



## WELDING PROCEDURE SPECIFICATION (WPS)

Company Name Thainumpon Construction Company Limited  
Welding Procedure Specification No. WPS - TNC - 009 Issued Date September 30, 2024  
Supporting PQR No. PQR - TNC - 009 Revision No. 0 Date September 30, 2024  
Welding Process(es) FCAW Type(s) Semi - Auto  
( Automatic, Manual, Machine, or Semi - Auto )

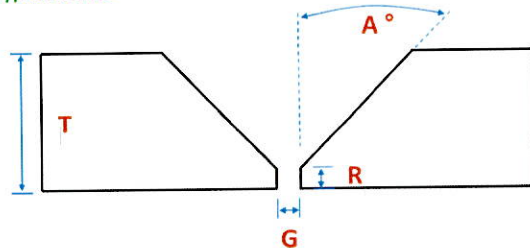
### Joins

Joint Design Single V Groove - Butt Joint  
Root Spacing 3 - 4 mm  
Backing (Yes) ☒ (No) ☒  
Backing Material (Type) Weld Metal  
(Refer to both backing and retainers)  
☒ Metal ☐ Nonfusing Metal  
☐ Non Metallic ☐ Other

Sketches, Production Drawing, Weld Symbols, or Written Description should show the general arrangement of the parts to be welded. Where applicable, the details of weld groove may be specified.

Sketches may be attached to illustrate joint design, welder layers, and bead sequence (e.g., for toughness procedures, for multiple process procedures, etc.)

### Typical Joins



Thickness (T) ~ 5.00 - 50.00 mm  
Root Face (R) ~ 0 - 4 mm  
Root Gap (G) ~ 2 - 4 mm  
Bevel Angle (A°) ~ 30° - 35°

or approval drawing joint

### Base Metals

P-No. Unassigned Group-No. - to P-No. Unassigned Group-No. -  
OR Specification, Type and Grade or UNS Number JIS G3101 SS400  
to Specification, Type and Grade or UNS Number JIS G3101 SS400  
OR Chem. Analysis and Mechanical Prop. -  
to Chem. Analysis and Mechanical Prop. -

### Thickness Range

Base Metal Groove 5.00 - 50.00 mm Fillet All  
Maximum Pass Thickness  $\leq \frac{1}{8}$  in. (13 mm.) (Yes) ☒ (No) ☒  
Other: -

### Filler Metal

Process  
Spec. No. (SFA)  
AWS No. (Class)  
F-No.  
A-No.  
Size of Filler Metals  
Filler metal product form  
Supplemental Filler Metal  
Weld Metal  
Deposited Thickness :  
Groove  
Fillet  
Electrode-flux Class  
Flux Type  
Flux Trade Name  
Consumable Insert  
Other : Trade Name

|                             |  |
|-----------------------------|--|
| FCAW                        |  |
| 5.20                        |  |
| E71T-1C                     |  |
| 6                           |  |
| 1                           |  |
| 1.2 mm                      |  |
| Flux Cored wire             |  |
| None                        |  |
| 50.0 mm                     |  |
| All                         |  |
| N/A                         |  |
| N/A                         |  |
| N/A                         |  |
| N/A                         |  |
| Hyundai SF-71 or equivalent |  |

\*Each base metal-filler metal combination should be recorded individually.



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Welding Process(es) FCAW Type(s) Semi - Auto  
( Automatic, Manual, Machine, or Semi-Auto )

### Positions

Position (s) of Groove All  
Welding Progression Uphill  
Position (s) of Fillet All  
Other -

### Postweld Heat Treatment

Temp. Range N/A  
Time Range N/A  
Other -

### Preheat

Preheat Temp. (Min) 10°C Min(\*)  
Interpass Temp. (Max) 250 °C Max  
Preheat Maintenance None  
(\*) thickness  $\geq 25$  mm required minimum preheat temperature 95°C

(Continuous or special heating where applicable should be recorded)

### Gas

|                 | Percent Composition |         |                   |
|-----------------|---------------------|---------|-------------------|
|                 | Gas(es)             | Mixture | Flow Rate (l/min) |
| Shielding Gas : | CO <sub>2</sub>     | 99.95%  | 10-25             |
| Trailing Gas :  | -                   | -       | -                 |
| Backing Gas :   | -                   | -       | -                 |
| Other :         | -                   | -       | -                 |

### Electrical characteristics

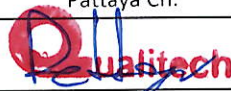
| Weld Pass(es) | Process | Filler Metal |        | Current Type and Polarity | Amps.     | Volts   | Travel Speed (cm/min.) | Other (e.g., Remark, Comments, Hot Wire Addition, Technique Torch Angle, etc.) |
|---------------|---------|--------------|--------|---------------------------|-----------|---------|------------------------|--------------------------------------------------------------------------------|
|               |         | Class.       | Dia.   |                           |           |         |                        |                                                                                |
| Root          | FCAW    | E71T-1C      | 1.2 mm | DCEP                      | 100 - 250 | 20 - 30 | 8 - 30                 | -                                                                              |
| Fill          | FCAW    | E71T-1C      | 1.2 mm | DCEP                      | 100 - 250 | 20 - 30 | 10 - 30                | -                                                                              |
| Cover         | FCAW    | E71T-1C      | 1.2 mm | DCEP                      | 100 - 250 | 20 - 30 | 10 - 30                | -                                                                              |
|               |         |              |        |                           |           |         |                        |                                                                                |

Amps and volts, or power or energy range, should be recorded for each electrode size, position, and thickness, etc.

Pulsing Current N/A Heat Input (max.) N/A (No impact test)  
Tungsten Electrode, Size in mm and Type N/A  
(Pure Tungsten, 2% Thoriated, etc.)  
Mode of Metal Transfer for GMAW (FCAW) Spray Arc / Globular Arc  
(Spray Arc, Short Circuiting Arc, etc.)  
Other -

### Technique

String or Weave Bead Both  
Orifice, Nozzle, or Gas Cup Size 3/8" - 7/8"  
Initial or Interpass Cleaning (Brushing, Grinding etc.) Brushing and Grinding  
Method of Back Gouging Grinding  
Oscillation N/A  
Contact Tube to Work Distance 25 - 30 mm  
Multiple or single pass (per side) Multiple pass  
Multiple or Single Electrode Single  
Electrode Spacing N/A  
Peening No  
Other -

|             | Prepared By / Certified By                                                          | Witnessed / Reviewed By                                                               |
|-------------|-------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| COMPANY :   | Thainumpon Construction Company Limited                                             | Qualitech Public Company Limited                                                      |
| NAME :      |  | Pattaya Ch.                                                                           |
| SIGNATURE : |  |  |
| DATE :      | SEP 30 2024                                                                         | September 30, 2024                                                                    |

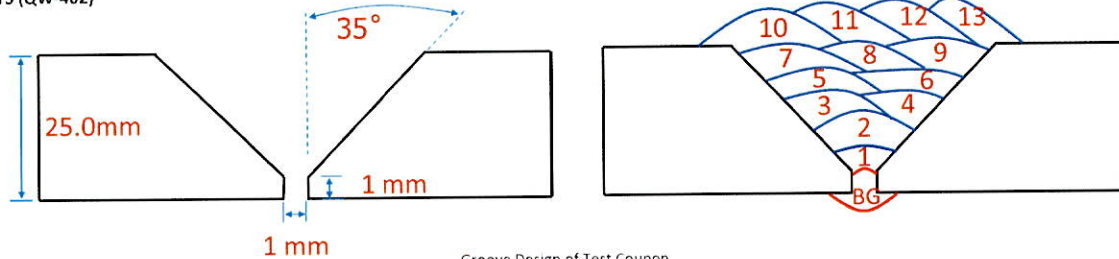


## PROCEDURE QUALIFICATION RECORDS (PQR)

(Section IX, ASME Boiler & Pressure Vessel Code) Record Actual Variables Used to Weld Test Coupon

Organization Name: Thainumpon Construction Company Limited  
 Procedure Qualification Record No.: PQR - TNC - 009  
 WPS No.: WPS - TNC - 009  
 Welding Process (es): FCAW  
 Types (Manual, Automatic, Semi - Automatic): Semi-Automatic  
 Date: 30-Sep-2024

### JOINTS (QW-402)



Groove Design of Test Coupon

(For combination qualifications, the deposited weld metal thickness shall be recorded for each filler metal and process used.)

### BASE METALS (QW-403)

Material Spec. JIS G3101 to JIS G3101  
 Type/Grade, or UNS Number SS400 to SS400  
 P - No. Unassigned Group No. - to P - No. Unassigned Group No. -  
 Thickness of Test coupon 25.00 mm  
 Diameter of Test coupon Plate length 300 mm x 300 mm  
 Maximum Pass Thickness 6.00 mm  
 Other N/A

### POSTWELD HEAT TREATMENT (QW-407)

Temperature None  
 Time N/A  
 Other N/A

### GAS (QW-408)

| Shielding | Percent Composition |            | Flow Rate |
|-----------|---------------------|------------|-----------|
|           | Gas (es)            | ( Mixture) |           |
|           | CO <sub>2</sub>     | 99.50%     | 20 L/min. |
| Trailing  | -                   | -          | -         |
| Backing   | -                   | -          | -         |
| Other     | -                   | -          | -         |

### FILLER METALS (QW-404)

SFA Specification SFA 5.20  
 AWS Classification E71T-1C  
 Filler Metal F-No. F-No.6  
 Weld Metal Analysis A-No. A-No.1  
 Size of Filler Metal 1.2 mm  
 Filler Metal Product Form Flux Cored Wire  
 Supplemental Filler Metal None  
 Electrode Flux Classification N/A  
 Flux Type N/A  
 Flux Trade Name N/A  
 Weld Metal Thickness 25.00 mm  
 Other N/A

### ELECTRICAL CHARACTERISTICS (QW-409)

Current DC  
 Polarity EP (+)  
 Amps. 140.8 - 228.1  
 Volts 22.4 - 30.3  
 Waveform Control N/A  
 Power or Energy N/A  
 Arc Time N/A  
 Weld Bead Length 10 mm max.  
 Tungsten Electrode Size N/A  
 Mode of Metal Transfer for GMAW (FCAW) Spray  
 Heat Input 31.63 kJ/cm max.  
 Other N/A

### POSITION (QW-405)

Position (s) 3G  
 Weld Progression (Uphill, Downhill) Uphill  
 Other N/A

### TECHNIQUE (QW-410)

Travel Speed (cm./min.) 8.65 - 22.22  
 String or Weave Bead Both  
 Oscillation N/A  
 Multiple or Single Pass ( Per Side ) Multipass  
 Single or Multiple Electrodes Single Electrode  
 Other N/A

### PREHEAT (QW-406)

Preheat Temperature 32.0 °C minimum  
 Interpass Temperature 157.2 °C maximum  
 Other N/A

| Weld Pass(es) | Process | Deposited thickness (mm) | Filler Metal |           | Current Type & Polarity | Ampere Range (A) | Volt Range (V) | Travel Speed (cm/min) |         |       | Inter Pass Temp. °C | Heat Input (kJ/cm) |
|---------------|---------|--------------------------|--------------|-----------|-------------------------|------------------|----------------|-----------------------|---------|-------|---------------------|--------------------|
|               |         |                          | Class        | Dia. (mm) |                         |                  |                | Length                | Min:Sec | TS    |                     |                    |
| 1             | FCAW    | 6.00                     | E71T-1C      | 1.2       | DCEP                    | 140.8            | 22.4           | 30.0                  | 3.28    | 8.65  | -                   | 21.87              |
| 2             | FCAW    | 4.00                     | E71T-1C      | 1.2       | DCEP                    | 228.1            | 27.8           | 30.0                  | 1.21    | 22.22 | 63.4                | 17.12              |
| 3             | FCAW    | 4.00                     | E71T-1C      | 1.2       | DCEP                    | 200.0            | 27.3           | 30.0                  | 1.42    | 17.65 | 89.6                | 18.56              |
| 4             | FCAW    | 4.00                     | E71T-1C      | 1.2       | DCEP                    | 194.1            | 27.1           | 30.0                  | 1.40    | 18.00 | 127.5               | 17.53              |
| 5             | FCAW    | 5.00                     | E71T-1C      | 1.2       | DCEP                    | 198.1            | 27.6           | 30.0                  | 1.48    | 16.67 | 120.4               | 19.68              |
| 6             | FCAW    | 5.00                     | E71T-1C      | 1.2       | DCEP                    | 191.6            | 29.4           | 30.0                  | 1.43    | 17.48 | 133.4               | 19.34              |
| 7             | FCAW    | 5.00                     | E71T-1C      | 1.2       | DCEP                    | 189.6            | 30.0           | 30.0                  | 1.35    | 18.95 | 137.7               | 18.01              |
| 8             | FCAW    | 5.00                     | E71T-1C      | 1.2       | DCEP                    | 193.3            | 30.3           | 30.0                  | 2.04    | 14.52 | 144.3               | 24.21              |
| 9             | FCAW    | 5.00                     | E71T-1C      | 1.2       | DCEP                    | 190.8            | 29.6           | 30.0                  | 2.48    | 10.71 | 157.2               | 31.63              |
| 10            | FCAW    | 1.00                     | E71T-1C      | 1.2       | DCEP                    | 194.6            | 27.9           | 30.0                  | 1.58    | 15.25 | 65.6                | 21.36              |
| 11            | FCAW    | 1.00                     | E71T-1C      | 1.2       | DCEP                    | 191.7            | 29.8           | 30.0                  | 2.22    | 12.68 | 81.3                | 27.04              |
| 12            | FCAW    | 1.00                     | E71T-1C      | 1.2       | DCEP                    | 192.1            | 29.2           | 30.0                  | 2.19    | 12.95 | 104.8               | 25.99              |
| 13            | FCAW    | 1.00                     | E71T-1C      | 1.2       | DCEP                    | 195.6            | 29.8           | 30.0                  | 1.22    | 21.95 | 141.6               | 15.93              |
| BG            | FCAW    | 3.00                     | E71T-1C      | 1.2       | DCEP                    | 192.4            | 29.1           | 30.0                  | 1.21    | 22.22 | 65.4                | 15.12              |



## PROCEDURE QUALIFICATION RECORD (PQR)

PQR No. PQR - TNC - 009

### TENSILE TEST (QW-150)

#### TENSILE TEST REPORT NO. 837-67-9 TS001

| Test No.     | Thickness<br>(mm) | Width<br>(mm) | Area<br>(mm <sup>2</sup> ) | Ultimate<br>Total Load<br>(kN) | Ultimate<br>Unit Stress<br>(MPa) | Type of Failure<br>and Location |
|--------------|-------------------|---------------|----------------------------|--------------------------------|----------------------------------|---------------------------------|
| 837-67-9 TS1 | 23.94             | 19.00         | 454.860                    | 234.734                        | 516                              | Out of weld metal               |
| 837-67-9 TS2 | 24.04             | 19.08         | 458.683                    | 233.643                        | 509                              | Out of weld metal               |

### GUIDE BEND TESTS (QW-160)

#### GUIDE BEND TEST REPORT NO. 837-67-9 BD001

| Type and Figure No.    | Result                   |
|------------------------|--------------------------|
| 837-67-9 SB1 Side Bend | No Surface Discontinuity |
| 837-67-9 SB2 Side Bend | No Surface Discontinuity |
| 837-67-9 SB3 Side Bend | No Surface Discontinuity |
| 837-67-9 SB4 Side Bend | No Surface Discontinuity |

### TOUGHNESS TEST (QW-170)

#### TOUGHNESS TEST REPORT NO. -

| Specimen<br>No. | Notch<br>Location | Specimen<br>Size | Test<br>Temp. | Impact Value |         |         | Lateral Expansion<br>(mm.) |
|-----------------|-------------------|------------------|---------------|--------------|---------|---------|----------------------------|
|                 |                   |                  |               | J            | Average | % Shear |                            |
| -               | -                 | -                | -             | -            | -       | -       | -                          |
| -               | -                 | -                | -             | -            | -       | -       | -                          |
| -               | -                 | -                | -             | -            | -       | -       | -                          |
| -               | -                 | -                | -             | -            | -       | -       | -                          |
| -               | -                 | -                | -             | -            | -       | -       | -                          |
| -               | -                 | -                | -             | -            | -       | -       | -                          |

### FILLET TEST (QW-180)

Result - Satisfactory : Yes - No - Penetration into Parent Metal : Yes - No -

Macro - Results : -

### OTHER TESTS

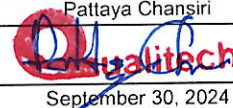
Type of Test Visual Examination Acceptable  
Macrostructure Test Report Report No. 837 - 67 - 9 / MA001  
Vickers Hardness Test Report Report No. 837 - 67 - 9 / HV001  
(Hardness HV10 , Max value at Weld Metal 214.8 HV, Max value at HAZ 195.0 HV, and Max value at Base Metal 156.6 HV)  
Deposit Analysis N/A  
Other N/A

Welder's Name Mr. Kangsak J. Clock No. - Stamp No. -  
Test Conducted by Qualitech Public Company Limited Laboratory Test No. 837 - 67 - 9

We certify that the statements in this record are correct and that the test weld were prepared, welded and tested in accordance with the requirements of Section IX of the ASME Boiler and Pressure Vessel Code

Manufacturer Thainumpon Construction Company Limited

| Prepared By / Certified By |                                         | Witnessed By / Reviewed By       |  |
|----------------------------|-----------------------------------------|----------------------------------|--|
| COMPANY :                  | Thainumpon Construction Company Limited | Qualitech Public Company Limited |  |
| NAME :                     | <u>Mr. Sittichai Ananthachit</u>        | <u>Pattaya Chansiri</u>          |  |
| SIGNATURE :                |                                         |                                  |  |
| DATE :                     | <u>30 Sep 2024</u>                      | <u>September 30, 2024</u>        |  |



|           |                                                                                                                                                                                                                                                                                                      |                                                         |
|-----------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------|
| FM-NDT-13 | <p>THE PRESENT INSPECTION HAS BEEN CARRIED OUT TO THE BEST OF OUR KNOWLEDGE AND ABILITY</p> <p>AND OUR RESPONSIBILITY IS LIMITED TO THE EXERCISE OF DUE CARE</p> <p>THIS CERTIFICATE / REPORT IS ISSUED ON THE UNDERSTANDING THAT IT DOES NOT RELIEVE SELLERS FROM THEIR CONTRACTUAL OBLIGATIONS</p> | <p>Qualitech Job No. : NDTA240000</p> <p>REP-01-04/</p> |
|-----------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------|

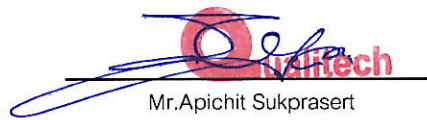
## MECHANICAL AND METALLURGICAL TESTING LABORATORY

### TEST REPORT

Report No. : 837-67-9 / TS001 , 837-67-9 / BD001  
: 837-67-9 / MA001 , 837-67-9 / HV001  
Page : 9  
Test Date : 30 September 2024

Test No. : 837-67  
  
Received Date : 26 September 2024  
  
Customer : Thainumpon Construction Company Limited  
  
Address : 35/5 Nong Wa Rd., Huai Pong, Mueang Rayong District, Rayong 21150  
  
Test Product : PQR-TNC-009  
  
Project Name : N/A  
  
Project No : N/A

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Mr. Apichit Sukprasert  
LAB Division Manager

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Laboratory of Qualitech plc wasn't accredited in testing scope that show \*(an asterisk)

| <b>TENSILE TEST REPORT</b>                                                     |  |  |  |                            |  |                                                   |  | Report No. : 837-67-9 / TS001 |  |  |  |
|--------------------------------------------------------------------------------|--|--|--|----------------------------|--|---------------------------------------------------|--|-------------------------------|--|--|--|
|                                                                                |  |  |  |                            |  |                                                   |  | Page : 1 / 3                  |  |  |  |
|                                                                                |  |  |  |                            |  |                                                   |  | Test Date : 30 September 2024 |  |  |  |
| Customer : Thainumpon Construction Company Limited                             |  |  |  |                            |  | Project Name : N/A                                |  |                               |  |  |  |
|                                                                                |  |  |  |                            |  | Project No : N/A                                  |  |                               |  |  |  |
| Address : 35/5 Nong Wa Rd., Huai Pong, Mueang Rayong District,<br>Rayong 21150 |  |  |  |                            |  | Welding Process : FCAW                            |  |                               |  |  |  |
|                                                                                |  |  |  |                            |  | Welding Position : 3G                             |  |                               |  |  |  |
|                                                                                |  |  |  |                            |  | Test Temperature : 25 ± 3 °C Humidity : 50 ± 15 % |  |                               |  |  |  |
| Test Product : PQR-TNC-009                                                     |  |  |  |                            |  | Dimension (mm) : Plate Thk. 25 mm.                |  |                               |  |  |  |
| Material Specification : SS400+SS400                                           |  |  |  |                            |  | Received Date : 26 September 2024                 |  |                               |  |  |  |
| Equipment : MTS-SANS, Universal Testing Machine, Model E64.206                 |  |  |  |                            |  | Machine Capacity : 2,000kN, Class 0.5             |  |                               |  |  |  |
| Serial No. : 51607002                                                          |  |  |  |                            |  | Calibration Date : 24 January 2024                |  |                               |  |  |  |
| Preparation method : ASTM A370-21                                              |  |  |  | Test method : ASTM A370-21 |  | Reference Code / Standard : ASME IX : 2023        |  |                               |  |  |  |

| No. | Sample No.   | Specimen Dimension |               |                            | Gauge Length   |               | Yield (0.2%Offset) |                   | Ultimate Tensile |                   | Location of fracture |
|-----|--------------|--------------------|---------------|----------------------------|----------------|---------------|--------------------|-------------------|------------------|-------------------|----------------------|
|     |              | Thickness<br>(mm)  | Width<br>(mm) | Area<br>(mm <sup>2</sup> ) | Before<br>(mm) | After<br>(mm) | Load<br>(kN)       | Strength<br>(MPa) | Load<br>(kN)     | Strength<br>(MPa) |                      |
|     |              |                    |               |                            |                |               |                    |                   |                  |                   |                      |
| 1   | 837-67-9 TS1 | 23.94              | 19.00         | 454.860                    | N/A            | N/A           | N/A                | N/A               | 234.734          | 516               | OUT of Weld metal    |
| 2   | 837-67-9 TS2 | 24.04              | 19.08         | 458.683                    | N/A            | N/A           | N/A                | N/A               | 233.643          | 509               | OUT of Weld metal    |

Remark : 1. Machine was calibrated by Thailand Institute of Scientific and Technological Research (TISTR)

2. Stress-Strain curve were attached at the end of this report

Addition details : Type of test specimen : Transverse Tensile Test (Weld)

Welder Name : Mr. Kaingsak J.

|              |                                                                                     |                       |  |             |            |             |   |                      |         |
|--------------|-------------------------------------------------------------------------------------|-----------------------|--|-------------|------------|-------------|---|----------------------|---------|
| Total        |                                                                                     | 2                     |  | Unit(s)     | Attachment |             | 2 |                      | Page(s) |
| Completed by | Approved by                                                                         | Client Representative |  | Reviewed by |            | Reviewed by |   | Owner Representative |         |
| Company      | Qualitech PCL.                                                                      |                       |  |             |            |             |   |                      |         |
| Signature    |  |                       |  |             |            |             |   |                      |         |
| Name         | Mr.Puriwat Sukonpatttra                                                             |                       |  |             |            |             |   |                      |         |
| Date         | 30 September 2024                                                                   |                       |  |             |            |             |   |                      |         |

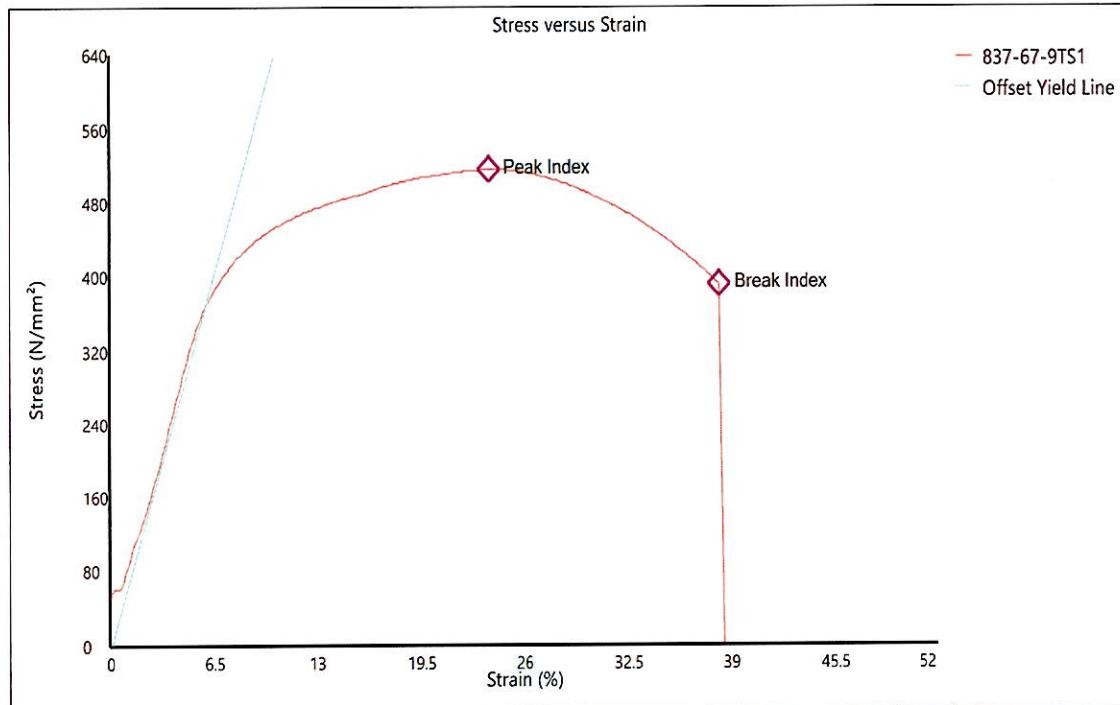
Note

1. The above results are valid exclusively for tested samples as mentioned in this report.
2. Partial publicity of the result on testing is prohibited without the written permission from Qualitech plc
3. This report shall not be reproduced in whole or part without the written approval from Qualitech plc

Attachment 1 : Test Run Review Graph

**TENSILE TEST REPORT**

Report No. : 837-67-9 / TS001  
Page : 2 / 3  
Test Date : 30 September 2024

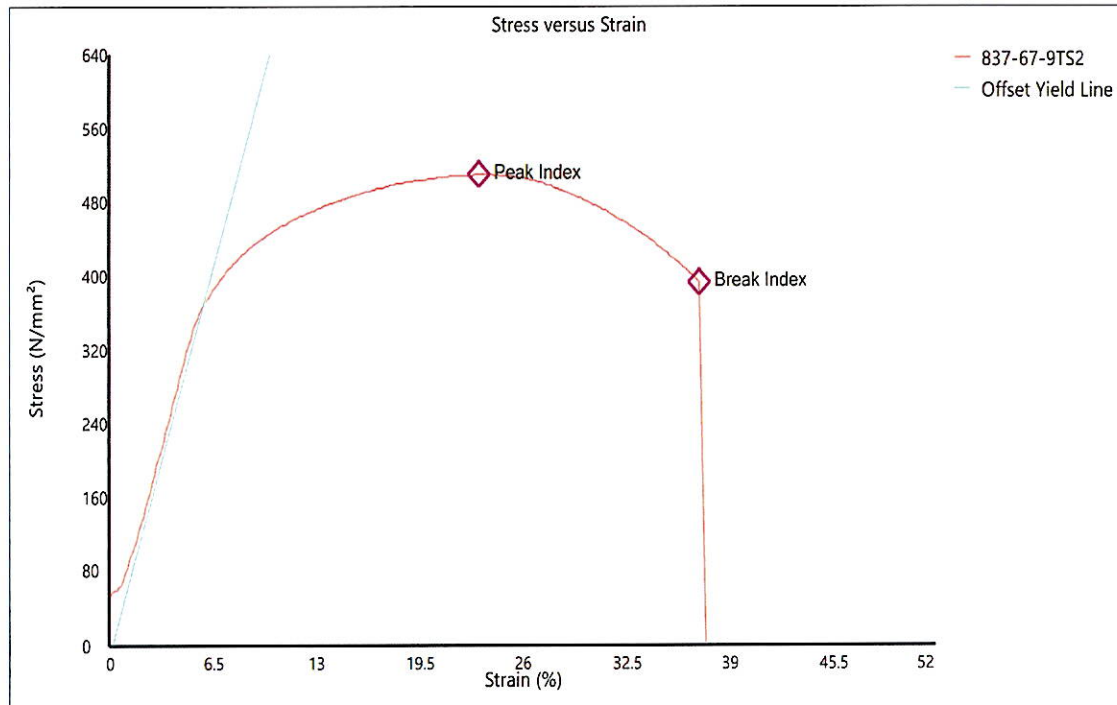


| Display Name   | Value        | Unit            |
|----------------|--------------|-----------------|
| Thickness      | 23.94        | mm              |
| Width          | 19.00        | mm              |
| Test Run Name  | 837-67-9 TS1 |                 |
| Test Rate      | 0.21         | mm/s            |
| Temperature    | 25 ± 3       | °C              |
| Area           | 454.860      | mm <sup>2</sup> |
| Maximum Force  | 234.734      | kN              |
| Maximum Stress | 516          | MPa             |

Attachment 2 : Test Run Review Graph

**TENSILE TEST REPORT**

Report No. : 837-67-9 / TS001  
Page : 3 / 3  
Test Date : 30 September 2024



| Display Name   | Value        | Unit            |
|----------------|--------------|-----------------|
| Thickness      | 24.04        | mm              |
| Width          | 19.08        | mm              |
| Test Run Name  | 837-67-9 TS2 |                 |
| Test Rate      | 0.21         | mm/s            |
| Temperature    | 25 ± 3       | °C              |
| Area           | 458.683      | mm <sup>2</sup> |
| Maximum Force  | 233.643      | kN              |
| Maximum Stress | 509          | MPa             |

## GUIDED-BEND TEST REPORT

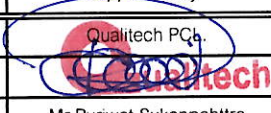
Report No. : 837-67-9 / BD001  
Page : 1 / 1  
Test Date : 30 September 2024

|                                                                                |                                                   |
|--------------------------------------------------------------------------------|---------------------------------------------------|
| Customer : Thainumpon Construction Company Limited                             | Project Name : N/A                                |
| Address : 35/5 Nong Wa Rd., Huai Pong, Mueang Rayong District,<br>Rayong 21150 | Project No : N/A                                  |
| Test Product : PQR-TNC-009                                                     | Welding Process : FCAW                            |
| Material Specification : SS400+SS400                                           | Welding Position : 3G                             |
| Equipment : Guided Bend Machine, Model PU 30 L                                 | Test Temperature : 25 ± 3 °C Humidity : 50 ± 15 % |
| Serial No. : SC 001                                                            | Dimension (mm) : Plate Thk. 25 mm.                |
| Preparation method : ASME IX : 2023                                            | Received Date : 26 September 2024                 |
| Test method : ASME IX : 2023                                                   | Machine Capacity : 30 Tons                        |
| Reference Code / Standard : ASME IX : 2023                                     | Calibration Date : 23 December 2023               |

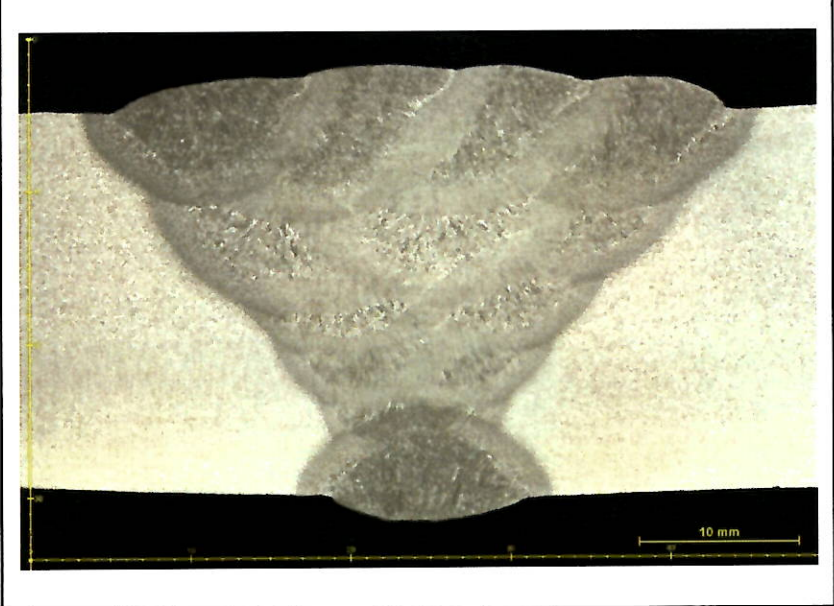
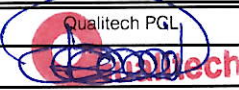
| No. | Sample No.   | Specimen Type | Specimen Dimension (mm) |       |        | Mandrel Diameter (mm) | Bend Angle (Degree) | Visually examined result for Surface discontinuities | Remark |
|-----|--------------|---------------|-------------------------|-------|--------|-----------------------|---------------------|------------------------------------------------------|--------|
|     |              |               | Thickness               | Width | Length |                       |                     |                                                      |        |
| 1   | 837-67-9 SB1 | Side bend     | 24.86                   | 10.27 | 200.00 | 40                    | 180°                | NSD                                                  | N/A    |
| 2   | 837-67-9 SB2 | Side bend     | 24.86                   | 10.25 | 200.00 | 40                    | 180°                | NSD                                                  | N/A    |
| 3   | 837-67-9 SB3 | Side bend     | 24.86                   | 10.25 | 200.00 | 40                    | 180°                | NSD                                                  | N/A    |
| 4   | 837-67-9 SB4 | Side bend     | 24.86                   | 10.26 | 200.00 | 40                    | 180°                | NSD                                                  | N/A    |

Remark : (NSD) = No Surface Discontinuity (OSD) = Open Surface Discontinuity (CD) = Corner Discontinuity

Addition details : Welder Name : Mr. Kaingsak J.

|              |                                                                                     |                       |             |             |                      |
|--------------|-------------------------------------------------------------------------------------|-----------------------|-------------|-------------|----------------------|
| Total        | 4                                                                                   | Unit(s)               | Attachment  | -           | Page(s)              |
| Completed by | Approved by                                                                         | Client Representative | Reviewed by | Reviewed by | Owner Representative |
| Company      | Qualitech PLC.                                                                      |                       |             |             |                      |
| Signature    |  |                       |             |             |                      |
| Name         | Mr. Puriwat Sukonpatttra                                                            |                       |             |             |                      |
| Date         | 30 September 2024                                                                   |                       |             |             |                      |

- Note
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| <b>MACROSTRUCTURE TEST REPORT</b>                                                   |                                                                                                                   |                                    |                                                                  | Report No. : 837-67-9 / MA001              |                      |
|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------|------------------------------------|------------------------------------------------------------------|--------------------------------------------|----------------------|
|                                                                                     |                                                                                                                   |                                    |                                                                  | Page : 1 / 1                               |                      |
|                                                                                     |                                                                                                                   |                                    |                                                                  | Test Date : 30 September 2024              |                      |
| Customer : Thainumpon Construction Company Limited                                  |                                                                                                                   |                                    | Project Name : N/A                                               |                                            |                      |
|                                                                                     |                                                                                                                   |                                    | Project No : N/A                                                 |                                            |                      |
| Address : 35/5 Nong Wa Rd., Huai Pong, Mueang Rayong District,<br>Rayong 21150      |                                                                                                                   |                                    | Welding Process : FCAW                                           |                                            |                      |
|                                                                                     |                                                                                                                   |                                    | Welding Position : 3G                                            |                                            |                      |
|                                                                                     |                                                                                                                   |                                    | Test Temperature : 25 ± 3 °C Humidity : 50 ± 15 %                |                                            |                      |
| Test Product : PQR-TNC-009                                                          |                                                                                                                   |                                    | Dimension (mm) : Plate Thk. 25 mm.                               |                                            |                      |
| Material Specification : SS400+SS400                                                |                                                                                                                   |                                    | Received Date : 26 September 2024                                |                                            |                      |
| Equipment : Microscope, SMZ745T                                                     |                                                                                                                   |                                    | Etchants Reagent : 10% Nital , Nitric Acid (65%) + Ethyl alcohol |                                            |                      |
| Serial No. : 2003739                                                                |                                                                                                                   | Calibration Date : 26 October 2023 |                                                                  | Etching Temperature: N/A °C                |                      |
|                                                                                     |                                                                                                                   |                                    |                                                                  | Etching Time : N/A sec.                    |                      |
| Preparation method : ASTM E340-15                                                   |                                                                                                                   | Test method : ASTM E340-15         |                                                                  | Reference Code / Standard : ASME IX : 2023 |                      |
| Sample No.                                                                          | Macrostructure Description                                                                                        |                                    |                                                                  |                                            | Remark               |
| 837-67-9 MA                                                                         | The macrostructure show completed fusion of the weldment. Weld metal and Heat affected zone are free from cracks. |                                    |                                                                  |                                            | N/A                  |
|  |                                                                                                                   |                                    |                                                                  |                                            |                      |
| Addition details : Welder Name : Mr. Kaingsak J.                                    |                                                                                                                   |                                    |                                                                  |                                            |                      |
|                                                                                     |                                                                                                                   |                                    |                                                                  |                                            |                      |
| Total                                                                               |                                                                                                                   | 1                                  |                                                                  | Unit(s) Attachment - Page(s)               |                      |
| Completed by                                                                        | Approved by                                                                                                       | Client Representative              | Reviewed by                                                      | Reviewed by                                | Owner Representative |
| Company                                                                             | Qualitech PGL                                                                                                     |                                    |                                                                  |                                            |                      |
| Signature                                                                           |                                |                                    |                                                                  |                                            |                      |
| Name                                                                                | Mr.Puriwat Sukonpatttra                                                                                           |                                    |                                                                  |                                            |                      |
| Date                                                                                | 30 September 2024                                                                                                 |                                    |                                                                  |                                            |                      |

Note

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2. Partial publicity of the result on testing is prohibited without the written permission from Qualitech plc
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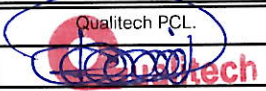
## VICKERS HARDNESS TEST REPORT

Report No. : 837-67-9 / HV001  
Page : 1 / 3  
Test Date : 30 September 2024

|                                                                                |                                                                       |
|--------------------------------------------------------------------------------|-----------------------------------------------------------------------|
| Customer : Thainumpon Construction Company Limited                             | Project Name : N/A                                                    |
|                                                                                | Project No : N/A                                                      |
| Address : 35/5 Nong Wa Rd., Huai Pong, Mueang Rayong District,<br>Rayong 21150 | Welding Process : FCAW                                                |
|                                                                                | Welding Position : 3G                                                 |
|                                                                                | Test Temperature : 25 ± 3 °C Humidity : 50 ± 15 %                     |
| Test Product : PQR-TNC-009                                                     | Dimension (mm) : Plate Thk. 25 mm.                                    |
| Material Specification : SS400+SS400                                           | Received Date : 26 September 2024                                     |
| Equipment : Vickers Hardness Testing Machine, Model HV-100                     | Indenter : Diamond                                                    |
| Serial No. : 000031410 Calibration Date : 28 September 2023                    | Test Force : 10 Kgf. Test Scale : HV10                                |
| Preparation method : ASTM E384-17                                              | Test method : ASTM E384-17 Reference Code / Standard : ASME IX : 2023 |

| Sample No. 837-67-9 HV<br>Test Location | Hardness Value |        |           |        |           |        |
|-----------------------------------------|----------------|--------|-----------|--------|-----------|--------|
|                                         | Point No.      | Line 1 | Point No. | Line 2 | Point No. | Line 3 |
| Base Metal of Left Side                 | 1              | 142.9  | 16        | 152.1  | -         | -      |
|                                         | 2              | 146.5  | 17        | 154.6  | -         | -      |
|                                         | 3              | 148.9  | 18        | 156.6  | -         | -      |
| Heat Affected Zone (HAZ) of Left Side   | 4              | 166.2  | 19        | 160.7  | -         | -      |
|                                         | 5              | 179.6  | 20        | 174.1  | -         | -      |
|                                         | 6              | 189.5  | 21        | 195.0  | -         | -      |
| Weld Metal                              | 7              | 190.7  | 22        | 208.4  | -         | -      |
|                                         | 8              | 189.2  | 23        | 214.8  | -         | -      |
|                                         | 9              | 188.8  | 24        | 207.1  | -         | -      |
| Heat Affected Zone (HAZ) of Right Side  | 10             | 192.6  | 25        | 191.8  | -         | -      |
|                                         | 11             | 183.5  | 26        | 172.4  | -         | -      |
|                                         | 12             | 173.7  | 27        | 164.1  | -         | -      |
| Base Metal of Right Side                | 13             | 146.7  | 28        | 154.1  | -         | -      |
|                                         | 14             | 146.5  | 29        | 154.4  | -         | -      |
|                                         | 15             | 145.2  | 30        | 155.5  | -         | -      |

Addition details : Welder Name : Mr. Kaingsak J.

|              |                                                                                     |                       |             |             |                      |
|--------------|-------------------------------------------------------------------------------------|-----------------------|-------------|-------------|----------------------|
| Total        | 1                                                                                   | Unit(s)               | Attachment  | -           | Page(s)              |
| Completed by | Approved by                                                                         | Client Representative | Reviewed by | Reviewed by | Owner Representative |
| Company      | Qualitech PCL.                                                                      |                       |             |             |                      |
| Signature    |  |                       |             |             |                      |
| Name         | Mr. Puriwat Sukonpahttra                                                            |                       |             |             |                      |
| Date         | 30 September 2024                                                                   |                       |             |             |                      |

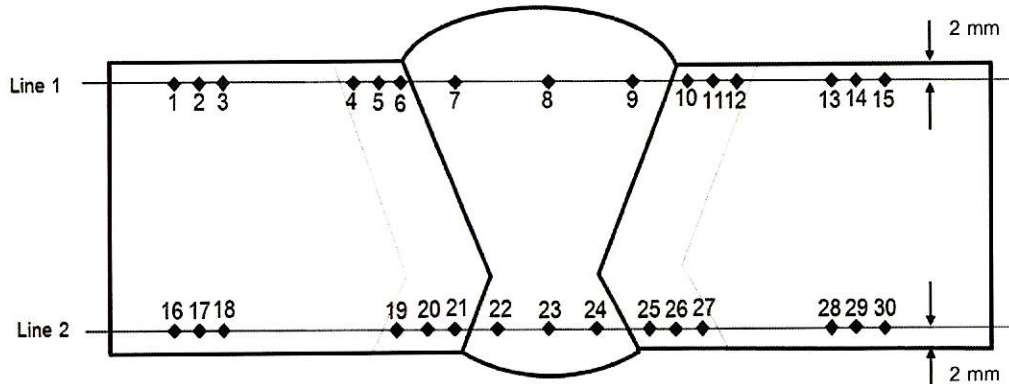
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## VICKERS HARDNESS TEST REPORT

Report No. : 837-67-9 / HV001  
Page : 3 / 3  
Test Date : 30 September 2024

|                                                                                |                            |                                                   |                   |
|--------------------------------------------------------------------------------|----------------------------|---------------------------------------------------|-------------------|
| Customer : Thainumpon Construction Company Limited                             |                            | Project Name : N/A                                |                   |
| Address : 35/5 Nong Wa Rd., Huai Pong, Mueang Rayong District,<br>Rayong 21150 |                            | Project No : N/A                                  |                   |
|                                                                                |                            | Welding Process : FCAW                            |                   |
|                                                                                |                            | Welding Position : 3G                             |                   |
| Test Product : PQR-TNC-009                                                     |                            | Test Temperature : 25 ± 3 °C Humidity : 50 ± 15 % |                   |
| Material Specification : SS400+SS400                                           |                            | Dimension (mm) : Plate Thk. 25 mm.                |                   |
| Equipment : Vickers Hardness Testing Machine, Model HV-100                     |                            | Received Date : 26 September 2024                 |                   |
| Serial No. : 000031410                                                         |                            | Indenter : Diamond                                |                   |
| Calibration Date : 28 September 2023                                           |                            | Test Force : 10 Kgf.                              | Test Scale : HV10 |
| Preparation method : ASTM E384-17                                              | Test method : ASTM E384-17 | Reference Code / Standard : ASME IX : 2023        |                   |

Layout of Test Location



Addition details : Welder Name : Mr. Kaingsak J.

|              |                          |                       |             |             |                      |
|--------------|--------------------------|-----------------------|-------------|-------------|----------------------|
| Total        | 1                        | Unit(s)               | Attachment  | -           | Page(s)              |
| Completed by | Approved by              | Client Representative | Reviewed by | Reviewed by | Owner Representative |
| Company      | Qualitech PLC.           |                       |             |             |                      |
| Signature    |                          |                       |             |             |                      |
| Name         | Mr. Puriwat Sukonpatttra |                       |             |             |                      |
| Date         | 30 September 2024        |                       |             |             |                      |

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Appendix #1

Pictures of Specimen Test

Before Testing



After Testing



Thainumpon Construction Company Limited

Test Method : ASMA Section IX : 2023

PQR No : PQR-TNC-009

Process : FCAW , Position : 3G , Material : Plate Thk. 25.0 mm. , 55400 + 55400

Detail test : Tensile Weld 2 pcs , Side bend 4 pcs , Macro 1 pcs , Hardness HV10 1 pcs / 30 point

Mr. Kaingsak J.

Lab Test Sample No. 837-67-9

Test No. : 837-67  
Test date : 20/9/2024  
Temperature : 25.8° C  
Humidity : 46% RH

Sample No : 837-67-9HV  
Standard : ASME IX : 2023  
Test Method : ASTM E384-17

PQR-TNC-009  
Plate T25 / S9400

# Vickers Hardness Test Result

| No. | Force | Detection Lens | d1 [μm] | d2 [μm] | Hardness | Scale | No. | Force | Detection Lens | d1 [μm] | d2 [μm] | Hardness | Scale |
|-----|-------|----------------|---------|---------|----------|-------|-----|-------|----------------|---------|---------|----------|-------|
| 1   | 10    | 10X            | 360.72  | 359.70  | 142.9    | HV    | 16  | 10    | 10X            | 351.18  | 347.12  | 152.1    | HV    |
| 2   | 10    | 10X            | 346.72  | 364.73  | 146.5    | HV    | 17  | 10    | 10X            | 345.45  | 347.12  | 154.6    | HV    |
| 3   | 10    | 10X            | 351.18  | 354.67  | 148.9    | HV    | 18  | 10    | 10X            | 343.54  | 344.61  | 156.6    | HV    |
| 4   | 10    | 10X            | 337.82  | 330.14  | 166.2    | HV    | 19  | 10    | 10X            | 340.36  | 338.95  | 160.7    | HV    |
| 5   | 10    | 10X            | 322.55  | 320.08  | 179.6    | HV    | 20  | 10    | 10X            | 332.73  | 320.08  | 174.1    | HV    |
| 6   | 10    | 10X            | 320.00  | 305.62  | 189.5    | HV    | 21  | 10    | 10X            | 316.18  | 300.59  | 195.0    | HV    |
| 7   | 10    | 10X            | 318.09  | 305.62  | 190.7    | HV    | 22  | 10    | 10X            | 306.64  | 289.90  | 208.4    | HV    |
| 8   | 10    | 10X            | 314.91  | 311.28  | 189.2    | HV    | 23  | 10    | 10X            | 299.01  | 288.64  | 214.8    | HV    |
| 9   | 10    | 10X            | 315.55  | 311.28  | 188.8    | HV    | 24  | 10    | 10X            | 307.91  | 290.53  | 207.1    | HV    |
| 10  | 10    | 10X            | 315.55  | 304.99  | 192.6    | HV    | 25  | 10    | 10X            | 315.55  | 306.25  | 191.8    | HV    |
| 11  | 10    | 10X            | 322.55  | 313.17  | 183.5    | HV    | 26  | 10    | 10X            | 330.82  | 325.11  | 172.4    | HV    |
| 12  | 10    | 10X            | 331.45  | 321.97  | 173.7    | HV    | 27  | 10    | 10X            | 341.00  | 331.40  | 164.1    | HV    |
| 13  | 10    | 10X            | 359.45  | 351.53  | 146.7    | HV    | 28  | 10    | 10X            | 347.36  | 346.49  | 154.1    | HV    |
| 14  | 10    | 10X            | 360.08  | 351.53  | 146.5    | HV    | 29  | 10    | 10X            | 344.18  | 349.01  | 154.4    | HV    |
| 15  | 10    | 10X            | 360.08  | 354.67  | 145.2    | HV    | 30  | 10    | 10X            | 341.63  | 349.01  | 155.5    | HV    |

Tested By : M. S.  
Position : Engineer  
Date : 20 Sep 2024

Attant.  
Project Engineer  
1 / 10 / 24

Reviewed By : [Signature]  
Position : Supervisor  
Date : 20/9/2024



บริษัท ควอลิเทค จำกัด (มหาชน)  
Qualitech Public Company Limited

บันทึกผลการทดสอบความต้านแรงดึง

Tensile Test Record

รหัสเอกสาร : FM-TS-01

หน้าที่ : 1 / 1

แก้ไขครั้งที่ : 04

วันที่บังคับใช้ : 28 พฤศจิกายน 2560

|                       |                                                                                                                                                |                       |                |
|-----------------------|------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|----------------|
| Test No.              | : 837-67                                                                                                                                       | Test Date             | : 30/9/2024    |
| Shape of Crosssection | : <input checked="" type="checkbox"/> Rectangular <input type="checkbox"/> Round <input type="checkbox"/> Pipe <input type="checkbox"/> Camber | Test Temp.            | : 25.0 °C      |
| area                  | : <input type="checkbox"/> Other : Tensile Transverse Weld                                                                                     | Humidity              | : 44 %         |
| Reference Standard    | : ASME Section IX: 2023                                                                                                                        | Test Standard         | : ASTM A370-21 |
| Measurement tools (1) | : 1107211                                                                                                                                      | Measurement tools (2) | :              |

| Sample No.                                                                 |                                              |                       | 837-67-1 TS 1        | 837-67-1 TS 2         | 837-67-2 TS 1 | 837-67-2 TS 2                 | 837-67-3 TS 1 | 837-67-3 TS 2 |
|----------------------------------------------------------------------------|----------------------------------------------|-----------------------|----------------------|-----------------------|---------------|-------------------------------|---------------|---------------|
| Before                                                                     | Thickness (T) (mm)                           | 1                     | 5.09                 | 5.05                  | 10.15         | 10.15                         | 5.07          | 5.09          |
|                                                                            |                                              | 2                     | 5.09                 | 5.05                  | 10.15         | 10.15                         | 5.07          | 5.09          |
|                                                                            |                                              | 3                     | 5.09                 | 5.05                  | 10.15         | 10.15                         | 5.07          | 5.09          |
|                                                                            |                                              | Avg.                  | 5.09                 | 5.05                  | 10.15         | 10.15                         | 5.07          | 5.09          |
|                                                                            | Width (W) / Diameter(D) (mm)                 | 1                     | 13.02                | 13.00                 | 19.00         | 19.00                         | 13.00         | 13.00         |
|                                                                            |                                              | 2                     | 13.02                | 13.00                 | 19.00         | 19.00                         | 13.00         | 13.00         |
|                                                                            |                                              | 3                     | 13.02                | 13.00                 | 19.00         | 19.00                         | 13.00         | 13.00         |
|                                                                            |                                              | Avg.                  | 13.02                | 13.00                 | 19.00         | 19.00                         | 13.00         | 13.00         |
| After                                                                      | Thickness (T) (mm)                           | 1                     | -                    | -                     | -             | -                             | -             | -             |
|                                                                            |                                              | 2                     | -                    | -                     | -             | -                             | -             | -             |
|                                                                            |                                              | 3                     | -                    | -                     | -             | -                             | -             | -             |
|                                                                            |                                              | Avg.                  | -                    | -                     | -             | -                             | -             | -             |
|                                                                            | Width (W) / Diameter(D) (mm)                 | 1                     | -                    | -                     | -             | -                             | -             | -             |
|                                                                            |                                              | 2                     | -                    | -                     | -             | -                             | -             | -             |
|                                                                            |                                              | 3                     | -                    | -                     | -             | -                             | -             | -             |
|                                                                            |                                              | Avg.                  | -                    | -                     | -             | -                             | -             | -             |
| Area (mm^2)                                                                | Before                                       | 66.2719               | 65.6500              | 192.8500              | 192.8500      | 65.9100                       | 65.3900       |               |
|                                                                            | After                                        | -                     | -                    | -                     | -             | -                             | -             |               |
| Reduction of Area (%)                                                      |                                              | -                     | -                    | -                     | -             | -                             | -             |               |
| Gauge length (mm)                                                          | Before                                       | -                     | -                    | -                     | -             | -                             | -             |               |
|                                                                            | After                                        | -                     | -                    | -                     | -             | -                             | -             |               |
| Elongation (%)                                                             |                                              | -                     | -                    | -                     | -             | -                             | -             |               |
| Yield<br><input type="checkbox"/> Upper<br><input type="checkbox"/> Offset | Load (kN)                                    | -                     | -                    | -                     | -             | -                             | -             |               |
|                                                                            | Strength (Mpa)                               | -                     | -                    | -                     | -             | -                             | -             |               |
| Tensile                                                                    | Load (kN)                                    | 49.659                | 47.696               | 116.661               | 117.472       | 52.316                        | 48.958        |               |
|                                                                            | Strength (Mpa)                               | 749                   | 726                  | 605                   | 609           | 794                           | 749           |               |
| Fracture (IN/OUT)                                                          | <input type="checkbox"/> Gauge length        | OUT weld              | OUT weld             | OUT weld              | OUT weld      | IN weld                       | IN weld       |               |
|                                                                            | <input checked="" type="checkbox"/> Weldment |                       |                      |                       |               |                               |               |               |
| Remark :                                                                   | PQR NO :                                     | PQR-TNC-001           |                      | PQR-TNC-002           |               | PQR-TNC-003                   |               |               |
|                                                                            | Material :                                   | A106 GR.B + A106 GR.B |                      | A106 GR.B + A106 GR.B |               | A312 GR.TP304 + A312 GR.TP304 |               |               |
|                                                                            | Tested by                                    |                       | Reviewed by          |                       |               | Witness by                    |               |               |
| Signature                                                                  |                                              |                       |                      |                       |               |                               |               |               |
| Name                                                                       | Thirupong Sampathin                          |                       | PURIWAT / SUPERVISOR |                       |               | Mr. Sathya Narayana           |               |               |
| Position                                                                   | Technician                                   |                       |                      |                       |               | Project Engineer              |               |               |
| Date                                                                       | 30/9/2024                                    |                       | 30/9/2024            |                       |               | 1-10-24                       |               |               |

|                         |                                                                                                                                              |  |                         |              |  |
|-------------------------|----------------------------------------------------------------------------------------------------------------------------------------------|--|-------------------------|--------------|--|
| Test No. :              | 837-67                                                                                                                                       |  | Test Date :             | 30/9/2024    |  |
| Shape of Crossection :  | <input checked="" type="checkbox"/> Rectangular <input type="checkbox"/> Round <input type="checkbox"/> Pipe <input type="checkbox"/> Camber |  | Test Temp. :            | 25.0 °C      |  |
| area                    | <input type="checkbox"/> Other :    Tensile Transverse Weld                                                                                  |  | Humidity :              | 44 %         |  |
| Reference Standard :    | ASME Section IX: 2023                                                                                                                        |  | Test Standard :         | ASTM A370-21 |  |
| Measurement tools (1) : |                                                                                                                                              |  | Measurement tools (2) : |              |  |

| Sample No.              |                                                | 837-67- 4 TS 1               | 837-67- 4 TS 2 | 837-67- 5 TS 1          | 837-67- 5 TS 2 | 837-67- 6 TS 1        | 837-67- 6 TS 2 |       |
|-------------------------|------------------------------------------------|------------------------------|----------------|-------------------------|----------------|-----------------------|----------------|-------|
| Before                  | Thickness (T) (mm)                             | 1                            | 8.67           | 9.75                    | 4.65           | 4.66                  | 10.03          | 10.07 |
|                         |                                                | 2                            | 8.67           | 9.75                    | 4.65           | 4.66                  | 10.03          | 10.07 |
|                         |                                                | 3                            | 8.67           | 9.75                    | 4.65           | 4.66                  | 10.03          | 10.07 |
|                         |                                                | Avg.                         | 8.67           | 9.75                    | 4.65           | 4.66                  | 10.03          | 10.07 |
|                         | Width (W) / Diameter(D) (mm)                   | 1                            | 19.01          | 19.02                   | 19.02          | 19.00                 | 19.01          | 19.03 |
|                         |                                                | 2                            | 19.01          | 19.02                   | 19.02          | 19.00                 | 19.01          | 19.03 |
|                         |                                                | 3                            | 19.01          | 19.02                   | 19.02          | 19.00                 | 19.01          | 19.03 |
|                         |                                                | Avg.                         | 19.01          | 19.02                   | 19.02          | 19.00                 | 19.01          | 19.03 |
| After                   | Thickness (T) (mm)                             | 1                            | -              | -                       | -              | -                     | -              | -     |
|                         |                                                | 2                            | -              | -                       | -              | -                     | -              | -     |
|                         |                                                | 3                            | -              | -                       | -              | -                     | -              | -     |
|                         |                                                | Avg.                         | -              | -                       | -              | -                     | -              | -     |
|                         | Width (W) / Diameter(D) (mm)                   | 1                            | -              | -                       | -              | -                     | -              | -     |
|                         |                                                | 2                            | -              | -                       | -              | -                     | -              | -     |
|                         |                                                | 3                            | -              | -                       | -              | -                     | -              | -     |
|                         |                                                | Avg.                         | -              | -                       | -              | -                     | -              | -     |
| Area (mm <sup>2</sup> ) | Before                                         | 168.6187                     | 185.4450       | 68.1470                 | 60.0600        | 190.6703              | 191.63210      |       |
|                         | After                                          | -                            | -              | -                       | -              | -                     | -              |       |
| Reduction of Area (%)   |                                                | -                            | -              | -                       | -              | -                     | -              |       |
| Gauge length (mm)       | Before                                         | -                            | -              | -                       | -              | -                     | -              |       |
|                         | After                                          | -                            | -              | -                       | -              | -                     | -              |       |
| Elongation (%)          |                                                | -                            | -              | -                       | -              | -                     | -              |       |
| Yield                   | <input type="checkbox"/> Upper Load (kN)       | -                            | -              | -                       | -              | -                     | -              |       |
|                         | <input type="checkbox"/> Offset Strength (Mpa) | -                            | -              | -                       | -              | -                     | -              |       |
| Tensile                 | Load (kN)                                      | 118.713                      | 126.475        | 41.727                  | 40.999         | 109.399               | 110.437        |       |
|                         | Strength (Mpa)                                 | 704                          | 682            | 661                     | 683            | 574                   | 576            |       |
| Fracture (IN/OUT)       | <input type="checkbox"/> Gauge length          | IN Weld                      | IN Weld        | out weld.               | out weld.      | out weld.             | Out of Weld    |       |
|                         | <input checked="" type="checkbox"/> Weldment   |                              |                |                         |                |                       |                |       |
| Remark :                | PQR NO :                                       | PQR-TNC-004                  |                | PQR-TNC-005             |                | PQR-TNC-006           |                |       |
|                         | Material :                                     | A312 GR.TP304 + A312GR.TP304 |                | A335GR.P11 + A335GR.P11 |                | A335GR.P11+A335GR.P11 |                |       |
| Tested by               |                                                | Reviewed by                  |                |                         | Witness by     |                       |                |       |
| Signature               |                                                | Signature                    |                |                         | Signature      |                       |                |       |
| Name                    |                                                | Name                         |                |                         | Name           |                       |                |       |
| Position                |                                                | Position                     |                |                         | Position       |                       |                |       |
| Date                    |                                                | Date                         |                |                         | Date           |                       |                |       |

|                                                                                           |  |                                                                                                                                                                                                                                            |  |  |  |                                                                                                       |  |
|-------------------------------------------------------------------------------------------|--|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|--|-------------------------------------------------------------------------------------------------------|--|
| <br><b>Qualitech</b><br>บริษัท ควอลิเทค จำกัด (มหาชน)<br>Qualitech Public Company Limited |  | <b>บันทึกผลการทดสอบความต้านแรงดึง</b><br><br><b>Tensile Test Record</b>                                                                                                                                                                    |  |  |  | รหัสเอกสาร : FM-TS-01<br>หน้าที่ : 1 / 1<br>แก้ไขครั้งที่ : 04<br>วันที่บังคับใช้ : 28 พฤศจิกายน 2560 |  |
|                                                                                           |  | Test No. : 837-67                                                                                                                                                                                                                          |  |  |  | Test Date : 30/9/2024                                                                                 |  |
|                                                                                           |  | Shape of Crossection : <input checked="" type="checkbox"/> Rectangular <input type="checkbox"/> Round <input type="checkbox"/> Pipe <input type="checkbox"/> Camber<br>area <input type="checkbox"/> Other : _____ Tensile Transverse Weld |  |  |  | Test Temp. : 25.0 °C<br>Humidity : 44 %                                                               |  |
|                                                                                           |  | Reference Standard : ASME Section IX: 2023                                                                                                                                                                                                 |  |  |  | Test Standard : ASTM A370-21                                                                          |  |
| Measurement tools (1) : _____                                                             |  | Measurement tools (2) : _____                                                                                                                                                                                                              |  |  |  |                                                                                                       |  |

| Sample No.            |                                                | 837-67- 7 TS 1                               | 837-67- 7 TS 2 | 837-67- 8 TS 1               | 837-67- 8 TS 2 | 837-67- 9 TS 2               | 837-67- 9 TS 2 |       |
|-----------------------|------------------------------------------------|----------------------------------------------|----------------|------------------------------|----------------|------------------------------|----------------|-------|
| Before                | Thickness (T) (mm)                             | 1                                            | 24.85          | 24.87                        | 11.97          | 11.07                        | 29.94          | 24.04 |
|                       |                                                | 2                                            | 24.85          | 24.87                        | 11.97          | 11.07                        | 29.94          | 24.04 |
|                       |                                                | 3                                            | 24.86          | 24.87                        | 11.97          | 11.07                        | 29.94          | 24.04 |
|                       |                                                | Avg.                                         | 24.85          | 24.87                        | 11.97          | 11.07                        | 29.94          | 24.04 |
|                       | Width (W) / Diameter(D) (mm)                   | 1                                            | 19.00          | 19.08                        | 19.03          | 19.00                        | 19.00          | 19.03 |
|                       |                                                | 2                                            | 19.00          | 19.08                        | 19.03          | 19.00                        | 19.00          | 19.03 |
|                       |                                                | 3                                            | 19.00          | 19.08                        | 19.03          | 19.00                        | 19.00          | 19.03 |
|                       |                                                | Avg.                                         | 19.00          | 19.08                        | 19.03          | 19.00                        | 19.00          | 19.03 |
| After                 | Thickness (T) (mm)                             | 1                                            | -              | -                            | -              | -                            | -              | -     |
|                       |                                                | 2                                            | -              | -                            | -              | -                            | -              | -     |
|                       |                                                | 3                                            | -              | -                            | -              | -                            | -              | -     |
|                       |                                                | Avg.                                         | -              | -                            | -              | -                            | -              | -     |
|                       | Width (W) / Diameter(D) (mm)                   | 1                                            | -              | -                            | -              | -                            | -              | -     |
|                       |                                                | 2                                            | -              | -                            | -              | -                            | -              | -     |
|                       |                                                | 3                                            | -              | -                            | -              | -                            | -              | -     |
|                       |                                                | Avg.                                         | -              | -                            | -              | -                            | -              | -     |
| Area (mm^2)           | Before                                         | 472.1500                                     | 472.5300       | 216.9896                     | 210.3300       | 454.8600                     | 458.6832       |       |
|                       | After                                          | -                                            | -              | -                            | -              | -                            | -              |       |
| Reduction of Area (%) |                                                | -                                            | -              | -                            | -              | -                            | -              |       |
| Gauge length (mm)     | Before                                         | -                                            | -              | -                            | -              | -                            | -              |       |
|                       | After                                          | -                                            | -              | -                            | -              | -                            | -              |       |
| Elongation (%)        |                                                | -                                            | -              | -                            | -              | -                            | -              |       |
| Yield                 | <input type="checkbox"/> Upper Load (kN)       | -                                            | -              | -                            | -              | -                            | -              |       |
|                       | <input type="checkbox"/> Offset Strength (Mpa) | -                                            | -              | -                            | -              | -                            | -              |       |
| Tensile               | Load (kN)                                      | 248.2%<br>526                                | 248.848<br>527 | 107.055<br>493               | 103.244<br>491 | 234.732<br>516               | 233.643<br>509 |       |
|                       | Strength (Mpa)                                 |                                              |                |                              |                |                              |                |       |
| Fracture (IN/OUT)     | <input type="checkbox"/> Gauge length          | out weld.                                    | out weld.      | out weld.                    | out weld.      | out weld.                    | out weld.      |       |
|                       | <input checked="" type="checkbox"/> Weldment   |                                              |                |                              |                |                              |                |       |
| Remark :              |                                                | PQR NO : PQR-TNC-007<br>Material : A36 + A36 |                | PQR-TNC-008<br>SS400 + SS400 |                | PQR-TNC-009<br>SS400 + SS400 |                |       |
| Tested by             |                                                | Reviewed by                                  |                | Witness by                   |                |                              |                |       |
| Signature             |                                                | Signature                                    |                | Signature                    |                |                              |                |       |
| Name                  |                                                | Name                                         |                | Name                         |                |                              |                |       |
| Position              |                                                | Position                                     |                | Position                     |                |                              |                |       |
| Date                  |                                                | Date                                         |                | Date                         |                |                              |                |       |

บันทึกผลชิ้นงานทดสอบการดัดโค้ง  
Guided-Bend Test Record

รหัสเอกสาร : FM-BD-01  
หน้าที่ : 1 / 1  
แก้ไขครั้งที่ : 04  
วันที่บังคับใช้ : 28 พฤศจิกายน 2560

Reference code/Standard : ASME Section IX: 2023

Test Standard : ASME IX : 2023

Testing room temperature : 24.5 °C

Test No. : 837-67

Measurement Tools : 110 ๙๗.๗

Humidity : 47 %

| Sample No. | Location | Sample Dimension (mm.) |       |        | Mandrel Dia.<br>(mm.) | Angle | Visually examined for surface discontinuities |                                | Remark                       |
|------------|----------|------------------------|-------|--------|-----------------------|-------|-----------------------------------------------|--------------------------------|------------------------------|
|            |          | Thickness              | Width | Length |                       |       | Visual result                                 | Discontinuity Dimensions (mm.) |                              |
| 837-67-5   | FB1      | 5.5๖                   | 14.1๑ | ๑๕๕.๐๖ | 20                    | 180°  | N/A                                           | N/A                            | PQR No : PQR-TNC-005         |
| "          | FB2      | 5.๕๑                   | 1๑.๑๐ | ๑๕๐.๖๖ | 20                    | 180°  | N/A                                           | N/A                            | GTAW / 6G / 5.54 mm.         |
| "          | RB1      | 5.5๖                   | 1๑.1๖ | ๑๖๐.๖๖ | 20                    | 180°  | ๕๔D                                           | 0-5๐ mm                        | Pipe 2 " / A335GR.P11        |
| "          | RB2      | 5.51                   | 1๑.1๑ | ๑๖๐.๔๖ | 20                    | 180°  | N/A                                           | N/A                            | "                            |
| 837-67-6   | SB1      | 11.๑๑                  | 1๐.๑5 | ๑๐๐.๖๖ | 40                    | 180°  | N/A                                           | N/A                            | PQR No : PQR-TNC-006         |
| "          | SB2      | 11.๑5                  | 1๐.๑6 | ๑๐๐.๖๖ | 40                    | 180°  | ๕๔D                                           | 0-5๐ mm                        | GTAW + SMAW / 6G / 10.97 mm. |
| "          | SB3      | 11.๑๔                  | 1๐.๑๕ | ๑๐๐.๖๖ | 40                    | 180°  | N/A                                           | N/A                            | Pipe 6 " / A335GR.P11        |
| "          | SB4      | 11.๑๑                  | 1๐.๑๖ | ๑๐๐.๖๖ | 40                    | 180°  | N/A                                           | N/A                            | "                            |
| 837-67-7   | SB1      | ๑5.4๑                  | 1๐.๑1 | ๑๐๐.๖๖ | 40                    | 180°  | N/A                                           | N/A                            | PQR No : PQR-TNC-007         |
| "          | SB2      | ๑5.4๑                  | 1๐.๑4 | ๑๐๕.๖๖ | 40                    | 180°  | N/A                                           | N/A                            | FCAW / Plate Thk.25.0 mm.    |
| "          | SB3      | ๑5.4๑                  | 1๐.๑5 | ๑๐๐.๖๖ | 40                    | 180°  | N/A                                           | N/A                            | A36 + A36                    |
| "          | SB4      | ๑5.4๑                  | 1๐.๑6 | ๑๐๐.๖๖ | 40                    | 180°  | N/A                                           | N/A                            | "                            |
| 837-67-8   | SB1      | 11.๖15                 | 1๐.๑๑ | ๑๕๐.๖๖ | 40                    | 180°  | N/A                                           | N/A                            | PQR No : PQR-TNC-008         |
| "          | SB2      | 11.๖15                 | 1๐.๑6 | ๑๕๐.๖๖ | 40                    | 180°  | ๕๔D                                           | 0-5๐ mm                        | SMAW / Plate Thk.12.0 mm.    |
| "          | SB3      | 11.๖1๑                 | 1๐.๑5 | ๑๕๐.๖๖ | 40                    | 180°  | N/A                                           | N/A                            | SS400 + SS400                |
| "          | SB4      | 11.๖14                 | 1๐.๑4 | ๑๕๐.๖๖ | 40                    | 180°  | N/A                                           | N/A                            | "                            |

Additional Detail :

Result : (NSD) = No Surface Discontinuity

(OSD) = Open Surface Discontinuity

(CC) = Corner Crack

| Tested by       |                         | Reviewed by          |  | Witnessed by                     |  |
|-----------------|-------------------------|----------------------|--|----------------------------------|--|
| Signature       |                         | Signature            |  | Signature                        |  |
| Name / Position | Suttin / Asst. Engineer | PURIWAT / SUPERVISOR |  | Mr. Suttanwit / Project Engineer |  |
| Date            | 30/9/2024               | 30/9/2024            |  | 1 - 10 - 24                      |  |



บริษัท ควอลิเทค จำกัด (มหาชน)  
Qualitech Public Company Limited

# บันทึกผลชิ้นงานทดสอบการดัดโค้ง

## Guided-Bend Test Record

รหัสเอกสาร : FM-BD-01

หน้าที่ : 1 / 1

แก้ไขครั้งที่ : 04

วันที่บังคับใช้ : 28 พฤศจิกายน 2560

Reference code/Standard : ASME Section IX: 2023

Test Standard : ASME IX : 2023

Testing room temperature : 24.4 °C

Test No. : 837-67

Measurement Tools : 1207211

Humidity : 42 %

| Sample No. | Location      | Sample Dimension (mm.) |        |        | Mandrel Dia.<br>(mm.) | Angle | Visually examined for surface discontinuities |                                | Remark                       |
|------------|---------------|------------------------|--------|--------|-----------------------|-------|-----------------------------------------------|--------------------------------|------------------------------|
|            |               | Thickness              | Width  | Length |                       |       | Visual result                                 | Discontinuity Dimensions (mm.) |                              |
| 837-67-1   | FB1 Face bend | 5.75                   | 111.25 | 160.00 | 20                    | 180°  | N/D                                           | N/A                            | PQR No : PQR-TNC-001         |
| "          | FB2 "         | 5.55                   | 111.25 | 160.00 | 20                    | 180°  | N/D                                           | N/A                            | GTAW / 6G / 5.54 mm.         |
| "          | RB1 Root bend | 5.55                   | 111.25 | 160.00 | 20                    | 180°  | N/D                                           | N/A                            | Pipe 2 " / A106 GR.B         |
| "          | RB2 "         | 5.55                   | 111.25 | 160.00 | 20                    | 180°  | N/D                                           | N/A                            | "                            |
| 837-67-2   | SB1 Side bend | 11.44                  | 110.25 | 200.00 | 40                    | 180°  | N/D                                           | N/A                            | PQR No : PQR-TNC-002         |
| "          | SB2 "         | 11.44                  | 110.25 | 200.00 | 40                    | 180°  | N/D                                           | N/A                            | GTAW + SMAW / 6G / 10.97 mm. |
| "          | SB3 "         | 11.44                  | 110.25 | 200.00 | 40                    | 180°  | N/D                                           | N/A                            | Pipe 6 " / A106GR.B          |
| "          | SB4 "         | 11.37                  | 110.25 | 200.00 | 40                    | 180°  | N/D                                           | N/A                            | "                            |
| 837-67-3   | FB1 Face bend | 5.49                   | 111.22 | 160.00 | 20                    | 180°  | N/D                                           | N/A                            | PQR No : PQR-TNC-003         |
| "          | FB2 "         | 5.44                   | 111.25 | 160.00 | 20                    | 180°  | N/D                                           | N/A                            | GTAW / 6G / 5.54 mm.         |
| "          | RB1 Root bend | 5.46                   | 111.26 | 160.00 | 20                    | 180°  | N/D                                           | N/A                            | Pipe 2 " / A312GR.TP304      |
| "          | RB2 "         | 5.50                   | 111.22 | 160.00 | 20                    | 180°  | N/D                                           | N/A                            | "                            |
| 837-67-4   | SB1 Side bend | 11.07                  | 110.25 | 200.00 | 40                    | 180°  | N/D                                           | N/A                            | PQR No : PQR-TNC-004         |
| "          | SB2 "         | 11.07                  | 110.24 | 200.00 | 40                    | 180°  | N/D                                           | N/A                            | GTAW + SMAW / 6G / 10.97 mm. |
| "          | SB3 "         | 11.00                  | 110.26 | 200.00 | 40                    | 180°  | N/D                                           | N/A                            | Pipe 6 " / A312GR.TP304      |
| "          | SB4 "         | 11.05                  | 110.25 | 200.00 | 40                    | 180°  | N/D                                           | N/A                            | "                            |

Additional Detail :

Result : (NSD) = No Surface Discontinuity

(OSD) = Open Surface Discontinuity

(CC) = Corner Crack

Tested by

Reviewed By

Witnessed by

Signature

Signature

Signature

Signature

Name / Position

Name / Position

PURIWAT / SUPERVISOR

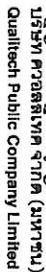
Project Engineer

Date

30/9/2024

30/9/2024

1-10-24



บันทึกผลชิ้นงานทดสอบประกอบการตัดสินใจ

## Guided-Bend Test Record

|                                |
|--------------------------------|
| รหัสเอกสาร : FM-BD-01          |
| หน้าที่ : 1 /                  |
| แก้ไขครั้งที่ : 04             |
| วันที่บังคับใช้ : 28 พฤศจิกายน |

วันที่พิมพ์: 28 พฤศจิกายน 2560

Reference code/Standard : ASME Section IX: 2023

ASME Section IX: 2023

Test Standard

: ASME IX : 2023

Testing room temperature : 24.5 °C

|          |   |        |
|----------|---|--------|
| Test No. | : | 837-67 |
|----------|---|--------|

837-67

Measurement Tools : 1207212

Humidity : 24%

[illegible]

Additional Detail :

Result : (NSD) = No Surface Discontinuity

(OSD) = Open Surface Discontinuity

(CC) = Coner Crack

|                 |                  |                                                                                     |                                                                                     |
|-----------------|------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
|                 | Tested by        | Reviewed By                                                                         | Witnessed by                                                                        |
| Signature       | SBI              |  |  |
| Name / Position | Sathawat / Admin | PURIWAT / SUPERVISOR                                                                | Mr. Sathawat / Project Engineer                                                     |
| Date            | 30/9/2024        | 30/9/2024                                                                           | 1-10-24                                                                             |