Comparative Analysis between SA-516 Gr 70 Material with SA-537 Class 2 Material in Shell Pressure Vessel Fabrication Process

Final Project

By:
Sarah Athaullah Wenna Putri (3222101024)

Electronics Manufacturing Engineering Study Program
Electrical Engineering Department
Polytechnic Negeri Batam
2024

Statement of Authenticity of Final Project

I, the undersigned, certify that the contents of part or all of my Final Project entitled: " **Comparative Analysis between SA-516 Gr 70 Material with SA-537 Class 2 Material in Shell Pressure Vessel Fabrication Process**" is my **own work, completed without the use of materials that are not permitted,** and **is not the work of other parties which I acknowledge as my own work.** All references cited or referred to have been written in full in the bibliography. If it turns out that my statement is not true, I am willing to accept sanctions in accordance with applicable regulations.

Batam, 31 July 2024

Sarah Athaullah Wenna Putri
NIM: 3222101024

Validity Sheet

The Final Project is structured to fulfill one of the requirements for obtaining a degree
Bachelor of Associate Engineer (A.Md.T)
in
Batam State Polytechnic

By:
Sarah Athaullah Wenna Putri (322101024)

Session date: 24 July 2024

Approved By :

1. Examiner I

Muhammad Arifin, S.Si., M.Si.
NIK: 116161

1. Supervisor

Widya Rika Puspita, S.Pd., M.Si., ph.D
NIK: 1119211

2. Examiner II

Hana Mutialif Maulidiah, S.T., M.Sc
NIK: 120241

Comparative Analysis between SA-516 Gr 70 Material with SA-537 Class 2 Material in Shell Pressure Vessel Fabrication Process

***Abstract*— Pressure vessel is a container to accommodate or store pressure fluids, both liquid and gas fluids which both have different pressures and temperatures. The pressure on the walls and body of the pressure vessel must be taken seriously, because it complies with applicable international design standards and priority the safety and security of workers. Research was conducted on a pressure vessel that aims to determine whether using the specified temperature affects the thickness of the shell to meet ASME standards. Research on shell components using SA-516 Gr 70 material and SA-537 material. Experiments were carried out with each material at temperatures of 250 C, 235 C, 343 C, where each material and temperature different thickness. The results of this research meet ASME standards because during the trial the thickness of the shell is not less than the actual thickness specified by the drawing. Which each experiment has an average value, namely SA-516 Gr 70 at 250 C with an average value of 13.25 mm, then at a temperature of 235 C the average value is 18.25 mm, at a temperature of 343 C the average value is 22.55 mm. While SA-537 Class 2 at a temperature of 250 C average value of 25.72 mm, at a temperature of 235 C average value of 18.31, at a temperature of 343 C average value of 13.82 mm.**

Keyword: Pressure Vessel, ASME VIII DIV 1, Shell, Temperature, Pressure

I. INTRODUCTION

PT X Batam is a manufacturing company engaged in oil and gas fabrication. The company utilizes high-tech production equipment that includes various fabrication processes. One of the fabricated products made is pressure vessel. The product has good quality, this is because in carrying out the fabrication process the Company has high standards [1]. A pressure vessel is a closed metal container designed to hold a fluid that has a temperature or pressure different from its environment and is used for a certain process according to the function of the vessel [2]. Pressure vessels must be operated under the maximum allowable working temperature and pressure, i.e. the safe limit of the pressure vessel. The designer must choose a combination of loads for a safe and economical design, so in designing a pressure vessel must understand several types of stresses and loading [2].

This research uses a horizontal pressure vessel using the ASME VII Div 1 standard. The analyzed pressure vessel is able to withstand the pressure that occurs during operation both internal and external pressure which can withstand various other loads [3]. In pressure vessel planning, material selection is recommended using SA-516 grade 70 material with SA-537 Class 2 material. Both materials are used in pressure vessel fabrication. The analysis is carried out using calculations that refer to the ASME section VIII standard which is the standard for pressure vessel calculations and stress analysis. The choice of material thickness must be able to withstand the load received by the vessel, as well as other stresses that arise due to the load received by the vessel [4].

There are theoretically two forms of pressure vessels, namely spherical pressure vessels which are often used to store high-pressure liquids. This type of pressure vessel is a very strong structure. The uniform distribution of pressure on the spherical surface, both internally and externally, generally means that there are no weak points [5]. Then tube type pressure vessels are widely used because they are cheaper to manufacture than spherical vessels. However, cylindrical vessels are not as strong as spherical vessels due to the presence of weak points at each end [4].

Then based on the orientation of the pressure vessel there are two kinds. The first is horizontal position Horizontal pressure vessels that withstand internal pressure based on codes and standards. This type of vessel extends parallel to the flat plane. These vessels are used for oil storage or for 3-phase separators that separate oil, water, gas. This vessel is located in a large area [6]. Then there are vertical position pressure vessels widely used in offshore oil platform installations, which have limited space [6].

The components of the pressure vessel consist of several main parts, namely: Head is the main part of the pressure vessel located at the end of the pressure vessel. The entire pressure vessel must be covered with a head [2], [7]. Shell is a part that is part of the entire body of the pressure vessel and serves to accommodate the fluid in it [2]. Nozzle is used to connect the pressure vessel with instrumentation or piping system [2]. Flange is the inlet and outlet of a pressure vessel which is generally tubular and made of steel which is placed on the head and shell by welding [2]. flange is used for water distribution systems that require long pipes [8]. Support The support must be able to withstand pressure vessels from heavy loads, wind, and earthquakes that may occur [2]. This research was conducted on one of the pressure vessel components, namely the Shell. By using different temperature parameters and shell thickness. The materials used are SA-516 Gr 70 and SA-537 Class 2. This study aims to determine whether using the specified parameters affects the thickness of the shell and whether the material used meets ASME standards.

II. METHOD

The research that has been carried out follows a flow diagram which is shown in Figure 1.

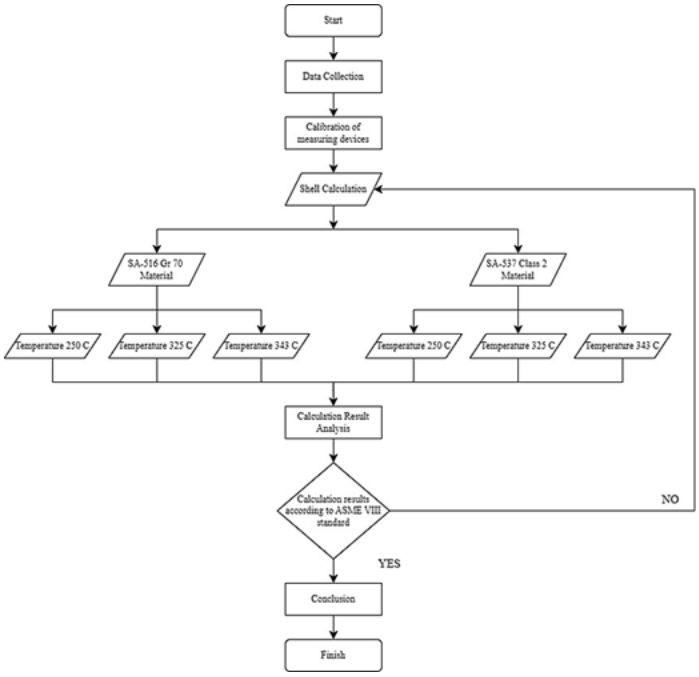


Figure 1. flowchart analysis shell

A. Data Collection

1. Literature reference

In this search and read reference sources both from the internet and scientific articles that discuss the topic of design and simulation of pressure vessels.

2. Direct field visits

See firsthand how the pressure vessel manufacturing process works, as well as reviewing the parts to be studied.

3. Determination of shell material

This research uses SA-516 70N material and SA-537 Class 2 material.

4. Using the data collected

- Calculate shell thickness using predetermined parameters.
- The results of the analysis carried out must meet the criteria of the ASME DIV VII Sec 1 standard.
- If the calculation value exceeds or does not meet the criteria set by the ASME DIV VIII Sec 1 standard, the pressure and pressure step calculations must be changed and repeated to the initial step of the shell calculation input.

5. Conclusion of the analysis

After the data obtained is processed. This data will be used as a reference for the results of the analysis carried out, whether it is safe or not the Shell is analyzed using predetermined parameters. Then from the results of this analysis can find out which of the two material analyzes are in accordance with the classification of the ASME DIV VIII Sec 1 standard.

B. Preparation of Tools and Materials

1. SA- 516 Gr 70 carbon stell plate
   Material SA 516 Gr 70 is a standard specification for pressure vessel plates, carbon steel, for medium and low temperature service. SA 516 Gr 70 material is a carbon steel material. Usually the higher the carbon content, the higher the strength level which will also increase its resistance to corrosion [9].
2. SA-537 Class 2 carbon stell plate
   This material is a type of plate made from a mixture of carbon, manganese, and silicon. This type of plate is often used for pressure vessel design by oil and gas companies. This material has low temperature resistance to both internal and external temperature changes [10].
3. Pressure vessel component shell
4. Modul ASME VII Div 1
5. American Society of Mechanical Engineers. ASME is a professional organization that produces standard rules for machines such as compressors, turbines, industrial trucks, flow measurement, nuclear, pressure vessels, boilers, and many others [2]. The function of the pressure vessel design standard code is to determine how to design and manufacture in accordance with design procedures and maintenance procedures for the safety of the vessels made. At least the existence of this vessel design code can reduce the possibility of failure or danger from the pressure vessel process. The codes and standards usually used by designers are ASME code, sec. VII [11].
6. Shell Thickness Measuring Instrument
   The Dakota Ultrasonics MX-3 is a precision ultrasonic micro meter. Based on the same operating principle as SONAR, it is able to measure the thickness of various materials with accuracy as high as ±0.001 inch, or ±0.01 milli meter. The Dakota Ultrasonics wall thickness gauge accurately measures the thickness of one side of a wall as well as the corrosion rate of all metals, ceramics, glass and most rigid plastics. It can be used in single thickness reading mode or in scanning mode, by placing the probe over the area to be measured. As long as the probe is placed on the measurement area, the minimum thickness will be displayed [12].

C. Calibration

In order for the MX-3 to make accurate measurements, it must be set to the correct speed of sound for the material being measured. Different types of materials have different speeds of sound. If the gauge is not set to the correct speed of sound, all gauge measurements will be wrong by a certain percentage. One-point calibration is the simplest and most commonly used calibration procedure - optimizing linearity over a large range. Two-point calibration allows greater accuracy over small ranges by calculating probe zero and velocity.

Calibration to a known thickness

NOTE: This procedure requires a specific sample piece of the material to be measured, the thickness of which is known with certainty.

1. Make sure the MX-3 is on.
2. Perform Probe-Zero.
3. Apply couplant to the sample piece.
4. Press the transducer against the sample section, ensuring that the transducer is flat against the sample surface. The Display Screen should show some thickness values and the Stability Indicator should show almost all of its bars.

5. After obtaining a stable reading, remove the transducer. If the displayed thickness changes from the value displayed when the transducer was attached, repeat step 4
6. Press the CAL button. The IN (or MM) symbol will start blinking.
7. Use the UP and DOWN arrow keys to adjust the thickness display up or down, until it matches the thickness of the piece sample.
8. Press the CAL button once again. The IN/ms (or M/s) symbol should start flashing. The MX-3 now displays the calculated sound velocity value based on the thickness value entered in step 7.
9. Press the CAL button again to exit calibration mode. The MX-3 is now ready to take measurements.

D. Testing

1. Analysis

Testing on the shell uses a manual calculation method that has been determined by the engineer or by the mentor in accordance with the ASME DIV VII Sec 1 standard. The testing technique is to use one of the pressure vessel components, namely the Shell. This test aims to determine the thickness of the shell using predetermined parameters.

2. Place and Time

This research started in October 2023 until April 2024. The place used in conducting research is PT X Batam. To get the results of analysis the effect of shell thickness on the parameters that have been determined and discussed as research results.

3. Calculation

After all the necessary data is collected, at this stage the calculation is carried out, the calculation process is carried out manually according to the ASME DIV VII Sec 1 standard. 3 trials were carried out for each temperature.

Table 1. Design Data SA-516 Gr 70

Parameter	Data
Code	ASME VIII Div 1
Design Pressure (P)	10 Mpa
Design Temperature (T)	250 C, 325 C, 343 C
Fluid	Water
Vessel Inside Diameter (D)	200 mm
Material	SA-516 Gr 70

The table above is the pressure design that will be analysed, the data is obtained from existing drawings.

Table 2. Design Data SA-537 Class 2

Parameter	Data
Code	ASME VIII Div 1
Design Pressure (P)	10 Mpa
Design Temperature (T)	250 C, 325 C, 343 C
Fluid	Water
Vessel Inside Diameter (D)	200 mm
Material	SA-537 Class 2

The table above is the pressure design that will be analysed, the data is obtained from existing drawings.

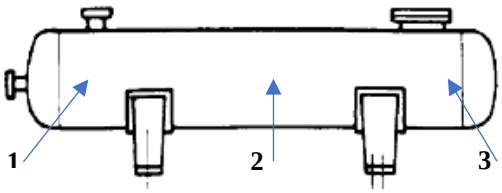


Figure 2. Shell part tested

The number in the figure above is the point where the thickness analysis is carried out on the shell. There are 3 points in the figure, namely 1 is the front part near the head, then 2 is the middle part between the supports, then 3 is at the back. At each point, 3 calculations were performed.

Table 3. SA-516 Experiment

SA-516 Gr 70 Experiment		
	Unit	Actual
250 C	1	13 mm
	2	13 mm
	3	13 mm
235 C	1	18 mm
	2	18 mm
	3	18 mm
343 C	1	22 mm
	2	22 mm
	3	22 mm

The table above is the parameter used to calculate the shell thickness later. From the table above there are three temperatures where each temperature has a different thickness. The calculation is done manually, namely by using a measuring instrument. Measurements at each temperature are made at 3 points, each of which is done 3 times.

Table 4. SA-537 Class 2 Experiment

SA-537 Class Experiment		
	Unit	Actual
250 C	1	25 mm
	2	25 mm
	3	25 mm
235 C	1	18 mm
	2	18 mm
	3	18 mm
343 C	1	13 mm
	2	13 mm
	3	13 mm

The table above is the parameter used to calculate the shell thickness later. From the table above there are three temperatures where each temperature has a different thickness. The calculation is done manually, namely by using a measuring instrument. Measurements at each temperature are made at 3 points, each of which is done 3 times.

III. RESULTS AND DISCUSSION

A. Research Result Data

In the process of calculating the thickness of the shell component parts, it is carried out at 3 points where each point is carried out 3 times, namely at the front near the head, the quiet part and the back. The analysis is carried out with the temperature and shell thickness that has been determined when designing the pressure vessel, so that the parameters used are parameters that are in accordance with the design drawing made by the engineer. In this final project report, the author analyses two different materials but both are carbon.

B. Result

Analysis carried out on SA-516 Gr 70 and SA-537 Class 2 materials carried out at 3 points in each shell with different shell temperatures and thicknesses.

Table 5. Results on SA-516 at 250 C

SA-516 at 250 C			
	Trial	Actual	Results
Unit 1	1	13 mm	13.25 mm
	2	13 mm	13.25 mm
	3	13 mm	13.29 mm
Unit 2	1	13 mm	13.25 mm
	2	13 mm	13.22 mm
	3	13 mm	12.12 mm
Unit 3	1	13 mm	13.30 mm
	2	13 mm	13.34 mm
	3	13 mm	13.34 mm

The table above is the calculation result of SA-516 Gr 70 material with a temperature of 250 C and a shell thickness of 13 mm. of the 3 units, the largest number is in unit 3.

Table 6. Results on SA-537 at 250 C

SA-537 at 250 C			
	Trial	Actual	Results
Unit 1	1	25 mm	25.71 mm
	2	25 mm	25.74 mm
	3	25 mm	25.78 mm
Unit 2	1	25 mm	25. 54 mm
	2	25 mm	25.56 mm
	3	25 mm	25.57 mm
Unit 3	1	25 mm	25.84 mm
	2	25 mm	25.86 mm
	3	25 mm	25.89 mm

The table above is the result of the calculation of SA-537 Class 2 material using a temperature of 250 C and a shell thickness of 25 mm, of the 3 units above, unit 3 has a larger number than the other units.

Table 7. Results on SA-516 Gr 70 at 235 C

SA-516 at 235 C			
	Trial	Actual	Results
Unit 1	1	18 mm	18.16 mm
	2	18 mm	18.28 mm
	3	18 mm	18.30 mm
Unit 2	1	18 mm	18.21 mm
	2	18 mm	18.24 mm
	3	18 mm	18.24 mm
Unit 3	1	18 mm	18.27 mm
	2	18 mm	18.27 mm
	3	18 mm	18.33 mm

The table above is from the calculation of SA-516 Gr 70 material with a temperature of 235 and a shell thickness of 18 mm, the unit above shows numbers that are not much different.

Table 8. Results on SA-537 Class 2 at 235 C

SA-537 at 235 C			
	Trial	Actual	Results
Unit 1	1	18 mm	18.26 mm
	2	18 mm	18.28 mm
	3	18 mm	18.28 mm
Unit 2	1	18 mm	18.28 mm
	2	18 mm	18.30 mm
	3	18 mm	18.33 mm
Unit 3	1	18 mm	18.34 mm
	2	18 mm	18.37 mm
	3	18 mm	18.35 mm

The table above is the result of calculating SA-537 Class 2 material with a shell thickness of 18 mm, in this calculation the shell thickness is the same as SA-516 material, but the numbers obtained are different.

Table 9. Results on SA-516 at 343 C

SA-516 at 343 C			
	Trial	Actual	Results
Unit 1	1	22 mm	22.71 mm
	2	22 mm	22.78 mm
	3	22 mm	22.77 mm
Unit 2	1	22 mm	22.55 mm
	2	22 mm	22.57 mm
	3	22 mm	22.56 mm
Unit 3	1	22 mm	22.30 mm
	2	22 mm	22.33 mm
	3	22 mm	22.38 mm

The table above is the calculation result of SA-516 Gr 70 material with a temperature of 343 C and a shell thickness of

22 mm, the table above shows that in the first trial the number obtained is higher than the other 2 trials.

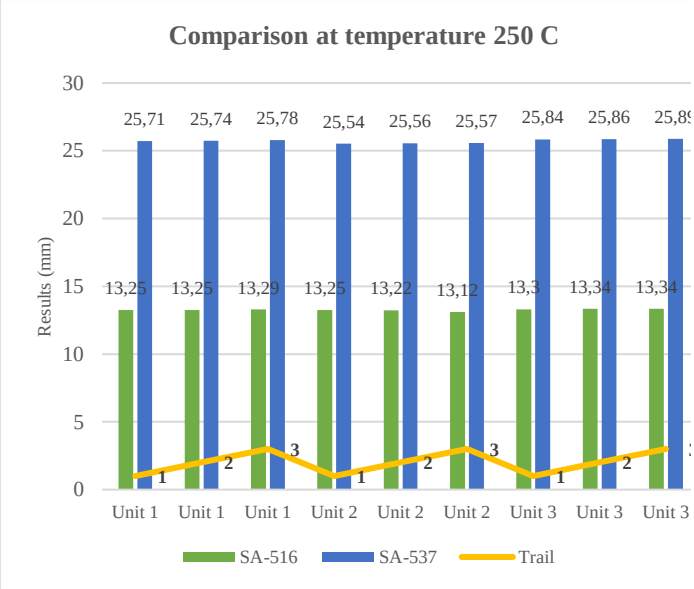
Table 10. Results on SA-516 at 343 C

SA-537 at 343 C			
	Trial	Actual	Results
Unit 1	1	13 mm	13.97 mm
	2	13 mm	13.90 mm
	3	13 mm	13.93 mm
Unit 2	1	13 mm	13.77 mm
	2	13 mm	13.69 mm
	3	13 mm	13.68 mm
Unit 3	1	13 mm	13.86 mm
	2	13 mm	13.88 mm
	3	13 mm	13.78 mm

The table above is the calculation result of SA-537 Class 2 material with a temperature of 343 C and a shell thickness of 13 mm, the table above shows a high number compared to other tests. In unit 1 the dominant number is greater than other units.

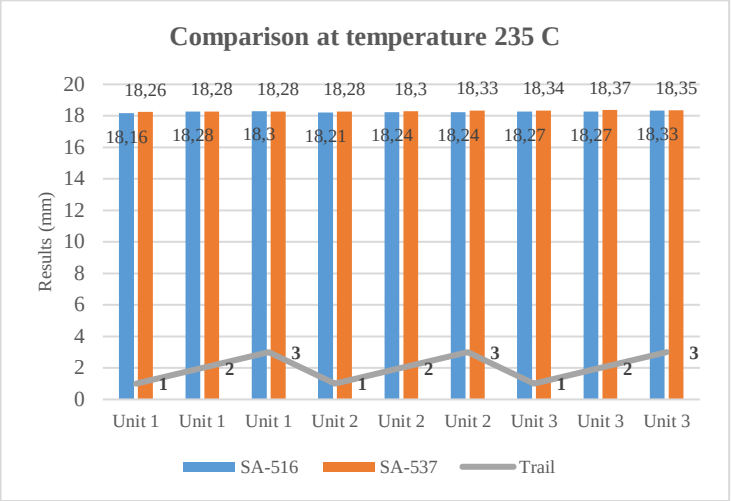
IV. DISCUSSION

Table 11. Temperature 250 C



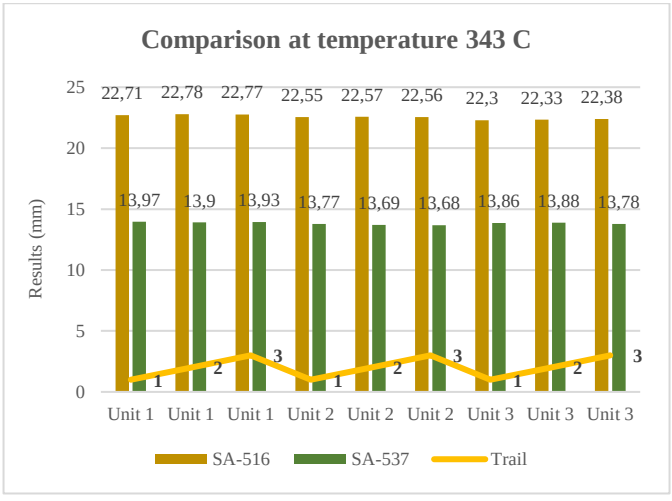
The table above is the result of comparing the shell thickness of SA-516 Gr 70 material and SA-537 Class 2 material. The two materials are measured at the same temperature of 250 C but have different shell thicknesses, this test is carried out on an ongoing project so that it uses existing samples. In SA-516 Gr 70 material with a standard of 13 mm, with the measurement results there is nothing less than the actual value. Then in SA-537 Class 2 material with a standard of 25 mm, at the time of measurement there is nothing less than the actual value. So that both materials are declared to meet ASME standards because they are not less than the actual value. Both materials have an average value of 19.49 mm.

Table 12. Temperature 235 C



The table above is the result of comparing the shell thickness of SA-516 Gr 70 material and SA-537 Class 2 material. Both materials are measured at the same temperature 235 C with the same shell thickness. This test is carried out on an ongoing project so that it uses existing samples. In SA-516 Gr 70 material with a standard of 18 mm, with no measurement results less than the actual value. Then in SA-537 Class 2 material with a standard of 18 mm, at the time of measurement there is nothing less than the actual value. So that both materials are declared to meet ASME standards because they are not less than the actual value. Although both pressure vessels have the same shell thickness, the measurement results obtained are still different although not too far away. Both materials have an average value of 18.28mm.

Table 13. Temperature 343 C



The table above is the result of comparing the shell thickness of SA-516 Gr 70 material and SA-537 Class 2 material. Both materials are measured at the same temperature of 343 C with different shell thicknesses. This test is carried out on an ongoing project so that it uses existing samples. In SA-516 Gr 70 material with a standard of 22 mm, with no measurement results less than the actual value. Then in SA-

537 Class 2 material with a standard of 13 mm, at the time of measurement there is nothing less than the actual value. So that both materials are declared to meet ASME standards because they are not less than the actual value. Both materials have an average value of 18.18mm.

From the analysis carried out on the two materials, the numbers obtained from the measurement results were carried out. Then it is stated that the measurement results meet ASME standards, because the nominal thickness in the drawing is ideal, while at the time of measurement the nominal is more than the ideal number. as long as it is not less than the ideal number, the measurement results are said to comply with ASME standards. because when the shell measurement is completed, it will be stamped by the relevant inspection.

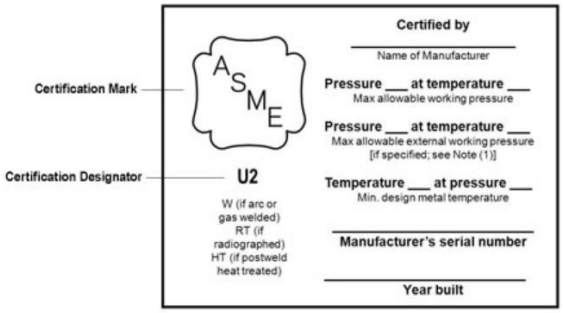


Figure 3. Sample ASME Product Certification Nameplate

There are many factors that influence carbon steel to be very commonly used in various industries, especially in piping systems. There are many advantages that carbon steel has, but there are also disadvantages of carbon steel itself. Carbon steel has its own characteristics that make it superior so that it can be used in many aspects of the industry. The advantages of using carbon steel include:

A. Strength

Carbon steel has a high strength-to-weight ratio and is also able to withstand high pressures and loads, making it ideal for use in piping systems that transport liquids and gases.

B. Durability

Like stainless steel, carbon steel is also known for its durability and resistance to corrosion. This factor makes it a suitable choice for piping systems exposed to harsh environments and corrosive substances.

C. Cost-effective

Carbon steel is relatively more affordable. Can be the right choice to save expenses.

D. Cost-effective

Carbon steel is also widely available, making it easy to find and purchase this material especially for piping systems.

E. Weldability

Carbon steel tends to be easy to weld, allowing for quick and efficient installation and repair of piping systems.

F. Standards

Carbon steel in piping systems is manufactured in accordance with various industry standards such as ASTM, API, ASME, and other standards, which ensure the quality, safety, and reliability of piping systems.

In addition to the advantages, there are also disadvantages of carbon steel when compared to other materials, including:

A. Slightly more brittle than other steels.

When compared to stainless steel, carbon steel can become brittle at low temperatures, which makes it easy to crack or break. However, this is rare and only under certain conditions.

B. Susceptible to hydrogen embrittlement.

Under certain conditions, there is a phenomenon where hydrogen atoms penetrate the steel. This can cause carbon steel to lose its flexibility and become vulnerable.

C. Stress corrosion cracking.

Carbon steel can be susceptible to stress corrosion cracking, which is a type of corrosion that occurs when steel is exposed to certain environments and is under stress.

Although it has several disadvantages, there are many advantages of carbon steel material that cannot be underestimated. These advantages also make carbon steel one of the materials that are in great demand in various industries, of course, because of its sturdiness to corrosion resistance that is taken into consideration. Therefore, it is necessary to understand the material requirements and also consider other factors before deciding to use carbon steel equipment in applications, especially in the piping system industry.

V. CONCLUSIONS AND SUGGESTION

A. Conclusions

Based on the results of the research conducted in this project, both materials meet ASME standards, because the measurements and tests carried out meet the ideal thickness of the drawing. Nothing is less than the ideal thickness of the drawing. So that when the hydrotest inspection is carried out everything runs smoothly and safely. After all the inspections are carried out, at the end of the ASME provides a stamp on the ASME on the shell that the pressure vessel is suitable for operation. Both materials are carbon steel only the most commonly used is SA-516 Gr 70 because it is the most widely marketed.

B. Suggestions

Further research that needs to be done to improve this research is to analysis each part of the pressure vessel component, as well as repeated analysis of each component. In future research, it is expected to be able to take 2 materials of different types and can develop parameters every time measurements are taken. In addition, it is also necessary to periodically check the shell that there are times when welding occurs which causes the thickness to be different or the temperature in the shell to be influential.

REFERENCES

[1] National Oilwell Varco, "Products profab," internet: https://www.nov.com/products/profab 2023 [Des. 14, 2023]

[2] Design, Fabrication & Inspection of Pressure Vessel Per ASME VIII Div 1, 200 ed., 2008, pp.1-2

[3] Wiratama Casesar. Arsyada Daris. "Analisis Kegagalan Pressure Vessel." Internet: https://www.aeroengineering.co.id/2021/10/analisis-kegagalan- pressure-vessel/ Oct. 5, 2021 [Des. 14.2023]

[4] Design, Fabrication & Inspection of Pressure Vessel Per ASME VIII Div 1, 200 ed., 2008, pp.1-2

[5] Werner Solken. "Spherical and Cylindrical Pressure Vessels". Internet: https://www.wermac.org/equipment/pressurevessel.html 2008 [Nov. 22, 2023]

[6] Aziz Abdul, Hamid Abdul, Hidayat Imam. "Perancangan Bejana Tekan (Pressure Vessel) Untuk Separasi 3 Fasa", Universitas Mercu Buana, Jakarta, 2013.

[7] M. Novian Rizky N.P, Mohammad Miftachul Munir, Rizal Indrawan. "Desain Stiffener Ring pada Heavy Hydrocarbon Pressure Vessel terhadap Perubahan Tekanan." Politeknik Perkapalan Negeri Surabaya, Surabaya, 2023.

[8] Juragan Material.id. "Jenis Flange pada Sistem Pemipaan Industri Manufaktur." Internet: https://juraganmaterial.id/blog/tips-juragan/jenis-flange Dec. 22, 2022 [Apr. 15 2024]

[9] Champak Steel & Engg. Co. "SA 516 GR. 70 Carbon Stell Boiler Plate Suppliers and Stockists in Mumbai India". Internet: https://www.csecplates.com/sa-516-gr-70-plate-stockists-suppliers.html#specification , 2017 [Apr. 28 2024]

[10] Csteelindia.com. "Leading Supplier SA 537 Class 2 Plates". Internet: https://www.csteelindia.com/sa-537-class-2-plates-supplier-exporter.html , 2017 [Apr. 28 2024]

[11] Nur Muhammad. "Dasar teori bejana tekan." Internet: https://www.scribd.com/document/251018520/DASAR-TEORI-Bejana-Tekan Dec. 26, 2014 [Apr. 30 2024]

[12] Checkline " Dakota Ultrasonics Thickness Wall Gauge", internet https://www.checkline.com/product/MX-3 , [Mei. 05 2024]

FORMULIR LOOGBOOK BIMBINGAN DAN PENGAJUAN
SEMINAR PROPOSAL/SIDANG TUGAS AKHIR*

Nama : Sarah Athaullah Wenna Putri
NIM : 3222101024
Pembimbing I : Widya Rika Puspita, S.Pd., MS1., Ph.D
Pembimbing II* :
Judul : Comparative Analysis between SA-517 Gr 70 Material with SA-537 Class 2 Material in Shell Pressure Vessel Fabrication Process

No	Hari/Tgl	Rincian Kegiatan	TTD Pembimbing I & II	
1	Senin-19-02-24	Awal semester-6 melaporkan rencana untuk penyusunan TA (Tugas Akhir) Bab-4 danmohon bimbingan		
2	Selasa-12-03-24	Melaporkan rancangan penyusunan laporanTA Bab-4		
3	Senin-25-03-24	Melaporkan hasil revisi TA Bab-4 dan mulai		
4	Selasa-02-04-24	Melaporkan penyusunan laporan TA Bab-5		
5	Rabu-17-04-24	Melaporkan hasil revisi TA Bab-5		
6	Senin-22-04-24	Review Flowchart		
7	Rabu-24-04-24	Revisi terkait pengolahan data		
8	Selasa-30-04-24	Review data analysis		
9	Selasa-13-05-24	Review hasil pengolahan data		
10	Senin-01-07-24	Review laporan,jurnal, ppt untuk maju siding akhir		

Berdasarkan hasil bimbingan yang telah dilaksanakan selama 4 bulan dan telah disetujui oleh dosen pembimbing, maka dengan ini saya mengajukan diri sebagai peserta Seminar Proposal /Sidang Tugas Akhir*.

Batam, 03 Juli 2024
Peserta

Sarah Athaullah Wenna Putri
NIM: 3222101024