

# International Journal of Science, Engineering and Technology Research

ISSN: 2278-7798(Online)

[Home](#)

[Archives](#)

[Call for Papers](#)

[Author Guidelines](#)

[Editorial Board](#)

[Scope](#)

[Publication Fee](#)

[Contact Us](#)



**setr@gmail.com,editor@ijsetr.org**

International Journal of Science, Engineering and Technology Research (IJSETR) is a Scholarly scientific e-journal that publishes original research papers in the field of Science, Technology and Literature. It aims to contribute to the world of research by publishing peer reviewed research and review articles, experimental studies, letter to the editors, book reviews as well as news of engineering, literature, science fields. The Journal welcomes the submission of manuscripts that meet the criteria of significance and scientific excellence. The Journal covers all essential branches of Engineering, Science, Technology & Literature, Management, Economics & Commerce.

**IJSETR** aims are to publish high-quality papers with a specific focus on learning within their specified focus that are accessible and of interest to educators, researchers and academicians. The journal invites authors to submit original and unpublished work that communicates current research on Engineering, Science, Technology & Literature, Management, Economics & Commerce. Original works are invited in form of research paper/ manuscript. Manuscripts should follow the style of the journal and are subject to both review and editing.

Authors are invited to submit papers through E-mail at **ijsetr@gmail.com**

Submissions must be original and should not have been published previously or be under consideration for publication while being evaluated for this journal. Authors note that paper cannot be withdrawn at any condition once it is accepted. The Team of **IJSETR** advise you, do not submit same article to the multiple journals simultaneously. This may create a problem for you. Please wait for review report which will take maximum 5 to 10 days. Paper must be in **IJSETR** Template format.

Publication Date of Volume 6 Issue 4: **30th April 2017.**

Last Date for Submission of Manuscript for Volume 6 Issue 5: **30th April 2017.**

E-mail: **ijsetr@gmail.com,editor@ijsetr.org**

Website: **www.ijsetr.org**

With Warm Regards,  
Editor-in-chief

*Announcement*

CALL FOR PAPERS VOLUME 6, ISSUE 5, May-2017

Activate Windows  
Go to Settings to activate Windows.

*Indexing*

• Rectangular

bing

Google Custom Search

Activate W  
Go to Settings

# International Journal of Science, Engineering and Technology Research

ISSN: 2278-7798(Online)

[Home](#) [Archives](#) [Call for Papers](#) [Author Guidelines](#) [Editorial Board](#) [Scope](#) [Publication Fee](#) [Contact Us](#)



## Volume 6 Issue 3 March 2017

S.No.	Title and Authors of Paper	Page.No.
01	Large eddy simulation of an oblique vortex ring impinging on a flat wall Heng Ren	285-287
02	Enhancement of Transient Stability with Unified Power Flow Controller-UPFC Poonam G Umap, Assist. Prof Prashant P Jagtap	288-292
03	Research Trends in Area Optimized FIR filter Implementation on FPGA Sejal D. Patel, Prof. M.C. Patel	293-296
04	Research Trends in Fault Detection and Analysis of Three Phase Induction Machine Tejas K. Rathod, Prof. V.P. Patel	297-300
05	Micro-strip line feed 'I' shaped slot Antenna with finite slotted ground plane for Return Loss enhancement Poonam Rajput, Prof. Prateek Wankhade	301-305
06	Analysis of Mustard crop with the help of Remote Sensing in Jhajjar District (Haryana) India Jitin Pal, Manjit Singh, Satyawar	306-308
07	Solving Intuitionistic Fuzzy Linear Programming Problem Based on Ranking Function G.Sudha, K. Kavithanjali	309-312
08	Review paper on MPA for Wireless Communication Systems Hariom Meena, Prof. Prateek Wankhade	313-316
09	Review On Human-Machine Interface based on EOG Ms Swati Palheriya, Dr.S.S.Dorle, Prof.R.S.Agrawal	317-319
10	A NEW HIGH EFFICIENCY HIGH POWER FACTOR INTERLEAVED THREE-PHASE SINGLE-STAGE AC-DC CONVERTER WITH FLYING CAPACITOR G. Deekshath, Dr. G.V.Marutheswar	320-327
11	Dependability analysis of inventory management in construction project based on joint inventory management model ZHAO Huifang	328-332

### Announcement

CALL FOR PAPERS VOLUME 6, ISSUE 5, May-2017

### Indexing

Activate Windows  
Go to Settings to activate

bing

Google Custom Search

Activate Windows  
Go to Settings

12	A Review on Improving the Efficiency of the Network Attack Detection Using Global Inspector Adarsh D. Mamidpelliwar, Prof S. Kumbhalkar, Prof S. Kuntawar	333-335
13	Securing Software-Defined Networks using OpenFlow Protocol (SSNOP) Ancy Julius, Hamil Stanly, Archa A.T.	336-338
14	HYDRAULIC PUMP BASED CENTER STAND FOR PARKING MOTORCYCLE Manjunath G. Kallur	339-342
15	THE ANALYSIS OF TYPES EVAPORATOR WITH REFRIGERANT LPG AGAINST THE PERFORMA ENGINE REFRIGERATOR Digdo Listyadi, Alif Puspita Ningrum	343-348
16	Protected Replica Placement Scheme to Improve Data Availability in Cloud Data Center VS.Selva Siva Santhiya, Mr. D. Vijayakumar	349-355
17	Accident Detection System Using Piezo Disk Sensor Rohit Ganiga, Rohit Maurya, Archana Nanade	356-360
18	g-mi-closed sets in Supra Topological space N Nagamani, V. Thiripurasundari	361-366
19	Kinetic and Equilibrium Studies on Lead (II) Ion Removal from Aqueous Solution Using Succinic Acid Modified Red Onion Skin Extract Millicent U. Ibezim-Ezeani, Ikodiya Orji	367-374
20	One bit Full adder design in Sub threshold region with low Power Delay Product (PDP) G. A. Arunkumar, K. Parvateesam	375-378
21	SYMMETRIC BI-DERIVATION ON MULTIPLICATIVE HYPERRING K.Krishna Lakshmi, S. Murugesan	379-383
22	DURABILITY OF GLASS FIBER REINFORCED PLASTIC BARS BY STATIC STRUCTURAL ANALYSIS Kadium Ramakrishna, S. Rajasekhar, A.V. Sridhar	384-392
23	Design & Implementation of Soil Analyzer by means of Internet of Things Prachi Shrama, Dr. D.V Padole	393-395
24	Disease Detection in Pomegranate Leaf Using Image Processing Technique Sowmya GM, Chandan V, Sampath Kini	396-400

25	Tomograph Based Concept Detection of Video Data by means of Particle Swarm Optimization Priyanka Lall, Prof. Swati Sorte	401-403
26	Emotion Recognition in Speech by MFCC and SVM Akhilesh Watile, Vilas Alagdeve, Swapnil Jain	404-407
27	LPG Gas Auto Booking By GSM and Leakage Detection with Auto Switchable Exhaust Fan Badri Narayan Mohapatra, Aishwarya Dash, Dhiraj Kumar Chaubey	408-411
28	Multiparty Privacy Management and Cluster Analysis in Social media (MPMC) Sreekutty J.S., Hamil Stanly, Archa A.T.	412-415
29	Application Checker System Anish Kale	416-419
30	$\mu$ -Closed Sets in Supra Topological Spaces G.Saroja, V.Thiripurasundari	420-424
31	Experimental Analysis of Cotton Seed oil Biodiesel in a Compression Ignition Engine Allen Jeffrey.J,Kiran Kumar.S,Antonymishanthraj.R,Arivoli.N,Balakrishnan.P	425-429
32	Experimental Investigation on R 290 and R 600a In a Vapor Compression Refrigeration Barathiraja.K, Allen Jeffrey.J, Attin kishore.R, Brito Raj.S, Ashwath Raj.A, Jayakumar.S	430-434
33	Developing the Optical Instrumentation for Micro-Raman Spectroscopy(DOIMS) Jency Julius	435-437
34	FABRICATION OF KIDS BIKE A. Harikrishna,Dr.K.Rajagopal,Dr.V.S.S. Murty,Dr.D.Ravikanth	438-447
35	DESIGN OF A GO KART VEHICLE Dr.D.Ravikanth,Dr.K.Rajagopal,Dr.V.S.S. Murty,A. Harikrishna	448-456
36	A study based on Performance Analysis of Energy efficient cross layer Load Balancing in Tactical Multi-gateway Wireless Sensor Network Mohammad Sarfaraz Munawwar, Prof. Vijay Roy, Prof. Sunil Kuntawar	457-460

# International Journal of Science, Engineering and Technology Research

ISSN: 2278-7798(Online)

[Home](#)

[Archives](#)

[Call for Papers](#)

[Author Guidelines](#)

[Editorial Board](#)

[Scope](#)

[Publication Fee](#)

[Contact Us](#)



1. Dr. Ahmed Nabih Zaki Rashed, Menoufia University, Egypt
2. Dr. R. N. Patel, Shri Shankaracharya Group of Institutions, Bhilai, India
3. Dr. Neetu Srivastava, Assistant Professor Department of Mathematics -Amrita Vishwa Vidyapeetham Bangalore, India
4. Dr. Haritha Dasari, Professor SRK INSTITUTE OF TECHNOLOGY VIJAYAWADA, India
5. Dr. Hazem El-Gendy, Ahram Canadian University, Egypt
6. Dr. Krishan Kumar Saluja, Punjab Institute of Technology, Kapurthala, India
7. Dr. U. Balakrishna, Sreenivasa Institute of Technology and Management Studies, Chittoor, A. P., India
8. Dr. Rajesh S Prasad, Vishwakarma Institute of Information Technology, Pune, Maharashtra, India

9. Dr.S.R.BOSELIN PRABHUM.E., Ph.D,FUAMAE, FISECE, FUAAMP, FISQEM, FUACEE,SVS College of Engineering, Coimbatore
- 10.Dr. Snehangsu Sinha BVSc, MVSc (Anatomy), NET, FIARA, FISROSET, FSAB, FAELS, FSOE,MIAVA, MISACP,College of Veterinary Science, AAU
11. Prof. Puttegowda Devegowda, ATME College of Engineering, Mysore, India
12. Prof. Amit Karbhari Mogal, MVP Samaja's CMCS College, Gangapur Road, Nashik-13, India
13. Prof. SARUCHI KUKKAR, LOVELY PROFESSIONAL UNIVERSITY, India
14. Prof. ALEEM ALI, JAMIA MILLIA ISLAMIA, India
15. Prof. Govind N Sarage, HOD Computer Science, National Defence Academy, India
16. Prof Varadala Sridhar, Assistant professor,Electronics and Communication Engineering, vidya jyothi institute of technology,c.b.post,aziz nagar, India
17. Prof. Krishnamoorthy Palani, Anna university, India
18. Prof. MALLAVOLU MALLESWARARAO,B.Tech(EEE), M.Tech (PS), MIAENG, MISRD, MIACSIT,MISIE, MIACSE.Department of Electrical & Electronics Engineering, RISE Prakasam Group of institutions, Ongole (A.P), India
19. Prof. N.BALAKUMAR M.E., FUAMAE, AMUAAMP, MISEIS, AMUACEE, MPASS.,Assistant Professor, Tamilnadu College of Engineering , Karumathampatti, Coimbatore-641659
- 20.BABITA BHATIA, Mumbai University India

## Announcement

For online Payment, click here

## Indexing



Google Custom Search



This work is licensed under a Creative Commons Attribution 3.0 Unported License.

Activate V  
Go to Setting

## THE ANALYSIS OF TYPES EVAPORATOR WITH REFRIGERANT LPG AGAINST THE PERFORMA ENGINE REFRIGERATOR

Digdo Listyadi<sup>1</sup>, Alif Puspita Ningrum<sup>2</sup>

<sup>1,2</sup> The Department of Mechanical Engineering, The Faculty of Engineering, University of Jember Indonesia

**ABSTRACT** - Refrigeration system is a system working for cooling temperature some goods or room with absorbs the heat. Refrigeration process is very important for store a food and beverage so will be able to keep up in certain time, refrigerator development has achieve characteristic improvement about non-ODP (Ozone Depleting Potential) and non-GWP (Global Warming Potential) refrigerant as well as alternative refrigerant until now. The purpose of this research is to know about effect from variation evaporator type using LPG refrigerant against refrigerator performance. Experimental method did for the direct test to analyzed how much effect from variation evaporator type that are used in (series one space, series two space, parallel one space, and parallel two space) using C plate evaporator and compressor ¼ pk. This research are do it by installing an evaporator in each unit of refrigerator chamber top part and refrigerator chamber bottom part that arranged by series and parallel which is in each chamber have a breaker or without breaker. The result from the research variation of evaporator type for refrigerator is to know how much the effect of refrigeration, compression working, refrigeration capacity, and Coefficient of Performance (COP). The lowest temperature is shown from evaporator type series one space, that have a value -21,2 °C. The lowest interval from both of chamber type is shown from evaporator type parallel two space, that have a value 3,64° C. Coefficient of Performance (COP) from series type is 9,06 for one space and 9,01 for two space, then from parallel type is 10,59 for one space and 13,43 for two space. Based from research the acquired result that is from using evaporator series type and parallel type is could be used for cooling down several room in refrigerator.

Keywords: Refrigerator, type evaporator, LPG refrigerant.

### I. Introduction

Engine cooling system works by pulling or absorb heat from the substance or the room resulting in a change of air temperature in a material or a room to a lower temperature than the temperature of the surrounding environment. The cooling system is strongly influenced by the performance of the engine coolant. Engine cooling

is one of the machines are used for preserving food or drink without changing the flavor and taste [1].

The three main things that influence the development of technology in the field of refrigeration is about how the energy savings, the use of refrigerant non-ODP (Ozone Depleting Potential), and the refrigerant non-GWP (Global Warming Potential). Scientists and researchers have attempted to innovate to answer these three needs to develop refrigeration technology with improved achievement and characteristics of existing refrigeration machine, research to produce non-ODS refrigerants and non-GWP, and the search for alternative refrigeration technologies [2].

One of the study of vapor compression cooling machine by using LPG as a refrigerant indicate that the engine cooling with refrigerant LPG can cool the room faster than the cooling machine using refrigerant R-12. The coefficient of achievement (COP) generated by the engine cooling with refrigerant these LPG refrigerant mass of 80 grams is 6.30 [3].

LPG (Liquified Petroleum Gas) is one example of a hydrocarbon gas that can be used as a refrigerant. LPG is liquefied natural gas from the processing of petroleum products which functioned as a fuel for stoves in households. PT. Pertamina, Indonesia's oil company, has memproduksi memasarkan gas and LPG as fuel is cheap in Indonesia. Kandaungan Gas LPG circulating widely in the community containing 50% propane and 50% butane, in accordance with the provisions of the aspects of the composition or the vapor pressure. The provision is calculated in accordance calories or burn the necessary power for the needs of the community. The composition is not intended to harm consumers but taking account of consumer safety LPG gas users.

Research to generate coefficients achievement better engine cooling has been done using a system of two evaporator and two

compressors. Research carried out by using two evaporator and two compressor results in improved efficiency of as much as 3,5% of its original efficiency. The efficiency value obtained showed that the variation of the superior when compared to standard cooling machines [4]

Research has also been carried out with the engine cooling system of another is by menggunakan multi evaporator. The study involved multiple components such as evaporators, two expansion valves, compressor, condenser, heat exchanger, and a solenoid valve connected to the refrigerant flow to the evaporator freezer and freshfood. The result in the work cycle in series obtained an increase in efficiency of 8,5% [5].

Other research is research by varying the size of the evaporator on the performance of the engine cooling evaporator to produce that increase in size is not significant with increased COP. The only significant increase in the size of the evaporator to increase capacity at the two evaporator refrigeration performance [6].

The problems of the refrigeration machine and Previous research, be an excuse to do more careful research using several types of single and multi-storey evaporator (series and parallel) using liquefied petroleum gas as a refrigerant in the refrigeration system. This research is expected to result in enhancing work performance refrigeration machine is now significantly better, especially raising the coefficient of achievement, lowering energy use, and produce non-ODS refrigerants and non-GWP refrigerants using LPG according to the standard product.

## II. Methodology

This research use experimental methodology that direct observation. The equipment and materials used in the test are as follows:

- Refrigerators one door
- Pressure gauge
- Manifold gauge
- A set of thermoreader
- Swaging tools
- Tube welding
- Brander las
- Cutting the pipe
- Stingy round
- Evaporator plate C ( $\frac{1}{4}$  inch diameter and a length of 110 cm)
- Compressor  $\frac{3}{4}$  pk
- LPG (50% propane and 50% butane)

## Testing procedure

- Arranging engine components of refrigerant in correctly, using a variation of the series evaporators space
- Installing the temperature measuring devices (thermoreader), a pressure gauge at the points are observed
- Conducting the process of vacuum, in order to avoid a refrigerant or other substances that are still left inside.
- Turn on the engine cooling with a discharged condition to ensure there are no leaks in all parts
- Charge the refrigerant correctly and according to the procedure, in this study the refrigerant used is LPG
- Further conduct testing up to 120 minutes.
- Measure and record the temperature and pressure are the measurement tools to ensure the correctness of measuring the numbers listed on the tool, according variable a predetermined time
- Conducting the experiment again by using various types of evaporators to suit different predetermined
- Record back pressure and temperature indicated by the measuring instrument, at all points and a predetermined time.
- collect the data, perform calculations and analysis

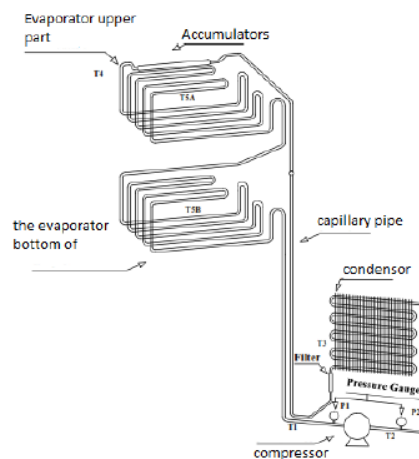


Figure 1. Evaporator series with one space

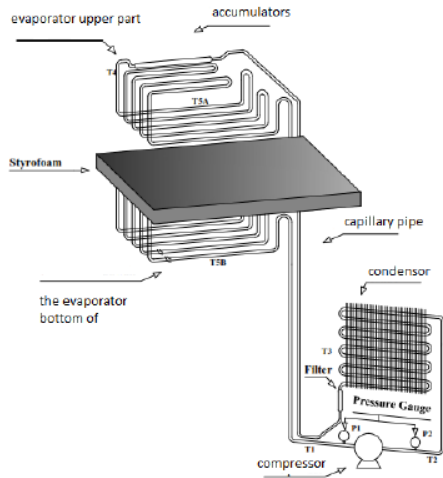


Figure 2. Evaporator series with two spaces

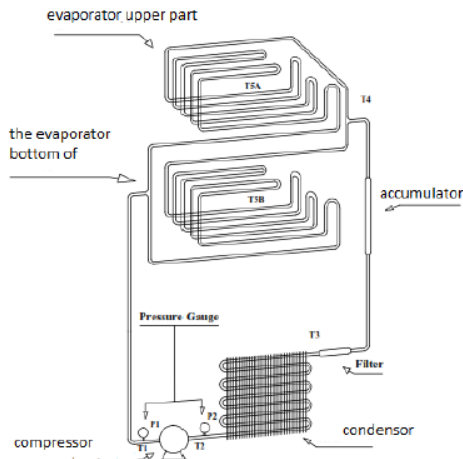


Figure 3. Evaporator parallel with one space

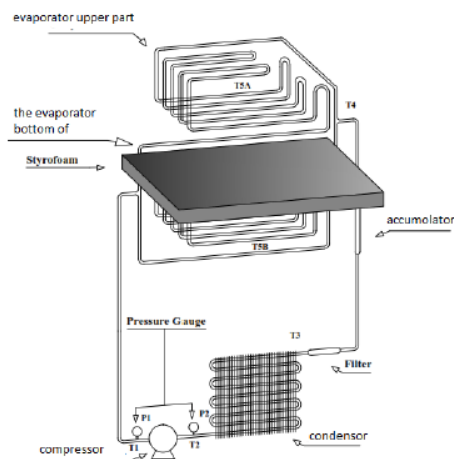


Figure 4. Evaporator parallel with two spaces

## RESULTS AND DISCUSSION

### Data Testing Results

After the testing process measurement data obtained. The data obtained in the form of temperature (T1, T2, T3, T4, T5a, T5B) and pressure (P1 and P2) every 10 minutes for 120 minutes. The data obtained will be used to calculate the performance of the cooling machine

Table 1. Results of the temperature on the evaporator series with one space

Time (minute)	Temperature (°C)						Pressure (Bar)	
	T <sub>1</sub>	T <sub>2</sub>	T <sub>3</sub>	T <sub>4</sub>	T <sub>5a</sub>	T <sub>5b</sub>	P <sub>1</sub>	P <sub>2</sub>
10	30,9	78,61	38,63	13,30	3,90	13,47	0,30	13,00
20	30,43	79,34	38,60	6,37	-3,37	10,50	0,30	13,00
30	29,97	75,23	38,20	-0,90	-11,07	3,70	0,30	13,00
40	30,37	76,27	37,50	-6,07	-14,77	0,70	0,30	13,00
50	30,20	77,65	37,70	-9,93	-15,93	-1,73	0,30	13,00
60	30,93	80,34	38,17	-6,83	-17,40	-3,50	0,30	13,00
70	30,37	80,34	38,83	-5,70	-17,90	-3,77	0,30	13,00
80	32,80	82,81	38,70	-6,80	-19,50	-5,17	0,30	13,00
90	30,10	80,73	39,17	-4,47	-19,50	-5,93	0,30	12,50
100	30,13	82,39	39,37	-7,73	-20,30	-6,83	0,30	12,50
110	29,30	83,16	39,07	-7,53	-21,60	-7,43	0,30	12,00
120	30,30	81,81	38,80	-5,03	-21,20	-7,00	0,30	12,00

Table 2. Results of the temperature of the evaporator series with two spaces

Time (minute)	Temperature (°C)						Pressure (Bar)	
	T <sub>1</sub>	T <sub>2</sub>	T <sub>3</sub>	T <sub>4</sub>	T <sub>5a</sub>	T <sub>5b</sub>	P <sub>1</sub>	P <sub>2</sub>
10	32,70	74,20	33,97	18,13	15,77	20,67	0,40	14,00
20	31,73	78,52	39,90	7,60	-0,17	6,23	0,40	14,00
30	30,50	75,23	35,53	10,63	-2,80	12,23	0,40	13,00
40	31,07	81,81	40,37	5,60	-5,23	3,03	0,40	13,00
50	31,40	81,90	41,70	2,40	-6,00	1,67	0,40	13,00
60	32,70	82,90	42,23	1,63	-7,10	-0,13	0,40	13,00
70	32,00	82,90	41,63	1,13	-8,03	-0,90	0,40	12,00
80	31,57	78,65	40,90	-0,67	-9,00	-1,27	0,30	12,00
90	30,80	78,87	39,80	-3,17	-10,67	-3,80	0,30	12,00
100	30,77	78,53	39,83	-3,17	-11,33	-4,77	0,30	12,00
110	29,90	81,55	39,40	-10,00	-13,37	-4,70	0,30	12,00
120	29,27	79,95	37,90	-12,00	-15,07	-6,53	0,30	12,00

Table 3. Results of the temperature on the evaporator parallel with one space

Time (minute)	Temperature (°C)						Pressure (Bar)	
	T <sub>1</sub>	T <sub>2</sub>	T <sub>3</sub>	T <sub>4</sub>	T <sub>5a</sub>	T <sub>5b</sub>	P <sub>1</sub>	P <sub>2</sub>
10	34,20	75,01	36,70	8,03	14,50	18,13	0,50	12,00
20	34,90	79,43	36,90	3,57	8,47	12,07	0,40	13,00
30	34,50	75,40	38,70	-0,60	3,33	9,37	0,40	12,00
40	35,00	76,83	38,20	-4,80	-0,07	5,20	0,30	13,00
50	34,90	76,96	38,70	-3,00	-2,47	2,07	0,30	12,00
60	35,20	79,04	38,90	-2,80	-3,40	1,20	0,30	13,00
70	34,80	80,47	38,80	-3,70	-4,33	0,50	0,30	12,00
80	35,10	79,69	38,60	-4,30	-5,17	-0,50	0,30	12,00
90	34,30	79,82	38,60	-4,80	-6,10	-1,30	0,30	12,00
100	35,80	81,12	39,10	-5,40	-6,63	-2,30	0,30	12,00
110	35,40	79,69	38,90	-6,10	-7,03	-2,57	0,30	12,00
120	35,00	79,43	39,20	-7,20	-7,67	-4,03	0,30	12,00



Table 4. Results of the temperature on the evaporator parallel with two spaces

Time (minute)	Temperature (°C)							Pressure (Bar)	
	T <sub>1</sub>	T <sub>2</sub>	T <sub>3</sub>	T <sub>4</sub>	T <sub>5a</sub>	T <sub>5b</sub>	P <sub>1</sub>	P <sub>2</sub>	
10	30,7	62,30	29,20	10,50	19,40	23,63	0,40	13,00	
20	31,00	63,98	29,10	6,60	17,50	21,73	0,40	13,00	
30	31,40	66,50	29,40	3,800	13,50	18,50	0,40	13,00	
40	31,80	74,20	31,40	0,40	6,53	12,10	0,40	13,00	
50	32,40	70,56	34,50	-6,40	-1,40	4,13	0,40	13,00	
60	32,40	71,40	34,70	-5,70	-3,53	2,10	0,40	13,00	
70	32,80	74,06	35,30	-8,30	-5,40	0,30	0,40	12,50	
80	33,20	74,90	35,40	-110	-6,57	-0,90	0,40	12,50	
90	33,60	80,36	38,30	-7,80	-6,87	-2,17	0,40	12,50	
100	33,80	81,76	37,50	-8,50	-7,80	-2,90	0,30	12,50	
110	34,30	79,24	38,30	-7,00	-8,23	-3,43	0,30	12,50	
120	34,10	78,82	37,80	-7,10	-8,65	-3,47	0,30	12,00	

Discussion

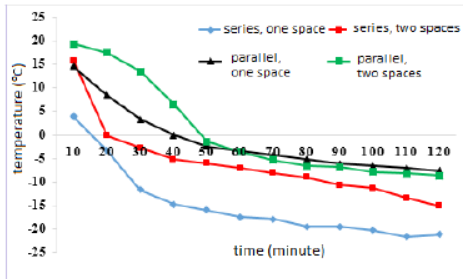


Figure 5. Graph of the value of the upper space temperature versus time

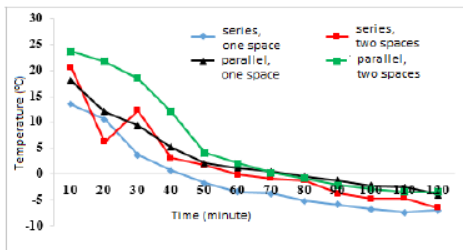


Figure 6. Graph of the value of the bottom space temperature versus time

From Figure 5 and Figure 6 shows that a decrease in the lowest temperature obtained by the type of the evaporator series with one room, it is because the use of two the evaporator in the cooling chamber smaller and all the refrigerant was focused to cool the upper part first, so that the temperature reached by type of series the evaporator is lower than the temperature reached by the type of parallel evaporator, such that the temperature is shown in a refrigerated space is the result of the redistribution of fluid between the two the evaporator [7].

The Performance of Refrigerator Machine

1. The Refrigerating Effect

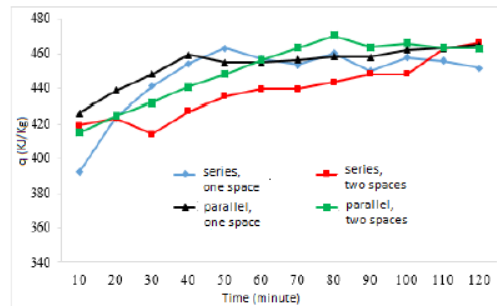


Figure 7. Graph of The Refrigerating Effect

The result of the calculation of the impact of refrigeration on each of the various types of the evaporator increased as the time changes, the cause of the increase is among other things due to each variation has the ability to absorb heat better [8]. Impact value refrigeration which experienced the largest increase in minute 80 amounted to 470,605 kJ /Kg and began to stabilize in the next minute is a parallel-type two spaces, it is because the type of parallel evaporator huge flow of refrigerant passing through the the evaporator is concentrated in each room are cooled so the ability to absorb heat better

2. The Work of Compression

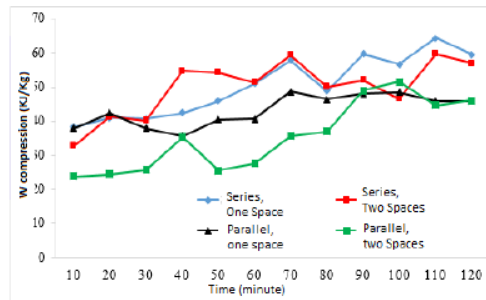


Figure 8. Graph of the work of compression

Pressure compression performed by the compressor on the type of an evaporator series is higher compared with a parallel-type an evaporator. Differences in the work of compression between the various types of an evaporator are in because of the type of an evaporator series has a distance of cooling longer for cooling the room top and bottom of dibandingkan type parallel evaporator, because of the type of parallel evaporator flow rate divided directly to a second room which is

cooled, so the work compression is not as heavy work of compression-type an evaporator series

### 3. The Refrigerating Capacity

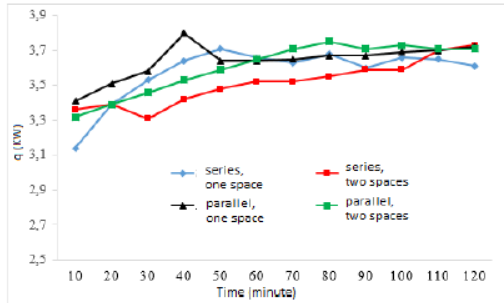


Figure 9. Graph of the refrigerating capacity

Refrigeration capacity values were achieved in all variations of type an evaporator (parallel or series) is almost the same or close to each other. Cause of the same refrigeration capacity values for the cooling process performed on same machine refrigerator, so the need for refrigeration machine is the same [9]. Type of parallel evaporator for a single room (borderless) began to reach stable at 50 minutes (around 3.6 kW) compared to the type of an evaporator series one space (borderless) that has not reached a stable state at the minute, also for two types of parallel evaporator room (with a divider) began to reach a steady state at 70 minutes (around 3.7 kW). The difference in time to reach steady state for the type an evaporator are arranged in parallel and in series-type an evaporator due at the evaporator in parallel flats have same length of pipelines and flow in time and the same state.

### 4. Coefficient Of Performance (COP)

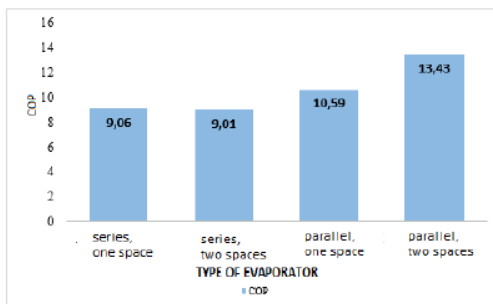


Figure 10. Graph of COP

From Figure 10 shows that the type of parallel evaporator has a value of COP is better than the COP values on various types of evaporator series, it is because the type of parallel evaporator flow barriers shorter and concentrated in each room are

cooled. As a result of constraints on the type of parallel evaporator shorter and the cooling is concentrated to the second evaporator used was faster in the process cools the room, shorten the difference of temperature for both rooms were cooled, and accelerate to reach steady state, another influence that is at work lower compression value than the compression work done on the type of evaporator series, so that type of parallel evaporator has a higher COP values. The average value of the highest COP is owned by two parallel evaporator type of room (with a divider) which is equal to 13,34 and the lowest by type evaporator varasi series two rooms of 9,01.

### CONCLUSION

From the results of research and analysis has been done, it can be concluded as follows:

1. Effect of time to decrease the lowest temperature obtained type evaporator series one space, namely equal to 21,2 °C. Speed evaporator temperature decrease on the type of series one space due to the evaporator series using two evaporator to cool the space is small and the rest of the refrigerant is used in its entirety evaporator upper part can be cooled faster.
2. The highest compression power obtained in the test series is a space evaporator reaches 64,85 kJ / kg at 110 minutes, it is because the type Evaporator channel series that must be passed is longer. Values refrigeration capacity generated on each type is not much different (3,14 kW – 3,73 kW), the cause is the engine coolant tested and refrigerants used are the same, so the cooling requirements are the same.
3. Research have shown the value of COP (Coefficient Of Performance) for parallel-type evaporator (with borders and without borders) is better than the type of evaporator series (with divider and without divider), type a space parallel evaporator can increase the COP by 1,17% higher than the COP type of series and parallel two-space space of 1,49% more than two series space, the cause is the parallel evaporator to cool the room down the top and bottom space of time to get in is almost the same refrigerant (s shorter) so that the lower compression work, and if a low compression work it produces better COP values.

Nomenclature :

P1: Inlet pressure compressor (Bar)  
P1: pressure compressor exit (Bar)  
T1: Temperature out evaporator (°C)  
T2: Temperature entrance condenser (°C)  
T3: condenser exit temperature (°C)  
T4: Temperature sign evaporator (°C)  
T5a: The temperature of evaporator upper part (°C)  
T5b: The temperature of evaoprator bottom of (°C)

REFERENCES

- [1]. Ruhyat *et al.* 2015. *Effect of Variation diameter of the Pipe Evaporator Tube with Circular Fins Against The Pressure Drops of Refrigerant Flow in The Refrigeration System* Jurnal SINERGI. Vol. 19, No. 1. The University of Marcu Buana. Jakarta. Indonesia
- [2]. Maclaine and Leonardi. 1997. *Why Hydrocarbons Save Energy* School of Mechanical and manufacturing Engineering The University of New South Wales Sydney NSW. Australia.
- [3]. Perkasa. 2013. *The Analysis Effect Variation of Mass of LPG as Refrigerant Against Coefisien of Performance of mechine Refrigeration with type vapour compression.* The University of Jember. Indonesia.
- [4]. Won. 1994. *An Experimental Study on the Performance of a Two-Circuit Cycle with Parallel Evaporators for a Domestic Refrigerator-Freezer.* Jurnal Purdue e-Pubs.
- [5]. Lavanis, *et al.* R. 1998. *Experimental Investigation of an Alternating Evaporator Duty Refrigerator or Freezer.* Vol. 104, P. 2. ASHRAE Transactions.
- [6]. Gerlach dan Newell. 2001. *Dual Evaporator Household Refrigerator Performance Testing and Simulation.* United States.
- [7]. X. H. Sun, *et al.* 2009. *Analysis of Temperature Oscillations in Parallel Evaporators of a Carbon Dioxide Two-Phase Loop.* Microgravity Sci. Technol S299-S304. Sun Yat-Sen University. China.
- [8]. Galla Rezki. 2014. *Effect of the use Water Cooled Condenser Cooling Machine Against Coefisien of Performance of mechine Refrigeration Using LPG as refrigerant.* The University of Jember. Indonesia
- [9]. Hatib. 2011. *Experimental Study of Cascade Evaporator that Compiled Parallel Against the performance of Refrigeration engine fokus 802.* The University of Hasanudin. Makasar. Indonesia.

IJSETR

ISSN: 2278 – 7798

International Journal of Science, Engineering and  
Technology Research

*Certificate of Publication*

This is to certify that Prof. /Dr. /Mr. /Mrs. /Ms.

**Digdo Listyadi**

has published the paper titled

**THE ANALYSIS OF TYPES EVAPORATOR WITH REFRIGERANT  
LPG AGAINST THE PERFORMA ENGINE REFRIGERATOR**  
in International Journal of Science, Engineering and Technology  
Research , Volume...6...Issue...3...,March-2017...pp...343...-348...



Editor-in-Chief  
International Journal of Science, Engineering and  
Technology Research