar 2.6 Rezim api *flashback*
(Sumber: Baigmohammadi *et al*., 2015)

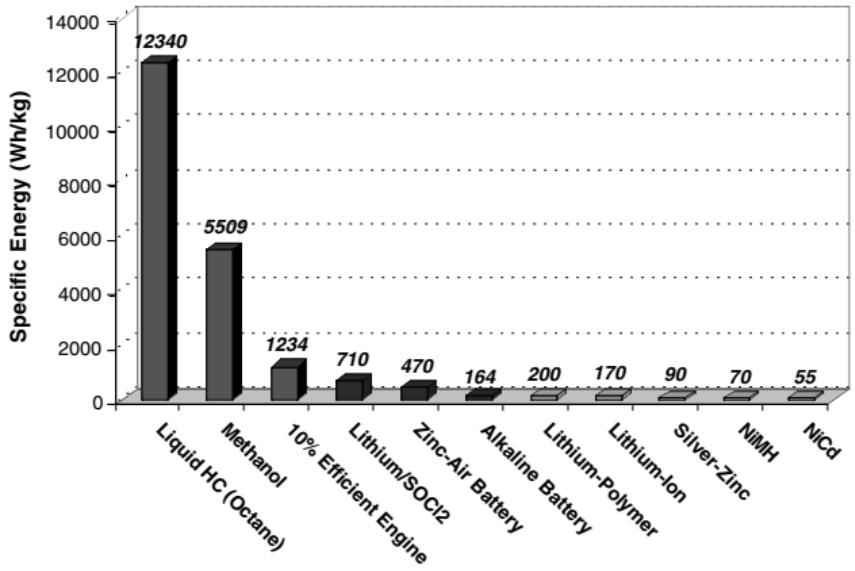
2.5 *Micro Power Generator*

Produksi miniaturisasi peralatan membuka peluang baru untuk pembakaran khususnya di bidang pembangkit listrik mikro karena dibutuhkan perangkat catu daya dengan energi spesifik yang tinggi, ukuran kecil, ringan, dan tahan lama (Fernandez-Pello dan Carlos, 2002).

Toriyama *et al*. (2007) menyatakan konsep awal *Micro electro mechanical system* membuat munculnya beberapa konsep miniaturisasi peralatan seperti

micro gas turbine, micro steam turbine dan *micro internal combustion* yang dikembangkan untuk menyediakan sumber daya listrik. Strategi dalam mengembangkan peralatan ini mempunyai tujuan untuk menghasilkan tenaga yang bersumber dari panas.

Micro power generator atau pembangkit listrik mikro memanfaatkan pembakaran dari bahan bakar hidrokarbon cair. Potensi keuntungan menggunakan pembakaran hidrokarbon cair untuk menghasilkan energi dapat dilihat pada gambar 2.7. Hidrokarbon cair dapat menghasilkan energi tinggi (biasanya 45 MJ/kg) yang transportable dan cukup aman (Weinberg, 1974).



Gambar 2.7 Spesifik energi iso-octane dan beberapa baterai
(Sumber: FernandezPello dan Carlos, 2002)

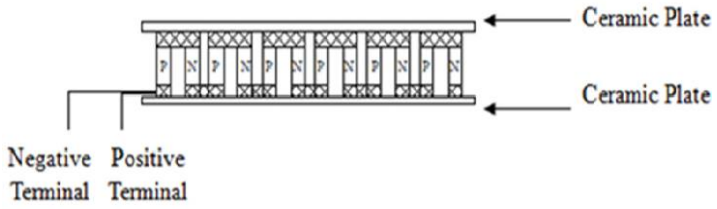
Meskipun *micro power generator* dengan menggunakan bidang pembakaran masih baru, beberapa proyek pengembangannya *micro-scale power generator* sudah berjalan meliputi:

a. *Micro-thermoelectric*

Thermoelectric memanfaatkan efek *Seebeck*, Peltier dan Thomson yang pertama kali diamati antara tahun 1821 dan 1851 (Nolas *et al.*, 2001). Perangkat *thermoelectric* praktis muncul pada tahun 1960-an dan telah

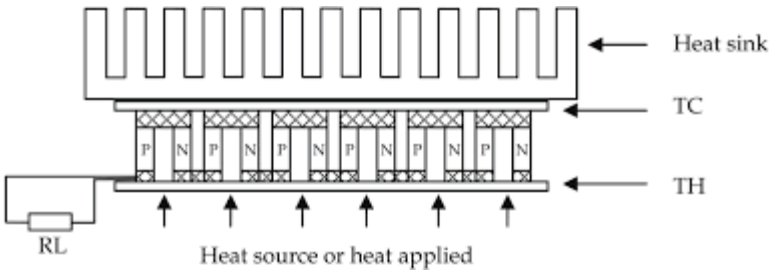
berkembang secara signifikan sejak itu dengan sejumlah produsen sekarang memasarkan modul *thermoelectric* untuk pendingin, pemanas dan aplikasi pembangkit listrik. Pembangkit listrik thermoelectric terutama dipengaruhi oleh efek Seebeck, dengan pendingin *thermoelectric* dan pemanasan dipengaruhi secara dominan oleh efek peltier. Efek Thompson tidak memiliki pengaruh besar meskipun dimasukkan dalam rincian perhitungan (Rowe, 2006). Aplikasi pembangkit listrik modul *thermoelectric* biasanya menghasilkan sejumlah kecil daya listrik dalam μW atau mW jika perbedaan suhu dipertahankan antara dua terminal dari modul *thermoelectric*. Modul *thermoelectric* dapat beroperasi sebagai pemanasan atau pendinginan dari suatu obyek yang terhubung ke satu sisi dari modul *thermoelectric* jika arus DC diterapkan terminal input modul.

Modul *thermoelectric* standar yang dibangun dari termo-elemen tipe P dan tipe N, terhubung secara seri untuk yang elektrik dan secara paralel untuk thermal. Setiap pasangan dibangun dari dua pellet dari bahan semi konduktor biasanya terbuat dari Bismuth Telluride. Kedua pellet secara fisik terhubung bersama-sama di satu sisi, biasanya dengan strip kecil tembaga, dan ditempatkan di antara dua plat keramik. plat keramik melakukan dua fungsi; mereka bertindak sebagai dasar di mana untuk mengikat termo-elemen; dan juga mengisolasi listrik termoelemen (Riffat dan Ma, 2003). Modul *thermoelectric* akan ditunjukkan pada Gambar 2.8.



Gambar 2.8 Modul *thermoelectric* sebagai pembangkit listrik
(Sumber: Gould dan Shammas, 2009)

Satu sisi modul terpasang dengan sumber panas dan disebut sebagai sisi ‘panas’ atau ‘TH’. Sisi lain dari modul biasanya melekat pada *heat sink* dan disebut sisi ‘dingin’ atau ‘TC’. *Heat sink* digunakan untuk membuat perbedaan suhu antara sisi dingin dan panas dari modul. Jika beban resistif (RL) terhubung di terminal output modul, daya listrik akan dihasilkan dalam beban resistif ketika perbedaan suhu ada antara sisi panas dan dingin dari modul karena efek Seebeck

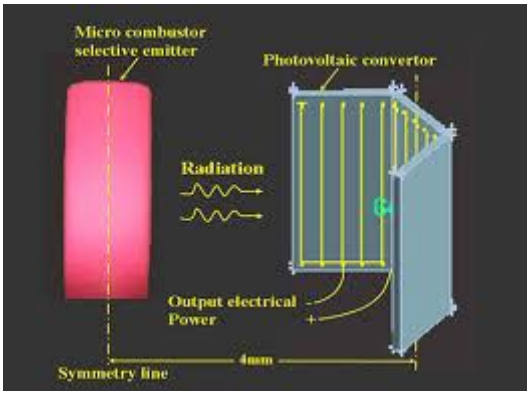


Gambar 2.9 Modul *thermoelectric* sebagai pembangkit listrik
(Sumber: Gould dan Shammas, 2009)

Thermoelectric dalam skala mikro memiliki beberapa keunggulan seperti masa pemakaian alat yang relatif panjang tanpa dibutuhkan prosedur perbaikan alat untuk 10 tahun, mudah mengumpulkan energi inputan dari berbagai macam sumber panas, dan dapat menghasilkan listrik dengan perbedaan temperatur antara kedua sisi logam *thermoelectric* yang rendah.

b. *Micro-thermophotovoltaic (TPV)*

Micro thermophotovoltaic merupakan tipe perangkat yang mengkonversi energi secara langsung, dimana menggunakan sel *photovoltaic* untuk mengubah radiasi panas dari pembakaran bahan bakar menjadi listrik. Pembuatan dan perakitan yang relatif mudah sehingga dapat menjadi lebih umum untuk dijadikan sebagai perangkat elektronik mikro secara komersial. Sistem ini terutama terdiri dari sumber panas, emitor dan sel PV. Skema sistem *micro thermophotovoltaic* ditunjukan pada Gambar 2.10.



Gambar 2.10 Skema sistem *micro*-TPV
(Sumber: Yang *et al.*, 2003)

Micro thermophotovoltaic terdiri atas sumber panas, selektif emitor dan sel *photovoltaic*. Sumber panas didapatkan dari pembakaran bahan bakar dan oksidator, selektif emitor dimana dalam hal ini adalah dinding *combustor* yang berfungsi mengkonversi panas dari pembakaran menjadi radiasi yang selanjutnya radiasi panas tersebut dikonversikan menjadi listrik oleh sel *photovoltaic* (Yang *et al.*, 2002).

2.6 Aliran Fluida

Zat yang tersebar di alam dibedakan menjadi dalam tiga fase, yaitu fase padat, fase cair dan fase gas. Fase cair dan gas memiliki karakter tidak mempertahankan suatu bentuk yang tetap, maka keduanya memiliki kemampuan untuk mengalir, dengan demikian keduanya disebut dengan fluida (Olson dan Steven, 1993).

Fluida adalah zat yang dapat mengalir, yang terdiri dari zat cair dan gas. Ada fluida yang tak mengalir dan ada fluida yang mengalir. Ilmu yang mempelajari fluida yang tak mengalir disebut statika fluida dan ilmu yang mempelajari fluida yang mengalir disebut dinamika fluida (Helmizar, 2011).

2.6.1 Fluida Statis dan Fluida Dinamis

a. Fluida Statis

Fluida statis adalah fluida yang tidak bergerak atau dalam keadaan diam, misalnya air dalam gelas. Fluida statis mempelajari hukum-hukum dasar antara

lain mengenai tekanan hidrostatis, hukum Archimedes, tegangan permukaan dan kapilaritas (Rosyid, 2014).

b. Fluida Dinamis

Fluida dinamis atau dinamika fluida adalah subdisiplin dari mekanika yang mempelajari tentang pergerakan dari fluida, terutama pada fluida cairan dan gas. Penyelesaian dari masalah dinamika fluida biasanya melibatkan perhitungan dari sifat fluida seperti kecepatan, kepadatan, tekanan dan suhu sebagai fungsi ruang dan waktu. Disiplin ini memiliki beberapa subdisiplin termasuk aerodinamika (penelitian gas) dan hidrodinamika (penelitian cairan). Dinamika fluida memiliki aplikasi yang luas, contohnya adalah pada saat dinamika fluida digunakan dalam menghitung gaya, hambatan dan momen pada pesawat terbang, *mass flow rate* dari petroleum dalam jalur pipa, perkiraan pola cuaca dan bahkan digunakan pada teknik lalu lintas, dimana lalu lintas diperlakukan sebagai fluida yang berkelanjutan (Rosyid, 2014).

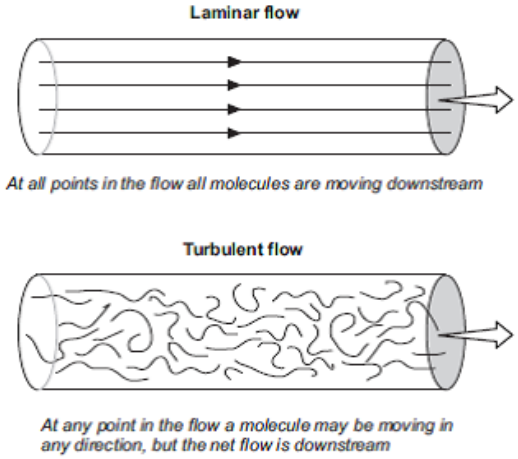
2.6.2 Aliran Laminer dan Turbulen

Aliran fluida dapat dibedakan menjadi dua tipe yaitu aliran laminar dan aliran turbulen. Aliran dikatakan laminar jika partikel-partikel fluida yang bergerak teratur mengikuti lintasan yang sejajar pipa dan bergerak dengan kecepatan sama. Aliran ini terjadi apabila kecepatan kecil dan kekentalan besar. Aliran disebut turbulen jika tiap partikel fluida bergerak mengikuti lintasan sembarang di sepanjang pipa dan hanya gerakan rata-rata saja yang mengikuti sumbu pipa. Aliran ini terjadi apabila kecepatan besar dan kekentalan zat cair kecil (Sularso dan Tahara, 1983).

Pengaruh kekentalan sangat besar sehingga dapat meredam gangguan yang dapat menyebabkan aliran menjadi turbulen. Berkurangnya kekentalan dan bertambahnya kecepatan aliran maka daya redam terhadap gangguan akan berkurang, yang sampai pada batas tertentu akan menyebabkan terjadinya perubahan aliran dari laminar menjadi turbulen (Sularso dan Tahara, 1983).

Fluida laminar disebut juga dengan fluida viskos atau fluida garis alir (*streamline*). Kata laminar berasal dari bahasa latin *lamina*, yang berarti lapisan

atau plat tipis, sehingga aliran laminar berarti aliran yang berlapis-lapis. Lapisan-lapisan fluida akan saling bertindihan satu sama lain tanpa bersilangan. Gerakan partikel fluida tidak lagi sejajar, mulai saling bersilang satu sama lain sehingga terbentuk pusaran di dalam fluida, aliran yang seperti ini disebut dengan aliran turbulen (Bruce *et al*., 2004).



Gambar 2.11 Aliran laminer dan turbulen
(Sumber: Boggs, 2006)

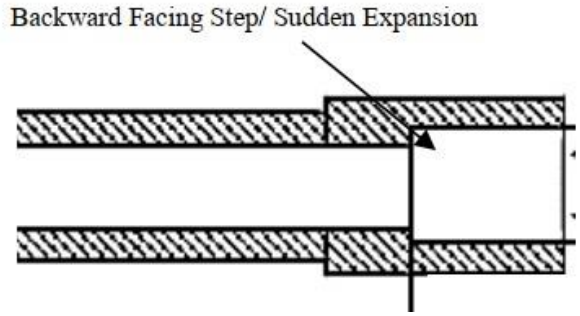
2.7 *Flame Holder*

Flame holder (penahan api) merupakan komponen yang dirancang untuk membantu menjaga pembakaran yang berkelanjutan pada *scramjet engine*. Flame holder dapat menciptakan pusaran arus atau turbulensi pada bahan bakar yang memiliki kecepatan rendah sehingga dapat mencegah api *blow out*. Pada penelitian ini *flame holder* digunakan untuk mengontrol posisi api pada ruang bakar.

2.7.1 *Sudden Expansion* sebagai *Flame Holder*

Sudden expansion merupakan kondisi dimana *combustor* memiliki perbandingan luas permukaan terhadap volume yang tinggi. Hal tersebut diaplikasikan dengan cara menciptakan perbedaan antara diameter *inlet* dan diameter *outlet* pada *combustor* sehingga akan meningkatkan *heat loss*¸ yang mana hal ini dapat menyebabkan pembakaran yang tidak stabil dan dapat

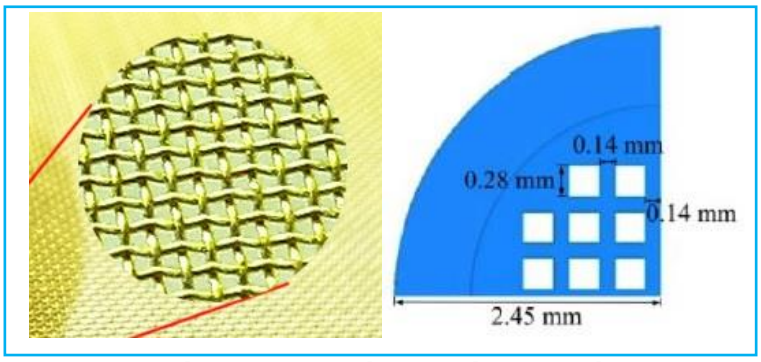
memadamkan api. Menurut Yang *et al.* (2002), *backward facing step* atau *sudden expansion* pada *combustor* mampu mensirkulasikan pencampuran reaktan pada pembakaran di area dekat dinding *combustor*, sehingga meningkatkan proses pencampuran pembakaran di sekitar tepi tabung *combustor*, serta membuat pembakaran lebih komplit dan stabil. Penelitiannya menunjukkan bahwa *meso-scale combustor* dengan *backward facing step* sangat efektif untuk aplikasi konversi energi secara langsung dimana temperatur panas dinding tersebut yang diperlukan sebagai sumber panas, seperti pada aplikasi *Thermoelectric Power Generator* (Sari, 2015).



Gambar 2.12 *Sudden expansion*
(Sumber: Li *et al*., 2005)

2.7.2 *Wire Mesh* sebagai *Flame Holder*

Wire mesh ialah rangkaian kawat yang tersusun secara berpotongan hingga membentuk baris dan kolom. Pada umumnya *wire mesh* terbuat dari bahan *stainless steel,* aluminium, dan paduan logam lainnya. *Stainless steel wire mesh* memiliki karakteristik alami yang istimewa seperti daya tahan kuat dan umur pemakaian yang tahan lama. Material kawat yang dipakai merupakan kawat yang tahan terhadap karat, tahan asam, tahan korosi dan juga tahan terhadap serangan zat kimia, sehingga ketika digunakan nantinya akan memiliki daya tahan yang sangat baik terhadap semua unsur penyebab korosi (PT. Sinar Kharisma Mitra Agung, 2019).



Gambar 2.12 *Stainless steel wiremesh 60*

(Sumber: Munir dan Mikami, 2015)

Wire mesh banyak digunakan pada proses penghalusan suatu bahan padatan, yang sebelum dihaluskan memiliki ukuran yang lebih besar. Setiap *mesh* memiliki spesifikasi yang berbeda. Pengertian ukuran *mesh* adalah ukuran dari jumlah lubang suatu jaring atau kasa pada luasan 1 *inch*^{2} jaring/kasa yang bisa dilalui oleh material padat. Angka 60 menunjukan bahwa dalam setiap 1 inch^2 *wire mesh* memiliki sebanyak 60 lubang, demikian seterusnya. Berikut dapat dilihat pada tabel 2.3 mengenai konversi ayakan dari *mesh* ke mikron.

Tabel 2.3 Daftar konversi ayakan *mesh* ke mikron

U.S Mesh	Inch	Microns	Milimeter
3	0,2650	6730	6,730
4	0,1870	4760	4,760
5	0,1570	4000	4,000
6	0,1320	3360	3,360
8	0,0937	2380	2,380
10	0,0787	2000	2,000
12	0,0661	1680	1,680
14	0,0555	1410	1,410
16	0,0469	1190	1,190
18	0,0394	1000	1,000
20	0,331	841	0,841

25	0,0280	707	0,707
30	0,0232	595	0,595
35	0,0197	500	0,500
40	0,0165	400	0,400
45	1,0138	354	0,354
50	0,0117	297	0,297
60	0,0098	250	0,250
70	0,0070	210	0,210
80	0,0059	177	0,177
100	0,0049	149	0,149
120	0,0041	125	0,125
140	0,0035	105	0,105
170	0,0029	8	0,88
200	0,0029	74	0,074
230	0,0024	63	0,063
270	0,0021	53	0,053
325	0,0017	44	0,044
400	0,0015	37	0,037
625	0,0008	20	0,020
1250	0,0004	10	0,010
2500	0,0002	5	0,005

(Sumber: Skylighter)

Menurut Mikami (2012), *wire mesh* berfungsi sebagai penyetabil nyala api didekat *wire mesh* di dalam tabung bahkan diluar batas kilas balik (*flashback*) tanpa menggunakan pemanasan eksternal. Jenis stabilitas nyala api ini disebabkan oleh interaksi dinding api, yaitu resirkulasi panas dan gas yang terbakar melalui konduksi panas di dinding dan *mesh*. *Mesh* meningkatkan perpindahan panas dari dinding yang dipanaskan ke gas yang tidak terbakar.

Dalam rentang kecepatan aliran tertentu, nyala api merambat dengan kecepatan dan padam yang relatif tinggi di dekat *mesh*. Namun nyala api dapat

distabilkan di dekat *mesh* jika kondisinya secara bertahap bergeser dengan nyala api yang stabil. Oleh karena itu mesh dapat bertindak sebagai *inhibitor* pembakaran atau penambah (peranti tambahan).

2.8 Penelitian Sebelumya

Penelitian tentang *meso-scale combustion* sudah banyak dilakukan dengan menggunakan beberapa jenis bahan bakar gas seperti hidrogen, methane, propane atau butane. Yang *et al*. (2002) melakukan penelitian dengan mambandingkan *combustor* dengan dan tanpa *backward facing step*. Hasil dari penelitian tersebut menunjukkan bahwa *sudden expansion* memberikan solusi sederhana namun efektif untuk meningkatkan pencampuran bahan bakar dan udara. Saluran tersebut berguna untuk mengontrol posisi nyala api pada ruang bakar.

Sadeghi *et al*. (2014) mengatakan untuk mendapatkan nyala api yang stabil kecepatan reaktan harus diimbangi dengan kecepatan nyala api. Kecepatan nyala api meningkat ketika rasio ekuivalen mendekati nilai stoikiometri ($\phi = 1$).

Baighmohammadi *et al*. (2015) melakukan penelitian dengan memvariasikan geometri *combustor,* kecepatan aliran dan rasio ekuivalen bahan bakar metana dan oksigen sehingga didapatkan tujuh rezim api dalam *combustor* dengan *sudden expansion*. Rezim api tersebut antara lain *Blow out, Marginal, Stationary (stabil), Repetitive Extinction and re-ignition (RERI), RERI-flashback, Stationary-flashback* dan *Flashback*. Rezim api tersebut memiliki karakteristik pembakaran masing-masing seperti rezim api *stationary* (stabil) yang terdiri dari api simetris, asimetris dan *spinning flame*, dimana *spinning flame* merupakan api yang muncul membentuk huruf X dengan kondisi tertentu. Penurunan panjang reaktor memperluas kisaran operasional Reri dan rezim api stasioner dalam reaktor dengan diameter dalam 5 mm. Sebaliknya, penurunan panjang reaktor menekan kisaran operasional api dalam reaktor dengan diameter dalam 3 mm. Meningkatkan rasio ekuivalen pada bilangan reynolds konstan menurunkan *traveling speed* dan frekuinsi rezim api RERI. Meningkatkan panjang reaktor pada diameter dalam, rasio ekuivalen dan bilangan reynolds konstan dapat

meningkatkan *traveling speed* dan frekuensi rezim api RERI pada *combustor* skala meso.

Mikami *et al.* (2012) juga melakukan penelitian mengenai *meso-scale combustor tube type with wiremesh* 60. Hasil penelitiannya menunjukan bahwa nyala api dapat distabilkan di dekat *wire mesh* tanpa pemanasan eksternal. *Mesh* tunggal berperan sebagai pengumpul tetesan bahan bakar cair dan sebagai penahan api (*flame holder*). *Wire mesh* meningkatkan resirkulasi panas dari gas yang terbakar ke gas yang tidak terbakar, namun tetesan bahan bakar cair yang melewati *wire mesh* langsung bereaksi dengan api sehingga menghasilkan kehilangan panas (*heat loss*) dan bentuk api yang asimetris untuk laju aliran bahan bakar yang relatif tinggi. Daerah stabilitas nyala api (*Flammability limit*) dengan *wire mesh* ganda lebih besar dari *wire mesh* tunggal.

Wire mesh ganda digunakan atau berfungsi untuk menghindari reaksi langsung bahan bakar cair dengan api karena peran *wire mesh* sendiri yaitu pengumpul tetesan bahan bakar cair dan penahan api *(flame holder*) yang dipisahkan. Nyala api yang dihasilkan dengan *wire mesh* ganda lebih asimetris dibandingkan dengan *wire mesh* tunggal hal ini disebabkan karena bahan bakar cair tidak langsung bereaksi dengan api secara langsung melainkan ditahan oleh mesh pertama. Panas yang dibutuhkan untuk memanaskan tetesan bahan bakar cair yaitu panas yang hilang dari nyala api yang di timbulkan. Pembasahan dinding *combustor* akibat bahan bakar yang berbentuk cair mengakibatkan menyempitnya batas stabilitas api (*flammability limit*). *Flammability limit combustor* dengan *wire mesh* tunggal berbahan bakar cair lebih kecil dari pada menggunakan bahan bakar gas karena mesh tunggal hanya berperan sebagai pengumpul tetesan bahan bakar dan penahan api (*flame holder*) (Mikami *et al*., 2012).

Yuliati, (2014) mengatakan bahwa penggunaan bahan bakar gas menunjukan nyala api tunggal dapat distabilkan pada *down stream wire mesh* dan nyala api ganda hanya dapat distabilkan diantara *wire mesh* yang pertama dan kedua dengan *multiple fuel inlet*. Nyala api ganda tidak dapat distabilkan di zona yang berbeda pada masing-masing *down stream wire mesh* pertama dan kedua.

Flammability limit yang dihasilkan dengan *multiple inlet* lebih tinggi dari pada *single inlet*. Selanjutnya hasil penelitian penggunaan bahan bakar cair yaitu api dapat distabilkan dengan sistem suplai bahan bakar *electrospray*. Api dapat stabil dalam *combustor* hanya pada *equivalen ratio* lebih dari satu, hal ini disebabkan bahan bakar dan udara belum tercampur secara merata dan pada bagian tertentu terdapat sangat kaya bahan bakar, sehingga tidak dapat terbakar karena berada diluar batas *flammability limit*nya (Yuliati, 2014).

Sementara itu Munir dan Mikami (2015) melakukan penelitian dengan simulasi numerik tiga dimensi untuk menunjukkan pembakaran campuran propana-udara dalam tabung *meso scale* dengan *wire mesh stainless steel*. Model numerik yang disajikan pada hasil penelitiannya cukup mewakili pembakaran propana-udara dalam jenis pembakaran ini. Pada kecepatan masuk yang rendah nyala api yang stabil terletak didekat jaring kawat. Bahkan zona pra-panas nyala sudah kontak dengan *wire mesh*. Akibatnya perpindahan panas dari gas yang terbakar panas ke dinding ruang bakar dan udara sekitar diintensifkan. Pengurangan lebih lanjut dari kecepatan saluran masuk berpotensi menyebabkan pemadaman api.

Di sisi lain, kecepatan inlet yang cukup tinggi tetapi masih dalam batas ledakan sedikit menggeser nyala api stabil menjauh dari *wire mesh*. Zona pra-panas nyala tidak lagi bersentuhan dengan *wire mesh*. Dengan demikian dinding bagian dalam ruang bakar mendominasi peran resirkulasi panas dari gas panas yang terbakar ke bagian tengah *wire mesh* dan daerah gas yang tidak terbakar. Resirkulasi panas ini meningkatkan stabilitas nyala api di ruang bakar. Efek *wire mesh* pada batas semburan api juga diselidiki secara numerik. Dengan memiliki celah kecil antara dinding bagian dalam ruang bakar dan bagian tengah dari *wire mesh*, panas dari daerah gas yang terbakar tidak dapat ditransfer secara efisien dari dinding bagian dalam ke wilayah gas yang tidak terbakar. Akibatnya suhu di sekitar bagian tengah *wire mesh* berkurang. Sehingga batas ledakan berkurang secara signifikan (Munir dan Mikami, 2015).

2.9 Hipotesis

Berdasarkan beberapa penelitian sebelumnya yang berkaitan dengan topik *meso-scale combustor* dengan *wire mesh* berbahan bakar gas butana, pada karya tulis ilmiah ini penulis mencoba menysusun hipotesa bahwa dengan penambahan *wire mesh* pada *meso-scale combustor* diharapkan mengahasilkan nyala api yang stabil, sehingga dapat diperoleh sebuah *meso-scale combustor* dengan laju pembangkitan energi yang tinggi. Selain itu dilakukan variasi terhadap diameter *out* pada *meso-scale combustor,* dimana variasi yang digunakan pada diameter *out combustor* ialah 5 mm, 6 mm dan 7 mm. Semakin kecil diameter *out* pada *meso-scale combustor* maka daerah *flammability limit* yang terbentuk semakin sempit, serta visualisasi nyala api semakin redup. Dan apabila diameter out semakin besar, maka daerah *flammability limit* yang terbentuk semakin luas, lama waktu tinggal nyala api juga semakin lama serta visualisasi nyala api semakin biru terang yang artinya api tersebut memiliki temperatur yang lebih tinggi. Penggunaan bahan bakar butana dipilih karena butana memiliki keunggulan dari pada propana yaitu titik didih, titik leleh, titik nyala dan temperatur kritis yang lebih tinggi.

BAB 3. METODOLOGI PENELITIAN

3.1 Metode Penelitian

Metode pada penelitian yang digunakan ialah metode eksperimental, yaitu metode yang dilakukan dengan mengamati pengaruh variasi *outer diameter* pada *meso-scale combustor* dengan *wire mesh* dan *sudden expansion* sebagai *flame holder* terhadap karakteristik nyala api secara uji eksperimental.

3.2 Metode Pengolahan Data

Metode pengolahan data yang digunakan pada penelitian ini ialah metode kualitatif-kuantitatif. Dimana dilakukan reduksi data terlebih dahulu dengan cara pemilihan dan pemusatan perhatian untuk penyederhanaan data yang diperoleh sebelum dilakukan penyajian data. Selanjutnya dilakukan penarikan kesimpulan serta verifikasi dengan mencari makna dan menghubungkan data tersebut secara matematis.

3.3 Waktu dan Tempat Penelitian

Waktu pelaksanaan penelitian ini adalah pada bulan Februari 2020 sampai dengan bulan Maret 2020. Penelitian ini dilaksanakan di Laboratorium Konversi Energi Fakultas Teknik Universitas Jember.

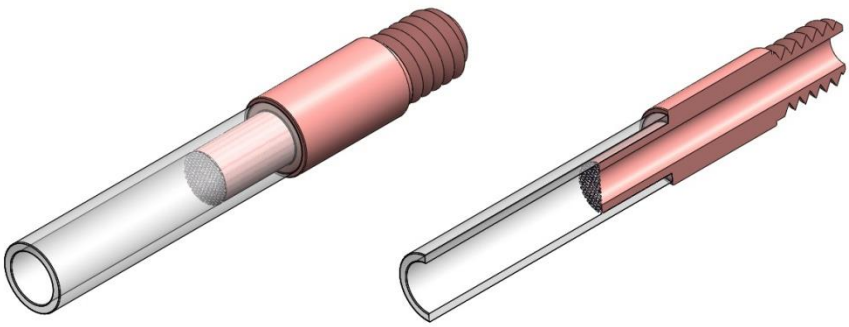
3.4 Alat dan Bahan

3.4.1 Alat

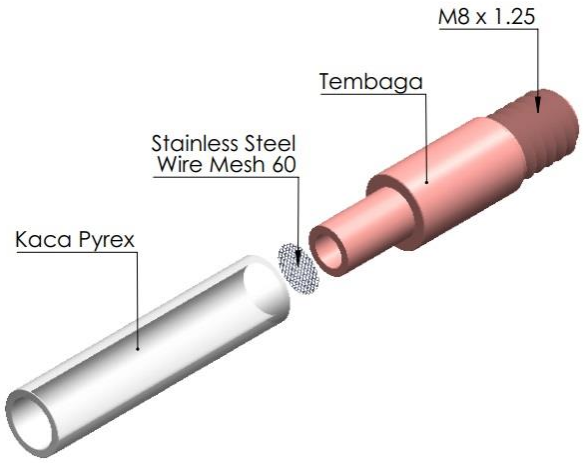
Alat yang digunakan dalam penelitian ini adalah sebagai berikut:

1. *Combustor* Skala Meso

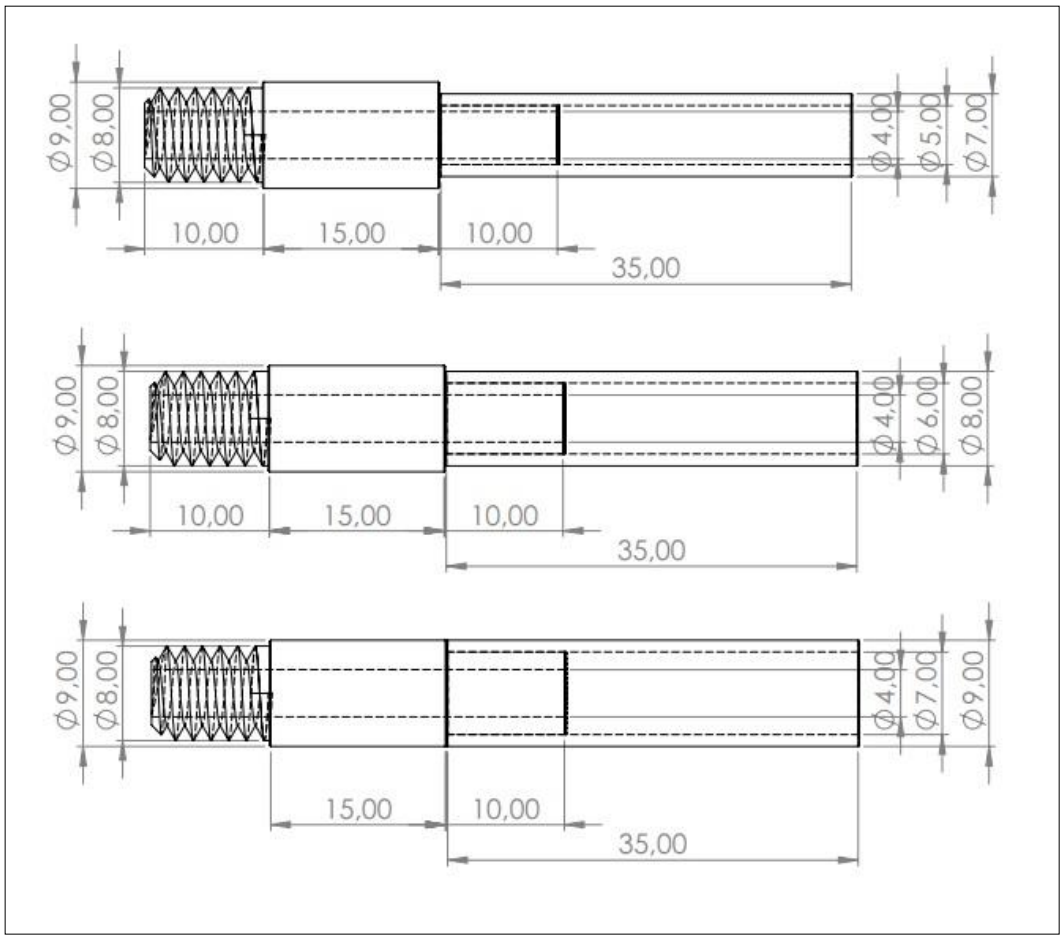
   Proses pembakaran gas Butana terjadi di dalam *combustor* yang dibuat dengan menggunakan bahan tembaga (Cu). *Combusto*r yang digunakan ini terdiri dari empat komponen yaitu komponen masukan (*input*), dinding pipa *combustor, Wiremesh 60* dan keluaran (*output*). Sketsa dimensi *meso scale combustor* dapat di lihat pada gambar 3.3.



Gambar 3.1 Sketsa *meso-scale combustor*



Gambar 3.2 Bagian-bagian *combustor*



Gambar 3.3 Sketsa dimensi *meso scale combustor*

2. *Combustor Holder*

Combustor holder berfungsi sebagai tempat dudukan dari combustor dan juga untuk memudahkan penyambungan antara komponen *mixer* bahan bakar dan udara terhadap *combustor*.

3. *Mixer*

Mixer digunakan untuk mencampur bahan bakar dan udara sebelum terjadi reaksi pembakaran agar terjadi campuran yang homogen sehingga dapat menunjang terjadinya proses pembakaran yang sempurna. Seperti yang terlihat pada Gambar 3.4, komponen *mixer* memiliki dua inputan dimana satu *input* untuk saluran bahan bakar dan satu *input* untuk saluran udara.

Gambar 3.4 Mixer udara dan bahan bakar

4. Kompresor

Udara yang disuplai untuk reaksi pembakaran pada *combustor* berasal dari kompresor, penggunaan kompresor ditujukan untuk memudahkan memberikan tekanan pada udara dan variasi aliran udara. Kompresor secara fisik sama seperti yang ditunjukkan pada Gambar 3.5.

Gambar 3.5 kompresor

Spesifikasi kompresor:

- Merek : Lakoni Imola 76
- Daya : 0,75 HP
- Daya listrik : 500 Watt
- Kapasitas tangki : 10 liter
- Kapasitas aliran : 120 liter / menit
- Kecepatan mesin : 2800 rpm
- Kapasitas tekanan : 8 bar

5. *Flowmeter*

Flowmeter merupakan alat yang berfungsi untuk mengukur dan mengatur debit udara dari kompresor dan debit bahan bakar yang akan disalurkan menuju combustor. *Flowmeter* ditunjukkan pada Gambar 3.6, dimana *flowmeter* sebelah kiri dengan ukuran lebih kecil adalah *flowmeter* untuk mengukur debit bahan bakar. Sedangakan *flowmeter* sebelah kanan digunakan untuk mengukur dan mengatur debit udara dari kompresor.

Gambar 3.6 *Flow Meter*

Spesifikasi *Flowmeter*:

a) *Flowmeter* udara

1) Merek :Kofloc
2) Seri : RK-1250
3) Jenis : *Flowmeter* udara
4) Tekanan Kerja : 0,1 MPa
5) Aliran Maks. : 500 ml/min
6) Aliran Min. : 50 ml/min
7) Skala Terkecil : 5 ml/min

b) *Flowmeter* bahan bakar

1) Merek : Kofloc
2) Seri : RK-1250

3) Jenis : *Flowmeter* Propana dan Butana
4) Tekanan Kerja : 0,1 MPa
5) Aliran Maks. : 20 ml/min
6) Aliran Min. : 2 ml/min
7) Skala Terkecil : 0,5 ml/min

6. *Pisco Tube*

Pisco tube merupakan selang kecil sebagai saluran tempat bahan bakar dan udara mengalir. Udara dari kompresor dan gas LPG dari tabung gas disalurkan ke *flowmeter* dan *mixer* menggunakan saluran selang ini. *Pisco tube* ditunjukkan pada Gambar 3.7.

Gambar 3.7 *Pisco tube*

7. *Regulator* butana

Regulator berfungsi untuk mengalirkan bahan bakar gas butan dari tabung gas menuju *flowmeter*. *Regulator* butan dapat dilihat pada Gambar 3.8.

Gambar 3.8 *Regulator butane*

8. Kamera

Kamera digunakan untuk mengambil gambar dari visualisasi api serta mengambil video rambat nyala api. Kamera yang digunakan yaitu DSLR (*Digital Single Lens Reflex*) Nikkon D600.

Gambar 3.9 Kamera

10. Korek api

Korek api digunakan sebagai alat pemantik api pada proses pembakaran skala meso.

Gambar 3.11 Korek api

11. Seal tape

Seal tape mempunyai fungsi dasar untuk mencegah terjadinya kebocoran pada fluida gas maupun cair diantara dua permukaan yang disambung atau disatukan. Seal tape pada penelitian ini diapliaksikan pada *combustor* dan *combustor holder* untuk mencegah terjadinya kebocoran fluida gas (bahan bakar-udara)

Gambar 3.12 Seal tape

3.3.2 Bahan

Bahan yang digunakan dalam penelitian ini adalah Gas butane.Gas Butane digunakan sebagai bahan bakar dalam proses pembakaran pada *combustor* skala meso.

Gambar 3.13 Gas Butane

3.5 Variabel Penelitian

3.5.1 Variabel Bebas

Variabel bebas merupakan variabel yang mempengaruhi faktor-faktor yang diukur oleh peneliti untuk menentukan hubungan antara fenomena yang diamati, adapun variabel bebas yang digunakan dalam penelitian ini adalah:

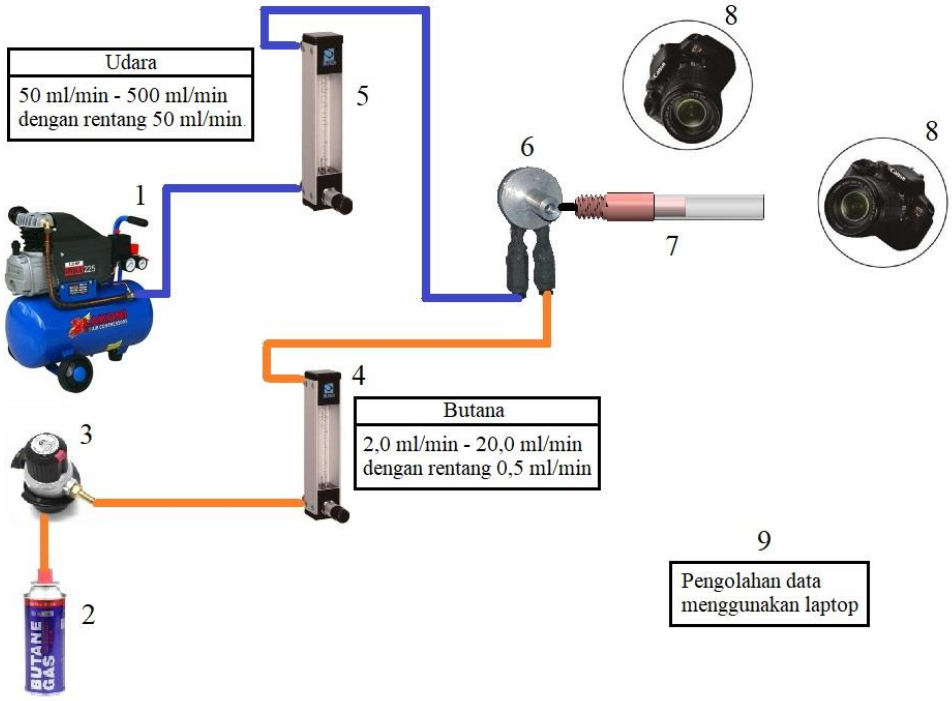
1. Debit bahan bakar dan debit udara (kecepatan reaktan).
2. *Outlet* diameter, yaitu 5 mm, 6 mm dan 7 mm.

3.5.2 Variabel Terikat

Variabel terikat adalah variabel yang nilainya dipengaruhi oleh variabel bebas. Penelitian ini mempunyai variabel terikat yang meliputi

1. Rentang nyala api.
2. Visualisasi nyala api.

3.6 Skema Alat Uji



Gambar 3.14 Skema instalasi alat penelitian

Keterangan:

Saluran Udara

Saluran Bahan Bakar

1. Kompresor
2. Gas butana
3. Regulator butana
4. *Flowmeter* butana
5. *Flowmeter* udara
6. Mixer
7. *Combustor*
8. Kamera
9. Laptop (Ms. Excel)

Gambar 3.14 menunjukkan skema rangkaian pemasangan alat pada penelitian karakteristik pembakaran pada *combustor* skala meso. Bahan bakar disuplai dari tabung gas butane, sedangkan udara bebas didapatkan dari kompresor. Bahan bakar dan udara disalurkan menuju *flowmeter* dengan jenis yang berbeda, yaitu *flowmeter* bahan bakar dan *flowmeter* udara. *Flowmeter* difungsikan sebagai media pengatur debit darialiran bahan bakar dan udara. Dimana nilai debit tersebut dapat diubah-ubah dengan kisaran tertentu sesuai dengan spesifikasi *flowmeter*. Dari *flowmeter* bahan bakar dan udara yang sudah diatur nilai debitnya, disalurkan menuju *mixer* agar terjadi pencampuran homogen antara bahan bakar dan udara.

Selanjutnya campuran bahan bakar dan udara dialirkan menuju *combustor* skala meso sebagai bahan dasar dalam reaksi pembakaran di dalam *combustor*. Hasil visualisasi nyala api dari proses pembakaran didokumentasikan menggunakan kamera, data yang diambil berupa gambar nyala api.

3.7 Prosedur Penelitian

Pengambilan data dalam penelitian karakteristik pembakaran dan pada *meso-scale combustor* harus melakukan beberapa tahapan secara berurutan. Adapun tahapan-tahapan tersebut adalah sebagai berikut:

1. Menyiapkan *meso-scale combustor* beserta seluruh perlengkapannya.
2. Merangkai alat-alat penelitian sesuai dengan skema pada Gambar 3.14, selang saluran bahan bakar, saluran udara, dan saluran campuran bahan bakar dan udaraharus terpasang dengan baik tanpa terjadi kebocoran.
3. Melakukan *setting* pada *flowmeter* udara dengan jalan membuka bukaan *flowmeter* secara penuh, lalu membuka tuas output kompresor sampai bola penunjuk debit udara pada *flowmeter* berada dalam posisi debit 50-500 ml/min.
4. Melakukan setting pada *flowmeter* bahan bakar dengan jalan membuka bukaan pada *flowmeter* secara penuh, lalu buka regulator butane secara perlahan sampai bola penunjuk debit bahan bakar pada *flowmeter* berada pada posisi debit 2-20 ml/min.

5. Memulai reaksi pembakaran pada *meso scale combustor* dengan jalan memberikan pemantik api dengan menggunakan korek api pada mulut *outlet combustor*.
6. Ketika api menyala, atur debit bahan bakar dan udara dari debit terendah sampai tertinggi, cari komposisi bahan bakar-udara yang menghasilkan api stabil.
7. Dokumentasikan gambar visualisasi nyala api menggunakan kamera.
8. Mengulangi prosedur pengambilan data dari awal dengan variasi diameter *out combustor* yang berbeda (5 mm, 6 mm dan 7 mm). Pengambilan dan pengumpulan data dilakukan sebanyak tiga kali untuk setiap ukuran *combustor* dan kemudian diambil rata-rata. Pengambilan data dilakukan dengan prosedur yang sama pada masing-masing variasi diameter *combustor*.

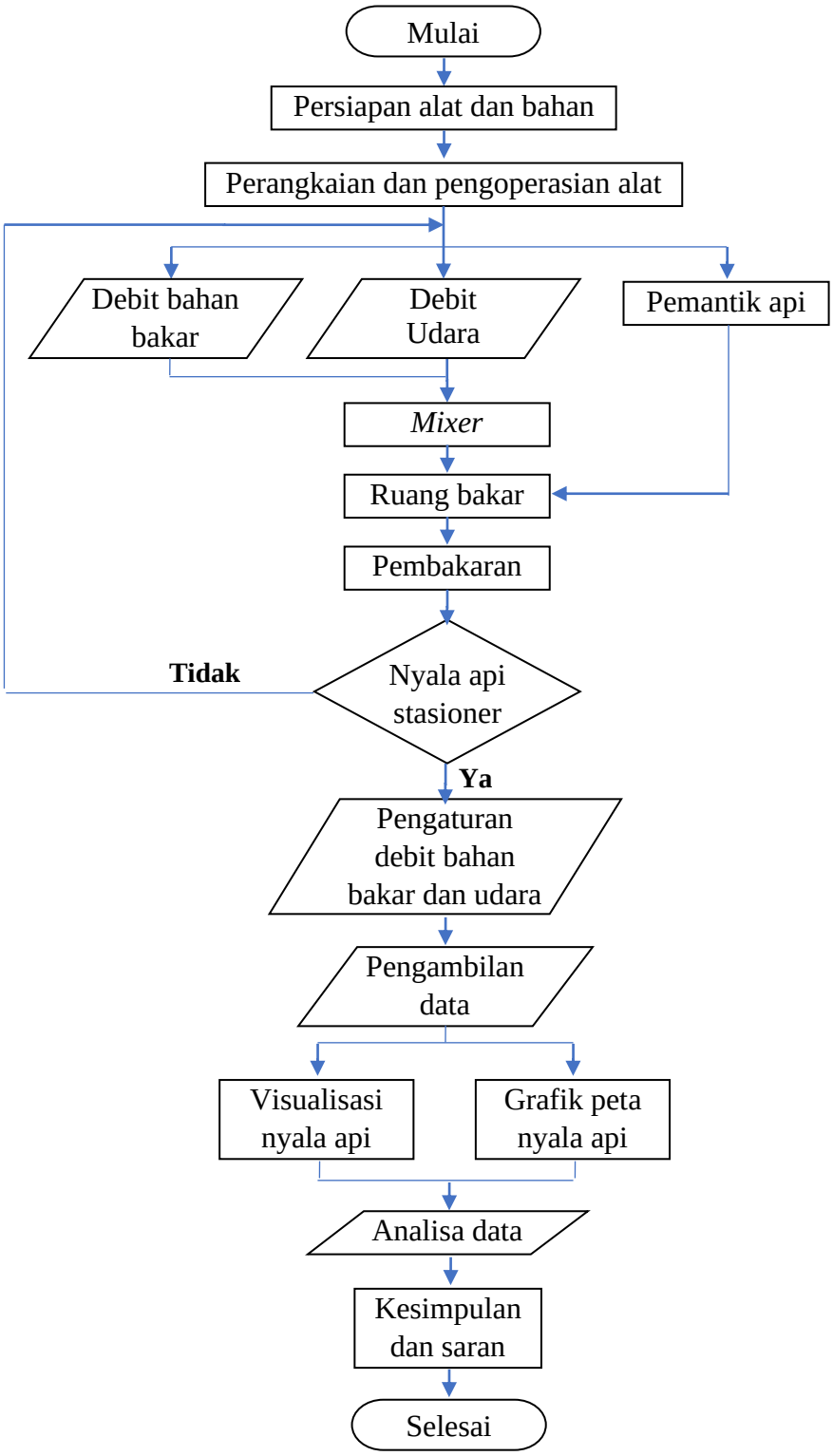
3.8 Penyajian Data Penelitian

Data dari hasil penelitian kemudian diolah menggunakan *software* microsoft excel serta foto rezim api untuk memudahkan pencarian nilai variabel terikat. Hasil pengolahan data disajikan dalam bentuk tabel sebagai berikut.

Tabel 3.1 Data debit bahan bakar dan udara

No.	$Q_{f\ actual}$	$Q_{a\ actual}$	$V_{reaktan}$	Φ
1				
2				
dst.				

3.8 Diagram Alir Penelitian Karakteristik Nyala Api



BAB 5. PENUTUP

5.1 Kesimpulan

Kesimpulan yang dapat ditarik dari penelitian karakteristik nyala api pada *meso-scale combustor* dengan *sudden expansion* dan *wire mesh* sebagai *flame holder* adalah:

1. Hasil analisa data terhadap diameter *outlet combustor* menunjukkan daerah *flammability limit* terluas terdapat pada *combustor* dengan diameter *outlet* 7 mm dimana pada rasio ekuivalen (Φ) = 1 api dapat menyala pada *flame holder* dalam rentang kecepatan rektan (v) = 9,06 cm/s – 24,60 cm/s. Untuk *combustor* dengan diameter *outlet* 5 mm pada rasio ekuivalen (Φ) = 1 api dapat menyala pada *flame holder* dalam rentang kecepatan rektan (v) = 16,26 cm/s – 30,74 cm/s. Dan untuk *combustor* dengan diameter *outlet* 6 mm pada rasio ekuivalen (Φ) = 1 api dapat menyala pada *flame holder* dalam rentang kecepatan rektan (v) = 12,33 cm/s – 23,46 cm/s. Sehingga dapat dikatakan *combustor* dengan diameter *outlet* 7 mm memiliki batas nyala api terluas dan stabilitas api paling baik diantara ketiga *combustor*.
2. Karakteristik warna api mempunyai tingkat kecerahan yang berbeda meskipun rasio ekuivalennya sama. Semakin tinggi kecepatan reaktan pada *meso-scale combustor* dengan *sudden expansion* dan *wire mesh* sebagai *flame holder* menghasilkan api yang tampak biru terang dan semakin lebar.
3. Letak nyala api terbaik dimiliki oleh *combustor* dengan diameter *outlet* 7 mm, dimana pada rasio ekuivalen (Φ) = 1, posisi semua api menempel pada *sudden expansion* dan *wire mesh* sehingga memiliki waktu tinggal api yang lebih lama, karena fungsi *sudden expansion* dan *wire mesh* sendiri disini sebagai *flame holder*. Diikuti oleh *combustor* dengan diameter *outlet* 6 mm, dimana pada rasio ekuivalen (Φ) = 1, terdapat 9 api yang menempel pada *sudden expansion* dan *wire mesh.* sedangkan *combustor* dengan diameter *outlet* 5 mm memiliki letak nyala api paling

buruk, dimana pada rasio ekuivalen (Φ) = 1, api yang menempel pada *sudden expansion* dan *wire mesh* kurang dari 50%, bahkan pada *combustor* ini juga terdapat api yang menyala pada ujung *combustor*.

4. Bentuk nyala api terbaik dimiliki oleh *combustor* dengan diameter *outlet* 7 mm, dimana pada rasio ekuivalen (Φ) = 1, api yang menyala pada *combustor* ini memiliki bentuk yang lebih bulat pipih (simetris) dari pada kedua *combustor* lainnya. Dimana api dengan bentuk simetris memiliki tingkat kestabilan yang lebih tinggi.

5.2 Saran

Adapun saran untuk penelitian selanjutnya ialah sebagai berikut:

1. Pengembangan dari proses pembakaran pada *meso-scale combustor* menggunakan alat pengubah energi, sehingga dapat mengetahui proses konversi energi panas menjadi energi listrik (*thermophotovoltaic*) atau yang lain.
2. Optimasi penggunaan dimensi *wire mesh* serta geometri *combustor* untuk mendapatkan *output* yang lebih maksimal.
3. *Software* simulasi fluida dapat dimanfaatkan untuk memberikan kemudahan dalam memberikan gambaran pola aliran fluida yang terjadi di dalam *meso-scale combustor.*

DAFTAR PUSTAKA

Ariwibowo. 2013. *Partisipasi Masyarakat Dalam Pengelolaan PLTMH di Desa Depok Kecamatan Lebakbarang Kabupaten Pekalongan*. Tesis. Semarang: Program Studi Magister Ilmu Lingkungan Universitas Diponegoro.

Baigmohammadi, M., S. Tabejamaat dan Y. Farsiani. 2015. *Experimental Study of The Effects of Geometrical Parameters, Reynolds Number, and Equivalence Ratio on Methane–Oxygen Premixed Flame Dynamics in Non-Adiabatic Cylinderical Meso-Scale Reactors with The Backward Facing Step*. *Chemical Engineering Science*. 132: 215-233.

Boggs, S. Jr. 2006. Principle of *Sedimentology and Stratigrapgy. Fourth Edition*. New Jersey: Pearson Education.

Carlos, A. dan F. Pello. 2002. Micropower Generation Using Combustion: Issues and Approach. *Proceedings of the Combustion Institute*. 29. Elsevier Inc: 883-899.

Chou, S.K., W.M. Yang, K.J. Chua, J.Li, dan K.L. Zhang. 2010. Development of Micro Power Generators – A Review. *Applied Energy*. 88: 1-16.

Farizkaraja M., Sasongko, M. N., dan Wijayanti W. 2014. *Pengaruh Konsentrasi CO2 terhadap Karakteristik Api Pembakaran Difusi CH4 + CO2 pada Counter Flow Burner*. Malang. Jurusan Teknik Mesin Universitas Brawijaya.

Fernandez, A. C. dan Pello. 2002. *Micropower Generation Using Combustion Issues and Approaches*. Department of Mechanical Engineering University of California. Berkeley. USA. 29 (2002) 883-899.

Fitriansyah, R. D. 2017. *Pengaruh Rasio Ekuivalen Gas LPG dan Udara terhadap Karakteristik Pembakaran Flame Regime pada Meso-Scale Combustor dengan Sudden Expansion.* Jember: Digital Repository Universitas Jember

Gould, C dan N. Shammas. 2009. A Review of Thermoelectric MEMS Device for Micro-power Generation, Heating and Cooling Applications. *Micro electronic and mechanical system.* Vukovar: InTech.

Helmizar. 2011. *Studi Eksperimental Tentang Head Loss pada Aliran Fluida yang Melalui Elbow 90°*. Bengkulu. Program studi Teknik Mesin Fakultas Teknik Universitas Bengkulu.

Ju, Y. dan K. Maruta. 2011. Microscale combustion: Technology development and fundamental research. *Progress in Energy and Combustion Science*. 37: 669-715.

Mahandri, C.P. dan I. M. K. Dhiputra. 2010. Flame Lift-up on A Bunsen Burner. *Energy, Process and Enviromental Engineering and Management & Sustainable Architecture.* 13: 1-4.

Maruta, K. 2011. *Technology Development and Fundamental Research*. Tohoku University. Japan. 37(2011) 669-715.

Mikami, M., Maeda, Y., Matsui, K., Seo, T., dan Yuliati, L. 2012. *Combustion of Gaseous and Liquid Fuels in Meso-Scale Tubes with Wire Mesh.* Department of Mechanical Engineering, Yamaguchi University, Japan.

Munir, F. A. dan Masato, M. 2015. *A Numerical Study of Propane-air Combustion in Meso-scale Tube Combustors with Concentric Rings*. Journal of Thermal Science and Technology Vol.10 No. Halaman 15-29.

Nolas, G. S., J. Sharp, dan J. Goldsmid. 2001. *Thermoelectrics: Basic Principles and New Materials Developments.* Edisi Pertama. Berlin: Springer. Olson, R. M. dan Steven J. 1993. *Dasar-dasar Mekanika Fluida Teknik*. Jakarta: Gramedia Pustaka Utama.

Pradika, Z. R., Sasongko, M. N., dan Yuliati, L. 2014. *Studi Eksperimental Mengenai Nyala Api dan Gas Hasil Pembakaran pada Meso Scale Combustor dengan Material Non-Homogen*. Teknik Mesin Fakultas Teknik Universitas Brawijaya. Malang.

Rafandi, Mochamad. 2016. Pengaruh Jenis Bahan Bakar terhadap Karakteristik Pembakaran pada *Meso-scale Combustor* dengan *Backward Facing Step*. Malang. Teknik Mesin Universitas Brawijaya.

Riffat, S.B. dan X. Ma. 2003. Thermoelectrics: A Review of Present and Potential Applications. *Applied Thermal Engineering*. 23: 913-935.

Sadeghi, S.S., S. Tabejamaat, M. Baighmohammadi dan J. Zarvandi. 2014. An experimental study of the effects of equivalence ratio, mixture velocity and nitrogen dilution on methane/oxygen pre-mixed flame dynamics in a mesoscale reactor. *Energy Conversion and Management*. 81: 169-183.

Sari, S. 2015. *Pengaruh Diameter Combustor Terhadap Karakteristik Pembakaran pada Meso-scale Combustor dengan Backward Facing Step*. Malang. Teknik Mesin Universitas Brawijaya.

Sularso dan H. Tahara. 1983. *Pompa dan Kompresor: Pemilihan, Pemakaian dan Pemeliharaan*. Tokyo: Association for International Technical Promotion.

Taufiq. 2008. *Perbandingan Temperatur Ring Stainless Steel dan Temperatur Ring Keramik pada Fenomena " Flame Lift-Up"*. Depok. Fakultas Teknik Program Studi Teknik Mesin Universitas Indonesia.

Toriyama T (2004). *Piezoresistance Consideration on n-type 6H SiC for MEMS based Piezoresistance Sensors*. J. Micromech. Microeng. 14:1445–1448.

Wardana, I.N.G. 2008. *Bahan Bakar dan Teknologi Pembakaran*. Malang: PT. Danar Wijaya Brawijaya University Press.

Weinberg, F. J. 1975. The First Half-million Years of Combustion Research and Today's Burning Problems. *Progress in Energy and Combustion Science*. 1: 17-31.

Yang, W. M., Chou, S. K., Shu, C., Li, Z. W., dan Xue, H. 2002. *Combustion in Micro-Cylindrical Combustors With and Without a Backward Facing Step*. *Department of Mechanical Engineering, National University of Singapore*.

Singapore. Department of Mechanical Engineering, California State Polytechnic University. USA. 22 (2002) 1777–1787.

Yang, W.M., S.K. Chou, C. Shu, Z.W. Li, dan H. Xue. 2003. Research on microthermophotovoltaic power generators. *Solar Energy Materials and Solar Cell*. 80: 95-104.

Yuliati, L. 2014. *Flame Stability of Gaseous Fuel Combustion Inside Meso-Scale Combustor with Double Wire Mesh*. Applied Mechanics and Materials, vol. 664, pp. 231-235, 2014.

Z.W. Li, S.K Chou, C. Shu, H. Xue, W.M. Yang 2005. *Characteristics of premixed flame in microcombustors with different diameters*. Department of Mechanical Engineering, National University of Singapore, 10 Kent Ridge Crescent, Singapore 119260, Singapore, Department of Mechanical Engineering, California State Polytechnic University, 3801 West Temple Avenue, Pomona, CA 91768, USA. 25 (2005) 271–281.

LAMPIRAN A. Perhitungan Data Penelitian

1. Perhitungan $AFR_{stoikiometri}$

   Persamaan pembakaran butana (C_4H_{10})

   $$C_4H_{10(g)} + 6{,}5\ (O_2 + 3{,}76\ N_2)_{(g)} \rightarrow 4\ CO_{2(g)} + 5\ H_2O + 24{,}44\ N_2$$

   a) Diketahui:
      - Massa atom relatif (Ar)

        C = 12 gram/mol; H = 1 gram/mol; O = 16 gram/mol; dan N = 14 gram/mol.
      - Massa jenis udara pada suhu ruangan 27 ℃ = 0,001205 gram/cm^3.
      - Massa jenis butana = 0,002417 gram/cm^3.

   b) Ditanya:
      - $AFR_{stoikiometri}$ = ...?

   c) Penyelesaian:
      - $AFR_{stoikiometri}$ berdasarkan rasio massa udara dan bahan bakar:
        - Massa bahan bakar = n x Mr
          = 1 MrC_4H_{10}
          = 1 (48 + 10)
          = 58 gram
        - Massa udara = n x Mr
          = 6,5 x (MrO_2 + 3,76 MrN_2)
          = 6,5 x (32 + 3,76 (28))
          = 6,5 x 137,28
          = 892,32 gram
        - $AFR_{stoikiometri}$ $= \frac{\text{Massa udara}}{\text{Massa bahan bakar}}$
          $= \frac{892{,}32\ \text{gram}}{58\ \text{gram}}$
          = 15,3848

2. Perhitungan AFR_{aktual}

   a) Diketahui:

   - ρ_{udara} = 0,001205 gram/cm^3
   - ρ_{butana} = 0,002417 gram/cm^3
   - Q_f = 6,02 ml/min
   - Q_a = 185,44 ml/min

   b) Karena perbedaan fase bahan bakar dan udara, maka keduanya diubah menjadi massa alir (*m*).

   - m_f = ρ_{butana} x Q_f
     = 0,002417 gram/cm^3 x 6,02 ml/min
     = 0,01455 gram/min
   - m_a = ρ_{udara} x Q_a
     = 0,001205 gram/cm^3 x 185,44 ml/min
     = 0,22346 gram/min

   c) Nilai AFR_{aktual}

   $$AFR_{aktual} = \frac{ma}{mf}$$
   $$= \frac{0{,}22346 \text{ gram/min}}{0{,}01455 \text{ gram/min}}$$
   $$= 15{,}35807$$

3. Perhitungan Rasio Ekuivalen (Φ)

   $$(\Phi) = \frac{\text{AFR stoikiometri}}{\text{AFR aktual}}$$
   $$= \frac{15{,}3848}{15{,}35807}$$
   $$= 1$$

4. Perhitungan Kecepatan Reaktan (V)

   a) Diketahui:

   - Q_a = 185,44 ml/min
   - Q_f = 6,02 ml/min
   - d_{out} *combustor* = 5 mm

- r_{out} *combustor* = 2,5 mm

b) Ditanya:

$V_{reaktan}$ = ...?

c) Penyelesaian

$$V_{reaktan} = \frac{\frac{Qf+Qa}{60}}{\frac{3{,}14\ x\ rxr}{100}}$$

$$= \frac{\frac{6{,}02+185{,}44}{60}}{\frac{3{,}14\ x\ 2{,}5x2{,}5}{100}}$$

$$= 16{,}26 \text{ cm/s}$$

5. Perhitungan lama tinggal reaktan pada *mixer*

a) Diketahui:

- Diameter *mixer* = 30 mm
- Lebar *mixer* = 20 mm
- $Q_{reaktan}$ = 185,44 ml/min + 6,02 ml/min = 191,46 ml/min

b) Ditanya:

- Volume *mixer* = ...?
- Lama tinggal reaktan pada *mixer* = ...?

c) Penyelesaian:

- Volume *mixer* $= \pi$ x r^2 x 20

$$= \frac{22}{7} \text{ x } 15^2 \text{ x } 20$$

$$= 14142{,}86 \text{ mm}^3$$

- Lama tinggal reaktan pada *mixer* $= \frac{\text{volume mixer}}{Q\ reaktan}$

$$= \frac{14142{,}86 \text{ mm}^3}{191{,}46 \text{ ml/min}}$$

$$= \frac{14{,}14286 \text{ cm}^3}{191{,}46 \text{ ml/min}}$$

$$= 0{,}073868 \text{ min}$$

$$= 4{,}432 \text{ detik}$$

6. Perhitungan nilai Q_a dan Q_f untuk data visualisasi nyala api

a) Diketahui:

- Φ = 1
- V = 16,26 cm/s
- $AFR_{stoikiometri}$ = 15,3848
- ρ_{udara} = 0,001205 gram/cm^3
- ρ_{butana} = 0,002417 gram/cm^3

b) Ditanya:

- Q_a = ...?
- Q_f = ...?

c) Penyelesaian:

- $(\Phi) = \frac{\text{AFR stoikiometri}}{\text{AFR aktual}}$

$1 = \frac{15,38}{\text{AFR aktual}}$

$AFR_{aktual} = \frac{15,38}{1}$

$= 15,38$

- $AFR_{aktual} = \frac{ma}{mf}$

$15,38 = \frac{Q_a \text{ x } 0,001205 \text{ gram/cm}^3}{Q_f \text{ x } 0,002417 \text{ gram/cm}^3}$

$Q_a = 30,81\ Q_f$

- $V_{reaktan} = \frac{\frac{Qf+Qa}{60}}{\frac{3,14\ x\ rxr}{100}}$

$16,26 \text{ cm/s} = \frac{\frac{Qf\ +(30,81\ Qf)}{60}}{\frac{3,14\ x\ 2,5x2,5}{100}}$

$16,26 \text{ cm/s} = \frac{\frac{Qf}{60}+\left(\frac{30,81}{60}\ Qf\right)}{0,196\ cm^2}$

$16,26 \text{ cm/s} = \frac{\frac{Qf}{60}+(0,5135\ Qf)}{0,196\ cm^2}$

$16,26 \text{ cm/s} = \frac{Qf\left(\frac{1}{60}+0,5135\ ml/s\right)}{0,196\ cm^2}$

$0,5302\ Q_f = \frac{16,26\ cm/s}{0,196\ cm^2}$

$$Q_f = \frac{3,18696}{0,5302}$$

$$Q_f = 6,02 \text{ ml/min}$$

$$Q_a = 30,81\ Q_f$$

$$Q_a = 30,81 \text{ x } 6,02 \text{ ml/min}$$

$$Q_a = 185,44 \text{ ml/min}$$

Lampiran B. Data Penelitian

Berdasarkan hasil pengambilan data pembakaran pada *meso-scale combustor* dengan *sudden expansion* dan *wiremesh* sebagai *flame holder* yang divariasikan dengan Diameter *out* sebesar 5 mm , 6 mm dan 7 mm diperoleh data sebagai berikut:

Tabel 1 Data komposisi bahan bakar dan udara *Combustor* D_{out} 5 mm (Q_{fuel} 3,36 ml/min)

No	Q_{fuel} (ml/min)	Q_{air} (ml/min)	$V_{reaktan}$ (Cm/s)	Ekv Rasio (Φ)	Keterangan
1	3,36	54,43	4,91	1,91	Δ Flame at combustor rim
2	3,36	60,13	5,39	1,73	Δ Flame at combustor rim
3	3,36	65,82	5,88	1,58	Δ Flame at combustor rim
4	3,36	71,52	6,36	1,45	Δ Flame at combustor rim
5	3,36	77,21	6,84	1,35	x Flashback flame
6	3,36	82,91	7,33	1,25	x Flashback flame
7	3,36	88,61	7,81	1,17	x Flashback flame
8	3,36	94,30	8,29	1,10	x Flashback flame
9	3,36	100,00	8,78	1,04	x Flashback flame
10	3,36	105,69	9,26	0,98	x Flashback flame
11	3,36	111,39	9,75	0,93	x Flashback flame
12	3,36	117,09	10,23	0,89	x Flashback flame
13	3,36	122,78	10,71	0,85	x Flashback flame
14	3,36	128,48	11,20	0,81	x Flashback flame
15	3,36	134,17	11,68	0,78	x Flashback flame
16	3,36	139,87	12,16	0,74	x Flashback flame
17	3,36	145,57	12,65	0,71	No ignition

Tabel 2 Data komposisi bahan bakar dan udara *Combustor* D_{out} 5 mm (Q_{fuel} 3,89 ml/min)

No	Q_{fuel} (ml/min)	Q_{air} (ml/min)	$V_{reaktan}$ (Cm/s)	Ekv Rasio (Φ)	Keterangan
1	3,89	54,43	4,95	2,21	Δ Flame at combustor rim
2	3,89	60,13	5,44	2,00	Δ Flame at combustor rim
3	3,89	65,82	5,92	1,83	Δ Flame at combustor rim
4	3,89	71,52	6,40	1,68	Δ Flame at combustor rim
5	3,89	77,21	6,89	1,56	Δ Flame at combustor rim
6	3,89	82,91	7,37	1,45	x Flashback flame
7	3,89	88,61	7,86	1,36	x Flashback flame
8	3,89	94,30	8,34	1,28	x Flashback flame
9	3,89	100,00	8,82	1,20	x Flashback flame
10	3,89	105,69	9,31	1,14	x Flashback flame
11	3,89	111,39	9,79	1,08	x Flashback flame
12	3,89	117,09	10,27	1,03	x Flashback flame
13	3,89	122,78	10,76	0,98	x Flashback flame
14	3,89	128,48	11,24	0,94	x Flashback flame
15	3,89	134,17	11,73	0,90	x Flashback flame
16	3,89	139,87	12,21	0,86	x Flashback flame
17	3,89	145,57	12,69	0,83	x Flashback flame
18	3,89	151,26	13,18	0,80	x Flashback flame
19	3,89	156,96	13,66	0,77	No ignition

Tabel 3 Data komposisi bahan bakar dan udara *Combustor* D_{out} 5 mm (Q_{fuel} 4,43 ml/min)

No	Q_{fuel} (ml/min)	Q_{air} (ml/min)	$V_{reaktan}$ (Cm/s)	Ekv Rasio (Φ)	Keterangan
1	4,43	54,43	5,00	2,52	Δ Flame at combustor rim
2	4,43	60,13	5,48	2,28	Δ Flame at combustor rim
3	4,43	65,82	5,97	2,08	Δ Flame at combustor rim

4	4,43	71,52	6,45	1,91	Δ Flame at combustor rim
5	4,43	77,21	6,93	1,77	Δ Flame at combustor rim
6	4,43	82,91	7,42	1,65	Δ Flame at combustor rim
7	4,43	88,61	7,90	1,55	Δ Flame at combustor rim
8	4,43	94,30	8,38	1,45	x Flashback flame
9	4,43	100,00	8,87	1,37	x Flashback flame
10	4,43	105,69	9,35	1,30	x Flashback flame
11	4,43	111,39	9,84	1,23	x Flashback flame
12	4,43	117,09	10,32	1,17	x Flashback flame
13	4,43	122,78	10,80	1,12	x Flashback flame
14	4,43	128,48	11,29	1,07	x Flashback flame
15	4,43	134,17	11,77	1,02	x Flashback flame
16	4,43	139,87	12,25	0,98	x Flashback flame
17	4,43	145,57	12,74	0,94	x Flashback flame
18	4,43	151,26	13,22	0,91	x Flashback flame
19	4,43	156,96	13,71	0,87	x Flashback flame
20	4,43	162,65	14,19	0,84	x Flashback flame
21	4,43	168,35	14,67	0,81	x Flashback flame
22	4,43	174,05	15,16	0,79	x Flashback flame
23	4,43	179,74	15,64	0,76	x Flashback flame
24	4,43	185,44	16,12	0,74	□ Flame in combustor
25	4,43	191,13	16,61	0,72	No ignition

Tabel 4 Data komposisi bahan bakar dan udara *Combustor* D_{out} 5 mm (Q_{fuel} 4,96 ml/min)

No	Q_{fuel} (ml/min)	Q_{air} (ml/min)	$V_{reaktan}$ (Cm/s)	Ekv Rasio (Φ)	Keterangan
1	4,96	54,43	5,04	2,82	Δ Flame at combustor rim
2	4,96	60,13	5,53	2,55	Δ Flame at combustor rim
3	4,96	65,82	6,01	2,33	Δ Flame at combustor rim
4	4,96	71,52	6,49	2,15	Δ Flame at combustor rim
5	4,96	77,21	6,98	1,99	Δ Flame at combustor rim

6	4,96	82,91	7,46	1,85	Δ Flame at combustor rim
7	4,96	88,61	7,95	1,73	Δ Flame at combustor rim
8	4,96	94,30	8,43	1,63	Δ Flame at combustor rim
9	4,96	100,00	8,91	1,53	Δ Flame at combustor rim
10	4,96	105,69	9,40	1,45	x Flashback flame
11	4,96	111,39	9,88	1,38	x Flashback flame
12	4,96	117,09	10,36	1,31	x Flashback flame
13	4,96	122,78	10,85	1,25	x Flashback flame
14	4,96	128,48	11,33	1,19	x Flashback flame
15	4,96	134,17	11,82	1,14	x Flashback flame
16	4,96	139,87	12,30	1,10	x Flashback flame
17	4,96	145,57	12,78	1,05	x Flashback flame
18	4,96	151,26	13,27	1,01	x Flashback flame
19	4,96	156,96	13,75	0,98	x Flashback flame
20	4,96	162,65	14,23	0,94	x Flashback flame
21	4,96	168,35	14,72	0,91	x Flashback flame
22	4,96	174,05	15,20	0,88	x Flashback flame
23	4,96	179,74	15,69	0,85	x Flashback flame
24	4,96	185,44	16,17	0,83	x Flashback flame
25	4,96	191,13	16,65	0,80	x Flashback flame
26	4,96	196,83	17,14	0,78	x Flashback flame
27	4,96	202,53	17,62	0,76	□ Flame in combustor
28	4,96	208,22	18,10	0,74	□ Flame in combustor
29	4,96	213,92	18,59	0,72	□ Flame in combustor
30	4,96	219,61	19,07	0,70	□ Flame in combustor
31	4,96	225,31	19,56	0,68	□ Flame in combustor
32	4,96	231,01	20,04	0,66	□ Flame in combustor
33	4,96	236,70	20,52	0,65	□ Flame in combustor
34	4,96	242,40	21,01	0,63	Δ Flame at combustor rim
35	4,96	248,09	21,49	0,62	No ignition

Tabel 5 Data komposisi bahan bakar dan udara *Combustor* D_{out} 5 mm (Q_{fuel} 5,49 ml/min)

No	Q_{fuel} (ml/min)	Q_{air} (ml/min)	$V_{reaktan}$ (Cm/s)	Ekv Rasio (Φ)	Keterangan
1	5,49	54,43	5,09	3,12	Δ Flame at combustor rim
2	5,49	60,13	5,57	2,83	Δ Flame at combustor rim
3	5,49	65,82	6,06	2,58	Δ Flame at combustor rim
4	5,49	71,52	6,54	2,38	Δ Flame at combustor rim
5	5,49	77,21	7,02	2,20	Δ Flame at combustor rim
6	5,49	82,91	7,51	2,05	Δ Flame at combustor rim
7	5,49	88,61	7,99	1,92	Δ Flame at combustor rim
8	5,49	94,30	8,47	1,80	Δ Flame at combustor rim
9	5,49	100,00	8,96	1,70	Δ Flame at combustor rim
10	5,49	105,69	9,44	1,61	Δ Flame at combustor rim
11	5,49	111,39	9,93	1,52	x Flashback flame
12	5,49	117,09	10,41	1,45	x Flashback flame
13	5,49	122,78	10,89	1,38	x Flashback flame
14	5,49	128,48	11,38	1,32	x Flashback flame
15	5,49	134,17	11,86	1,27	x Flashback flame
16	5,49	139,87	12,34	1,21	x Flashback flame
17	5,49	145,57	12,83	1,17	x Flashback flame
18	5,49	151,26	13,31	1,12	x Flashback flame
19	5,49	156,96	13,80	1,08	x Flashback flame
20	5,49	162,65	14,28	1,04	x Flashback flame
21	5,49	168,35	14,76	1,01	x Flashback flame
22	5,49	174,05	15,25	0,98	x Flashback flame
23	5,49	179,74	15,73	0,95	x Flashback flame
24	5,49	185,44	16,21	0,92	x Flashback flame
25	5,49	191,13	16,70	0,89	x Flashback flame
26	5,49	196,83	17,18	0,86	x Flashback flame
27	5,49	202,53	17,67	0,84	x Flashback flame
28	5,49	208,22	18,15	0,82	x Flashback flame

29	5,49	213,92	18,63	0,79	O Flame at flame holder
30	5,49	219,61	19,12	0,77	O Flame at flame holder
31	5,49	225,31	19,60	0,75	□ Flame in combustor
32	5,49	231,01	20,08	0,74	□ Flame in combustor
33	5,49	236,70	20,57	0,72	□ Flame in combustor
34	5,49	242,40	21,05	0,70	□ Flame in combustor
35	5,49	248,09	21,54	0,68	□ Flame in combustor
36	5,49	253,79	22,02	0,67	□ Flame in combustor
37	5,49	259,49	22,50	0,65	No ignition

Tabel 6 Data komposisi bahan bakar dan udara *Combustor* D_{out} 5 mm (Q_{fuel} 6,02 ml/min)

No	Q_{fuel} (ml/min)	Q_{air} (ml/min)	$V_{reaktan}$ (Cm/s)	Ekv Rasio (Φ)	Keterangan
1	6,02	54,43	5,13	3,42	Δ Flame at combustor rim
2	6,02	60,13	5,62	3,10	Δ Flame at combustor rim
3	6,02	65,82	6,10	2,83	Δ Flame at combustor rim
4	6,02	71,52	6,59	2,61	Δ Flame at combustor rim
5	6,02	77,21	7,07	2,41	Δ Flame at combustor rim
6	6,02	82,91	7,55	2,25	Δ Flame at combustor rim
7	6,02	88,61	8,04	2,10	Δ Flame at combustor rim
8	6,02	94,30	8,52	1,98	Δ Flame at combustor rim
9	6,02	100,00	9,00	1,86	Δ Flame at combustor rim
10	6,02	105,69	9,49	1,76	Δ Flame at combustor rim
11	6,02	111,39	9,97	1,67	Δ Flame at combustor rim
12	6,02	117,09	10,46	1,59	Δ Flame at combustor rim
13	6,02	122,78	10,94	1,52	Δ Flame at combustor rim
14	6,02	128,48	11,42	1,45	□ Flame in combustor
15	6,02	134,17	11,91	1,39	□ Flame in combustor
16	6,02	139,87	12,39	1,33	O Flame at flame holder
17	6,02	145,57	12,87	1,28	O Flame at flame holder
18	6,02	151,26	13,36	1,23	O Flame at flame holder

19	6,02	156,96	13,84	1,19	O Flame at flame holder
20	6,02	162,65	14,32	1,15	O Flame at flame holder
21	6,02	168,35	14,81	1,11	O Flame at flame holder
22	6,02	174,05	15,29	1,07	O Flame at flame holder
23	6,02	179,74	15,78	1,04	O Flame at flame holder
24	6,02	185,44	16,26	1,00	O Flame at flame holder
25	6,02	191,13	16,74	0,97	O Flame at flame holder
26	6,02	196,83	17,23	0,95	O Flame at flame holder
27	6,02	202,53	17,71	0,92	O Flame at flame holder
28	6,02	208,22	18,19	0,89	O Flame at flame holder
29	6,02	213,92	18,68	0,87	O Flame at flame holder
30	6,02	219,61	19,16	0,85	O Flame at flame holder
31	6,02	225,31	19,65	0,83	O Flame at flame holder
32	6,02	231,01	20,13	0,81	O Flame at flame holder
33	6,02	236,70	20,61	0,79	O Flame at flame holder
34	6,02	242,40	21,10	0,77	□ Flame in combustor
35	6,02	248,09	21,58	0,75	□ Flame in combustor
36	6,02	253,79	22,06	0,73	□ Flame in combustor
37	6,02	259,49	22,55	0,72	□ Flame in combustor
38	6,02	265,18	23,03	0,70	□ Flame in combustor
39	6,02	270,88	23,52	0,69	□ Flame in combustor
40	6,02	276,57	24,00	0,67	□ Flame in combustor
41	6,02	282,27	24,48	0,66	Δ Flame at combustor rim
42	6,02	287,97	24,97	0,65	No ignition

Tabel 7 Data komposisi bahan bakar dan udara *Combustor* D_{out} 5 mm (Q_{fuel} 6,55 ml/min)

No	Q_{fuel} (ml/min)	Q_{air} (ml/min)	$V_{reaktan}$ (Cm/s)	Ekv Rasio (Φ)	Keterangan
1	6,55	54,43	5,18	3,73	Δ Flame at combustor rim
2	6,55	60,13	5,66	3,37	Δ Flame at combustor rim
3	6,55	65,82	6,15	3,08	Δ Flame at combustor rim

4	6,55	71,52	6,63	2,84	Δ Flame at combustor rim
5	6,55	77,21	7,11	2,63	Δ Flame at combustor rim
6	6,55	82,91	7,60	2,45	Δ Flame at combustor rim
7	6,55	88,61	8,08	2,29	Δ Flame at combustor rim
8	6,55	94,30	8,57	2,15	Δ Flame at combustor rim
9	6,55	100,00	9,05	2,03	Δ Flame at combustor rim
10	6,55	105,69	9,53	1,92	Δ Flame at combustor rim
11	6,55	111,39	10,02	1,82	Δ Flame at combustor rim
12	6,55	117,09	10,50	1,73	Δ Flame at combustor rim
13	6,55	122,78	10,98	1,65	Δ Flame at combustor rim
14	6,55	128,48	11,47	1,58	Δ Flame at combustor rim
15	6,55	134,17	11,95	1,51	□ Flame in combustor
16	6,55	139,87	12,44	1,45	□ Flame in combustor
17	6,55	145,57	12,92	1,39	O Flame at flame holder
18	6,55	151,26	13,40	1,34	O Flame at flame holder
19	6,55	156,96	13,89	1,29	O Flame at flame holder
20	6,55	162,65	14,37	1,25	O Flame at flame holder
21	6,55	168,35	14,85	1,20	O Flame at flame holder
22	6,55	174,05	15,34	1,17	O Flame at flame holder
23	6,55	179,74	15,82	1,13	O Flame at flame holder
24	6,55	185,44	16,31	1,09	O Flame at flame holder
25	6,55	191,13	16,79	1,06	O Flame at flame holder
26	6,55	196,83	17,27	1,03	O Flame at flame holder
27	6,55	202,53	17,76	1,00	O Flame at flame holder
28	6,55	208,22	18,24	0,97	O Flame at flame holder
29	6,55	213,92	18,72	0,95	O Flame at flame holder
30	6,55	219,61	19,21	0,92	O Flame at flame holder
31	6,55	225,31	19,69	0,90	O Flame at flame holder
32	6,55	231,01	20,17	0,88	O Flame at flame holder
33	6,55	236,70	20,66	0,86	O Flame at flame holder
34	6,55	242,40	21,14	0,84	O Flame at flame holder

35	6,55	248,09	21,63	0,82	O Flame at flame holder
36	6,55	253,79	22,11	0,80	O Flame at flame holder
37	6,55	259,49	22,59	0,78	□ Flame in combustor
38	6,55	265,18	23,08	0,76	□ Flame in combustor
39	6,55	270,88	23,56	0,75	□ Flame in combustor
40	6,55	276,57	24,04	0,73	□ Flame in combustor
41	6,55	282,27	24,53	0,72	□ Flame in combustor
42	6,55	287,97	25,01	0,70	□ Flame in combustor
43	6,55	293,66	25,50	0,69	Δ Flame at combustor rim
44	6,55	299,36	25,98	0,68	No Ignition

Tabel 8 Data komposisi bahan bakar dan udara *Combustor* D_{out} 5 mm (Q_{fuel} 7,09 ml/min)

No	Q_{fuel} (ml/min)	Q_{air} (ml/min)	$V_{reaktan}$ (Cm/s)	Ekv Rasio (Φ)	Keterangan
1	7,09	54,43	5,22	4,03	Δ Flame at combustor rim
2	7,09	60,13	5,71	3,65	Δ Flame at combustor rim
3	7,09	65,82	6,19	3,33	Δ Flame at combustor rim
4	7,09	71,52	6,68	3,07	Δ Flame at combustor rim
5	7,09	77,21	7,16	2,84	Δ Flame at combustor rim
6	7,09	82,91	7,64	2,64	Δ Flame at combustor rim
7	7,09	88,61	8,13	2,47	Δ Flame at combustor rim
8	7,09	94,30	8,61	2,32	Δ Flame at combustor rim
9	7,09	100,00	9,09	2,19	Δ Flame at combustor rim
10	7,09	105,69	9,58	2,07	Δ Flame at combustor rim
11	7,09	111,39	10,06	1,97	Δ Flame at combustor rim
12	7,09	117,09	10,55	1,87	Δ Flame at combustor rim
13	7,09	122,78	11,03	1,79	Δ Flame at combustor rim
14	7,09	128,48	11,51	1,71	Δ Flame at combustor rim
15	7,09	134,17	12,00	1,63	Δ Flame at combustor rim
16	7,09	139,87	12,48	1,57	□ Flame in combustor
17	7,09	145,57	12,96	1,51	□ Flame in combustor

18	7,09	151,26	13,45	1,45	□ Flame in combustor
19	7,09	156,96	13,93	1,40	O Flame at flame holder
20	7,09	162,65	14,42	1,35	O Flame at flame holder
21	7,09	168,35	14,90	1,30	O Flame at flame holder
22	7,09	174,05	15,38	1,26	O Flame at flame holder
23	7,09	179,74	15,87	1,22	O Flame at flame holder
24	7,09	185,44	16,35	1,18	O Flame at flame holder
25	7,09	191,13	16,83	1,15	O Flame at flame holder
26	7,09	196,83	17,32	1,11	O Flame at flame holder
27	7,09	202,53	17,80	1,08	O Flame at flame holder
28	7,09	208,22	18,29	1,05	O Flame at flame holder
29	7,09	213,92	18,77	1,02	O Flame at flame holder
30	7,09	219,61	19,25	1,00	O Flame at flame holder
31	7,09	225,31	19,74	0,97	O Flame at flame holder
32	7,09	231,01	20,22	0,95	O Flame at flame holder
33	7,09	236,70	20,70	0,93	O Flame at flame holder
34	7,09	242,40	21,19	0,90	□ Flame in combustor
35	7,09	248,09	21,67	0,88	□ Flame in combustor
36	7,09	253,79	22,16	0,86	□ Flame in combustor
37	7,09	259,49	22,64	0,84	□ Flame in combustor
38	7,09	265,18	23,12	0,83	□ Flame in combustor
39	7,09	270,88	23,61	0,81	□ Flame in combustor
40	7,09	276,57	24,09	0,79	□ Flame in combustor
41	7,09	282,27	24,57	0,78	□ Flame in combustor
42	7,09	287,97	25,06	0,76	□ Flame in combustor
43	7,09	293,66	25,54	0,75	□ Flame in combustor
44	7,09	299,36	26,02	0,73	Δ Flame at combustor rim
45	7,09	305,05	26,51	0,72	Δ Flame at combustor rim
46	7,09	310,75	26,99	0,71	No ignition

Tabel 9 Data komposisi bahan bakar dan udara *Combustor* D_{out} 5 mm (Q_{fuel} 7,62 ml/min)

No	Q_{fuel} (ml/min)	Q_{air} (ml/min)	$V_{reaktan}$ (Cm/s)	Ekv Rasio (Φ)	Keterangan
1	7,62	54,43	5,27	4,33	Δ Flame at combustor rim
2	7,62	60,13	5,75	3,92	Δ Flame at combustor rim
3	7,62	65,82	6,24	3,58	Δ Flame at combustor rim
4	7,62	71,52	6,72	3,30	Δ Flame at combustor rim
5	7,62	77,21	7,20	3,05	Δ Flame at combustor rim
6	7,62	82,91	7,69	2,84	Δ Flame at combustor rim
7	7,62	88,61	8,17	2,66	Δ Flame at combustor rim
8	7,62	94,30	8,66	2,50	Δ Flame at combustor rim
9	7,62	100,00	9,14	2,36	Δ Flame at combustor rim
10	7,62	105,69	9,62	2,23	Δ Flame at combustor rim
11	7,62	111,39	10,11	2,12	Δ Flame at combustor rim
12	7,62	117,09	10,59	2,01	Δ Flame at combustor rim
13	7,62	122,78	11,07	1,92	Δ Flame at combustor rim
14	7,62	128,48	11,56	1,83	Δ Flame at combustor rim
15	7,62	134,17	12,04	1,76	Δ Flame at combustor rim
16	7,62	139,87	12,53	1,69	Δ Flame at combustor rim
17	7,62	145,57	13,01	1,62	Δ Flame at combustor rim
18	7,62	151,26	13,49	1,56	Δ Flame at combustor rim
19	7,62	156,96	13,98	1,50	Δ Flame at combustor rim
20	7,62	162,65	14,46	1,45	□ Flame in combustor
21	7,62	168,35	14,94	1,40	□ Flame in combustor
22	7,62	174,05	15,43	1,35	□ Flame in combustor
23	7,62	179,74	15,91	1,31	□ Flame in combustor
24	7,62	185,44	16,40	1,27	□ Flame in combustor
25	7,62	191,13	16,88	1,23	O Flame at flame holder
26	7,62	196,83	17,36	1,20	O Flame at flame holder
27	7,62	202,53	17,85	1,16	O Flame at flame holder
28	7,62	208,22	18,33	1,13	O Flame at flame holder

29	7,62	213,92	18,81	1,10	O Flame at flame holder
30	7,62	219,61	19,30	1,07	O Flame at flame holder
31	7,62	225,31	19,78	1,05	O Flame at flame holder
32	7,62	231,01	20,27	1,02	O Flame at flame holder
33	7,62	236,70	20,75	1,00	O Flame at flame holder
34	7,62	242,40	21,23	0,97	O Flame at flame holder
35	7,62	248,09	21,72	0,95	O Flame at flame holder
36	7,62	253,79	22,20	0,93	O Flame at flame holder
37	7,62	259,49	22,68	0,91	O Flame at flame holder
38	7,62	265,18	23,17	0,89	O Flame at flame holder
39	7,62	270,88	23,65	0,87	□ Flame in combustor
40	7,62	276,57	24,14	0,85	□ Flame in combustor
41	7,62	282,27	24,62	0,83	□ Flame in combustor
42	7,62	287,97	25,10	0,82	□ Flame in combustor
43	7,62	293,66	25,59	0,80	□ Flame in combustor
44	7,62	299,36	26,07	0,79	□ Flame in combustor
45	7,62	305,05	26,55	0,77	□ Flame in combustor
46	7,62	310,75	27,04	0,76	Δ Flame at combustor rim
47	7,62	316,45	27,52	0,74	Δ Flame at combustor rim
48	7,62	322,14	28,01	0,73	No ignition

Tabel 10 Data komposisi bahan bakar dan udara *Combustor* D_{out} 5 mm (Q_{fuel} 8,15 ml/min)

No	Q_{fuel} (ml/min)	Q_{air} (ml/min)	$V_{reaktan}$ (Cm/s)	Ekv Rasio (Φ)	Keterangan
1	8,15	54,43	5,31	4,63	Δ Flame at combustor rim
2	8,15	60,13	5,80	4,19	Δ Flame at combustor rim
3	8,15	65,82	6,28	3,83	Δ Flame at combustor rim
4	8,15	71,52	6,77	3,53	Δ Flame at combustor rim
5	8,15	77,21	7,25	3,27	Δ Flame at combustor rim
6	8,15	82,91	7,73	3,04	Δ Flame at combustor rim

7	8,15	88,61	8,22	2,85	Δ Flame at combustor rim
8	8,15	94,30	8,70	2,67	Δ Flame at combustor rim
9	8,15	100,00	9,18	2,52	Δ Flame at combustor rim
10	8,15	105,69	9,67	2,39	Δ Flame at combustor rim
11	8,15	111,39	10,15	2,26	Δ Flame at combustor rim
12	8,15	117,09	10,64	2,15	Δ Flame at combustor rim
13	8,15	122,78	11,12	2,05	Δ Flame at combustor rim
14	8,15	128,48	11,60	1,96	Δ Flame at combustor rim
15	8,15	134,17	12,09	1,88	Δ Flame at combustor rim
16	8,15	139,87	12,57	1,80	Δ Flame at combustor rim
17	8,15	145,57	13,05	1,73	Δ Flame at combustor rim
18	8,15	151,26	13,54	1,67	Δ Flame at combustor rim
19	8,15	156,96	14,02	1,61	Δ Flame at combustor rim
20	8,15	162,65	14,51	1,55	Δ Flame at combustor rim
21	8,15	168,35	14,99	1,50	Δ Flame at combustor rim
22	8,15	174,05	15,47	1,45	Δ Flame at combustor rim
23	8,15	179,74	15,96	1,40	□ Flame in combustor
24	8,15	185,44	16,44	1,36	□ Flame in combustor
25	8,15	191,13	16,92	1,32	□ Flame in combustor
26	8,15	196,83	17,41	1,28	□ Flame in combustor
27	8,15	202,53	17,89	1,24	O Flame at flame holder
28	8,15	208,22	18,38	1,21	O Flame at flame holder
29	8,15	213,92	18,86	1,18	O Flame at flame holder
30	8,15	219,61	19,34	1,15	O Flame at flame holder
31	8,15	225,31	19,83	1,12	O Flame at flame holder
32	8,15	231,01	20,31	1,09	O Flame at flame holder
33	8,15	236,70	20,79	1,07	O Flame at flame holder
34	8,15	242,40	21,28	1,04	O Flame at flame holder
35	8,15	248,09	21,76	1,02	O Flame at flame holder
36	8,15	253,79	22,25	0,99	O Flame at flame holder
37	8,15	259,49	22,73	0,97	O Flame at flame holder

38	8,15	265,18	23,21	0,95	O Flame at flame holder
39	8,15	270,88	23,70	0,93	O Flame at flame holder
40	8,15	276,57	24,18	0,91	O Flame at flame holder
41	8,15	282,27	24,66	0,89	O Flame at flame holder
42	8,15	287,97	25,15	0,88	O Flame at flame holder
43	8,15	293,66	25,63	0,86	□ Flame in combustor
44	8,15	299,36	26,12	0,84	□ Flame in combustor
45	8,15	305,05	26,60	0,83	□ Flame in combustor
46	8,15	310,75	27,08	0,81	□ Flame in combustor
47	8,15	316,45	27,57	0,80	□ Flame in combustor
48	8,15	322,14	28,05	0,78	□ Flame in combustor
49	8,15	327,84	28,53	0,77	□ Flame in combustor
50	8,15	333,53	29,02	0,76	□ Flame in combustor
51	8,15	339,23	29,50	0,74	□ Flame in combustor
52	8,15	344,93	29,99	0,73	□ Flame in combustor
53	8,15	350,62	30,47	0,72	Δ Flame at combustor rim
54	8,15	356,32	30,95	0,71	Δ Flame at combustor rim
55	8,15	362,01	31,44	0,70	Δ Flame at combustor rim
56	8,15	367,71	31,92	0,69	No ignition

Tabel 11 Data komposisi bahan bakar dan udara *Combustor* D_{out} 5 mm (Q_{fuel} 8,68 ml/min)

No	Q_{fuel} (ml/min)	Q_{air} (ml/min)	$V_{reaktan}$ (Cm/s)	Ekv Rasio (Φ)	Keterangan
1	8,68	54,43	5,36	4,93	Δ Flame at combustor rim
2	8,68	60,13	5,84	4,47	Δ Flame at combustor rim
3	8,68	65,82	6,33	4,08	Δ Flame at combustor rim
4	8,68	71,52	6,81	3,76	Δ Flame at combustor rim
5	8,68	77,21	7,29	3,48	Δ Flame at combustor rim
6	8,68	82,91	7,78	3,24	Δ Flame at combustor rim
7	8,68	88,61	8,26	3,03	Δ Flame at combustor rim

8	8,68	94,30	8,75	2,85	Δ Flame at combustor rim
9	8,68	100,00	9,23	2,69	Δ Flame at combustor rim
10	8,68	105,69	9,71	2,54	Δ Flame at combustor rim
11	8,68	111,39	10,20	2,41	Δ Flame at combustor rim
12	8,68	117,09	10,68	2,29	Δ Flame at combustor rim
13	8,68	122,78	11,16	2,19	Δ Flame at combustor rim
14	8,68	128,48	11,65	2,09	Δ Flame at combustor rim
15	8,68	134,17	12,13	2,00	Δ Flame at combustor rim
16	8,68	139,87	12,62	1,92	Δ Flame at combustor rim
17	8,68	145,57	13,10	1,85	Δ Flame at combustor rim
18	8,68	151,26	13,58	1,78	Δ Flame at combustor rim
19	8,68	156,96	14,07	1,71	Δ Flame at combustor rim
20	8,68	162,65	14,55	1,65	Δ Flame at combustor rim
21	8,68	168,35	15,03	1,60	Δ Flame at combustor rim
22	8,68	174,05	15,52	1,54	□ Flame in combustor
23	8,68	179,74	16,00	1,49	□ Flame in combustor
24	8,68	185,44	16,49	1,45	□ Flame in combustor
25	8,68	191,13	16,97	1,41	□ Flame in combustor
26	8,68	196,83	17,45	1,36	□ Flame in combustor
27	8,68	202,53	17,94	1,33	O Flame at flame holder
28	8,68	208,22	18,42	1,29	O Flame at flame holder
29	8,68	213,92	18,90	1,26	O Flame at flame holder
30	8,68	219,61	19,39	1,22	O Flame at flame holder
31	8,68	225,31	19,87	1,19	O Flame at flame holder
32	8,68	231,01	20,36	1,16	O Flame at flame holder
33	8,68	236,70	20,84	1,13	O Flame at flame holder
34	8,68	242,40	21,32	1,11	O Flame at flame holder
35	8,68	248,09	21,81	1,08	O Flame at flame holder
36	8,68	253,79	22,29	1,06	O Flame at flame holder
37	8,68	259,49	22,77	1,04	O Flame at flame holder
38	8,68	265,18	23,26	1,01	O Flame at flame holder

39	8,68	270,88	23,74	0,99	O Flame at flame holder
40	8,68	276,57	24,23	0,97	O Flame at flame holder
41	8,68	282,27	24,71	0,95	O Flame at flame holder
42	8,68	287,97	25,19	0,93	O Flame at flame holder
43	8,68	293,66	25,68	0,91	O Flame at flame holder
44	8,68	299,36	26,16	0,90	O Flame at flame holder
45	8,68	305,05	26,64	0,88	O Flame at flame holder
46	8,68	310,75	27,13	0,86	O Flame at flame holder
47	8,68	316,45	27,61	0,85	O Flame at flame holder
48	8,68	322,14	28,10	0,83	O Flame at flame holder
49	8,68	327,84	28,58	0,82	O Flame at flame holder
50	8,68	333,53	29,06	0,81	O Flame at flame holder
51	8,68	339,23	29,55	0,79	O Flame at flame holder
52	8,68	344,93	30,03	0,78	O Flame at flame holder
53	8,68	350,62	30,51	0,77	O Flame at flame holder
54	8,68	356,32	31,00	0,75	Δ Flame at combustor rim
55	8,68	362,01	31,48	0,74	Δ Flame at combustor rim
56	8,68	367,71	31,97	0,73	Δ Flame at combustor rim
57	8,68	373,40	32,45	0,72	No ignition

Tabel 12 Data komposisi bahan bakar dan udara *Combustor* D_{out} 5 mm (Q_{fuel} 9,21 ml/min)

No	Q_{fuel} (ml/min)	Q_{air} (ml/min)	$V_{reaktan}$ (Cm/s)	Ekv Rasio (Φ)	Keterangan
1	9,21	54,43	5,40	5,24	Δ Flame at combustor rim
2	9,21	60,13	5,89	4,74	Δ Flame at combustor rim
3	9,21	65,82	6,37	4,33	Δ Flame at combustor rim
4	9,21	71,52	6,86	3,99	Δ Flame at combustor rim
5	9,21	77,21	7,34	3,69	Δ Flame at combustor rim
6	9,21	82,91	7,82	3,44	Δ Flame at combustor rim
7	9,21	88,61	8,31	3,22	Δ Flame at combustor rim

8	9,21	94,30	8,79	3,02	Δ Flame at combustor rim
9	9,21	100,00	9,27	2,85	Δ Flame at combustor rim
10	9,21	105,69	9,76	2,70	Δ Flame at combustor rim
11	9,21	111,39	10,24	2,56	Δ Flame at combustor rim
12	9,21	117,09	10,73	2,43	Δ Flame at combustor rim
13	9,21	122,78	11,21	2,32	Δ Flame at combustor rim
14	9,21	128,48	11,69	2,22	Δ Flame at combustor rim
15	9,21	134,17	12,18	2,12	Δ Flame at combustor rim
16	9,21	139,87	12,66	2,04	Δ Flame at combustor rim
17	9,21	145,57	13,14	1,96	Δ Flame at combustor rim
18	9,21	151,26	13,63	1,88	Δ Flame at combustor rim
19	9,21	156,96	14,11	1,82	Δ Flame at combustor rim
20	9,21	162,65	14,60	1,75	Δ Flame at combustor rim
21	9,21	168,35	15,08	1,69	Δ Flame at combustor rim
22	9,21	174,05	15,56	1,64	Δ Flame at combustor rim
23	9,21	179,74	16,05	1,59	Δ Flame at combustor rim
24	9,21	185,44	16,53	1,54	Δ Flame at combustor rim
25	9,21	191,13	17,01	1,49	Δ Flame at combustor rim
26	9,21	196,83	17,50	1,45	□ Flame in combustor
27	9,21	202,53	17,98	1,41	□ Flame in combustor
28	9,21	208,22	18,47	1,37	□ Flame in combustor
29	9,21	213,92	18,95	1,33	□ Flame in combustor
30	9,21	219,61	19,43	1,30	□ Flame in combustor
31	9,21	225,31	19,92	1,27	O Flame at flame holder
32	9,21	231,01	20,40	1,23	O Flame at flame holder
33	9,21	236,70	20,88	1,20	O Flame at flame holder
34	9,21	242,40	21,37	1,18	O Flame at flame holder
35	9,21	248,09	21,85	1,15	O Flame at flame holder
36	9,21	253,79	22,34	1,12	O Flame at flame holder
37	9,21	259,49	22,82	1,10	O Flame at flame holder
38	9,21	265,18	23,30	1,07	O Flame at flame holder

39	9,21	270,88	23,79	1,05	O Flame at flame holder
40	9,21	276,57	24,27	1,03	O Flame at flame holder
41	9,21	282,27	24,75	1,01	O Flame at flame holder
42	9,21	287,97	25,24	0,99	O Flame at flame holder
43	9,21	293,66	25,72	0,97	O Flame at flame holder
44	9,21	299,36	26,21	0,95	□ Flame in combustor
45	9,21	305,05	26,69	0,93	□ Flame in combustor
46	9,21	310,75	27,17	0,92	□ Flame in combustor
47	9,21	316,45	27,66	0,90	□ Flame in combustor
48	9,21	322,14	28,14	0,88	□ Flame in combustor
49	9,21	327,84	28,62	0,87	□ Flame in combustor
50	9,21	333,53	29,11	0,85	□ Flame in combustor
51	9,21	339,23	29,59	0,84	□ Flame in combustor
52	9,21	344,93	30,08	0,83	□ Flame in combustor
53	9,21	350,62	30,56	0,81	□ Flame in combustor
54	9,21	356,32	31,04	0,80	□ Flame in combustor
55	9,21	362,01	31,53	0,79	□ Flame in combustor
56	9,21	367,71	32,01	0,78	□ Flame in combustor
57	9,21	373,41	32,49	0,76	Δ Flame at combustor rim
58	9,21	379,10	32,98	0,75	Δ Flame at combustor rim
59	9,21	384,80	33,46	0,74	Δ Flame at combustor rim
60	9,21	390,49	33,95	0,73	No ignition

Tabel 13 Data komposisi bahan bakar dan udara *Combustor* D_{out} 5 mm (Q_{fuel} 9,74 ml/min)

No	Q_{fuel} (ml/min)	Q_{air} (ml/min)	$V_{reaktan}$ (Cm/s)	Ekv Rasio (Φ)	Keterangan
1	9,74	54,43	5,45	5,54	Δ Flame at combustor rim
2	9,74	60,13	5,93	5,01	Δ Flame at combustor rim
3	9,74	65,82	6,42	4,58	Δ Flame at combustor rim
4	9,74	71,52	6,90	4,22	Δ Flame at combustor rim

5	9,74	77,21	7,39	3,90	Δ Flame at combustor rim
6	9,74	82,91	7,87	3,64	Δ Flame at combustor rim
7	9,74	88,61	8,35	3,40	Δ Flame at combustor rim
8	9,74	94,30	8,84	3,20	Δ Flame at combustor rim
9	9,74	100,00	9,32	3,02	Δ Flame at combustor rim
10	9,74	105,69	9,80	2,85	Δ Flame at combustor rim
11	9,74	111,39	10,29	2,71	Δ Flame at combustor rim
12	9,74	117,09	10,77	2,58	Δ Flame at combustor rim
13	9,74	122,78	11,25	2,46	Δ Flame at combustor rim
14	9,74	128,48	11,74	2,35	Δ Flame at combustor rim
15	9,74	134,17	12,22	2,25	Δ Flame at combustor rim
16	9,74	139,87	12,71	2,16	Δ Flame at combustor rim
17	9,74	145,57	13,19	2,07	Δ Flame at combustor rim
18	9,74	151,26	13,67	1,99	Δ Flame at combustor rim
19	9,74	156,96	14,16	1,92	Δ Flame at combustor rim
20	9,74	162,65	14,64	1,85	Δ Flame at combustor rim
21	9,74	168,35	15,12	1,79	Δ Flame at combustor rim
22	9,74	174,05	15,61	1,73	Δ Flame at combustor rim
23	9,74	179,74	16,09	1,68	Δ Flame at combustor rim
24	9,74	185,44	16,58	1,63	Δ Flame at combustor rim
25	9,74	191,13	17,06	1,58	Δ Flame at combustor rim
26	9,74	196,83	17,54	1,53	Δ Flame at combustor rim
27	9,74	202,53	18,03	1,49	Δ Flame at combustor rim
28	9,74	208,22	18,51	1,45	Δ Flame at combustor rim
29	9,74	213,92	18,99	1,41	Δ Flame at combustor rim
30	9,74	219,61	19,48	1,37	Δ Flame at combustor rim
31	9,74	225,31	19,96	1,34	□ Flame in combustor
32	9,74	231,01	20,45	1,31	□ Flame in combustor
33	9,74	236,70	20,93	1,27	□ Flame in combustor
34	9,74	242,40	21,41	1,24	□ Flame in combustor
35	9,74	248,09	21,90	1,22	O Flame at flame holder

36	9,74	253,79	22,38	1,19	O Flame at flame holder
37	9,74	259,49	22,86	1,16	O Flame at flame holder
38	9,74	265,18	23,35	1,14	O Flame at flame holder
39	9,74	270,88	23,83	1,11	O Flame at flame holder
40	9,74	276,57	24,32	1,09	O Flame at flame holder
41	9,74	282,27	24,80	1,07	O Flame at flame holder
42	9,74	287,97	25,28	1,05	O Flame at flame holder
43	9,74	293,66	25,77	1,03	O Flame at flame holder
44	9,74	299,36	26,25	1,01	O Flame at flame holder
45	9,74	305,05	26,73	0,99	O Flame at flame holder
46	9,74	310,75	27,22	0,97	O Flame at flame holder
47	9,74	316,45	27,70	0,95	O Flame at flame holder
48	9,74	322,14	28,19	0,94	O Flame at flame holder
49	9,74	327,84	28,67	0,92	O Flame at flame holder
50	9,74	333,53	29,15	0,90	□ Flame in combustor
51	9,74	339,23	29,64	0,89	□ Flame in combustor
52	9,74	344,93	30,12	0,87	□ Flame in combustor
53	9,74	350,62	30,60	0,86	□ Flame in combustor
54	9,74	356,32	31,09	0,85	□ Flame in combustor
55	9,74	362,01	31,57	0,83	□ Flame in combustor
56	9,74	367,71	32,06	0,82	□ Flame in combustor
57	9,74	373,41	32,54	0,81	□ Flame in combustor
58	9,74	379,10	33,02	0,80	□ Flame in combustor
59	9,74	384,80	33,51	0,78	□ Flame in combustor
60	9,74	390,49	33,99	0,77	□ Flame in combustor
61	9,74	396,19	34,47	0,76	□ Flame in combustor
62	9,74	401,89	34,96	0,75	Δ Flame at combustor rim
63	9,74	407,58	35,44	0,74	Δ Flame at combustor rim
64	9,74	413,28	35,93	0,73	Δ Flame at combustor rim
65	9,74	418,97	36,41	0,72	Δ Flame at combustor rim
66	9,74	424,67	36,89	0,71	Δ Flame at combustor rim

67	9,74	430,36	37,38	0,70	No Ignition

Tabel 14 Data komposisi bahan bakar dan udara *Combustor* D_{out} 5 mm (Q_{fuel} 10,28 ml/min)

No	Q_{fuel} (ml/min)	Q_{air} (ml/min)	$V_{reaktan}$ (Cm/s)	Ekv Rasio (Φ)	Keterangan
1	10,28	54,43	5,50	5,84	Δ Flame at combustor rim
2	10,28	60,13	5,98	5,29	Δ Flame at combustor rim
3	10,28	65,82	6,46	4,83	Δ Flame at combustor rim
4	10,28	71,52	6,95	4,45	Δ Flame at combustor rim
5	10,28	77,21	7,43	4,12	Δ Flame at combustor rim
6	10,28	82,91	7,91	3,84	Δ Flame at combustor rim
7	10,28	88,61	8,40	3,59	Δ Flame at combustor rim
8	10,28	94,30	8,88	3,37	Δ Flame at combustor rim
9	10,28	100,00	9,37	3,18	Δ Flame at combustor rim
10	10,28	105,69	9,85	3,01	Δ Flame at combustor rim
11	10,28	111,39	10,33	2,85	Δ Flame at combustor rim
12	10,28	117,09	10,82	2,72	Δ Flame at combustor rim
13	10,28	122,78	11,30	2,59	Δ Flame at combustor rim
14	10,28	128,48	11,78	2,47	Δ Flame at combustor rim
15	10,28	134,17	12,27	2,37	Δ Flame at combustor rim
16	10,28	139,87	12,75	2,27	Δ Flame at combustor rim
17	10,28	145,57	13,24	2,18	Δ Flame at combustor rim
18	10,28	151,26	13,72	2,10	Δ Flame at combustor rim
19	10,28	156,96	14,20	2,03	Δ Flame at combustor rim
20	10,28	162,65	14,69	1,95	Δ Flame at combustor rim
21	10,28	168,35	15,17	1,89	Δ Flame at combustor rim
22	10,28	174,05	15,65	1,83	Δ Flame at combustor rim
23	10,28	179,74	16,14	1,77	Δ Flame at combustor rim
24	10,28	185,44	16,62	1,71	Δ Flame at combustor rim
25	10,28	191,13	17,10	1,66	Δ Flame at combustor rim

26	10,28	196,83	17,59	1,62	Δ Flame at combustor rim
27	10,28	202,53	18,07	1,57	Δ Flame at combustor rim
28	10,28	208,22	18,56	1,53	Δ Flame at combustor rim
29	10,28	213,92	19,04	1,49	Δ Flame at combustor rim
30	10,28	219,61	19,52	1,45	Δ Flame at combustor rim
31	10,28	225,31	20,01	1,41	Δ Flame at combustor rim
32	10,28	231,01	20,49	1,38	Δ Flame at combustor rim
33	10,28	236,70	20,97	1,34	Δ Flame at combustor rim
34	10,28	242,40	21,46	1,31	Δ Flame at combustor rim
35	10,28	248,09	21,94	1,28	□ Flame in combustor
36	10,28	253,79	22,43	1,25	□ Flame in combustor
37	10,28	259,49	22,91	1,23	□ Flame in combustor
38	10,28	265,18	23,39	1,20	□ Flame in combustor
39	10,28	270,88	23,88	1,17	□ Flame in combustor
40	10,28	276,57	24,36	1,15	O Flame at flame holder
41	10,28	282,27	24,84	1,13	O Flame at flame holder
42	10,28	287,97	25,33	1,10	O Flame at flame holder
43	10,28	293,66	25,81	1,08	O Flame at flame holder
44	10,28	299,36	26,30	1,06	O Flame at flame holder
45	10,28	305,05	26,78	1,04	O Flame at flame holder
46	10,28	310,75	27,26	1,02	O Flame at flame holder
47	10,28	316,45	27,75	1,00	O Flame at flame holder
48	10,28	322,14	28,23	0,99	O Flame at flame holder
49	10,28	327,84	28,71	0,97	O Flame at flame holder
50	10,28	333,53	29,20	0,95	O Flame at flame holder
51	10,28	339,23	29,68	0,94	O Flame at flame holder
52	10,28	344,93	30,17	0,92	O Flame at flame holder
53	10,28	350,62	30,65	0,91	O Flame at flame holder
54	10,28	356,32	31,13	0,89	□ Flame in combustor
55	10,28	362,01	31,62	0,88	□ Flame in combustor
56	10,28	367,71	32,10	0,86	□ Flame in combustor

57	10,28	373,41	32,58	0,85	□ Flame in combustor
58	10,28	379,10	33,07	0,84	□ Flame in combustor
59	10,28	384,80	33,55	0,83	□ Flame in combustor
60	10,28	390,49	34,04	0,81	□ Flame in combustor
61	10,28	396,19	34,52	0,80	□ Flame in combustor
62	10,28	401,89	35,00	0,79	□ Flame in combustor
63	10,28	407,58	35,49	0,78	□ Flame in combustor
64	10,28	413,28	35,97	0,77	□ Flame in combustor
65	10,28	418,97	36,45	0,76	Δ Flame at combustor rim
66	10,28	424,67	36,94	0,75	Δ Flame at combustor rim
67	10,28	430,37	37,42	0,74	Δ Flame at combustor rim
68	10,28	436,06	37,91	0,73	Δ Flame at combustor rim
69	10,28	441,76	38,39	0,72	Δ Flame at combustor rim
70	10,28	447,45	38,87	0,71	Δ Flame at combustor rim
71	10,28	453,15	39,36	0,70	Δ Flame at combustor rim
72	10,28	458,84	39,84	0,69	No ignition

Tabel 15 Data komposisi bahan bakar dan udara *Combustor* D_{out} 5 mm (Q_{fuel} 10,81 ml/min)

No	Q_{fuel} (ml/min)	Q_{air} (ml/min)	$V_{reaktan}$ (Cm/s)	Ekv Rasio (Φ)	Keterangan
1	10,81	54,43	5,54	6,14	Δ Flame at combustor rim
2	10,81	60,13	6,02	5,56	Δ Flame at combustor rim
3	10,81	65,82	6,51	5,08	Δ Flame at combustor rim
4	10,81	71,52	6,99	4,68	Δ Flame at combustor rim
5	10,81	77,21	7,48	4,33	Δ Flame at combustor rim
6	10,81	82,91	7,96	4,03	Δ Flame at combustor rim
7	10,81	88,61	8,44	3,77	Δ Flame at combustor rim
8	10,81	94,30	8,93	3,55	Δ Flame at combustor rim
9	10,81	100,00	9,41	3,34	Δ Flame at combustor rim
10	10,81	105,69	9,89	3,16	Δ Flame at combustor rim

11	10,81	111,39	10,38	3,00	Δ Flame at combustor rim
12	10,81	117,09	10,86	2,86	Δ Flame at combustor rim
13	10,81	122,78	11,35	2,72	Δ Flame at combustor rim
14	10,81	128,48	11,83	2,60	Δ Flame at combustor rim
15	10,81	134,17	12,31	2,49	Δ Flame at combustor rim
16	10,81	139,87	12,80	2,39	Δ Flame at combustor rim
17	10,81	145,57	13,28	2,30	Δ Flame at combustor rim
18	10,81	151,26	13,76	2,21	Δ Flame at combustor rim
19	10,81	156,96	14,25	2,13	Δ Flame at combustor rim
20	10,81	162,65	14,73	2,06	Δ Flame at combustor rim
21	10,81	168,35	15,22	1,99	Δ Flame at combustor rim
22	10,81	174,05	15,70	1,92	Δ Flame at combustor rim
23	10,81	179,74	16,18	1,86	Δ Flame at combustor rim
24	10,81	185,44	16,67	1,80	Δ Flame at combustor rim
25	10,81	191,13	17,15	1,75	Δ Flame at combustor rim
26	10,81	196,83	17,63	1,70	Δ Flame at combustor rim
27	10,81	202,53	18,12	1,65	Δ Flame at combustor rim
28	10,81	208,22	18,60	1,61	Δ Flame at combustor rim
29	10,81	213,92	19,09	1,56	Δ Flame at combustor rim
30	10,81	219,61	19,57	1,52	Δ Flame at combustor rim
31	10,81	225,31	20,05	1,48	Δ Flame at combustor rim
32	10,81	231,01	20,54	1,45	Δ Flame at combustor rim
33	10,81	236,70	21,02	1,41	Δ Flame at combustor rim
34	10,81	242,40	21,50	1,38	Δ Flame at combustor rim
35	10,81	248,09	21,99	1,35	Δ Flame at combustor rim
36	10,81	253,79	22,47	1,32	Δ Flame at combustor rim
37	10,81	259,49	22,96	1,29	Δ Flame at combustor rim
38	10,81	265,18	23,44	1,26	Δ Flame at combustor rim
39	10,81	270,88	23,92	1,23	□ Flame in combustor
40	10,81	276,57	24,41	1,21	□ Flame in combustor
41	10,81	282,27	24,89	1,18	□ Flame in combustor

42	10,81	287,97	25,37	1,16	□ Flame in combustor
43	10,81	293,66	25,86	1,14	□ Flame in combustor
44	10,81	299,36	26,34	1,12	□ Flame in combustor
45	10,81	305,05	26,82	1,10	O Flame at flame holder
46	10,81	310,75	27,31	1,08	O Flame at flame holder
47	10,81	316,45	27,79	1,06	O Flame at flame holder
48	10,81	322,14	28,28	1,04	O Flame at flame holder
49	10,81	327,84	28,76	1,02	O Flame at flame holder
50	10,81	333,53	29,24	1,00	O Flame at flame holder
51	10,81	339,23	29,73	0,99	O Flame at flame holder
52	10,81	344,93	30,21	0,97	O Flame at flame holder
53	10,81	350,62	30,69	0,95	O Flame at flame holder
54	10,81	356,32	31,18	0,94	□ Flame in combustor
55	10,81	362,01	31,66	0,92	□ Flame in combustor
56	10,81	367,71	32,15	0,91	□ Flame in combustor
57	10,81	373,41	32,63	0,90	□ Flame in combustor
58	10,81	379,10	33,11	0,88	□ Flame in combustor
59	10,81	384,80	33,60	0,87	□ Flame in combustor
60	10,81	390,49	34,08	0,86	□ Flame in combustor
61	10,81	396,19	34,56	0,84	□ Flame in combustor
62	10,81	401,89	35,05	0,83	□ Flame in combustor
63	10,81	407,58	35,53	0,82	□ Flame in combustor
64	10,81	413,28	36,02	0,81	□ Flame in combustor
65	10,81	418,97	36,50	0,80	□ Flame in combustor
66	10,81	424,67	36,98	0,79	□ Flame in combustor
67	10,81	430,37	37,47	0,78	□ Flame in combustor
68	10,81	436,06	37,95	0,77	□ Flame in combustor
69	10,81	441,76	38,43	0,76	□ Flame in combustor
70	10,81	447,45	38,92	0,75	□ Flame in combustor
71	10,81	453,15	39,40	0,74	□ Flame in combustor
72	10,81	458,85	39,89	0,73	Δ Flame at combustor rim

73	10,81	464,54	40,37	0,72	Δ Flame at combustor rim
74	10,81	470,24	40,85	0,71	Δ Flame at combustor rim
75	10,81	475,93	41,34	0,70	Δ Flame at combustor rim
76	10,81	481,63	41,82	0,69	Δ Flame at combustor rim
77	10,81	487,33	42,30	0,69	No ignition

Tabel 16 Data komposisi bahan bakar dan udara *Combustor* D_{out} 5 mm (Q_{fuel} 11,34 ml/min)

No	Q_{fuel} (ml/min)	Q_{air} (ml/min)	$V_{reaktan}$ (Cm/s)	Ekv Rasio (Φ)	Keterangan
1	11,34	54,43	5,59	6,45	Δ Flame at combustor rim
2	11,34	60,13	6,07	5,84	Δ Flame at combustor rim
3	11,34	65,82	6,55	5,33	Δ Flame at combustor rim
4	11,34	71,52	7,04	4,91	Δ Flame at combustor rim
5	11,34	77,21	7,52	4,54	Δ Flame at combustor rim
6	11,34	82,91	8,00	4,23	Δ Flame at combustor rim
7	11,34	88,61	8,49	3,96	Δ Flame at combustor rim
8	11,34	94,30	8,97	3,72	Δ Flame at combustor rim
9	11,34	100,00	9,46	3,51	Δ Flame at combustor rim
10	11,34	105,69	9,94	3,32	Δ Flame at combustor rim
11	11,34	111,39	10,42	3,15	Δ Flame at combustor rim
12	11,34	117,09	10,91	3,00	Δ Flame at combustor rim
13	11,34	122,78	11,39	2,86	Δ Flame at combustor rim
14	11,34	128,48	11,87	2,73	Δ Flame at combustor rim
15	11,34	134,17	12,36	2,62	Δ Flame at combustor rim
16	11,34	139,87	12,84	2,51	Δ Flame at combustor rim
17	11,34	145,57	13,33	2,41	Δ Flame at combustor rim
18	11,34	151,26	13,81	2,32	Δ Flame at combustor rim
19	11,34	156,96	14,29	2,24	Δ Flame at combustor rim
20	11,34	162,65	14,78	2,16	Δ Flame at combustor rim
21	11,34	168,35	15,26	2,08	Δ Flame at combustor rim

22	11,34	174,05	15,74	2,02	Δ Flame at combustor rim
23	11,34	179,74	16,23	1,95	Δ Flame at combustor rim
24	11,34	185,44	16,71	1,89	Δ Flame at combustor rim
25	11,34	191,13	17,20	1,84	Δ Flame at combustor rim
26	11,34	196,83	17,68	1,78	Δ Flame at combustor rim
27	11,34	202,53	18,16	1,73	Δ Flame at combustor rim
28	11,34	208,22	18,65	1,69	Δ Flame at combustor rim
29	11,34	213,92	19,13	1,64	Δ Flame at combustor rim
30	11,34	219,61	19,61	1,60	Δ Flame at combustor rim
31	11,34	225,31	20,10	1,56	Δ Flame at combustor rim
32	11,34	231,01	20,58	1,52	Δ Flame at combustor rim
33	11,34	236,70	21,07	1,48	Δ Flame at combustor rim
34	11,34	242,40	21,55	1,45	Δ Flame at combustor rim
35	11,34	248,09	22,03	1,41	Δ Flame at combustor rim
36	11,34	253,79	22,52	1,38	Δ Flame at combustor rim
37	11,34	259,49	23,00	1,35	Δ Flame at combustor rim
38	11,34	265,18	23,48	1,32	Δ Flame at combustor rim
39	11,34	270,88	23,97	1,30	Δ Flame at combustor rim
40	11,34	276,57	24,45	1,27	□ Flame in combustor
41	11,34	282,27	24,94	1,24	□ Flame in combustor
42	11,34	287,97	25,42	1,22	□ Flame in combustor
43	11,34	293,66	25,90	1,19	□ Flame in combustor
44	11,34	299,36	26,39	1,17	□ Flame in combustor
45	11,34	305,05	26,87	1,15	□ Flame in combustor
46	11,34	310,75	27,35	1,13	O Flame at flame holder
47	11,34	316,45	27,84	1,11	O Flame at flame holder
48	11,34	322,14	28,32	1,09	O Flame at flame holder
49	11,34	327,84	28,81	1,07	O Flame at flame holder
50	11,34	333,53	29,29	1,05	O Flame at flame holder
51	11,34	339,23	29,77	1,03	O Flame at flame holder
52	11,34	344,93	30,26	1,02	O Flame at flame holder

53	11,34	350,62	30,74	1,00	O Flame at flame holder
54	11,34	356,32	31,22	0,98	O Flame at flame holder
55	11,34	362,01	31,71	0,97	□ Flame in combustor
56	11,34	367,71	32,19	0,95	□ Flame in combustor
57	11,34	373,41	32,67	0,94	□ Flame in combustor
58	11,34	379,10	33,16	0,93	□ Flame in combustor
59	11,34	384,80	33,64	0,91	□ Flame in combustor
60	11,34	390,49	34,13	0,90	□ Flame in combustor
61	11,34	396,19	34,61	0,89	□ Flame in combustor
62	11,34	401,89	35,09	0,87	□ Flame in combustor
63	11,34	407,58	35,58	0,86	□ Flame in combustor
64	11,34	413,28	36,06	0,85	□ Flame in combustor
65	11,34	418,97	36,54	0,84	□ Flame in combustor
66	11,34	424,67	37,03	0,83	□ Flame in combustor
67	11,34	430,37	37,51	0,82	□ Flame in combustor
68	11,34	436,06	38,00	0,80	□ Flame in combustor
69	11,34	441,76	38,48	0,79	□ Flame in combustor
70	11,34	447,45	38,96	0,78	□ Flame in combustor
71	11,34	453,15	39,45	0,77	□ Flame in combustor
72	11,34	458,85	39,93	0,76	□ Flame in combustor
73	11,34	464,54	40,41	0,76	Δ Flame at combustor rim
74	11,34	470,24	40,90	0,75	Δ Flame at combustor rim
75	11,34	475,93	41,38	0,74	Δ Flame at combustor rim
76	11,34	481,63	41,87	0,73	Δ Flame at combustor rim
77	11,34	487,33	42,35	0,72	Δ Flame at combustor rim
78	11,34	493,02	42,83	0,71	Δ Flame at combustor rim
79	11,34	498,72	43,32	0,70	No ignition

Tabel 17 Data komposisi bahan bakar dan udara *Combustor* D_{out} 5 mm (Q_{fuel} 11,87 ml/min)

No	Q_{fuel} (ml/min)	Q_{air} (ml/min)	$V_{reaktan}$ (Cm/s)	Ekv Rasio (Φ)	Keterangan
1	11,87	54,43	5,63	6,75	Δ Flame at combustor rim
2	11,87	60,13	6,11	6,11	Δ Flame at combustor rim
3	11,87	65,82	6,60	5,58	Δ Flame at combustor rim
4	11,87	71,52	7,08	5,14	Δ Flame at combustor rim
5	11,87	77,21	7,57	4,76	Δ Flame at combustor rim
6	11,87	82,91	8,05	4,43	Δ Flame at combustor rim
7	11,87	88,61	8,53	4,15	Δ Flame at combustor rim
8	11,87	94,30	9,02	3,90	Δ Flame at combustor rim
9	11,87	100,00	9,50	3,67	Δ Flame at combustor rim
10	11,87	105,69	9,98	3,48	Δ Flame at combustor rim
11	11,87	111,39	10,47	3,30	Δ Flame at combustor rim
12	11,87	117,09	10,95	3,14	Δ Flame at combustor rim
13	11,87	122,78	11,44	2,99	Δ Flame at combustor rim
14	11,87	128,48	11,92	2,86	Δ Flame at combustor rim
15	11,87	134,17	12,40	2,74	Δ Flame at combustor rim
16	11,87	139,87	12,89	2,63	Δ Flame at combustor rim
17	11,87	145,57	13,37	2,52	Δ Flame at combustor rim
18	11,87	151,26	13,85	2,43	Δ Flame at combustor rim
19	11,87	156,96	14,34	2,34	Δ Flame at combustor rim
20	11,87	162,65	14,82	2,26	Δ Flame at combustor rim
21	11,87	168,35	15,31	2,18	Δ Flame at combustor rim
22	11,87	174,05	15,79	2,11	Δ Flame at combustor rim
23	11,87	179,74	16,27	2,04	Δ Flame at combustor rim
24	11,87	185,44	16,76	1,98	Δ Flame at combustor rim
25	11,87	191,13	17,24	1,92	Δ Flame at combustor rim
26	11,87	196,83	17,72	1,87	Δ Flame at combustor rim
27	11,87	202,53	18,21	1,81	Δ Flame at combustor rim

28	11,87	208,22	18,69	1,76	Δ Flame at combustor rim
29	11,87	213,92	19,18	1,72	Δ Flame at combustor rim
30	11,87	219,61	19,66	1,67	Δ Flame at combustor rim
31	11,87	225,31	20,14	1,63	Δ Flame at combustor rim
32	11,87	231,01	20,63	1,59	Δ Flame at combustor rim
33	11,87	236,70	21,11	1,55	Δ Flame at combustor rim
34	11,87	242,40	21,59	1,52	Δ Flame at combustor rim
35	11,87	248,09	22,08	1,48	Δ Flame at combustor rim
36	11,87	253,79	22,56	1,45	Δ Flame at combustor rim
37	11,87	259,49	23,05	1,42	Δ Flame at combustor rim
38	11,87	265,18	23,53	1,39	Δ Flame at combustor rim
39	11,87	270,88	24,01	1,36	Δ Flame at combustor rim
40	11,87	276,57	24,50	1,33	Δ Flame at combustor rim
41	11,87	282,27	24,98	1,30	Δ Flame at combustor rim
42	11,87	287,97	25,46	1,28	Δ Flame at combustor rim
43	11,87	293,66	25,95	1,25	□ Flame in combustor
44	11,87	299,36	26,43	1,23	□ Flame in combustor
45	11,87	305,05	26,92	1,20	□ Flame in combustor
46	11,87	310,75	27,40	1,18	□ Flame in combustor
47	11,87	316,45	27,88	1,16	□ Flame in combustor
48	11,87	322,14	28,37	1,14	□ Flame in combustor
49	11,87	327,84	28,85	1,12	□ Flame in combustor
50	11,87	333,53	29,33	1,10	□ Flame in combustor
51	11,87	339,23	29,82	1,08	□ Flame in combustor
52	11,87	344,93	30,30	1,06	O Flame at flame holder
53	11,87	350,62	30,79	1,05	O Flame at flame holder
54	11,87	356,32	31,27	1,03	O Flame at flame holder
55	11,87	362,01	31,75	1,01	□ Flame in combustor
56	11,87	367,71	32,24	1,00	□ Flame in combustor
57	11,87	373,41	32,72	0,98	□ Flame in combustor
58	11,87	379,10	33,20	0,97	□ Flame in combustor

59	11,87	384,80	33,69	0,95	□ Flame in combustor
60	11,87	390,49	34,17	0,94	□ Flame in combustor
61	11,87	396,19	34,66	0,93	□ Flame in combustor
62	11,87	401,89	35,14	0,91	□ Flame in combustor
63	11,87	407,58	35,62	0,90	□ Flame in combustor
64	11,87	413,28	36,11	0,89	□ Flame in combustor
65	11,87	418,97	36,59	0,88	□ Flame in combustor
66	11,87	424,67	37,07	0,86	□ Flame in combustor
67	11,87	430,37	37,56	0,85	□ Flame in combustor
68	11,87	436,06	38,04	0,84	□ Flame in combustor
69	11,87	441,76	38,52	0,83	□ Flame in combustor
70	11,87	447,45	39,01	0,82	□ Flame in combustor
71	11,87	453,15	39,49	0,81	□ Flame in combustor
72	11,87	458,85	39,98	0,80	□ Flame in combustor
73	11,87	464,54	40,46	0,79	□ Flame in combustor
74	11,87	470,24	40,94	0,78	□ Flame in combustor
75	11,87	475,93	41,43	0,77	□ Flame in combustor
76	11,87	481,63	41,91	0,76	Δ Flame at combustor rim
77	11,87	487,33	42,39	0,75	Δ Flame at combustor rim
78	11,87	493,02	42,88	0,75	Δ Flame at combustor rim
79	11,87	498,72	43,36	0,74	Δ Flame at combustor rim
80	11,87	504,41	43,85	0,73	Δ Flame at combustor rim
81	11,87	510,11	44,33	0,72	Δ Flame at combustor rim
82	11,87	515,81	44,81	0,71	No ignition

Tabel 18 Data komposisi bahan bakar dan udara *Combustor* D_{out} 5 mm (Q_{fuel} 12,40 ml/min)

No	Q_{fuel} (ml/min)	Q_{air} (ml/min)	$V_{reaktan}$ (Cm/s)	Ekv Rasio (Φ)	Keterangan
1	12,40	54,43	5,68	7,05	Δ Flame at combustor rim
2	12,40	60,13	6,16	6,38	Δ Flame at combustor rim

3	12,40	65,82	6,64	5,83	Δ Flame at combustor rim
4	12,40	71,52	7,13	5,37	Δ Flame at combustor rim
5	12,40	77,21	7,61	4,97	Δ Flame at combustor rim
6	12,40	82,91	8,09	4,63	Δ Flame at combustor rim
7	12,40	88,61	8,58	4,33	Δ Flame at combustor rim
8	12,40	94,30	9,06	4,07	Δ Flame at combustor rim
9	12,40	100,00	9,55	3,84	Δ Flame at combustor rim
10	12,40	105,69	10,03	3,63	Δ Flame at combustor rim
11	12,40	111,39	10,51	3,45	Δ Flame at combustor rim
12	12,40	117,09	11,00	3,28	Δ Flame at combustor rim
13	12,40	122,78	11,48	3,13	Δ Flame at combustor rim
14	12,40	128,48	11,96	2,99	Δ Flame at combustor rim
15	12,40	134,17	12,45	2,86	Δ Flame at combustor rim
16	12,40	139,87	12,93	2,74	Δ Flame at combustor rim
17	12,40	145,57	13,42	2,64	Δ Flame at combustor rim
18	12,40	151,26	13,90	2,54	Δ Flame at combustor rim
19	12,40	156,96	14,38	2,45	Δ Flame at combustor rim
20	12,40	162,65	14,87	2,36	Δ Flame at combustor rim
21	12,40	168,35	15,35	2,28	Δ Flame at combustor rim
22	12,40	174,05	15,83	2,21	Δ Flame at combustor rim
23	12,40	179,74	16,32	2,14	Δ Flame at combustor rim
24	12,40	185,44	16,80	2,07	Δ Flame at combustor rim
25	12,40	191,13	17,29	2,01	Δ Flame at combustor rim
26	12,40	196,83	17,77	1,95	Δ Flame at combustor rim
27	12,40	202,53	18,25	1,89	Δ Flame at combustor rim
28	12,40	208,22	18,74	1,84	Δ Flame at combustor rim
29	12,40	213,92	19,22	1,79	Δ Flame at combustor rim
30	12,40	219,61	19,70	1,75	Δ Flame at combustor rim
31	12,40	225,31	20,19	1,70	Δ Flame at combustor rim
32	12,40	231,01	20,67	1,66	Δ Flame at combustor rim
33	12,40	236,70	21,16	1,62	Δ Flame at combustor rim

34	12,40	242,40	21,64	1,58	Δ Flame at combustor rim
35	12,40	248,09	22,12	1,55	Δ Flame at combustor rim
36	12,40	253,79	22,61	1,51	Δ Flame at combustor rim
37	12,40	259,49	23,09	1,48	Δ Flame at combustor rim
38	12,40	265,18	23,57	1,45	Δ Flame at combustor rim
39	12,40	270,88	24,06	1,42	Δ Flame at combustor rim
40	12,40	276,57	24,54	1,39	Δ Flame at combustor rim
41	12,40	282,27	25,03	1,36	Δ Flame at combustor rim
42	12,40	287,97	25,51	1,33	Δ Flame at combustor rim
43	12,40	293,66	25,99	1,31	Δ Flame at combustor rim
44	12,40	299,36	26,48	1,28	Δ Flame at combustor rim
45	12,40	305,05	26,96	1,26	□ Flame in combustor
46	12,40	310,75	27,44	1,24	□ Flame in combustor
47	12,40	316,45	27,93	1,21	□ Flame in combustor
48	12,40	322,14	28,41	1,19	□ Flame in combustor
49	12,40	327,84	28,90	1,17	□ Flame in combustor
50	12,40	333,53	29,38	1,15	□ Flame in combustor
51	12,40	339,23	29,86	1,13	□ Flame in combustor
52	12,40	344,93	30,35	1,11	□ Flame in combustor
53	12,40	350,62	30,83	1,09	□ Flame in combustor
54	12,40	356,32	31,31	1,08	O Flame at flame holder
55	12,40	362,01	31,80	1,06	O Flame at flame holder
56	12,40	367,71	32,28	1,04	O Flame at flame holder
57	12,40	373,41	32,77	1,03	□ Flame in combustor
58	12,40	379,10	33,25	1,01	□ Flame in combustor
59	12,40	384,80	33,73	1,00	□ Flame in combustor
60	12,40	390,49	34,22	0,98	□ Flame in combustor
61	12,40	396,19	34,70	0,97	□ Flame in combustor
62	12,40	401,89	35,18	0,95	□ Flame in combustor
63	12,40	407,58	35,67	0,94	□ Flame in combustor
64	12,40	413,28	36,15	0,93	□ Flame in combustor

65	12,40	418,97	36,64	0,92	□ Flame in combustor
66	12,40	424,67	37,12	0,90	□ Flame in combustor
67	12,40	430,37	37,60	0,89	□ Flame in combustor
68	12,40	436,06	38,09	0,88	□ Flame in combustor
69	12,40	441,76	38,57	0,87	□ Flame in combustor
70	12,40	447,45	39,05	0,86	□ Flame in combustor
71	12,40	453,15	39,54	0,85	□ Flame in combustor
72	12,40	458,85	40,02	0,84	□ Flame in combustor
73	12,40	464,54	40,51	0,83	□ Flame in combustor
74	12,40	470,24	40,99	0,82	□ Flame in combustor
75	12,40	475,93	41,47	0,81	□ Flame in combustor
76	12,40	481,63	41,96	0,80	□ Flame in combustor
77	12,40	487,33	42,44	0,79	Δ Flame at combustor rim
78	12,40	493,02	42,92	0,78	Δ Flame at combustor rim
79	12,40	498,72	43,41	0,77	Δ Flame at combustor rim
80	12,40	504,41	43,89	0,76	Δ Flame at combustor rim
81	12,40	510,11	44,37	0,75	Δ Flame at combustor rim
82	12,40	515,81	44,86	0,74	Δ Flame at combustor rim
83	12,40	521,50	45,34	0,74	Δ Flame at combustor rim
84	12,40	527,20	45,83	0,73	No ignition

Tabel 19 Data komposisi bahan bakar dan udara *Combustor* D_{out} 5 mm (Q_{fuel} 12,94 ml/min)

No	Q_{fuel} (ml/min)	Q_{air} (ml/min)	$V_{reaktan}$ (Cm/s)	Ekv Rasio (Φ)	Keterangan
1	12,94	54,43	5,72	7,35	Δ Flame at combustor rim
2	12,94	60,13	6,20	6,66	Δ Flame at combustor rim
3	12,94	65,82	6,69	6,08	Δ Flame at combustor rim
4	12,94	71,52	7,17	5,60	Δ Flame at combustor rim
5	12,94	77,21	7,66	5,18	Δ Flame at combustor rim
6	12,94	82,91	8,14	4,83	Δ Flame at combustor rim

7	12,94	88,61	8,62	4,52	Δ Flame at combustor rim
8	12,94	94,30	9,11	4,24	Δ Flame at combustor rim
9	12,94	100,00	9,59	4,00	Δ Flame at combustor rim
10	12,94	105,69	10,07	3,79	Δ Flame at combustor rim
11	12,94	111,39	10,56	3,59	Δ Flame at combustor rim
12	12,94	117,09	11,04	3,42	Δ Flame at combustor rim
13	12,94	122,78	11,53	3,26	Δ Flame at combustor rim
14	12,94	128,48	12,01	3,12	Δ Flame at combustor rim
15	12,94	134,17	12,49	2,98	Δ Flame at combustor rim
16	12,94	139,87	12,98	2,86	Δ Flame at combustor rim
17	12,94	145,57	13,46	2,75	Δ Flame at combustor rim
18	12,94	151,26	13,94	2,65	Δ Flame at combustor rim
19	12,94	156,96	14,43	2,55	Δ Flame at combustor rim
20	12,94	162,65	14,91	2,46	Δ Flame at combustor rim
21	12,94	168,35	15,40	2,38	Δ Flame at combustor rim
22	12,94	174,05	15,88	2,30	Δ Flame at combustor rim
23	12,94	179,74	16,36	2,23	Δ Flame at combustor rim
24	12,94	185,44	16,85	2,16	Δ Flame at combustor rim
25	12,94	191,13	17,33	2,09	Δ Flame at combustor rim
26	12,94	196,83	17,81	2,03	Δ Flame at combustor rim
27	12,94	202,53	18,30	1,98	Δ Flame at combustor rim
28	12,94	208,22	18,78	1,92	Δ Flame at combustor rim
29	12,94	213,92	19,27	1,87	Δ Flame at combustor rim
30	12,94	219,61	19,75	1,82	Δ Flame at combustor rim
31	12,94	225,31	20,23	1,78	Δ Flame at combustor rim
32	12,94	231,01	20,72	1,73	Δ Flame at combustor rim
33	12,94	236,70	21,20	1,69	Δ Flame at combustor rim
34	12,94	242,40	21,68	1,65	Δ Flame at combustor rim
35	12,94	248,09	22,17	1,61	Δ Flame at combustor rim
36	12,94	253,79	22,65	1,58	Δ Flame at combustor rim
37	12,94	259,49	23,14	1,54	Δ Flame at combustor rim

38	12,94	265,18	23,62	1,51	Δ Flame at combustor rim
39	12,94	270,88	24,10	1,48	Δ Flame at combustor rim
40	12,94	276,57	24,59	1,45	Δ Flame at combustor rim
41	12,94	282,27	25,07	1,42	Δ Flame at combustor rim
42	12,94	287,97	25,55	1,39	Δ Flame at combustor rim
43	12,94	293,66	26,04	1,36	Δ Flame at combustor rim
44	12,94	299,36	26,52	1,34	Δ Flame at combustor rim
45	12,94	305,05	27,01	1,31	Δ Flame at combustor rim
46	12,94	310,75	27,49	1,29	Δ Flame at combustor rim
47	12,94	316,45	27,97	1,26	Δ Flame at combustor rim
48	12,94	322,14	28,46	1,24	Δ Flame at combustor rim
49	12,94	327,84	28,94	1,22	□ Flame in combustor
50	12,94	333,53	29,42	1,20	□ Flame in combustor
51	12,94	339,23	29,91	1,18	□ Flame in combustor
52	12,94	344,93	30,39	1,16	□ Flame in combustor
53	12,94	350,62	30,88	1,14	□ Flame in combustor
54	12,94	356,32	31,36	1,12	□ Flame in combustor
55	12,94	362,01	31,84	1,11	□ Flame in combustor
56	12,94	367,71	32,33	1,09	O Flame at flame holder
57	12,94	373,41	32,81	1,07	O Flame at flame holder
58	12,94	379,10	33,29	1,06	□ Flame in combustor
59	12,94	384,80	33,78	1,04	□ Flame in combustor
60	12,94	390,49	34,26	1,02	□ Flame in combustor
61	12,94	396,19	34,75	1,01	□ Flame in combustor
62	12,94	401,89	35,23	1,00	□ Flame in combustor
63	12,94	407,58	35,71	0,98	□ Flame in combustor
64	12,94	413,28	36,20	0,97	□ Flame in combustor
65	12,94	418,97	36,68	0,96	□ Flame in combustor
66	12,94	424,67	37,16	0,94	□ Flame in combustor
67	12,94	430,37	37,65	0,93	□ Flame in combustor
68	12,94	436,06	38,13	0,92	□ Flame in combustor

69	12,94	441,76	38,62	0,91	□ Flame in combustor
70	12,94	447,45	39,10	0,89	□ Flame in combustor
71	12,94	453,15	39,58	0,88	□ Flame in combustor
72	12,94	458,85	40,07	0,87	□ Flame in combustor
73	12,94	464,54	40,55	0,86	□ Flame in combustor
74	12,94	470,24	41,03	0,85	□ Flame in combustor
75	12,94	475,93	41,52	0,84	□ Flame in combustor
76	12,94	481,63	42,00	0,83	□ Flame in combustor
77	12,94	487,33	42,49	0,82	□ Flame in combustor
78	12,94	493,02	42,97	0,81	□ Flame in combustor
79	12,94	498,72	43,45	0,80	□ Flame in combustor
80	12,94	504,41	43,94	0,79	□ Flame in combustor
81	12,94	510,11	44,42	0,78	Δ Flame at combustor rim
82	12,94	515,81	44,90	0,78	Δ Flame at combustor rim
83	12,94	521,50	45,39	0,77	Δ Flame at combustor rim
84	12,94	527,20	45,87	0,76	Δ Flame at combustor rim
85	12,94	532,89	46,36	0,75	Δ Flame at combustor rim
86	12,94	538,59	46,84	0,74	Δ Flame at combustor rim
87	12,94	544,29	47,32	0,74	

Tabel 20 Data komposisi bahan bakar dan udara *Combustor* D_{out} 5 mm (Q_{fuel} 13,47 ml/min)

No	Q_{fuel} (ml/min)	Q_{air} (ml/min)	$V_{reaktan}$ (Cm/s)	Ekv Rasio (Φ)	Keterangan
1	13,47	54,43	5,77	7,66	Δ Flame at combustor rim
2	13,47	60,13	6,25	6,93	Δ Flame at combustor rim
3	13,47	65,82	6,73	6,33	Δ Flame at combustor rim
4	13,47	71,52	7,22	5,83	Δ Flame at combustor rim
5	13,47	77,21	7,70	5,40	Δ Flame at combustor rim
6	13,47	82,91	8,19	5,03	Δ Flame at combustor rim
7	13,47	88,61	8,67	4,70	Δ Flame at combustor rim

8	13,47	94,30	9,15	4,42	Δ Flame at combustor rim
9	13,47	100,00	9,64	4,17	Δ Flame at combustor rim
10	13,47	105,69	10,12	3,94	Δ Flame at combustor rim
11	13,47	111,39	10,60	3,74	Δ Flame at combustor rim
12	13,47	117,09	11,09	3,56	Δ Flame at combustor rim
13	13,47	122,78	11,57	3,39	Δ Flame at combustor rim
14	13,47	128,48	12,05	3,24	Δ Flame at combustor rim
15	13,47	134,17	12,54	3,11	Δ Flame at combustor rim
16	13,47	139,87	13,02	2,98	Δ Flame at combustor rim
17	13,47	145,57	13,51	2,86	Δ Flame at combustor rim
18	13,47	151,26	13,99	2,75	Δ Flame at combustor rim
19	13,47	156,96	14,47	2,65	Δ Flame at combustor rim
20	13,47	162,65	14,96	2,56	Δ Flame at combustor rim
21	13,47	168,35	15,44	2,48	Δ Flame at combustor rim
22	13,47	174,05	15,92	2,39	Δ Flame at combustor rim
23	13,47	179,74	16,41	2,32	Δ Flame at combustor rim
24	13,47	185,44	16,89	2,25	Δ Flame at combustor rim
25	13,47	191,13	17,38	2,18	Δ Flame at combustor rim
26	13,47	196,83	17,86	2,12	Δ Flame at combustor rim
27	13,47	202,53	18,34	2,06	Δ Flame at combustor rim
28	13,47	208,22	18,83	2,00	Δ Flame at combustor rim
29	13,47	213,92	19,31	1,95	Δ Flame at combustor rim
30	13,47	219,61	19,79	1,90	Δ Flame at combustor rim
31	13,47	225,31	20,28	1,85	Δ Flame at combustor rim
32	13,47	231,01	20,76	1,80	Δ Flame at combustor rim
33	13,47	236,70	21,25	1,76	Δ Flame at combustor rim
34	13,47	242,40	21,73	1,72	Δ Flame at combustor rim
35	13,47	248,09	22,21	1,68	Δ Flame at combustor rim
36	13,47	253,79	22,70	1,64	Δ Flame at combustor rim
37	13,47	259,49	23,18	1,61	Δ Flame at combustor rim
38	13,47	265,18	23,66	1,57	Δ Flame at combustor rim

39	13,47	270,88	24,15	1,54	Δ Flame at combustor rim
40	13,47	276,57	24,63	1,51	Δ Flame at combustor rim
41	13,47	282,27	25,12	1,48	Δ Flame at combustor rim
42	13,47	287,97	25,60	1,45	Δ Flame at combustor rim
43	13,47	293,66	26,08	1,42	Δ Flame at combustor rim
44	13,47	299,36	26,57	1,39	Δ Flame at combustor rim
45	13,47	305,05	27,05	1,37	Δ Flame at combustor rim
46	13,47	310,75	27,53	1,34	Δ Flame at combustor rim
47	13,47	316,45	28,02	1,32	Δ Flame at combustor rim
48	13,47	322,14	28,50	1,29	□ Flame in combustor
49	13,47	327,84	28,99	1,27	□ Flame in combustor
50	13,47	333,53	29,47	1,25	□ Flame in combustor
51	13,47	339,23	29,95	1,23	O Flame at flame holder
52	13,47	344,93	30,44	1,21	O Flame at flame holder
53	13,47	350,62	30,92	1,19	O Flame at flame holder
54	13,47	356,32	31,40	1,17	O Flame at flame holder
55	13,47	362,01	31,89	1,15	O Flame at flame holder
56	13,47	367,71	32,37	1,13	O Flame at flame holder
57	13,47	373,41	32,86	1,12	O Flame at flame holder
58	13,47	379,10	33,34	1,10	O Flame at flame holder
59	13,47	384,80	33,82	1,08	O Flame at flame holder
60	13,47	390,49	34,31	1,07	O Flame at flame holder
61	13,47	396,19	34,79	1,05	O Flame at flame holder
62	13,47	401,89	35,27	1,04	O Flame at flame holder
63	13,47	407,58	35,76	1,02	O Flame at flame holder
64	13,47	413,28	36,24	1,01	□ Flame in combustor
65	13,47	418,97	36,73	0,99	□ Flame in combustor
66	13,47	424,67	37,21	0,98	□ Flame in combustor
67	13,47	430,37	37,69	0,97	□ Flame in combustor
68	13,47	436,06	38,18	0,96	□ Flame in combustor
69	13,47	441,76	38,66	0,94	□ Flame in combustor

70	13,47	447,45	39,14	0,93	□ Flame in combustor
71	13,47	453,15	39,63	0,92	□ Flame in combustor
72	13,47	458,85	40,11	0,91	□ Flame in combustor
73	13,47	464,54	40,60	0,90	□ Flame in combustor
74	13,47	470,24	41,08	0,89	□ Flame in combustor
75	13,47	475,93	41,56	0,88	□ Flame in combustor
76	13,47	481,63	42,05	0,87	□ Flame in combustor
77	13,47	487,33	42,53	0,86	□ Flame in combustor
78	13,47	493,02	43,01	0,85	□ Flame in combustor
79	13,47	498,72	43,50	0,84	□ Flame in combustor
80	13,47	504,41	43,98	0,83	Δ Flame at combustor rim
81	13,47	510,11	44,47	0,82	Δ Flame at combustor rim
82	13,47	515,81	44,95	0,81	Δ Flame at combustor rim
83	13,47	521,50	45,43	0,80	Δ Flame at combustor rim
84	13,47	527,20	45,92	0,79	Δ Flame at combustor rim
85	13,47	532,89	46,40	0,78	Δ Flame at combustor rim
86	13,47	538,59	46,88	0,77	Δ Flame at combustor rim
87	13,47	544,29	47,37	0,77	Δ Flame at combustor rim
88	13,47	549,98	47,85	0,76	No ignition

Tabel 21 Data komposisi bahan bakar dan udara *Combustor* D_{out} 5 mm (Q_{fuel} 14.00 ml/min)

No	Q_{fuel} (ml/min)	Q_{air} (ml/min)	$V_{reaktan}$ (Cm/s)	Ekv Rasio (Φ)	Keterangan
1	14.00	54,43	5,81	7,96	Δ Flame at combustor rim
2	14.00	60,13	6,30	7,20	Δ Flame at combustor rim
3	14.00	65,82	6,78	6,58	Δ Flame at combustor rim
4	14.00	71,52	7,26	6,06	Δ Flame at combustor rim
5	14.00	77,21	7,75	5,61	Δ Flame at combustor rim
6	14.00	82,91	8,23	5,22	Δ Flame at combustor rim
7	14.00	88,61	8,71	4,89	Δ Flame at combustor rim

8	14.00	94,30	9,20	4,59	Δ Flame at combustor rim
9	14.00	100,00	9,68	4,33	Δ Flame at combustor rim
10	14.00	105,69	10,17	4,10	Δ Flame at combustor rim
11	14.00	111,39	10,65	3,89	Δ Flame at combustor rim
12	14.00	117,09	11,13	3,70	Δ Flame at combustor rim
13	14.00	122,78	11,62	3,53	Δ Flame at combustor rim
14	14.00	128,48	12,10	3,37	Δ Flame at combustor rim
15	14.00	134,17	12,58	3,23	Δ Flame at combustor rim
16	14.00	139,87	13,07	3,10	Δ Flame at combustor rim
17	14.00	145,57	13,55	2,98	Δ Flame at combustor rim
18	14.00	151,26	14,04	2,86	Δ Flame at combustor rim
19	14.00	156,96	14,52	2,76	Δ Flame at combustor rim
20	14.00	162,65	15,00	2,66	Δ Flame at combustor rim
21	14.00	168,35	15,49	2,57	Δ Flame at combustor rim
22	14.00	174,05	15,97	2,49	Δ Flame at combustor rim
23	14.00	179,74	16,45	2,41	Δ Flame at combustor rim
24	14.00	185,44	16,94	2,34	Δ Flame at combustor rim
25	14.00	191,13	17,42	2,27	Δ Flame at combustor rim
26	14.00	196,83	17,90	2,20	Δ Flame at combustor rim
27	14.00	202,53	18,39	2,14	Δ Flame at combustor rim
28	14.00	208,22	18,87	2,08	Δ Flame at combustor rim
29	14.00	213,92	19,36	2,02	Δ Flame at combustor rim
30	14.00	219,61	19,84	1,97	Δ Flame at combustor rim
31	14.00	225,31	20,32	1,92	Δ Flame at combustor rim
32	14.00	231,01	20,81	1,88	Δ Flame at combustor rim
33	14.00	236,70	21,29	1,83	Δ Flame at combustor rim
34	14.00	242,40	21,77	1,79	Δ Flame at combustor rim
35	14.00	248,09	22,26	1,75	Δ Flame at combustor rim
36	14.00	253,79	22,74	1,71	Δ Flame at combustor rim
37	14.00	259,49	23,23	1,67	Δ Flame at combustor rim
38	14.00	265,18	23,71	1,63	Δ Flame at combustor rim

39	14.00	270,88	24,19	1,60	Δ Flame at combustor rim
40	14.00	276,57	24,68	1,57	Δ Flame at combustor rim
41	14.00	282,27	25,16	1,53	Δ Flame at combustor rim
42	14.00	287,97	25,64	1,50	Δ Flame at combustor rim
43	14.00	293,66	26,13	1,47	Δ Flame at combustor rim
44	14.00	299,36	26,61	1,45	Δ Flame at combustor rim
45	14.00	305,05	27,10	1,42	Δ Flame at combustor rim
46	14.00	310,75	27,58	1,39	Δ Flame at combustor rim
47	14.00	316,45	28,06	1,37	Δ Flame at combustor rim
48	14.00	322,14	28,55	1,34	Δ Flame at combustor rim
49	14.00	327,84	29,03	1,32	Δ Flame at combustor rim
50	14.00	333,53	29,51	1,30	Δ Flame at combustor rim
51	14.00	339,23	30,00	1,28	Δ Flame at combustor rim
52	14.00	344,93	30,48	1,26	Δ Flame at combustor rim
53	14.00	350,62	30,97	1,24	□ Flame in combustor
54	14.00	356,32	31,45	1,22	□ Flame in combustor
55	14.00	362,01	31,93	1,20	□ Flame in combustor
56	14.00	367,71	32,42	1,18	□ Flame in combustor
57	14.00	373,41	32,90	1,16	□ Flame in combustor
58	14.00	379,10	33,38	1,14	□ Flame in combustor
59	14.00	384,80	33,87	1,13	O Flame at flame holder
60	14.00	390,49	34,35	1,11	O Flame at flame holder
61	14.00	396,19	34,84	1,09	O Flame at flame holder
62	14.00	401,89	35,32	1,08	O Flame at flame holder
63	14.00	407,58	35,80	1,06	O Flame at flame holder
64	14.00	413,28	36,29	1,05	O Flame at flame holder
65	14.00	418,97	36,77	1,03	□ Flame in combustor
66	14.00	424,67	37,25	1,02	□ Flame in combustor
67	14.00	430,37	37,74	1,01	□ Flame in combustor
68	14.00	436,06	38,22	0,99	□ Flame in combustor
69	14.00	441,76	38,71	0,98	□ Flame in combustor

70	14.00	447,45	39,19	0,97	□ Flame in combustor
71	14.00	453,15	39,67	0,96	□ Flame in combustor
72	14.00	458,85	40,16	0,94	□ Flame in combustor
73	14.00	464,54	40,64	0,93	□ Flame in combustor
74	14.00	470,24	41,12	0,92	□ Flame in combustor
75	14.00	475,93	41,61	0,91	□ Flame in combustor
76	14.00	481,63	42,09	0,90	□ Flame in combustor
77	14.00	487,33	42,58	0,89	□ Flame in combustor
78	14.00	493,02	43,06	0,88	□ Flame in combustor
79	14.00	498,72	43,54	0,87	□ Flame in combustor
80	14.00	504,41	44,03	0,86	□ Flame in combustor
81	14.00	510,11	44,51	0,85	□ Flame in combustor
82	14.00	515,81	44,99	0,84	□ Flame in combustor
83	14.00	521,50	45,48	0,83	□ Flame in combustor
84	14.00	527,20	45,96	0,82	□ Flame in combustor
85	14.00	532,89	46,45	0,81	Δ Flame at combustor rim
86	14.00	538,59	46,93	0,80	Δ Flame at combustor rim
87	14.00	544,29	47,41	0,80	Δ Flame at combustor rim
88	14.00	549,98	47,90	0,79	Δ Flame at combustor rim
89	14.00	555,68	48,38	0,78	Δ Flame at combustor rim
90	14.00	561,37	48,86	0,77	Δ Flame at combustor rim
91	14.00	567,07	49,35	0,76	Δ Flame at combustor rim

Tabel 22 Data komposisi bahan bakar dan udara *Combustor* D_{out} 5 mm (Q_{fuel} 14.53 ml/min)

No	Q_{fuel} (ml/min)	Q_{air} (ml/min)	$V_{reaktan}$ (Cm/s)	Ekv Rasio (Φ)	Keterangan
1	14,53	54,43	5,86	8,26	Δ Flame at combustor rim
2	14,53	60,13	6,34	7,48	Δ Flame at combustor rim
3	14,53	65,82	6,82	6,83	Δ Flame at combustor rim
4	14,53	71,52	7,31	6,29	Δ Flame at combustor rim

5	14,53	77,21	7,79	5,82	Δ Flame at combustor rim
6	14,53	82,91	8,28	5,42	Δ Flame at combustor rim
7	14,53	88,61	8,76	5,07	Δ Flame at combustor rim
8	14,53	94,30	9,24	4,77	Δ Flame at combustor rim
9	14,53	100,00	9,73	4,50	Δ Flame at combustor rim
10	14,53	105,69	10,21	4,25	Δ Flame at combustor rim
11	14,53	111,39	10,69	4,04	Δ Flame at combustor rim
12	14,53	117,09	11,18	3,84	Δ Flame at combustor rim
13	14,53	122,78	11,66	3,66	Δ Flame at combustor rim
14	14,53	128,48	12,15	3,50	Δ Flame at combustor rim
15	14,53	134,17	12,63	3,35	Δ Flame at combustor rim
16	14,53	139,87	13,11	3,21	Δ Flame at combustor rim
17	14,53	145,57	13,60	3,09	Δ Flame at combustor rim
18	14,53	151,26	14,08	2,97	Δ Flame at combustor rim
19	14,53	156,96	14,56	2,86	Δ Flame at combustor rim
20	14,53	162,65	15,05	2,76	Δ Flame at combustor rim
21	14,53	168,35	15,53	2,67	Δ Flame at combustor rim
22	14,53	174,05	16,02	2,58	Δ Flame at combustor rim
23	14,53	179,74	16,50	2,50	Δ Flame at combustor rim
24	14,53	185,44	16,98	2,42	Δ Flame at combustor rim
25	14,53	191,13	17,47	2,35	Δ Flame at combustor rim
26	14,53	196,83	17,95	2,28	Δ Flame at combustor rim
27	14,53	202,53	18,43	2,22	Δ Flame at combustor rim
28	14,53	208,22	18,92	2,16	Δ Flame at combustor rim
29	14,53	213,92	19,40	2,10	Δ Flame at combustor rim
30	14,53	219,61	19,89	2,05	Δ Flame at combustor rim
31	14,53	225,31	20,37	2,00	Δ Flame at combustor rim
32	14,53	231,01	20,85	1,95	Δ Flame at combustor rim
33	14,53	236,70	21,34	1,90	Δ Flame at combustor rim
34	14,53	242,40	21,82	1,85	Δ Flame at combustor rim
35	14,53	248,09	22,30	1,81	Δ Flame at combustor rim

36	14,53	253,79	22,79	1,77	Δ Flame at combustor rim
37	14,53	259,49	23,27	1,73	Δ Flame at combustor rim
38	14,53	265,18	23,75	1,70	Δ Flame at combustor rim
39	14,53	270,88	24,24	1,66	Δ Flame at combustor rim
40	14,53	276,57	24,72	1,63	Δ Flame at combustor rim
41	14,53	282,27	25,21	1,59	Δ Flame at combustor rim
42	14,53	287,97	25,69	1,56	Δ Flame at combustor rim
43	14,53	293,66	26,17	1,53	Δ Flame at combustor rim
44	14,53	299,36	26,66	1,50	Δ Flame at combustor rim
45	14,53	305,05	27,14	1,47	Δ Flame at combustor rim
46	14,53	310,75	27,62	1,45	Δ Flame at combustor rim
47	14,53	316,45	28,11	1,42	Δ Flame at combustor rim
48	14,53	322,14	28,59	1,40	Δ Flame at combustor rim
49	14,53	327,84	29,08	1,37	Δ Flame at combustor rim
50	14,53	333,53	29,56	1,35	Δ Flame at combustor rim
51	14,53	339,23	30,04	1,33	Δ Flame at combustor rim
52	14,53	344,93	30,53	1,30	Δ Flame at combustor rim
53	14,53	350,62	31,01	1,28	□ Flame in combustor
54	14,53	356,32	31,49	1,26	□ Flame in combustor
55	14,53	362,01	31,98	1,24	□ Flame in combustor
56	14,53	367,71	32,46	1,22	□ Flame in combustor
57	14,53	373,41	32,95	1,20	□ Flame in combustor
58	14,53	379,10	33,43	1,19	O Flame at flame holder
59	14,53	384,80	33,91	1,17	O Flame at flame holder
60	14,53	390,49	34,40	1,15	O Flame at flame holder
61	14,53	396,19	34,88	1,13	O Flame at flame holder
62	14,53	401,89	35,36	1,12	O Flame at flame holder
63	14,53	407,58	35,85	1,10	O Flame at flame holder
64	14,53	413,28	36,33	1,09	O Flame at flame holder
65	14,53	418,97	36,82	1,07	O Flame at flame holder
66	14,53	424,67	37,30	1,06	O Flame at flame holder

67	14,53	430,37	37,78	1,04	O Flame at flame holder
68	14,53	436,06	38,27	1,03	□ Flame in combustor
69	14,53	441,76	38,75	1,02	□ Flame in combustor
70	14,53	447,45	39,23	1,00	□ Flame in combustor
71	14,53	453,15	39,72	0,99	□ Flame in combustor
72	14,53	458,85	40,20	0,98	□ Flame in combustor
73	14,53	464,54	40,69	0,97	□ Flame in combustor
74	14,53	470,24	41,17	0,96	□ Flame in combustor
75	14,53	475,93	41,65	0,94	□ Flame in combustor
76	14,53	481,63	42,14	0,93	□ Flame in combustor
77	14,53	487,33	42,62	0,92	□ Flame in combustor
78	14,53	493,02	43,10	0,91	□ Flame in combustor
79	14,53	498,72	43,59	0,90	□ Flame in combustor
80	14,53	504,41	44,07	0,89	□ Flame in combustor
81	14,53	510,11	44,56	0,88	□ Flame in combustor
82	14,53	515,81	45,04	0,87	□ Flame in combustor
83	14,53	521,50	45,52	0,86	□ Flame in combustor
84	14,53	527,20	46,01	0,85	□ Flame in combustor
85	14,53	532,89	46,49	0,84	□ Flame in combustor
86	14,53	538,59	46,97	0,83	Δ Flame at combustor rim
87	14,53	544,29	47,46	0,83	Δ Flame at combustor rim
88	14,53	549,98	47,94	0,82	Δ Flame at combustor rim
89	14,53	555,68	48,43	0,81	Δ Flame at combustor rim
90	14,53	561,37	48,91	0,80	Δ Flame at combustor rim
91	14,53	567,07	49,39	0,79	Δ Flame at combustor rim

Tabel 23 Data komposisi bahan bakar dan udara *Combustor* D_{out} 5 mm (Q_{fuel} 15,06 ml/min)

No	Q_{fuel} (ml/min)	Q_{air} (ml/min)	$V_{reaktan}$ (Cm/s)	Ekv Rasio (Φ)	Keterangan
1	15,06	54,43	5,90	8,56	Δ Flame at combustor rim

2	15,06	60,13	6,39	7,75	Δ Flame at combustor rim
3	15,06	65,82	6,87	7,08	Δ Flame at combustor rim
4	15,06	71,52	7,35	6,52	Δ Flame at combustor rim
5	15,06	77,21	7,84	6,04	Δ Flame at combustor rim
6	15,06	82,91	8,32	5,62	Δ Flame at combustor rim
7	15,06	88,61	8,80	5,26	Δ Flame at combustor rim
8	15,06	94,30	9,29	4,94	Δ Flame at combustor rim
9	15,06	100,00	9,77	4,66	Δ Flame at combustor rim
10	15,06	105,69	10,26	4,41	Δ Flame at combustor rim
11	15,06	111,39	10,74	4,18	Δ Flame at combustor rim
12	15,06	117,09	11,22	3,98	Δ Flame at combustor rim
13	15,06	122,78	11,71	3,80	Δ Flame at combustor rim
14	15,06	128,48	12,19	3,63	Δ Flame at combustor rim
15	15,06	134,17	12,67	3,47	Δ Flame at combustor rim
16	15,06	139,87	13,16	3,33	Δ Flame at combustor rim
17	15,06	145,57	13,64	3,20	Δ Flame at combustor rim
18	15,06	151,26	14,13	3,08	Δ Flame at combustor rim
19	15,06	156,96	14,61	2,97	Δ Flame at combustor rim
20	15,06	162,65	15,09	2,87	Δ Flame at combustor rim
21	15,06	168,35	15,58	2,77	Δ Flame at combustor rim
22	15,06	174,05	16,06	2,68	Δ Flame at combustor rim
23	15,06	179,74	16,54	2,59	Δ Flame at combustor rim
24	15,06	185,44	17,03	2,51	Δ Flame at combustor rim
25	15,06	191,13	17,51	2,44	Δ Flame at combustor rim
26	15,06	196,83	18,00	2,37	Δ Flame at combustor rim
27	15,06	202,53	18,48	2,30	Δ Flame at combustor rim
28	15,06	208,22	18,96	2,24	Δ Flame at combustor rim
29	15,06	213,92	19,45	2,18	Δ Flame at combustor rim
30	15,06	219,61	19,93	2,12	Δ Flame at combustor rim
31	15,06	225,31	20,41	2,07	Δ Flame at combustor rim
32	15,06	231,01	20,90	2,02	Δ Flame at combustor rim

33	15,06	236,70	21,38	1,97	Δ Flame at combustor rim
34	15,06	242,40	21,87	1,92	Δ Flame at combustor rim
35	15,06	248,09	22,35	1,88	Δ Flame at combustor rim
36	15,06	253,79	22,83	1,84	Δ Flame at combustor rim
37	15,06	259,49	23,32	1,80	Δ Flame at combustor rim
38	15,06	265,18	23,80	1,76	Δ Flame at combustor rim
39	15,06	270,88	24,28	1,72	Δ Flame at combustor rim
40	15,06	276,57	24,77	1,69	Δ Flame at combustor rim
41	15,06	282,27	25,25	1,65	Δ Flame at combustor rim
42	15,06	287,97	25,74	1,62	Δ Flame at combustor rim
43	15,06	293,66	26,22	1,59	Δ Flame at combustor rim
44	15,06	299,36	26,70	1,56	Δ Flame at combustor rim
45	15,06	305,05	27,19	1,53	Δ Flame at combustor rim
46	15,06	310,75	27,67	1,50	Δ Flame at combustor rim
47	15,06	316,45	28,15	1,47	Δ Flame at combustor rim
48	15,06	322,14	28,64	1,45	Δ Flame at combustor rim
49	15,06	327,84	29,12	1,42	Δ Flame at combustor rim
50	15,06	333,53	29,60	1,40	Δ Flame at combustor rim
51	15,06	339,23	30,09	1,37	Δ Flame at combustor rim
52	15,06	344,93	30,57	1,35	Δ Flame at combustor rim
53	15,06	350,62	31,06	1,33	Δ Flame at combustor rim
54	15,06	356,32	31,54	1,31	Δ Flame at combustor rim
55	15,06	362,01	32,02	1,29	Δ Flame at combustor rim
56	15,06	367,71	32,51	1,27	Δ Flame at combustor rim
57	15,06	373,41	32,99	1,25	□ Flame in combustor
58	15,06	379,10	33,47	1,23	□ Flame in combustor
59	15,06	384,80	33,96	1,21	□ Flame in combustor
60	15,06	390,49	34,44	1,19	□ Flame in combustor
61	15,06	396,19	34,93	1,18	□ Flame in combustor
62	15,06	401,89	35,41	1,16	□ Flame in combustor
63	15,06	407,58	35,89	1,14	O Flame at flame holder

64	15,06	413,28	36,38	1,13	O Flame at flame holder
65	15,06	418,97	36,86	1,11	O Flame at flame holder
66	15,06	424,67	37,34	1,10	O Flame at flame holder
67	15,06	430,37	37,83	1,08	O Flame at flame holder
68	15,06	436,06	38,31	1,07	O Flame at flame holder
69	15,06	441,76	38,80	1,06	□ Flame in combustor
70	15,06	447,45	39,28	1,04	□ Flame in combustor
71	15,06	453,15	39,76	1,03	□ Flame in combustor
72	15,06	458,85	40,25	1,02	□ Flame in combustor
73	15,06	464,54	40,73	1,00	□ Flame in combustor
74	15,06	470,24	41,21	0,99	□ Flame in combustor
75	15,06	475,93	41,70	0,98	□ Flame in combustor
76	15,06	481,63	42,18	0,97	□ Flame in combustor
77	15,06	487,33	42,67	0,96	□ Flame in combustor
78	15,06	493,02	43,15	0,95	□ Flame in combustor
79	15,06	498,72	43,63	0,93	□ Flame in combustor
80	15,06	504,41	44,12	0,92	□ Flame in combustor
81	15,06	510,11	44,60	0,91	□ Flame in combustor
82	15,06	515,81	45,08	0,90	□ Flame in combustor
83	15,06	521,50	45,57	0,89	□ Flame in combustor
84	15,06	527,20	46,05	0,88	□ Flame in combustor
85	15,06	532,89	46,54	0,87	□ Flame in combustor
86	15,06	538,59	47,02	0,87	□ Flame in combustor
87	15,06	544,29	47,50	0,86	□ Flame in combustor
88	15,06	549,98	47,99	0,85	□ Flame in combustor
89	15,06	555,68	48,47	0,84	□ Flame in combustor
90	15,06	561,37	48,95	0,83	□ Flame in combustor
91	15,06	567,07	49,44	0,82	Δ Flame at combustor rim

Tabel 24 Data komposisi bahan bakar dan udara *Combustor* D_{out} 5 mm (Q_{fuel} 15,60 ml/min)

No	Q_{fuel} (ml/min)	Q_{air} (ml/min)	$V_{reaktan}$ (Cm/s)	Ekv Rasio (Φ)	Keterangan
1	15,60	54,43	5,95	8,86	Δ Flame at combustor rim
2	15,60	60,13	6,43	8,03	Δ Flame at combustor rim
3	15,60	65,82	6,91	7,33	Δ Flame at combustor rim
4	15,60	71,52	7,40	6,75	Δ Flame at combustor rim
5	15,60	77,21	7,88	6,25	Δ Flame at combustor rim
6	15,60	82,91	8,37	5,82	Δ Flame at combustor rim
7	15,60	88,61	8,85	5,45	Δ Flame at combustor rim
8	15,60	94,30	9,33	5,12	Δ Flame at combustor rim
9	15,60	100,00	9,82	4,83	Δ Flame at combustor rim
10	15,60	105,69	10,30	4,57	Δ Flame at combustor rim
11	15,60	111,39	10,78	4,33	Δ Flame at combustor rim
12	15,60	117,09	11,27	4,12	Δ Flame at combustor rim
13	15,60	122,78	11,75	3,93	Δ Flame at combustor rim
14	15,60	128,48	12,24	3,76	Δ Flame at combustor rim
15	15,60	134,17	12,72	3,60	Δ Flame at combustor rim
16	15,60	139,87	13,20	3,45	Δ Flame at combustor rim
17	15,60	145,57	13,69	3,31	Δ Flame at combustor rim
18	15,60	151,26	14,17	3,19	Δ Flame at combustor rim
19	15,60	156,96	14,65	3,07	Δ Flame at combustor rim
20	15,60	162,65	15,14	2,97	Δ Flame at combustor rim
21	15,60	168,35	15,62	2,87	Δ Flame at combustor rim
22	15,60	174,05	16,11	2,77	Δ Flame at combustor rim
23	15,60	179,74	16,59	2,68	Δ Flame at combustor rim
24	15,60	185,44	17,07	2,60	Δ Flame at combustor rim
25	15,60	191,13	17,56	2,52	Δ Flame at combustor rim
26	15,60	196,83	18,04	2,45	Δ Flame at combustor rim
27	15,60	202,53	18,52	2,38	Δ Flame at combustor rim

28	15,60	208,22	19,01	2,32	Δ Flame at combustor rim
29	15,60	213,92	19,49	2,26	Δ Flame at combustor rim
30	15,60	219,61	19,98	2,20	Δ Flame at combustor rim
31	15,60	225,31	20,46	2,14	Δ Flame at combustor rim
32	15,60	231,01	20,94	2,09	Δ Flame at combustor rim
33	15,60	236,70	21,43	2,04	Δ Flame at combustor rim
34	15,60	242,40	21,91	1,99	Δ Flame at combustor rim
35	15,60	248,09	22,39	1,94	Δ Flame at combustor rim
36	15,60	253,79	22,88	1,90	Δ Flame at combustor rim
37	15,60	259,49	23,36	1,86	Δ Flame at combustor rim
38	15,60	265,18	23,85	1,82	Δ Flame at combustor rim
39	15,60	270,88	24,33	1,78	Δ Flame at combustor rim
40	15,60	276,57	24,81	1,74	Δ Flame at combustor rim
41	15,60	282,27	25,30	1,71	Δ Flame at combustor rim
42	15,60	287,97	25,78	1,68	Δ Flame at combustor rim
43	15,60	293,66	26,26	1,64	Δ Flame at combustor rim
44	15,60	299,36	26,75	1,61	Δ Flame at combustor rim
45	15,60	305,05	27,23	1,58	Δ Flame at combustor rim
46	15,60	310,75	27,72	1,55	Δ Flame at combustor rim
47	15,60	316,45	28,20	1,52	Δ Flame at combustor rim
48	15,60	322,14	28,68	1,50	Δ Flame at combustor rim
49	15,60	327,84	29,17	1,47	Δ Flame at combustor rim
50	15,60	333,53	29,65	1,45	Δ Flame at combustor rim
51	15,60	339,23	30,13	1,42	Δ Flame at combustor rim
52	15,60	344,93	30,62	1,40	Δ Flame at combustor rim
53	15,60	350,62	31,10	1,38	Δ Flame at combustor rim
54	15,60	356,32	31,59	1,35	Δ Flame at combustor rim
55	15,60	362,01	32,07	1,33	Δ Flame at combustor rim
56	15,60	367,71	32,55	1,31	Δ Flame at combustor rim
57	15,60	373,41	33,04	1,29	Δ Flame at combustor rim
58	15,60	379,10	33,52	1,27	□ Flame in combustor

59	15,60	384,80	34,00	1,25	□ Flame in combustor
60	15,60	390,49	34,49	1,24	□ Flame in combustor
61	15,60	396,19	34,97	1,22	□ Flame in combustor
62	15,60	401,89	35,45	1,20	□ Flame in combustor
63	15,60	407,58	35,94	1,18	□ Flame in combustor
64	15,60	413,28	36,42	1,17	□ Flame in combustor
65	15,60	418,97	36,91	1,15	□ Flame in combustor
66	15,60	424,67	37,39	1,14	□ Flame in combustor
67	15,60	430,37	37,87	1,12	O Flame at flame holder
68	15,60	436,06	38,36	1,11	O Flame at flame holder
69	15,60	441,76	38,84	1,09	O Flame at flame holder
70	15,60	447,45	39,32	1,08	O Flame at flame holder
71	15,60	453,15	39,81	1,06	□ Flame in combustor
72	15,60	458,85	40,29	1,05	□ Flame in combustor
73	15,60	464,54	40,78	1,04	□ Flame in combustor
74	15,60	470,24	41,26	1,03	□ Flame in combustor
75	15,60	475,93	41,74	1,01	□ Flame in combustor
76	15,60	481,63	42,23	1,00	□ Flame in combustor
77	15,60	487,33	42,71	0,99	□ Flame in combustor
78	15,60	493,02	43,19	0,98	□ Flame in combustor
79	15,60	498,72	43,68	0,97	□ Flame in combustor
80	15,60	504,41	44,16	0,96	□ Flame in combustor
81	15,60	510,11	44,65	0,95	□ Flame in combustor
82	15,60	515,81	45,13	0,94	□ Flame in combustor
83	15,60	521,50	45,61	0,93	□ Flame in combustor
84	15,60	527,20	46,10	0,92	□ Flame in combustor
85	15,60	532,89	46,58	0,91	□ Flame in combustor
86	15,60	538,59	47,06	0,90	□ Flame in combustor
87	15,60	544,29	47,55	0,89	□ Flame in combustor
88	15,60	549,98	48,03	0,88	□ Flame in combustor
89	15,60	555,68	48,52	0,87	□ Flame in combustor

90	15,60	561,37	49,00	0,86	□ Flame in combustor
91	15,60	567,07	49,48	0,85	Δ Flame at combustor rim

Tabel 25 Data komposisi bahan bakar dan udara *Combustor* D_{out} 5 mm (Q_{fuel} 16,13 ml/min)

No	Q_{fuel} (ml/min)	Q_{air} (ml/min)	$V_{reaktan}$ (Cm/s)	Ekv Rasio (Φ)	Keterangan
1	16,13	54,43	5,99	9,17	Δ Flame at combustor rim
2	16,13	60,13	6,48	8,30	Δ Flame at combustor rim
3	16,13	65,82	6,96	7,58	Δ Flame at combustor rim
4	16,13	71,52	7,44	6,98	Δ Flame at combustor rim
5	16,13	77,21	7,93	6,46	Δ Flame at combustor rim
6	16,13	82,91	8,41	6,02	Δ Flame at combustor rim
7	16,13	88,61	8,89	5,63	Δ Flame at combustor rim
8	16,13	94,30	9,38	5,29	Δ Flame at combustor rim
9	16,13	100,00	9,86	4,99	Δ Flame at combustor rim
10	16,13	105,69	10,35	4,72	Δ Flame at combustor rim
11	16,13	111,39	10,83	4,48	Δ Flame at combustor rim
12	16,13	117,09	11,31	4,26	Δ Flame at combustor rim
13	16,13	122,78	11,80	4,06	Δ Flame at combustor rim
14	16,13	128,48	12,28	3,88	Δ Flame at combustor rim
15	16,13	134,17	12,76	3,72	Δ Flame at combustor rim
16	16,13	139,87	13,25	3,57	Δ Flame at combustor rim
17	16,13	145,57	13,73	3,43	Δ Flame at combustor rim
18	16,13	151,26	14,22	3,30	Δ Flame at combustor rim
19	16,13	156,96	14,70	3,18	Δ Flame at combustor rim
20	16,13	162,65	15,18	3,07	Δ Flame at combustor rim
21	16,13	168,35	15,67	2,96	Δ Flame at combustor rim
22	16,13	174,05	16,15	2,87	Δ Flame at combustor rim
23	16,13	179,74	16,63	2,78	Δ Flame at combustor rim
24	16,13	185,44	17,12	2,69	Δ Flame at combustor rim

25	16,13	191,13	17,60	2,61	Δ Flame at combustor rim
26	16,13	196,83	18,09	2,54	Δ Flame at combustor rim
27	16,13	202,53	18,57	2,46	Δ Flame at combustor rim
28	16,13	208,22	19,05	2,40	Δ Flame at combustor rim
29	16,13	213,92	19,54	2,33	Δ Flame at combustor rim
30	16,13	219,61	20,02	2,27	Δ Flame at combustor rim
31	16,13	225,31	20,50	2,21	Δ Flame at combustor rim
32	16,13	231,01	20,99	2,16	Δ Flame at combustor rim
33	16,13	236,70	21,47	2,11	Δ Flame at combustor rim
34	16,13	242,40	21,96	2,06	Δ Flame at combustor rim
35	16,13	248,09	22,44	2,01	Δ Flame at combustor rim
36	16,13	253,79	22,92	1,97	Δ Flame at combustor rim
37	16,13	259,49	23,41	1,92	Δ Flame at combustor rim
38	16,13	265,18	23,89	1,88	Δ Flame at combustor rim
39	16,13	270,88	24,37	1,84	Δ Flame at combustor rim
40	16,13	276,57	24,86	1,80	Δ Flame at combustor rim
41	16,13	282,27	25,34	1,77	Δ Flame at combustor rim
42	16,13	287,97	25,83	1,73	Δ Flame at combustor rim
43	16,13	293,66	26,31	1,70	Δ Flame at combustor rim
44	16,13	299,36	26,79	1,67	Δ Flame at combustor rim
45	16,13	305,05	27,28	1,64	Δ Flame at combustor rim
46	16,13	310,75	27,76	1,61	Δ Flame at combustor rim
47	16,13	316,45	28,24	1,58	Δ Flame at combustor rim
48	16,13	322,14	28,73	1,55	Δ Flame at combustor rim
49	16,13	327,84	29,21	1,52	Δ Flame at combustor rim
50	16,13	333,53	29,70	1,50	Δ Flame at combustor rim
51	16,13	339,23	30,18	1,47	Δ Flame at combustor rim
52	16,13	344,93	30,66	1,45	Δ Flame at combustor rim
53	16,13	350,62	31,15	1,42	Δ Flame at combustor rim
54	16,13	356,32	31,63	1,40	Δ Flame at combustor rim
55	16,13	362,01	32,11	1,38	Δ Flame at combustor rim

56	16,13	367,71	32,60	1,36	Δ Flame at combustor rim
57	16,13	373,41	33,08	1,34	Δ Flame at combustor rim
58	16,13	379,10	33,57	1,32	Δ Flame at combustor rim
59	16,13	384,80	34,05	1,30	Δ Flame at combustor rim
60	16,13	390,49	34,53	1,28	Δ Flame at combustor rim
61	16,13	396,19	35,02	1,26	□ Flame in combustor
62	16,13	401,89	35,50	1,24	□ Flame in combustor
63	16,13	407,58	35,98	1,22	□ Flame in combustor
64	16,13	413,28	36,47	1,21	□ Flame in combustor
65	16,13	418,97	36,95	1,19	□ Flame in combustor
66	16,13	424,67	37,44	1,17	□ Flame in combustor
67	16,13	430,37	37,92	1,16	□ Flame in combustor
68	16,13	436,06	38,40	1,14	□ Flame in combustor
69	16,13	441,76	38,89	1,13	□ Flame in combustor
70	16,13	447,45	39,37	1,12	□ Flame in combustor
71	16,13	453,15	39,85	1,10	□ Flame in combustor
72	16,13	458,85	40,34	1,09	□ Flame in combustor
73	16,13	464,54	40,82	1,07	□ Flame in combustor
74	16,13	470,24	41,30	1,06	□ Flame in combustor
75	16,13	475,93	41,79	1,05	□ Flame in combustor
76	16,13	481,63	42,27	1,04	□ Flame in combustor
77	16,13	487,33	42,76	1,02	□ Flame in combustor
78	16,13	493,02	43,24	1,01	□ Flame in combustor
79	16,13	498,72	43,72	1,00	□ Flame in combustor
80	16,13	504,41	44,21	0,99	□ Flame in combustor
81	16,13	510,11	44,69	0,98	□ Flame in combustor
82	16,13	515,81	45,17	0,97	□ Flame in combustor
83	16,13	521,50	45,66	0,96	□ Flame in combustor
84	16,13	527,20	46,14	0,95	□ Flame in combustor
85	16,13	532,89	46,63	0,94	□ Flame in combustor
86	16,13	538,59	47,11	0,93	□ Flame in combustor

87	16,13	544,29	47,59	0,92	□ Flame in combustor
88	16,13	549,98	48,08	0,91	□ Flame in combustor
89	16,13	555,68	48,56	0,90	□ Flame in combustor
90	16,13	561,37	49,04	0,89	□ Flame in combustor
91	16,13	567,07	49,53	0,88	□ Flame in combustor

Tabel 26 Data komposisi bahan bakar dan udara *Combustor* D_{out} 5 mm (Q_{fuel} 16,66 ml/min)

No	Q_{fuel} (ml/min)	Q_{air} (ml/min)	$V_{reaktan}$ (Cm/s)	Ekv Rasio (Φ)	Keterangan
1	16,66	54,43	6,04	9,47	Δ Flame at combustor rim
2	16,66	60,13	6,52	8,57	Δ Flame at combustor rim
3	16,66	65,82	7,00	7,83	Δ Flame at combustor rim
4	16,66	71,52	7,49	7,21	Δ Flame at combustor rim
5	16,66	77,21	7,97	6,68	Δ Flame at combustor rim
6	16,66	82,91	8,46	6,22	Δ Flame at combustor rim
7	16,66	88,61	8,94	5,82	Δ Flame at combustor rim
8	16,66	94,30	9,42	5,47	Δ Flame at combustor rim
9	16,66	100,00	9,91	5,15	Δ Flame at combustor rim
10	16,66	105,69	10,39	4,88	Δ Flame at combustor rim
11	16,66	111,39	10,87	4,63	Δ Flame at combustor rim
12	16,66	117,09	11,36	4,40	Δ Flame at combustor rim
13	16,66	122,78	11,84	4,20	Δ Flame at combustor rim
14	16,66	128,48	12,33	4,01	Δ Flame at combustor rim
15	16,66	134,17	12,81	3,84	Δ Flame at combustor rim
16	16,66	139,87	13,29	3,69	Δ Flame at combustor rim
17	16,66	145,57	13,78	3,54	Δ Flame at combustor rim
18	16,66	151,26	14,26	3,41	Δ Flame at combustor rim
19	16,66	156,96	14,74	3,28	Δ Flame at combustor rim
20	16,66	162,65	15,23	3,17	Δ Flame at combustor rim
21	16,66	168,35	15,71	3,06	Δ Flame at combustor rim

22	16,66	174,05	16,20	2,96	Δ Flame at combustor rim
23	16,66	179,74	16,68	2,87	Δ Flame at combustor rim
24	16,66	185,44	17,16	2,78	Δ Flame at combustor rim
25	16,66	191,13	17,65	2,70	Δ Flame at combustor rim
26	16,66	196,83	18,13	2,62	Δ Flame at combustor rim
27	16,66	202,53	18,61	2,54	Δ Flame at combustor rim
28	16,66	208,22	19,10	2,48	Δ Flame at combustor rim
29	16,66	213,92	19,58	2,41	Δ Flame at combustor rim
30	16,66	219,61	20,07	2,35	Δ Flame at combustor rim
31	16,66	225,31	20,55	2,29	Δ Flame at combustor rim
32	16,66	231,01	21,03	2,23	Δ Flame at combustor rim
33	16,66	236,70	21,52	2,18	Δ Flame at combustor rim
34	16,66	242,40	22,00	2,13	Δ Flame at combustor rim
35	16,66	248,09	22,48	2,08	Δ Flame at combustor rim
36	16,66	253,79	22,97	2,03	Δ Flame at combustor rim
37	16,66	259,49	23,45	1,99	Δ Flame at combustor rim
38	16,66	265,18	23,94	1,94	Δ Flame at combustor rim
39	16,66	270,88	24,42	1,90	Δ Flame at combustor rim
40	16,66	276,57	24,90	1,86	Δ Flame at combustor rim
41	16,66	282,27	25,39	1,83	Δ Flame at combustor rim
42	16,66	287,97	25,87	1,79	Δ Flame at combustor rim
43	16,66	293,66	26,35	1,76	Δ Flame at combustor rim
44	16,66	299,36	26,84	1,72	Δ Flame at combustor rim
45	16,66	305,05	27,32	1,69	Δ Flame at combustor rim
46	16,66	310,75	27,81	1,66	Δ Flame at combustor rim
47	16,66	316,45	28,29	1,63	Δ Flame at combustor rim
48	16,66	322,14	28,77	1,60	Δ Flame at combustor rim
49	16,66	327,84	29,26	1,57	Δ Flame at combustor rim
50	16,66	333,53	29,74	1,55	Δ Flame at combustor rim
51	16,66	339,23	30,22	1,52	Δ Flame at combustor rim
52	16,66	344,93	30,71	1,49	Δ Flame at combustor rim

53	16,66	350,62	31,19	1,47	Δ Flame at combustor rim
54	16,66	356,32	31,68	1,45	Δ Flame at combustor rim
55	16,66	362,01	32,16	1,42	Δ Flame at combustor rim
56	16,66	367,71	32,64	1,40	Δ Flame at combustor rim
57	16,66	373,41	33,13	1,38	Δ Flame at combustor rim
58	16,66	379,10	33,61	1,36	Δ Flame at combustor rim
59	16,66	384,80	34,09	1,34	Δ Flame at combustor rim
60	16,66	390,49	34,58	1,32	Δ Flame at combustor rim
61	16,66	396,19	35,06	1,30	Δ Flame at combustor rim
62	16,66	401,89	35,55	1,28	Δ Flame at combustor rim
63	16,66	407,58	36,03	1,26	Δ Flame at combustor rim
64	16,66	413,28	36,51	1,25	Δ Flame at combustor rim
65	16,66	418,97	37,00	1,23	Δ Flame at combustor rim
66	16,66	424,67	37,48	1,21	Δ Flame at combustor rim
67	16,66	430,37	37,96	1,20	Δ Flame at combustor rim
68	16,66	436,06	38,45	1,18	Δ Flame at combustor rim
69	16,66	441,76	38,93	1,17	Δ Flame at combustor rim
70	16,66	447,45	39,42	1,15	Δ Flame at combustor rim
71	16,66	453,15	39,90	1,14	□ Flame in combustor
72	16,66	458,85	40,38	1,12	□ Flame in combustor
73	16,66	464,54	40,87	1,11	□ Flame in combustor
74	16,66	470,24	41,35	1,10	□ Flame in combustor
75	16,66	475,93	41,83	1,08	□ Flame in combustor
76	16,66	481,63	42,32	1,07	□ Flame in combustor
77	16,66	487,33	42,80	1,06	□ Flame in combustor
78	16,66	493,02	43,29	1,05	□ Flame in combustor
79	16,66	498,72	43,77	1,03	□ Flame in combustor
80	16,66	504,41	44,25	1,02	□ Flame in combustor
81	16,66	510,11	44,74	1,01	□ Flame in combustor
82	16,66	515,81	45,22	1,00	□ Flame in combustor
83	16,66	521,50	45,70	0,99	□ Flame in combustor

84	16,66	527,20	46,19	0,98	□ Flame in combustor
85	16,66	532,89	46,67	0,97	□ Flame in combustor
86	16,66	538,59	47,15	0,96	□ Flame in combustor
87	16,66	544,29	47,64	0,95	□ Flame in combustor
88	16,66	549,98	48,12	0,94	□ Flame in combustor
89	16,66	555,68	48,61	0,93	□ Flame in combustor
90	16,66	561,37	49,09	0,92	□ Flame in combustor
91	16,66	567,07	49,57	0,91	□ Flame in combustor

Tabel 27 Data komposisi bahan bakar dan udara *Combustor* D_{out} 5 mm (Q_{fuel} 17,19 ml/min)

No	Q_{fuel} (ml/min)	Q_{air} (ml/min)	$V_{reaktan}$ (Cm/s)	Ekv Rasio (Φ)	Keterangan
1	17,19	54,43	6,08	9,77	Δ Flame at combustor rim
2	17,19	60,13	6,57	8,85	Δ Flame at combustor rim
3	17,19	65,82	7,05	8,08	Δ Flame at combustor rim
4	17,19	71,52	7,53	7,44	Δ Flame at combustor rim
5	17,19	77,21	8,02	6,89	Δ Flame at combustor rim
6	17,19	82,91	8,50	6,42	Δ Flame at combustor rim
7	17,19	88,61	8,98	6,00	Δ Flame at combustor rim
8	17,19	94,30	9,47	5,64	Δ Flame at combustor rim
9	17,19	100,00	9,95	5,32	Δ Flame at combustor rim
10	17,19	105,69	10,44	5,03	Δ Flame at combustor rim
11	17,19	111,39	10,92	4,77	Δ Flame at combustor rim
12	17,19	117,09	11,40	4,54	Δ Flame at combustor rim
13	17,19	122,78	11,89	4,33	Δ Flame at combustor rim
14	17,19	128,48	12,37	4,14	Δ Flame at combustor rim
15	17,19	134,17	12,85	3,96	Δ Flame at combustor rim
16	17,19	139,87	13,34	3,80	Δ Flame at combustor rim
17	17,19	145,57	13,82	3,65	Δ Flame at combustor rim
18	17,19	151,26	14,31	3,52	Δ Flame at combustor rim

19	17,19	156,96	14,79	3,39	Δ Flame at combustor rim
20	17,19	162,65	15,27	3,27	Δ Flame at combustor rim
21	17,19	168,35	15,76	3,16	Δ Flame at combustor rim
22	17,19	174,05	16,24	3,06	Δ Flame at combustor rim
23	17,19	179,74	16,72	2,96	Δ Flame at combustor rim
24	17,19	185,44	17,21	2,87	Δ Flame at combustor rim
25	17,19	191,13	17,69	2,78	Δ Flame at combustor rim
26	17,19	196,83	18,18	2,70	Δ Flame at combustor rim
27	17,19	202,53	18,66	2,63	Δ Flame at combustor rim
28	17,19	208,22	19,14	2,55	Δ Flame at combustor rim
29	17,19	213,92	19,63	2,49	Δ Flame at combustor rim
30	17,19	219,61	20,11	2,42	Δ Flame at combustor rim
31	17,19	225,31	20,59	2,36	Δ Flame at combustor rim
32	17,19	231,01	21,08	2,30	Δ Flame at combustor rim
33	17,19	236,70	21,56	2,25	Δ Flame at combustor rim
34	17,19	242,40	22,05	2,19	Δ Flame at combustor rim
35	17,19	248,09	22,53	2,14	Δ Flame at combustor rim
36	17,19	253,79	23,01	2,10	Δ Flame at combustor rim
37	17,19	259,49	23,50	2,05	Δ Flame at combustor rim
38	17,19	265,18	23,98	2,01	Δ Flame at combustor rim
39	17,19	270,88	24,46	1,96	Δ Flame at combustor rim
40	17,19	276,57	24,95	1,92	Δ Flame at combustor rim
41	17,19	282,27	25,43	1,88	Δ Flame at combustor rim
42	17,19	287,97	25,92	1,85	Δ Flame at combustor rim
43	17,19	293,66	26,40	1,81	Δ Flame at combustor rim
44	17,19	299,36	26,88	1,78	Δ Flame at combustor rim
45	17,19	305,05	27,37	1,74	Δ Flame at combustor rim
46	17,19	310,75	27,85	1,71	Δ Flame at combustor rim
47	17,19	316,45	28,33	1,68	Δ Flame at combustor rim
48	17,19	322,14	28,82	1,65	Δ Flame at combustor rim
49	17,19	327,84	29,30	1,62	Δ Flame at combustor rim

50	17,19	333,53	29,79	1,59	Δ Flame at combustor rim
51	17,19	339,23	30,27	1,57	Δ Flame at combustor rim
52	17,19	344,93	30,75	1,54	Δ Flame at combustor rim
53	17,19	350,62	31,24	1,52	Δ Flame at combustor rim
54	17,19	356,32	31,72	1,49	Δ Flame at combustor rim
55	17,19	362,01	32,20	1,47	Δ Flame at combustor rim
56	17,19	367,71	32,69	1,45	Δ Flame at combustor rim
57	17,19	373,41	33,17	1,42	Δ Flame at combustor rim
58	17,19	379,10	33,66	1,40	Δ Flame at combustor rim
59	17,19	384,80	34,14	1,38	Δ Flame at combustor rim
60	17,19	390,49	34,62	1,36	Δ Flame at combustor rim
61	17,19	396,19	35,11	1,34	Δ Flame at combustor rim
62	17,19	401,89	35,59	1,32	Δ Flame at combustor rim
63	17,19	407,58	36,07	1,30	Δ Flame at combustor rim
64	17,19	413,28	36,56	1,29	Δ Flame at combustor rim
65	17,19	418,97	37,04	1,27	Δ Flame at combustor rim
66	17,19	424,67	37,53	1,25	Δ Flame at combustor rim
67	17,19	430,37	38,01	1,24	Δ Flame at combustor rim
68	17,19	436,06	38,49	1,22	Δ Flame at combustor rim
69	17,19	441,76	38,98	1,20	Δ Flame at combustor rim
70	17,19	447,45	39,46	1,19	Δ Flame at combustor rim
71	17,19	453,15	39,94	1,17	Δ Flame at combustor rim
72	17,19	458,85	40,43	1,16	Δ Flame at combustor rim
73	17,19	464,54	40,91	1,14	Δ Flame at combustor rim
74	17,19	470,24	41,40	1,13	Δ Flame at combustor rim
75	17,19	475,93	41,88	1,12	Δ Flame at combustor rim
76	17,19	481,63	42,36	1,10	Δ Flame at combustor rim
77	17,19	487,33	42,85	1,09	Δ Flame at combustor rim
78	17,19	493,02	43,33	1,08	Δ Flame at combustor rim
79	17,19	498,72	43,81	1,07	Δ Flame at combustor rim
80	17,19	504,41	44,30	1,05	Δ Flame at combustor rim

81	17,19	510,11	44,78	1,04	Δ Flame at combustor rim
82	17,19	515,81	45,27	1,03	Δ Flame at combustor rim
83	17,19	521,50	45,75	1,02	Δ Flame at combustor rim
84	17,19	527,20	46,23	1,01	Δ Flame at combustor rim
85	17,19	532,89	46,72	1,00	Δ Flame at combustor rim
86	17,19	538,59	47,20	0,99	Δ Flame at combustor rim
87	17,19	544,29	47,68	0,98	Δ Flame at combustor rim
88	17,19	549,98	48,17	0,97	Δ Flame at combustor rim
89	17,19	555,68	48,65	0,96	Δ Flame at combustor rim
90	17,19	561,37	49,14	0,95	Δ Flame at combustor rim
91	17,19	567,07	49,62	0,94	Δ Flame at combustor rim

Tabel 28 Data komposisi bahan bakar dan udara *Combustor* D_{out} 6 mm (Q_{fuel} 3,36 ml/min)

No	Q_{fuel} (ml/min)	Q_{air} (ml/min)	$V_{reaktan}$ (Cm/s)	Ekv Rasio (Φ)	Keterangan
1	3,36	54,43	3,41	1,91	Δ Flame at combustor rim
2	3,36	60,13	3,74	1,73	Δ Flame at combustor rim
3	3,36	65,82	4,08	1,58	Δ Flame at combustor rim
4	3,36	71,52	4,42	1,45	Δ Flame at combustor rim
5	3,36	77,21	4,75	1,35	x Flashback flame
6	3,36	82,91	5,09	1,25	x Flashback flame
7	3,36	88,61	5,42	1,17	x Flashback flame
8	3,36	94,30	5,76	1,10	x Flashback flame
9	3,36	100,00	6,10	1,04	x Flashback flame
10	3,36	105,69	6,43	0,98	x Flashback flame
11	3,36	111,39	6,77	0,93	x Flashback flame
12	3,36	117,09	7,10	0,89	x Flashback flame
13	3,36	122,78	7,44	0,85	x Flashback flame
14	3,36	128,48	7,78	0,81	x Flashback flame
15	3,36	134,17	8,11	0,78	x Flashback flame

16	3,36	139,87	8,45	0,74	x Flashback flame
17	3,36	145,57	8,78	0,71	x Flashback flame
18	3,36	151,26	9,12	0,69	x Flashback flame
19	3,36	156,96	9,46	0,66	x Flashback flame
20	3,36	162,65	9,79	0,64	x Flashback flame
21	3,36	168,35	10,13	0,62	x Flashback flame
22	3,36	174,05	10,46	0,60	No ignition

Tabel 29 Data komposisi bahan bakar dan udara *Combustor* D_{out} 6 mm (Q_{fuel} 3,89 ml/min)

No	Q_{fuel} (ml/min)	Q_{air} (ml/min)	$V_{reaktan}$ (Cm/s)	Ekv Rasio (Φ)	Keterangan
1	3,89	54,43	3,44	2,21	Δ Flame at combustor rim
2	3,89	60,13	3,78	2,00	Δ Flame at combustor rim
3	3,89	65,82	4,11	1,83	Δ Flame at combustor rim
4	3,89	71,52	4,45	1,68	Δ Flame at combustor rim
5	3,89	77,21	4,78	1,56	Δ Flame at combustor rim
6	3,89	82,91	5,12	1,45	Δ Flame at combustor rim
7	3,89	88,61	5,46	1,36	x Flashback flame
8	3,89	94,30	5,79	1,28	x Flashback flame
9	3,89	100,00	6,13	1,20	x Flashback flame
10	3,89	105,69	6,46	1,14	x Flashback flame
11	3,89	111,39	6,80	1,08	x Flashback flame
12	3,89	117,09	7,14	1,03	x Flashback flame
13	3,89	122,78	7,47	0,98	x Flashback flame
14	3,89	128,48	7,81	0,94	x Flashback flame
15	3,89	134,17	8,14	0,90	x Flashback flame
16	3,89	139,87	8,48	0,86	x Flashback flame
17	3,89	145,57	8,81	0,83	x Flashback flame
18	3,89	151,26	9,15	0,80	x Flashback flame
19	3,89	156,96	9,49	0,77	x Flashback flame

20	3,89	162,65	9,82	0,74	x Flashback flame
21	3,89	168,35	10,16	0,72	x Flashback flame
22	3,89	174,05	10,49	0,69	x Flashback flame
23	3,89	179,74	10,83	0,67	x Flashback flame
24	3,89	185,44	11,17	0,65	x Flashback flame
25	3,89	191,13	11,50	0,63	No ignition

Tabel 30 Data komposisi bahan bakar dan udara *Combustor* D_{out} 6 mm (Q_{fuel} 4,43 ml/min)

No	Q_{fuel} (ml/min)	Q_{air} (ml/min)	$V_{reaktan}$ (Cm/s)	Ekv Rasio (Φ)	Keterangan
1	4,43	54,43	3,47	2,52	Δ Flame at combustor rim
2	4,43	60,13	3,81	2,28	Δ Flame at combustor rim
3	4,43	65,82	4,14	2,08	Δ Flame at combustor rim
4	4,43	71,52	4,48	1,91	Δ Flame at combustor rim
5	4,43	77,21	4,81	1,77	Δ Flame at combustor rim
6	4,43	82,91	5,15	1,65	Δ Flame at combustor rim
7	4,43	88,61	5,49	1,55	Δ Flame at combustor rim
8	4,43	94,30	5,82	1,45	Δ Flame at combustor rim
9	4,43	100,00	6,16	1,37	x Flashback flame
10	4,43	105,69	6,49	1,30	x Flashback flame
11	4,43	111,39	6,83	1,23	x Flashback flame
12	4,43	117,09	7,17	1,17	x Flashback flame
13	4,43	122,78	7,50	1,12	x Flashback flame
14	4,43	128,48	7,84	1,07	x Flashback flame
15	4,43	134,17	8,17	1,02	x Flashback flame
16	4,43	139,87	8,51	0,98	x Flashback flame
17	4,43	145,57	8,85	0,94	x Flashback flame
18	4,43	151,26	9,18	0,91	x Flashback flame
19	4,43	156,96	9,52	0,87	x Flashback flame
20	4,43	162,65	9,85	0,84	x Flashback flame

21	4,43	168,35	10,19	0,81	x Flashback flame
22	4,43	174,05	10,53	0,79	x Flashback flame
23	4,43	179,74	10,86	0,76	x Flashback flame
24	4,43	185,44	11,20	0,74	x Flashback flame
25	4,43	191,13	11,53	0,72	x Flashback flame
26	4,43	196,83	11,87	0,70	x Flashback flame
27	4,43	202,53	12,21	0,68	x Flashback flame
28	4,43	208,22	12,54	0,66	x Flashback flame
29	4,43	213,92	12,88	0,64	x Flashback flame
30	4,43	219,61	13,21	0,62	No ignition

Tabel 31 Data komposisi bahan bakar dan udara *Combustor* D_{out} 6 mm (Q_{fuel} 4,96 ml/min)

No	Q_{fuel} (ml/min)	Q_{air} (ml/min)	$V_{reaktan}$ (Cm/s)	Ekv Rasio (Φ)	Keterangan
1	4,96	54,43	3,50	2,82	Δ Flame at combustor rim
2	4,96	60,13	3,84	2,55	Δ Flame at combustor rim
3	4,96	65,82	4,17	2,33	Δ Flame at combustor rim
4	4,96	71,52	4,51	2,15	Δ Flame at combustor rim
5	4,96	77,21	4,85	1,99	Δ Flame at combustor rim
6	4,96	82,91	5,18	1,85	Δ Flame at combustor rim
7	4,96	88,61	5,52	1,73	Δ Flame at combustor rim
8	4,96	94,30	5,85	1,63	Δ Flame at combustor rim
9	4,96	100,00	6,19	1,53	Δ Flame at combustor rim
10	4,96	105,69	6,53	1,45	Δ Flame at combustor rim
11	4,96	111,39	6,86	1,38	x Flashback flame
12	4,96	117,09	7,20	1,31	x Flashback flame
13	4,96	122,78	7,53	1,25	x Flashback flame
14	4,96	128,48	7,87	1,19	x Flashback flame
15	4,96	134,17	8,21	1,14	x Flashback flame
16	4,96	139,87	8,54	1,10	x Flashback flame

17	4,96	145,57	8,88	1,05	x Flashback flame
18	4,96	151,26	9,21	1,01	x Flashback flame
19	4,96	156,96	9,55	0,98	x Flashback flame
20	4,96	162,65	9,89	0,94	x Flashback flame
21	4,96	168,35	10,22	0,91	x Flashback flame
22	4,96	174,05	10,56	0,88	x Flashback flame
23	4,96	179,74	10,89	0,85	x Flashback flame
24	4,96	185,44	11,23	0,83	x Flashback flame
25	4,96	191,13	11,56	0,80	x Flashback flame
26	4,96	196,83	11,90	0,78	x Flashback flame
27	4,96	202,53	12,24	0,76	x Flashback flame
28	4,96	208,22	12,57	0,74	x Flashback flame
29	4,96	213,92	12,91	0,72	x Flashback flame
30	4,96	219,61	13,24	0,70	x Flashback flame
31	4,96	225,31	13,58	0,68	x Flashback flame
32	4,96	231,01	13,92	0,66	x Flashback flame
33	4,96	236,70	14,25	0,65	□ Flame in combustor
34	4,96	242,40	14,59	0,63	□ Flame in combustor
35	4,96	248,09	14,92	0,62	□ Flame in combustor
36	4,96	253,79	15,26	0,60	□ Flame in combustor
37	4,96	259,49	15,60	0,59	□ Flame in combustor
38	4,96	265,18	15,93	0,58	□ Flame in combustor
39	4,96	270,88	16,27	0,57	□ Flame in combustor
40	4,96	276,57	16,60	0,55	

Tabel 32 Data komposisi bahan bakar dan udara *Combustor* D_{out} 6 mm (Q_{fuel} 5,49 ml/min)

No	Q_{fuel} (ml/min)	Q_{air} (ml/min)	$V_{reaktan}$ (Cm/s)	Ekv Rasio (Φ)	Keterangan
1	5,49	54,43	3,53	3,12	Δ Flame at combustor rim
2	5,49	60,13	3,87	2,83	Δ Flame at combustor rim

3	5,49	65,82	4,21	2,58	Δ Flame at combustor rim
4	5,49	71,52	4,54	2,38	Δ Flame at combustor rim
5	5,49	77,21	4,88	2,20	Δ Flame at combustor rim
6	5,49	82,91	5,21	2,05	Δ Flame at combustor rim
7	5,49	88,61	5,55	1,92	Δ Flame at combustor rim
8	5,49	94,30	5,89	1,80	Δ Flame at combustor rim
9	5,49	100,00	6,22	1,70	Δ Flame at combustor rim
10	5,49	105,69	6,56	1,61	Δ Flame at combustor rim
11	5,49	111,39	6,89	1,52	Δ Flame at combustor rim
12	5,49	117,09	7,23	1,45	x Flashback flame
13	5,49	122,78	7,57	1,38	x Flashback flame
14	5,49	128,48	7,90	1,32	x Flashback flame
15	5,49	134,17	8,24	1,27	x Flashback flame
16	5,49	139,87	8,57	1,21	x Flashback flame
17	5,49	145,57	8,91	1,17	x Flashback flame
18	5,49	151,26	9,24	1,12	x Flashback flame
19	5,49	156,96	9,58	1,08	x Flashback flame
20	5,49	162,65	9,92	1,04	x Flashback flame
21	5,49	168,35	10,25	1,01	x Flashback flame
22	5,49	174,05	10,59	0,98	x Flashback flame
23	5,49	179,74	10,92	0,95	x Flashback flame
24	5,49	185,44	11,26	0,92	x Flashback flame
25	5,49	191,13	11,60	0,89	x Flashback flame
26	5,49	196,83	11,93	0,86	x Flashback flame
27	5,49	202,53	12,27	0,84	x Flashback flame
28	5,49	208,22	12,60	0,82	x Flashback flame
29	5,49	213,92	12,94	0,79	x Flashback flame
30	5,49	219,61	13,28	0,77	x Flashback flame
31	5,49	225,31	13,61	0,75	x Flashback flame
32	5,49	231,01	13,95	0,74	x Flashback flame
33	5,49	236,70	14,28	0,72	x Flashback flame

34	5,49	242,40	14,62	0,70	x Flashback flame
35	5,49	248,09	14,96	0,68	x Flashback flame
36	5,49	253,79	15,29	0,67	x Flashback flame
37	5,49	259,49	15,63	0,65	x Flashback flame
38	5,49	265,18	15,96	0,64	□ Flame in combustor
39	5,49	270,88	16,30	0,63	□ Flame in combustor
40	5,49	276,57	16,64	0,61	□ Flame in combustor
41	5,49	282,27	16,97	0,60	□ Flame in combustor
42	5,49	287,97	17,31	0,59	□ Flame in combustor
43	5,49	293,66	17,64	0,58	□ Flame in combustor
44	5,49	299,36	17,98	0,57	□ Flame in combustor
45	5,49	305,05	18,31	0,56	Δ Flame at combustor rim
46	5,49	310,07	18,65	0,55	No ignition

Tabel 33 Data komposisi bahan bakar dan udara *Combustor* D_{out} 6 mm (Q_{fuel} 6,02 ml/min)

No	Q_{fuel} (ml/min)	Q_{air} (ml/min)	$V_{reaktan}$ (Cm/s)	Ekv Rasio (Φ)	Keterangan
1	6,02	54,43	3,57	3,42	Δ Flame at combustor rim
2	6,02	60,13	3,90	3,10	Δ Flame at combustor rim
3	6,02	65,82	4,24	2,83	Δ Flame at combustor rim
4	6,02	71,52	4,57	2,61	Δ Flame at combustor rim
5	6,02	77,21	4,91	2,41	Δ Flame at combustor rim
6	6,02	82,91	5,24	2,25	Δ Flame at combustor rim
7	6,02	88,61	5,58	2,10	Δ Flame at combustor rim
8	6,02	94,30	5,92	1,98	Δ Flame at combustor rim
9	6,02	100,00	6,25	1,86	Δ Flame at combustor rim
10	6,02	105,69	6,59	1,76	Δ Flame at combustor rim
11	6,02	111,39	6,92	1,67	Δ Flame at combustor rim
12	6,02	117,09	7,26	1,59	Δ Flame at combustor rim
13	6,02	122,78	7,60	1,52	x Flashback flame

14	6,02	128,48	7,93	1,45	x Flashback flame
15	6,02	134,17	8,27	1,39	x Flashback flame
16	6,02	139,87	8,60	1,33	x Flashback flame
17	6,02	145,57	8,94	1,28	x Flashback flame
18	6,02	151,26	9,28	1,23	x Flashback flame
19	6,02	156,96	9,61	1,19	x Flashback flame
20	6,02	162,65	9,95	1,15	x Flashback flame
21	6,02	168,35	10,28	1,11	x Flashback flame
22	6,02	174,05	10,62	1,07	x Flashback flame
23	6,02	179,74	10,96	1,04	x Flashback flame
24	6,02	185,44	11,29	1,00	x Flashback flame
25	6,02	191,13	11,63	0,97	x Flashback flame
26	6,02	196,83	11,96	0,95	x Flashback flame
27	6,02	202,53	12,30	0,92	x Flashback flame
28	6,02	208,22	12,64	0,89	x Flashback flame
29	6,02	213,92	12,97	0,87	x Flashback flame
30	6,02	219,61	13,31	0,85	x Flashback flame
31	6,02	225,31	13,64	0,83	x Flashback flame
32	6,02	231,01	13,98	0,81	x Flashback flame
33	6,02	236,70	14,31	0,79	x Flashback flame
34	6,02	242,40	14,65	0,77	x Flashback flame
35	6,02	248,09	14,99	0,75	x Flashback flame
36	6,02	253,79	15,32	0,73	x Flashback flame
37	6,02	259,49	15,66	0,72	x Flashback flame
38	6,02	265,18	15,99	0,70	x Flashback flame
39	6,02	270,88	16,33	0,69	O Flame at flame holder
40	6,02	276,57	16,67	0,67	O Flame at flame holder
41	6,02	282,27	17,00	0,66	O Flame at flame holder
42	6,02	287,97	17,34	0,65	□ Flame in combustor
43	6,02	293,66	17,67	0,63	□ Flame in combustor
44	6,02	299,36	18,01	0,62	□ Flame in combustor

45	6,02	305,05	18,35	0,61	□ Flame in combustor
46	6,02	310,75	18,68	0,60	Δ Flame at combustor rim
47	6,02	316,45	19,02	0,59	No ignition

Tabel 34 Data komposisi bahan bakar dan udara *Combustor* D_{out} 6 mm (Q_{fuel} 6,55 ml/min)

No	Q_{fuel} (ml/min)	Q_{air} (ml/min)	$V_{reaktan}$ (Cm/s)	Ekv Rasio (Φ)	Keterangan
1	6,55	54,43	3,60	3,73	Δ Flame at combustor rim
2	6,55	60,13	3,93	3,37	Δ Flame at combustor rim
3	6,55	65,82	4,27	3,08	Δ Flame at combustor rim
4	6,55	71,52	4,60	2,84	Δ Flame at combustor rim
5	6,55	77,21	4,94	2,63	Δ Flame at combustor rim
6	6,55	82,91	5,28	2,45	Δ Flame at combustor rim
7	6,55	88,61	5,61	2,29	Δ Flame at combustor rim
8	6,55	94,30	5,95	2,15	Δ Flame at combustor rim
9	6,55	100,00	6,28	2,03	Δ Flame at combustor rim
10	6,55	105,69	6,62	1,92	Δ Flame at combustor rim
11	6,55	111,39	6,96	1,82	Δ Flame at combustor rim
12	6,55	117,09	7,29	1,73	Δ Flame at combustor rim
13	6,55	122,78	7,63	1,65	□ Flame in combustor
14	6,55	128,48	7,96	1,58	□ Flame in combustor
15	6,55	134,17	8,30	1,51	□ Flame in combustor
16	6,55	139,87	8,64	1,45	□ Flame in combustor
17	6,55	145,57	8,97	1,39	O Flame at flame holder
18	6,55	151,26	9,31	1,34	O Flame at flame holder
19	6,55	156,96	9,64	1,29	O Flame at flame holder
20	6,55	162,65	9,98	1,25	O Flame at flame holder
21	6,55	168,35	10,32	1,20	O Flame at flame holder
22	6,55	174,05	10,65	1,17	O Flame at flame holder
23	6,55	179,74	10,99	1,13	O Flame at flame holder

24	6,55	185,44	11,32	1,09	O Flame at flame holder
25	6,55	191,13	11,66	1,06	O Flame at flame holder
26	6,55	196,83	11,99	1,03	O Flame at flame holder
27	6,55	202,53	12,33	1,00	O Flame at flame holder
28	6,55	208,22	12,67	0,97	O Flame at flame holder
29	6,55	213,92	13,00	0,95	O Flame at flame holder
30	6,55	219,61	13,34	0,92	O Flame at flame holder
31	6,55	225,31	13,67	0,90	O Flame at flame holder
32	6,55	231,01	14,01	0,88	O Flame at flame holder
33	6,55	236,70	14,35	0,86	O Flame at flame holder
34	6,55	242,40	14,68	0,84	O Flame at flame holder
35	6,55	248,09	15,02	0,82	O Flame at flame holder
36	6,55	253,79	15,35	0,80	O Flame at flame holder
37	6,55	259,49	15,69	0,78	□ Flame in combustor
38	6,55	265,18	16,03	0,76	□ Flame in combustor
39	6,55	270,88	16,36	0,75	□ Flame in combustor
40	6,55	276,57	16,70	0,73	□ Flame in combustor
41	6,55	282,27	17,03	0,72	□ Flame in combustor
42	6,55	287,97	17,37	0,70	□ Flame in combustor
43	6,55	293,66	17,71	0,69	□ Flame in combustor
44	6,55	299,36	18,04	0,68	□ Flame in combustor
45	6,55	305,05	18,38	0,66	□ Flame in combustor
46	6,55	310,75	18,71	0,65	Δ Flame at combustor rim
47	6,55	316,45	19,05	0,64	No ignition

Tabel 35 Data komposisi bahan bakar dan udara *Combustor* D_{out} 6 mm (Q_{fuel} 7,09 ml/min)

No	Q_{fuel} (ml/min)	Q_{air} (ml/min)	$V_{reaktan}$ (Cm/s)	Ekv Rasio (Φ)	Keterangan
1	7,09	54,43	3,63	4,03	Δ Flame at combustor rim
2	7,09	60,13	3,96	3,65	Δ Flame at combustor rim

3	7,09	65,82	4,30	3,33	Δ Flame at combustor rim
4	7,09	71,52	4,64	3,07	Δ Flame at combustor rim
5	7,09	77,21	4,97	2,84	Δ Flame at combustor rim
6	7,09	82,91	5,31	2,64	Δ Flame at combustor rim
7	7,09	88,61	5,64	2,47	Δ Flame at combustor rim
8	7,09	94,30	5,98	2,32	Δ Flame at combustor rim
9	7,09	100,00	6,32	2,19	Δ Flame at combustor rim
10	7,09	105,69	6,65	2,07	Δ Flame at combustor rim
11	7,09	111,39	6,99	1,97	Δ Flame at combustor rim
12	7,09	117,09	7,32	1,87	Δ Flame at combustor rim
13	7,09	122,78	7,66	1,79	Δ Flame at combustor rim
14	7,09	128,48	8,00	1,71	Δ Flame at combustor rim
15	7,09	134,17	8,33	1,63	Δ Flame at combustor rim
16	7,09	139,87	8,67	1,57	□ Flame in combustor
17	7,09	145,57	9,00	1,51	□ Flame in combustor
18	7,09	151,26	9,34	1,45	□ Flame in combustor
19	7,09	156,96	9,67	1,40	O Flame at flame holder
20	7,09	162,65	10,01	1,35	O Flame at flame holder
21	7,09	168,35	10,35	1,30	O Flame at flame holder
22	7,09	174,05	10,68	1,26	O Flame at flame holder
23	7,09	179,74	11,02	1,22	O Flame at flame holder
24	7,09	185,44	11,35	1,18	O Flame at flame holder
25	7,09	191,13	11,69	1,15	O Flame at flame holder
26	7,09	196,83	12,03	1,11	O Flame at flame holder
27	7,09	202,53	12,36	1,08	O Flame at flame holder
28	7,09	208,22	12,70	1,05	O Flame at flame holder
29	7,09	213,92	13,03	1,02	O Flame at flame holder
30	7,09	219,61	13,37	1,00	O Flame at flame holder
31	7,09	225,31	13,71	0,97	O Flame at flame holder
32	7,09	231,01	14,04	0,95	O Flame at flame holder
33	7,09	236,70	14,38	0,93	O Flame at flame holder

34	7,09	242,40	14,71	0,90	O Flame at flame holder
35	7,09	248,09	15,05	0,88	O Flame at flame holder
36	7,09	253,79	15,39	0,86	O Flame at flame holder
37	7,09	259,49	15,72	0,84	O Flame at flame holder
38	7,09	265,18	16,06	0,83	O Flame at flame holder
39	7,09	270,88	16,39	0,81	O Flame at flame holder
40	7,09	276,57	16,73	0,79	O Flame at flame holder
41	7,09	282,27	17,07	0,78	O Flame at flame holder
42	7,09	287,97	17,40	0,76	□ Flame in combustor
43	7,09	293,66	17,74	0,75	□ Flame in combustor
44	7,09	299,36	18,07	0,73	□ Flame in combustor
45	7,09	305,05	18,41	0,72	□ Flame in combustor
46	7,09	310,75	18,74	0,71	□ Flame in combustor
47	7,09	316,45	19,08	0,69	□ Flame in combustor
48	7,09	322,14	19,42	0,68	□ Flame in combustor
49	7,09	327,84	19,75	0,67	□ Flame in combustor
50	7,09	333,53	20,09	0,66	□ Flame in combustor
51	7,09	339,23	20,42	0,65	Δ Flame at combustor rim
52	7,09	344,93	20,76	0,64	No ignition

Tabel 36 Data komposisi bahan bakar dan udara *Combustor* D_{out} 6 mm (Q_{fuel} 7,62 ml/min)

No	Q_{fuel} (ml/min)	Q_{air} (ml/min)	$V_{reaktan}$ (Cm/s)	Ekv Rasio (Φ)	Keterangan
1	7,62	54,43	3,66	4,33	Δ Flame at combustor rim
2	7,62	60,13	4,00	3,92	Δ Flame at combustor rim
3	7,62	65,82	4,33	3,58	Δ Flame at combustor rim
4	7,62	71,52	4,67	3,30	Δ Flame at combustor rim
5	7,62	77,21	5,00	3,05	Δ Flame at combustor rim
6	7,62	82,91	5,34	2,84	Δ Flame at combustor rim
7	7,62	88,61	5,67	2,66	Δ Flame at combustor rim

8	7,62	94,30	6,01	2,50	Δ Flame at combustor rim
9	7,62	100,00	6,35	2,36	Δ Flame at combustor rim
10	7,62	105,69	6,68	2,23	Δ Flame at combustor rim
11	7,62	111,39	7,02	2,12	Δ Flame at combustor rim
12	7,62	117,09	7,35	2,01	Δ Flame at combustor rim
13	7,62	122,78	7,69	1,92	Δ Flame at combustor rim
14	7,62	128,48	8,03	1,83	Δ Flame at combustor rim
15	7,62	134,17	8,36	1,76	Δ Flame at combustor rim
16	7,62	139,87	8,70	1,69	Δ Flame at combustor rim
17	7,62	145,57	9,03	1,62	Δ Flame at combustor rim
18	7,62	151,26	9,37	1,56	□ Flame in combustor
19	7,62	156,96	9,71	1,50	□ Flame in combustor
20	7,62	162,65	10,04	1,45	□ Flame in combustor
21	7,62	168,35	10,38	1,40	□ Flame in combustor
22	7,62	174,05	10,71	1,35	O Flame at flame holder
23	7,62	179,74	11,05	1,31	O Flame at flame holder
24	7,62	185,44	11,39	1,27	O Flame at flame holder
25	7,62	191,13	11,72	1,23	O Flame at flame holder
26	7,62	196,83	12,06	1,20	O Flame at flame holder
27	7,62	202,53	12,39	1,16	O Flame at flame holder
28	7,62	208,22	12,73	1,13	O Flame at flame holder
29	7,62	213,92	13,07	1,10	O Flame at flame holder
30	7,62	219,61	13,40	1,07	O Flame at flame holder
31	7,62	225,31	13,74	1,05	O Flame at flame holder
32	7,62	231,01	14,07	1,02	O Flame at flame holder
33	7,62	236,70	14,41	1,00	O Flame at flame holder
34	7,62	242,40	14,74	0,97	O Flame at flame holder
35	7,62	248,09	15,08	0,95	O Flame at flame holder
36	7,62	253,79	15,42	0,93	O Flame at flame holder
37	7,62	259,49	15,75	0,91	O Flame at flame holder
38	7,62	265,18	16,09	0,89	O Flame at flame holder

39	7,62	270,88	16,42	0,87	O Flame at flame holder
40	7,62	276,57	16,76	0,85	O Flame at flame holder
41	7,62	282,27	17,10	0,83	O Flame at flame holder
42	7,62	287,97	17,43	0,82	O Flame at flame holder
43	7,62	293,66	17,77	0,80	O Flame at flame holder
44	7,62	299,36	18,10	0,79	□ Flame in combustor
45	7,62	305,05	18,44	0,77	□ Flame in combustor
46	7,62	310,75	18,78	0,76	□ Flame in combustor
47	7,62	316,45	19,11	0,74	□ Flame in combustor
48	7,62	322,14	19,45	0,73	□ Flame in combustor
49	7,62	327,84	19,78	0,72	□ Flame in combustor
50	7,62	333,53	20,12	0,71	□ Flame in combustor
51	7,62	339,23	20,46	0,69	□ Flame in combustor
52	7,62	344,93	20,79	0,68	□ Flame in combustor
53	7,62	350,62	21,13	0,67	□ Flame in combustor
54	7,62	356,32	21,46	0,66	□ Flame in combustor
55	7,62	362,01	21,80	0,65	Δ Flame at combustor rim
56	7,62	367,71	22,14	0,64	No ignition

Tabel 37 Data komposisi bahan bakar dan udara *Combustor* D_{out} 6 mm (Q_{fuel} 8,15 ml/min)

No	Q_{fuel} (ml/min)	Q_{air} (ml/min)	$V_{reaktan}$ (Cm/s)	Ekv Rasio (Φ)	Keterangan
1	8,15	54,43	3,69	4,63	Δ Flame at combustor rim
2	8,15	60,13	4,03	4,19	Δ Flame at combustor rim
3	8,15	65,82	4,36	3,83	Δ Flame at combustor rim
4	8,15	71,52	4,70	3,53	Δ Flame at combustor rim
5	8,15	77,21	5,03	3,27	Δ Flame at combustor rim
6	8,15	82,91	5,37	3,04	Δ Flame at combustor rim
7	8,15	88,61	5,71	2,85	Δ Flame at combustor rim
8	8,15	94,30	6,04	2,67	Δ Flame at combustor rim

9	8,15	100,00	6,38	2,52	Δ Flame at combustor rim
10	8,15	105,69	6,71	2,39	Δ Flame at combustor rim
11	8,15	111,39	7,05	2,26	Δ Flame at combustor rim
12	8,15	117,09	7,39	2,15	Δ Flame at combustor rim
13	8,15	122,78	7,72	2,05	Δ Flame at combustor rim
14	8,15	128,48	8,06	1,96	Δ Flame at combustor rim
15	8,15	134,17	8,39	1,88	Δ Flame at combustor rim
16	8,15	139,87	8,73	1,80	Δ Flame at combustor rim
17	8,15	145,57	9,07	1,73	Δ Flame at combustor rim
18	8,15	151,26	9,40	1,67	Δ Flame at combustor rim
19	8,15	156,96	9,74	1,61	Δ Flame at combustor rim
20	8,15	162,65	10,07	1,55	Δ Flame at combustor rim
21	8,15	168,35	10,41	1,50	Δ Flame at combustor rim
22	8,15	174,05	10,75	1,45	□ Flame in combustor
23	8,15	179,74	11,08	1,40	□ Flame in combustor
24	8,15	185,44	11,42	1,36	□ Flame in combustor
25	8,15	191,13	11,75	1,32	O Flame at flame holder
26	8,15	196,83	12,09	1,28	O Flame at flame holder
27	8,15	202,53	12,42	1,24	O Flame at flame holder
28	8,15	208,22	12,76	1,21	O Flame at flame holder
29	8,15	213,92	13,10	1,18	O Flame at flame holder
30	8,15	219,61	13,43	1,15	O Flame at flame holder
31	8,15	225,31	13,77	1,12	O Flame at flame holder
32	8,15	231,01	14,10	1,09	O Flame at flame holder
33	8,15	236,70	14,44	1,07	O Flame at flame holder
34	8,15	242,40	14,78	1,04	O Flame at flame holder
35	8,15	248,09	15,11	1,02	O Flame at flame holder
36	8,15	253,79	15,45	0,99	O Flame at flame holder
37	8,15	259,49	15,78	0,97	O Flame at flame holder
38	8,15	265,18	16,12	0,95	O Flame at flame holder
39	8,15	270,88	16,46	0,93	O Flame at flame holder

40	8,15	276,57	16,79	0,91	O Flame at flame holder
41	8,15	282,27	17,13	0,89	O Flame at flame holder
42	8,15	287,97	17,46	0,88	O Flame at flame holder
43	8,15	293,66	17,80	0,86	O Flame at flame holder
44	8,15	299,36	18,14	0,84	O Flame at flame holder
45	8,15	305,05	18,47	0,83	O Flame at flame holder
46	8,15	310,75	18,81	0,81	O Flame at flame holder
47	8,15	316,45	19,14	0,80	□ Flame in combustor
48	8,15	322,14	19,48	0,78	□ Flame in combustor
49	8,15	327,84	19,82	0,77	□ Flame in combustor
50	8,15	333,53	20,15	0,76	□ Flame in combustor
51	8,15	339,23	20,49	0,74	□ Flame in combustor
52	8,15	344,93	20,82	0,73	□ Flame in combustor
53	8,15	350,62	21,16	0,72	□ Flame in combustor
54	8,15	356,32	21,49	0,71	□ Flame in combustor
55	8,15	362,01	21,83	0,70	□ Flame in combustor
56	8,15	367,71	22,17	0,69	□ Flame in combustor
57	8,15	373,41	22,50	0,68	□ Flame in combustor
58	8,15	379,10	22,84	0,67	□ Flame in combustor
59	8,15	384,80	23,17	0,66	□ Flame in combustor
60	8,15	390,49	23,51	0,65	□ Flame in combustor
61	8,15	396,19	23,85	0,64	Δ Flame at combustor rim
62	8,15	401,89	24,18	0,63	No ignition

Tabel 38 Data komposisi bahan bakar dan udara *Combustor* D_{out} 6 mm (Q_{fuel} 8,68 ml/min)

No	Q_{fuel} (ml/min)	Q_{air} (ml/min)	$V_{reaktan}$ (Cm/s)	Ekv Rasio (Φ)	Keterangan
1	8,68	54,43	3,72	4,93	Δ Flame at combustor rim
2	8,68	60,13	4,06	4,47	Δ Flame at combustor rim
3	8,68	65,82	4,39	4,08	Δ Flame at combustor rim

4	8,68	71,52	4,73	3,76	Δ Flame at combustor rim
5	8,68	77,21	5,07	3,48	Δ Flame at combustor rim
6	8,68	82,91	5,40	3,24	Δ Flame at combustor rim
7	8,68	88,61	5,74	3,03	Δ Flame at combustor rim
8	8,68	94,30	6,07	2,85	Δ Flame at combustor rim
9	8,68	100,00	6,41	2,69	Δ Flame at combustor rim
10	8,68	105,69	6,75	2,54	Δ Flame at combustor rim
11	8,68	111,39	7,08	2,41	Δ Flame at combustor rim
12	8,68	117,09	7,42	2,29	Δ Flame at combustor rim
13	8,68	122,78	7,75	2,19	Δ Flame at combustor rim
14	8,68	128,48	8,09	2,09	Δ Flame at combustor rim
15	8,68	134,17	8,43	2,00	Δ Flame at combustor rim
16	8,68	139,87	8,76	1,92	Δ Flame at combustor rim
17	8,68	145,57	9,10	1,85	Δ Flame at combustor rim
18	8,68	151,26	9,43	1,78	Δ Flame at combustor rim
19	8,68	156,96	9,77	1,71	Δ Flame at combustor rim
20	8,68	162,65	10,10	1,65	Δ Flame at combustor rim
21	8,68	168,35	10,44	1,60	Δ Flame at combustor rim
22	8,68	174,05	10,78	1,54	□ Flame in combustor
23	8,68	179,74	11,11	1,49	□ Flame in combustor
24	8,68	185,44	11,45	1,45	□ Flame in combustor
25	8,68	191,13	11,78	1,41	□ Flame in combustor
26	8,68	196,83	12,12	1,36	□ Flame in combustor
27	8,68	202,53	12,46	1,33	O Flame at flame holder
28	8,68	208,22	12,79	1,29	O Flame at flame holder
29	8,68	213,92	13,13	1,26	O Flame at flame holder
30	8,68	219,61	13,46	1,22	O Flame at flame holder
31	8,68	225,31	13,80	1,19	O Flame at flame holder
32	8,68	231,01	14,14	1,16	O Flame at flame holder
33	8,68	236,70	14,47	1,13	O Flame at flame holder
34	8,68	242,40	14,81	1,11	O Flame at flame holder

35	8,68	248,09	15,14	1,08	O Flame at flame holder
36	8,68	253,79	15,48	1,06	O Flame at flame holder
37	8,68	259,49	15,82	1,04	O Flame at flame holder
38	8,68	265,18	16,15	1,01	O Flame at flame holder
39	8,68	270,88	16,49	0,99	O Flame at flame holder
40	8,68	276,57	16,82	0,97	O Flame at flame holder
41	8,68	282,27	17,16	0,95	O Flame at flame holder
42	8,68	287,97	17,50	0,93	O Flame at flame holder
43	8,68	293,66	17,83	0,91	O Flame at flame holder
44	8,68	299,36	18,17	0,90	O Flame at flame holder
45	8,68	305,05	18,50	0,88	O Flame at flame holder
46	8,68	310,75	18,84	0,86	O Flame at flame holder
47	8,68	316,45	19,17	0,85	O Flame at flame holder
48	8,68	322,14	19,51	0,83	□ Flame in combustor
49	8,68	327,84	19,85	0,82	□ Flame in combustor
50	8,68	333,53	20,18	0,81	□ Flame in combustor
51	8,68	339,23	20,52	0,79	□ Flame in combustor
52	8,68	344,93	20,85	0,78	□ Flame in combustor
53	8,68	350,62	21,19	0,77	□ Flame in combustor
54	8,68	356,32	21,53	0,75	□ Flame in combustor
55	8,68	362,01	21,86	0,74	□ Flame in combustor
56	8,68	367,71	22,20	0,73	□ Flame in combustor
57	8,68	373,41	22,53	0,72	□ Flame in combustor
58	8,68	379,10	22,87	0,71	□ Flame in combustor
59	8,68	384,80	23,21	0,70	□ Flame in combustor
60	8,68	390,49	23,54	0,69	□ Flame in combustor
61	8,68	396,19	23,88	0,68	Δ Flame at combustor rim
62	8,68	401,89	24,21	0,67	No ignition

Tabel 39 Data komposisi bahan bakar dan udara *Combustor* D_{out} 6 mm (Q_{fuel} 9,21 ml/min)

No	Q_{fuel} (ml/min)	Q_{air} (ml/min)	$V_{reaktan}$ (Cm/s)	Ekv Rasio (Φ)	Keterangan
1	9,21	54,43	3,75	5,24	Δ Flame at combustor rim
2	9,21	60,13	4,09	4,74	Δ Flame at combustor rim
3	9,21	65,82	4,43	4,33	Δ Flame at combustor rim
4	9,21	71,52	4,76	3,99	Δ Flame at combustor rim
5	9,21	77,21	5,10	3,69	Δ Flame at combustor rim
6	9,21	82,91	5,43	3,44	Δ Flame at combustor rim
7	9,21	88,61	5,77	3,22	Δ Flame at combustor rim
8	9,21	94,30	6,10	3,02	Δ Flame at combustor rim
9	9,21	100,00	6,44	2,85	Δ Flame at combustor rim
10	9,21	105,69	6,78	2,70	Δ Flame at combustor rim
11	9,21	111,39	7,11	2,56	Δ Flame at combustor rim
12	9,21	117,09	7,45	2,43	Δ Flame at combustor rim
13	9,21	122,78	7,78	2,32	Δ Flame at combustor rim
14	9,21	128,48	8,12	2,22	Δ Flame at combustor rim
15	9,21	134,17	8,46	2,12	Δ Flame at combustor rim
16	9,21	139,87	8,79	2,04	Δ Flame at combustor rim
17	9,21	145,57	9,13	1,96	Δ Flame at combustor rim
18	9,21	151,26	9,46	1,88	Δ Flame at combustor rim
19	9,21	156,96	9,80	1,82	Δ Flame at combustor rim
20	9,21	162,65	10,14	1,75	Δ Flame at combustor rim
21	9,21	168,35	10,47	1,69	Δ Flame at combustor rim
22	9,21	174,05	10,81	1,64	Δ Flame at combustor rim
23	9,21	179,74	11,14	1,59	□ Flame in combustor
24	9,21	185,44	11,48	1,54	□ Flame in combustor
25	9,21	191,13	11,82	1,49	□ Flame in combustor
26	9,21	196,83	12,15	1,45	□ Flame in combustor
27	9,21	202,53	12,49	1,41	□ Flame in combustor

28	9,21	208,22	12,82	1,37	□ Flame in combustor
29	9,21	213,92	13,16	1,33	O Flame at flame holder
30	9,21	219,61	13,50	1,30	O Flame at flame holder
31	9,21	225,31	13,83	1,27	O Flame at flame holder
32	9,21	231,01	14,17	1,23	O Flame at flame holder
33	9,21	236,70	14,50	1,20	O Flame at flame holder
34	9,21	242,40	14,84	1,18	O Flame at flame holder
35	9,21	248,09	15,18	1,15	O Flame at flame holder
36	9,21	253,79	15,51	1,12	O Flame at flame holder
37	9,21	259,49	15,85	1,10	O Flame at flame holder
38	9,21	265,18	16,18	1,07	O Flame at flame holder
39	9,21	270,88	16,52	1,05	O Flame at flame holder
40	9,21	276,57	16,85	1,03	O Flame at flame holder
41	9,21	282,27	17,19	1,01	O Flame at flame holder
42	9,21	287,97	17,53	0,99	O Flame at flame holder
43	9,21	293,66	17,86	0,97	O Flame at flame holder
44	9,21	299,36	18,20	0,95	O Flame at flame holder
45	9,21	305,05	18,53	0,93	O Flame at flame holder
46	9,21	310,75	18,87	0,92	O Flame at flame holder
47	9,21	316,45	19,21	0,90	O Flame at flame holder
48	9,21	322,14	19,54	0,88	O Flame at flame holder
49	9,21	327,84	19,88	0,87	O Flame at flame holder
50	9,21	333,53	20,21	0,85	O Flame at flame holder
51	9,21	339,23	20,55	0,84	O Flame at flame holder
52	9,21	344,93	20,89	0,83	□ Flame in combustor
53	9,21	350,62	21,22	0,81	□ Flame in combustor
54	9,21	356,32	21,56	0,80	□ Flame in combustor
55	9,21	362,01	21,89	0,79	□ Flame in combustor
56	9,21	367,71	22,23	0,78	□ Flame in combustor
57	9,21	373,41	22,57	0,76	□ Flame in combustor
58	9,21	379,10	22,90	0,75	□ Flame in combustor

59	9,21	384,80	23,24	0,74	□ Flame in combustor
60	9,21	390,49	23,57	0,73	□ Flame in combustor
61	9,21	396,19	23,91	0,72	□ Flame in combustor
62	9,21	401,89	24,25	0,71	□ Flame in combustor
63	9,21	407,58	24,58	0,70	□ Flame in combustor
64	9,21	413,28	24,92	0,69	□ Flame in combustor
65	9,21	418,97	25,25	0,68	Δ Flame at combustor rim
66	9,21	424,67	25,59	0,67	No ignition

Tabel 40 Data komposisi bahan bakar dan udara *Combustor* D_{out} 6 mm (Q_{fuel} 9,74 ml/min)

No	Q_{fuel} (ml/min)	Q_{air} (ml/min)	$V_{reaktan}$ (Cm/s)	Ekv Rasio (Φ)	Keterangan
1	9,74	54,43	3,78	5,54	Δ Flame at combustor rim
2	9,74	60,13	4,12	5,01	Δ Flame at combustor rim
3	9,74	65,82	4,46	4,58	Δ Flame at combustor rim
4	9,74	71,52	4,79	4,22	Δ Flame at combustor rim
5	9,74	77,21	5,13	3,90	Δ Flame at combustor rim
6	9,74	82,91	5,46	3,64	Δ Flame at combustor rim
7	9,74	88,61	5,80	3,40	Δ Flame at combustor rim
8	9,74	94,30	6,14	3,20	Δ Flame at combustor rim
9	9,74	100,00	6,47	3,02	Δ Flame at combustor rim
10	9,74	105,69	6,81	2,85	Δ Flame at combustor rim
11	9,74	111,39	7,14	2,71	Δ Flame at combustor rim
12	9,74	117,09	7,48	2,58	Δ Flame at combustor rim
13	9,74	122,78	7,82	2,46	Δ Flame at combustor rim
14	9,74	128,48	8,15	2,35	Δ Flame at combustor rim
15	9,74	134,17	8,49	2,25	Δ Flame at combustor rim
16	9,74	139,87	8,82	2,16	Δ Flame at combustor rim
17	9,74	145,57	9,16	2,07	Δ Flame at combustor rim
18	9,74	151,26	9,50	1,99	Δ Flame at combustor rim

19	9,74	156,96	9,83	1,92	Δ Flame at combustor rim
20	9,74	162,65	10,17	1,85	Δ Flame at combustor rim
21	9,74	168,35	10,50	1,79	Δ Flame at combustor rim
22	9,74	174,05	10,84	1,73	Δ Flame at combustor rim
23	9,74	179,74	11,18	1,68	Δ Flame at combustor rim
24	9,74	185,44	11,51	1,63	Δ Flame at combustor rim
25	9,74	191,13	11,85	1,58	Δ Flame at combustor rim
26	9,74	196,83	12,18	1,53	Δ Flame at combustor rim
27	9,74	202,53	12,52	1,49	□ Flame in combustor
28	9,74	208,22	12,85	1,45	□ Flame in combustor
29	9,74	213,92	13,19	1,41	□ Flame in combustor
30	9,74	219,61	13,53	1,37	□ Flame in combustor
31	9,74	225,31	13,86	1,34	□ Flame in combustor
32	9,74	231,01	14,20	1,31	□ Flame in combustor
33	9,74	236,70	14,53	1,27	□ Flame in combustor
34	9,74	242,40	14,87	1,24	O Flame at flame holder
35	9,74	248,09	15,21	1,22	O Flame at flame holder
36	9,74	253,79	15,54	1,19	O Flame at flame holder
37	9,74	259,49	15,88	1,16	O Flame at flame holder
38	9,74	265,18	16,21	1,14	O Flame at flame holder
39	9,74	270,88	16,55	1,11	O Flame at flame holder
40	9,74	276,57	16,89	1,09	O Flame at flame holder
41	9,74	282,27	17,22	1,07	O Flame at flame holder
42	9,74	287,97	17,56	1,05	O Flame at flame holder
43	9,74	293,66	17,89	1,03	O Flame at flame holder
44	9,74	299,36	18,23	1,01	O Flame at flame holder
45	9,74	305,05	18,57	0,99	O Flame at flame holder
46	9,74	310,75	18,90	0,97	O Flame at flame holder
47	9,74	316,45	19,24	0,95	O Flame at flame holder
48	9,74	322,14	19,57	0,94	O Flame at flame holder
49	9,74	327,84	19,91	0,92	O Flame at flame holder

50	9,74	333,53	20,25	0,90	O Flame at flame holder
51	9,74	339,23	20,58	0,89	O Flame at flame holder
52	9,74	344,93	20,92	0,87	O Flame at flame holder
53	9,74	350,62	21,25	0,86	O Flame at flame holder
54	9,74	356,32	21,59	0,85	O Flame at flame holder
55	9,74	362,01	21,92	0,83	O Flame at flame holder
56	9,74	367,71	22,26	0,82	O Flame at flame holder
57	9,74	373,41	22,60	0,81	□ Flame in combustor
58	9,74	379,10	22,93	0,80	□ Flame in combustor
59	9,74	384,80	23,27	0,78	□ Flame in combustor
60	9,74	390,49	23,60	0,77	□ Flame in combustor
61	9,74	396,19	23,94	0,76	□ Flame in combustor
62	9,74	401,89	24,28	0,75	□ Flame in combustor
63	9,74	407,58	24,61	0,74	□ Flame in combustor
64	9,74	413,28	24,95	0,73	□ Flame in combustor
65	9,74	418,97	25,28	0,72	□ Flame in combustor
66	9,74	424,67	25,62	0,71	□ Flame in combustor
67	9,74	430,37	25,96	0,70	□ Flame in combustor
68	9,74	436,06	26,29	0,69	□ Flame in combustor
69	9,74	441,76	26,63	0,68	□ Flame in combustor
70	9,74	447,45	26,96	0,67	□ Flame in combustor
71	9,74	453,15	27,30	0,67	□ Flame in combustor
72	9,74	458,85	27,64	0,66	Δ Flame at combustor rim
73	9,74	464,54	27,97	0,65	Δ Flame at combustor rim
74	9,74	470,24	28,31	0,64	No ignition

Tabel 41 Data komposisi bahan bakar dan udara *Combustor* D_{out} 6 mm (Q_{fuel} 10,28 ml/min)

No	Q_{fuel} (ml/min)	Q_{air} (ml/min)	$V_{reaktan}$ (Cm/s)	Ekv Rasio (Φ)	Keterangan
1	10,28	54,43	3,82	5,84	Δ Flame at combustor rim

2	10,28	60,13	4,15	5,29	Δ Flame at combustor rim
3	10,28	65,82	4,49	4,83	Δ Flame at combustor rim
4	10,28	71,52	4,82	4,45	Δ Flame at combustor rim
5	10,28	77,21	5,16	4,12	Δ Flame at combustor rim
6	10,28	82,91	5,50	3,84	Δ Flame at combustor rim
7	10,28	88,61	5,83	3,59	Δ Flame at combustor rim
8	10,28	94,30	6,17	3,37	Δ Flame at combustor rim
9	10,28	100,00	6,50	3,18	Δ Flame at combustor rim
10	10,28	105,69	6,84	3,01	Δ Flame at combustor rim
11	10,28	111,39	7,18	2,85	Δ Flame at combustor rim
12	10,28	117,09	7,51	2,72	Δ Flame at combustor rim
13	10,28	122,78	7,85	2,59	Δ Flame at combustor rim
14	10,28	128,48	8,18	2,47	Δ Flame at combustor rim
15	10,28	134,17	8,52	2,37	Δ Flame at combustor rim
16	10,28	139,87	8,86	2,27	Δ Flame at combustor rim
17	10,28	145,57	9,19	2,18	Δ Flame at combustor rim
18	10,28	151,26	9,53	2,10	Δ Flame at combustor rim
19	10,28	156,96	9,86	2,03	Δ Flame at combustor rim
20	10,28	162,65	10,20	1,95	Δ Flame at combustor rim
21	10,28	168,35	10,53	1,89	Δ Flame at combustor rim
22	10,28	174,05	10,87	1,83	Δ Flame at combustor rim
23	10,28	179,74	11,21	1,77	Δ Flame at combustor rim
24	10,28	185,44	11,54	1,71	Δ Flame at combustor rim
25	10,28	191,13	11,88	1,66	Δ Flame at combustor rim
26	10,28	196,83	12,21	1,62	Δ Flame at combustor rim
27	10,28	202,53	12,55	1,57	Δ Flame at combustor rim
28	10,28	208,22	12,89	1,53	Δ Flame at combustor rim
29	10,28	213,92	13,22	1,49	Δ Flame at combustor rim
30	10,28	219,61	13,56	1,45	Δ Flame at combustor rim
31	10,28	225,31	13,89	1,41	Δ Flame at combustor rim
32	10,28	231,01	14,23	1,38	□ Flame in combustor

33	10,28	236,70	14,57	1,34	□ Flame in combustor
34	10,28	242,40	14,90	1,31	□ Flame in combustor
35	10,28	248,09	15,24	1,28	□ Flame in combustor
36	10,28	253,79	15,57	1,25	□ Flame in combustor
37	10,28	259,49	15,91	1,23	□ Flame in combustor
38	10,28	265,18	16,25	1,20	□ Flame in combustor
39	10,28	270,88	16,58	1,17	O Flame at flame holder
40	10,28	276,57	16,92	1,15	O Flame at flame holder
41	10,28	282,27	17,25	1,13	O Flame at flame holder
42	10,28	287,97	17,59	1,10	O Flame at flame holder
43	10,28	293,66	17,93	1,08	O Flame at flame holder
44	10,28	299,36	18,26	1,06	O Flame at flame holder
45	10,28	305,05	18,60	1,04	O Flame at flame holder
46	10,28	310,75	18,93	1,02	O Flame at flame holder
47	10,28	316,45	19,27	1,00	O Flame at flame holder
48	10,28	322,14	19,60	0,99	O Flame at flame holder
49	10,28	327,84	19,94	0,97	O Flame at flame holder
50	10,28	333,53	20,28	0,95	O Flame at flame holder
51	10,28	339,23	20,61	0,94	O Flame at flame holder
52	10,28	344,93	20,95	0,92	O Flame at flame holder
53	10,28	350,62	21,28	0,91	O Flame at flame holder
54	10,28	356,32	21,62	0,89	O Flame at flame holder
55	10,28	362,01	21,96	0,88	O Flame at flame holder
56	10,28	367,71	22,29	0,86	O Flame at flame holder
57	10,28	373,41	22,63	0,85	O Flame at flame holder
58	10,28	379,10	22,96	0,84	O Flame at flame holder
59	10,28	384,80	23,30	0,83	O Flame at flame holder
60	10,28	390,49	23,64	0,81	O Flame at flame holder
61	10,28	396,19	23,97	0,80	O Flame at flame holder
62	10,28	401,89	24,31	0,79	□ Flame in combustor
63	10,28	407,58	24,64	0,78	□ Flame in combustor

64	10,28	413,28	24,98	0,77	□ Flame in combustor
65	10,28	418,97	25,32	0,76	□ Flame in combustor
66	10,28	424,67	25,65	0,75	□ Flame in combustor
67	10,28	430,37	25,99	0,74	□ Flame in combustor
68	10,28	436,06	26,32	0,73	□ Flame in combustor
69	10,28	441,76	26,66	0,72	□ Flame in combustor
70	10,28	447,45	27,00	0,71	□ Flame in combustor
71	10,28	453,15	27,33	0,70	□ Flame in combustor
72	10,28	458,85	27,67	0,69	□ Flame in combustor
73	10,28	464,54	28,00	0,68	□ Flame in combustor
74	10,28	470,24	28,34	0,68	□ Flame in combustor
75	10,28	475,93	28,67	0,67	□ Flame in combustor
76	10,28	481,63	29,01	0,66	□ Flame in combustor
77	10,28	487,33	29,35	0,65	Δ Flame at combustor rim
78	10,28	493,02	29,68	0,64	Δ Flame at combustor rim
79	10,28	498,72	30,02	0,64	Δ Flame at combustor rim
80	10,28	504,41	30,35	0,63	No ignition

Tabel 42 Data komposisi bahan bakar dan udara *Combustor* D_{out} 6 mm (Q_{fuel} 10,28 ml/min)

No	Q_{fuel} (ml/min)	Q_{air} (ml/min)	$V_{reaktan}$ (Cm/s)	Ekv Rasio (Φ)	Keterangan
1	10,81	54,43	3,85	6,14	Δ Flame at combustor rim
2	10,81	60,13	4,18	5,56	Δ Flame at combustor rim
3	10,81	65,82	4,52	5,08	Δ Flame at combustor rim
4	10,81	71,52	4,86	4,68	Δ Flame at combustor rim
5	10,81	77,21	5,19	4,33	Δ Flame at combustor rim
6	10,81	82,91	5,53	4,03	Δ Flame at combustor rim
7	10,81	88,61	5,86	3,77	Δ Flame at combustor rim
8	10,81	94,30	6,20	3,55	Δ Flame at combustor rim
9	10,81	100,00	6,53	3,34	Δ Flame at combustor rim

10	10,81	105,69	6,87	3,16	Δ Flame at combustor rim
11	10,81	111,39	7,21	3,00	Δ Flame at combustor rim
12	10,81	117,09	7,54	2,86	Δ Flame at combustor rim
13	10,81	122,78	7,88	2,72	Δ Flame at combustor rim
14	10,81	128,48	8,21	2,60	Δ Flame at combustor rim
15	10,81	134,17	8,55	2,49	Δ Flame at combustor rim
16	10,81	139,87	8,89	2,39	Δ Flame at combustor rim
17	10,81	145,57	9,22	2,30	Δ Flame at combustor rim
18	10,81	151,26	9,56	2,21	Δ Flame at combustor rim
19	10,81	156,96	9,89	2,13	Δ Flame at combustor rim
20	10,81	162,65	10,23	2,06	Δ Flame at combustor rim
21	10,81	168,35	10,57	1,99	Δ Flame at combustor rim
22	10,81	174,05	10,90	1,92	Δ Flame at combustor rim
23	10,81	179,74	11,24	1,86	Δ Flame at combustor rim
24	10,81	185,44	11,57	1,80	Δ Flame at combustor rim
25	10,81	191,13	11,91	1,75	Δ Flame at combustor rim
26	10,81	196,83	12,25	1,70	Δ Flame at combustor rim
27	10,81	202,53	12,58	1,65	Δ Flame at combustor rim
28	10,81	208,22	12,92	1,61	Δ Flame at combustor rim
29	10,81	213,92	13,25	1,56	Δ Flame at combustor rim
30	10,81	219,61	13,59	1,52	Δ Flame at combustor rim
31	10,81	225,31	13,93	1,48	Δ Flame at combustor rim
32	10,81	231,01	14,26	1,45	Δ Flame at combustor rim
33	10,81	236,70	14,60	1,41	Δ Flame at combustor rim
34	10,81	242,40	14,93	1,38	□ Flame in combustor
35	10,81	248,09	15,27	1,35	□ Flame in combustor
36	10,81	253,79	15,61	1,32	□ Flame in combustor
37	10,81	259,49	15,94	1,29	□ Flame in combustor
38	10,81	265,18	16,28	1,26	□ Flame in combustor
39	10,81	270,88	16,61	1,23	□ Flame in combustor
40	10,81	276,57	16,95	1,21	□ Flame in combustor

41	10,81	282,27	17,28	1,18	□ Flame in combustor
42	10,81	287,97	17,62	1,16	O Flame at flame holder
43	10,81	293,66	17,96	1,14	O Flame at flame holder
44	10,81	299,36	18,29	1,12	O Flame at flame holder
45	10,81	305,05	18,63	1,10	O Flame at flame holder
46	10,81	310,75	18,96	1,08	O Flame at flame holder
47	10,81	316,45	19,30	1,06	O Flame at flame holder
48	10,81	322,14	19,64	1,04	O Flame at flame holder
49	10,81	327,84	19,97	1,02	O Flame at flame holder
50	10,81	333,53	20,31	1,00	O Flame at flame holder
51	10,81	339,23	20,64	0,99	O Flame at flame holder
52	10,81	344,93	20,98	0,97	O Flame at flame holder
53	10,81	350,62	21,32	0,95	O Flame at flame holder
54	10,81	356,32	21,65	0,94	O Flame at flame holder
55	10,81	362,01	21,99	0,92	O Flame at flame holder
56	10,81	367,71	22,32	0,91	O Flame at flame holder
57	10,81	373,41	22,66	0,90	O Flame at flame holder
58	10,81	379,10	23,00	0,88	O Flame at flame holder
59	10,81	384,80	23,33	0,87	O Flame at flame holder
60	10,81	390,49	23,67	0,86	O Flame at flame holder
61	10,81	396,19	24,00	0,84	O Flame at flame holder
62	10,81	401,89	24,34	0,83	O Flame at flame holder
63	10,81	407,58	24,68	0,82	□ Flame in combustor
64	10,81	413,28	25,01	0,81	□ Flame in combustor
65	10,81	418,97	25,35	0,80	□ Flame in combustor
66	10,81	424,67	25,68	0,79	□ Flame in combustor
67	10,81	430,37	26,02	0,78	□ Flame in combustor
68	10,81	436,06	26,35	0,77	□ Flame in combustor
69	10,81	441,76	26,69	0,76	□ Flame in combustor
70	10,81	447,45	27,03	0,75	□ Flame in combustor
71	10,81	453,15	27,36	0,74	□ Flame in combustor

72	10,81	458,85	27,70	0,73	□ Flame in combustor
73	10,81	464,54	28,03	0,72	□ Flame in combustor
74	10,81	470,24	28,37	0,71	□ Flame in combustor
75	10,81	475,93	28,71	0,70	□ Flame in combustor
76	10,81	481,63	29,04	0,69	□ Flame in combustor
77	10,81	487,33	29,38	0,69	□ Flame in combustor
78	10,81	493,02	29,71	0,68	□ Flame in combustor
79	10,81	498,72	30,05	0,67	□ Flame in combustor
80	10,81	504,41	30,39	0,66	□ Flame in combustor
81	10,81	510,11	30,72	0,66	Δ Flame at combustor rim
82	10,81	515,81	31,06	0,65	Δ Flame at combustor rim
83	10,81	521,50	31,39	0,64	No ignition

Tabel 43 Data komposisi bahan bakar dan udara *Combustor* D_{out} 6 mm (Q_{fuel} 10,28 ml/min)

No	Q_{fuel} (ml/min)	Q_{air} (ml/min)	$V_{reaktan}$ (Cm/s)	Ekv Rasio (Φ)	Keterangan
1	11,34	54,43	3,88	6,45	Δ Flame at combustor rim
2	11,34	60,13	4,21	5,84	Δ Flame at combustor rim
3	11,34	65,82	4,55	5,33	Δ Flame at combustor rim
4	11,34	71,52	4,89	4,91	Δ Flame at combustor rim
5	11,34	77,21	5,22	4,54	Δ Flame at combustor rim
6	11,34	82,91	5,56	4,23	Δ Flame at combustor rim
7	11,34	88,61	5,89	3,96	Δ Flame at combustor rim
8	11,34	94,30	6,23	3,72	Δ Flame at combustor rim
9	11,34	100,00	6,57	3,51	Δ Flame at combustor rim
10	11,34	105,69	6,90	3,32	Δ Flame at combustor rim
11	11,34	111,39	7,24	3,15	Δ Flame at combustor rim
12	11,34	117,09	7,57	3,00	Δ Flame at combustor rim
13	11,34	122,78	7,91	2,86	Δ Flame at combustor rim
14	11,34	128,48	8,25	2,73	Δ Flame at combustor rim

15	11,34	134,17	8,58	2,62	Δ Flame at combustor rim
16	11,34	139,87	8,92	2,51	Δ Flame at combustor rim
17	11,34	145,57	9,25	2,41	Δ Flame at combustor rim
18	11,34	151,26	9,59	2,32	Δ Flame at combustor rim
19	11,34	156,96	9,93	2,24	Δ Flame at combustor rim
20	11,34	162,65	10,26	2,16	Δ Flame at combustor rim
21	11,34	168,35	10,60	2,08	Δ Flame at combustor rim
22	11,34	174,05	10,93	2,02	Δ Flame at combustor rim
23	11,34	179,74	11,27	1,95	Δ Flame at combustor rim
24	11,34	185,44	11,61	1,89	Δ Flame at combustor rim
25	11,34	191,13	11,94	1,84	Δ Flame at combustor rim
26	11,34	196,83	12,28	1,78	Δ Flame at combustor rim
27	11,34	202,53	12,61	1,73	Δ Flame at combustor rim
28	11,34	208,22	12,95	1,69	Δ Flame at combustor rim
29	11,34	213,92	13,28	1,64	Δ Flame at combustor rim
30	11,34	219,61	13,62	1,60	Δ Flame at combustor rim
31	11,34	225,31	13,96	1,56	Δ Flame at combustor rim
32	11,34	231,01	14,29	1,52	Δ Flame at combustor rim
33	11,34	236,70	14,63	1,48	Δ Flame at combustor rim
34	11,34	242,40	14,96	1,45	Δ Flame at combustor rim
35	11,34	248,09	15,30	1,41	Δ Flame at combustor rim
36	11,34	253,79	15,64	1,38	Δ Flame at combustor rim
37	11,34	259,49	15,97	1,35	Δ Flame at combustor rim
38	11,34	265,18	16,31	1,32	□ Flame in combustor
39	11,34	270,88	16,64	1,30	□ Flame in combustor
40	11,34	276,57	16,98	1,27	□ Flame in combustor
41	11,34	282,27	17,32	1,24	□ Flame in combustor
42	11,34	287,97	17,65	1,22	□ Flame in combustor
43	11,34	293,66	17,99	1,19	□ Flame in combustor
44	11,34	299,36	18,32	1,17	□ Flame in combustor
45	11,34	305,05	18,66	1,15	O Flame at flame holder

46	11,34	310,75	19,00	1,13	O Flame at flame holder
47	11,34	316,45	19,33	1,11	O Flame at flame holder
48	11,34	322,14	19,67	1,09	O Flame at flame holder
49	11,34	327,84	20,00	1,07	O Flame at flame holder
50	11,34	333,53	20,34	1,05	O Flame at flame holder
51	11,34	339,23	20,68	1,03	O Flame at flame holder
52	11,34	344,93	21,01	1,02	O Flame at flame holder
53	11,34	350,62	21,35	1,00	O Flame at flame holder
54	11,34	356,32	21,68	0,98	O Flame at flame holder
55	11,34	362,01	22,02	0,97	O Flame at flame holder
56	11,34	367,71	22,35	0,95	O Flame at flame holder
57	11,34	373,41	22,69	0,94	O Flame at flame holder
58	11,34	379,10	23,03	0,93	O Flame at flame holder
59	11,34	384,80	23,36	0,91	O Flame at flame holder
60	11,34	390,49	23,70	0,90	O Flame at flame holder
61	11,34	396,19	24,03	0,89	O Flame at flame holder
62	11,34	401,89	24,37	0,87	O Flame at flame holder
63	11,34	407,58	24,71	0,86	O Flame at flame holder
64	11,34	413,28	25,04	0,85	O Flame at flame holder
65	11,34	418,97	25,38	0,84	□ Flame in combustor
66	11,34	424,67	25,71	0,83	□ Flame in combustor
67	11,34	430,37	26,05	0,82	□ Flame in combustor
68	11,34	436,06	26,39	0,80	□ Flame in combustor
69	11,34	441,76	26,72	0,79	□ Flame in combustor
70	11,34	447,45	27,06	0,78	□ Flame in combustor
71	11,34	453,15	27,39	0,77	□ Flame in combustor
72	11,34	458,85	27,73	0,76	□ Flame in combustor
73	11,34	464,54	28,07	0,76	□ Flame in combustor
74	11,34	470,24	28,40	0,75	□ Flame in combustor
75	11,34	475,93	28,74	0,74	□ Flame in combustor
76	11,34	481,63	29,07	0,73	□ Flame in combustor

77	11,34	487,33	29,41	0,72	□ Flame in combustor
78	11,34	493,02	29,75	0,71	□ Flame in combustor
79	11,34	498,72	30,08	0,70	□ Flame in combustor
80	11,34	504,41	30,42	0,70	□ Flame in combustor
81	11,34	510,11	30,75	0,69	□ Flame in combustor
82	11,34	515,81	31,09	0,68	□ Flame in combustor
83	11,34	521,50	31,43	0,67	□ Flame in combustor
84	11,34	527,20	31,76	0,67	□ Flame in combustor
85	11,34	532,89	32,10	0,66	Δ Flame at combustor rim
86	11,34	538,59	32,43	0,65	Δ Flame at combustor rim
87	11,34	544,29	32,77	0,64	Δ Flame at combustor rim
88	11,34	549,98	33,10	0,64	No ignition

Tabel 44 Data komposisi bahan bakar dan udara *Combustor* D_{out} 6 mm (Q_{fuel} 11,87 ml/min)

No	Q_{fuel} (ml/min)	Q_{air} (ml/min)	$V_{reaktan}$ (Cm/s)	Ekv Rasio (Φ)	Keterangan
1	11,87	54,43	3,91	6,75	Δ Flame at combustor rim
2	11,87	60,13	4,25	6,11	Δ Flame at combustor rim
3	11,87	65,82	4,58	5,58	Δ Flame at combustor rim
4	11,87	71,52	4,92	5,14	Δ Flame at combustor rim
5	11,87	77,21	5,25	4,76	Δ Flame at combustor rim
6	11,87	82,91	5,59	4,43	Δ Flame at combustor rim
7	11,87	88,61	5,93	4,15	Δ Flame at combustor rim
8	11,87	94,30	6,26	3,90	Δ Flame at combustor rim
9	11,87	100,00	6,60	3,67	Δ Flame at combustor rim
10	11,87	105,69	6,93	3,48	Δ Flame at combustor rim
11	11,87	111,39	7,27	3,30	Δ Flame at combustor rim
12	11,87	117,09	7,61	3,14	Δ Flame at combustor rim
13	11,87	122,78	7,94	2,99	Δ Flame at combustor rim
14	11,87	128,48	8,28	2,86	Δ Flame at combustor rim

15	11,87	134,17	8,61	2,74	Δ Flame at combustor rim
16	11,87	139,87	8,95	2,63	Δ Flame at combustor rim
17	11,87	145,57	9,29	2,52	Δ Flame at combustor rim
18	11,87	151,26	9,62	2,43	Δ Flame at combustor rim
19	11,87	156,96	9,96	2,34	Δ Flame at combustor rim
20	11,87	162,65	10,29	2,26	Δ Flame at combustor rim
21	11,87	168,35	10,63	2,18	Δ Flame at combustor rim
22	11,87	174,05	10,96	2,11	Δ Flame at combustor rim
23	11,87	179,74	11,30	2,04	Δ Flame at combustor rim
24	11,87	185,44	11,64	1,98	Δ Flame at combustor rim
25	11,87	191,13	11,97	1,92	Δ Flame at combustor rim
26	11,87	196,83	12,31	1,87	Δ Flame at combustor rim
27	11,87	202,53	12,64	1,81	Δ Flame at combustor rim
28	11,87	208,22	12,98	1,76	Δ Flame at combustor rim
29	11,87	213,92	13,32	1,72	Δ Flame at combustor rim
30	11,87	219,61	13,65	1,67	Δ Flame at combustor rim
31	11,87	225,31	13,99	1,63	Δ Flame at combustor rim
32	11,87	231,01	14,32	1,59	Δ Flame at combustor rim
33	11,87	236,70	14,66	1,55	Δ Flame at combustor rim
34	11,87	242,40	15,00	1,52	Δ Flame at combustor rim
35	11,87	248,09	15,33	1,48	Δ Flame at combustor rim
36	11,87	253,79	15,67	1,45	Δ Flame at combustor rim
37	11,87	259,49	16,00	1,42	Δ Flame at combustor rim
38	11,87	265,18	16,34	1,39	Δ Flame at combustor rim
39	11,87	270,88	16,68	1,36	Δ Flame at combustor rim
40	11,87	276,57	17,01	1,33	□ Flame in combustor
41	11,87	282,27	17,35	1,30	□ Flame in combustor
42	11,87	287,97	17,68	1,28	□ Flame in combustor
43	11,87	293,66	18,02	1,25	□ Flame in combustor
44	11,87	299,36	18,36	1,23	□ Flame in combustor
45	11,87	305,05	18,69	1,20	□ Flame in combustor

46	11,87	310,75	19,03	1,18	O Flame at flame holder
47	11,87	316,45	19,36	1,16	O Flame at flame holder
48	11,87	322,14	19,70	1,14	O Flame at flame holder
49	11,87	327,84	20,03	1,12	O Flame at flame holder
50	11,87	333,53	20,37	1,10	O Flame at flame holder
51	11,87	339,23	20,71	1,08	O Flame at flame holder
52	11,87	344,93	21,04	1,06	O Flame at flame holder
53	11,87	350,62	21,38	1,05	O Flame at flame holder
54	11,87	356,32	21,71	1,03	O Flame at flame holder
55	11,87	362,01	22,05	1,01	O Flame at flame holder
56	11,87	367,71	22,39	1,00	O Flame at flame holder
57	11,87	373,41	22,72	0,98	O Flame at flame holder
58	11,87	379,10	23,06	0,97	O Flame at flame holder
59	11,87	384,80	23,39	0,95	O Flame at flame holder
60	11,87	390,49	23,73	0,94	O Flame at flame holder
61	11,87	396,19	24,07	0,93	O Flame at flame holder
62	11,87	401,89	24,40	0,91	O Flame at flame holder
63	11,87	407,58	24,74	0,90	O Flame at flame holder
64	11,87	413,28	25,07	0,89	O Flame at flame holder
65	11,87	418,97	25,41	0,88	O Flame at flame holder
66	11,87	424,67	25,75	0,86	□ Flame in combustor
67	11,87	430,37	26,08	0,85	□ Flame in combustor
68	11,87	436,06	26,42	0,84	□ Flame in combustor
69	11,87	441,76	26,75	0,83	□ Flame in combustor
70	11,87	447,45	27,09	0,82	□ Flame in combustor
71	11,87	453,15	27,43	0,81	□ Flame in combustor
72	11,87	458,85	27,76	0,80	□ Flame in combustor
73	11,87	464,54	28,10	0,79	□ Flame in combustor
74	11,87	470,24	28,43	0,78	□ Flame in combustor
75	11,87	475,93	28,77	0,77	□ Flame in combustor
76	11,87	481,63	29,10	0,76	□ Flame in combustor

77	11,87	487,33	29,44	0,75	□ Flame in combustor
78	11,87	493,02	29,78	0,75	□ Flame in combustor
79	11,87	498,72	30,11	0,74	□ Flame in combustor
80	11,87	504,41	30,45	0,73	□ Flame in combustor
81	11,87	510,11	30,78	0,72	□ Flame in combustor
82	11,87	515,81	31,12	0,71	□ Flame in combustor
83	11,87	521,50	31,46	0,70	□ Flame in combustor
84	11,87	527,20	31,79	0,70	□ Flame in combustor
85	11,87	532,89	32,13	0,69	□ Flame in combustor
86	11,87	538,59	32,46	0,68	□ Flame in combustor
87	11,87	544,29	32,80	0,67	Δ Flame at combustor rim
88	11,87	549,98	33,14	0,67	Δ Flame at combustor rim
89	11,87	555,68	33,47	0,66	Δ Flame at combustor rim
90	11,87	561,37	33,81	0,65	Δ Flame at combustor rim
91	11,87	567,07	34,14	0,65	No ignition

Tabel 45 Data komposisi bahan bakar dan udara *Combustor* D_{out} 6 mm (Q_{fuel} 12,40 ml/min)

No	Q_{fuel} (ml/min)	Q_{air} (ml/min)	$V_{reaktan}$ (Cm/s)	Ekv Rasio (Φ)	Keterangan
1	12,40	54,43	3,94	7,05	Δ Flame at combustor rim
2	12,40	60,13	4,28	6,38	Δ Flame at combustor rim
3	12,40	65,82	4,61	5,83	Δ Flame at combustor rim
4	12,40	71,52	4,95	5,37	Δ Flame at combustor rim
5	12,40	77,21	5,29	4,97	Δ Flame at combustor rim
6	12,40	82,91	5,62	4,63	Δ Flame at combustor rim
7	12,40	88,61	5,96	4,33	Δ Flame at combustor rim
8	12,40	94,30	6,29	4,07	Δ Flame at combustor rim
9	12,40	100,00	6,63	3,84	Δ Flame at combustor rim
10	12,40	105,69	6,97	3,63	Δ Flame at combustor rim
11	12,40	111,39	7,30	3,45	Δ Flame at combustor rim

12	12,40	117,09	7,64	3,28	Δ Flame at combustor rim
13	12,40	122,78	7,97	3,13	Δ Flame at combustor rim
14	12,40	128,48	8,31	2,99	Δ Flame at combustor rim
15	12,40	134,17	8,64	2,86	Δ Flame at combustor rim
16	12,40	139,87	8,98	2,74	Δ Flame at combustor rim
17	12,40	145,57	9,32	2,64	Δ Flame at combustor rim
18	12,40	151,26	9,65	2,54	Δ Flame at combustor rim
19	12,40	156,96	9,99	2,45	Δ Flame at combustor rim
20	12,40	162,65	10,32	2,36	Δ Flame at combustor rim
21	12,40	168,35	10,66	2,28	Δ Flame at combustor rim
22	12,40	174,05	11,00	2,21	Δ Flame at combustor rim
23	12,40	179,74	11,33	2,14	Δ Flame at combustor rim
24	12,40	185,44	11,67	2,07	Δ Flame at combustor rim
25	12,40	191,13	12,00	2,01	Δ Flame at combustor rim
26	12,40	196,83	12,34	1,95	Δ Flame at combustor rim
27	12,40	202,53	12,68	1,89	Δ Flame at combustor rim
28	12,40	208,22	13,01	1,84	Δ Flame at combustor rim
29	12,40	213,92	13,35	1,79	Δ Flame at combustor rim
30	12,40	219,61	13,68	1,75	Δ Flame at combustor rim
31	12,40	225,31	14,02	1,70	Δ Flame at combustor rim
32	12,40	231,01	14,36	1,66	Δ Flame at combustor rim
33	12,40	236,70	14,69	1,62	Δ Flame at combustor rim
34	12,40	242,40	15,03	1,58	Δ Flame at combustor rim
35	12,40	248,09	15,36	1,55	Δ Flame at combustor rim
36	12,40	253,79	15,70	1,51	Δ Flame at combustor rim
37	12,40	259,49	16,04	1,48	Δ Flame at combustor rim
38	12,40	265,18	16,37	1,45	Δ Flame at combustor rim
39	12,40	270,88	16,71	1,42	Δ Flame at combustor rim
40	12,40	276,57	17,04	1,39	Δ Flame at combustor rim
41	12,40	282,27	17,38	1,36	Δ Flame at combustor rim
42	12,40	287,97	17,71	1,33	□ Flame in combustor

43	12,40	293,66	18,05	1,31	□ Flame in combustor
44	12,40	299,36	18,39	1,28	□ Flame in combustor
45	12,40	305,05	18,72	1,26	□ Flame in combustor
46	12,40	310,75	19,06	1,24	□ Flame in combustor
47	12,40	316,45	19,39	1,21	□ Flame in combustor
48	12,40	322,14	19,73	1,19	O Flame at flame holder
49	12,40	327,84	20,07	1,17	O Flame at flame holder
50	12,40	333,53	20,40	1,15	O Flame at flame holder
51	12,40	339,23	20,74	1,13	O Flame at flame holder
52	12,40	344,93	21,07	1,11	O Flame at flame holder
53	12,40	350,62	21,41	1,09	O Flame at flame holder
54	12,40	356,32	21,75	1,08	O Flame at flame holder
55	12,40	362,01	22,08	1,06	O Flame at flame holder
56	12,40	367,71	22,42	1,04	O Flame at flame holder
57	12,40	373,41	22,75	1,03	O Flame at flame holder
58	12,40	379,10	23,09	1,01	O Flame at flame holder
59	12,40	384,80	23,43	1,00	O Flame at flame holder
60	12,40	390,49	23,76	0,98	O Flame at flame holder
61	12,40	396,19	24,10	0,97	O Flame at flame holder
62	12,40	401,89	24,43	0,95	O Flame at flame holder
63	12,40	407,58	24,77	0,94	O Flame at flame holder
64	12,40	413,28	25,11	0,93	O Flame at flame holder
65	12,40	418,97	25,44	0,92	O Flame at flame holder
66	12,40	424,67	25,78	0,90	O Flame at flame holder
67	12,40	430,37	26,11	0,89	O Flame at flame holder
68	12,40	436,06	26,45	0,88	□ Flame in combustor
69	12,40	441,76	26,78	0,87	□ Flame in combustor
70	12,40	447,45	27,12	0,86	□ Flame in combustor
71	12,40	453,15	27,46	0,85	□ Flame in combustor
72	12,40	458,85	27,79	0,84	□ Flame in combustor
73	12,40	464,54	28,13	0,83	□ Flame in combustor

74	12,40	470,24	28,46	0,82	□ Flame in combustor
75	12,40	475,93	28,80	0,81	□ Flame in combustor
76	12,40	481,63	29,14	0,80	□ Flame in combustor
77	12,40	487,33	29,47	0,79	□ Flame in combustor
78	12,40	493,02	29,81	0,78	□ Flame in combustor
79	12,40	498,72	30,14	0,77	□ Flame in combustor
80	12,40	504,41	30,48	0,76	□ Flame in combustor
81	12,40	510,11	30,82	0,75	□ Flame in combustor
82	12,40	515,81	31,15	0,74	□ Flame in combustor
83	12,40	521,50	31,49	0,74	□ Flame in combustor
84	12,40	527,20	31,82	0,73	□ Flame in combustor
85	12,40	532,89	32,16	0,72	□ Flame in combustor
86	12,40	538,59	32,50	0,71	□ Flame in combustor
87	12,40	544,29	32,83	0,71	□ Flame in combustor
88	12,40	549,98	33,17	0,70	□ Flame in combustor
89	12,40	555,68	33,50	0,69	Δ Flame at combustor rim
90	12,40	561,37	33,84	0,68	Δ Flame at combustor rim
91	12,40	567,07	34,18	0,68	Δ Flame at combustor rim

Tabel 46 Data komposisi bahan bakar dan udara *Combustor* D_{out} 6 mm (Q_{fuel} 12,94 ml/min)

No	Q_{fuel} (ml/min)	Q_{air} (ml/min)	$V_{reaktan}$ (Cm/s)	Ekv Rasio (Φ)	Keterangan
1	12,94	54,43	3,97	7,35	Δ Flame at combustor rim
2	12,94	60,13	4,31	6,66	Δ Flame at combustor rim
3	12,94	65,82	4,64	6,08	Δ Flame at combustor rim
4	12,94	71,52	4,98	5,60	Δ Flame at combustor rim
5	12,94	77,21	5,32	5,18	Δ Flame at combustor rim
6	12,94	82,91	5,65	4,83	Δ Flame at combustor rim
7	12,94	88,61	5,99	4,52	Δ Flame at combustor rim
8	12,94	94,30	6,32	4,24	Δ Flame at combustor rim

9	12,94	100,00	6,66	4,00	Δ Flame at combustor rim
10	12,94	105,69	7,00	3,79	Δ Flame at combustor rim
11	12,94	111,39	7,33	3,59	Δ Flame at combustor rim
12	12,94	117,09	7,67	3,42	Δ Flame at combustor rim
13	12,94	122,78	8,00	3,26	Δ Flame at combustor rim
14	12,94	128,48	8,34	3,12	Δ Flame at combustor rim
15	12,94	134,17	8,68	2,98	Δ Flame at combustor rim
16	12,94	139,87	9,01	2,86	Δ Flame at combustor rim
17	12,94	145,57	9,35	2,75	Δ Flame at combustor rim
18	12,94	151,26	9,68	2,65	Δ Flame at combustor rim
19	12,94	156,96	10,02	2,55	Δ Flame at combustor rim
20	12,94	162,65	10,36	2,46	Δ Flame at combustor rim
21	12,94	168,35	10,69	2,38	Δ Flame at combustor rim
22	12,94	174,05	11,03	2,30	Δ Flame at combustor rim
23	12,94	179,74	11,36	2,23	Δ Flame at combustor rim
24	12,94	185,44	11,70	2,16	Δ Flame at combustor rim
25	12,94	191,13	12,04	2,09	Δ Flame at combustor rim
26	12,94	196,83	12,37	2,03	Δ Flame at combustor rim
27	12,94	202,53	12,71	1,98	Δ Flame at combustor rim
28	12,94	208,22	13,04	1,92	Δ Flame at combustor rim
29	12,94	213,92	13,38	1,87	Δ Flame at combustor rim
30	12,94	219,61	13,71	1,82	Δ Flame at combustor rim
31	12,94	225,31	14,05	1,78	Δ Flame at combustor rim
32	12,94	231,01	14,39	1,73	Δ Flame at combustor rim
33	12,94	236,70	14,72	1,69	Δ Flame at combustor rim
34	12,94	242,40	15,06	1,65	Δ Flame at combustor rim
35	12,94	248,09	15,39	1,61	Δ Flame at combustor rim
36	12,94	253,79	15,73	1,58	Δ Flame at combustor rim
37	12,94	259,49	16,07	1,54	Δ Flame at combustor rim
38	12,94	265,18	16,40	1,51	Δ Flame at combustor rim
39	12,94	270,88	16,74	1,48	Δ Flame at combustor rim

40	12,94	276,57	17,07	1,45	Δ Flame at combustor rim
41	12,94	282,27	17,41	1,42	Δ Flame at combustor rim
42	12,94	287,97	17,75	1,39	Δ Flame at combustor rim
43	12,94	293,66	18,08	1,36	Δ Flame at combustor rim
44	12,94	299,36	18,42	1,34	□ Flame in combustor
45	12,94	305,05	18,75	1,31	□ Flame in combustor
46	12,94	310,75	19,09	1,29	□ Flame in combustor
47	12,94	316,45	19,43	1,26	□ Flame in combustor
48	12,94	322,14	19,76	1,24	□ Flame in combustor
49	12,94	327,84	20,10	1,22	□ Flame in combustor
50	12,94	333,53	20,43	1,20	□ Flame in combustor
51	12,94	339,23	20,77	1,18	□ Flame in combustor
52	12,94	344,93	21,11	1,16	O Flame at flame holder
53	12,94	350,62	21,44	1,14	O Flame at flame holder
54	12,94	356,32	21,78	1,12	O Flame at flame holder
55	12,94	362,01	22,11	1,11	O Flame at flame holder
56	12,94	367,71	22,45	1,09	O Flame at flame holder
57	12,94	373,41	22,79	1,07	O Flame at flame holder
58	12,94	379,10	23,12	1,06	O Flame at flame holder
59	12,94	384,80	23,46	1,04	O Flame at flame holder
60	12,94	390,49	23,79	1,02	O Flame at flame holder
61	12,94	396,19	24,13	1,01	O Flame at flame holder
62	12,94	401,89	24,46	1,00	O Flame at flame holder
63	12,94	407,58	24,80	0,98	O Flame at flame holder
64	12,94	413,28	25,14	0,97	O Flame at flame holder
65	12,94	418,97	25,47	0,96	O Flame at flame holder
66	12,94	424,67	25,81	0,94	O Flame at flame holder
67	12,94	430,37	26,14	0,93	O Flame at flame holder
68	12,94	436,06	26,48	0,92	O Flame at flame holder
69	12,94	441,76	26,82	0,91	O Flame at flame holder
70	12,94	447,45	27,15	0,89	O Flame at flame holder

71	12,94	453,15	27,49	0,88	□ Flame in combustor
72	12,94	458,85	27,82	0,87	□ Flame in combustor
73	12,94	464,54	28,16	0,86	□ Flame in combustor
74	12,94	470,24	28,50	0,85	□ Flame in combustor
75	12,94	475,93	28,83	0,84	□ Flame in combustor
76	12,94	481,63	29,17	0,83	□ Flame in combustor
77	12,94	487,33	29,50	0,82	□ Flame in combustor
78	12,94	493,02	29,84	0,81	□ Flame in combustor
79	12,94	498,72	30,18	0,80	□ Flame in combustor
80	12,94	504,41	30,51	0,79	□ Flame in combustor
81	12,94	510,11	30,85	0,78	□ Flame in combustor
82	12,94	515,81	31,18	0,78	□ Flame in combustor
83	12,94	521,50	31,52	0,77	□ Flame in combustor
84	12,94	527,20	31,86	0,76	□ Flame in combustor
85	12,94	532,89	32,19	0,75	□ Flame in combustor
86	12,94	538,59	32,53	0,74	□ Flame in combustor
87	12,94	544,29	32,86	0,74	□ Flame in combustor
88	12,94	549,98	33,20	0,73	□ Flame in combustor
89	12,94	555,68	33,53	0,72	□ Flame in combustor
90	12,94	561,37	33,87	0,71	□ Flame in combustor
91	12,94	567,07	34,21	0,71	□ Flame in combustor

Tabel 47 Data komposisi bahan bakar dan udara *Combustor* D_{out} 6 mm (Q_{fuel} 13,47 ml/min)

No	Q_{fuel} (ml/min)	Q_{air} (ml/min)	$V_{reaktan}$ (Cm/s)	Ekv Rasio (Φ)	Keterangan
1	13,47	54,43	4,00	7,66	Δ Flame at combustor rim
2	13,47	60,13	4,34	6,93	Δ Flame at combustor rim
3	13,47	65,82	4,68	6,33	Δ Flame at combustor rim
4	13,47	71,52	5,01	5,83	Δ Flame at combustor rim
5	13,47	77,21	5,35	5,40	Δ Flame at combustor rim

6	13,47	82,91	5,68	5,03	Δ Flame at combustor rim
7	13,47	88,61	6,02	4,70	Δ Flame at combustor rim
8	13,47	94,30	6,36	4,42	Δ Flame at combustor rim
9	13,47	100,00	6,69	4,17	Δ Flame at combustor rim
10	13,47	105,69	7,03	3,94	Δ Flame at combustor rim
11	13,47	111,39	7,36	3,74	Δ Flame at combustor rim
12	13,47	117,09	7,70	3,56	Δ Flame at combustor rim
13	13,47	122,78	8,04	3,39	Δ Flame at combustor rim
14	13,47	128,48	8,37	3,24	Δ Flame at combustor rim
15	13,47	134,17	8,71	3,11	Δ Flame at combustor rim
16	13,47	139,87	9,04	2,98	Δ Flame at combustor rim
17	13,47	145,57	9,38	2,86	Δ Flame at combustor rim
18	13,47	151,26	9,72	2,75	Δ Flame at combustor rim
19	13,47	156,96	10,05	2,65	Δ Flame at combustor rim
20	13,47	162,65	10,39	2,56	Δ Flame at combustor rim
21	13,47	168,35	10,72	2,48	Δ Flame at combustor rim
22	13,47	174,05	11,06	2,39	Δ Flame at combustor rim
23	13,47	179,74	11,39	2,32	Δ Flame at combustor rim
24	13,47	185,44	11,73	2,25	Δ Flame at combustor rim
25	13,47	191,13	12,07	2,18	Δ Flame at combustor rim
26	13,47	196,83	12,40	2,12	Δ Flame at combustor rim
27	13,47	202,53	12,74	2,06	Δ Flame at combustor rim
28	13,47	208,22	13,07	2,00	Δ Flame at combustor rim
29	13,47	213,92	13,41	1,95	Δ Flame at combustor rim
30	13,47	219,61	13,75	1,90	Δ Flame at combustor rim
31	13,47	225,31	14,08	1,85	Δ Flame at combustor rim
32	13,47	231,01	14,42	1,80	Δ Flame at combustor rim
33	13,47	236,70	14,75	1,76	Δ Flame at combustor rim
34	13,47	242,40	15,09	1,72	Δ Flame at combustor rim
35	13,47	248,09	15,43	1,68	Δ Flame at combustor rim
36	13,47	253,79	15,76	1,64	Δ Flame at combustor rim

37	13,47	259,49	16,10	1,61	Δ Flame at combustor rim
38	13,47	265,18	16,43	1,57	Δ Flame at combustor rim
39	13,47	270,88	16,77	1,54	Δ Flame at combustor rim
40	13,47	276,57	17,11	1,51	Δ Flame at combustor rim
41	13,47	282,27	17,44	1,48	Δ Flame at combustor rim
42	13,47	287,97	17,78	1,45	Δ Flame at combustor rim
43	13,47	293,66	18,11	1,42	Δ Flame at combustor rim
44	13,47	299,36	18,45	1,39	Δ Flame at combustor rim
45	13,47	305,05	18,79	1,37	Δ Flame at combustor rim
46	13,47	310,75	19,12	1,34	Δ Flame at combustor rim
47	13,47	316,45	19,46	1,32	□ Flame in combustor
48	13,47	322,14	19,79	1,29	□ Flame in combustor
49	13,47	327,84	20,13	1,27	□ Flame in combustor
50	13,47	333,53	20,46	1,25	□ Flame in combustor
51	13,47	339,23	20,80	1,23	□ Flame in combustor
52	13,47	344,93	21,14	1,21	□ Flame in combustor
53	13,47	350,62	21,47	1,19	□ Flame in combustor
54	13,47	356,32	21,81	1,17	□ Flame in combustor
55	13,47	362,01	22,14	1,15	O Flame at flame holder
56	13,47	367,71	22,48	1,13	O Flame at flame holder
57	13,47	373,41	22,82	1,12	O Flame at flame holder
58	13,47	379,10	23,15	1,10	O Flame at flame holder
59	13,47	384,80	23,49	1,08	O Flame at flame holder
60	13,47	390,49	23,82	1,07	O Flame at flame holder
61	13,47	396,19	24,16	1,05	O Flame at flame holder
62	13,47	401,89	24,50	1,04	O Flame at flame holder
63	13,47	407,58	24,83	1,02	O Flame at flame holder
64	13,47	413,28	25,17	1,01	O Flame at flame holder
65	13,47	418,97	25,50	0,99	O Flame at flame holder
66	13,47	424,67	25,84	0,98	O Flame at flame holder
67	13,47	430,37	26,18	0,97	O Flame at flame holder

68	13,47	436,06	26,51	0,96	O Flame at flame holder
69	13,47	441,76	26,85	0,94	O Flame at flame holder
70	13,47	447,45	27,18	0,93	O Flame at flame holder
71	13,47	453,15	27,52	0,92	O Flame at flame holder
72	13,47	458,85	27,86	0,91	□ Flame in combustor
73	13,47	464,54	28,19	0,90	□ Flame in combustor
74	13,47	470,24	28,53	0,89	□ Flame in combustor
75	13,47	475,93	28,86	0,88	□ Flame in combustor
76	13,47	481,63	29,20	0,87	□ Flame in combustor
77	13,47	487,33	29,53	0,86	□ Flame in combustor
78	13,47	493,02	29,87	0,85	□ Flame in combustor
79	13,47	498,72	30,21	0,84	□ Flame in combustor
80	13,47	504,41	30,54	0,83	□ Flame in combustor
81	13,47	510,11	30,88	0,82	□ Flame in combustor
82	13,47	515,81	31,21	0,81	□ Flame in combustor
83	13,47	521,50	31,55	0,80	□ Flame in combustor
84	13,47	527,20	31,89	0,79	□ Flame in combustor
85	13,47	532,89	32,22	0,78	□ Flame in combustor
86	13,47	538,59	32,56	0,77	□ Flame in combustor
87	13,47	544,29	32,89	0,77	□ Flame in combustor
88	13,47	549,98	33,23	0,76	□ Flame in combustor
89	13,47	555,68	33,57	0,75	□ Flame in combustor
90	13,47	561,37	33,90	0,74	□ Flame in combustor
91	13,47	567,07	34,24	0,73	□ Flame in combustor

Tabel 48 Data komposisi bahan bakar dan udara *Combustor* D_{out} 6 mm (Q_{fuel} 14.00 ml/min)

No	Q_{fuel} (ml/min)	Q_{air} (ml/min)	$V_{reaktan}$ (Cm/s)	Ekv Rasio (Φ)	Keterangan
1	14,00	54,43	4,04	7,96	Δ Flame at combustor rim
2	14,00	60,13	4,37	7,20	Δ Flame at combustor rim

3	14,00	65,82	4,71	6,58	Δ Flame at combustor rim
4	14,00	71,52	5,04	6,06	Δ Flame at combustor rim
5	14,00	77,21	5,38	5,61	Δ Flame at combustor rim
6	14,00	82,91	5,72	5,22	Δ Flame at combustor rim
7	14,00	88,61	6,05	4,89	Δ Flame at combustor rim
8	14,00	94,30	6,39	4,59	Δ Flame at combustor rim
9	14,00	100,00	6,72	4,33	Δ Flame at combustor rim
10	14,00	105,69	7,06	4,10	Δ Flame at combustor rim
11	14,00	111,39	7,40	3,89	Δ Flame at combustor rim
12	14,00	117,09	7,73	3,70	Δ Flame at combustor rim
13	14,00	122,78	8,07	3,53	Δ Flame at combustor rim
14	14,00	128,48	8,40	3,37	Δ Flame at combustor rim
15	14,00	134,17	8,74	3,23	Δ Flame at combustor rim
16	14,00	139,87	9,07	3,10	Δ Flame at combustor rim
17	14,00	145,57	9,41	2,98	Δ Flame at combustor rim
18	14,00	151,26	9,75	2,86	Δ Flame at combustor rim
19	14,00	156,96	10,08	2,76	Δ Flame at combustor rim
20	14,00	162,65	10,42	2,66	Δ Flame at combustor rim
21	14,00	168,35	10,75	2,57	Δ Flame at combustor rim
22	14,00	174,05	11,09	2,49	Δ Flame at combustor rim
23	14,00	179,74	11,43	2,41	Δ Flame at combustor rim
24	14,00	185,44	11,76	2,34	Δ Flame at combustor rim
25	14,00	191,13	12,10	2,27	Δ Flame at combustor rim
26	14,00	196,83	12,43	2,20	Δ Flame at combustor rim
27	14,00	202,53	12,77	2,14	Δ Flame at combustor rim
28	14,00	208,22	13,11	2,08	Δ Flame at combustor rim
29	14,00	213,92	13,44	2,02	Δ Flame at combustor rim
30	14,00	219,61	13,78	1,97	Δ Flame at combustor rim
31	14,00	225,31	14,11	1,92	Δ Flame at combustor rim
32	14,00	231,01	14,45	1,88	Δ Flame at combustor rim
33	14,00	236,70	14,79	1,83	Δ Flame at combustor rim

34	14,00	242,40	15,12	1,79	Δ Flame at combustor rim
35	14,00	248,09	15,46	1,75	Δ Flame at combustor rim
36	14,00	253,79	15,79	1,71	Δ Flame at combustor rim
37	14,00	259,49	16,13	1,67	Δ Flame at combustor rim
38	14,00	265,18	16,47	1,63	Δ Flame at combustor rim
39	14,00	270,88	16,80	1,60	Δ Flame at combustor rim
40	14,00	276,57	17,14	1,57	Δ Flame at combustor rim
41	14,00	282,27	17,47	1,53	Δ Flame at combustor rim
42	14,00	287,97	17,81	1,50	Δ Flame at combustor rim
43	14,00	293,66	18,14	1,47	Δ Flame at combustor rim
44	14,00	299,36	18,48	1,45	Δ Flame at combustor rim
45	14,00	305,05	18,82	1,42	Δ Flame at combustor rim
46	14,00	310,75	19,15	1,39	Δ Flame at combustor rim
47	14,00	316,45	19,49	1,37	Δ Flame at combustor rim
48	14,00	322,14	19,82	1,34	Δ Flame at combustor rim
49	14,00	327,84	20,16	1,32	Δ Flame at combustor rim
50	14,00	333,53	20,50	1,30	Δ Flame at combustor rim
51	14,00	339,23	20,83	1,28	Δ Flame at combustor rim
52	14,00	344,93	21,17	1,26	□ Flame in combustor
53	14,00	350,62	21,50	1,24	□ Flame in combustor
54	14,00	356,32	21,84	1,22	□ Flame in combustor
55	14,00	362,01	22,18	1,20	□ Flame in combustor
56	14,00	367,71	22,51	1,18	□ Flame in combustor
57	14,00	373,41	22,85	1,16	□ Flame in combustor
58	14,00	379,10	23,18	1,14	□ Flame in combustor
59	14,00	384,80	23,52	1,13	□ Flame in combustor
60	14,00	390,49	23,86	1,11	□ Flame in combustor
61	14,00	396,19	24,19	1,09	□ Flame in combustor
62	14,00	401,89	24,53	1,08	□ Flame in combustor
63	14,00	407,58	24,86	1,06	O Flame at flame holder
64	14,00	413,28	25,20	1,05	O Flame at flame holder

65	14,00	418,97	25,54	1,03	O Flame at flame holder
66	14,00	424,67	25,87	1,02	O Flame at flame holder
67	14,00	430,37	26,21	1,01	O Flame at flame holder
68	14,00	436,06	26,54	0,99	O Flame at flame holder
69	14,00	441,76	26,88	0,98	O Flame at flame holder
70	14,00	447,45	27,21	0,97	O Flame at flame holder
71	14,00	453,15	27,55	0,96	O Flame at flame holder
72	14,00	458,85	27,89	0,94	O Flame at flame holder
73	14,00	464,54	28,22	0,93	O Flame at flame holder
74	14,00	470,24	28,56	0,92	O Flame at flame holder
75	14,00	475,93	28,89	0,91	O Flame at flame holder
76	14,00	481,63	29,23	0,90	O Flame at flame holder
77	14,00	487,33	29,57	0,89	O Flame at flame holder
78	14,00	493,02	29,90	0,88	□ Flame in combustor
79	14,00	498,72	30,24	0,87	□ Flame in combustor
80	14,00	504,41	30,57	0,86	□ Flame in combustor
81	14,00	510,11	30,91	0,85	□ Flame in combustor
82	14,00	515,81	31,25	0,84	□ Flame in combustor
83	14,00	521,50	31,58	0,83	□ Flame in combustor
84	14,00	527,20	31,92	0,82	□ Flame in combustor
85	14,00	532,89	32,25	0,81	□ Flame in combustor
86	14,00	538,59	32,59	0,80	□ Flame in combustor
87	14,00	544,29	32,93	0,80	□ Flame in combustor
88	14,00	549,98	33,26	0,79	□ Flame in combustor
89	14,00	555,68	33,60	0,78	□ Flame in combustor
90	14,00	561,37	33,93	0,77	□ Flame in combustor
91	14,00	567,07	34,27	0,76	□ Flame in combustor

Tabel 49 Data komposisi bahan bakar dan udara *Combustor* D_{out} 6 mm (Q_{fuel} 14.53 ml/min)

No	Q_{fuel} (ml/min)	Q_{air} (ml/min)	$V_{reaktan}$ (Cm/s)	Ekv Rasio (Φ)	Keterangan
1	14,53	54,43	4,07	8,26	Δ Flame at combustor rim
2	14,53	60,13	4,40	7,48	Δ Flame at combustor rim
3	14,53	65,82	4,74	6,83	Δ Flame at combustor rim
4	14,53	71,52	5,07	6,29	Δ Flame at combustor rim
5	14,53	77,21	5,41	5,82	Δ Flame at combustor rim
6	14,53	82,91	5,75	5,42	Δ Flame at combustor rim
7	14,53	88,61	6,08	5,07	Δ Flame at combustor rim
8	14,53	94,30	6,42	4,77	Δ Flame at combustor rim
9	14,53	100,00	6,75	4,50	Δ Flame at combustor rim
10	14,53	105,69	7,09	4,25	Δ Flame at combustor rim
11	14,53	111,39	7,43	4,04	Δ Flame at combustor rim
12	14,53	117,09	7,76	3,84	Δ Flame at combustor rim
13	14,53	122,78	8,10	3,66	Δ Flame at combustor rim
14	14,53	128,48	8,43	3,50	Δ Flame at combustor rim
15	14,53	134,17	8,77	3,35	Δ Flame at combustor rim
16	14,53	139,87	9,11	3,21	Δ Flame at combustor rim
17	14,53	145,57	9,44	3,09	Δ Flame at combustor rim
18	14,53	151,26	9,78	2,97	Δ Flame at combustor rim
19	14,53	156,96	10,11	2,86	Δ Flame at combustor rim
20	14,53	162,65	10,45	2,76	Δ Flame at combustor rim
21	14,53	168,35	10,79	2,67	Δ Flame at combustor rim
22	14,53	174,05	11,12	2,58	Δ Flame at combustor rim
23	14,53	179,74	11,46	2,50	Δ Flame at combustor rim
24	14,53	185,44	11,79	2,42	Δ Flame at combustor rim
25	14,53	191,13	12,13	2,35	Δ Flame at combustor rim
26	14,53	196,83	12,47	2,28	Δ Flame at combustor rim
27	14,53	202,53	12,80	2,22	Δ Flame at combustor rim

28	14,53	208,22	13,14	2,16	Δ Flame at combustor rim
29	14,53	213,92	13,47	2,10	Δ Flame at combustor rim
30	14,53	219,61	13,81	2,05	Δ Flame at combustor rim
31	14,53	225,31	14,14	2,00	Δ Flame at combustor rim
32	14,53	231,01	14,48	1,95	Δ Flame at combustor rim
33	14,53	236,70	14,82	1,90	Δ Flame at combustor rim
34	14,53	242,40	15,15	1,85	Δ Flame at combustor rim
35	14,53	248,09	15,49	1,81	Δ Flame at combustor rim
36	14,53	253,79	15,82	1,77	Δ Flame at combustor rim
37	14,53	259,49	16,16	1,73	Δ Flame at combustor rim
38	14,53	265,18	16,50	1,70	Δ Flame at combustor rim
39	14,53	270,88	16,83	1,66	Δ Flame at combustor rim
40	14,53	276,57	17,17	1,63	Δ Flame at combustor rim
41	14,53	282,27	17,50	1,59	Δ Flame at combustor rim
42	14,53	287,97	17,84	1,56	Δ Flame at combustor rim
43	14,53	293,66	18,18	1,53	Δ Flame at combustor rim
44	14,53	299,36	18,51	1,50	Δ Flame at combustor rim
45	14,53	305,05	18,85	1,47	Δ Flame at combustor rim
46	14,53	310,75	19,18	1,45	Δ Flame at combustor rim
47	14,53	316,45	19,52	1,42	Δ Flame at combustor rim
48	14,53	322,14	19,86	1,40	Δ Flame at combustor rim
49	14,53	327,84	20,19	1,37	Δ Flame at combustor rim
50	14,53	333,53	20,53	1,35	Δ Flame at combustor rim
51	14,53	339,23	20,86	1,33	Δ Flame at combustor rim
52	14,53	344,93	21,20	1,30	Δ Flame at combustor rim
53	14,53	350,62	21,54	1,28	Δ Flame at combustor rim
54	14,53	356,32	21,87	1,26	Δ Flame at combustor rim
55	14,53	362,01	22,21	1,24	Δ Flame at combustor rim
56	14,53	367,71	22,54	1,22	Δ Flame at combustor rim
57	14,53	373,41	22,88	1,20	Δ Flame at combustor rim
58	14,53	379,10	23,22	1,19	Δ Flame at combustor rim

59	14,53	384,80	23,55	1,17	Δ Flame at combustor rim
60	14,53	390,49	23,89	1,15	Δ Flame at combustor rim
61	14,53	396,19	24,22	1,13	Δ Flame at combustor rim
62	14,53	401,89	24,56	1,12	□ Flame in combustor
63	14,53	407,58	24,89	1,10	□ Flame in combustor
64	14,53	413,28	25,23	1,09	□ Flame in combustor
65	14,53	418,97	25,57	1,07	□ Flame in combustor
66	14,53	424,67	25,90	1,06	□ Flame in combustor
67	14,53	430,37	26,24	1,04	□ Flame in combustor
68	14,53	436,06	26,57	1,03	□ Flame in combustor
69	14,53	441,76	26,91	1,02	□ Flame in combustor
70	14,53	447,45	27,25	1,00	□ Flame in combustor
71	14,53	453,15	27,58	0,99	□ Flame in combustor
72	14,53	458,85	27,92	0,98	□ Flame in combustor
73	14,53	464,54	28,25	0,97	□ Flame in combustor
74	14,53	470,24	28,59	0,96	□ Flame in combustor
75	14,53	475,93	28,93	0,94	□ Flame in combustor
76	14,53	481,63	29,26	0,93	□ Flame in combustor
77	14,53	487,33	29,60	0,92	O Flame at flame holder
78	14,53	493,02	29,93	0,91	O Flame at flame holder
79	14,53	498,72	30,27	0,90	O Flame at flame holder
80	14,53	504,41	30,61	0,89	O Flame at flame holder
81	14,53	510,11	30,94	0,88	O Flame at flame holder
82	14,53	515,81	31,28	0,87	O Flame at flame holder
83	14,53	521,50	31,61	0,86	O Flame at flame holder
84	14,53	527,20	31,95	0,85	O Flame at flame holder
85	14,53	532,89	32,29	0,84	O Flame at flame holder
86	14,53	538,59	32,62	0,83	O Flame at flame holder
87	14,53	544,29	32,96	0,83	O Flame at flame holder
88	14,53	549,98	33,29	0,82	O Flame at flame holder
89	14,53	555,68	33,63	0,81	O Flame at flame holder

90	14,53	561,37	33,96	0,80	O Flame at flame holder
91	14,53	567,07	34,30	0,79	O Flame at flame holder

Tabel 50 Data komposisi bahan bakar dan udara *Combustor* D_{out} 6 mm (Q_{fuel} 15,06 ml/min)

No	Q_{fuel} (ml/min)	Q_{air} (ml/min)	$V_{reaktan}$ (Cm/s)	Ekv Rasio (Φ)	Keterangan
1	15,06	54,43	4,10	8,56	Δ Flame at combustor rim
2	15,06	60,13	4,43	7,75	Δ Flame at combustor rim
3	15,06	65,82	4,77	7,08	Δ Flame at combustor rim
4	15,06	71,52	5,11	6,52	Δ Flame at combustor rim
5	15,06	77,21	5,44	6,04	Δ Flame at combustor rim
6	15,06	82,91	5,78	5,62	Δ Flame at combustor rim
7	15,06	88,61	6,11	5,26	Δ Flame at combustor rim
8	15,06	94,30	6,45	4,94	Δ Flame at combustor rim
9	15,06	100,00	6,79	4,66	Δ Flame at combustor rim
10	15,06	105,69	7,12	4,41	Δ Flame at combustor rim
11	15,06	111,39	7,46	4,18	Δ Flame at combustor rim
12	15,06	117,09	7,79	3,98	Δ Flame at combustor rim
13	15,06	122,78	8,13	3,80	Δ Flame at combustor rim
14	15,06	128,48	8,47	3,63	Δ Flame at combustor rim
15	15,06	134,17	8,80	3,47	Δ Flame at combustor rim
16	15,06	139,87	9,14	3,33	Δ Flame at combustor rim
17	15,06	145,57	9,47	3,20	Δ Flame at combustor rim
18	15,06	151,26	9,81	3,08	Δ Flame at combustor rim
19	15,06	156,96	10,15	2,97	Δ Flame at combustor rim
20	15,06	162,65	10,48	2,87	Δ Flame at combustor rim
21	15,06	168,35	10,82	2,77	Δ Flame at combustor rim
22	15,06	174,05	11,15	2,68	Δ Flame at combustor rim
23	15,06	179,74	11,49	2,59	Δ Flame at combustor rim
24	15,06	185,44	11,82	2,51	Δ Flame at combustor rim

25	15,06	191,13	12,16	2,44	Δ Flame at combustor rim
26	15,06	196,83	12,50	2,37	Δ Flame at combustor rim
27	15,06	202,53	12,83	2,30	Δ Flame at combustor rim
28	15,06	208,22	13,17	2,24	Δ Flame at combustor rim
29	15,06	213,92	13,50	2,18	Δ Flame at combustor rim
30	15,06	219,61	13,84	2,12	Δ Flame at combustor rim
31	15,06	225,31	14,18	2,07	Δ Flame at combustor rim
32	15,06	231,01	14,51	2,02	Δ Flame at combustor rim
33	15,06	236,70	14,85	1,97	Δ Flame at combustor rim
34	15,06	242,40	15,18	1,92	Δ Flame at combustor rim
35	15,06	248,09	15,52	1,88	Δ Flame at combustor rim
36	15,06	253,79	15,86	1,84	Δ Flame at combustor rim
37	15,06	259,49	16,19	1,80	Δ Flame at combustor rim
38	15,06	265,18	16,53	1,76	Δ Flame at combustor rim
39	15,06	270,88	16,86	1,72	Δ Flame at combustor rim
40	15,06	276,57	17,20	1,69	Δ Flame at combustor rim
41	15,06	282,27	17,54	1,65	Δ Flame at combustor rim
42	15,06	287,97	17,87	1,62	Δ Flame at combustor rim
43	15,06	293,66	18,21	1,59	Δ Flame at combustor rim
44	15,06	299,36	18,54	1,56	Δ Flame at combustor rim
45	15,06	305,05	18,88	1,53	Δ Flame at combustor rim
46	15,06	310,75	19,22	1,50	Δ Flame at combustor rim
47	15,06	316,45	19,55	1,47	Δ Flame at combustor rim
48	15,06	322,14	19,89	1,45	Δ Flame at combustor rim
49	15,06	327,84	20,22	1,42	Δ Flame at combustor rim
50	15,06	333,53	20,56	1,40	Δ Flame at combustor rim
51	15,06	339,23	20,89	1,37	Δ Flame at combustor rim
52	15,06	344,93	21,23	1,35	Δ Flame at combustor rim
53	15,06	350,62	21,57	1,33	Δ Flame at combustor rim
54	15,06	356,32	21,90	1,31	Δ Flame at combustor rim
55	15,06	362,01	22,24	1,29	Δ Flame at combustor rim

56	15,06	367,71	22,57	1,27	Δ Flame at combustor rim
57	15,06	373,41	22,91	1,25	Δ Flame at combustor rim
58	15,06	379,10	23,25	1,23	Δ Flame at combustor rim
59	15,06	384,80	23,58	1,21	Δ Flame at combustor rim
60	15,06	390,49	23,92	1,19	Δ Flame at combustor rim
61	15,06	396,19	24,25	1,18	Δ Flame at combustor rim
62	15,06	401,89	24,59	1,16	Δ Flame at combustor rim
63	15,06	407,58	24,93	1,14	Δ Flame at combustor rim
64	15,06	413,28	25,26	1,13	Δ Flame at combustor rim
65	15,06	418,97	25,60	1,11	□ Flame in combustor
66	15,06	424,67	25,93	1,10	□ Flame in combustor
67	15,06	430,37	26,27	1,08	□ Flame in combustor
68	15,06	436,06	26,61	1,07	□ Flame in combustor
69	15,06	441,76	26,94	1,06	□ Flame in combustor
70	15,06	447,45	27,28	1,04	□ Flame in combustor
71	15,06	453,15	27,61	1,03	□ Flame in combustor
72	15,06	458,85	27,95	1,02	□ Flame in combustor
73	15,06	464,54	28,29	1,00	□ Flame in combustor
74	15,06	470,24	28,62	0,99	□ Flame in combustor
75	15,06	475,93	28,96	0,98	□ Flame in combustor
76	15,06	481,63	29,29	0,97	□ Flame in combustor
77	15,06	487,33	29,63	0,96	□ Flame in combustor
78	15,06	493,02	29,96	0,95	□ Flame in combustor
79	15,06	498,72	30,30	0,93	O Flame at flame holder
80	15,06	504,41	30,64	0,92	O Flame at flame holder
81	15,06	510,11	30,97	0,91	O Flame at flame holder
82	15,06	515,81	31,31	0,90	O Flame at flame holder
83	15,06	521,50	31,64	0,89	O Flame at flame holder
84	15,06	527,20	31,98	0,88	O Flame at flame holder
85	15,06	532,89	32,32	0,87	O Flame at flame holder
86	15,06	538,59	32,65	0,87	O Flame at flame holder

87	15,06	544,29	32,99	0,86	O Flame at flame holder
88	15,06	549,98	33,32	0,85	O Flame at flame holder
89	15,06	555,68	33,66	0,84	O Flame at flame holder
90	15,06	561,37	34,00	0,83	O Flame at flame holder
91	15,06	567,07	34,33	0,82	O Flame at flame holder

Tabel 51 Data komposisi bahan bakar dan udara *Combustor* D_{out} 6 mm (Q_{fuel} 15,60 ml/min)

No	Q_{fuel} (ml/min)	Q_{air} (ml/min)	$V_{reaktan}$ (Cm/s)	Ekv Rasio (Φ)	Keterangan
1	15,60	54,43	4,13	8,86	Δ Flame at combustor rim
2	15,60	60,13	4,47	8,03	Δ Flame at combustor rim
3	15,60	65,82	4,80	7,33	Δ Flame at combustor rim
4	15,60	71,52	5,14	6,75	Δ Flame at combustor rim
5	15,60	77,21	5,47	6,25	Δ Flame at combustor rim
6	15,60	82,91	5,81	5,82	Δ Flame at combustor rim
7	15,60	88,61	6,15	5,45	Δ Flame at combustor rim
8	15,60	94,30	6,48	5,12	Δ Flame at combustor rim
9	15,60	100,00	6,82	4,83	Δ Flame at combustor rim
10	15,60	105,69	7,15	4,57	Δ Flame at combustor rim
11	15,60	111,39	7,49	4,33	Δ Flame at combustor rim
12	15,60	117,09	7,83	4,12	Δ Flame at combustor rim
13	15,60	122,78	8,16	3,93	Δ Flame at combustor rim
14	15,60	128,48	8,50	3,76	Δ Flame at combustor rim
15	15,60	134,17	8,83	3,60	Δ Flame at combustor rim
16	15,60	139,87	9,17	3,45	Δ Flame at combustor rim
17	15,60	145,57	9,50	3,31	Δ Flame at combustor rim
18	15,60	151,26	9,84	3,19	Δ Flame at combustor rim
19	15,60	156,96	10,18	3,07	Δ Flame at combustor rim
20	15,60	162,65	10,51	2,97	Δ Flame at combustor rim
21	15,60	168,35	10,85	2,87	Δ Flame at combustor rim

22	15,60	174,05	11,18	2,77	Δ Flame at combustor rim
23	15,60	179,74	11,52	2,68	Δ Flame at combustor rim
24	15,60	185,44	11,86	2,60	Δ Flame at combustor rim
25	15,60	191,13	12,19	2,52	Δ Flame at combustor rim
26	15,60	196,83	12,53	2,45	Δ Flame at combustor rim
27	15,60	202,53	12,86	2,38	Δ Flame at combustor rim
28	15,60	208,22	13,20	2,32	Δ Flame at combustor rim
29	15,60	213,92	13,54	2,26	Δ Flame at combustor rim
30	15,60	219,61	13,87	2,20	Δ Flame at combustor rim
31	15,60	225,31	14,21	2,14	Δ Flame at combustor rim
32	15,60	231,01	14,54	2,09	Δ Flame at combustor rim
33	15,60	236,70	14,88	2,04	Δ Flame at combustor rim
34	15,60	242,40	15,22	1,99	Δ Flame at combustor rim
35	15,60	248,09	15,55	1,94	Δ Flame at combustor rim
36	15,60	253,79	15,89	1,90	Δ Flame at combustor rim
37	15,60	259,49	16,22	1,86	Δ Flame at combustor rim
38	15,60	265,18	16,56	1,82	Δ Flame at combustor rim
39	15,60	270,88	16,90	1,78	Δ Flame at combustor rim
40	15,60	276,57	17,23	1,74	Δ Flame at combustor rim
41	15,60	282,27	17,57	1,71	Δ Flame at combustor rim
42	15,60	287,97	17,90	1,68	Δ Flame at combustor rim
43	15,60	293,66	18,24	1,64	Δ Flame at combustor rim
44	15,60	299,36	18,57	1,61	Δ Flame at combustor rim
45	15,60	305,05	18,91	1,58	Δ Flame at combustor rim
46	15,60	310,75	19,25	1,55	Δ Flame at combustor rim
47	15,60	316,45	19,58	1,52	Δ Flame at combustor rim
48	15,60	322,14	19,92	1,50	Δ Flame at combustor rim
49	15,60	327,84	20,25	1,47	Δ Flame at combustor rim
50	15,60	333,53	20,59	1,45	Δ Flame at combustor rim
51	15,60	339,23	20,93	1,42	Δ Flame at combustor rim
52	15,60	344,93	21,26	1,40	Δ Flame at combustor rim

53	15,60	350,62	21,60	1,38	Δ Flame at combustor rim
54	15,60	356,32	21,93	1,35	Δ Flame at combustor rim
55	15,60	362,01	22,27	1,33	Δ Flame at combustor rim
56	15,60	367,71	22,61	1,31	Δ Flame at combustor rim
57	15,60	373,41	22,94	1,29	Δ Flame at combustor rim
58	15,60	379,10	23,28	1,27	Δ Flame at combustor rim
59	15,60	384,80	23,61	1,25	Δ Flame at combustor rim
60	15,60	390,49	23,95	1,24	Δ Flame at combustor rim
61	15,60	396,19	24,29	1,22	Δ Flame at combustor rim
62	15,60	401,89	24,62	1,20	Δ Flame at combustor rim
63	15,60	407,58	24,96	1,18	Δ Flame at combustor rim
64	15,60	413,28	25,29	1,17	Δ Flame at combustor rim
65	15,60	418,97	25,63	1,15	Δ Flame at combustor rim
66	15,60	424,67	25,97	1,14	Δ Flame at combustor rim
67	15,60	430,37	26,30	1,12	□ Flame in combustor
68	15,60	436,06	26,64	1,11	□ Flame in combustor
69	15,60	441,76	26,97	1,09	□ Flame in combustor
70	15,60	447,45	27,31	1,08	□ Flame in combustor
71	15,60	453,15	27,64	1,06	□ Flame in combustor
72	15,60	458,85	27,98	1,05	□ Flame in combustor
73	15,60	464,54	28,32	1,04	□ Flame in combustor
74	15,60	470,24	28,65	1,03	□ Flame in combustor
75	15,60	475,93	28,99	1,01	□ Flame in combustor
76	15,60	481,63	29,32	1,00	□ Flame in combustor
77	15,60	487,33	29,66	0,99	□ Flame in combustor
78	15,60	493,02	30,00	0,98	□ Flame in combustor
79	15,60	498,72	30,33	0,97	□ Flame in combustor
80	15,60	504,41	30,67	0,96	□ Flame in combustor
81	15,60	510,11	31,00	0,95	□ Flame in combustor
82	15,60	515,81	31,34	0,94	□ Flame in combustor
83	15,60	521,50	31,68	0,93	□ Flame in combustor

84	15,60	527,20	32,01	0,92	O Flame at flame holder
85	15,60	532,89	32,35	0,91	O Flame at flame holder
86	15,60	538,59	32,68	0,90	O Flame at flame holder
87	15,60	544,29	33,02	0,89	O Flame at flame holder
88	15,60	549,98	33,36	0,88	O Flame at flame holder
89	15,60	555,68	33,69	0,87	O Flame at flame holder
90	15,60	561,37	34,03	0,86	O Flame at flame holder
91	15,60	567,07	34,36	0,85	O Flame at flame holder

Tabel 52 Data komposisi bahan bakar dan udara *Combustor* D_{out} 6 mm (Q_{fuel} 16,13 ml/min)

No	Q_{fuel} (ml/min)	Q_{air} (ml/min)	$V_{reaktan}$ (Cm/s)	Ekv Rasio (Φ)	Keterangan
1	16,13	54,43	4,16	9,17	Δ Flame at combustor rim
2	16,13	60,13	4,50	8,30	Δ Flame at combustor rim
3	16,13	65,82	4,83	7,58	Δ Flame at combustor rim
4	16,13	71,52	5,17	6,98	Δ Flame at combustor rim
5	16,13	77,21	5,50	6,46	Δ Flame at combustor rim
6	16,13	82,91	5,84	6,02	Δ Flame at combustor rim
7	16,13	88,61	6,18	5,63	Δ Flame at combustor rim
8	16,13	94,30	6,51	5,29	Δ Flame at combustor rim
9	16,13	100,00	6,85	4,99	Δ Flame at combustor rim
10	16,13	105,69	7,18	4,72	Δ Flame at combustor rim
11	16,13	111,39	7,52	4,48	Δ Flame at combustor rim
12	16,13	117,09	7,86	4,26	Δ Flame at combustor rim
13	16,13	122,78	8,19	4,06	Δ Flame at combustor rim
14	16,13	128,48	8,53	3,88	Δ Flame at combustor rim
15	16,13	134,17	8,86	3,72	Δ Flame at combustor rim
16	16,13	139,87	9,20	3,57	Δ Flame at combustor rim
17	16,13	145,57	9,54	3,43	Δ Flame at combustor rim
18	16,13	151,26	9,87	3,30	Δ Flame at combustor rim

19	16,13	156,96	10,21	3,18	Δ Flame at combustor rim
20	16,13	162,65	10,54	3,07	Δ Flame at combustor rim
21	16,13	168,35	10,88	2,96	Δ Flame at combustor rim
22	16,13	174,05	11,22	2,87	Δ Flame at combustor rim
23	16,13	179,74	11,55	2,78	Δ Flame at combustor rim
24	16,13	185,44	11,89	2,69	Δ Flame at combustor rim
25	16,13	191,13	12,22	2,61	Δ Flame at combustor rim
26	16,13	196,83	12,56	2,54	Δ Flame at combustor rim
27	16,13	202,53	12,90	2,46	Δ Flame at combustor rim
28	16,13	208,22	13,23	2,40	Δ Flame at combustor rim
29	16,13	213,92	13,57	2,33	Δ Flame at combustor rim
30	16,13	219,61	13,90	2,27	Δ Flame at combustor rim
31	16,13	225,31	14,24	2,21	Δ Flame at combustor rim
32	16,13	231,01	14,58	2,16	Δ Flame at combustor rim
33	16,13	236,70	14,91	2,11	Δ Flame at combustor rim
34	16,13	242,40	15,25	2,06	Δ Flame at combustor rim
35	16,13	248,09	15,58	2,01	Δ Flame at combustor rim
36	16,13	253,79	15,92	1,97	Δ Flame at combustor rim
37	16,13	259,49	16,25	1,92	Δ Flame at combustor rim
38	16,13	265,18	16,59	1,88	Δ Flame at combustor rim
39	16,13	270,88	16,93	1,84	Δ Flame at combustor rim
40	16,13	276,57	17,26	1,80	Δ Flame at combustor rim
41	16,13	282,27	17,60	1,77	Δ Flame at combustor rim
42	16,13	287,97	17,93	1,73	Δ Flame at combustor rim
43	16,13	293,66	18,27	1,70	Δ Flame at combustor rim
44	16,13	299,36	18,61	1,67	Δ Flame at combustor rim
45	16,13	305,05	18,94	1,64	Δ Flame at combustor rim
46	16,13	310,75	19,28	1,61	Δ Flame at combustor rim
47	16,13	316,45	19,61	1,58	Δ Flame at combustor rim
48	16,13	322,14	19,95	1,55	Δ Flame at combustor rim
49	16,13	327,84	20,29	1,52	Δ Flame at combustor rim

50	16,13	333,53	20,62	1,50	Δ Flame at combustor rim
51	16,13	339,23	20,96	1,47	Δ Flame at combustor rim
52	16,13	344,93	21,29	1,45	Δ Flame at combustor rim
53	16,13	350,62	21,63	1,42	Δ Flame at combustor rim
54	16,13	356,32	21,97	1,40	Δ Flame at combustor rim
55	16,13	362,01	22,30	1,38	Δ Flame at combustor rim
56	16,13	367,71	22,64	1,36	Δ Flame at combustor rim
57	16,13	373,41	22,97	1,34	Δ Flame at combustor rim
58	16,13	379,10	23,31	1,32	Δ Flame at combustor rim
59	16,13	384,80	23,65	1,30	Δ Flame at combustor rim
60	16,13	390,49	23,98	1,28	Δ Flame at combustor rim
61	16,13	396,19	24,32	1,26	Δ Flame at combustor rim
62	16,13	401,89	24,65	1,24	Δ Flame at combustor rim
63	16,13	407,58	24,99	1,22	Δ Flame at combustor rim
64	16,13	413,28	25,32	1,21	Δ Flame at combustor rim
65	16,13	418,97	25,66	1,19	Δ Flame at combustor rim
66	16,13	424,67	26,00	1,17	Δ Flame at combustor rim
67	16,13	430,37	26,33	1,16	Δ Flame at combustor rim
68	16,13	436,06	26,67	1,14	Δ Flame at combustor rim
69	16,13	441,76	27,00	1,13	Δ Flame at combustor rim
70	16,13	447,45	27,34	1,12	Δ Flame at combustor rim
71	16,13	453,15	27,68	1,10	□ Flame in combustor
72	16,13	458,85	28,01	1,09	□ Flame in combustor
73	16,13	464,54	28,35	1,07	□ Flame in combustor
74	16,13	470,24	28,68	1,06	□ Flame in combustor
75	16,13	475,93	29,02	1,05	□ Flame in combustor
76	16,13	481,63	29,36	1,04	□ Flame in combustor
77	16,13	487,33	29,69	1,02	□ Flame in combustor
78	16,13	493,02	30,03	1,01	□ Flame in combustor
79	16,13	498,72	30,36	1,00	□ Flame in combustor
80	16,13	504,41	30,70	0,99	□ Flame in combustor

81	16,13	510,11	31,04	0,98	□ Flame in combustor
82	16,13	515,81	31,37	0,97	□ Flame in combustor
83	16,13	521,50	31,71	0,96	□ Flame in combustor
84	16,13	527,20	32,04	0,95	□ Flame in combustor
85	16,13	532,89	32,38	0,94	□ Flame in combustor
86	16,13	538,59	32,72	0,93	□ Flame in combustor
87	16,13	544,29	33,05	0,92	□ Flame in combustor
88	16,13	549,98	33,39	0,91	O Flame at flame holder
89	16,13	555,68	33,72	0,90	O Flame at flame holder
90	16,13	561,37	34,06	0,89	O Flame at flame holder
91	16,13	567,07	34,39	0,88	O Flame at flame holder

Tabel 53 Data komposisi bahan bakar dan udara *Combustor* D_{out} 6 mm (Q_{fuel} 16,66 ml/min)

No	Q_{fuel} (ml/min)	Q_{air} (ml/min)	$V_{reaktan}$ (Cm/s)	Ekv Rasio (Φ)	Keterangan
1	16,66	54,43	4,19	9,47	Δ Flame at combustor rim
2	16,66	60,13	4,53	8,57	Δ Flame at combustor rim
3	16,66	65,82	4,86	7,83	Δ Flame at combustor rim
4	16,66	71,52	5,20	7,21	Δ Flame at combustor rim
5	16,66	77,21	5,54	6,68	Δ Flame at combustor rim
6	16,66	82,91	5,87	6,22	Δ Flame at combustor rim
7	16,66	88,61	6,21	5,82	Δ Flame at combustor rim
8	16,66	94,30	6,54	5,47	Δ Flame at combustor rim
9	16,66	100,00	6,88	5,15	Δ Flame at combustor rim
10	16,66	105,69	7,22	4,88	Δ Flame at combustor rim
11	16,66	111,39	7,55	4,63	Δ Flame at combustor rim
12	16,66	117,09	7,89	4,40	Δ Flame at combustor rim
13	16,66	122,78	8,22	4,20	Δ Flame at combustor rim
14	16,66	128,48	8,56	4,01	Δ Flame at combustor rim
15	16,66	134,17	8,90	3,84	Δ Flame at combustor rim

16	16,66	139,87	9,23	3,69	Δ Flame at combustor rim
17	16,66	145,57	9,57	3,54	Δ Flame at combustor rim
18	16,66	151,26	9,90	3,41	Δ Flame at combustor rim
19	16,66	156,96	10,24	3,28	Δ Flame at combustor rim
20	16,66	162,65	10,58	3,17	Δ Flame at combustor rim
21	16,66	168,35	10,91	3,06	Δ Flame at combustor rim
22	16,66	174,05	11,25	2,96	Δ Flame at combustor rim
23	16,66	179,74	11,58	2,87	Δ Flame at combustor rim
24	16,66	185,44	11,92	2,78	Δ Flame at combustor rim
25	16,66	191,13	12,25	2,70	Δ Flame at combustor rim
26	16,66	196,83	12,59	2,62	Δ Flame at combustor rim
27	16,66	202,53	12,93	2,54	Δ Flame at combustor rim
28	16,66	208,22	13,26	2,48	Δ Flame at combustor rim
29	16,66	213,92	13,60	2,41	Δ Flame at combustor rim
30	16,66	219,61	13,93	2,35	Δ Flame at combustor rim
31	16,66	225,31	14,27	2,29	Δ Flame at combustor rim
32	16,66	231,01	14,61	2,23	Δ Flame at combustor rim
33	16,66	236,70	14,94	2,18	Δ Flame at combustor rim
34	16,66	242,40	15,28	2,13	Δ Flame at combustor rim
35	16,66	248,09	15,61	2,08	Δ Flame at combustor rim
36	16,66	253,79	15,95	2,03	Δ Flame at combustor rim
37	16,66	259,49	16,29	1,99	Δ Flame at combustor rim
38	16,66	265,18	16,62	1,94	Δ Flame at combustor rim
39	16,66	270,88	16,96	1,90	Δ Flame at combustor rim
40	16,66	276,57	17,29	1,86	Δ Flame at combustor rim
41	16,66	282,27	17,63	1,83	Δ Flame at combustor rim
42	16,66	287,97	17,97	1,79	Δ Flame at combustor rim
43	16,66	293,66	18,30	1,76	Δ Flame at combustor rim
44	16,66	299,36	18,64	1,72	Δ Flame at combustor rim
45	16,66	305,05	18,97	1,69	Δ Flame at combustor rim
46	16,66	310,75	19,31	1,66	Δ Flame at combustor rim

47	16,66	316,45	19,65	1,63	Δ Flame at combustor rim
48	16,66	322,14	19,98	1,60	Δ Flame at combustor rim
49	16,66	327,84	20,32	1,57	Δ Flame at combustor rim
50	16,66	333,53	20,65	1,55	Δ Flame at combustor rim
51	16,66	339,23	20,99	1,52	Δ Flame at combustor rim
52	16,66	344,93	21,32	1,49	Δ Flame at combustor rim
53	16,66	350,62	21,66	1,47	Δ Flame at combustor rim
54	16,66	356,32	22,00	1,45	Δ Flame at combustor rim
55	16,66	362,01	22,33	1,42	Δ Flame at combustor rim
56	16,66	367,71	22,67	1,40	Δ Flame at combustor rim
57	16,66	373,41	23,00	1,38	Δ Flame at combustor rim
58	16,66	379,10	23,34	1,36	Δ Flame at combustor rim
59	16,66	384,80	23,68	1,34	Δ Flame at combustor rim
60	16,66	390,49	24,01	1,32	Δ Flame at combustor rim
61	16,66	396,19	24,35	1,30	Δ Flame at combustor rim
62	16,66	401,89	24,68	1,28	Δ Flame at combustor rim
63	16,66	407,58	25,02	1,26	Δ Flame at combustor rim
64	16,66	413,28	25,36	1,25	Δ Flame at combustor rim
65	16,66	418,97	25,69	1,23	Δ Flame at combustor rim
66	16,66	424,67	26,03	1,21	Δ Flame at combustor rim
67	16,66	430,37	26,36	1,20	Δ Flame at combustor rim
68	16,66	436,06	26,70	1,18	Δ Flame at combustor rim
69	16,66	441,76	27,04	1,17	Δ Flame at combustor rim
70	16,66	447,45	27,37	1,15	Δ Flame at combustor rim
71	16,66	453,15	27,71	1,14	Δ Flame at combustor rim
72	16,66	458,85	28,04	1,12	Δ Flame at combustor rim
73	16,66	464,54	28,38	1,11	Δ Flame at combustor rim
74	16,66	470,24	28,72	1,10	Δ Flame at combustor rim
75	16,66	475,93	29,05	1,08	□ Flame in combustor
76	16,66	481,63	29,39	1,07	□ Flame in combustor
77	16,66	487,33	29,72	1,06	□ Flame in combustor

78	16,66	493,02	30,06	1,05	□ Flame in combustor
79	16,66	498,72	30,39	1,03	□ Flame in combustor
80	16,66	504,41	30,73	1,02	□ Flame in combustor
81	16,66	510,11	31,07	1,01	□ Flame in combustor
82	16,66	515,81	31,40	1,00	□ Flame in combustor
83	16,66	521,50	31,74	0,99	□ Flame in combustor
84	16,66	527,20	32,07	0,98	□ Flame in combustor
85	16,66	532,89	32,41	0,97	□ Flame in combustor
86	16,66	538,59	32,75	0,96	□ Flame in combustor
87	16,66	544,29	33,08	0,95	□ Flame in combustor
88	16,66	549,98	33,42	0,94	□ Flame in combustor
89	16,66	555,68	33,75	0,93	□ Flame in combustor
90	16,66	561,37	34,09	0,92	□ Flame in combustor
91	16,66	567,07	34,43	0,91	□ Flame in combustor

Tabel 54 Data komposisi bahan bakar dan udara *Combustor* D_{out} 6 mm (Q_{fuel} 17,19 ml/min)

No	Q_{fuel} (ml/min)	Q_{air} (ml/min)	$V_{reaktan}$ (Cm/s)	Ekv Rasio (Φ)	Keterangan
1	17,19	54,43	4,22	9,77	Δ Flame at combustor rim
2	17,19	60,13	4,56	8,85	Δ Flame at combustor rim
3	17,19	65,82	4,90	8,08	Δ Flame at combustor rim
4	17,19	71,52	5,23	7,44	Δ Flame at combustor rim
5	17,19	77,21	5,57	6,89	Δ Flame at combustor rim
6	17,19	82,91	5,90	6,42	Δ Flame at combustor rim
7	17,19	88,61	6,24	6,00	Δ Flame at combustor rim
8	17,19	94,30	6,58	5,64	Δ Flame at combustor rim
9	17,19	100,00	6,91	5,32	Δ Flame at combustor rim
10	17,19	105,69	7,25	5,03	Δ Flame at combustor rim
11	17,19	111,39	7,58	4,77	Δ Flame at combustor rim
12	17,19	117,09	7,92	4,54	Δ Flame at combustor rim

13	17,19	122,78	8,26	4,33	Δ Flame at combustor rim
14	17,19	128,48	8,59	4,14	Δ Flame at combustor rim
15	17,19	134,17	8,93	3,96	Δ Flame at combustor rim
16	17,19	139,87	9,26	3,80	Δ Flame at combustor rim
17	17,19	145,57	9,60	3,65	Δ Flame at combustor rim
18	17,19	151,26	9,93	3,52	Δ Flame at combustor rim
19	17,19	156,96	10,27	3,39	Δ Flame at combustor rim
20	17,19	162,65	10,61	3,27	Δ Flame at combustor rim
21	17,19	168,35	10,94	3,16	Δ Flame at combustor rim
22	17,19	174,05	11,28	3,06	Δ Flame at combustor rim
23	17,19	179,74	11,61	2,96	Δ Flame at combustor rim
24	17,19	185,44	11,95	2,87	Δ Flame at combustor rim
25	17,19	191,13	12,29	2,78	Δ Flame at combustor rim
26	17,19	196,83	12,62	2,70	Δ Flame at combustor rim
27	17,19	202,53	12,96	2,63	Δ Flame at combustor rim
28	17,19	208,22	13,29	2,55	Δ Flame at combustor rim
29	17,19	213,92	13,63	2,49	Δ Flame at combustor rim
30	17,19	219,61	13,97	2,42	Δ Flame at combustor rim
31	17,19	225,31	14,30	2,36	Δ Flame at combustor rim
32	17,19	231,01	14,64	2,30	Δ Flame at combustor rim
33	17,19	236,70	14,97	2,25	Δ Flame at combustor rim
34	17,19	242,40	15,31	2,19	Δ Flame at combustor rim
35	17,19	248,09	15,65	2,14	Δ Flame at combustor rim
36	17,19	253,79	15,98	2,10	Δ Flame at combustor rim
37	17,19	259,49	16,32	2,05	Δ Flame at combustor rim
38	17,19	265,18	16,65	2,01	Δ Flame at combustor rim
39	17,19	270,88	16,99	1,96	Δ Flame at combustor rim
40	17,19	276,57	17,33	1,92	Δ Flame at combustor rim
41	17,19	282,27	17,66	1,88	Δ Flame at combustor rim
42	17,19	287,97	18,00	1,85	Δ Flame at combustor rim
43	17,19	293,66	18,33	1,81	Δ Flame at combustor rim

44	17,19	299,36	18,67	1,78	Δ Flame at combustor rim
45	17,19	305,05	19,00	1,74	Δ Flame at combustor rim
46	17,19	310,75	19,34	1,71	Δ Flame at combustor rim
47	17,19	316,45	19,68	1,68	Δ Flame at combustor rim
48	17,19	322,14	20,01	1,65	Δ Flame at combustor rim
49	17,19	327,84	20,35	1,62	Δ Flame at combustor rim
50	17,19	333,53	20,68	1,59	Δ Flame at combustor rim
51	17,19	339,23	21,02	1,57	Δ Flame at combustor rim
52	17,19	344,93	21,36	1,54	Δ Flame at combustor rim
53	17,19	350,62	21,69	1,52	Δ Flame at combustor rim
54	17,19	356,32	22,03	1,49	Δ Flame at combustor rim
55	17,19	362,01	22,36	1,47	Δ Flame at combustor rim
56	17,19	367,71	22,70	1,45	Δ Flame at combustor rim
57	17,19	373,41	23,04	1,42	Δ Flame at combustor rim
58	17,19	379,10	23,37	1,40	Δ Flame at combustor rim
59	17,19	384,80	23,71	1,38	Δ Flame at combustor rim
60	17,19	390,49	24,04	1,36	Δ Flame at combustor rim
61	17,19	396,19	24,38	1,34	Δ Flame at combustor rim
62	17,19	401,89	24,72	1,32	Δ Flame at combustor rim
63	17,19	407,58	25,05	1,30	Δ Flame at combustor rim
64	17,19	413,28	25,39	1,29	Δ Flame at combustor rim
65	17,19	418,97	25,72	1,27	Δ Flame at combustor rim
66	17,19	424,67	26,06	1,25	Δ Flame at combustor rim
67	17,19	430,37	26,40	1,24	Δ Flame at combustor rim
68	17,19	436,06	26,73	1,22	Δ Flame at combustor rim
69	17,19	441,76	27,07	1,20	Δ Flame at combustor rim
70	17,19	447,45	27,40	1,19	Δ Flame at combustor rim
71	17,19	453,15	27,74	1,17	Δ Flame at combustor rim
72	17,19	458,85	28,07	1,16	Δ Flame at combustor rim
73	17,19	464,54	28,41	1,14	Δ Flame at combustor rim
74	17,19	470,24	28,75	1,13	Δ Flame at combustor rim

75	17,19	475,93	29,08	1,12	Δ Flame at combustor rim
76	17,19	481,63	29,42	1,10	Δ Flame at combustor rim
77	17,19	487,33	29,75	1,09	Δ Flame at combustor rim
78	17,19	493,02	30,09	1,08	□ Flame in combustor
79	17,19	498,72	30,43	1,07	□ Flame in combustor
80	17,19	504,41	30,76	1,05	□ Flame in combustor
81	17,19	510,11	31,10	1,04	□ Flame in combustor
82	17,19	515,81	31,43	1,03	□ Flame in combustor
83	17,19	521,50	31,77	1,02	□ Flame in combustor
84	17,19	527,20	32,11	1,01	□ Flame in combustor
85	17,19	532,89	32,44	1,00	□ Flame in combustor
86	17,19	538,59	32,78	0,99	□ Flame in combustor
87	17,19	544,29	33,11	0,98	□ Flame in combustor
88	17,19	549,98	33,45	0,97	□ Flame in combustor
89	17,19	555,68	33,79	0,96	□ Flame in combustor
90	17,19	561,37	34,12	0,95	□ Flame in combustor
91	17,19	567,07	34,46	0,94	□ Flame in combustor

Tabel 55 Data komposisi bahan bakar dan udara *Combustor* D_{out} 6 mm (Q_{fuel} 17,72 ml/min)

No	Q_{fuel} (ml/min)	Q_{air} (ml/min)	$V_{reaktan}$ (Cm/s)	Ekv Rasio (Φ)	Keterangan
1	17,72	54,43	4,26	10,07	Δ Flame at combustor rim
2	17,72	60,13	4,59	9,12	Δ Flame at combustor rim
3	17,72	65,82	4,93	8,33	Δ Flame at combustor rim
4	17,72	71,52	5,26	7,67	Δ Flame at combustor rim
5	17,72	77,21	5,60	7,10	Δ Flame at combustor rim
6	17,72	82,91	5,93	6,61	Δ Flame at combustor rim
7	17,72	88,61	6,27	6,19	Δ Flame at combustor rim
8	17,72	94,30	6,61	5,81	Δ Flame at combustor rim
9	17,72	100,00	6,94	5,48	Δ Flame at combustor rim

10	17,72	105,69	7,28	5,19	Δ Flame at combustor rim
11	17,72	111,39	7,61	4,92	Δ Flame at combustor rim
12	17,72	117,09	7,95	4,68	Δ Flame at combustor rim
13	17,72	122,78	8,29	4,47	Δ Flame at combustor rim
14	17,72	128,48	8,62	4,27	Δ Flame at combustor rim
15	17,72	134,17	8,96	4,09	Δ Flame at combustor rim
16	17,72	139,87	9,29	3,92	Δ Flame at combustor rim
17	17,72	145,57	9,63	3,77	Δ Flame at combustor rim
18	17,72	151,26	9,97	3,63	Δ Flame at combustor rim
19	17,72	156,96	10,30	3,49	Δ Flame at combustor rim
20	17,72	162,65	10,64	3,37	Δ Flame at combustor rim
21	17,72	168,35	10,97	3,26	Δ Flame at combustor rim
22	17,72	174,05	11,31	3,15	Δ Flame at combustor rim
23	17,72	179,74	11,65	3,05	Δ Flame at combustor rim
24	17,72	185,44	11,98	2,96	Δ Flame at combustor rim
25	17,72	191,13	12,32	2,87	Δ Flame at combustor rim
26	17,72	196,83	12,65	2,79	Δ Flame at combustor rim
27	17,72	202,53	12,99	2,71	Δ Flame at combustor rim
28	17,72	208,22	13,33	2,63	Δ Flame at combustor rim
29	17,72	213,92	13,66	2,56	Δ Flame at combustor rim
30	17,72	219,61	14,00	2,50	Δ Flame at combustor rim
31	17,72	225,31	14,33	2,43	Δ Flame at combustor rim
32	17,72	231,01	14,67	2,37	Δ Flame at combustor rim
33	17,72	236,70	15,01	2,32	Δ Flame at combustor rim
34	17,72	242,40	15,34	2,26	Δ Flame at combustor rim
35	17,72	248,09	15,68	2,21	Δ Flame at combustor rim
36	17,72	253,79	16,01	2,16	Δ Flame at combustor rim
37	17,72	259,49	16,35	2,11	Δ Flame at combustor rim
38	17,72	265,18	16,68	2,07	Δ Flame at combustor rim
39	17,72	270,88	17,02	2,02	Δ Flame at combustor rim
40	17,72	276,57	17,36	1,98	Δ Flame at combustor rim

41	17,72	282,27	17,69	1,94	Δ Flame at combustor rim
42	17,72	287,97	18,03	1,90	Δ Flame at combustor rim
43	17,72	293,66	18,36	1,87	Δ Flame at combustor rim
44	17,72	299,36	18,70	1,83	Δ Flame at combustor rim
45	17,72	305,05	19,04	1,80	Δ Flame at combustor rim
46	17,72	310,75	19,37	1,76	Δ Flame at combustor rim
47	17,72	316,45	19,71	1,73	Δ Flame at combustor rim
48	17,72	322,14	20,04	1,70	Δ Flame at combustor rim
49	17,72	327,84	20,38	1,67	Δ Flame at combustor rim
50	17,72	333,53	20,72	1,64	Δ Flame at combustor rim
51	17,72	339,23	21,05	1,62	Δ Flame at combustor rim
52	17,72	344,93	21,39	1,59	Δ Flame at combustor rim
53	17,72	350,62	21,72	1,56	Δ Flame at combustor rim
54	17,72	356,32	22,06	1,54	Δ Flame at combustor rim
55	17,72	362,01	22,40	1,51	Δ Flame at combustor rim
56	17,72	367,71	22,73	1,49	Δ Flame at combustor rim
57	17,72	373,41	23,07	1,47	Δ Flame at combustor rim
58	17,72	379,10	23,40	1,45	Δ Flame at combustor rim
59	17,72	384,80	23,74	1,43	Δ Flame at combustor rim
60	17,72	390,49	24,08	1,40	Δ Flame at combustor rim
61	17,72	396,19	24,41	1,38	Δ Flame at combustor rim
62	17,72	401,89	24,75	1,36	Δ Flame at combustor rim
63	17,72	407,58	25,08	1,35	Δ Flame at combustor rim
64	17,72	413,28	25,42	1,33	Δ Flame at combustor rim
65	17,72	418,97	25,75	1,31	Δ Flame at combustor rim
66	17,72	424,67	26,09	1,29	Δ Flame at combustor rim
67	17,72	430,37	26,43	1,27	Δ Flame at combustor rim
68	17,72	436,06	26,76	1,26	Δ Flame at combustor rim
69	17,72	441,76	27,10	1,24	Δ Flame at combustor rim
70	17,72	447,45	27,43	1,23	Δ Flame at combustor rim
71	17,72	453,15	27,77	1,21	Δ Flame at combustor rim

72	17,72	458,85	28,11	1,20	Δ Flame at combustor rim
73	17,72	464,54	28,44	1,18	Δ Flame at combustor rim
74	17,72	470,24	28,78	1,17	Δ Flame at combustor rim
75	17,72	475,93	29,11	1,15	Δ Flame at combustor rim
76	17,72	481,63	29,45	1,14	Δ Flame at combustor rim
77	17,72	487,33	29,79	1,13	Δ Flame at combustor rim
78	17,72	493,02	30,12	1,11	Δ Flame at combustor rim
79	17,72	498,72	30,46	1,10	Δ Flame at combustor rim
80	17,72	504,41	30,79	1,09	Δ Flame at combustor rim
81	17,72	510,11	31,13	1,07	□ Flame in combustor
82	17,72	515,81	31,47	1,06	□ Flame in combustor
83	17,72	521,50	31,80	1,05	□ Flame in combustor
84	17,72	527,20	32,14	1,04	□ Flame in combustor
85	17,72	532,89	32,47	1,03	□ Flame in combustor
86	17,72	538,59	32,81	1,02	□ Flame in combustor
87	17,72	544,29	33,15	1,01	□ Flame in combustor
88	17,72	549,98	33,48	1,00	□ Flame in combustor
89	17,72	555,68	33,82	0,99	□ Flame in combustor
90	17,72	561,37	34,15	0,98	□ Flame in combustor
91	17,72	567,07	34,49	0,97	□ Flame in combustor

Tabel 56 Data komposisi bahan bakar dan udara *Combustor* D_{out} 6 mm (Q_{fuel} 18,25 ml/min)

No	Q_{fuel} (ml/min)	Q_{air} (ml/min)	$V_{reaktan}$ (Cm/s)	Ekv Rasio (Φ)	Keterangan
1	18,25	54,43	4,29	10,38	Δ Flame at combustor rim
2	18,25	60,13	4,62	9,39	Δ Flame at combustor rim
3	18,25	65,82	4,96	8,58	Δ Flame at combustor rim
4	18,25	71,52	5,29	7,90	Δ Flame at combustor rim
5	18,25	77,21	5,63	7,31	Δ Flame at combustor rim
6	18,25	82,91	5,97	6,81	Δ Flame at combustor rim

7	18,25	88,61	6,30	6,37	Δ Flame at combustor rim
8	18,25	94,30	6,64	5,99	Δ Flame at combustor rim
9	18,25	100,00	6,97	5,65	Δ Flame at combustor rim
10	18,25	105,69	7,31	5,34	Δ Flame at combustor rim
11	18,25	111,39	7,65	5,07	Δ Flame at combustor rim
12	18,25	117,09	7,98	4,82	Δ Flame at combustor rim
13	18,25	122,78	8,32	4,60	Δ Flame at combustor rim
14	18,25	128,48	8,65	4,40	Δ Flame at combustor rim
15	18,25	134,17	8,99	4,21	Δ Flame at combustor rim
16	18,25	139,87	9,33	4,04	Δ Flame at combustor rim
17	18,25	145,57	9,66	3,88	Δ Flame at combustor rim
18	18,25	151,26	10,00	3,73	Δ Flame at combustor rim
19	18,25	156,96	10,33	3,60	Δ Flame at combustor rim
20	18,25	162,65	10,67	3,47	Δ Flame at combustor rim
21	18,25	168,35	11,01	3,35	Δ Flame at combustor rim
22	18,25	174,05	11,34	3,25	Δ Flame at combustor rim
23	18,25	179,74	11,68	3,14	Δ Flame at combustor rim
24	18,25	185,44	12,01	3,05	Δ Flame at combustor rim
25	18,25	191,13	12,35	2,95	Δ Flame at combustor rim
26	18,25	196,83	12,68	2,87	Δ Flame at combustor rim
27	18,25	202,53	13,02	2,79	Δ Flame at combustor rim
28	18,25	208,22	13,36	2,71	Δ Flame at combustor rim
29	18,25	213,92	13,69	2,64	Δ Flame at combustor rim
30	18,25	219,61	14,03	2,57	Δ Flame at combustor rim
31	18,25	225,31	14,36	2,51	Δ Flame at combustor rim
32	18,25	231,01	14,70	2,44	Δ Flame at combustor rim
33	18,25	236,70	15,04	2,39	Δ Flame at combustor rim
34	18,25	242,40	15,37	2,33	Δ Flame at combustor rim
35	18,25	248,09	15,71	2,28	Δ Flame at combustor rim
36	18,25	253,79	16,04	2,23	Δ Flame at combustor rim
37	18,25	259,49	16,38	2,18	Δ Flame at combustor rim

38	18,25	265,18	16,72	2,13	Δ Flame at combustor rim
39	18,25	270,88	17,05	2,09	Δ Flame at combustor rim
40	18,25	276,57	17,39	2,04	Δ Flame at combustor rim
41	18,25	282,27	17,72	2,00	Δ Flame at combustor rim
42	18,25	287,97	18,06	1,96	Δ Flame at combustor rim
43	18,25	293,66	18,40	1,92	Δ Flame at combustor rim
44	18,25	299,36	18,73	1,89	Δ Flame at combustor rim
45	18,25	305,05	19,07	1,85	Δ Flame at combustor rim
46	18,25	310,75	19,40	1,82	Δ Flame at combustor rim
47	18,25	316,45	19,74	1,78	Δ Flame at combustor rim
48	18,25	322,14	20,08	1,75	Δ Flame at combustor rim
49	18,25	327,84	20,41	1,72	Δ Flame at combustor rim
50	18,25	333,53	20,75	1,69	Δ Flame at combustor rim
51	18,25	339,23	21,08	1,66	Δ Flame at combustor rim
52	18,25	344,93	21,42	1,64	Δ Flame at combustor rim
53	18,25	350,62	21,75	1,61	Δ Flame at combustor rim
54	18,25	356,32	22,09	1,59	Δ Flame at combustor rim
55	18,25	362,01	22,43	1,56	Δ Flame at combustor rim
56	18,25	367,71	22,76	1,54	Δ Flame at combustor rim
57	18,25	373,41	23,10	1,51	Δ Flame at combustor rim
58	18,25	379,10	23,43	1,49	Δ Flame at combustor rim
59	18,25	384,80	23,77	1,47	Δ Flame at combustor rim
60	18,25	390,49	24,11	1,45	Δ Flame at combustor rim
61	18,25	396,19	24,44	1,43	Δ Flame at combustor rim
62	18,25	401,89	24,78	1,41	Δ Flame at combustor rim
63	18,25	407,58	25,11	1,39	Δ Flame at combustor rim
64	18,25	413,28	25,45	1,37	Δ Flame at combustor rim
65	18,25	418,97	25,79	1,35	Δ Flame at combustor rim
66	18,25	424,67	26,12	1,33	Δ Flame at combustor rim
67	18,25	430,37	26,46	1,31	Δ Flame at combustor rim
68	18,25	436,06	26,79	1,30	Δ Flame at combustor rim

69	18,25	441,76	27,13	1,28	Δ Flame at combustor rim
70	18,25	447,45	27,47	1,26	Δ Flame at combustor rim
71	18,25	453,15	27,80	1,25	Δ Flame at combustor rim
72	18,25	458,85	28,14	1,23	Δ Flame at combustor rim
73	18,25	464,54	28,47	1,22	Δ Flame at combustor rim
74	18,25	470,24	28,81	1,20	Δ Flame at combustor rim
75	18,25	475,93	29,15	1,19	Δ Flame at combustor rim
76	18,25	481,63	29,48	1,17	Δ Flame at combustor rim
77	18,25	487,33	29,82	1,16	Δ Flame at combustor rim
78	18,25	493,02	30,15	1,15	Δ Flame at combustor rim
79	18,25	498,72	30,49	1,13	Δ Flame at combustor rim
80	18,25	504,41	30,83	1,12	Δ Flame at combustor rim
81	18,25	510,11	31,16	1,11	Δ Flame at combustor rim
82	18,25	515,81	31,50	1,09	Δ Flame at combustor rim
83	18,25	521,50	31,83	1,08	Δ Flame at combustor rim
84	18,25	527,20	32,17	1,07	Δ Flame at combustor rim
85	18,25	532,89	32,50	1,06	Δ Flame at combustor rim
86	18,25	538,59	32,84	1,05	□ Flame in combustor
87	18,25	544,29	33,18	1,04	□ Flame in combustor
88	18,25	549,98	33,51	1,03	□ Flame in combustor
89	18,25	555,68	33,85	1,02	□ Flame in combustor
90	18,25	561,37	34,18	1,01	□ Flame in combustor
91	18,25	567,07	34,52	1,00	□ Flame in combustor

Tabel 57 Data komposisi bahan bakar dan udara *Combustor* D_{out} 6 mm (Q_{fuel} 18,79 ml/min)

No	Q_{fuel} (ml/min)	Q_{air} (ml/min)	$V_{reaktan}$ (Cm/s)	Ekv Rasio (Φ)	Keterangan
1	18,79	54,43	4,32	10,68	Δ Flame at combustor rim
2	18,79	60,13	4,65	9,67	Δ Flame at combustor rim
3	18,79	65,82	4,99	8,83	Δ Flame at combustor rim

4	18,79	71,52	5,33	8,13	Δ Flame at combustor rim
5	18,79	77,21	5,66	7,53	Δ Flame at combustor rim
6	18,79	82,91	6,00	7,01	Δ Flame at combustor rim
7	18,79	88,61	6,33	6,56	Δ Flame at combustor rim
8	18,79	94,30	6,67	6,16	Δ Flame at combustor rim
9	18,79	100,00	7,01	5,81	Δ Flame at combustor rim
10	18,79	105,69	7,34	5,50	Δ Flame at combustor rim
11	18,79	111,39	7,68	5,22	Δ Flame at combustor rim
12	18,79	117,09	8,01	4,96	Δ Flame at combustor rim
13	18,79	122,78	8,35	4,73	Δ Flame at combustor rim
14	18,79	128,48	8,69	4,52	Δ Flame at combustor rim
15	18,79	134,17	9,02	4,33	Δ Flame at combustor rim
16	18,79	139,87	9,36	4,16	Δ Flame at combustor rim
17	18,79	145,57	9,69	3,99	Δ Flame at combustor rim
18	18,79	151,26	10,03	3,84	Δ Flame at combustor rim
19	18,79	156,96	10,36	3,70	Δ Flame at combustor rim
20	18,79	162,65	10,70	3,57	Δ Flame at combustor rim
21	18,79	168,35	11,04	3,45	Δ Flame at combustor rim
22	18,79	174,05	11,37	3,34	Δ Flame at combustor rim
23	18,79	179,74	11,71	3,23	Δ Flame at combustor rim
24	18,79	185,44	12,04	3,13	Δ Flame at combustor rim
25	18,79	191,13	12,38	3,04	Δ Flame at combustor rim
26	18,79	196,83	12,72	2,95	Δ Flame at combustor rim
27	18,79	202,53	13,05	2,87	Δ Flame at combustor rim
28	18,79	208,22	13,39	2,79	Δ Flame at combustor rim
29	18,79	213,92	13,72	2,72	Δ Flame at combustor rim
30	18,79	219,61	14,06	2,65	Δ Flame at combustor rim
31	18,79	225,31	14,40	2,58	Δ Flame at combustor rim
32	18,79	231,01	14,73	2,52	Δ Flame at combustor rim
33	18,79	236,70	15,07	2,46	Δ Flame at combustor rim
34	18,79	242,40	15,40	2,40	Δ Flame at combustor rim

35	18,79	248,09	15,74	2,34	Δ Flame at combustor rim
36	18,79	253,79	16,08	2,29	Δ Flame at combustor rim
37	18,79	259,49	16,41	2,24	Δ Flame at combustor rim
38	18,79	265,18	16,75	2,19	Δ Flame at combustor rim
39	18,79	270,88	17,08	2,15	Δ Flame at combustor rim
40	18,79	276,57	17,42	2,10	Δ Flame at combustor rim
41	18,79	282,27	17,76	2,06	Δ Flame at combustor rim
42	18,79	287,97	18,09	2,02	Δ Flame at combustor rim
43	18,79	293,66	18,43	1,98	Δ Flame at combustor rim
44	18,79	299,36	18,76	1,94	Δ Flame at combustor rim
45	18,79	305,05	19,10	1,91	Δ Flame at combustor rim
46	18,79	310,75	19,43	1,87	Δ Flame at combustor rim
47	18,79	316,45	19,77	1,84	Δ Flame at combustor rim
48	18,79	322,14	20,11	1,80	Δ Flame at combustor rim
49	18,79	327,84	20,44	1,77	Δ Flame at combustor rim
50	18,79	333,53	20,78	1,74	Δ Flame at combustor rim
51	18,79	339,23	21,11	1,71	Δ Flame at combustor rim
52	18,79	344,93	21,45	1,69	Δ Flame at combustor rim
53	18,79	350,62	21,79	1,66	Δ Flame at combustor rim
54	18,79	356,32	22,12	1,63	Δ Flame at combustor rim
55	18,79	362,01	22,46	1,61	Δ Flame at combustor rim
56	18,79	367,71	22,79	1,58	Δ Flame at combustor rim
57	18,79	373,41	23,13	1,56	Δ Flame at combustor rim
58	18,79	379,10	23,47	1,53	Δ Flame at combustor rim
59	18,79	384,80	23,80	1,51	Δ Flame at combustor rim
60	18,79	390,49	24,14	1,49	Δ Flame at combustor rim
61	18,79	396,19	24,47	1,47	Δ Flame at combustor rim
62	18,79	401,89	24,81	1,45	Δ Flame at combustor rim
63	18,79	407,58	25,15	1,43	Δ Flame at combustor rim
64	18,79	413,28	25,48	1,41	Δ Flame at combustor rim
65	18,79	418,97	25,82	1,39	Δ Flame at combustor rim

66	18,79	424,67	26,15	1,37	Δ Flame at combustor rim
67	18,79	430,37	26,49	1,35	Δ Flame at combustor rim
68	18,79	436,06	26,83	1,33	Δ Flame at combustor rim
69	18,79	441,76	27,16	1,32	Δ Flame at combustor rim
70	18,79	447,45	27,50	1,30	Δ Flame at combustor rim
71	18,79	453,15	27,83	1,28	Δ Flame at combustor rim
72	18,79	458,85	28,17	1,27	Δ Flame at combustor rim
73	18,79	464,54	28,50	1,25	Δ Flame at combustor rim
74	18,79	470,24	28,84	1,24	Δ Flame at combustor rim
75	18,79	475,93	29,18	1,22	Δ Flame at combustor rim
76	18,79	481,63	29,51	1,21	Δ Flame at combustor rim
77	18,79	487,33	29,85	1,19	Δ Flame at combustor rim
78	18,79	493,02	30,18	1,18	Δ Flame at combustor rim
79	18,79	498,72	30,52	1,17	Δ Flame at combustor rim
80	18,79	504,41	30,86	1,15	Δ Flame at combustor rim
81	18,79	510,11	31,19	1,14	Δ Flame at combustor rim
82	18,79	515,81	31,53	1,13	Δ Flame at combustor rim
83	18,79	521,50	31,86	1,11	Δ Flame at combustor rim
84	18,79	527,20	32,20	1,10	Δ Flame at combustor rim
85	18,79	532,89	32,54	1,09	Δ Flame at combustor rim
86	18,79	538,59	32,87	1,08	Δ Flame at combustor rim
87	18,79	544,29	33,21	1,07	Δ Flame at combustor rim
88	18,79	549,98	33,54	1,06	Δ Flame at combustor rim
89	18,79	555,68	33,88	1,05	Δ Flame at combustor rim
90	18,79	561,37	34,22	1,04	Δ Flame at combustor rim
91	18,79	567,07	34,55	1,03	□ Flame in combustor

Tabel 58 Data komposisi bahan bakar dan udara *Combustor* D_{out} 6 mm (Q_{fuel} 18,79 ml/min)

No	Q_{fuel} (ml/min)	Q_{air} (ml/min)	$V_{reaktan}$ (Cm/s)	Ekv Rasio (Φ)	Keterangan
1	19,32	54,43	4,35	10,98	Δ Flame at combustor rim
2	19,32	60,13	4,69	9,94	Δ Flame at combustor rim
3	19,32	65,82	5,02	9,08	Δ Flame at combustor rim
4	19,32	71,52	5,36	8,36	Δ Flame at combustor rim
5	19,32	77,21	5,69	7,74	Δ Flame at combustor rim
6	19,32	82,91	6,03	7,21	Δ Flame at combustor rim
7	19,32	88,61	6,36	6,75	Δ Flame at combustor rim
8	19,32	94,30	6,70	6,34	Δ Flame at combustor rim
9	19,32	100,00	7,04	5,98	Δ Flame at combustor rim
10	19,32	105,69	7,37	5,66	Δ Flame at combustor rim
11	19,32	111,39	7,71	5,37	Δ Flame at combustor rim
12	19,32	117,09	8,04	5,10	Δ Flame at combustor rim
13	19,32	122,78	8,38	4,87	Δ Flame at combustor rim
14	19,32	128,48	8,72	4,65	Δ Flame at combustor rim
15	19,32	134,17	9,05	4,45	Δ Flame at combustor rim
16	19,32	139,87	9,39	4,27	Δ Flame at combustor rim
17	19,32	145,57	9,72	4,11	Δ Flame at combustor rim
18	19,32	151,26	10,06	3,95	Δ Flame at combustor rim
19	19,32	156,96	10,40	3,81	Δ Flame at combustor rim
20	19,32	162,65	10,73	3,67	Δ Flame at combustor rim
21	19,32	168,35	11,07	3,55	Δ Flame at combustor rim
22	19,32	174,05	11,40	3,43	Δ Flame at combustor rim
23	19,32	179,74	11,74	3,33	Δ Flame at combustor rim
24	19,32	185,44	12,08	3,22	Δ Flame at combustor rim
25	19,32	191,13	12,41	3,13	Δ Flame at combustor rim
26	19,32	196,83	12,75	3,04	Δ Flame at combustor rim
27	19,32	202,53	13,08	2,95	Δ Flame at combustor rim

28	19,32	208,22	13,42	2,87	Δ Flame at combustor rim
29	19,32	213,92	13,76	2,79	Δ Flame at combustor rim
30	19,32	219,61	14,09	2,72	Δ Flame at combustor rim
31	19,32	225,31	14,43	2,65	Δ Flame at combustor rim
32	19,32	231,01	14,76	2,59	Δ Flame at combustor rim
33	19,32	236,70	15,10	2,53	Δ Flame at combustor rim
34	19,32	242,40	15,44	2,47	Δ Flame at combustor rim
35	19,32	248,09	15,77	2,41	Δ Flame at combustor rim
36	19,32	253,79	16,11	2,36	Δ Flame at combustor rim
37	19,32	259,49	16,44	2,30	Δ Flame at combustor rim
38	19,32	265,18	16,78	2,25	Δ Flame at combustor rim
39	19,32	270,88	17,11	2,21	Δ Flame at combustor rim
40	19,32	276,57	17,45	2,16	Δ Flame at combustor rim
41	19,32	282,27	17,79	2,12	Δ Flame at combustor rim
42	19,32	287,97	18,12	2,08	Δ Flame at combustor rim
43	19,32	293,66	18,46	2,04	Δ Flame at combustor rim
44	19,32	299,36	18,79	2,00	Δ Flame at combustor rim
45	19,32	305,05	19,13	1,96	Δ Flame at combustor rim
46	19,32	310,75	19,47	1,92	Δ Flame at combustor rim
47	19,32	316,45	19,80	1,89	Δ Flame at combustor rim
48	19,32	322,14	20,14	1,86	Δ Flame at combustor rim
49	19,32	327,84	20,47	1,82	Δ Flame at combustor rim
50	19,32	333,53	20,81	1,79	Δ Flame at combustor rim
51	19,32	339,23	21,15	1,76	Δ Flame at combustor rim
52	19,32	344,93	21,48	1,73	Δ Flame at combustor rim
53	19,32	350,62	21,82	1,70	Δ Flame at combustor rim
54	19,32	356,32	22,15	1,68	Δ Flame at combustor rim
55	19,32	362,01	22,49	1,65	Δ Flame at combustor rim
56	19,32	367,71	22,83	1,63	Δ Flame at combustor rim
57	19,32	373,41	23,16	1,60	Δ Flame at combustor rim
58	19,32	379,10	23,50	1,58	Δ Flame at combustor rim

59	19,32	384,80	23,83	1,55	Δ Flame at combustor rim
60	19,32	390,49	24,17	1,53	Δ Flame at combustor rim
61	19,32	396,19	24,51	1,51	Δ Flame at combustor rim
62	19,32	401,89	24,84	1,49	Δ Flame at combustor rim
63	19,32	407,58	25,18	1,47	Δ Flame at combustor rim
64	19,32	413,28	25,51	1,45	Δ Flame at combustor rim
65	19,32	418,97	25,85	1,43	Δ Flame at combustor rim
66	19,32	424,67	26,18	1,41	Δ Flame at combustor rim
67	19,32	430,37	26,52	1,39	Δ Flame at combustor rim
68	19,32	436,06	26,86	1,37	Δ Flame at combustor rim
69	19,32	441,76	27,19	1,35	Δ Flame at combustor rim
70	19,32	447,45	27,53	1,34	Δ Flame at combustor rim
71	19,32	453,15	27,86	1,32	Δ Flame at combustor rim
72	19,32	458,85	28,20	1,30	Δ Flame at combustor rim
73	19,32	464,54	28,54	1,29	Δ Flame at combustor rim
74	19,32	470,24	28,87	1,27	Δ Flame at combustor rim
75	19,32	475,93	29,21	1,26	Δ Flame at combustor rim
76	19,32	481,63	29,54	1,24	Δ Flame at combustor rim
77	19,32	487,33	29,88	1,23	Δ Flame at combustor rim
78	19,32	493,02	30,22	1,21	Δ Flame at combustor rim
79	19,32	498,72	30,55	1,20	Δ Flame at combustor rim
80	19,32	504,41	30,89	1,18	Δ Flame at combustor rim
81	19,32	510,11	31,22	1,17	Δ Flame at combustor rim
82	19,32	515,81	31,56	1,16	Δ Flame at combustor rim
83	19,32	521,50	31,90	1,15	Δ Flame at combustor rim
84	19,32	527,20	32,23	1,13	Δ Flame at combustor rim
85	19,32	532,89	32,57	1,12	Δ Flame at combustor rim
86	19,32	538,59	32,90	1,11	Δ Flame at combustor rim
87	19,32	544,29	33,24	1,10	Δ Flame at combustor rim
88	19,32	549,98	33,58	1,09	Δ Flame at combustor rim
89	19,32	555,68	33,91	1,08	Δ Flame at combustor rim

90	19,32	561,37	34,25	1,06	Δ Flame at combustor rim
91	19,32	567,07	34,58	1,05	Δ Flame at combustor rim

Tabel 59 Data komposisi bahan bakar dan udara *Combustor* D_{out} 7 mm (Q_{fuel} 3,36 ml/min)

No	Q_{fuel} (ml/min)	Q_{air} (ml/min)	$V_{reaktan}$ (Cm/s)	Ekv Rasio (Φ)	Keterangan
1	3,36	54,43	2,50	1,91	□ Flame in combustor
2	3,36	60,13	2,75	1,73	□ Flame in combustor
3	3,36	65,82	3,00	1,58	□ Flame in combustor
4	3,36	71,52	3,24	1,45	□ Flame in combustor
5	3,36	77,21	3,49	1,35	x Flashback flame
6	3,36	82,91	3,74	1,25	x Flashback flame
7	3,36	88,61	3,98	1,17	x Flashback flame
8	3,36	94,30	4,23	1,10	x Flashback flame
9	3,36	100,00	4,48	1,04	x Flashback flame
10	3,36	105,69	4,73	0,98	x Flashback flame
11	3,36	111,39	4,97	0,93	x Flashback flame
12	3,36	117,09	5,22	0,89	x Flashback flame
13	3,36	122,78	5,47	0,85	x Flashback flame
14	3,36	128,48	5,71	0,81	x Flashback flame
15	3,36	134,17	5,96	0,78	x Flashback flame
16	3,36	139,87	6,21	0,74	x Flashback flame
17	3,36	145,57	6,45	0,71	x Flashback flame
18	3,36	151,26	6,70	0,69	x Flashback flame
19	3,36	156,96	6,95	0,66	x Flashback flame
20	3,36	162,65	7,19	0,64	x Flashback flame
21	3,36	168,35	7,44	0,62	x Flashback flame
22	3,36	174,05	7,69	0,60	x Flashback flame

Tabel 60 Data komposisi bahan bakar dan udara *Combustor* D_{out} 7 mm (Q_{fuel} 3,89 ml/min)

No	Q_{fuel} (ml/min)	Q_{air} (ml/min)	$V_{reaktan}$ (Cm/s)	Ekv Rasio (Φ)	Keterangan posisi api
1	3,89	54,43	2,53	2,21	Δ Flame at combustor rim
2	3,89	60,13	2,77	2,00	Δ Flame at combustor rim
3	3,89	65,82	3,02	1,83	Δ Flame at combustor rim
4	3,89	71,52	3,27	1,68	Δ Flame at combustor rim
5	3,89	77,21	3,51	1,56	Δ Flame at combustor rim
6	3,89	82,91	3,76	1,45	x Flashback flame
7	3,89	88,61	4,01	1,36	x Flashback flame
8	3,89	94,30	4,25	1,28	x Flashback flame
9	3,89	100,00	4,50	1,20	x Flashback flame
10	3,89	105,69	4,75	1,14	x Flashback flame
11	3,89	111,39	5,00	1,08	x Flashback flame
12	3,89	117,09	5,24	1,03	x Flashback flame
13	3,89	122,78	5,49	0,98	x Flashback flame
14	3,89	128,48	5,74	0,94	x Flashback flame
15	3,89	134,17	5,98	0,90	x Flashback flame
16	3,89	139,87	6,23	0,86	x Flashback flame
17	3,89	145,57	6,48	0,83	x Flashback flame
18	3,89	151,26	6,72	0,80	x Flashback flame
19	3,89	156,96	6,97	0,77	x Flashback flame
20	3,89	162,65	7,22	0,74	x Flashback flame
21	3,89	168,35	7,46	0,72	x Flashback flame
22	3,89	174,05	7,71	0,69	x Flashback flame
23	3,89	179,74	7,96	0,67	x Flashback flame
24	3,89	185,44	8,20	0,65	x Flashback flame
25	3,89	191,13	8,45	0,63	x Flashback flame
26	3,89	196,83	8,70	0,61	No ignition

Tabel 61 Data komposisi bahan bakar dan udara *Combustor* D_{out} 7 mm (Q_{fuel} 4,43 ml/min)

No	Q_{fuel} (ml/min)	Q_{air} (ml/min)	$V_{reaktan}$ (Cm/s)	Ekv Rasio (Φ)	Keterangan
1	4,43	54,43	2,55	2,52	Δ Flame at combustor rim
2	4,43	60,13	2,80	2,28	Δ Flame at combustor rim
3	4,43	65,82	3,04	2,08	Δ Flame at combustor rim
4	4,43	71,52	3,29	1,91	Δ Flame at combustor rim
5	4,43	77,21	3,54	1,77	Δ Flame at combustor rim
6	4,43	82,91	3,78	1,65	Δ Flame at combustor rim
7	4,43	88,61	4,03	1,55	x Flashback flame
8	4,43	94,30	4,28	1,45	x Flashback flame
9	4,43	100,00	4,52	1,37	x Flashback flame
10	4,43	105,69	4,77	1,30	x Flashback flame
11	4,43	111,39	5,02	1,23	x Flashback flame
12	4,43	117,09	5,27	1,17	x Flashback flame
13	4,43	122,78	5,51	1,12	x Flashback flame
14	4,43	128,48	5,76	1,07	x Flashback flame
15	4,43	134,17	6,01	1,02	x Flashback flame
16	4,43	139,87	6,25	0,98	x Flashback flame
17	4,43	145,57	6,50	0,94	x Flashback flame
18	4,43	151,26	6,75	0,91	x Flashback flame
19	4,43	156,96	6,99	0,87	x Flashback flame
20	4,43	162,65	7,24	0,84	x Flashback flame
21	4,43	168,35	7,49	0,81	x Flashback flame
22	4,43	174,05	7,73	0,79	x Flashback flame
23	4,43	179,74	7,98	0,76	x Flashback flame
24	4,43	185,44	8,23	0,74	x Flashback flame
25	4,43	191,13	8,47	0,72	x Flashback flame
26	4,43	196,83	8,72	0,70	x Flashback flame
27	4,43	202,53	8,97	0,68	x Flashback flame

28	4,43	208,22	9,21	0,66	x Flashback flame
29	4,43	213,92	9,46	0,64	No ignition

Tabel 62 Data komposisi bahan bakar dan udara *Combustor* D_{out} 7 mm (Q_{fuel} 4,96 ml/min)

No	Q_{fuel} (ml/min)	Q_{air} (ml/min)	$V_{reaktan}$ (Cm/s)	Ekv Rasio (Φ)	Keterangan posisi api
1	4,96	54,43	2,57	2,82	Δ Flame at combustor rim
2	4,96	60,13	2,82	2,55	Δ Flame at combustor rim
3	4,96	65,82	3,07	2,33	Δ Flame at combustor rim
4	4,96	71,52	3,31	2,15	Δ Flame at combustor rim
5	4,96	77,21	3,56	1,99	Δ Flame at combustor rim
6	4,96	82,91	3,81	1,85	Δ Flame at combustor rim
7	4,96	88,61	4,05	1,73	Δ Flame at combustor rim
8	4,96	94,30	4,30	1,63	Δ Flame at combustor rim
9	4,96	100,00	4,55	1,53	x Flashback flame
10	4,96	105,69	4,79	1,45	x Flashback flame
11	4,96	111,39	5,04	1,38	x Flashback flame
12	4,96	117,09	5,29	1,31	x Flashback flame
13	4,96	122,78	5,53	1,25	x Flashback flame
14	4,96	128,48	5,78	1,19	x Flashback flame
15	4,96	134,17	6,03	1,14	x Flashback flame
16	4,96	139,87	6,28	1,10	x Flashback flame
17	4,96	145,57	6,52	1,05	x Flashback flame
18	4,96	151,26	6,77	1,01	x Flashback flame
19	4,96	156,96	7,02	0,98	x Flashback flame
20	4,96	162,65	7,26	0,94	x Flashback flame
21	4,96	168,35	7,51	0,91	x Flashback flame
22	4,96	174,05	7,76	0,88	x Flashback flame
23	4,96	179,74	8,00	0,85	x Flashback flame
24	4,96	185,44	8,25	0,83	x Flashback flame

25	4,96	191,13	8,50	0,80	x Flashback flame
26	4,96	196,83	8,74	0,78	x Flashback flame
27	4,96	202,53	8,99	0,76	x Flashback flame
28	4,96	208,22	9,24	0,74	x Flashback flame
29	4,96	213,92	9,48	0,72	x Flashback flame
30	4,96	219,61	9,73	0,70	x Flashback flame
31	4,96	225,31	9,98	0,68	x Flashback flame
32	4,96	231,01	10,22	0,66	x Flashback flame
33	4,96	236,70	10,47	0,65	x Flashback flame
34	4,96	242,40	10,72	0,63	x Flashback flame
35	4,96	248,09	10,96	0,62	No ignition

Tabel 63 Data komposisi bahan bakar dan udara *Combustor* D_{out} 7 mm (Q_{fuel} 5,49 ml/min)

No	Q_{fuel} (ml/min)	Q_{air} (ml/min)	$V_{reaktan}$ (Cm/s)	Ekv Rasio (Φ)	Keterangan
1	5,49	54,43	2,60	3,12	Δ Flame at combustor rim
2	5,49	60,13	2,84	2,83	Δ Flame at combustor rim
3	5,49	65,82	3,09	2,58	Δ Flame at combustor rim
4	5,49	71,52	3,34	2,38	Δ Flame at combustor rim
5	5,49	77,21	3,58	2,20	Δ Flame at combustor rim
6	5,49	82,91	3,83	2,05	Δ Flame at combustor rim
7	5,49	88,61	4,08	1,92	Δ Flame at combustor rim
8	5,49	94,30	4,32	1,80	Δ Flame at combustor rim
9	5,49	100,00	4,57	1,70	Δ Flame at combustor rim
10	5,49	105,69	4,82	1,61	Δ Flame at combustor rim
11	5,49	111,39	5,06	1,52	x Flashback flame
12	5,49	117,09	5,31	1,45	x Flashback flame
13	5,49	122,78	5,56	1,38	x Flashback flame
14	5,49	128,48	5,80	1,32	x Flashback flame
15	5,49	134,17	6,05	1,27	x Flashback flame

16	5,49	139,87	6,30	1,21	x Flashback flame
17	5,49	145,57	6,55	1,17	x Flashback flame
18	5,49	151,26	6,79	1,12	x Flashback flame
19	5,49	156,96	7,04	1,08	x Flashback flame
20	5,49	162,65	7,29	1,04	x Flashback flame
21	5,49	168,35	7,53	1,01	x Flashback flame
22	5,49	174,05	7,78	0,98	x Flashback flame
23	5,49	179,74	8,03	0,95	x Flashback flame
24	5,49	185,44	8,27	0,92	x Flashback flame
25	5,49	191,13	8,52	0,89	x Flashback flame
26	5,49	196,83	8,77	0,86	x Flashback flame
27	5,49	202,53	9,01	0,84	x Flashback flame
28	5,49	208,22	9,26	0,82	x Flashback flame
29	5,49	213,92	9,51	0,79	x Flashback flame
30	5,49	219,61	9,75	0,77	x Flashback flame
31	5,49	225,31	10,00	0,75	x Flashback flame
32	5,49	231,01	10,25	0,74	x Flashback flame
33	5,49	236,70	10,49	0,72	x Flashback flame
34	5,49	242,40	10,74	0,70	x Flashback flame
35	5,49	248,09	10,99	0,68	x Flashback flame
36	5,49	253,79	11,23	0,67	x Flashback flame
37	5,49	259,49	11,48	0,65	x Flashback flame
38	5,49	265,18	11,73	0,64	No ignition

Tabel 64 Data komposisi bahan bakar dan udara *Combustor* D_{out} 7 mm (Q_{fuel} 6,02 ml/min)

No	Q_{fuel} (ml/min)	Q_{air} (ml/min)	$V_{reaktan}$ (Cm/s)	Ekv Rasio (Φ)	Keterangan
1	6,02	54,43	2,62	3,42	Δ Flame at combustor rim
2	6,02	60,13	2,87	3,10	Δ Flame at combustor rim
3	6,02	65,82	3,11	2,83	Δ Flame at combustor rim

4	6,02	71,52	3,36	2,61	Δ Flame at combustor rim
5	6,02	77,21	3,61	2,41	Δ Flame at combustor rim
6	6,02	82,91	3,85	2,25	Δ Flame at combustor rim
7	6,02	88,61	4,10	2,10	Δ Flame at combustor rim
8	6,02	94,30	4,35	1,98	Δ Flame at combustor rim
9	6,02	100,00	4,59	1,86	Δ Flame at combustor rim
10	6,02	105,69	4,84	1,76	Δ Flame at combustor rim
11	6,02	111,39	5,09	1,67	Δ Flame at combustor rim
12	6,02	117,09	5,33	1,59	x Flashback flame
13	6,02	122,78	5,58	1,52	x Flashback flame
14	6,02	128,48	5,83	1,45	x Flashback flame
15	6,02	134,17	6,07	1,39	x Flashback flame
16	6,02	139,87	6,32	1,33	x Flashback flame
17	6,02	145,57	6,57	1,28	x Flashback flame
18	6,02	151,26	6,82	1,23	x Flashback flame
19	6,02	156,96	7,06	1,19	x Flashback flame
20	6,02	162,65	7,31	1,15	x Flashback flame
21	6,02	168,35	7,56	1,11	x Flashback flame
22	6,02	174,05	7,80	1,07	x Flashback flame
23	6,02	179,74	8,05	1,04	x Flashback flame
24	6,02	185,44	8,30	1,00	x Flashback flame
25	6,02	191,13	8,54	0,97	x Flashback flame
26	6,02	196,83	8,79	0,95	x Flashback flame
27	6,02	202,53	9,04	0,92	x Flashback flame
28	6,02	208,22	9,28	0,89	x Flashback flame
29	6,02	213,92	9,53	0,87	x Flashback flame
30	6,02	219,61	9,78	0,85	x Flashback flame
31	6,02	225,31	10,02	0,83	x Flashback flame
32	6,02	231,01	10,27	0,81	x Flashback flame
33	6,02	236,70	10,52	0,79	x Flashback flame
34	6,02	242,40	10,76	0,77	x Flashback flame

35	6,02	248,09	11,01	0,75	x Flashback flame
36	6,02	253,79	11,26	0,73	x Flashback flame
37	6,02	259,49	11,50	0,72	x Flashback flame
38	6,02	265,18	11,75	0,70	x Flashback flame
39	6,02	270,88	12,00	0,69	x Flashback flame
40	6,02	276,57	12,24	0,67	□ Flame in combustor
41	6,02	282,27	12,49	0,66	□ Flame in combustor
42	6,02	287,97	12,74	0,65	□ Flame in combustor
43	6,02	293,66	12,99	0,63	□ Flame in combustor
44	6,02	299,36	13,23	0,62	□ Flame in combustor
45	6,02	305,05	13,48	0,61	□ Flame in combustor
46	6,02	310,75	13,73	0,60	□ Flame in combustor
47	6,02	316,45	13,97	0,59	□ Flame in combustor
48	6,02	322,14	14,22	0,58	No ignition

Tabel 65 Data komposisi bahan bakar dan udara *Combustor* D_{out} 7 mm (Q_{fuel} 6,55 ml/min)

No	Q_{fuel} (ml/min)	Q_{air} (ml/min)	$V_{reaktan}$ (Cm/s)	Ekv Rasio (Φ)	Keterangan
1	6,55	54,43	2,64	3,73	Δ Flame at combustor rim
2	6,55	60,13	2,89	3,37	Δ Flame at combustor rim
3	6,55	65,82	3,14	3,08	Δ Flame at combustor rim
4	6,55	71,52	3,38	2,84	Δ Flame at combustor rim
5	6,55	77,21	3,63	2,63	Δ Flame at combustor rim
6	6,55	82,91	3,88	2,45	Δ Flame at combustor rim
7	6,55	88,61	4,12	2,29	Δ Flame at combustor rim
8	6,55	94,30	4,37	2,15	Δ Flame at combustor rim
9	6,55	100,00	4,62	2,03	Δ Flame at combustor rim
10	6,55	105,69	4,86	1,92	Δ Flame at combustor rim
11	6,55	111,39	5,11	1,82	Δ Flame at combustor rim
12	6,55	117,09	5,36	1,73	Δ Flame at combustor rim

13	6,55	122,78	5,60	1,65	x Flashback flame
14	6,55	128,48	5,85	1,58	x Flashback flame
15	6,55	134,17	6,10	1,51	x Flashback flame
16	6,55	139,87	6,34	1,45	x Flashback flame
17	6,55	145,57	6,59	1,39	x Flashback flame
18	6,55	151,26	6,84	1,34	x Flashback flame
19	6,55	156,96	7,08	1,29	x Flashback flame
20	6,55	162,65	7,33	1,25	x Flashback flame
21	6,55	168,35	7,58	1,20	O Flame at flame holder
22	6,55	174,05	7,83	1,17	O Flame at flame holder
23	6,55	179,74	8,07	1,13	O Flame at flame holder
24	6,55	185,44	8,32	1,09	O Flame at flame holder
25	6,55	191,13	8,57	1,06	O Flame at flame holder
26	6,55	196,83	8,81	1,03	O Flame at flame holder
27	6,55	202,53	9,06	1,00	O Flame at flame holder
28	6,55	208,22	9,31	0,97	O Flame at flame holder
29	6,55	213,92	9,55	0,95	O Flame at flame holder
30	6,55	219,61	9,80	0,92	O Flame at flame holder
31	6,55	225,31	10,05	0,90	O Flame at flame holder
32	6,55	231,01	10,29	0,88	O Flame at flame holder
33	6,55	236,70	10,54	0,86	O Flame at flame holder
34	6,55	242,40	10,79	0,84	O Flame at flame holder
35	6,55	248,09	11,03	0,82	O Flame at flame holder
36	6,55	253,79	11,28	0,80	O Flame at flame holder
37	6,55	259,49	11,53	0,78	O Flame at flame holder
38	6,55	265,18	11,77	0,76	O Flame at flame holder
39	6,55	270,88	12,02	0,75	O Flame at flame holder
40	6,55	276,57	12,27	0,73	O Flame at flame holder
41	6,55	282,27	12,51	0,72	O Flame at flame holder
42	6,55	287,97	12,76	0,70	□ Flame in combustor
43	6,55	293,66	13,01	0,69	□ Flame in combustor

44	6,55	299,36	13,26	0,68	□ Flame in combustor
45	6,55	305,05	13,50	0,66	□ Flame in combustor
46	6,55	310,75	13,75	0,65	□ Flame in combustor
47	6,55	316,45	14,00	0,64	□ Flame in combustor
48	6,55	322,14	14,24	0,63	□ Flame in combustor
49	6,55	327,84	14,49	0,62	□ Flame in combustor
50	6,55	333,53	14,74	0,61	□ Flame in combustor
51	6,55	339,23	14,98	0,60	No ignition

Tabel 66 Data komposisi bahan bakar dan udara *Combustor* D_{out} 7 mm (Q_{fuel} 7,09 ml/min)

No	Q_{fuel} (ml/min)	Q_{air} (ml/min)	$V_{reaktan}$ (Cm/s)	Ekv Rasio (Φ)	Keterangan
1	7,09	54,43	2,67	4,03	Δ Flame at combustor rim
2	7,09	60,13	2,91	3,65	Δ Flame at combustor rim
3	7,09	65,82	3,16	3,33	Δ Flame at combustor rim
4	7,09	71,52	3,41	3,07	Δ Flame at combustor rim
5	7,09	77,21	3,65	2,84	Δ Flame at combustor rim
6	7,09	82,91	3,90	2,64	Δ Flame at combustor rim
7	7,09	88,61	4,15	2,47	Δ Flame at combustor rim
8	7,09	94,30	4,39	2,32	Δ Flame at combustor rim
9	7,09	100,00	4,64	2,19	Δ Flame at combustor rim
10	7,09	105,69	4,89	2,07	Δ Flame at combustor rim
11	7,09	111,39	5,13	1,97	Δ Flame at combustor rim
12	7,09	117,09	5,38	1,87	Δ Flame at combustor rim
13	7,09	122,78	5,63	1,79	Δ Flame at combustor rim
14	7,09	128,48	5,87	1,71	Δ Flame at combustor rim
15	7,09	134,17	6,12	1,63	□ Flame in combustor
16	7,09	139,87	6,37	1,57	□ Flame in combustor
17	7,09	145,57	6,61	1,51	□ Flame in combustor
18	7,09	151,26	6,86	1,45	□ Flame in combustor

19	7,09	156,96	7,11	1,40	□ Flame in combustor
20	7,09	162,65	7,35	1,35	□ Flame in combustor
21	7,09	168,35	7,60	1,30	□ Flame in combustor
22	7,09	174,05	7,85	1,26	O Flame at flame holder
23	7,09	179,74	8,10	1,22	O Flame at flame holder
24	7,09	185,44	8,34	1,18	O Flame at flame holder
25	7,09	191,13	8,59	1,15	O Flame at flame holder
26	7,09	196,83	8,84	1,11	O Flame at flame holder
27	7,09	202,53	9,08	1,08	O Flame at flame holder
28	7,09	208,22	9,33	1,05	O Flame at flame holder
29	7,09	213,92	9,58	1,02	O Flame at flame holder
30	7,09	219,61	9,82	1,00	O Flame at flame holder
31	7,09	225,31	10,07	0,97	O Flame at flame holder
32	7,09	231,01	10,32	0,95	O Flame at flame holder
33	7,09	236,70	10,56	0,93	O Flame at flame holder
34	7,09	242,40	10,81	0,90	O Flame at flame holder
35	7,09	248,09	11,06	0,88	O Flame at flame holder
36	7,09	253,79	11,30	0,86	O Flame at flame holder
37	7,09	259,49	11,55	0,84	O Flame at flame holder
38	7,09	265,18	11,80	0,83	O Flame at flame holder
39	7,09	270,88	12,04	0,81	O Flame at flame holder
40	7,09	276,57	12,29	0,79	O Flame at flame holder
41	7,09	282,27	12,54	0,78	O Flame at flame holder
42	7,09	287,97	12,78	0,76	O Flame at flame holder
43	7,09	293,66	13,03	0,75	□ Flame in combustor
44	7,09	299,36	13,28	0,73	□ Flame in combustor
45	7,09	305,05	13,52	0,72	□ Flame in combustor
46	7,09	310,75	13,77	0,71	□ Flame in combustor
47	7,09	316,45	14,02	0,69	□ Flame in combustor
48	7,09	322,14	14,27	0,68	□ Flame in combustor
49	7,09	327,84	14,51	0,67	□ Flame in combustor

50	7,09	333,53	14,76	0,66	□ Flame in combustor
51	7,09	339,23	15,01	0,65	□ Flame in combustor
52	7,09	344,93	15,25	0,64	□ Flame in combustor
53	7,09	350,62	15,50	0,63	□ Flame in combustor
54	7,09	356,32	15,75	0,62	□ Flame in combustor
55	7,09	362,01	15,99	0,61	□ Flame in combustor
56	7,09	367,71	16,24	0,60	No ignition

Tabel 67 Data komposisi bahan bakar dan udara *Combustor* D_{out} 7 mm (Q_{fuel} 7,62 ml/min)

No	Q_{fuel} (ml/min)	Q_{air} (ml/min)	$V_{reaktan}$ (Cm/s)	Ekv Rasio (Φ)	Keterangan
1	7,62	54,43	2,69	4,33	Δ Flame at combustor rim
2	7,62	60,13	2,94	3,92	Δ Flame at combustor rim
3	7,62	65,82	3,18	3,58	Δ Flame at combustor rim
4	7,62	71,52	3,43	3,30	Δ Flame at combustor rim
5	7,62	77,21	3,68	3,05	Δ Flame at combustor rim
6	7,62	82,91	3,92	2,84	Δ Flame at combustor rim
7	7,62	88,61	4,17	2,66	Δ Flame at combustor rim
8	7,62	94,30	4,42	2,50	Δ Flame at combustor rim
9	7,62	100,00	4,66	2,36	Δ Flame at combustor rim
10	7,62	105,69	4,91	2,23	Δ Flame at combustor rim
11	7,62	111,39	5,16	2,12	Δ Flame at combustor rim
12	7,62	117,09	5,40	2,01	Δ Flame at combustor rim
13	7,62	122,78	5,65	1,92	Δ Flame at combustor rim
14	7,62	128,48	5,90	1,83	Δ Flame at combustor rim
15	7,62	134,17	6,14	1,76	Δ Flame at combustor rim
16	7,62	139,87	6,39	1,69	Δ Flame at combustor rim
17	7,62	145,57	6,64	1,62	□ Flame in combustor
18	7,62	151,26	6,88	1,56	□ Flame in combustor
19	7,62	156,96	7,13	1,50	□ Flame in combustor

20	7,62	162,65	7,38	1,45	□ Flame in combustor
21	7,62	168,35	7,62	1,40	□ Flame in combustor
22	7,62	174,05	7,87	1,35	□ Flame in combustor
23	7,62	179,74	8,12	1,31	O Flame at flame holder
24	7,62	185,44	8,37	1,27	O Flame at flame holder
25	7,62	191,13	8,61	1,23	O Flame at flame holder
26	7,62	196,83	8,86	1,20	O Flame at flame holder
27	7,62	202,53	9,11	1,16	O Flame at flame holder
28	7,62	208,22	9,35	1,13	O Flame at flame holder
29	7,62	213,92	9,60	1,10	O Flame at flame holder
30	7,62	219,61	9,85	1,07	O Flame at flame holder
31	7,62	225,31	10,09	1,05	O Flame at flame holder
32	7,62	231,01	10,34	1,02	O Flame at flame holder
33	7,62	236,70	10,59	1,00	O Flame at flame holder
34	7,62	242,40	10,83	0,97	O Flame at flame holder
35	7,62	248,09	11,08	0,95	O Flame at flame holder
36	7,62	253,79	11,33	0,93	O Flame at flame holder
37	7,62	259,49	11,57	0,91	O Flame at flame holder
38	7,62	265,18	11,82	0,89	O Flame at flame holder
39	7,62	270,88	12,07	0,87	O Flame at flame holder
40	7,62	276,57	12,31	0,85	O Flame at flame holder
41	7,62	282,27	12,56	0,83	O Flame at flame holder
42	7,62	287,97	12,81	0,82	O Flame at flame holder
43	7,62	293,66	13,05	0,80	O Flame at flame holder
44	7,62	299,36	13,30	0,79	O Flame at flame holder
45	7,62	305,05	13,55	0,77	□ Flame in combustor
46	7,62	310,75	13,79	0,76	□ Flame in combustor
47	7,62	316,45	14,04	0,74	□ Flame in combustor
48	7,62	322,14	14,29	0,73	□ Flame in combustor
49	7,62	327,84	14,54	0,72	□ Flame in combustor
50	7,62	333,53	14,78	0,71	□ Flame in combustor

51	7,62	339,23	15,03	0,69	□ Flame in combustor
52	7,62	344,93	15,28	0,68	□ Flame in combustor
53	7,62	350,62	15,52	0,67	□ Flame in combustor
54	7,62	356,32	15,77	0,66	□ Flame in combustor
55	7,62	362,01	16,02	0,65	□ Flame in combustor
56	7,62	367,71	16,26	0,64	□ Flame in combustor
57	7,62	373,41	16,51	0,63	□ Flame in combustor
58	7,62	379,10	16,76	0,62	Δ Flame at combustor rim
59	7,62	384,80	17,00	0,61	No ignition

Tabel 68 Data komposisi bahan bakar dan udara *Combustor* D_{out} 7 mm (Q_{fuel} 8,15 ml/min)

No	Q_{fuel} (ml/min)	Q_{air} (ml/min)	$V_{reaktan}$ (Cm/s)	Ekv Rasio (Φ)	Keterangan
1	8,15	54,43	2,71	4,63	Δ Flame at combustor rim
2	8,15	60,13	2,96	4,19	Δ Flame at combustor rim
3	8,15	65,82	3,21	3,83	Δ Flame at combustor rim
4	8,15	71,52	3,45	3,53	Δ Flame at combustor rim
5	8,15	77,21	3,70	3,27	Δ Flame at combustor rim
6	8,15	82,91	3,95	3,04	Δ Flame at combustor rim
7	8,15	88,61	4,19	2,85	Δ Flame at combustor rim
8	8,15	94,30	4,44	2,67	Δ Flame at combustor rim
9	8,15	100,00	4,69	2,52	Δ Flame at combustor rim
10	8,15	105,69	4,93	2,39	Δ Flame at combustor rim
11	8,15	111,39	5,18	2,26	Δ Flame at combustor rim
12	8,15	117,09	5,43	2,15	Δ Flame at combustor rim
13	8,15	122,78	5,67	2,05	Δ Flame at combustor rim
14	8,15	128,48	5,92	1,96	Δ Flame at combustor rim
15	8,15	134,17	6,17	1,88	Δ Flame at combustor rim
16	8,15	139,87	6,41	1,80	Δ Flame at combustor rim
17	8,15	145,57	6,66	1,73	Δ Flame at combustor rim

18	8,15	151,26	6,91	1,67	Δ Flame at combustor rim
19	8,15	156,96	7,15	1,61	□ Flame in combustor
20	8,15	162,65	7,40	1,55	□ Flame in combustor
21	8,15	168,35	7,65	1,50	□ Flame in combustor
22	8,15	174,05	7,89	1,45	□ Flame in combustor
23	8,15	179,74	8,14	1,40	□ Flame in combustor
24	8,15	185,44	8,39	1,36	□ Flame in combustor
25	8,15	191,13	8,63	1,32	□ Flame in combustor
26	8,15	196,83	8,88	1,28	O Flame at flame holder
27	8,15	202,53	9,13	1,24	O Flame at flame holder
28	8,15	208,22	9,38	1,21	O Flame at flame holder
29	8,15	213,92	9,62	1,18	O Flame at flame holder
30	8,15	219,61	9,87	1,15	O Flame at flame holder
31	8,15	225,31	10,12	1,12	O Flame at flame holder
32	8,15	231,01	10,36	1,09	O Flame at flame holder
33	8,15	236,70	10,61	1,07	O Flame at flame holder
34	8,15	242,40	10,86	1,04	O Flame at flame holder
35	8,15	248,09	11,10	1,02	O Flame at flame holder
36	8,15	253,79	11,35	0,99	O Flame at flame holder
37	8,15	259,49	11,60	0,97	O Flame at flame holder
38	8,15	265,18	11,84	0,95	O Flame at flame holder
39	8,15	270,88	12,09	0,93	O Flame at flame holder
40	8,15	276,57	12,34	0,91	O Flame at flame holder
41	8,15	282,27	12,58	0,89	O Flame at flame holder
42	8,15	287,97	12,83	0,88	O Flame at flame holder
43	8,15	293,66	13,08	0,86	O Flame at flame holder
44	8,15	299,36	13,32	0,84	O Flame at flame holder
45	8,15	305,05	13,57	0,83	O Flame at flame holder
46	8,15	310,75	13,82	0,81	O Flame at flame holder
47	8,15	316,45	14,06	0,80	O Flame at flame holder
48	8,15	322,14	14,31	0,78	O Flame at flame holder

49	8,15	327,84	14,56	0,77	O Flame at flame holder
50	8,15	333,53	14,80	0,76	O Flame at flame holder
51	8,15	339,23	15,05	0,74	□ Flame in combustor
52	8,15	344,93	15,30	0,73	□ Flame in combustor
53	8,15	350,62	15,55	0,72	□ Flame in combustor
54	8,15	356,32	15,79	0,71	□ Flame in combustor
55	8,15	362,01	16,04	0,70	□ Flame in combustor
56	8,15	367,71	16,29	0,69	□ Flame in combustor
57	8,15	373,41	16,53	0,68	□ Flame in combustor
58	8,15	379,10	16,78	0,67	□ Flame in combustor
59	8,15	384,80	17,03	0,66	□ Flame in combustor
60	8,15	390,49	17,27	0,65	□ Flame in combustor
61	8,15	396,19	17,52	0,64	□ Flame in combustor
62	8,15	401,89	17,77	0,63	□ Flame in combustor
63	8,15	407,58	18,01	0,62	Δ Flame at combustor rim
64	8,15	413,28	18,26	0,61	No ignition

Tabel 69 Data komposisi bahan bakar dan udara *Combustor* D_{out} 7 mm (Q_{fuel} 8,68 ml/min)

No	Q_{fuel} (ml/min)	Q_{air} (ml/min)	$V_{reaktan}$ (Cm/s)	Ekv Rasio (Φ)	Keterangan
1	8,68	54,43	2,73	4,93	Δ Flame at combustor rim
2	8,68	60,13	2,98	4,47	Δ Flame at combustor rim
3	8,68	65,82	3,23	4,08	Δ Flame at combustor rim
4	8,68	71,52	3,48	3,76	Δ Flame at combustor rim
5	8,68	77,21	3,72	3,48	Δ Flame at combustor rim
6	8,68	82,91	3,97	3,24	Δ Flame at combustor rim
7	8,68	88,61	4,22	3,03	Δ Flame at combustor rim
8	8,68	94,30	4,46	2,85	Δ Flame at combustor rim
9	8,68	100,00	4,71	2,69	Δ Flame at combustor rim
10	8,68	105,69	4,96	2,54	Δ Flame at combustor rim

11	8,68	111,39	5,20	2,41	Δ Flame at combustor rim
12	8,68	117,09	5,45	2,29	Δ Flame at combustor rim
13	8,68	122,78	5,70	2,19	Δ Flame at combustor rim
14	8,68	128,48	5,94	2,09	Δ Flame at combustor rim
15	8,68	134,17	6,19	2,00	Δ Flame at combustor rim
16	8,68	139,87	6,44	1,92	Δ Flame at combustor rim
17	8,68	145,57	6,68	1,85	Δ Flame at combustor rim
18	8,68	151,26	6,93	1,78	Δ Flame at combustor rim
19	8,68	156,96	7,18	1,71	Δ Flame at combustor rim
20	8,68	162,65	7,42	1,65	□ Flame in combustor
21	8,68	168,35	7,67	1,60	□ Flame in combustor
22	8,68	174,05	7,92	1,54	□ Flame in combustor
23	8,68	179,74	8,16	1,49	□ Flame in combustor
24	8,68	185,44	8,41	1,45	□ Flame in combustor
25	8,68	191,13	8,66	1,41	□ Flame in combustor
26	8,68	196,83	8,90	1,36	□ Flame in combustor
27	8,68	202,53	9,15	1,33	□ Flame in combustor
28	8,68	208,22	9,40	1,29	□ Flame in combustor
29	8,68	213,92	9,65	1,26	O Flame at flame holder
30	8,68	219,61	9,89	1,22	O Flame at flame holder
31	8,68	225,31	10,14	1,19	O Flame at flame holder
32	8,68	231,01	10,39	1,16	O Flame at flame holder
33	8,68	236,70	10,63	1,13	O Flame at flame holder
34	8,68	242,40	10,88	1,11	O Flame at flame holder
35	8,68	248,09	11,13	1,08	O Flame at flame holder
36	8,68	253,79	11,37	1,06	O Flame at flame holder
37	8,68	259,49	11,62	1,04	O Flame at flame holder
38	8,68	265,18	11,87	1,01	O Flame at flame holder
39	8,68	270,88	12,11	0,99	O Flame at flame holder
40	8,68	276,57	12,36	0,97	O Flame at flame holder
41	8,68	282,27	12,61	0,95	O Flame at flame holder

42	8,68	287,97	12,85	0,93	O Flame at flame holder
43	8,68	293,66	13,10	0,91	O Flame at flame holder
44	8,68	299,36	13,35	0,90	O Flame at flame holder
45	8,68	305,05	13,59	0,88	O Flame at flame holder
46	8,68	310,75	13,84	0,86	O Flame at flame holder
47	8,68	316,45	14,09	0,85	O Flame at flame holder
48	8,68	322,14	14,33	0,83	O Flame at flame holder
49	8,68	327,84	14,58	0,82	O Flame at flame holder
50	8,68	333,53	14,83	0,81	O Flame at flame holder
51	8,68	339,23	15,07	0,79	O Flame at flame holder
52	8,68	344,93	15,32	0,78	□ Flame in combustor
53	8,68	350,62	15,57	0,77	□ Flame in combustor
54	8,68	356,32	15,82	0,75	□ Flame in combustor
55	8,68	362,01	16,06	0,74	□ Flame in combustor
56	8,68	367,71	16,31	0,73	□ Flame in combustor
57	8,68	373,41	16,56	0,72	□ Flame in combustor
58	8,68	379,10	16,80	0,71	□ Flame in combustor
59	8,68	384,80	17,05	0,70	□ Flame in combustor
60	8,68	390,49	17,30	0,69	□ Flame in combustor
61	8,68	396,19	17,54	0,68	□ Flame in combustor
62	8,68	401,89	17,79	0,67	□ Flame in combustor
63	8,68	407,58	18,04	0,66	□ Flame in combustor
64	8,68	413,28	18,28	0,65	Δ Flame at combustor rim
65	8,68	418,97	18,53	0,64	No ignition

Tabel 70 Data komposisi bahan bakar dan udara *Combustor* D_{out} 7 mm (Q_{fuel} 9,21 ml/min)

No	Q_{fuel} (ml/min)	Q_{air} (ml/min)	$V_{reaktan}$ (Cm/s)	Ekv Rasio (Φ)	Keterangan
1	9,21	54,43	2,76	5,24	Δ Flame at combustor rim
2	9,21	60,13	3,00	4,74	Δ Flame at combustor rim

3	9,21	65,82	3,25	4,33	Δ Flame at combustor rim
4	9,21	71,52	3,50	3,99	Δ Flame at combustor rim
5	9,21	77,21	3,74	3,69	Δ Flame at combustor rim
6	9,21	82,91	3,99	3,44	Δ Flame at combustor rim
7	9,21	88,61	4,24	3,22	Δ Flame at combustor rim
8	9,21	94,30	4,49	3,02	Δ Flame at combustor rim
9	9,21	100,00	4,73	2,85	Δ Flame at combustor rim
10	9,21	105,69	4,98	2,70	Δ Flame at combustor rim
11	9,21	111,39	5,23	2,56	Δ Flame at combustor rim
12	9,21	117,09	5,47	2,43	Δ Flame at combustor rim
13	9,21	122,78	5,72	2,32	Δ Flame at combustor rim
14	9,21	128,48	5,97	2,22	Δ Flame at combustor rim
15	9,21	134,17	6,21	2,12	Δ Flame at combustor rim
16	9,21	139,87	6,46	2,04	Δ Flame at combustor rim
17	9,21	145,57	6,71	1,96	Δ Flame at combustor rim
18	9,21	151,26	6,95	1,88	Δ Flame at combustor rim
19	9,21	156,96	7,20	1,82	Δ Flame at combustor rim
20	9,21	162,65	7,45	1,75	Δ Flame at combustor rim
21	9,21	168,35	7,69	1,69	Δ Flame at combustor rim
22	9,21	174,05	7,94	1,64	□ Flame in combustor
23	9,21	179,74	8,19	1,59	□ Flame in combustor
24	9,21	185,44	8,43	1,54	□ Flame in combustor
25	9,21	191,13	8,68	1,49	□ Flame in combustor
26	9,21	196,83	8,93	1,45	□ Flame in combustor
27	9,21	202,53	9,17	1,41	□ Flame in combustor
28	9,21	208,22	9,42	1,37	□ Flame in combustor
29	9,21	213,92	9,67	1,33	□ Flame in combustor
30	9,21	219,61	9,91	1,30	□ Flame in combustor
31	9,21	225,31	10,16	1,27	O Flame at flame holder
32	9,21	231,01	10,41	1,23	O Flame at flame holder
33	9,21	236,70	10,66	1,20	O Flame at flame holder

34	9,21	242,40	10,90	1,18	O Flame at flame holder
35	9,21	248,09	11,15	1,15	O Flame at flame holder
36	9,21	253,79	11,40	1,12	O Flame at flame holder
37	9,21	259,49	11,64	1,10	O Flame at flame holder
38	9,21	265,18	11,89	1,07	O Flame at flame holder
39	9,21	270,88	12,14	1,05	O Flame at flame holder
40	9,21	276,57	12,38	1,03	O Flame at flame holder
41	9,21	282,27	12,63	1,01	O Flame at flame holder
42	9,21	287,97	12,88	0,99	O Flame at flame holder
43	9,21	293,66	13,12	0,97	O Flame at flame holder
44	9,21	299,36	13,37	0,95	O Flame at flame holder
45	9,21	305,05	13,62	0,93	O Flame at flame holder
46	9,21	310,75	13,86	0,92	O Flame at flame holder
47	9,21	316,45	14,11	0,90	O Flame at flame holder
48	9,21	322,14	14,36	0,88	O Flame at flame holder
49	9,21	327,84	14,60	0,87	O Flame at flame holder
50	9,21	333,53	14,85	0,85	O Flame at flame holder
51	9,21	339,23	15,10	0,84	O Flame at flame holder
52	9,21	344,93	15,34	0,83	O Flame at flame holder
53	9,21	350,62	15,59	0,81	O Flame at flame holder
54	9,21	356,32	15,84	0,80	O Flame at flame holder
55	9,21	362,01	16,09	0,79	O Flame at flame holder
56	9,21	367,71	16,33	0,78	O Flame at flame holder
57	9,21	373,41	16,58	0,76	□ Flame in combustor
58	9,21	379,10	16,83	0,75	□ Flame in combustor
59	9,21	384,80	17,07	0,74	□ Flame in combustor
60	9,21	390,49	17,32	0,73	□ Flame in combustor
61	9,21	396,19	17,57	0,72	□ Flame in combustor
62	9,21	401,89	17,81	0,71	□ Flame in combustor
63	9,21	407,58	18,06	0,70	□ Flame in combustor
64	9,21	413,28	18,31	0,69	□ Flame in combustor

65	9,21	418,97	18,55	0,68	□ Flame in combustor
66	9,21	424,67	18,80	0,67	□ Flame in combustor
67	9,21	430,37	19,05	0,66	□ Flame in combustor
68	9,21	436,06	19,29	0,65	□ Flame in combustor
69	9,21	441,76	19,54	0,65	□ Flame in combustor
70	9,21	447,45	19,79	0,64	□ Flame in combustor
71	9,21	453,15	20,03	0,63	Δ Flame at combustor rim
72	9,21	458,85	20,28	0,62	No ignition

Tabel 71 Data komposisi bahan bakar dan udara *Combustor* D_{out} 7 mm (Q_{fuel} 9,74 ml/min)

No	Q_{fuel} (ml/min)	Q_{air} (ml/min)	$V_{reaktan}$ (Cm/s)	Ekv Rasio (Φ)	Keterangan
1	9,74	54,43	2,78	5,54	Δ Flame at combustor rim
2	9,74	60,13	3,03	5,01	Δ Flame at combustor rim
3	9,74	65,82	3,27	4,58	Δ Flame at combustor rim
4	9,74	71,52	3,52	4,22	Δ Flame at combustor rim
5	9,74	77,21	3,77	3,90	Δ Flame at combustor rim
6	9,74	82,91	4,01	3,64	Δ Flame at combustor rim
7	9,74	88,61	4,26	3,40	Δ Flame at combustor rim
8	9,74	94,30	4,51	3,20	Δ Flame at combustor rim
9	9,74	100,00	4,76	3,02	Δ Flame at combustor rim
10	9,74	105,69	5,00	2,85	Δ Flame at combustor rim
11	9,74	111,39	5,25	2,71	Δ Flame at combustor rim
12	9,74	117,09	5,50	2,58	Δ Flame at combustor rim
13	9,74	122,78	5,74	2,46	Δ Flame at combustor rim
14	9,74	128,48	5,99	2,35	Δ Flame at combustor rim
15	9,74	134,17	6,24	2,25	Δ Flame at combustor rim
16	9,74	139,87	6,48	2,16	Δ Flame at combustor rim
17	9,74	145,57	6,73	2,07	Δ Flame at combustor rim
18	9,74	151,26	6,98	1,99	Δ Flame at combustor rim

19	9,74	156,96	7,22	1,92	Δ Flame at combustor rim
20	9,74	162,65	7,47	1,85	Δ Flame at combustor rim
21	9,74	168,35	7,72	1,79	Δ Flame at combustor rim
22	9,74	174,05	7,96	1,73	Δ Flame at combustor rim
23	9,74	179,74	8,21	1,68	Δ Flame at combustor rim
24	9,74	185,44	8,46	1,63	Δ Flame at combustor rim
25	9,74	191,13	8,70	1,58	Δ Flame at combustor rim
26	9,74	196,83	8,95	1,53	□ Flame in combustor
27	9,74	202,53	9,20	1,49	□ Flame in combustor
28	9,74	208,22	9,44	1,45	□ Flame in combustor
29	9,74	213,92	9,69	1,41	□ Flame in combustor
30	9,74	219,61	9,94	1,37	□ Flame in combustor
31	9,74	225,31	10,18	1,34	□ Flame in combustor
32	9,74	231,01	10,43	1,31	□ Flame in combustor
33	9,74	236,70	10,68	1,27	□ Flame in combustor
34	9,74	242,40	10,93	1,24	□ Flame in combustor
35	9,74	248,09	11,17	1,22	O Flame at flame holder
36	9,74	253,79	11,42	1,19	O Flame at flame holder
37	9,74	259,49	11,67	1,16	O Flame at flame holder
38	9,74	265,18	11,91	1,14	O Flame at flame holder
39	9,74	270,88	12,16	1,11	O Flame at flame holder
40	9,74	276,57	12,41	1,09	O Flame at flame holder
41	9,74	282,27	12,65	1,07	O Flame at flame holder
42	9,74	287,97	12,90	1,05	O Flame at flame holder
43	9,74	293,66	13,15	1,03	O Flame at flame holder
44	9,74	299,36	13,39	1,01	O Flame at flame holder
45	9,74	305,05	13,64	0,99	O Flame at flame holder
46	9,74	310,75	13,89	0,97	O Flame at flame holder
47	9,74	316,45	14,13	0,95	O Flame at flame holder
48	9,74	322,14	14,38	0,94	O Flame at flame holder
49	9,74	327,84	14,63	0,92	O Flame at flame holder

50	9,74	333,53	14,87	0,90	O Flame at flame holder
51	9,74	339,23	15,12	0,89	O Flame at flame holder
52	9,74	344,93	15,37	0,87	O Flame at flame holder
53	9,74	350,62	15,61	0,86	O Flame at flame holder
54	9,74	356,32	15,86	0,85	O Flame at flame holder
55	9,74	362,01	16,11	0,83	O Flame at flame holder
56	9,74	367,71	16,35	0,82	O Flame at flame holder
57	9,74	373,41	16,60	0,81	O Flame at flame holder
58	9,74	379,10	16,85	0,80	O Flame at flame holder
59	9,74	384,80	17,10	0,78	O Flame at flame holder
60	9,74	390,49	17,34	0,77	O Flame at flame holder
61	9,74	396,19	17,59	0,76	□ Flame in combustor
62	9,74	401,89	17,84	0,75	□ Flame in combustor
63	9,74	407,58	18,08	0,74	□ Flame in combustor
64	9,74	413,28	18,33	0,73	□ Flame in combustor
65	9,74	418,97	18,58	0,72	□ Flame in combustor
66	9,74	424,67	18,82	0,71	□ Flame in combustor
67	9,74	430,37	19,07	0,70	□ Flame in combustor
68	9,74	436,06	19,32	0,69	□ Flame in combustor
69	9,74	441,76	19,56	0,68	□ Flame in combustor
70	9,74	447,45	19,81	0,67	□ Flame in combustor
71	9,74	453,15	20,06	0,67	□ Flame in combustor
72	9,74	458,85	20,30	0,66	□ Flame in combustor
73	9,74	464,54	20,55	0,65	□ Flame in combustor
74	9,74	470,24	20,80	0,64	□ Flame in combustor
75	9,74	475,93	21,04	0,63	□ Flame in combustor
76	9,74	481,63	21,29	0,63	Δ Flame at combustor rim
77	9,74	487,33	21,54	0,62	No ignition

Tabel 72 Data komposisi bahan bakar dan udara *Combustor* D_{out} 7 mm (Q_{fuel} 10,28 ml/min)

No	Q_{fuel} (ml/min)	Q_{air} (ml/min)	$V_{reaktan}$ (Cm/s)	Ekv Rasio (Φ)	Keterangan
1	10,28	54,43	2,80	5,84	Δ Flame at combustor rim
2	10,28	60,13	3,05	5,29	Δ Flame at combustor rim
3	10,28	65,82	3,30	4,83	Δ Flame at combustor rim
4	10,28	71,52	3,54	4,45	Δ Flame at combustor rim
5	10,28	77,21	3,79	4,12	Δ Flame at combustor rim
6	10,28	82,91	4,04	3,84	Δ Flame at combustor rim
7	10,28	88,61	4,28	3,59	Δ Flame at combustor rim
8	10,28	94,30	4,53	3,37	Δ Flame at combustor rim
9	10,28	100,00	4,78	3,18	Δ Flame at combustor rim
10	10,28	105,69	5,02	3,01	Δ Flame at combustor rim
11	10,28	111,39	5,27	2,85	Δ Flame at combustor rim
12	10,28	117,09	5,52	2,72	Δ Flame at combustor rim
13	10,28	122,78	5,77	2,59	Δ Flame at combustor rim
14	10,28	128,48	6,01	2,47	Δ Flame at combustor rim
15	10,28	134,17	6,26	2,37	Δ Flame at combustor rim
16	10,28	139,87	6,51	2,27	Δ Flame at combustor rim
17	10,28	145,57	6,75	2,18	Δ Flame at combustor rim
18	10,28	151,26	7,00	2,10	Δ Flame at combustor rim
19	10,28	156,96	7,25	2,03	Δ Flame at combustor rim
20	10,28	162,65	7,49	1,95	Δ Flame at combustor rim
21	10,28	168,35	7,74	1,89	Δ Flame at combustor rim
22	10,28	174,05	7,99	1,83	Δ Flame at combustor rim
23	10,28	179,74	8,23	1,77	Δ Flame at combustor rim
24	10,28	185,44	8,48	1,71	Δ Flame at combustor rim
25	10,28	191,13	8,73	1,66	Δ Flame at combustor rim
26	10,28	196,83	8,97	1,62	Δ Flame at combustor rim
27	10,28	202,53	9,22	1,57	Δ Flame at combustor rim

28	10,28	208,22	9,47	1,53	Δ Flame at combustor rim
29	10,28	213,92	9,71	1,49	Δ Flame at combustor rim
30	10,28	219,61	9,96	1,45	Δ Flame at combustor rim
31	10,28	225,31	10,21	1,41	□ Flame in combustor
32	10,28	231,01	10,45	1,38	□ Flame in combustor
33	10,28	236,70	10,70	1,34	□ Flame in combustor
34	10,28	242,40	10,95	1,31	□ Flame in combustor
35	10,28	248,09	11,20	1,28	□ Flame in combustor
36	10,28	253,79	11,44	1,25	□ Flame in combustor
37	10,28	259,49	11,69	1,23	□ Flame in combustor
38	10,28	265,18	11,94	1,20	□ Flame in combustor
39	10,28	270,88	12,18	1,17	□ Flame in combustor
40	10,28	276,57	12,43	1,15	□ Flame in combustor
41	10,28	282,27	12,68	1,13	□ Flame in combustor
42	10,28	287,97	12,92	1,10	O Flame at flame holder
43	10,28	293,66	13,17	1,08	O Flame at flame holder
44	10,28	299,36	13,42	1,06	O Flame at flame holder
45	10,28	305,05	13,66	1,04	O Flame at flame holder
46	10,28	310,75	13,91	1,02	O Flame at flame holder
47	10,28	316,45	14,16	1,00	O Flame at flame holder
48	10,28	322,14	14,40	0,99	O Flame at flame holder
49	10,28	327,84	14,65	0,97	O Flame at flame holder
50	10,28	333,53	14,90	0,95	O Flame at flame holder
51	10,28	339,23	15,14	0,94	O Flame at flame holder
52	10,28	344,93	15,39	0,92	O Flame at flame holder
53	10,28	350,62	15,64	0,91	O Flame at flame holder
54	10,28	356,32	15,88	0,89	O Flame at flame holder
55	10,28	362,01	16,13	0,88	O Flame at flame holder
56	10,28	367,71	16,38	0,86	O Flame at flame holder
57	10,28	373,41	16,62	0,85	O Flame at flame holder
58	10,28	379,10	16,87	0,84	O Flame at flame holder

59	10,28	384,80	17,12	0,83	O Flame at flame holder
60	10,28	390,49	17,37	0,81	O Flame at flame holder
61	10,28	396,19	17,61	0,80	O Flame at flame holder
62	10,28	401,89	17,86	0,79	O Flame at flame holder
63	10,28	407,58	18,11	0,78	O Flame at flame holder
64	10,28	413,28	18,35	0,77	O Flame at flame holder
65	10,28	418,97	18,60	0,76	O Flame at flame holder
66	10,28	424,67	18,85	0,75	O Flame at flame holder
67	10,28	430,37	19,09	0,74	□ Flame in combustor
68	10,28	436,06	19,34	0,73	□ Flame in combustor
69	10,28	441,76	19,59	0,72	□ Flame in combustor
70	10,28	447,45	19,83	0,71	□ Flame in combustor
71	10,28	453,15	20,08	0,70	□ Flame in combustor
72	10,28	458,85	20,33	0,69	□ Flame in combustor
73	10,28	464,54	20,57	0,68	□ Flame in combustor
74	10,28	470,24	20,82	0,68	□ Flame in combustor
75	10,28	475,93	21,07	0,67	□ Flame in combustor
76	10,28	481,63	21,31	0,66	□ Flame in combustor
77	10,28	487,33	21,56	0,65	□ Flame in combustor
78	10,28	493,02	21,81	0,64	□ Flame in combustor
79	10,28	498,72	22,05	0,64	□ Flame in combustor
80	10,28	504,41	22,30	0,63	□ Flame in combustor
81	10,28	510,11	22,55	0,62	Δ Flame at combustor rim
82	10,28	515,81	22,79	0,62	No ignition

Tabel 73 Data komposisi bahan bakar dan udara *Combustor* D_{out} 7 mm (Q_{fuel} 10,81 ml/min)

No	Q_{fuel} (ml/min)	Q_{air} (ml/min)	$V_{reaktan}$ (Cm/s)	Ekv Rasio (Φ)	Keterangan
1	10,81	54,43	2,83	6,14	Δ Flame at combustor rim
2	10,81	60,13	3,07	5,56	Δ Flame at combustor rim

3	10,81	65,82	3,32	5,08	Δ Flame at combustor rim
4	10,81	71,52	3,57	4,68	Δ Flame at combustor rim
5	10,81	77,21	3,81	4,33	Δ Flame at combustor rim
6	10,81	82,91	4,06	4,03	Δ Flame at combustor rim
7	10,81	88,61	4,31	3,77	Δ Flame at combustor rim
8	10,81	94,30	4,55	3,55	Δ Flame at combustor rim
9	10,81	100,00	4,80	3,34	Δ Flame at combustor rim
10	10,81	105,69	5,05	3,16	Δ Flame at combustor rim
11	10,81	111,39	5,29	3,00	Δ Flame at combustor rim
12	10,81	117,09	5,54	2,86	Δ Flame at combustor rim
13	10,81	122,78	5,79	2,72	Δ Flame at combustor rim
14	10,81	128,48	6,04	2,60	Δ Flame at combustor rim
15	10,81	134,17	6,28	2,49	Δ Flame at combustor rim
16	10,81	139,87	6,53	2,39	Δ Flame at combustor rim
17	10,81	145,57	6,78	2,30	Δ Flame at combustor rim
18	10,81	151,26	7,02	2,21	Δ Flame at combustor rim
19	10,81	156,96	7,27	2,13	Δ Flame at combustor rim
20	10,81	162,65	7,52	2,06	Δ Flame at combustor rim
21	10,81	168,35	7,76	1,99	Δ Flame at combustor rim
22	10,81	174,05	8,01	1,92	Δ Flame at combustor rim
23	10,81	179,74	8,26	1,86	Δ Flame at combustor rim
24	10,81	185,44	8,50	1,80	Δ Flame at combustor rim
25	10,81	191,13	8,75	1,75	Δ Flame at combustor rim
26	10,81	196,83	9,00	1,70	Δ Flame at combustor rim
27	10,81	202,53	9,24	1,65	Δ Flame at combustor rim
28	10,81	208,22	9,49	1,61	Δ Flame at combustor rim
29	10,81	213,92	9,74	1,56	Δ Flame at combustor rim
30	10,81	219,61	9,98	1,52	Δ Flame at combustor rim
31	10,81	225,31	10,23	1,48	Δ Flame at combustor rim
32	10,81	231,01	10,48	1,45	Δ Flame at combustor rim
33	10,81	236,70	10,72	1,41	□ Flame in combustor

34	10,81	242,40	10,97	1,38	□ Flame in combustor
35	10,81	248,09	11,22	1,35	□ Flame in combustor
36	10,81	253,79	11,46	1,32	□ Flame in combustor
37	10,81	259,49	11,71	1,29	□ Flame in combustor
38	10,81	265,18	11,96	1,26	□ Flame in combustor
39	10,81	270,88	12,21	1,23	□ Flame in combustor
40	10,81	276,57	12,45	1,21	□ Flame in combustor
41	10,81	282,27	12,70	1,18	□ Flame in combustor
42	10,81	287,97	12,95	1,16	□ Flame in combustor
43	10,81	293,66	13,19	1,14	O Flame at flame holder
44	10,81	299,36	13,44	1,12	O Flame at flame holder
45	10,81	305,05	13,69	1,10	O Flame at flame holder
46	10,81	310,75	13,93	1,08	O Flame at flame holder
47	10,81	316,45	14,18	1,06	O Flame at flame holder
48	10,81	322,14	14,43	1,04	O Flame at flame holder
49	10,81	327,84	14,67	1,02	O Flame at flame holder
50	10,81	333,53	14,92	1,00	O Flame at flame holder
51	10,81	339,23	15,17	0,99	O Flame at flame holder
52	10,81	344,93	15,41	0,97	O Flame at flame holder
53	10,81	350,62	15,66	0,95	O Flame at flame holder
54	10,81	356,32	15,91	0,94	O Flame at flame holder
55	10,81	362,01	16,15	0,92	O Flame at flame holder
56	10,81	367,71	16,40	0,91	O Flame at flame holder
57	10,81	373,41	16,65	0,90	O Flame at flame holder
58	10,81	379,10	16,89	0,88	O Flame at flame holder
59	10,81	384,80	17,14	0,87	O Flame at flame holder
60	10,81	390,49	17,39	0,86	O Flame at flame holder
61	10,81	396,19	17,64	0,84	O Flame at flame holder
62	10,81	401,89	17,88	0,83	O Flame at flame holder
63	10,81	407,58	18,13	0,82	O Flame at flame holder
64	10,81	413,28	18,38	0,81	O Flame at flame holder

65	10,81	418,97	18,62	0,80	O Flame at flame holder
66	10,81	424,67	18,87	0,79	O Flame at flame holder
67	10,81	430,37	19,12	0,78	O Flame at flame holder
68	10,81	436,06	19,36	0,77	O Flame at flame holder
69	10,81	441,76	19,61	0,76	O Flame at flame holder
70	10,81	447,45	19,86	0,75	□ Flame in combustor
71	10,81	453,15	20,10	0,74	□ Flame in combustor
72	10,81	458,85	20,35	0,73	□ Flame in combustor
73	10,81	464,54	20,60	0,72	□ Flame in combustor
74	10,81	470,24	20,84	0,71	□ Flame in combustor
75	10,81	475,93	21,09	0,70	□ Flame in combustor
76	10,81	481,63	21,34	0,69	□ Flame in combustor
77	10,81	487,33	21,58	0,69	□ Flame in combustor
78	10,81	493,02	21,83	0,68	□ Flame in combustor
79	10,81	498,72	22,08	0,67	□ Flame in combustor
80	10,81	504,41	22,32	0,66	□ Flame in combustor
81	10,81	510,11	22,57	0,66	□ Flame in combustor
82	10,81	515,81	22,82	0,65	□ Flame in combustor
83	10,81	521,50	23,06	0,64	□ Flame in combustor
84	10,81	527,20	23,31	0,63	Δ Flame at combustor rim
85	10,81	532,89	23,56	0,63	Δ Flame at combustor rim
86	10,81	538,59	23,81	0,62	No ignition

Tabel 74 Data komposisi bahan bakar dan udara *Combustor* D_{out} 7 mm (Q_{fuel} 11,34 ml/min)

No	Q_{fuel} (ml/min)	Q_{air} (ml/min)	$V_{reaktan}$ (Cm/s)	Ekv Rasio (Φ)	Keterangan
1	11,34	54,43	2,85	6,45	Δ Flame at combustor rim
2	11,34	60,13	3,10	5,84	Δ Flame at combustor rim
3	11,34	65,82	3,34	5,33	Δ Flame at combustor rim
4	11,34	71,52	3,59	4,91	Δ Flame at combustor rim

5	11,34	77,21	3,84	4,54	Δ Flame at combustor rim
6	11,34	82,91	4,08	4,23	Δ Flame at combustor rim
7	11,34	88,61	4,33	3,96	Δ Flame at combustor rim
8	11,34	94,30	4,58	3,72	Δ Flame at combustor rim
9	11,34	100,00	4,82	3,51	Δ Flame at combustor rim
10	11,34	105,69	5,07	3,32	Δ Flame at combustor rim
11	11,34	111,39	5,32	3,15	Δ Flame at combustor rim
12	11,34	117,09	5,56	3,00	Δ Flame at combustor rim
13	11,34	122,78	5,81	2,86	Δ Flame at combustor rim
14	11,34	128,48	6,06	2,73	Δ Flame at combustor rim
15	11,34	134,17	6,31	2,62	Δ Flame at combustor rim
16	11,34	139,87	6,55	2,51	Δ Flame at combustor rim
17	11,34	145,57	6,80	2,41	Δ Flame at combustor rim
18	11,34	151,26	7,05	2,32	Δ Flame at combustor rim
19	11,34	156,96	7,29	2,24	Δ Flame at combustor rim
20	11,34	162,65	7,54	2,16	Δ Flame at combustor rim
21	11,34	168,35	7,79	2,08	Δ Flame at combustor rim
22	11,34	174,05	8,03	2,02	Δ Flame at combustor rim
23	11,34	179,74	8,28	1,95	Δ Flame at combustor rim
24	11,34	185,44	8,53	1,89	Δ Flame at combustor rim
25	11,34	191,13	8,77	1,84	Δ Flame at combustor rim
26	11,34	196,83	9,02	1,78	Δ Flame at combustor rim
27	11,34	202,53	9,27	1,73	Δ Flame at combustor rim
28	11,34	208,22	9,51	1,69	Δ Flame at combustor rim
29	11,34	213,92	9,76	1,64	Δ Flame at combustor rim
30	11,34	219,61	10,01	1,60	Δ Flame at combustor rim
31	11,34	225,31	10,25	1,56	Δ Flame at combustor rim
32	11,34	231,01	10,50	1,52	Δ Flame at combustor rim
33	11,34	236,70	10,75	1,48	Δ Flame at combustor rim
34	11,34	242,40	10,99	1,45	Δ Flame at combustor rim
35	11,34	248,09	11,24	1,41	□ Flame in combustor

36	11,34	253,79	11,49	1,38	□ Flame in combustor
37	11,34	259,49	11,73	1,35	□ Flame in combustor
38	11,34	265,18	11,98	1,32	□ Flame in combustor
39	11,34	270,88	12,23	1,30	□ Flame in combustor
40	11,34	276,57	12,48	1,27	□ Flame in combustor
41	11,34	282,27	12,72	1,24	□ Flame in combustor
42	11,34	287,97	12,97	1,22	□ Flame in combustor
43	11,34	293,66	13,22	1,19	□ Flame in combustor
44	11,34	299,36	13,46	1,17	□ Flame in combustor
45	11,34	305,05	13,71	1,15	O Flame at flame holder
46	11,34	310,75	13,96	1,13	O Flame at flame holder
47	11,34	316,45	14,20	1,11	O Flame at flame holder
48	11,34	322,14	14,45	1,09	O Flame at flame holder
49	11,34	327,84	14,70	1,07	O Flame at flame holder
50	11,34	333,53	14,94	1,05	O Flame at flame holder
51	11,34	339,23	15,19	1,03	O Flame at flame holder
52	11,34	344,93	15,44	1,02	O Flame at flame holder
53	11,34	350,62	15,68	1,00	O Flame at flame holder
54	11,34	356,32	15,93	0,98	O Flame at flame holder
55	11,34	362,01	16,18	0,97	O Flame at flame holder
56	11,34	367,71	16,42	0,95	O Flame at flame holder
57	11,34	373,41	16,67	0,94	O Flame at flame holder
58	11,34	379,10	16,92	0,93	O Flame at flame holder
59	11,34	384,80	17,16	0,91	O Flame at flame holder
60	11,34	390,49	17,41	0,90	O Flame at flame holder
61	11,34	396,19	17,66	0,89	O Flame at flame holder
62	11,34	401,89	17,90	0,87	O Flame at flame holder
63	11,34	407,58	18,15	0,86	O Flame at flame holder
64	11,34	413,28	18,40	0,85	O Flame at flame holder
65	11,34	418,97	18,65	0,84	O Flame at flame holder
66	11,34	424,67	18,89	0,83	O Flame at flame holder

67	11,34	430,37	19,14	0,82	O Flame at flame holder
68	11,34	436,06	19,39	0,80	O Flame at flame holder
69	11,34	441,76	19,63	0,79	O Flame at flame holder
70	11,34	447,45	19,88	0,78	O Flame at flame holder
71	11,34	453,15	20,13	0,77	O Flame at flame holder
72	11,34	458,85	20,37	0,76	O Flame at flame holder
73	11,34	464,54	20,62	0,76	□ Flame in combustor
74	11,34	470,24	20,87	0,75	□ Flame in combustor
75	11,34	475,93	21,11	0,74	□ Flame in combustor
76	11,34	481,63	21,36	0,73	□ Flame in combustor
77	11,34	487,33	21,61	0,72	□ Flame in combustor
78	11,34	493,02	21,85	0,71	□ Flame in combustor
79	11,34	498,72	22,10	0,70	□ Flame in combustor
80	11,34	504,41	22,35	0,70	□ Flame in combustor
81	11,34	510,11	22,59	0,69	□ Flame in combustor
82	11,34	515,81	22,84	0,68	□ Flame in combustor
83	11,34	521,50	23,09	0,67	□ Flame in combustor
84	11,34	527,20	23,33	0,67	□ Flame in combustor
85	11,34	532,89	23,58	0,66	□ Flame in combustor
86	11,34	538,59	23,83	0,65	□ Flame in combustor
87	11,34	544,29	24,08	0,64	Δ Flame at combustor rim
88	11,34	549,98	24,32	0,64	Δ Flame at combustor rim
89	11,34	555,68	24,57	0,63	Δ Flame at combustor rim
90	11,34	561,37	24,82	0,63	No ignition

Tabel 75 Data komposisi bahan bakar dan udara *Combustor* D_{out} 7 mm (Q_{fuel} 11,87 ml/min)

No	Q_{fuel} (ml/min)	Q_{air} (ml/min)	$V_{reaktan}$ (Cm/s)	Ekv Rasio (Φ)	Keterangan
1	11,87	54,43	2,87	6,75	Δ Flame at combustor rim
2	11,87	60,13	3,12	6,11	Δ Flame at combustor rim

3	11,87	65,82	3,37	5,58	Δ Flame at combustor rim
4	11,87	71,52	3,61	5,14	Δ Flame at combustor rim
5	11,87	77,21	3,86	4,76	Δ Flame at combustor rim
6	11,87	82,91	4,11	4,43	Δ Flame at combustor rim
7	11,87	88,61	4,35	4,15	Δ Flame at combustor rim
8	11,87	94,30	4,60	3,90	Δ Flame at combustor rim
9	11,87	100,00	4,85	3,67	Δ Flame at combustor rim
10	11,87	105,69	5,09	3,48	Δ Flame at combustor rim
11	11,87	111,39	5,34	3,30	Δ Flame at combustor rim
12	11,87	117,09	5,59	3,14	Δ Flame at combustor rim
13	11,87	122,78	5,83	2,99	Δ Flame at combustor rim
14	11,87	128,48	6,08	2,86	Δ Flame at combustor rim
15	11,87	134,17	6,33	2,74	Δ Flame at combustor rim
16	11,87	139,87	6,57	2,63	Δ Flame at combustor rim
17	11,87	145,57	6,82	2,52	Δ Flame at combustor rim
18	11,87	151,26	7,07	2,43	Δ Flame at combustor rim
19	11,87	156,96	7,32	2,34	Δ Flame at combustor rim
20	11,87	162,65	7,56	2,26	Δ Flame at combustor rim
21	11,87	168,35	7,81	2,18	Δ Flame at combustor rim
22	11,87	174,05	8,06	2,11	Δ Flame at combustor rim
23	11,87	179,74	8,30	2,04	Δ Flame at combustor rim
24	11,87	185,44	8,55	1,98	Δ Flame at combustor rim
25	11,87	191,13	8,80	1,92	Δ Flame at combustor rim
26	11,87	196,83	9,04	1,87	Δ Flame at combustor rim
27	11,87	202,53	9,29	1,81	Δ Flame at combustor rim
28	11,87	208,22	9,54	1,76	Δ Flame at combustor rim
29	11,87	213,92	9,78	1,72	Δ Flame at combustor rim
30	11,87	219,61	10,03	1,67	Δ Flame at combustor rim
31	11,87	225,31	10,28	1,63	Δ Flame at combustor rim
32	11,87	231,01	10,52	1,59	Δ Flame at combustor rim
33	11,87	236,70	10,77	1,55	Δ Flame at combustor rim

34	11,87	242,40	11,02	1,52	Δ Flame at combustor rim
35	11,87	248,09	11,26	1,48	Δ Flame at combustor rim
36	11,87	253,79	11,51	1,45	Δ Flame at combustor rim
37	11,87	259,49	11,76	1,42	□ Flame in combustor
38	11,87	265,18	12,00	1,39	□ Flame in combustor
39	11,87	270,88	12,25	1,36	□ Flame in combustor
40	11,87	276,57	12,50	1,33	□ Flame in combustor
41	11,87	282,27	12,75	1,30	□ Flame in combustor
42	11,87	287,97	12,99	1,28	□ Flame in combustor
43	11,87	293,66	13,24	1,25	□ Flame in combustor
44	11,87	299,36	13,49	1,23	□ Flame in combustor
45	11,87	305,05	13,73	1,20	□ Flame in combustor
46	11,87	310,75	13,98	1,18	□ Flame in combustor
47	11,87	316,45	14,23	1,16	O Flame at flame holder
48	11,87	322,14	14,47	1,14	O Flame at flame holder
49	11,87	327,84	14,72	1,12	O Flame at flame holder
50	11,87	333,53	14,97	1,10	O Flame at flame holder
51	11,87	339,23	15,21	1,08	O Flame at flame holder
52	11,87	344,93	15,46	1,06	O Flame at flame holder
53	11,87	350,62	15,71	1,05	O Flame at flame holder
54	11,87	356,32	15,95	1,03	O Flame at flame holder
55	11,87	362,01	16,20	1,01	O Flame at flame holder
56	11,87	367,71	16,45	1,00	O Flame at flame holder
57	11,87	373,41	16,69	0,98	O Flame at flame holder
58	11,87	379,10	16,94	0,97	O Flame at flame holder
59	11,87	384,80	17,19	0,95	O Flame at flame holder
60	11,87	390,49	17,43	0,94	O Flame at flame holder
61	11,87	396,19	17,68	0,93	O Flame at flame holder
62	11,87	401,89	17,93	0,91	O Flame at flame holder
63	11,87	407,58	18,17	0,90	O Flame at flame holder
64	11,87	413,28	18,42	0,89	O Flame at flame holder

65	11,87	418,97	18,67	0,88	O Flame at flame holder
66	11,87	424,67	18,92	0,86	O Flame at flame holder
67	11,87	430,37	19,16	0,85	O Flame at flame holder
68	11,87	436,06	19,41	0,84	O Flame at flame holder
69	11,87	441,76	19,66	0,83	O Flame at flame holder
70	11,87	447,45	19,90	0,82	O Flame at flame holder
71	11,87	453,15	20,15	0,81	O Flame at flame holder
72	11,87	458,85	20,40	0,80	O Flame at flame holder
73	11,87	464,54	20,64	0,79	O Flame at flame holder
74	11,87	470,24	20,89	0,78	O Flame at flame holder
75	11,87	475,93	21,14	0,77	O Flame at flame holder
76	11,87	481,63	21,38	0,76	□ Flame in combustor
77	11,87	487,33	21,63	0,75	□ Flame in combustor
78	11,87	493,02	21,88	0,75	□ Flame in combustor
79	11,87	498,72	22,12	0,74	□ Flame in combustor
80	11,87	504,41	22,37	0,73	□ Flame in combustor
81	11,87	510,11	22,62	0,72	□ Flame in combustor
82	11,87	515,81	22,86	0,71	□ Flame in combustor
83	11,87	521,50	23,11	0,70	□ Flame in combustor
84	11,87	527,20	23,36	0,70	□ Flame in combustor
85	11,87	532,89	23,60	0,69	□ Flame in combustor
86	11,87	538,59	23,85	0,68	□ Flame in combustor
87	11,87	544,29	24,10	0,67	□ Flame in combustor
88	11,87	549,98	24,34	0,67	□ Flame in combustor
89	11,87	555,68	24,59	0,66	□ Flame in combustor
90	11,87	561,37	24,84	0,65	□ Flame in combustor
91	11,87	567,07	25,09	0,65	Δ Flame at combustor rim

Tabel 76 Data komposisi bahan bakar dan udara *Combustor* D_{out} 7 mm (Q_{fuel} 12,40 ml/min)

No	Q_{fuel} (ml/min)	Q_{air} (ml/min)	$V_{reaktan}$ (Cm/s)	Ekv Rasio (Φ)	Keterangan
1	12,40	54,43	2,90	7,05	Δ Flame at combustor rim
2	12,40	60,13	3,14	6,38	Δ Flame at combustor rim
3	12,40	65,82	3,39	5,83	Δ Flame at combustor rim
4	12,40	71,52	3,64	5,37	Δ Flame at combustor rim
5	12,40	77,21	3,88	4,97	Δ Flame at combustor rim
6	12,40	82,91	4,13	4,63	Δ Flame at combustor rim
7	12,40	88,61	4,38	4,33	Δ Flame at combustor rim
8	12,40	94,30	4,62	4,07	Δ Flame at combustor rim
9	12,40	100,00	4,87	3,84	Δ Flame at combustor rim
10	12,40	105,69	5,12	3,63	Δ Flame at combustor rim
11	12,40	111,39	5,36	3,45	Δ Flame at combustor rim
12	12,40	117,09	5,61	3,28	Δ Flame at combustor rim
13	12,40	122,78	5,86	3,13	Δ Flame at combustor rim
14	12,40	128,48	6,10	2,99	Δ Flame at combustor rim
15	12,40	134,17	6,35	2,86	Δ Flame at combustor rim
16	12,40	139,87	6,60	2,74	Δ Flame at combustor rim
17	12,40	145,57	6,84	2,64	Δ Flame at combustor rim
18	12,40	151,26	7,09	2,54	Δ Flame at combustor rim
19	12,40	156,96	7,34	2,45	Δ Flame at combustor rim
20	12,40	162,65	7,59	2,36	Δ Flame at combustor rim
21	12,40	168,35	7,83	2,28	Δ Flame at combustor rim
22	12,40	174,05	8,08	2,21	Δ Flame at combustor rim
23	12,40	179,74	8,33	2,14	Δ Flame at combustor rim
24	12,40	185,44	8,57	2,07	Δ Flame at combustor rim
25	12,40	191,13	8,82	2,01	Δ Flame at combustor rim
26	12,40	196,83	9,07	1,95	Δ Flame at combustor rim
27	12,40	202,53	9,31	1,89	Δ Flame at combustor rim

28	12,40	208,22	9,56	1,84	Δ Flame at combustor rim
29	12,40	213,92	9,81	1,79	Δ Flame at combustor rim
30	12,40	219,61	10,05	1,75	Δ Flame at combustor rim
31	12,40	225,31	10,30	1,70	Δ Flame at combustor rim
32	12,40	231,01	10,55	1,66	Δ Flame at combustor rim
33	12,40	236,70	10,79	1,62	Δ Flame at combustor rim
34	12,40	242,40	11,04	1,58	Δ Flame at combustor rim
35	12,40	248,09	11,29	1,55	□ Flame in combustor
36	12,40	253,79	11,53	1,51	□ Flame in combustor
37	12,40	259,49	11,78	1,48	□ Flame in combustor
38	12,40	265,18	12,03	1,45	□ Flame in combustor
39	12,40	270,88	12,27	1,42	□ Flame in combustor
40	12,40	276,57	12,52	1,39	□ Flame in combustor
41	12,40	282,27	12,77	1,36	□ Flame in combustor
42	12,40	287,97	13,01	1,33	□ Flame in combustor
43	12,40	293,66	13,26	1,31	□ Flame in combustor
44	12,40	299,36	13,51	1,28	O Flame at flame holder
45	12,40	305,05	13,76	1,26	O Flame at flame holder
46	12,40	310,75	14,00	1,24	O Flame at flame holder
47	12,40	316,45	14,25	1,21	O Flame at flame holder
48	12,40	322,14	14,50	1,19	O Flame at flame holder
49	12,40	327,84	14,74	1,17	O Flame at flame holder
50	12,40	333,53	14,99	1,15	O Flame at flame holder
51	12,40	339,23	15,24	1,13	O Flame at flame holder
52	12,40	344,93	15,48	1,11	O Flame at flame holder
53	12,40	350,62	15,73	1,09	O Flame at flame holder
54	12,40	356,32	15,98	1,08	O Flame at flame holder
55	12,40	362,01	16,22	1,06	O Flame at flame holder
56	12,40	367,71	16,47	1,04	O Flame at flame holder
57	12,40	373,41	16,72	1,03	O Flame at flame holder
58	12,40	379,10	16,96	1,01	O Flame at flame holder

59	12,40	384,80	17,21	1,00	O Flame at flame holder
60	12,40	390,49	17,46	0,98	O Flame at flame holder
61	12,40	396,19	17,70	0,97	O Flame at flame holder
62	12,40	401,89	17,95	0,95	O Flame at flame holder
63	12,40	407,58	18,20	0,94	O Flame at flame holder
64	12,40	413,28	18,44	0,93	O Flame at flame holder
65	12,40	418,97	18,69	0,92	O Flame at flame holder
66	12,40	424,67	18,94	0,90	O Flame at flame holder
67	12,40	430,37	19,19	0,89	O Flame at flame holder
68	12,40	436,06	19,43	0,88	O Flame at flame holder
69	12,40	441,76	19,68	0,87	O Flame at flame holder
70	12,40	447,45	19,93	0,86	O Flame at flame holder
71	12,40	453,15	20,17	0,85	O Flame at flame holder
72	12,40	458,85	20,42	0,84	□ Flame in combustor
73	12,40	464,54	20,67	0,83	□ Flame in combustor
74	12,40	470,24	20,91	0,82	□ Flame in combustor
75	12,40	475,93	21,16	0,81	□ Flame in combustor
76	12,40	481,63	21,41	0,80	□ Flame in combustor
77	12,40	487,33	21,65	0,79	□ Flame in combustor
78	12,40	493,02	21,90	0,78	□ Flame in combustor
79	12,40	498,72	22,15	0,77	□ Flame in combustor
80	12,40	504,41	22,39	0,76	□ Flame in combustor
81	12,40	510,11	22,64	0,75	□ Flame in combustor
82	12,40	515,81	22,89	0,74	□ Flame in combustor
83	12,40	521,50	23,13	0,74	□ Flame in combustor
84	12,40	527,20	23,38	0,73	□ Flame in combustor
85	12,40	532,89	23,63	0,72	□ Flame in combustor
86	12,40	538,59	23,87	0,71	□ Flame in combustor
87	12,40	544,29	24,12	0,71	□ Flame in combustor
88	12,40	549,98	24,37	0,70	□ Flame in combustor
89	12,40	555,68	24,61	0,69	□ Flame in combustor

90	12,40	561,37	24,86	0,68	□ Flame in combustor
91	12,40	567,07	25,11	0,68	Δ Flame at combustor rim

Tabel 77 Data komposisi bahan bakar dan udara *Combustor* D_{out} 7 mm (Q_{fuel} 12,94 ml/min)

No	Q_{fuel} (ml/min)	Q_{air} (ml/min)	$V_{reaktan}$ (Cm/s)	Ekv Rasio (Φ)	Keterangan
1	12,94	54,43	2,92	7,35	Δ Flame at combustor rim
2	12,94	60,13	3,17	6,66	Δ Flame at combustor rim
3	12,94	65,82	3,41	6,08	Δ Flame at combustor rim
4	12,94	71,52	3,66	5,60	Δ Flame at combustor rim
5	12,94	77,21	3,91	5,18	Δ Flame at combustor rim
6	12,94	82,91	4,15	4,83	Δ Flame at combustor rim
7	12,94	88,61	4,40	4,52	Δ Flame at combustor rim
8	12,94	94,30	4,65	4,24	Δ Flame at combustor rim
9	12,94	100,00	4,89	4,00	Δ Flame at combustor rim
10	12,94	105,69	5,14	3,79	Δ Flame at combustor rim
11	12,94	111,39	5,39	3,59	Δ Flame at combustor rim
12	12,94	117,09	5,63	3,42	Δ Flame at combustor rim
13	12,94	122,78	5,88	3,26	Δ Flame at combustor rim
14	12,94	128,48	6,13	3,12	Δ Flame at combustor rim
15	12,94	134,17	6,37	2,98	Δ Flame at combustor rim
16	12,94	139,87	6,62	2,86	Δ Flame at combustor rim
17	12,94	145,57	6,87	2,75	Δ Flame at combustor rim
18	12,94	151,26	7,11	2,65	Δ Flame at combustor rim
19	12,94	156,96	7,36	2,55	Δ Flame at combustor rim
20	12,94	162,65	7,61	2,46	Δ Flame at combustor rim
21	12,94	168,35	7,86	2,38	Δ Flame at combustor rim
22	12,94	174,05	8,10	2,30	Δ Flame at combustor rim
23	12,94	179,74	8,35	2,23	Δ Flame at combustor rim
24	12,94	185,44	8,60	2,16	Δ Flame at combustor rim

25	12,94	191,13	8,84	2,09	Δ Flame at combustor rim
26	12,94	196,83	9,09	2,03	Δ Flame at combustor rim
27	12,94	202,53	9,34	1,98	Δ Flame at combustor rim
28	12,94	208,22	9,58	1,92	Δ Flame at combustor rim
29	12,94	213,92	9,83	1,87	Δ Flame at combustor rim
30	12,94	219,61	10,08	1,82	Δ Flame at combustor rim
31	12,94	225,31	10,32	1,78	Δ Flame at combustor rim
32	12,94	231,01	10,57	1,73	Δ Flame at combustor rim
33	12,94	236,70	10,82	1,69	Δ Flame at combustor rim
34	12,94	242,40	11,06	1,65	Δ Flame at combustor rim
35	12,94	248,09	11,31	1,61	Δ Flame at combustor rim
36	12,94	253,79	11,56	1,58	Δ Flame at combustor rim
37	12,94	259,49	11,80	1,54	□ Flame in combustor
38	12,94	265,18	12,05	1,51	□ Flame in combustor
39	12,94	270,88	12,30	1,48	□ Flame in combustor
40	12,94	276,57	12,54	1,45	□ Flame in combustor
41	12,94	282,27	12,79	1,42	□ Flame in combustor
42	12,94	287,97	13,04	1,39	□ Flame in combustor
43	12,94	293,66	13,28	1,36	□ Flame in combustor
44	12,94	299,36	13,53	1,34	□ Flame in combustor
45	12,94	305,05	13,78	1,31	□ Flame in combustor
46	12,94	310,75	14,03	1,29	O Flame at flame holder
47	12,94	316,45	14,27	1,26	O Flame at flame holder
48	12,94	322,14	14,52	1,24	O Flame at flame holder
49	12,94	327,84	14,77	1,22	O Flame at flame holder
50	12,94	333,53	15,01	1,20	O Flame at flame holder
51	12,94	339,23	15,26	1,18	O Flame at flame holder
52	12,94	344,93	15,51	1,16	O Flame at flame holder
53	12,94	350,62	15,75	1,14	O Flame at flame holder
54	12,94	356,32	16,00	1,12	O Flame at flame holder
55	12,94	362,01	16,25	1,11	O Flame at flame holder

56	12,94	367,71	16,49	1,09	O Flame at flame holder
57	12,94	373,41	16,74	1,07	O Flame at flame holder
58	12,94	379,10	16,99	1,06	O Flame at flame holder
59	12,94	384,80	17,23	1,04	O Flame at flame holder
60	12,94	390,49	17,48	1,02	O Flame at flame holder
61	12,94	396,19	17,73	1,01	O Flame at flame holder
62	12,94	401,89	17,97	1,00	O Flame at flame holder
63	12,94	407,58	18,22	0,98	O Flame at flame holder
64	12,94	413,28	18,47	0,97	O Flame at flame holder
65	12,94	418,97	18,71	0,96	O Flame at flame holder
66	12,94	424,67	18,96	0,94	O Flame at flame holder
67	12,94	430,37	19,21	0,93	O Flame at flame holder
68	12,94	436,06	19,45	0,92	O Flame at flame holder
69	12,94	441,76	19,70	0,91	O Flame at flame holder
70	12,94	447,45	19,95	0,89	O Flame at flame holder
71	12,94	453,15	20,20	0,88	O Flame at flame holder
72	12,94	458,85	20,44	0,87	O Flame at flame holder
73	12,94	464,54	20,69	0,86	O Flame at flame holder
74	12,94	470,24	20,94	0,85	O Flame at flame holder
75	12,94	475,93	21,18	0,84	□ Flame in combustor
76	12,94	481,63	21,43	0,83	□ Flame in combustor
77	12,94	487,33	21,68	0,82	□ Flame in combustor
78	12,94	493,02	21,92	0,81	□ Flame in combustor
79	12,94	498,72	22,17	0,80	□ Flame in combustor
80	12,94	504,41	22,42	0,79	□ Flame in combustor
81	12,94	510,11	22,66	0,78	□ Flame in combustor
82	12,94	515,81	22,91	0,78	□ Flame in combustor
83	12,94	521,50	23,16	0,77	□ Flame in combustor
84	12,94	527,20	23,40	0,76	□ Flame in combustor
85	12,94	532,89	23,65	0,75	□ Flame in combustor
86	12,94	538,59	23,90	0,74	□ Flame in combustor

87	12,94	544,29	24,14	0,74	□ Flame in combustor
88	12,94	549,98	24,39	0,73	□ Flame in combustor
89	12,94	555,68	24,64	0,72	□ Flame in combustor
90	12,94	561,37	24,88	0,71	□ Flame in combustor
91	12,94	567,07	25,13	0,71	□ Flame in combustor

Tabel 78 Data komposisi bahan bakar dan udara *Combustor* D_{out} 7 mm (Q_{fuel} 13,47 ml/min)

No	Q_{fuel} (ml/min)	Q_{air} (ml/min)	$V_{reaktan}$ (Cm/s)	Ekv Rasio (Φ)	Keterangan
1	13,47	54,43	2,94	7,66	Δ Flame at combustor rim
2	13,47	60,13	3,19	6,93	Δ Flame at combustor rim
3	13,47	65,82	3,44	6,33	Δ Flame at combustor rim
4	13,47	71,52	3,68	5,83	Δ Flame at combustor rim
5	13,47	77,21	3,93	5,40	Δ Flame at combustor rim
6	13,47	82,91	4,18	5,03	Δ Flame at combustor rim
7	13,47	88,61	4,42	4,70	Δ Flame at combustor rim
8	13,47	94,30	4,67	4,42	Δ Flame at combustor rim
9	13,47	100,00	4,92	4,17	Δ Flame at combustor rim
10	13,47	105,69	5,16	3,94	Δ Flame at combustor rim
11	13,47	111,39	5,41	3,74	Δ Flame at combustor rim
12	13,47	117,09	5,66	3,56	Δ Flame at combustor rim
13	13,47	122,78	5,90	3,39	Δ Flame at combustor rim
14	13,47	128,48	6,15	3,24	Δ Flame at combustor rim
15	13,47	134,17	6,40	3,11	Δ Flame at combustor rim
16	13,47	139,87	6,64	2,98	Δ Flame at combustor rim
17	13,47	145,57	6,89	2,86	Δ Flame at combustor rim
18	13,47	151,26	7,14	2,75	Δ Flame at combustor rim
19	13,47	156,96	7,38	2,65	Δ Flame at combustor rim
20	13,47	162,65	7,63	2,56	Δ Flame at combustor rim
21	13,47	168,35	7,88	2,48	Δ Flame at combustor rim

22	13,47	174,05	8,12	2,39	Δ Flame at combustor rim
23	13,47	179,74	8,37	2,32	Δ Flame at combustor rim
24	13,47	185,44	8,62	2,25	Δ Flame at combustor rim
25	13,47	191,13	8,87	2,18	Δ Flame at combustor rim
26	13,47	196,83	9,11	2,12	Δ Flame at combustor rim
27	13,47	202,53	9,36	2,06	Δ Flame at combustor rim
28	13,47	208,22	9,61	2,00	Δ Flame at combustor rim
29	13,47	213,92	9,85	1,95	Δ Flame at combustor rim
30	13,47	219,61	10,10	1,90	Δ Flame at combustor rim
31	13,47	225,31	10,35	1,85	Δ Flame at combustor rim
32	13,47	231,01	10,59	1,80	Δ Flame at combustor rim
33	13,47	236,70	10,84	1,76	Δ Flame at combustor rim
34	13,47	242,40	11,09	1,72	Δ Flame at combustor rim
35	13,47	248,09	11,33	1,68	Δ Flame at combustor rim
36	13,47	253,79	11,58	1,64	Δ Flame at combustor rim
37	13,47	259,49	11,83	1,61	Δ Flame at combustor rim
38	13,47	265,18	12,07	1,57	Δ Flame at combustor rim
39	13,47	270,88	12,32	1,54	Δ Flame at combustor rim
40	13,47	276,57	12,57	1,51	Δ Flame at combustor rim
41	13,47	282,27	12,81	1,48	□ Flame in combustor
42	13,47	287,97	13,06	1,45	□ Flame in combustor
43	13,47	293,66	13,31	1,42	□ Flame in combustor
44	13,47	299,36	13,55	1,39	□ Flame in combustor
45	13,47	305,05	13,80	1,37	□ Flame in combustor
46	13,47	310,75	14,05	1,34	□ Flame in combustor
47	13,47	316,45	14,30	1,32	□ Flame in combustor
48	13,47	322,14	14,54	1,29	□ Flame in combustor
49	13,47	327,84	14,79	1,27	O Flame at flame holder
50	13,47	333,53	15,04	1,25	O Flame at flame holder
51	13,47	339,23	15,28	1,23	O Flame at flame holder
52	13,47	344,93	15,53	1,21	O Flame at flame holder

53	13,47	350,62	15,78	1,19	O Flame at flame holder
54	13,47	356,32	16,02	1,17	O Flame at flame holder
55	13,47	362,01	16,27	1,15	O Flame at flame holder
56	13,47	367,71	16,52	1,13	O Flame at flame holder
57	13,47	373,41	16,76	1,12	O Flame at flame holder
58	13,47	379,10	17,01	1,10	O Flame at flame holder
59	13,47	384,80	17,26	1,08	O Flame at flame holder
60	13,47	390,49	17,50	1,07	O Flame at flame holder
61	13,47	396,19	17,75	1,05	O Flame at flame holder
62	13,47	401,89	18,00	1,04	O Flame at flame holder
63	13,47	407,58	18,24	1,02	O Flame at flame holder
64	13,47	413,28	18,49	1,01	O Flame at flame holder
65	13,47	418,97	18,74	0,99	O Flame at flame holder
66	13,47	424,67	18,98	0,98	O Flame at flame holder
67	13,47	430,37	19,23	0,97	O Flame at flame holder
68	13,47	436,06	19,48	0,96	O Flame at flame holder
69	13,47	441,76	19,72	0,94	O Flame at flame holder
70	13,47	447,45	19,97	0,93	O Flame at flame holder
71	13,47	453,15	20,22	0,92	O Flame at flame holder
72	13,47	458,85	20,47	0,91	O Flame at flame holder
73	13,47	464,54	20,71	0,90	O Flame at flame holder
74	13,47	470,24	20,96	0,89	O Flame at flame holder
75	13,47	475,93	21,21	0,88	O Flame at flame holder
76	13,47	481,63	21,45	0,87	O Flame at flame holder
77	13,47	487,33	21,70	0,86	O Flame at flame holder
78	13,47	493,02	21,95	0,85	O Flame at flame holder
79	13,47	498,72	22,19	0,84	□ Flame in combustor
80	13,47	504,41	22,44	0,83	□ Flame in combustor
81	13,47	510,11	22,69	0,82	□ Flame in combustor
82	13,47	515,81	22,93	0,81	□ Flame in combustor
83	13,47	521,50	23,18	0,80	□ Flame in combustor

84	13,47	527,20	23,43	0,79	□ Flame in combustor
85	13,47	532,89	23,67	0,78	□ Flame in combustor
86	13,47	538,59	23,92	0,77	□ Flame in combustor
87	13,47	544,29	24,17	0,77	□ Flame in combustor
88	13,47	549,98	24,41	0,76	□ Flame in combustor
89	13,47	555,68	24,66	0,75	□ Flame in combustor
90	13,47	561,37	24,91	0,74	□ Flame in combustor
91	13,47	567,07	25,15	0,73	□ Flame in combustor

Tabel 79 Data komposisi bahan bakar dan udara *Combustor* D_{out} 7 mm (Q_{fuel} 14,00 ml/min)

No	Q_{fuel} (ml/min)	Q_{air} (ml/min)	$V_{reaktan}$ (Cm/s)	Ekv Rasio (Φ)	Keterangan
1	14,00	54,43	2,97	7,96	Δ Flame at combustor rim
2	14,00	60,13	3,21	7,20	Δ Flame at combustor rim
3	14,00	65,82	3,46	6,58	Δ Flame at combustor rim
4	14,00	71,52	3,71	6,06	Δ Flame at combustor rim
5	14,00	77,21	3,95	5,61	Δ Flame at combustor rim
6	14,00	82,91	4,20	5,22	Δ Flame at combustor rim
7	14,00	88,61	4,45	4,89	Δ Flame at combustor rim
8	14,00	94,30	4,69	4,59	Δ Flame at combustor rim
9	14,00	100,00	4,94	4,33	Δ Flame at combustor rim
10	14,00	105,69	5,19	4,10	Δ Flame at combustor rim
11	14,00	111,39	5,43	3,89	Δ Flame at combustor rim
12	14,00	117,09	5,68	3,70	Δ Flame at combustor rim
13	14,00	122,78	5,93	3,53	Δ Flame at combustor rim
14	14,00	128,48	6,17	3,37	Δ Flame at combustor rim
15	14,00	134,17	6,42	3,23	Δ Flame at combustor rim
16	14,00	139,87	6,67	3,10	Δ Flame at combustor rim
17	14,00	145,57	6,91	2,98	Δ Flame at combustor rim
18	14,00	151,26	7,16	2,86	Δ Flame at combustor rim

19	14,00	156,96	7,41	2,76	Δ Flame at combustor rim
20	14,00	162,65	7,65	2,66	Δ Flame at combustor rim
21	14,00	168,35	7,90	2,57	Δ Flame at combustor rim
22	14,00	174,05	8,15	2,49	Δ Flame at combustor rim
23	14,00	179,74	8,39	2,41	Δ Flame at combustor rim
24	14,00	185,44	8,64	2,34	Δ Flame at combustor rim
25	14,00	191,13	8,89	2,27	Δ Flame at combustor rim
26	14,00	196,83	9,14	2,20	Δ Flame at combustor rim
27	14,00	202,53	9,38	2,14	Δ Flame at combustor rim
28	14,00	208,22	9,63	2,08	Δ Flame at combustor rim
29	14,00	213,92	9,88	2,02	Δ Flame at combustor rim
30	14,00	219,61	10,12	1,97	Δ Flame at combustor rim
31	14,00	225,31	10,37	1,92	Δ Flame at combustor rim
32	14,00	231,01	10,62	1,88	Δ Flame at combustor rim
33	14,00	236,70	10,86	1,83	Δ Flame at combustor rim
34	14,00	242,40	11,11	1,79	Δ Flame at combustor rim
35	14,00	248,09	11,36	1,75	Δ Flame at combustor rim
36	14,00	253,79	11,60	1,71	Δ Flame at combustor rim
37	14,00	259,49	11,85	1,67	Δ Flame at combustor rim
38	14,00	265,18	12,10	1,63	Δ Flame at combustor rim
39	14,00	270,88	12,34	1,60	Δ Flame at combustor rim
40	14,00	276,57	12,59	1,57	Δ Flame at combustor rim
41	14,00	282,27	12,84	1,53	Δ Flame at combustor rim
42	14,00	287,97	13,08	1,50	Δ Flame at combustor rim
43	14,00	293,66	13,33	1,47	Δ Flame at combustor rim
44	14,00	299,36	13,58	1,45	□ Flame in combustor
45	14,00	305,05	13,82	1,42	□ Flame in combustor
46	14,00	310,75	14,07	1,39	□ Flame in combustor
47	14,00	316,45	14,32	1,37	□ Flame in combustor
48	14,00	322,14	14,56	1,34	□ Flame in combustor
49	14,00	327,84	14,81	1,32	□ Flame in combustor

50	14,00	333,53	15,06	1,30	□ Flame in combustor
51	14,00	339,23	15,31	1,28	□ Flame in combustor
52	14,00	344,93	15,55	1,26	O Flame at flame holder
53	14,00	350,62	15,80	1,24	O Flame at flame holder
54	14,00	356,32	16,05	1,22	O Flame at flame holder
55	14,00	362,01	16,29	1,20	O Flame at flame holder
56	14,00	367,71	16,54	1,18	O Flame at flame holder
57	14,00	373,41	16,79	1,16	O Flame at flame holder
58	14,00	379,10	17,03	1,14	O Flame at flame holder
59	14,00	384,80	17,28	1,13	O Flame at flame holder
60	14,00	390,49	17,53	1,11	O Flame at flame holder
61	14,00	396,19	17,77	1,09	O Flame at flame holder
62	14,00	401,89	18,02	1,08	O Flame at flame holder
63	14,00	407,58	18,27	1,06	O Flame at flame holder
64	14,00	413,28	18,51	1,05	O Flame at flame holder
65	14,00	418,97	18,76	1,03	O Flame at flame holder
66	14,00	424,67	19,01	1,02	O Flame at flame holder
67	14,00	430,37	19,25	1,01	O Flame at flame holder
68	14,00	436,06	19,50	0,99	O Flame at flame holder
69	14,00	441,76	19,75	0,98	O Flame at flame holder
70	14,00	447,45	19,99	0,97	O Flame at flame holder
71	14,00	453,15	20,24	0,96	O Flame at flame holder
72	14,00	458,85	20,49	0,94	O Flame at flame holder
73	14,00	464,54	20,73	0,93	O Flame at flame holder
74	14,00	470,24	20,98	0,92	O Flame at flame holder
75	14,00	475,93	21,23	0,91	O Flame at flame holder
76	14,00	481,63	21,48	0,90	O Flame at flame holder
77	14,00	487,33	21,72	0,89	O Flame at flame holder
78	14,00	493,02	21,97	0,88	O Flame at flame holder
79	14,00	498,72	22,22	0,87	O Flame at flame holder
80	14,00	504,41	22,46	0,86	O Flame at flame holder

81	14,00	510,11	22,71	0,85	O Flame at flame holder
82	14,00	515,81	22,96	0,84	□ Flame in combustor
83	14,00	521,50	23,20	0,83	□ Flame in combustor
84	14,00	527,20	23,45	0,82	□ Flame in combustor
85	14,00	532,89	23,70	0,81	□ Flame in combustor
86	14,00	538,59	23,94	0,80	□ Flame in combustor
87	14,00	544,29	24,19	0,80	□ Flame in combustor
88	14,00	549,98	24,44	0,79	□ Flame in combustor
89	14,00	555,68	24,68	0,78	□ Flame in combustor
90	14,00	561,37	24,93	0,77	□ Flame in combustor
91	14,00	567,07	25,18	0,76	□ Flame in combustor

Tabel 80 Data komposisi bahan bakar dan udara *Combustor* D_{out} 7 mm (Q_{fuel} 14,53 ml/min)

No	Q_{fuel} (ml/min)	Q_{air} (ml/min)	$V_{reaktan}$ (Cm/s)	Ekv Rasio (Φ)	Keterangan
1	14,53	54,43	2,99	8,26	Δ Flame at combustor rim
2	14,53	60,13	3,23	7,48	Δ Flame at combustor rim
3	14,53	65,82	3,48	6,83	Δ Flame at combustor rim
4	14,53	71,52	3,73	6,29	Δ Flame at combustor rim
5	14,53	77,21	3,98	5,82	Δ Flame at combustor rim
6	14,53	82,91	4,22	5,42	Δ Flame at combustor rim
7	14,53	88,61	4,47	5,07	Δ Flame at combustor rim
8	14,53	94,30	4,72	4,77	Δ Flame at combustor rim
9	14,53	100,00	4,96	4,50	Δ Flame at combustor rim
10	14,53	105,69	5,21	4,25	Δ Flame at combustor rim
11	14,53	111,39	5,46	4,04	Δ Flame at combustor rim
12	14,53	117,09	5,70	3,84	Δ Flame at combustor rim
13	14,53	122,78	5,95	3,66	Δ Flame at combustor rim
14	14,53	128,48	6,20	3,50	Δ Flame at combustor rim
15	14,53	134,17	6,44	3,35	Δ Flame at combustor rim

16	14,53	139,87	6,69	3,21	Δ Flame at combustor rim
17	14,53	145,57	6,94	3,09	Δ Flame at combustor rim
18	14,53	151,26	7,18	2,97	Δ Flame at combustor rim
19	14,53	156,96	7,43	2,86	Δ Flame at combustor rim
20	14,53	162,65	7,68	2,76	Δ Flame at combustor rim
21	14,53	168,35	7,92	2,67	Δ Flame at combustor rim
22	14,53	174,05	8,17	2,58	Δ Flame at combustor rim
23	14,53	179,74	8,42	2,50	Δ Flame at combustor rim
24	14,53	185,44	8,66	2,42	Δ Flame at combustor rim
25	14,53	191,13	8,91	2,35	Δ Flame at combustor rim
26	14,53	196,83	9,16	2,28	Δ Flame at combustor rim
27	14,53	202,53	9,41	2,22	Δ Flame at combustor rim
28	14,53	208,22	9,65	2,16	Δ Flame at combustor rim
29	14,53	213,92	9,90	2,10	Δ Flame at combustor rim
30	14,53	219,61	10,15	2,05	Δ Flame at combustor rim
31	14,53	225,31	10,39	2,00	Δ Flame at combustor rim
32	14,53	231,01	10,64	1,95	Δ Flame at combustor rim
33	14,53	236,70	10,89	1,90	Δ Flame at combustor rim
34	14,53	242,40	11,13	1,85	Δ Flame at combustor rim
35	14,53	248,09	11,38	1,81	Δ Flame at combustor rim
36	14,53	253,79	11,63	1,77	Δ Flame at combustor rim
37	14,53	259,49	11,87	1,73	Δ Flame at combustor rim
38	14,53	265,18	12,12	1,70	Δ Flame at combustor rim
39	14,53	270,88	12,37	1,66	Δ Flame at combustor rim
40	14,53	276,57	12,61	1,63	Δ Flame at combustor rim
41	14,53	282,27	12,86	1,59	Δ Flame at combustor rim
42	14,53	287,97	13,11	1,56	Δ Flame at combustor rim
43	14,53	293,66	13,35	1,53	Δ Flame at combustor rim
44	14,53	299,36	13,60	1,50	Δ Flame at combustor rim
45	14,53	305,05	13,85	1,47	Δ Flame at combustor rim
46	14,53	310,75	14,09	1,45	□ Flame in combustor

47	14,53	316,45	14,34	1,42	□ Flame in combustor
48	14,53	322,14	14,59	1,40	□ Flame in combustor
49	14,53	327,84	14,83	1,37	□ Flame in combustor
50	14,53	333,53	15,08	1,35	□ Flame in combustor
51	14,53	339,23	15,33	1,33	□ Flame in combustor
52	14,53	344,93	15,58	1,30	□ Flame in combustor
53	14,53	350,62	15,82	1,28	□ Flame in combustor
54	14,53	356,32	16,07	1,26	O Flame at flame holder
55	14,53	362,01	16,32	1,24	O Flame at flame holder
56	14,53	367,71	16,56	1,22	O Flame at flame holder
57	14,53	373,41	16,81	1,20	O Flame at flame holder
58	14,53	379,10	17,06	1,19	O Flame at flame holder
59	14,53	384,80	17,30	1,17	O Flame at flame holder
60	14,53	390,49	17,55	1,15	O Flame at flame holder
61	14,53	396,19	17,80	1,13	O Flame at flame holder
62	14,53	401,89	18,04	1,12	O Flame at flame holder
63	14,53	407,58	18,29	1,10	O Flame at flame holder
64	14,53	413,28	18,54	1,09	O Flame at flame holder
65	14,53	418,97	18,78	1,07	O Flame at flame holder
66	14,53	424,67	19,03	1,06	O Flame at flame holder
67	14,53	430,37	19,28	1,04	O Flame at flame holder
68	14,53	436,06	19,52	1,03	O Flame at flame holder
69	14,53	441,76	19,77	1,02	O Flame at flame holder
70	14,53	447,45	20,02	1,00	O Flame at flame holder
71	14,53	453,15	20,26	0,99	O Flame at flame holder
72	14,53	458,85	20,51	0,98	O Flame at flame holder
73	14,53	464,54	20,76	0,97	O Flame at flame holder
74	14,53	470,24	21,00	0,96	O Flame at flame holder
75	14,53	475,93	21,25	0,94	O Flame at flame holder
76	14,53	481,63	21,50	0,93	O Flame at flame holder
77	14,53	487,33	21,75	0,92	O Flame at flame holder

78	14,53	493,02	21,99	0,91	O Flame at flame holder
79	14,53	498,72	22,24	0,90	O Flame at flame holder
80	14,53	504,41	22,49	0,89	O Flame at flame holder
81	14,53	510,11	22,73	0,88	O Flame at flame holder
82	14,53	515,81	22,98	0,87	O Flame at flame holder
83	14,53	521,50	23,23	0,86	O Flame at flame holder
84	14,53	527,20	23,47	0,85	□ Flame in combustor
85	14,53	532,89	23,72	0,84	□ Flame in combustor
86	14,53	538,59	23,97	0,83	□ Flame in combustor
87	14,53	544,29	24,21	0,83	□ Flame in combustor
88	14,53	549,98	24,46	0,82	□ Flame in combustor
89	14,53	555,68	24,71	0,81	□ Flame in combustor
90	14,53	561,37	24,95	0,80	□ Flame in combustor
91	14,53	567,07	25,20	0,79	□ Flame in combustor

Tabel 81 Data komposisi bahan bakar dan udara *Combustor* D_{out} 7 mm (Q_{fuel} 15,06 ml/min)

No	Q_{fuel} (ml/min)	Q_{air} (ml/min)	$V_{reaktan}$ (Cm/s)	Ekv Rasio (Φ)	Keterangan
1	15,06	54,43	3,01	8,56	Δ Flame at combustor rim
2	15,06	60,13	3,26	7,75	Δ Flame at combustor rim
3	15,06	65,82	3,50	7,08	Δ Flame at combustor rim
4	15,06	71,52	3,75	6,52	Δ Flame at combustor rim
5	15,06	77,21	4,00	6,04	Δ Flame at combustor rim
6	15,06	82,91	4,25	5,62	Δ Flame at combustor rim
7	15,06	88,61	4,49	5,26	Δ Flame at combustor rim
8	15,06	94,30	4,74	4,94	Δ Flame at combustor rim
9	15,06	100,00	4,99	4,66	Δ Flame at combustor rim
10	15,06	105,69	5,23	4,41	Δ Flame at combustor rim
11	15,06	111,39	5,48	4,18	Δ Flame at combustor rim
12	15,06	117,09	5,73	3,98	Δ Flame at combustor rim

13	15,06	122,78	5,97	3,80	Δ Flame at combustor rim
14	15,06	128,48	6,22	3,63	Δ Flame at combustor rim
15	15,06	134,17	6,47	3,47	Δ Flame at combustor rim
16	15,06	139,87	6,71	3,33	Δ Flame at combustor rim
17	15,06	145,57	6,96	3,20	Δ Flame at combustor rim
18	15,06	151,26	7,21	3,08	Δ Flame at combustor rim
19	15,06	156,96	7,45	2,97	Δ Flame at combustor rim
20	15,06	162,65	7,70	2,87	Δ Flame at combustor rim
21	15,06	168,35	7,95	2,77	Δ Flame at combustor rim
22	15,06	174,05	8,19	2,68	Δ Flame at combustor rim
23	15,06	179,74	8,44	2,59	Δ Flame at combustor rim
24	15,06	185,44	8,69	2,51	Δ Flame at combustor rim
25	15,06	191,13	8,93	2,44	Δ Flame at combustor rim
26	15,06	196,83	9,18	2,37	Δ Flame at combustor rim
27	15,06	202,53	9,43	2,30	Δ Flame at combustor rim
28	15,06	208,22	9,67	2,24	Δ Flame at combustor rim
29	15,06	213,92	9,92	2,18	Δ Flame at combustor rim
30	15,06	219,61	10,17	2,12	Δ Flame at combustor rim
31	15,06	225,31	10,42	2,07	Δ Flame at combustor rim
32	15,06	231,01	10,66	2,02	Δ Flame at combustor rim
33	15,06	236,70	10,91	1,97	Δ Flame at combustor rim
34	15,06	242,40	11,16	1,92	Δ Flame at combustor rim
35	15,06	248,09	11,40	1,88	Δ Flame at combustor rim
36	15,06	253,79	11,65	1,84	Δ Flame at combustor rim
37	15,06	259,49	11,90	1,80	Δ Flame at combustor rim
38	15,06	265,18	12,14	1,76	Δ Flame at combustor rim
39	15,06	270,88	12,39	1,72	Δ Flame at combustor rim
40	15,06	276,57	12,64	1,69	Δ Flame at combustor rim
41	15,06	282,27	12,88	1,65	Δ Flame at combustor rim
42	15,06	287,97	13,13	1,62	Δ Flame at combustor rim
43	15,06	293,66	13,38	1,59	Δ Flame at combustor rim

44	15,06	299,36	13,62	1,56	Δ Flame at combustor rim
45	15,06	305,05	13,87	1,53	Δ Flame at combustor rim
46	15,06	310,75	14,12	1,50	Δ Flame at combustor rim
47	15,06	316,45	14,36	1,47	□ Flame in combustor
48	15,06	322,14	14,61	1,45	□ Flame in combustor
49	15,06	327,84	14,86	1,42	□ Flame in combustor
50	15,06	333,53	15,10	1,40	□ Flame in combustor
51	15,06	339,23	15,35	1,37	□ Flame in combustor
52	15,06	344,93	15,60	1,35	□ Flame in combustor
53	15,06	350,62	15,84	1,33	□ Flame in combustor
54	15,06	356,32	16,09	1,31	□ Flame in combustor
55	15,06	362,01	16,34	1,29	□ Flame in combustor
56	15,06	367,71	16,59	1,27	O Flame at flame holder
57	15,06	373,41	16,83	1,25	O Flame at flame holder
58	15,06	379,10	17,08	1,23	O Flame at flame holder
59	15,06	384,80	17,33	1,21	O Flame at flame holder
60	15,06	390,49	17,57	1,19	O Flame at flame holder
61	15,06	396,19	17,82	1,18	O Flame at flame holder
62	15,06	401,89	18,07	1,16	O Flame at flame holder
63	15,06	407,58	18,31	1,14	O Flame at flame holder
64	15,06	413,28	18,56	1,13	O Flame at flame holder
65	15,06	418,97	18,81	1,11	O Flame at flame holder
66	15,06	424,67	19,05	1,10	O Flame at flame holder
67	15,06	430,37	19,30	1,08	O Flame at flame holder
68	15,06	436,06	19,55	1,07	O Flame at flame holder
69	15,06	441,76	19,79	1,06	O Flame at flame holder
70	15,06	447,45	20,04	1,04	O Flame at flame holder
71	15,06	453,15	20,29	1,03	O Flame at flame holder
72	15,06	458,85	20,53	1,02	O Flame at flame holder
73	15,06	464,54	20,78	1,00	O Flame at flame holder
74	15,06	470,24	21,03	0,99	O Flame at flame holder

75	15,06	475,93	21,27	0,98	O Flame at flame holder
76	15,06	481,63	21,52	0,97	O Flame at flame holder
77	15,06	487,33	21,77	0,96	O Flame at flame holder
78	15,06	493,02	22,02	0,95	O Flame at flame holder
79	15,06	498,72	22,26	0,93	O Flame at flame holder
80	15,06	504,41	22,51	0,92	O Flame at flame holder
81	15,06	510,11	22,76	0,91	O Flame at flame holder
82	15,06	515,81	23,00	0,90	O Flame at flame holder
83	15,06	521,50	23,25	0,89	O Flame at flame holder
84	15,06	527,20	23,50	0,88	O Flame at flame holder
85	15,06	532,89	23,74	0,87	O Flame at flame holder
86	15,06	538,59	23,99	0,87	□ Flame in combustor
87	15,06	544,29	24,24	0,86	□ Flame in combustor
88	15,06	549,98	24,48	0,85	□ Flame in combustor
89	15,06	555,68	24,73	0,84	□ Flame in combustor
90	15,06	561,37	24,98	0,83	□ Flame in combustor
91	15,06	567,07	25,22	0,82	□ Flame in combustor

Tabel 82 Data komposisi bahan bakar dan udara *Combustor* D_{out} 7 mm (Q_{fuel} 15,60 ml/min)

No	Q_{fuel} (ml/min)	Q_{air} (ml/min)	$V_{reaktan}$ (Cm/s)	Ekv Rasio (Φ)	Keterangan
1	15,60	54,43	3,03	8,86	Δ Flame at combustor rim
2	15,60	60,13	3,28	8,03	Δ Flame at combustor rim
3	15,60	65,82	3,53	7,33	Δ Flame at combustor rim
4	15,60	71,52	3,77	6,75	Δ Flame at combustor rim
5	15,60	77,21	4,02	6,25	Δ Flame at combustor rim
6	15,60	82,91	4,27	5,82	Δ Flame at combustor rim
7	15,60	88,61	4,52	5,45	Δ Flame at combustor rim
8	15,60	94,30	4,76	5,12	Δ Flame at combustor rim
9	15,60	100,00	5,01	4,83	Δ Flame at combustor rim

10	15,60	105,69	5,26	4,57	Δ Flame at combustor rim
11	15,60	111,39	5,50	4,33	Δ Flame at combustor rim
12	15,60	117,09	5,75	4,12	Δ Flame at combustor rim
13	15,60	122,78	6,00	3,93	Δ Flame at combustor rim
14	15,60	128,48	6,24	3,76	Δ Flame at combustor rim
15	15,60	134,17	6,49	3,60	Δ Flame at combustor rim
16	15,60	139,87	6,74	3,45	Δ Flame at combustor rim
17	15,60	145,57	6,98	3,31	Δ Flame at combustor rim
18	15,60	151,26	7,23	3,19	Δ Flame at combustor rim
19	15,60	156,96	7,48	3,07	Δ Flame at combustor rim
20	15,60	162,65	7,72	2,97	Δ Flame at combustor rim
21	15,60	168,35	7,97	2,87	Δ Flame at combustor rim
22	15,60	174,05	8,22	2,77	Δ Flame at combustor rim
23	15,60	179,74	8,46	2,68	Δ Flame at combustor rim
24	15,60	185,44	8,71	2,60	Δ Flame at combustor rim
25	15,60	191,13	8,96	2,52	Δ Flame at combustor rim
26	15,60	196,83	9,20	2,45	Δ Flame at combustor rim
27	15,60	202,53	9,45	2,38	Δ Flame at combustor rim
28	15,60	208,22	9,70	2,32	Δ Flame at combustor rim
29	15,60	213,92	9,94	2,26	Δ Flame at combustor rim
30	15,60	219,61	10,19	2,20	Δ Flame at combustor rim
31	15,60	225,31	10,44	2,14	Δ Flame at combustor rim
32	15,60	231,01	10,69	2,09	Δ Flame at combustor rim
33	15,60	236,70	10,93	2,04	Δ Flame at combustor rim
34	15,60	242,40	11,18	1,99	Δ Flame at combustor rim
35	15,60	248,09	11,43	1,94	Δ Flame at combustor rim
36	15,60	253,79	11,67	1,90	Δ Flame at combustor rim
37	15,60	259,49	11,92	1,86	Δ Flame at combustor rim
38	15,60	265,18	12,17	1,82	Δ Flame at combustor rim
39	15,60	270,88	12,41	1,78	Δ Flame at combustor rim
40	15,60	276,57	12,66	1,74	Δ Flame at combustor rim

41	15,60	282,27	12,91	1,71	Δ Flame at combustor rim
42	15,60	287,97	13,15	1,68	Δ Flame at combustor rim
43	15,60	293,66	13,40	1,64	Δ Flame at combustor rim
44	15,60	299,36	13,65	1,61	Δ Flame at combustor rim
45	15,60	305,05	13,89	1,58	Δ Flame at combustor rim
46	15,60	310,75	14,14	1,55	Δ Flame at combustor rim
47	15,60	316,45	14,39	1,52	Δ Flame at combustor rim
48	15,60	322,14	14,63	1,50	Δ Flame at combustor rim
49	15,60	327,84	14,88	1,47	□ Flame in combustor
50	15,60	333,53	15,13	1,45	□ Flame in combustor
51	15,60	339,23	15,37	1,42	□ Flame in combustor
52	15,60	344,93	15,62	1,40	□ Flame in combustor
53	15,60	350,62	15,87	1,38	□ Flame in combustor
54	15,60	356,32	16,11	1,35	□ Flame in combustor
55	15,60	362,01	16,36	1,33	□ Flame in combustor
56	15,60	367,71	16,61	1,31	□ Flame in combustor
57	15,60	373,41	16,86	1,29	□ Flame in combustor
58	15,60	379,10	17,10	1,27	O Flame at flame holder
59	15,60	384,80	17,35	1,25	O Flame at flame holder
60	15,60	390,49	17,60	1,24	O Flame at flame holder
61	15,60	396,19	17,84	1,22	O Flame at flame holder
62	15,60	401,89	18,09	1,20	O Flame at flame holder
63	15,60	407,58	18,34	1,18	O Flame at flame holder
64	15,60	413,28	18,58	1,17	O Flame at flame holder
65	15,60	418,97	18,83	1,15	O Flame at flame holder
66	15,60	424,67	19,08	1,14	O Flame at flame holder
67	15,60	430,37	19,32	1,12	O Flame at flame holder
68	15,60	436,06	19,57	1,11	O Flame at flame holder
69	15,60	441,76	19,82	1,09	O Flame at flame holder
70	15,60	447,45	20,06	1,08	O Flame at flame holder
71	15,60	453,15	20,31	1,06	O Flame at flame holder

72	15,60	458,85	20,56	1,05	O Flame at flame holder
73	15,60	464,54	20,80	1,04	O Flame at flame holder
74	15,60	470,24	21,05	1,03	O Flame at flame holder
75	15,60	475,93	21,30	1,01	O Flame at flame holder
76	15,60	481,63	21,54	1,00	O Flame at flame holder
77	15,60	487,33	21,79	0,99	O Flame at flame holder
78	15,60	493,02	22,04	0,98	O Flame at flame holder
79	15,60	498,72	22,28	0,97	O Flame at flame holder
80	15,60	504,41	22,53	0,96	O Flame at flame holder
81	15,60	510,11	22,78	0,95	O Flame at flame holder
82	15,60	515,81	23,03	0,94	O Flame at flame holder
83	15,60	521,50	23,27	0,93	O Flame at flame holder
84	15,60	527,20	23,52	0,92	O Flame at flame holder
85	15,60	532,89	23,77	0,91	O Flame at flame holder
86	15,60	538,59	24,01	0,90	O Flame at flame holder
87	15,60	544,29	24,26	0,89	□ Flame in combustor
88	15,60	549,98	24,51	0,88	□ Flame in combustor
89	15,60	555,68	24,75	0,87	□ Flame in combustor
90	15,60	561,37	25,00	0,86	□ Flame in combustor
91	15,60	567,07	25,25	0,85	□ Flame in combustor

Tabel 83 Data komposisi bahan bakar dan udara *Combustor* D_{out} 7 mm (Q_{fuel} 16,13 ml/min)

No	Q_{fuel} (ml/min)	Q_{air} (ml/min)	$V_{reaktan}$ (Cm/s)	Ekv Rasio (Φ)	Keterangan
1	16,13	54,43	3,06	9,17	Δ Flame at combustor rim
2	16,13	60,13	3,30	8,30	Δ Flame at combustor rim
3	16,13	65,82	3,55	7,58	Δ Flame at combustor rim
4	16,13	71,52	3,80	6,98	Δ Flame at combustor rim
5	16,13	77,21	4,04	6,46	Δ Flame at combustor rim
6	16,13	82,91	4,29	6,02	Δ Flame at combustor rim

7	16,13	88,61	4,54	5,63	Δ Flame at combustor rim
8	16,13	94,30	4,78	5,29	Δ Flame at combustor rim
9	16,13	100,00	5,03	4,99	Δ Flame at combustor rim
10	16,13	105,69	5,28	4,72	Δ Flame at combustor rim
11	16,13	111,39	5,53	4,48	Δ Flame at combustor rim
12	16,13	117,09	5,77	4,26	Δ Flame at combustor rim
13	16,13	122,78	6,02	4,06	Δ Flame at combustor rim
14	16,13	128,48	6,27	3,88	Δ Flame at combustor rim
15	16,13	134,17	6,51	3,72	Δ Flame at combustor rim
16	16,13	139,87	6,76	3,57	Δ Flame at combustor rim
17	16,13	145,57	7,01	3,43	Δ Flame at combustor rim
18	16,13	151,26	7,25	3,30	Δ Flame at combustor rim
19	16,13	156,96	7,50	3,18	Δ Flame at combustor rim
20	16,13	162,65	7,75	3,07	Δ Flame at combustor rim
21	16,13	168,35	7,99	2,96	Δ Flame at combustor rim
22	16,13	174,05	8,24	2,87	Δ Flame at combustor rim
23	16,13	179,74	8,49	2,78	Δ Flame at combustor rim
24	16,13	185,44	8,73	2,69	Δ Flame at combustor rim
25	16,13	191,13	8,98	2,61	Δ Flame at combustor rim
26	16,13	196,83	9,23	2,54	Δ Flame at combustor rim
27	16,13	202,53	9,47	2,46	Δ Flame at combustor rim
28	16,13	208,22	9,72	2,40	Δ Flame at combustor rim
29	16,13	213,92	9,97	2,33	Δ Flame at combustor rim
30	16,13	219,61	10,21	2,27	Δ Flame at combustor rim
31	16,13	225,31	10,46	2,21	Δ Flame at combustor rim
32	16,13	231,01	10,71	2,16	Δ Flame at combustor rim
33	16,13	236,70	10,95	2,11	Δ Flame at combustor rim
34	16,13	242,40	11,20	2,06	Δ Flame at combustor rim
35	16,13	248,09	11,45	2,01	Δ Flame at combustor rim
36	16,13	253,79	11,70	1,97	Δ Flame at combustor rim
37	16,13	259,49	11,94	1,92	Δ Flame at combustor rim

38	16,13	265,18	12,19	1,88	Δ Flame at combustor rim
39	16,13	270,88	12,44	1,84	Δ Flame at combustor rim
40	16,13	276,57	12,68	1,80	Δ Flame at combustor rim
41	16,13	282,27	12,93	1,77	Δ Flame at combustor rim
42	16,13	287,97	13,18	1,73	Δ Flame at combustor rim
43	16,13	293,66	13,42	1,70	Δ Flame at combustor rim
44	16,13	299,36	13,67	1,67	Δ Flame at combustor rim
45	16,13	305,05	13,92	1,64	Δ Flame at combustor rim
46	16,13	310,75	14,16	1,61	Δ Flame at combustor rim
47	16,13	316,45	14,41	1,58	Δ Flame at combustor rim
48	16,13	322,14	14,66	1,55	Δ Flame at combustor rim
49	16,13	327,84	14,90	1,52	Δ Flame at combustor rim
50	16,13	333,53	15,15	1,50	Δ Flame at combustor rim
51	16,13	339,23	15,40	1,47	Δ Flame at combustor rim
52	16,13	344,93	15,64	1,45	O Flame at flame holder
53	16,13	350,62	15,89	1,42	O Flame at flame holder
54	16,13	356,32	16,14	1,40	O Flame at flame holder
55	16,13	362,01	16,38	1,38	O Flame at flame holder
56	16,13	367,71	16,63	1,36	O Flame at flame holder
57	16,13	373,41	16,88	1,34	O Flame at flame holder
58	16,13	379,10	17,13	1,32	O Flame at flame holder
59	16,13	384,80	17,37	1,30	O Flame at flame holder
60	16,13	390,49	17,62	1,28	O Flame at flame holder
61	16,13	396,19	17,87	1,26	O Flame at flame holder
62	16,13	401,89	18,11	1,24	O Flame at flame holder
63	16,13	407,58	18,36	1,22	O Flame at flame holder
64	16,13	413,28	18,61	1,21	O Flame at flame holder
65	16,13	418,97	18,85	1,19	O Flame at flame holder
66	16,13	424,67	19,10	1,17	O Flame at flame holder
67	16,13	430,37	19,35	1,16	O Flame at flame holder
68	16,13	436,06	19,59	1,14	O Flame at flame holder

69	16,13	441,76	19,84	1,13	O Flame at flame holder
70	16,13	447,45	20,09	1,12	O Flame at flame holder
71	16,13	453,15	20,33	1,10	O Flame at flame holder
72	16,13	458,85	20,58	1,09	O Flame at flame holder
73	16,13	464,54	20,83	1,07	O Flame at flame holder
74	16,13	470,24	21,07	1,06	O Flame at flame holder
75	16,13	475,93	21,32	1,05	O Flame at flame holder
76	16,13	481,63	21,57	1,04	O Flame at flame holder
77	16,13	487,33	21,81	1,02	O Flame at flame holder
78	16,13	493,02	22,06	1,01	O Flame at flame holder
79	16,13	498,72	22,31	1,00	O Flame at flame holder
80	16,13	504,41	22,55	0,99	O Flame at flame holder
81	16,13	510,11	22,80	0,98	O Flame at flame holder
82	16,13	515,81	23,05	0,97	O Flame at flame holder
83	16,13	521,50	23,30	0,96	O Flame at flame holder
84	16,13	527,20	23,54	0,95	O Flame at flame holder
85	16,13	532,89	23,79	0,94	O Flame at flame holder
86	16,13	538,59	24,04	0,93	O Flame at flame holder
87	16,13	544,29	24,28	0,92	O Flame at flame holder
88	16,13	549,98	24,53	0,91	O Flame at flame holder
89	16,13	555,68	24,78	0,90	□ Flame in combustor
90	16,13	561,37	25,02	0,89	□ Flame in combustor
91	16,13	567,07	25,27	0,88	□ Flame in combustor

Tabel 84 Data komposisi bahan bakar dan udara *Combustor* D_{out} 7 mm (Q_{fuel} 16,66 ml/min)

No	Q_{fuel} (ml/min)	Q_{air} (ml/min)	$V_{reaktan}$ (Cm/s)	Ekv Rasio (Φ)	Keterangan
1	16,66	54,43	3,08	9,47	Δ Flame at combustor rim
2	16,66	60,13	3,33	8,57	Δ Flame at combustor rim
3	16,66	65,82	3,57	7,83	Δ Flame at combustor rim

4	16,66	71,52	3,82	7,21	Δ Flame at combustor rim
5	16,66	77,21	4,07	6,68	Δ Flame at combustor rim
6	16,66	82,91	4,31	6,22	Δ Flame at combustor rim
7	16,66	88,61	4,56	5,82	Δ Flame at combustor rim
8	16,66	94,30	4,81	5,47	Δ Flame at combustor rim
9	16,66	100,00	5,05	5,15	Δ Flame at combustor rim
10	16,66	105,69	5,30	4,88	Δ Flame at combustor rim
11	16,66	111,39	5,55	4,63	Δ Flame at combustor rim
12	16,66	117,09	5,80	4,40	Δ Flame at combustor rim
13	16,66	122,78	6,04	4,20	Δ Flame at combustor rim
14	16,66	128,48	6,29	4,01	Δ Flame at combustor rim
15	16,66	134,17	6,54	3,84	Δ Flame at combustor rim
16	16,66	139,87	6,78	3,69	Δ Flame at combustor rim
17	16,66	145,57	7,03	3,54	Δ Flame at combustor rim
18	16,66	151,26	7,28	3,41	Δ Flame at combustor rim
19	16,66	156,96	7,52	3,28	Δ Flame at combustor rim
20	16,66	162,65	7,77	3,17	Δ Flame at combustor rim
21	16,66	168,35	8,02	3,06	Δ Flame at combustor rim
22	16,66	174,05	8,26	2,96	Δ Flame at combustor rim
23	16,66	179,74	8,51	2,87	Δ Flame at combustor rim
24	16,66	185,44	8,76	2,78	Δ Flame at combustor rim
25	16,66	191,13	9,00	2,70	Δ Flame at combustor rim
26	16,66	196,83	9,25	2,62	Δ Flame at combustor rim
27	16,66	202,53	9,50	2,54	Δ Flame at combustor rim
28	16,66	208,22	9,74	2,48	Δ Flame at combustor rim
29	16,66	213,92	9,99	2,41	Δ Flame at combustor rim
30	16,66	219,61	10,24	2,35	Δ Flame at combustor rim
31	16,66	225,31	10,48	2,29	Δ Flame at combustor rim
32	16,66	231,01	10,73	2,23	Δ Flame at combustor rim
33	16,66	236,70	10,98	2,18	Δ Flame at combustor rim
34	16,66	242,40	11,22	2,13	Δ Flame at combustor rim

35	16,66	248,09	11,47	2,08	Δ Flame at combustor rim
36	16,66	253,79	11,72	2,03	Δ Flame at combustor rim
37	16,66	259,49	11,97	1,99	Δ Flame at combustor rim
38	16,66	265,18	12,21	1,94	Δ Flame at combustor rim
39	16,66	270,88	12,46	1,90	Δ Flame at combustor rim
40	16,66	276,57	12,71	1,86	Δ Flame at combustor rim
41	16,66	282,27	12,95	1,83	Δ Flame at combustor rim
42	16,66	287,97	13,20	1,79	Δ Flame at combustor rim
43	16,66	293,66	13,45	1,76	Δ Flame at combustor rim
44	16,66	299,36	13,69	1,72	Δ Flame at combustor rim
45	16,66	305,05	13,94	1,69	Δ Flame at combustor rim
46	16,66	310,75	14,19	1,66	Δ Flame at combustor rim
47	16,66	316,45	14,43	1,63	Δ Flame at combustor rim
48	16,66	322,14	14,68	1,60	Δ Flame at combustor rim
49	16,66	327,84	14,93	1,57	Δ Flame at combustor rim
50	16,66	333,53	15,17	1,55	Δ Flame at combustor rim
51	16,66	339,23	15,42	1,52	Δ Flame at combustor rim
52	16,66	344,93	15,67	1,49	Δ Flame at combustor rim
53	16,66	350,62	15,91	1,47	Δ Flame at combustor rim
54	16,66	356,32	16,16	1,45	□ Flame in combustor
55	16,66	362,01	16,41	1,42	□ Flame in combustor
56	16,66	367,71	16,65	1,40	□ Flame in combustor
57	16,66	373,41	16,90	1,38	□ Flame in combustor
58	16,66	379,10	17,15	1,36	□ Flame in combustor
59	16,66	384,80	17,39	1,34	□ Flame in combustor
60	16,66	390,49	17,64	1,32	□ Flame in combustor
61	16,66	396,19	17,89	1,30	□ Flame in combustor
62	16,66	401,89	18,14	1,28	□ Flame in combustor
63	16,66	407,58	18,38	1,26	□ Flame in combustor
64	16,66	413,28	18,63	1,25	O Flame at flame holder
65	16,66	418,97	18,88	1,23	O Flame at flame holder

66	16,66	424,67	19,12	1,21	O Flame at flame holder
67	16,66	430,37	19,37	1,20	O Flame at flame holder
68	16,66	436,06	19,62	1,18	O Flame at flame holder
69	16,66	441,76	19,86	1,17	O Flame at flame holder
70	16,66	447,45	20,11	1,15	O Flame at flame holder
71	16,66	453,15	20,36	1,14	O Flame at flame holder
72	16,66	458,85	20,60	1,12	O Flame at flame holder
73	16,66	464,54	20,85	1,11	O Flame at flame holder
74	16,66	470,24	21,10	1,10	O Flame at flame holder
75	16,66	475,93	21,34	1,08	O Flame at flame holder
76	16,66	481,63	21,59	1,07	O Flame at flame holder
77	16,66	487,33	21,84	1,06	O Flame at flame holder
78	16,66	493,02	22,08	1,05	O Flame at flame holder
79	16,66	498,72	22,33	1,03	O Flame at flame holder
80	16,66	504,41	22,58	1,02	O Flame at flame holder
81	16,66	510,11	22,82	1,01	O Flame at flame holder
82	16,66	515,81	23,07	1,00	O Flame at flame holder
83	16,66	521,50	23,32	0,99	O Flame at flame holder
84	16,66	527,20	23,57	0,98	O Flame at flame holder
85	16,66	532,89	23,81	0,97	O Flame at flame holder
86	16,66	538,59	24,06	0,96	O Flame at flame holder
87	16,66	544,29	24,31	0,95	O Flame at flame holder
88	16,66	549,98	24,55	0,94	O Flame at flame holder
89	16,66	555,68	24,80	0,93	O Flame at flame holder
90	16,66	561,37	25,05	0,92	O Flame at flame holder
91	16,66	567,07	25,29	0,91	□ Flame in combustor

Tabel 85 Data komposisi bahan bakar dan udara *Combustor* D_{out} 7 mm (Q_{fuel} 17,19 ml/min)

No	Q_{fuel} (ml/min)	Q_{air} (ml/min)	$V_{reaktan}$ (Cm/s)	Ekv Rasio (Φ)	Keterangan

1	17,19	54,43	3,10	9,77	Δ Flame at combustor rim
2	17,19	60,13	3,35	8,85	Δ Flame at combustor rim
3	17,19	65,82	3,60	8,08	Δ Flame at combustor rim
4	17,19	71,52	3,84	7,44	Δ Flame at combustor rim
5	17,19	77,21	4,09	6,89	Δ Flame at combustor rim
6	17,19	82,91	4,34	6,42	Δ Flame at combustor rim
7	17,19	88,61	4,58	6,00	Δ Flame at combustor rim
8	17,19	94,30	4,83	5,64	Δ Flame at combustor rim
9	17,19	100,00	5,08	5,32	Δ Flame at combustor rim
10	17,19	105,69	5,32	5,03	Δ Flame at combustor rim
11	17,19	111,39	5,57	4,77	Δ Flame at combustor rim
12	17,19	117,09	5,82	4,54	Δ Flame at combustor rim
13	17,19	122,78	6,06	4,33	Δ Flame at combustor rim
14	17,19	128,48	6,31	4,14	Δ Flame at combustor rim
15	17,19	134,17	6,56	3,96	Δ Flame at combustor rim
16	17,19	139,87	6,81	3,80	Δ Flame at combustor rim
17	17,19	145,57	7,05	3,65	Δ Flame at combustor rim
18	17,19	151,26	7,30	3,52	Δ Flame at combustor rim
19	17,19	156,96	7,55	3,39	Δ Flame at combustor rim
20	17,19	162,65	7,79	3,27	Δ Flame at combustor rim
21	17,19	168,35	8,04	3,16	Δ Flame at combustor rim
22	17,19	174,05	8,29	3,06	Δ Flame at combustor rim
23	17,19	179,74	8,53	2,96	Δ Flame at combustor rim
24	17,19	185,44	8,78	2,87	Δ Flame at combustor rim
25	17,19	191,13	9,03	2,78	Δ Flame at combustor rim
26	17,19	196,83	9,27	2,70	Δ Flame at combustor rim
27	17,19	202,53	9,52	2,63	Δ Flame at combustor rim
28	17,19	208,22	9,77	2,55	Δ Flame at combustor rim
29	17,19	213,92	10,01	2,49	Δ Flame at combustor rim
30	17,19	219,61	10,26	2,42	Δ Flame at combustor rim
31	17,19	225,31	10,51	2,36	Δ Flame at combustor rim

32	17,19	231,01	10,75	2,30	Δ Flame at combustor rim
33	17,19	236,70	11,00	2,25	Δ Flame at combustor rim
34	17,19	242,40	11,25	2,19	Δ Flame at combustor rim
35	17,19	248,09	11,49	2,14	Δ Flame at combustor rim
36	17,19	253,79	11,74	2,10	Δ Flame at combustor rim
37	17,19	259,49	11,99	2,05	Δ Flame at combustor rim
38	17,19	265,18	12,24	2,01	Δ Flame at combustor rim
39	17,19	270,88	12,48	1,96	Δ Flame at combustor rim
40	17,19	276,57	12,73	1,92	Δ Flame at combustor rim
41	17,19	282,27	12,98	1,88	Δ Flame at combustor rim
42	17,19	287,97	13,22	1,85	Δ Flame at combustor rim
43	17,19	293,66	13,47	1,81	Δ Flame at combustor rim
44	17,19	299,36	13,72	1,78	Δ Flame at combustor rim
45	17,19	305,05	13,96	1,74	Δ Flame at combustor rim
46	17,19	310,75	14,21	1,71	Δ Flame at combustor rim
47	17,19	316,45	14,46	1,68	Δ Flame at combustor rim
48	17,19	322,14	14,70	1,65	Δ Flame at combustor rim
49	17,19	327,84	14,95	1,62	Δ Flame at combustor rim
50	17,19	333,53	15,20	1,59	Δ Flame at combustor rim
51	17,19	339,23	15,44	1,57	Δ Flame at combustor rim
52	17,19	344,93	15,69	1,54	Δ Flame at combustor rim
53	17,19	350,62	15,94	1,52	Δ Flame at combustor rim
54	17,19	356,32	16,18	1,49	Δ Flame at combustor rim
55	17,19	362,01	16,43	1,47	Δ Flame at combustor rim
56	17,19	367,71	16,68	1,45	□ Flame in combustor
57	17,19	373,41	16,92	1,42	□ Flame in combustor
58	17,19	379,10	17,17	1,40	□ Flame in combustor
59	17,19	384,80	17,42	1,38	□ Flame in combustor
60	17,19	390,49	17,66	1,36	□ Flame in combustor
61	17,19	396,19	17,91	1,34	□ Flame in combustor
62	17,19	401,89	18,16	1,32	□ Flame in combustor

63	17,19	407,58	18,41	1,30	□ Flame in combustor
64	17,19	413,28	18,65	1,29	□ Flame in combustor
65	17,19	418,97	18,90	1,27	□ Flame in combustor
66	17,19	424,67	19,15	1,25	□ Flame in combustor
67	17,19	430,37	19,39	1,24	□ Flame in combustor
68	17,19	436,06	19,64	1,22	□ Flame in combustor
69	17,19	441,76	19,89	1,20	□ Flame in combustor
70	17,19	447,45	20,13	1,19	□ Flame in combustor
71	17,19	453,15	20,38	1,17	O Flame at flame holder
72	17,19	458,85	20,63	1,16	O Flame at flame holder
73	17,19	464,54	20,87	1,14	O Flame at flame holder
74	17,19	470,24	21,12	1,13	O Flame at flame holder
75	17,19	475,93	21,37	1,12	O Flame at flame holder
76	17,19	481,63	21,61	1,10	O Flame at flame holder
77	17,19	487,33	21,86	1,09	O Flame at flame holder
78	17,19	493,02	22,11	1,08	O Flame at flame holder
79	17,19	498,72	22,35	1,07	O Flame at flame holder
80	17,19	504,41	22,60	1,05	O Flame at flame holder
81	17,19	510,11	22,85	1,04	O Flame at flame holder
82	17,19	515,81	23,09	1,03	O Flame at flame holder
83	17,19	521,50	23,34	1,02	O Flame at flame holder
84	17,19	527,20	23,59	1,01	O Flame at flame holder
85	17,19	532,89	23,83	1,00	O Flame at flame holder
86	17,19	538,59	24,08	0,99	O Flame at flame holder
87	17,19	544,29	24,33	0,98	O Flame at flame holder
88	17,19	549,98	24,58	0,97	O Flame at flame holder
89	17,19	555,68	24,82	0,96	O Flame at flame holder
90	17,19	561,37	25,07	0,95	O Flame at flame holder
91	17,19	567,07	25,32	0,94	O Flame at flame holder

Tabel 86 Data komposisi bahan bakar dan udara *Combustor* D_{out} 7 mm (Q_{fuel} 17,72 ml/min)

No	Q_{fuel} (ml/min)	Q_{air} (ml/min)	$V_{reaktan}$ (Cm/s)	Ekv Rasio (Φ)	Keterangan
1	17,72	54,43	3,13	10,07	Δ Flame at combustor rim
2	17,72	60,13	3,37	9,12	Δ Flame at combustor rim
3	17,72	65,82	3,62	8,33	Δ Flame at combustor rim
4	17,72	71,52	3,87	7,67	Δ Flame at combustor rim
5	17,72	77,21	4,11	7,10	Δ Flame at combustor rim
6	17,72	82,91	4,36	6,61	Δ Flame at combustor rim
7	17,72	88,61	4,61	6,19	Δ Flame at combustor rim
8	17,72	94,30	4,85	5,81	Δ Flame at combustor rim
9	17,72	100,00	5,10	5,48	Δ Flame at combustor rim
10	17,72	105,69	5,35	5,19	Δ Flame at combustor rim
11	17,72	111,39	5,59	4,92	Δ Flame at combustor rim
12	17,72	117,09	5,84	4,68	Δ Flame at combustor rim
13	17,72	122,78	6,09	4,47	Δ Flame at combustor rim
14	17,72	128,48	6,33	4,27	Δ Flame at combustor rim
15	17,72	134,17	6,58	4,09	Δ Flame at combustor rim
16	17,72	139,87	6,83	3,92	Δ Flame at combustor rim
17	17,72	145,57	7,08	3,77	Δ Flame at combustor rim
18	17,72	151,26	7,32	3,63	Δ Flame at combustor rim
19	17,72	156,96	7,57	3,49	Δ Flame at combustor rim
20	17,72	162,65	7,82	3,37	Δ Flame at combustor rim
21	17,72	168,35	8,06	3,26	Δ Flame at combustor rim
22	17,72	174,05	8,31	3,15	Δ Flame at combustor rim
23	17,72	179,74	8,56	3,05	Δ Flame at combustor rim
24	17,72	185,44	8,80	2,96	Δ Flame at combustor rim
25	17,72	191,13	9,05	2,87	Δ Flame at combustor rim
26	17,72	196,83	9,30	2,79	Δ Flame at combustor rim
27	17,72	202,53	9,54	2,71	Δ Flame at combustor rim

28	17,72	208,22	9,79	2,63	Δ Flame at combustor rim
29	17,72	213,92	10,04	2,56	Δ Flame at combustor rim
30	17,72	219,61	10,28	2,50	Δ Flame at combustor rim
31	17,72	225,31	10,53	2,43	Δ Flame at combustor rim
32	17,72	231,01	10,78	2,37	Δ Flame at combustor rim
33	17,72	236,70	11,02	2,32	Δ Flame at combustor rim
34	17,72	242,40	11,27	2,26	Δ Flame at combustor rim
35	17,72	248,09	11,52	2,21	Δ Flame at combustor rim
36	17,72	253,79	11,76	2,16	Δ Flame at combustor rim
37	17,72	259,49	12,01	2,11	Δ Flame at combustor rim
38	17,72	265,18	12,26	2,07	Δ Flame at combustor rim
39	17,72	270,88	12,50	2,02	Δ Flame at combustor rim
40	17,72	276,57	12,75	1,98	Δ Flame at combustor rim
41	17,72	282,27	13,00	1,94	Δ Flame at combustor rim
42	17,72	287,97	13,25	1,90	Δ Flame at combustor rim
43	17,72	293,66	13,49	1,87	Δ Flame at combustor rim
44	17,72	299,36	13,74	1,83	Δ Flame at combustor rim
45	17,72	305,05	13,99	1,80	Δ Flame at combustor rim
46	17,72	310,75	14,23	1,76	Δ Flame at combustor rim
47	17,72	316,45	14,48	1,73	Δ Flame at combustor rim
48	17,72	322,14	14,73	1,70	Δ Flame at combustor rim
49	17,72	327,84	14,97	1,67	Δ Flame at combustor rim
50	17,72	333,53	15,22	1,64	Δ Flame at combustor rim
51	17,72	339,23	15,47	1,62	Δ Flame at combustor rim
52	17,72	344,93	15,71	1,59	Δ Flame at combustor rim
53	17,72	350,62	15,96	1,56	Δ Flame at combustor rim
54	17,72	356,32	16,21	1,54	Δ Flame at combustor rim
55	17,72	362,01	16,45	1,51	Δ Flame at combustor rim
56	17,72	367,71	16,70	1,49	Δ Flame at combustor rim
57	17,72	373,41	16,95	1,47	□ Flame in combustor
58	17,72	379,10	17,19	1,45	□ Flame in combustor

59	17,72	384,80	17,44	1,43	□ Flame in combustor
60	17,72	390,49	17,69	1,40	□ Flame in combustor
61	17,72	396,19	17,93	1,38	□ Flame in combustor
62	17,72	401,89	18,18	1,36	□ Flame in combustor
63	17,72	407,58	18,43	1,35	□ Flame in combustor
64	17,72	413,28	18,68	1,33	□ Flame in combustor
65	17,72	418,97	18,92	1,31	□ Flame in combustor
66	17,72	424,67	19,17	1,29	□ Flame in combustor
67	17,72	430,37	19,42	1,27	□ Flame in combustor
68	17,72	436,06	19,66	1,26	□ Flame in combustor
69	17,72	441,76	19,91	1,24	□ Flame in combustor
70	17,72	447,45	20,16	1,23	□ Flame in combustor
71	17,72	453,15	20,40	1,21	O Flame at flame holder
72	17,72	458,85	20,65	1,20	O Flame at flame holder
73	17,72	464,54	20,90	1,18	O Flame at flame holder
74	17,72	470,24	21,14	1,17	O Flame at flame holder
75	17,72	475,93	21,39	1,15	O Flame at flame holder
76	17,72	481,63	21,64	1,14	O Flame at flame holder
77	17,72	487,33	21,88	1,13	O Flame at flame holder
78	17,72	493,02	22,13	1,11	O Flame at flame holder
79	17,72	498,72	22,38	1,10	O Flame at flame holder
80	17,72	504,41	22,62	1,09	O Flame at flame holder
81	17,72	510,11	22,87	1,07	O Flame at flame holder
82	17,72	515,81	23,12	1,06	O Flame at flame holder
83	17,72	521,50	23,36	1,05	O Flame at flame holder
84	17,72	527,20	23,61	1,04	O Flame at flame holder
85	17,72	532,89	23,86	1,03	O Flame at flame holder
86	17,72	538,59	24,10	1,02	O Flame at flame holder
87	17,72	544,29	24,35	1,01	O Flame at flame holder
88	17,72	549,98	24,60	1,00	O Flame at flame holder
89	17,72	555,68	24,85	0,99	O Flame at flame holder

90	17,72	561,37	25,09	0,98	O Flame at flame holder
91	17,72	567,07	25,34	0,97	O Flame at flame holder

Tabel 87 Data komposisi bahan bakar dan udara *Combustor* D_{out} 7 mm (Q_{fuel} 18,25 ml/min)

No	Q_{fuel} (ml/min)	Q_{air} (ml/min)	$V_{reaktan}$ (Cm/s)	Ekv Rasio (Φ)	Keterangan
1	18,25	54,43	3,15	10,38	Δ Flame at combustor rim
2	18,25	60,13	3,40	9,39	Δ Flame at combustor rim
3	18,25	65,82	3,64	8,58	Δ Flame at combustor rim
4	18,25	71,52	3,89	7,90	Δ Flame at combustor rim
5	18,25	77,21	4,14	7,31	Δ Flame at combustor rim
6	18,25	82,91	4,38	6,81	Δ Flame at combustor rim
7	18,25	88,61	4,63	6,37	Δ Flame at combustor rim
8	18,25	94,30	4,88	5,99	Δ Flame at combustor rim
9	18,25	100,00	5,12	5,65	Δ Flame at combustor rim
10	18,25	105,69	5,37	5,34	Δ Flame at combustor rim
11	18,25	111,39	5,62	5,07	Δ Flame at combustor rim
12	18,25	117,09	5,86	4,82	Δ Flame at combustor rim
13	18,25	122,78	6,11	4,60	Δ Flame at combustor rim
14	18,25	128,48	6,36	4,40	Δ Flame at combustor rim
15	18,25	134,17	6,60	4,21	Δ Flame at combustor rim
16	18,25	139,87	6,85	4,04	Δ Flame at combustor rim
17	18,25	145,57	7,10	3,88	Δ Flame at combustor rim
18	18,25	151,26	7,35	3,73	Δ Flame at combustor rim
19	18,25	156,96	7,59	3,60	Δ Flame at combustor rim
20	18,25	162,65	7,84	3,47	Δ Flame at combustor rim
21	18,25	168,35	8,09	3,35	Δ Flame at combustor rim
22	18,25	174,05	8,33	3,25	Δ Flame at combustor rim
23	18,25	179,74	8,58	3,14	Δ Flame at combustor rim
24	18,25	185,44	8,83	3,05	Δ Flame at combustor rim

25	18,25	191,13	9,07	2,95	Δ Flame at combustor rim
26	18,25	196,83	9,32	2,87	Δ Flame at combustor rim
27	18,25	202,53	9,57	2,79	Δ Flame at combustor rim
28	18,25	208,22	9,81	2,71	Δ Flame at combustor rim
29	18,25	213,92	10,06	2,64	Δ Flame at combustor rim
30	18,25	219,61	10,31	2,57	Δ Flame at combustor rim
31	18,25	225,31	10,55	2,51	Δ Flame at combustor rim
32	18,25	231,01	10,80	2,44	Δ Flame at combustor rim
33	18,25	236,70	11,05	2,39	Δ Flame at combustor rim
34	18,25	242,40	11,29	2,33	Δ Flame at combustor rim
35	18,25	248,09	11,54	2,28	Δ Flame at combustor rim
36	18,25	253,79	11,79	2,23	Δ Flame at combustor rim
37	18,25	259,49	12,03	2,18	Δ Flame at combustor rim
38	18,25	265,18	12,28	2,13	Δ Flame at combustor rim
39	18,25	270,88	12,53	2,09	Δ Flame at combustor rim
40	18,25	276,57	12,77	2,04	Δ Flame at combustor rim
41	18,25	282,27	13,02	2,00	Δ Flame at combustor rim
42	18,25	287,97	13,27	1,96	Δ Flame at combustor rim
43	18,25	293,66	13,52	1,92	Δ Flame at combustor rim
44	18,25	299,36	13,76	1,89	Δ Flame at combustor rim
45	18,25	305,05	14,01	1,85	Δ Flame at combustor rim
46	18,25	310,75	14,26	1,82	Δ Flame at combustor rim
47	18,25	316,45	14,50	1,78	Δ Flame at combustor rim
48	18,25	322,14	14,75	1,75	Δ Flame at combustor rim
49	18,25	327,84	15,00	1,72	Δ Flame at combustor rim
50	18,25	333,53	15,24	1,69	Δ Flame at combustor rim
51	18,25	339,23	15,49	1,66	Δ Flame at combustor rim
52	18,25	344,93	15,74	1,64	Δ Flame at combustor rim
53	18,25	350,62	15,98	1,61	Δ Flame at combustor rim
54	18,25	356,32	16,23	1,59	Δ Flame at combustor rim
55	18,25	362,01	16,48	1,56	Δ Flame at combustor rim

56	18,25	367,71	16,72	1,54	Δ Flame at combustor rim
57	18,25	373,41	16,97	1,51	Δ Flame at combustor rim
58	18,25	379,10	17,22	1,49	Δ Flame at combustor rim
59	18,25	384,80	17,46	1,47	Δ Flame at combustor rim
60	18,25	390,49	17,71	1,45	Δ Flame at combustor rim
61	18,25	396,19	17,96	1,43	Δ Flame at combustor rim
62	18,25	401,89	18,20	1,41	Δ Flame at combustor rim
63	18,25	407,58	18,45	1,39	Δ Flame at combustor rim
64	18,25	413,28	18,70	1,37	Δ Flame at combustor rim
65	18,25	418,97	18,94	1,35	Δ Flame at combustor rim
66	18,25	424,67	19,19	1,33	□ Flame in combustor
67	18,25	430,37	19,44	1,31	□ Flame in combustor
68	18,25	436,06	19,69	1,30	□ Flame in combustor
69	18,25	441,76	19,93	1,28	□ Flame in combustor
70	18,25	447,45	20,18	1,26	□ Flame in combustor
71	18,25	453,15	20,43	1,25	□ Flame in combustor
72	18,25	458,85	20,67	1,23	□ Flame in combustor
73	18,25	464,54	20,92	1,22	□ Flame in combustor
74	18,25	470,24	21,17	1,20	□ Flame in combustor
75	18,25	475,93	21,41	1,19	□ Flame in combustor
76	18,25	481,63	21,66	1,17	□ Flame in combustor
77	18,25	487,33	21,91	1,16	□ Flame in combustor
78	18,25	493,02	22,15	1,15	□ Flame in combustor
79	18,25	498,72	22,40	1,13	□ Flame in combustor
80	18,25	504,41	22,65	1,12	□ Flame in combustor
81	18,25	510,11	22,89	1,11	□ Flame in combustor
82	18,25	515,81	23,14	1,09	□ Flame in combustor
83	18,25	521,50	23,39	1,08	□ Flame in combustor
84	18,25	527,20	23,63	1,07	□ Flame in combustor
85	18,25	532,89	23,88	1,06	O Flame at flame holder
86	18,25	538,59	24,13	1,05	O Flame at flame holder

87	18,25	544,29	24,37	1,04	O Flame at flame holder
88	18,25	549,98	24,62	1,03	O Flame at flame holder
89	18,25	555,68	24,87	1,02	O Flame at flame holder
90	18,25	561,37	25,12	1,01	O Flame at flame holder
91	18,25	567,07	25,36	1,00	O Flame at flame holder

Tabel 88 Data komposisi bahan bakar dan udara *Combustor* D_{out} 7 mm (Q_{fuel} 18,79 ml/min)

No	Q_{fuel} (ml/min)	Q_{air} (ml/min)	$V_{reaktan}$ (Cm/s)	Ekv Rasio (Φ)	Keterangan
1	18,79	54,43	3,17	10,68	Δ Flame at combustor rim
2	18,79	60,13	3,42	9,67	Δ Flame at combustor rim
3	18,79	65,82	3,67	8,83	Δ Flame at combustor rim
4	18,79	71,52	3,91	8,13	Δ Flame at combustor rim
5	18,79	77,21	4,16	7,53	Δ Flame at combustor rim
6	18,79	82,91	4,41	7,01	Δ Flame at combustor rim
7	18,79	88,61	4,65	6,56	Δ Flame at combustor rim
8	18,79	94,30	4,90	6,16	Δ Flame at combustor rim
9	18,79	100,00	5,15	5,81	Δ Flame at combustor rim
10	18,79	105,69	5,39	5,50	Δ Flame at combustor rim
11	18,79	111,39	5,64	5,22	Δ Flame at combustor rim
12	18,79	117,09	5,89	4,96	Δ Flame at combustor rim
13	18,79	122,78	6,13	4,73	Δ Flame at combustor rim
14	18,79	128,48	6,38	4,52	Δ Flame at combustor rim
15	18,79	134,17	6,63	4,33	Δ Flame at combustor rim
16	18,79	139,87	6,87	4,16	Δ Flame at combustor rim
17	18,79	145,57	7,12	3,99	Δ Flame at combustor rim
18	18,79	151,26	7,37	3,84	Δ Flame at combustor rim
19	18,79	156,96	7,61	3,70	Δ Flame at combustor rim
20	18,79	162,65	7,86	3,57	Δ Flame at combustor rim
21	18,79	168,35	8,11	3,45	Δ Flame at combustor rim

22	18,79	174,05	8,36	3,34	Δ Flame at combustor rim
23	18,79	179,74	8,60	3,23	Δ Flame at combustor rim
24	18,79	185,44	8,85	3,13	Δ Flame at combustor rim
25	18,79	191,13	9,10	3,04	Δ Flame at combustor rim
26	18,79	196,83	9,34	2,95	Δ Flame at combustor rim
27	18,79	202,53	9,59	2,87	Δ Flame at combustor rim
28	18,79	208,22	9,84	2,79	Δ Flame at combustor rim
29	18,79	213,92	10,08	2,72	Δ Flame at combustor rim
30	18,79	219,61	10,33	2,65	Δ Flame at combustor rim
31	18,79	225,31	10,58	2,58	Δ Flame at combustor rim
32	18,79	231,01	10,82	2,52	Δ Flame at combustor rim
33	18,79	236,70	11,07	2,46	Δ Flame at combustor rim
34	18,79	242,40	11,32	2,40	Δ Flame at combustor rim
35	18,79	248,09	11,56	2,34	Δ Flame at combustor rim
36	18,79	253,79	11,81	2,29	Δ Flame at combustor rim
37	18,79	259,49	12,06	2,24	Δ Flame at combustor rim
38	18,79	265,18	12,30	2,19	Δ Flame at combustor rim
39	18,79	270,88	12,55	2,15	Δ Flame at combustor rim
40	18,79	276,57	12,80	2,10	Δ Flame at combustor rim
41	18,79	282,27	13,04	2,06	Δ Flame at combustor rim
42	18,79	287,97	13,29	2,02	Δ Flame at combustor rim
43	18,79	293,66	13,54	1,98	Δ Flame at combustor rim
44	18,79	299,36	13,79	1,94	Δ Flame at combustor rim
45	18,79	305,05	14,03	1,91	Δ Flame at combustor rim
46	18,79	310,75	14,28	1,87	Δ Flame at combustor rim
47	18,79	316,45	14,53	1,84	Δ Flame at combustor rim
48	18,79	322,14	14,77	1,80	Δ Flame at combustor rim
49	18,79	327,84	15,02	1,77	Δ Flame at combustor rim
50	18,79	333,53	15,27	1,74	Δ Flame at combustor rim
51	18,79	339,23	15,51	1,71	Δ Flame at combustor rim
52	18,79	344,93	15,76	1,69	Δ Flame at combustor rim

53	18,79	350,62	16,01	1,66	Δ Flame at combustor rim
54	18,79	356,32	16,25	1,63	Δ Flame at combustor rim
55	18,79	362,01	16,50	1,61	Δ Flame at combustor rim
56	18,79	367,71	16,75	1,58	Δ Flame at combustor rim
57	18,79	373,41	16,99	1,56	Δ Flame at combustor rim
58	18,79	379,10	17,24	1,53	Δ Flame at combustor rim
59	18,79	384,80	17,49	1,51	Δ Flame at combustor rim
60	18,79	390,49	17,73	1,49	Δ Flame at combustor rim
61	18,79	396,19	17,98	1,47	Δ Flame at combustor rim
62	18,79	401,89	18,23	1,45	Δ Flame at combustor rim
63	18,79	407,58	18,47	1,43	Δ Flame at combustor rim
64	18,79	413,28	18,72	1,41	Δ Flame at combustor rim
65	18,79	418,97	18,97	1,39	Δ Flame at combustor rim
66	18,79	424,67	19,21	1,37	Δ Flame at combustor rim
67	18,79	430,37	19,46	1,35	Δ Flame at combustor rim
68	18,79	436,06	19,71	1,33	Δ Flame at combustor rim
69	18,79	441,76	19,96	1,32	Δ Flame at combustor rim
70	18,79	447,45	20,20	1,30	□ Flame in combustor
71	18,79	453,15	20,45	1,28	□ Flame in combustor
72	18,79	458,85	20,70	1,27	□ Flame in combustor
73	18,79	464,54	20,94	1,25	□ Flame in combustor
74	18,79	470,24	21,19	1,24	□ Flame in combustor
75	18,79	475,93	21,44	1,22	□ Flame in combustor
76	18,79	481,63	21,68	1,21	□ Flame in combustor
77	18,79	487,33	21,93	1,19	□ Flame in combustor
78	18,79	493,02	22,18	1,18	□ Flame in combustor
79	18,79	498,72	22,42	1,17	□ Flame in combustor
80	18,79	504,41	22,67	1,15	□ Flame in combustor
81	18,79	510,11	22,92	1,14	□ Flame in combustor
82	18,79	515,81	23,16	1,13	□ Flame in combustor
83	18,79	521,50	23,41	1,11	□ Flame in combustor

84	18,79	527,20	23,66	1,10	□ Flame in combustor
85	18,79	532,89	23,90	1,09	□ Flame in combustor
86	18,79	538,59	24,15	1,08	□ Flame in combustor
87	18,79	544,29	24,40	1,07	□ Flame in combustor
88	18,79	549,98	24,64	1,06	□ Flame in combustor
89	18,79	555,68	24,89	1,05	□ Flame in combustor
90	18,79	561,37	25,14	1,04	O Flame at flame holder
91	18,79	567,07	25,38	1,03	O Flame at flame holder

Tabel 89 Data komposisi bahan bakar dan udara *Combustor* D_{out} 7 mm (Q_{fuel} 19,32 ml/min)

No	Q_{fuel} (ml/min)	Q_{air} (ml/min)	$V_{reaktan}$ (Cm/s)	Ekv Rasio (Φ)	Keterangan
1	19,32	54,43	3,20	10,98	Δ Flame at combustor rim
2	19,32	60,13	3,44	9,94	Δ Flame at combustor rim
3	19,32	65,82	3,69	9,08	Δ Flame at combustor rim
4	19,32	71,52	3,94	8,36	Δ Flame at combustor rim
5	19,32	77,21	4,18	7,74	Δ Flame at combustor rim
6	19,32	82,91	4,43	7,21	Δ Flame at combustor rim
7	19,32	88,61	4,68	6,75	Δ Flame at combustor rim
8	19,32	94,30	4,92	6,34	Δ Flame at combustor rim
9	19,32	100,00	5,17	5,98	Δ Flame at combustor rim
10	19,32	105,69	5,42	5,66	Δ Flame at combustor rim
11	19,32	111,39	5,66	5,37	Δ Flame at combustor rim
12	19,32	117,09	5,91	5,10	Δ Flame at combustor rim
13	19,32	122,78	6,16	4,87	Δ Flame at combustor rim
14	19,32	128,48	6,40	4,65	Δ Flame at combustor rim
15	19,32	134,17	6,65	4,45	Δ Flame at combustor rim
16	19,32	139,87	6,90	4,27	Δ Flame at combustor rim
17	19,32	145,57	7,14	4,11	Δ Flame at combustor rim
18	19,32	151,26	7,39	3,95	Δ Flame at combustor rim

19	19,32	156,96	7,64	3,81	Δ Flame at combustor rim
20	19,32	162,65	7,88	3,67	Δ Flame at combustor rim
21	19,32	168,35	8,13	3,55	Δ Flame at combustor rim
22	19,32	174,05	8,38	3,43	Δ Flame at combustor rim
23	19,32	179,74	8,63	3,33	Δ Flame at combustor rim
24	19,32	185,44	8,87	3,22	Δ Flame at combustor rim
25	19,32	191,13	9,12	3,13	Δ Flame at combustor rim
26	19,32	196,83	9,37	3,04	Δ Flame at combustor rim
27	19,32	202,53	9,61	2,95	Δ Flame at combustor rim
28	19,32	208,22	9,86	2,87	Δ Flame at combustor rim
29	19,32	213,92	10,11	2,79	Δ Flame at combustor rim
30	19,32	219,61	10,35	2,72	Δ Flame at combustor rim
31	19,32	225,31	10,60	2,65	Δ Flame at combustor rim
32	19,32	231,01	10,85	2,59	Δ Flame at combustor rim
33	19,32	236,70	11,09	2,53	Δ Flame at combustor rim
34	19,32	242,40	11,34	2,47	Δ Flame at combustor rim
35	19,32	248,09	11,59	2,41	Δ Flame at combustor rim
36	19,32	253,79	11,83	2,36	Δ Flame at combustor rim
37	19,32	259,49	12,08	2,30	Δ Flame at combustor rim
38	19,32	265,18	12,33	2,25	Δ Flame at combustor rim
39	19,32	270,88	12,57	2,21	Δ Flame at combustor rim
40	19,32	276,57	12,82	2,16	Δ Flame at combustor rim
41	19,32	282,27	13,07	2,12	Δ Flame at combustor rim
42	19,32	287,97	13,31	2,08	Δ Flame at combustor rim
43	19,32	293,66	13,56	2,04	Δ Flame at combustor rim
44	19,32	299,36	13,81	2,00	Δ Flame at combustor rim
45	19,32	305,05	14,05	1,96	Δ Flame at combustor rim
46	19,32	310,75	14,30	1,92	Δ Flame at combustor rim
47	19,32	316,45	14,55	1,89	Δ Flame at combustor rim
48	19,32	322,14	14,80	1,86	Δ Flame at combustor rim
49	19,32	327,84	15,04	1,82	Δ Flame at combustor rim

50	19,32	333,53	15,29	1,79	Δ Flame at combustor rim
51	19,32	339,23	15,54	1,76	Δ Flame at combustor rim
52	19,32	344,93	15,78	1,73	Δ Flame at combustor rim
53	19,32	350,62	16,03	1,70	Δ Flame at combustor rim
54	19,32	356,32	16,28	1,68	Δ Flame at combustor rim
55	19,32	362,01	16,52	1,65	Δ Flame at combustor rim
56	19,32	367,71	16,77	1,63	Δ Flame at combustor rim
57	19,32	373,41	17,02	1,60	Δ Flame at combustor rim
58	19,32	379,10	17,26	1,58	Δ Flame at combustor rim
59	19,32	384,80	17,51	1,55	Δ Flame at combustor rim
60	19,32	390,49	17,76	1,53	Δ Flame at combustor rim
61	19,32	396,19	18,00	1,51	Δ Flame at combustor rim
62	19,32	401,89	18,25	1,49	Δ Flame at combustor rim
63	19,32	407,58	18,50	1,47	Δ Flame at combustor rim
64	19,32	413,28	18,74	1,45	Δ Flame at combustor rim
65	19,32	418,97	18,99	1,43	Δ Flame at combustor rim
66	19,32	424,67	19,24	1,41	Δ Flame at combustor rim
67	19,32	430,37	19,48	1,39	Δ Flame at combustor rim
68	19,32	436,06	19,73	1,37	Δ Flame at combustor rim
69	19,32	441,76	19,98	1,35	Δ Flame at combustor rim
70	19,32	447,45	20,23	1,34	Δ Flame at combustor rim
71	19,32	453,15	20,47	1,32	Δ Flame at combustor rim
72	19,32	458,85	20,72	1,30	Δ Flame at combustor rim
73	19,32	464,54	20,97	1,29	Δ Flame at combustor rim
74	19,32	470,24	21,21	1,27	□ Flame in combustor
75	19,32	475,93	21,46	1,26	□ Flame in combustor
76	19,32	481,63	21,71	1,24	□ Flame in combustor
77	19,32	487,33	21,95	1,23	□ Flame in combustor
78	19,32	493,02	22,20	1,21	□ Flame in combustor
79	19,32	498,72	22,45	1,20	□ Flame in combustor
80	19,32	504,41	22,69	1,18	□ Flame in combustor

81	19,32	510,11	22,94	1,17	□ Flame in combustor
82	19,32	515,81	23,19	1,16	□ Flame in combustor
83	19,32	521,50	23,43	1,15	□ Flame in combustor
84	19,32	527,20	23,68	1,13	□ Flame in combustor
85	19,32	532,89	23,93	1,12	□ Flame in combustor
86	19,32	538,59	24,17	1,11	□ Flame in combustor
87	19,32	544,29	24,42	1,10	□ Flame in combustor
88	19,32	549,98	24,67	1,09	□ Flame in combustor
89	19,32	555,68	24,91	1,08	□ Flame in combustor
90	19,32	561,37	25,16	1,06	□ Flame in combustor
91	19,32	567,07	25,41	1,05	□ Flame in combustor

Tabel 90 Data komposisi bahan bakar dan udara *Combustor* D_{out} 7 mm (Q_{fuel} 19,85 ml/min)

No	Q_{fuel} (ml/min)	Q_{air} (ml/min)	$V_{reaktan}$ (Cm/s)	Ekv Rasio (Φ)	Keterangan
1	19,85	54,43	3,22	11,28	Δ Flame at combustor rim
2	19,85	60,13	3,47	10,21	Δ Flame at combustor rim
3	19,85	65,82	3,71	9,33	Δ Flame at combustor rim
4	19,85	71,52	3,96	8,59	Δ Flame at combustor rim
5	19,85	77,21	4,21	7,95	Δ Flame at combustor rim
6	19,85	82,91	4,45	7,41	Δ Flame at combustor rim
7	19,85	88,61	4,70	6,93	Δ Flame at combustor rim
8	19,85	94,30	4,95	6,51	Δ Flame at combustor rim
9	19,85	100,00	5,19	6,14	Δ Flame at combustor rim
10	19,85	105,69	5,44	5,81	Δ Flame at combustor rim
11	19,85	111,39	5,69	5,51	Δ Flame at combustor rim
12	19,85	117,09	5,93	5,25	Δ Flame at combustor rim
13	19,85	122,78	6,18	5,00	Δ Flame at combustor rim
14	19,85	128,48	6,43	4,78	Δ Flame at combustor rim
15	19,85	134,17	6,67	4,58	Δ Flame at combustor rim

16	19,85	139,87	6,92	4,39	Δ Flame at combustor rim
17	19,85	145,57	7,17	4,22	Δ Flame at combustor rim
18	19,85	151,26	7,41	4,06	Δ Flame at combustor rim
19	19,85	156,96	7,66	3,91	Δ Flame at combustor rim
20	19,85	162,65	7,91	3,78	Δ Flame at combustor rim
21	19,85	168,35	8,15	3,65	Δ Flame at combustor rim
22	19,85	174,05	8,40	3,53	Δ Flame at combustor rim
23	19,85	179,74	8,65	3,42	Δ Flame at combustor rim
24	19,85	185,44	8,90	3,31	Δ Flame at combustor rim
25	19,85	191,13	9,14	3,21	Δ Flame at combustor rim
26	19,85	196,83	9,39	3,12	Δ Flame at combustor rim
27	19,85	202,53	9,64	3,03	Δ Flame at combustor rim
28	19,85	208,22	9,88	2,95	Δ Flame at combustor rim
29	19,85	213,92	10,13	2,87	Δ Flame at combustor rim
30	19,85	219,61	10,38	2,80	Δ Flame at combustor rim
31	19,85	225,31	10,62	2,73	Δ Flame at combustor rim
32	19,85	231,01	10,87	2,66	Δ Flame at combustor rim
33	19,85	236,70	11,12	2,59	Δ Flame at combustor rim
34	19,85	242,40	11,36	2,53	Δ Flame at combustor rim
35	19,85	248,09	11,61	2,48	Δ Flame at combustor rim
36	19,85	253,79	11,86	2,42	Δ Flame at combustor rim
37	19,85	259,49	12,10	2,37	Δ Flame at combustor rim
38	19,85	265,18	12,35	2,32	Δ Flame at combustor rim
39	19,85	270,88	12,60	2,27	Δ Flame at combustor rim
40	19,85	276,57	12,84	2,22	Δ Flame at combustor rim
41	19,85	282,27	13,09	2,18	Δ Flame at combustor rim
42	19,85	287,97	13,34	2,13	Δ Flame at combustor rim
43	19,85	293,66	13,58	2,09	Δ Flame at combustor rim
44	19,85	299,36	13,83	2,05	Δ Flame at combustor rim
45	19,85	305,05	14,08	2,01	Δ Flame at combustor rim
46	19,85	310,75	14,32	1,98	Δ Flame at combustor rim

47	19,85	316,45	14,57	1,94	Δ Flame at combustor rim
48	19,85	322,14	14,82	1,91	Δ Flame at combustor rim
49	19,85	327,84	15,07	1,87	Δ Flame at combustor rim
50	19,85	333,53	15,31	1,84	Δ Flame at combustor rim
51	19,85	339,23	15,56	1,81	Δ Flame at combustor rim
52	19,85	344,93	15,81	1,78	Δ Flame at combustor rim
53	19,85	350,62	16,05	1,75	Δ Flame at combustor rim
54	19,85	356,32	16,30	1,72	Δ Flame at combustor rim
55	19,85	362,01	16,55	1,70	Δ Flame at combustor rim
56	19,85	367,71	16,79	1,67	Δ Flame at combustor rim
57	19,85	373,41	17,04	1,64	Δ Flame at combustor rim
58	19,85	379,10	17,29	1,62	Δ Flame at combustor rim
59	19,85	384,80	17,53	1,60	Δ Flame at combustor rim
60	19,85	390,49	17,78	1,57	Δ Flame at combustor rim
61	19,85	396,19	18,03	1,55	Δ Flame at combustor rim
62	19,85	401,89	18,27	1,53	Δ Flame at combustor rim
63	19,85	407,58	18,52	1,51	Δ Flame at combustor rim
64	19,85	413,28	18,77	1,49	Δ Flame at combustor rim
65	19,85	418,97	19,01	1,47	Δ Flame at combustor rim
66	19,85	424,67	19,26	1,45	Δ Flame at combustor rim
67	19,85	430,37	19,51	1,43	Δ Flame at combustor rim
68	19,85	436,06	19,75	1,41	Δ Flame at combustor rim
69	19,85	441,76	20,00	1,39	Δ Flame at combustor rim
70	19,85	447,45	20,25	1,37	Δ Flame at combustor rim
71	19,85	453,15	20,49	1,36	Δ Flame at combustor rim
72	19,85	458,85	20,74	1,34	Δ Flame at combustor rim
73	19,85	464,54	20,99	1,32	Δ Flame at combustor rim
74	19,85	470,24	21,24	1,31	Δ Flame at combustor rim
75	19,85	475,93	21,48	1,29	Δ Flame at combustor rim
76	19,85	481,63	21,73	1,28	Δ Flame at combustor rim
77	19,85	487,33	21,98	1,26	□ Flame in combustor

78	19,85	493,02	22,22	1,25	□ Flame in combustor
79	19,85	498,72	22,47	1,23	□ Flame in combustor
80	19,85	504,41	22,72	1,22	□ Flame in combustor
81	19,85	510,11	22,96	1,20	□ Flame in combustor
82	19,85	515,81	23,21	1,19	□ Flame in combustor
83	19,85	521,50	23,46	1,18	□ Flame in combustor
84	19,85	527,20	23,70	1,16	□ Flame in combustor
85	19,85	532,89	23,95	1,15	□ Flame in combustor
86	19,85	538,59	24,20	1,14	□ Flame in combustor
87	19,85	544,29	24,44	1,13	□ Flame in combustor
88	19,85	549,98	24,69	1,12	□ Flame in combustor
89	19,85	555,68	24,94	1,11	□ Flame in combustor
90	19,85	561,37	25,18	1,09	□ Flame in combustor
91	19,85	567,07	25,43	1,08	□ Flame in combustor

Tabel 91 Data komposisi bahan bakar dan udara *Combustor* D_{out} 7 mm (Q_{fuel} 20,38 ml/min)

No	Q_{fuel} (ml/min)	Q_{air} (ml/min)	$V_{reaktan}$ (Cm/s)	Ekv Rasio (Φ)	Keterangan
1	20,38	54,43	3,24	11,59	Δ Flame at combustor rim
2	20,38	60,13	3,49	10,49	Δ Flame at combustor rim
3	20,38	65,82	3,74	9,58	Δ Flame at combustor rim
4	20,38	71,52	3,98	8,82	Δ Flame at combustor rim
5	20,38	77,21	4,23	8,17	Δ Flame at combustor rim
6	20,38	82,91	4,48	7,61	Δ Flame at combustor rim
7	20,38	88,61	4,72	7,12	Δ Flame at combustor rim
8	20,38	94,30	4,97	6,69	Δ Flame at combustor rim
9	20,38	100,00	5,22	6,31	Δ Flame at combustor rim
10	20,38	105,69	5,46	5,97	Δ Flame at combustor rim
11	20,38	111,39	5,71	5,66	Δ Flame at combustor rim
12	20,38	117,09	5,96	5,39	Δ Flame at combustor rim

13	20,38	122,78	6,20	5,14	Δ Flame at combustor rim
14	20,38	128,48	6,45	4,91	Δ Flame at combustor rim
15	20,38	134,17	6,70	4,70	Δ Flame at combustor rim
16	20,38	139,87	6,94	4,51	Δ Flame at combustor rim
17	20,38	145,57	7,19	4,33	Δ Flame at combustor rim
18	20,38	151,26	7,44	4,17	Δ Flame at combustor rim
19	20,38	156,96	7,68	4,02	Δ Flame at combustor rim
20	20,38	162,65	7,93	3,88	Δ Flame at combustor rim
21	20,38	168,35	8,18	3,75	Δ Flame at combustor rim
22	20,38	174,05	8,42	3,62	Δ Flame at combustor rim
23	20,38	179,74	8,67	3,51	Δ Flame at combustor rim
24	20,38	185,44	8,92	3,40	Δ Flame at combustor rim
25	20,38	191,13	9,16	3,30	Δ Flame at combustor rim
26	20,38	196,83	9,41	3,20	Δ Flame at combustor rim
27	20,38	202,53	9,66	3,11	Δ Flame at combustor rim
28	20,38	208,22	9,91	3,03	Δ Flame at combustor rim
29	20,38	213,92	10,15	2,95	Δ Flame at combustor rim
30	20,38	219,61	10,40	2,87	Δ Flame at combustor rim
31	20,38	225,31	10,65	2,80	Δ Flame at combustor rim
32	20,38	231,01	10,89	2,73	Δ Flame at combustor rim
33	20,38	236,70	11,14	2,66	Δ Flame at combustor rim
34	20,38	242,40	11,39	2,60	Δ Flame at combustor rim
35	20,38	248,09	11,63	2,54	Δ Flame at combustor rim
36	20,38	253,79	11,88	2,48	Δ Flame at combustor rim
37	20,38	259,49	12,13	2,43	Δ Flame at combustor rim
38	20,38	265,18	12,37	2,38	Δ Flame at combustor rim
39	20,38	270,88	12,62	2,33	Δ Flame at combustor rim
40	20,38	276,57	12,87	2,28	Δ Flame at combustor rim
41	20,38	282,27	13,11	2,23	Δ Flame at combustor rim
42	20,38	287,97	13,36	2,19	Δ Flame at combustor rim
43	20,38	293,66	13,61	2,15	Δ Flame at combustor rim

44	20,38	299,36	13,85	2,11	Δ Flame at combustor rim
45	20,38	305,05	14,10	2,07	Δ Flame at combustor rim
46	20,38	310,75	14,35	2,03	Δ Flame at combustor rim
47	20,38	316,45	14,59	1,99	Δ Flame at combustor rim
48	20,38	322,14	14,84	1,96	Δ Flame at combustor rim
49	20,38	327,84	15,09	1,92	Δ Flame at combustor rim
50	20,38	333,53	15,34	1,89	Δ Flame at combustor rim
51	20,38	339,23	15,58	1,86	Δ Flame at combustor rim
52	20,38	344,93	15,83	1,83	Δ Flame at combustor rim
53	20,38	350,62	16,08	1,80	Δ Flame at combustor rim
54	20,38	356,32	16,32	1,77	Δ Flame at combustor rim
55	20,38	362,01	16,57	1,74	Δ Flame at combustor rim
56	20,38	367,71	16,82	1,71	Δ Flame at combustor rim
57	20,38	373,41	17,06	1,69	Δ Flame at combustor rim
58	20,38	379,10	17,31	1,66	Δ Flame at combustor rim
59	20,38	384,80	17,56	1,64	Δ Flame at combustor rim
60	20,38	390,49	17,80	1,61	Δ Flame at combustor rim
61	20,38	396,19	18,05	1,59	Δ Flame at combustor rim
62	20,38	401,89	18,30	1,57	Δ Flame at combustor rim
63	20,38	407,58	18,54	1,55	Δ Flame at combustor rim
64	20,38	413,28	18,79	1,53	Δ Flame at combustor rim
65	20,38	418,97	19,04	1,51	Δ Flame at combustor rim
66	20,38	424,67	19,28	1,48	Δ Flame at combustor rim
67	20,38	430,37	19,53	1,47	Δ Flame at combustor rim
68	20,38	436,06	19,78	1,45	Δ Flame at combustor rim
69	20,38	441,76	20,02	1,43	Δ Flame at combustor rim
70	20,38	447,45	20,27	1,41	Δ Flame at combustor rim
71	20,38	453,15	20,52	1,39	Δ Flame at combustor rim
72	20,38	458,85	20,76	1,37	Δ Flame at combustor rim
73	20,38	464,54	21,01	1,36	Δ Flame at combustor rim
74	20,38	470,24	21,26	1,34	Δ Flame at combustor rim

75	20,38	475,93	21,51	1,33	Δ Flame at combustor rim
76	20,38	481,63	21,75	1,31	Δ Flame at combustor rim
77	20,38	487,33	22,00	1,29	Δ Flame at combustor rim
78	20,38	493,02	22,25	1,28	Δ Flame at combustor rim
79	20,38	498,72	22,49	1,26	Δ Flame at combustor rim
80	20,38	504,41	22,74	1,25	Δ Flame at combustor rim
81	20,38	510,11	22,99	1,24	□ Flame in combustor
82	20,38	515,81	23,23	1,22	□ Flame in combustor
83	20,38	521,50	23,48	1,21	□ Flame in combustor
84	20,38	527,20	23,73	1,20	□ Flame in combustor
85	20,38	532,89	23,97	1,18	□ Flame in combustor
86	20,38	538,59	24,22	1,17	□ Flame in combustor
87	20,38	544,29	24,47	1,16	□ Flame in combustor
88	20,38	549,98	24,71	1,15	□ Flame in combustor
89	20,38	555,68	24,96	1,13	□ Flame in combustor
90	20,38	561,37	25,21	1,12	□ Flame in combustor
91	20,38	567,07	25,45	1,11	□ Flame in combustor

Tabel 92 Data komposisi bahan bakar dan udara *Combustor* D_{out} 7 mm (Q_{fuel} 20,91 ml/min)

No	Q_{fuel} (ml/min)	Q_{air} (ml/min)	$V_{reaktan}$ (Cm/s)	Ekv Rasio (Φ)	Keterangan
1	20,91	54,43	3,26	11,89	Δ Flame at combustor rim
2	20,91	60,13	3,51	10,76	Δ Flame at combustor rim
3	20,91	65,82	3,76	9,83	Δ Flame at combustor rim
4	20,91	71,52	4,01	9,05	Δ Flame at combustor rim
5	20,91	77,21	4,25	8,38	Δ Flame at combustor rim
6	20,91	82,91	4,50	7,80	Δ Flame at combustor rim
7	20,91	88,61	4,75	7,30	Δ Flame at combustor rim
8	20,91	94,30	4,99	6,86	Δ Flame at combustor rim
9	20,91	100,00	5,24	6,47	Δ Flame at combustor rim

10	20,91	105,69	5,49	6,12	Δ Flame at combustor rim
11	20,91	111,39	5,73	5,81	Δ Flame at combustor rim
12	20,91	117,09	5,98	5,53	Δ Flame at combustor rim
13	20,91	122,78	6,23	5,27	Δ Flame at combustor rim
14	20,91	128,48	6,47	5,04	Δ Flame at combustor rim
15	20,91	134,17	6,72	4,82	Δ Flame at combustor rim
16	20,91	139,87	6,97	4,63	Δ Flame at combustor rim
17	20,91	145,57	7,21	4,45	Δ Flame at combustor rim
18	20,91	151,26	7,46	4,28	Δ Flame at combustor rim
19	20,91	156,96	7,71	4,12	Δ Flame at combustor rim
20	20,91	162,65	7,95	3,98	Δ Flame at combustor rim
21	20,91	168,35	8,20	3,84	Δ Flame at combustor rim
22	20,91	174,05	8,45	3,72	Δ Flame at combustor rim
23	20,91	179,74	8,69	3,60	Δ Flame at combustor rim
24	20,91	185,44	8,94	3,49	Δ Flame at combustor rim
25	20,91	191,13	9,19	3,39	Δ Flame at combustor rim
26	20,91	196,83	9,43	3,29	Δ Flame at combustor rim
27	20,91	202,53	9,68	3,19	Δ Flame at combustor rim
28	20,91	208,22	9,93	3,11	Δ Flame at combustor rim
29	20,91	213,92	10,18	3,02	Δ Flame at combustor rim
30	20,91	219,61	10,42	2,95	Δ Flame at combustor rim
31	20,91	225,31	10,67	2,87	Δ Flame at combustor rim
32	20,91	231,01	10,92	2,80	Δ Flame at combustor rim
33	20,91	236,70	11,16	2,73	Δ Flame at combustor rim
34	20,91	242,40	11,41	2,67	Δ Flame at combustor rim
35	20,91	248,09	11,66	2,61	Δ Flame at combustor rim
36	20,91	253,79	11,90	2,55	Δ Flame at combustor rim
37	20,91	259,49	12,15	2,49	Δ Flame at combustor rim
38	20,91	265,18	12,40	2,44	Δ Flame at combustor rim
39	20,91	270,88	12,64	2,39	Δ Flame at combustor rim
40	20,91	276,57	12,89	2,34	Δ Flame at combustor rim

41	20,91	282,27	13,14	2,29	Δ Flame at combustor rim
42	20,91	287,97	13,38	2,25	Δ Flame at combustor rim
43	20,91	293,66	13,63	2,20	Δ Flame at combustor rim
44	20,91	299,36	13,88	2,16	Δ Flame at combustor rim
45	20,91	305,05	14,12	2,12	Δ Flame at combustor rim
46	20,91	310,75	14,37	2,08	Δ Flame at combustor rim
47	20,91	316,45	14,62	2,04	Δ Flame at combustor rim
48	20,91	322,14	14,86	2,01	Δ Flame at combustor rim
49	20,91	327,84	15,11	1,97	Δ Flame at combustor rim
50	20,91	333,53	15,36	1,94	Δ Flame at combustor rim
51	20,91	339,23	15,60	1,91	Δ Flame at combustor rim
52	20,91	344,93	15,85	1,88	Δ Flame at combustor rim
53	20,91	350,62	16,10	1,85	Δ Flame at combustor rim
54	20,91	356,32	16,35	1,82	Δ Flame at combustor rim
55	20,91	362,01	16,59	1,79	Δ Flame at combustor rim
56	20,91	367,71	16,84	1,76	Δ Flame at combustor rim
57	20,91	373,41	17,09	1,73	Δ Flame at combustor rim
58	20,91	379,10	17,33	1,71	Δ Flame at combustor rim
59	20,91	384,80	17,58	1,68	Δ Flame at combustor rim
60	20,91	390,49	17,83	1,66	Δ Flame at combustor rim
61	20,91	396,19	18,07	1,63	Δ Flame at combustor rim
62	20,91	401,89	18,32	1,61	Δ Flame at combustor rim
63	20,91	407,58	18,57	1,59	Δ Flame at combustor rim
64	20,91	413,28	18,81	1,57	Δ Flame at combustor rim
65	20,91	418,97	19,06	1,54	Δ Flame at combustor rim
66	20,91	424,67	19,31	1,52	Δ Flame at combustor rim
67	20,91	430,37	19,55	1,50	Δ Flame at combustor rim
68	20,91	436,06	19,80	1,48	Δ Flame at combustor rim
69	20,91	441,76	20,05	1,46	Δ Flame at combustor rim
70	20,91	447,45	20,29	1,45	Δ Flame at combustor rim
71	20,91	453,15	20,54	1,43	Δ Flame at combustor rim

72	20,91	458,85	20,79	1,41	Δ Flame at combustor rim
73	20,91	464,54	21,03	1,39	Δ Flame at combustor rim
74	20,91	470,24	21,28	1,38	Δ Flame at combustor rim
75	20,91	475,93	21,53	1,36	Δ Flame at combustor rim
76	20,91	481,63	21,77	1,34	Δ Flame at combustor rim
77	20,91	487,33	22,02	1,33	Δ Flame at combustor rim
78	20,91	493,02	22,27	1,31	Δ Flame at combustor rim
79	20,91	498,72	22,52	1,30	Δ Flame at combustor rim
80	20,91	504,41	22,76	1,28	Δ Flame at combustor rim
81	20,91	510,11	23,01	1,27	Δ Flame at combustor rim
82	20,91	515,81	23,26	1,25	Δ Flame at combustor rim
83	20,91	521,50	23,50	1,24	Δ Flame at combustor rim
84	20,91	527,20	23,75	1,23	Δ Flame at combustor rim
85	20,91	532,89	24,00	1,21	◊ Osilating flame
86	20,91	538,59	24,24	1,20	◊ Osilating flame
87	20,91	544,29	24,49	1,19	◊ Osilating flame
88	20,91	549,98	24,74	1,18	◊ Osilating flame
89	20,91	555,68	24,98	1,16	◊ Osilating flame
90	20,91	561,37	25,23	1,15	◊ Osilating flame
91	20,91	567,07	25,48	1,14	□ Flame in combustor

Tabel 93 Data komposisi bahan bakar dan udara *Combustor* D_{out} 7 mm (Q_{fuel} 21,45 ml/min)

No	Q_{fuel} (ml/min)	Q_{air} (ml/min)	$V_{reaktan}$ (Cm/s)	Ekv Rasio (Φ)	Keterangan
1	21,45	54,43	3,29	12,19	Δ Flame at combustor rim
2	21,45	60,13	3,53	11,04	Δ Flame at combustor rim
3	21,45	65,82	3,78	10,08	Δ Flame at combustor rim
4	21,45	71,52	4,03	9,28	Δ Flame at combustor rim
5	21,45	77,21	4,27	8,59	Δ Flame at combustor rim
6	21,45	82,91	4,52	8,00	Δ Flame at combustor rim

7	21,45	88,61	4,77	7,49	Δ Flame at combustor rim
8	21,45	94,30	5,02	7,04	Δ Flame at combustor rim
9	21,45	100,00	5,26	6,64	Δ Flame at combustor rim
10	21,45	105,69	5,51	6,28	Δ Flame at combustor rim
11	21,45	111,39	5,76	5,96	Δ Flame at combustor rim
12	21,45	117,09	6,00	5,67	Δ Flame at combustor rim
13	21,45	122,78	6,25	5,40	Δ Flame at combustor rim
14	21,45	128,48	6,50	5,16	Δ Flame at combustor rim
15	21,45	134,17	6,74	4,95	Δ Flame at combustor rim
16	21,45	139,87	6,99	4,74	Δ Flame at combustor rim
17	21,45	145,57	7,24	4,56	Δ Flame at combustor rim
18	21,45	151,26	7,48	4,39	Δ Flame at combustor rim
19	21,45	156,96	7,73	4,23	Δ Flame at combustor rim
20	21,45	162,65	7,98	4,08	Δ Flame at combustor rim
21	21,45	168,35	8,22	3,94	Δ Flame at combustor rim
22	21,45	174,05	8,47	3,81	Δ Flame at combustor rim
23	21,45	179,74	8,72	3,69	Δ Flame at combustor rim
24	21,45	185,44	8,96	3,58	Δ Flame at combustor rim
25	21,45	191,13	9,21	3,47	Δ Flame at combustor rim
26	21,45	196,83	9,46	3,37	Δ Flame at combustor rim
27	21,45	202,53	9,70	3,28	Δ Flame at combustor rim
28	21,45	208,22	9,95	3,19	Δ Flame at combustor rim
29	21,45	213,92	10,20	3,10	Δ Flame at combustor rim
30	21,45	219,61	10,45	3,02	Δ Flame at combustor rim
31	21,45	225,31	10,69	2,94	Δ Flame at combustor rim
32	21,45	231,01	10,94	2,87	Δ Flame at combustor rim
33	21,45	236,70	11,19	2,80	Δ Flame at combustor rim
34	21,45	242,40	11,43	2,74	Δ Flame at combustor rim
35	21,45	248,09	11,68	2,67	Δ Flame at combustor rim
36	21,45	253,79	11,93	2,61	Δ Flame at combustor rim
37	21,45	259,49	12,17	2,56	Δ Flame at combustor rim

38	21,45	265,18	12,42	2,50	Δ Flame at combustor rim
39	21,45	270,88	12,67	2,45	Δ Flame at combustor rim
40	21,45	276,57	12,91	2,40	Δ Flame at combustor rim
41	21,45	282,27	13,16	2,35	Δ Flame at combustor rim
42	21,45	287,97	13,41	2,30	Δ Flame at combustor rim
43	21,45	293,66	13,65	2,26	Δ Flame at combustor rim
44	21,45	299,36	13,90	2,22	Δ Flame at combustor rim
45	21,45	305,05	14,15	2,18	Δ Flame at combustor rim
46	21,45	310,75	14,39	2,14	Δ Flame at combustor rim
47	21,45	316,45	14,64	2,10	Δ Flame at combustor rim
48	21,45	322,14	14,89	2,06	Δ Flame at combustor rim
49	21,45	327,84	15,13	2,02	Δ Flame at combustor rim
50	21,45	333,53	15,38	1,99	Δ Flame at combustor rim
51	21,45	339,23	15,63	1,96	Δ Flame at combustor rim
52	21,45	344,93	15,87	1,92	Δ Flame at combustor rim
53	21,45	350,62	16,12	1,89	Δ Flame at combustor rim
54	21,45	356,32	16,37	1,86	Δ Flame at combustor rim
55	21,45	362,01	16,62	1,83	Δ Flame at combustor rim
56	21,45	367,71	16,86	1,80	Δ Flame at combustor rim
57	21,45	373,41	17,11	1,78	Δ Flame at combustor rim
58	21,45	379,10	17,36	1,75	Δ Flame at combustor rim
59	21,45	384,80	17,60	1,72	Δ Flame at combustor rim
60	21,45	390,49	17,85	1,70	Δ Flame at combustor rim
61	21,45	396,19	18,10	1,67	Δ Flame at combustor rim
62	21,45	401,89	18,34	1,65	Δ Flame at combustor rim
63	21,45	407,58	18,59	1,63	Δ Flame at combustor rim
64	21,45	413,28	18,84	1,61	Δ Flame at combustor rim
65	21,45	418,97	19,08	1,58	Δ Flame at combustor rim
66	21,45	424,67	19,33	1,56	Δ Flame at combustor rim
67	21,45	430,37	19,58	1,54	Δ Flame at combustor rim
68	21,45	436,06	19,82	1,52	Δ Flame at combustor rim

69	21,45	441,76	20,07	1,50	Δ Flame at combustor rim
70	21,45	447,45	20,32	1,48	Δ Flame at combustor rim
71	21,45	453,15	20,56	1,46	Δ Flame at combustor rim
72	21,45	458,85	20,81	1,45	Δ Flame at combustor rim
73	21,45	464,54	21,06	1,43	Δ Flame at combustor rim
74	21,45	470,24	21,30	1,41	Δ Flame at combustor rim
75	21,45	475,93	21,55	1,39	Δ Flame at combustor rim
76	21,45	481,63	21,80	1,38	Δ Flame at combustor rim
77	21,45	487,33	22,04	1,36	Δ Flame at combustor rim
78	21,45	493,02	22,29	1,35	Δ Flame at combustor rim
79	21,45	498,72	22,54	1,33	Δ Flame at combustor rim
80	21,45	504,41	22,79	1,32	Δ Flame at combustor rim
81	21,45	510,11	23,03	1,30	Δ Flame at combustor rim
82	21,45	515,81	23,28	1,29	Δ Flame at combustor rim
83	21,45	521,50	23,53	1,27	Δ Flame at combustor rim
84	21,45	527,20	23,77	1,26	Δ Flame at combustor rim
85	21,45	532,89	24,02	1,25	Δ Flame at combustor rim
86	21,45	538,59	24,27	1,23	Δ Flame at combustor rim
87	21,45	544,29	24,51	1,22	Δ Flame at combustor rim
88	21,45	549,98	24,76	1,21	Δ Flame at combustor rim
89	21,45	555,68	25,01	1,19	◊ Osilating flame
90	21,45	561,37	25,25	1,18	◊ Osilating flame
91	21,45	567,07	25,50	1,17	◊ Osilating flame

Tabel 94 Data komposisi bahan bakar dan udara *Combustor* D_{out} 7 mm (Q_{fuel} 21,98 ml/min)

No	Q_{fuel} (ml/min)	Q_{air} (ml/min)	$V_{reaktan}$ (Cm/s)	Ekv Rasio (Φ)	Keterangan
1	21,98	54,43	3,31	12,49	Δ Flame at combustor rim
2	21,98	60,13	3,56	11,31	Δ Flame at combustor rim
3	21,98	65,82	3,80	10,33	Δ Flame at combustor rim

4	21,98	71,52	4,05	9,51	Δ Flame at combustor rim
5	21,98	77,21	4,30	8,81	Δ Flame at combustor rim
6	21,98	82,91	4,54	8,20	Δ Flame at combustor rim
7	21,98	88,61	4,79	7,67	Δ Flame at combustor rim
8	21,98	94,30	5,04	7,21	Δ Flame at combustor rim
9	21,98	100,00	5,29	6,80	Δ Flame at combustor rim
10	21,98	105,69	5,53	6,43	Δ Flame at combustor rim
11	21,98	111,39	5,78	6,10	Δ Flame at combustor rim
12	21,98	117,09	6,03	5,81	Δ Flame at combustor rim
13	21,98	122,78	6,27	5,54	Δ Flame at combustor rim
14	21,98	128,48	6,52	5,29	Δ Flame at combustor rim
15	21,98	134,17	6,77	5,07	Δ Flame at combustor rim
16	21,98	139,87	7,01	4,86	Δ Flame at combustor rim
17	21,98	145,57	7,26	4,67	Δ Flame at combustor rim
18	21,98	151,26	7,51	4,50	Δ Flame at combustor rim
19	21,98	156,96	7,75	4,33	Δ Flame at combustor rim
20	21,98	162,65	8,00	4,18	Δ Flame at combustor rim
21	21,98	168,35	8,25	4,04	Δ Flame at combustor rim
22	21,98	174,05	8,49	3,91	Δ Flame at combustor rim
23	21,98	179,74	8,74	3,78	Δ Flame at combustor rim
24	21,98	185,44	8,99	3,67	Δ Flame at combustor rim
25	21,98	191,13	9,23	3,56	Δ Flame at combustor rim
26	21,98	196,83	9,48	3,45	Δ Flame at combustor rim
27	21,98	202,53	9,73	3,36	Δ Flame at combustor rim
28	21,98	208,22	9,97	3,27	Δ Flame at combustor rim
29	21,98	213,92	10,22	3,18	Δ Flame at combustor rim
30	21,98	219,61	10,47	3,10	Δ Flame at combustor rim
31	21,98	225,31	10,71	3,02	Δ Flame at combustor rim
32	21,98	231,01	10,96	2,94	Δ Flame at combustor rim
33	21,98	236,70	11,21	2,87	Δ Flame at combustor rim
34	21,98	242,40	11,46	2,81	Δ Flame at combustor rim

35	21,98	248,09	11,70	2,74	Δ Flame at combustor rim
36	21,98	253,79	11,95	2,68	Δ Flame at combustor rim
37	21,98	259,49	12,20	2,62	Δ Flame at combustor rim
38	21,98	265,18	12,44	2,56	Δ Flame at combustor rim
39	21,98	270,88	12,69	2,51	Δ Flame at combustor rim
40	21,98	276,57	12,94	2,46	Δ Flame at combustor rim
41	21,98	282,27	13,18	2,41	Δ Flame at combustor rim
42	21,98	287,97	13,43	2,36	Δ Flame at combustor rim
43	21,98	293,66	13,68	2,32	Δ Flame at combustor rim
44	21,98	299,36	13,92	2,27	Δ Flame at combustor rim
45	21,98	305,05	14,17	2,23	Δ Flame at combustor rim
46	21,98	310,75	14,42	2,19	Δ Flame at combustor rim
47	21,98	316,45	14,66	2,15	Δ Flame at combustor rim
48	21,98	322,14	14,91	2,11	Δ Flame at combustor rim
49	21,98	327,84	15,16	2,07	Δ Flame at combustor rim
50	21,98	333,53	15,40	2,04	Δ Flame at combustor rim
51	21,98	339,23	15,65	2,00	Δ Flame at combustor rim
52	21,98	344,93	15,90	1,97	Δ Flame at combustor rim
53	21,98	350,62	16,14	1,94	Δ Flame at combustor rim
54	21,98	356,32	16,39	1,91	Δ Flame at combustor rim
55	21,98	362,01	16,64	1,88	Δ Flame at combustor rim
56	21,98	367,71	16,88	1,85	Δ Flame at combustor rim
57	21,98	373,41	17,13	1,82	Δ Flame at combustor rim
58	21,98	379,10	17,38	1,79	Δ Flame at combustor rim
59	21,98	384,80	17,63	1,77	Δ Flame at combustor rim
60	21,98	390,49	17,87	1,74	Δ Flame at combustor rim
61	21,98	396,19	18,12	1,72	Δ Flame at combustor rim
62	21,98	401,89	18,37	1,69	Δ Flame at combustor rim
63	21,98	407,58	18,61	1,67	Δ Flame at combustor rim
64	21,98	413,28	18,86	1,65	Δ Flame at combustor rim
65	21,98	418,97	19,11	1,62	Δ Flame at combustor rim

66	21,98	424,67	19,35	1,60	Δ Flame at combustor rim
67	21,98	430,37	19,60	1,58	Δ Flame at combustor rim
68	21,98	436,06	19,85	1,56	Δ Flame at combustor rim
69	21,98	441,76	20,09	1,54	Δ Flame at combustor rim
70	21,98	447,45	20,34	1,52	Δ Flame at combustor rim
71	21,98	453,15	20,59	1,50	Δ Flame at combustor rim
72	21,98	458,85	20,83	1,48	Δ Flame at combustor rim
73	21,98	464,54	21,08	1,46	Δ Flame at combustor rim
74	21,98	470,24	21,33	1,45	Δ Flame at combustor rim
75	21,98	475,93	21,57	1,43	Δ Flame at combustor rim
76	21,98	481,63	21,82	1,41	Δ Flame at combustor rim
77	21,98	487,33	22,07	1,40	Δ Flame at combustor rim
78	21,98	493,02	22,31	1,38	Δ Flame at combustor rim
79	21,98	498,72	22,56	1,36	Δ Flame at combustor rim
80	21,98	504,41	22,81	1,35	Δ Flame at combustor rim
81	21,98	510,11	23,06	1,33	Δ Flame at combustor rim
82	21,98	515,81	23,30	1,32	Δ Flame at combustor rim
83	21,98	521,50	23,55	1,30	Δ Flame at combustor rim
84	21,98	527,20	23,80	1,29	Δ Flame at combustor rim
85	21,98	532,89	24,04	1,28	Δ Flame at combustor rim
86	21,98	538,59	24,29	1,26	Δ Flame at combustor rim
87	21,98	544,29	24,54	1,25	Δ Flame at combustor rim
88	21,98	549,98	24,78	1,24	Δ Flame at combustor rim
89	21,98	555,68	25,03	1,22	Δ Flame at combustor rim
90	21,98	561,37	25,28	1,21	◊ Osilating flame
91	21,98	567,07	25,52	1,20	◊ Osilating flame

Tabel 95 Data komposisi bahan bakar dan udara *Combustor* D_{out} 7 mm (Q_{fuel} 22,51 ml/min)

No	Q_{fuel} (ml/min)	Q_{air} (ml/min)	$V_{reaktan}$ (Cm/s)	Ekv Rasio (Φ)	Keterangan
1	22,51	54,43	3,33	12,79	Δ Flame at combustor rim
2	22,51	60,13	3,58	11,58	Δ Flame at combustor rim
3	22,51	65,82	3,83	10,58	Δ Flame at combustor rim
4	22,51	71,52	4,07	9,74	Δ Flame at combustor rim
5	22,51	77,21	4,32	9,02	Δ Flame at combustor rim
6	22,51	82,91	4,57	8,40	Δ Flame at combustor rim
7	22,51	88,61	4,81	7,86	Δ Flame at combustor rim
8	22,51	94,30	5,06	7,39	Δ Flame at combustor rim
9	22,51	100,00	5,31	6,96	Δ Flame at combustor rim
10	22,51	105,69	5,56	6,59	Δ Flame at combustor rim
11	22,51	111,39	5,80	6,25	Δ Flame at combustor rim
12	22,51	117,09	6,05	5,95	Δ Flame at combustor rim
13	22,51	122,78	6,30	5,67	Δ Flame at combustor rim
14	22,51	128,48	6,54	5,42	Δ Flame at combustor rim
15	22,51	134,17	6,79	5,19	Δ Flame at combustor rim
16	22,51	139,87	7,04	4,98	Δ Flame at combustor rim
17	22,51	145,57	7,28	4,78	Δ Flame at combustor rim
18	22,51	151,26	7,53	4,60	Δ Flame at combustor rim
19	22,51	156,96	7,78	4,44	Δ Flame at combustor rim
20	22,51	162,65	8,02	4,28	Δ Flame at combustor rim
21	22,51	168,35	8,27	4,14	Δ Flame at combustor rim
22	22,51	174,05	8,52	4,00	Δ Flame at combustor rim
23	22,51	179,74	8,76	3,87	Δ Flame at combustor rim
24	22,51	185,44	9,01	3,76	Δ Flame at combustor rim
25	22,51	191,13	9,26	3,64	Δ Flame at combustor rim
26	22,51	196,83	9,50	3,54	Δ Flame at combustor rim
27	22,51	202,53	9,75	3,44	Δ Flame at combustor rim

28	22,51	208,22	10,00	3,34	Δ Flame at combustor rim
29	22,51	213,92	10,24	3,26	Δ Flame at combustor rim
30	22,51	219,61	10,49	3,17	Δ Flame at combustor rim
31	22,51	225,31	10,74	3,09	Δ Flame at combustor rim
32	22,51	231,01	10,98	3,01	Δ Flame at combustor rim
33	22,51	236,70	11,23	2,94	Δ Flame at combustor rim
34	22,51	242,40	11,48	2,87	Δ Flame at combustor rim
35	22,51	248,09	11,73	2,81	Δ Flame at combustor rim
36	22,51	253,79	11,97	2,74	Δ Flame at combustor rim
37	22,51	259,49	12,22	2,68	Δ Flame at combustor rim
38	22,51	265,18	12,47	2,63	Δ Flame at combustor rim
39	22,51	270,88	12,71	2,57	Δ Flame at combustor rim
40	22,51	276,57	12,96	2,52	Δ Flame at combustor rim
41	22,51	282,27	13,21	2,47	Δ Flame at combustor rim
42	22,51	287,97	13,45	2,42	Δ Flame at combustor rim
43	22,51	293,66	13,70	2,37	Δ Flame at combustor rim
44	22,51	299,36	13,95	2,33	Δ Flame at combustor rim
45	22,51	305,05	14,19	2,28	Δ Flame at combustor rim
46	22,51	310,75	14,44	2,24	Δ Flame at combustor rim
47	22,51	316,45	14,69	2,20	Δ Flame at combustor rim
48	22,51	322,14	14,93	2,16	Δ Flame at combustor rim
49	22,51	327,84	15,18	2,12	Δ Flame at combustor rim
50	22,51	333,53	15,43	2,09	Δ Flame at combustor rim
51	22,51	339,23	15,67	2,05	Δ Flame at combustor rim
52	22,51	344,93	15,92	2,02	Δ Flame at combustor rim
53	22,51	350,62	16,17	1,99	Δ Flame at combustor rim
54	22,51	356,32	16,41	1,95	Δ Flame at combustor rim
55	22,51	362,01	16,66	1,92	Δ Flame at combustor rim
56	22,51	367,71	16,91	1,89	Δ Flame at combustor rim
57	22,51	373,41	17,15	1,87	Δ Flame at combustor rim
58	22,51	379,10	17,40	1,84	Δ Flame at combustor rim

59	22,51	384,80	17,65	1,81	Δ Flame at combustor rim
60	22,51	390,49	17,90	1,78	Δ Flame at combustor rim
61	22,51	396,19	18,14	1,76	Δ Flame at combustor rim
62	22,51	401,89	18,39	1,73	Δ Flame at combustor rim
63	22,51	407,58	18,64	1,71	Δ Flame at combustor rim
64	22,51	413,28	18,88	1,69	Δ Flame at combustor rim
65	22,51	418,97	19,13	1,66	Δ Flame at combustor rim
66	22,51	424,67	19,38	1,64	Δ Flame at combustor rim
67	22,51	430,37	19,62	1,62	Δ Flame at combustor rim
68	22,51	436,06	19,87	1,60	Δ Flame at combustor rim
69	22,51	441,76	20,12	1,58	Δ Flame at combustor rim
70	22,51	447,45	20,36	1,56	Δ Flame at combustor rim
71	22,51	453,15	20,61	1,54	Δ Flame at combustor rim
72	22,51	458,85	20,86	1,52	Δ Flame at combustor rim
73	22,51	464,54	21,10	1,50	Δ Flame at combustor rim
74	22,51	470,24	21,35	1,48	Δ Flame at combustor rim
75	22,51	475,93	21,60	1,46	Δ Flame at combustor rim
76	22,51	481,63	21,84	1,45	Δ Flame at combustor rim
77	22,51	487,33	22,09	1,43	Δ Flame at combustor rim
78	22,51	493,02	22,34	1,41	Δ Flame at combustor rim
79	22,51	498,72	22,58	1,40	Δ Flame at combustor rim
80	22,51	504,41	22,83	1,38	Δ Flame at combustor rim
81	22,51	510,11	23,08	1,37	Δ Flame at combustor rim
82	22,51	515,81	23,32	1,35	Δ Flame at combustor rim
83	22,51	521,50	23,57	1,34	Δ Flame at combustor rim
84	22,51	527,20	23,82	1,32	Δ Flame at combustor rim
85	22,51	532,89	24,07	1,31	Δ Flame at combustor rim
86	22,51	538,59	24,31	1,29	Δ Flame at combustor rim
87	22,51	544,29	24,56	1,28	Δ Flame at combustor rim
88	22,51	549,98	24,81	1,27	Δ Flame at combustor rim
89	22,51	555,68	25,05	1,25	Δ Flame at combustor rim

90	22,51	561,37	25,30	1,24	Δ Flame at combustor rim
91	22,51	567,07	25,55	1,23	Δ Flame at combustor rim