

WELDING PROCEDURE SPECIFICATION

WELDING PROCEDURE SPECIFICATION No:

WPS-GASTECH-05

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SUPPORTED BY PROCEDURE QUALIFICATION RECORD No:

PQR-GASTECH-05

Welding process :

GTAW +SMAW

Type :

Manual/Mechanized

Joint design :

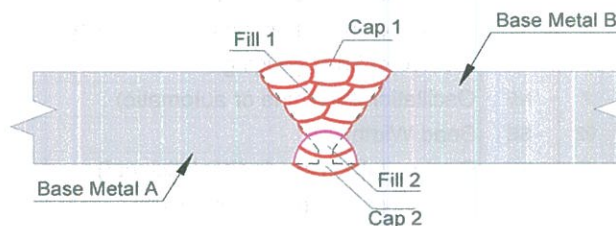
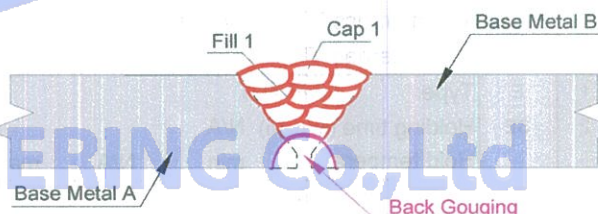
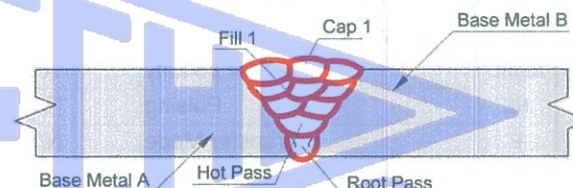
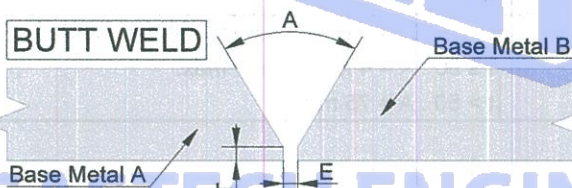
BW/FW

QW-403 Base Metals	NE	Base material:		GB/T 3880-2012 A6061 T6	to	GB/T 3880-2012 A6061 T6	
	.11 E	P. Number	-	to	-	Min. Impact Test applications :	N/A
	.5 SE	Group Number	-	to	-	SE Variable applicable :	N/A
	.8/.6 E/SE	Thickness range	Groove 1.5 mm to 20 mm		Fillet	All	
	.9 E	Pipe Ø range :	Groove All		Fillet	All	
		Thickness range limitation (t weld > 13mm)	N/A				

QW-402 Joints	.1 NE	Groove design	Preparation method : Machining / Thermal Cutting / Grinding				
		A=60°±10° T=0 to 1.5 mm E=2 ±1mm					
	.4 NE	Deletion of Backing	Tack welds : Process: GTAW				
	.5 NE	Addition of Backing	Location: In groove or bridge				
	.10 NE	Root spacing	Removal method Grinding				
	.11 NE	Retainers	N/A				

WELD PREPARATION

WELDING SEQUENCES / PASS LOCATION



Sketches, production drawings, weld symbols, or written description should show the general arrangement of the parts to be fused. Where applicable, the details of the joint groove may be specified.

QW-404 Filler Metals	QW-404			.33/ NE	.12 SE	.4 E	.5 E	.23 E	.50
	Process	Trade name	Manufacturer	Classification	AWS	F-No	A-No	Product form	Flux
	GTAW	-	JINAN	ER5356	-	-	-	Wire	N/A
	.14/.22	E	Welding without filler metal is not allowed		Other requirements				
	.27	NE	Alloy Elements	N/A					
	.9/.35	NE	Flux/Wire class.	N/A					

		Manufacturer : GAS TECHNICAL AND MECHANICAL ENGINEERING COMPANY LIMITED Add: 2274/9/12 NGUYEN VAN TAO ST, APT 18, HIEP PHUOC COMMUNE, HO CHI MINH CITY, VIETNAM WELDING PROCEDURE SPECIFICATION				Aluminium Alloy Code : ASME IX-2025	
WELDING PROCEDURE SPECIFICATION No: WPS-GASTECH-05				Page 2/2			
SUPPORTED BY PROCEDURE QUALIFICATION RECORD No: PQR-GASTECH-05							
WELDING PARAMETERS							
QW-405 Positions			Weld Layer	Root Pass	Hot Pass	Fill/Cap/Pass	
	.1	NE	Welding process	GTAW	GTAW	GTAW	
	.3	NE	Welding positions	All	All	All	
			Welding progress	Uphill for vertical	Uphill for vertical	Uphill for vertical	
QW-404	.3/6	NE	Trade name	0	0	0	
			Filler Metal Ø (mm)	2.4	2.4	2.4	
	.30	E	Max "t" deposited	10 mm			
QW-408 Gas	.2	E	Shielding Nature	Argon 99,99%	Argon 99,99%	Argon 99,99%	
	.3	NE	gas Flow rate (l/min)	10 to 25	10 to 25	10 to 25	
	.9	E	Backing Nature	N/A	N/A	N/A	
	.5	NE	gas Flow rate (l/min)	N/A	N/A	N/A	
	.10	E	Trailing Nature	N/A	N/A	N/A	
	.1	NE	Flow rate (l/min)	N/A	N/A	N/A	
QW-409 Electrical Characteristics	.8	NE	Amperes (A)	140 to 171	140 to 171	140 to 176	
		NE	Volts (V)	14 to 16.1	14 to 16.1	14 to 16.1	
			Welding speed (mm/min)	44 to 60	54 to 72	60 to 83	
	.1	SE	Energy U x I x 60 / V (kJ/mm)	1.95 to 3.71	1.61 to 3.07	1.41 to 2.81	
	.4/30	NE/SE	Current or polarity	AC	AC	AC	
	.3	NE	Pulsing	N/A	N/A	N/A	
	.32	E	Transfer Mode	N/A	N/A	N/A	
	.12	NE	Tungsten Electrode (type)	Tungsten Electrode SFA 5.12 (EWP;EWTh-2...)			
QW-406 Preheat	.1	E	Preheat T°: Ambient (30°C)	ISO 13916 : temperature to be measured :			
	.2	NE	Min interpass T°: Ambient	t ≤ 50 : A = 4 x t , 50 mm max.			
	.3	SE	Maxi interpass T°: 120°C	t > 50 : A = 75 mm.			
QW-407 PWHT	.1	E	Type: no PWHT				
	.2	SE	Holding time (min 1h) N/A	Heating rate	N/A	After	N/A
QW-410 Technique			Hold temperature min N/A max N/A	Cooling rate	N/A	Up to	N/A
			Welding process:	0			
	.1	NE	String/Weave method	String/Weave			
	.3	NE	Orifice, cup or nozzle size	4,5,6,7,8			
	.5	NE	Method of initial and interpass cleaning	Grinding / Brushing			
	.6	NE	Method of back gouging	N/A			
	.7	NE	Oscillation (Machine or automatic)	N/A			
	.92	SE	Bead Width	max 14 mm			
	.8	NE	Contact tube to work dist. (stick out)	N/A			
	.9/87	NE/SE	Multiple or single pass (per side)	Multiple			
	.10	SE	Single to multiple electrodes	Single			
	.11	E	Vacuum chamber welding	N/A			
	.25	NE	Manual, Automatic, Semi automatic	Manual			
	.26/15	NE/NE	Peening/ Electrode spacing	N/A			
	.64	E	Use of thermal processes	N/A			
Notes : 1/ E = Essential variable : Can not be changed / SE = Supplementary Essential variable : Can not be change on impact tested welds NE = Non Essential Variable : Guideline, could be changed with QAQC approval, if permitted by Client Specification							
0	8/Jan/2026	Manufacturer Prepared by:		GTC TECHNICAL CONSULTANCY CO., LTD. Reviewed by: Inspector: BUI VAN THAO Approved by: [Signature] GTC CSWIP 3.2: 348700/2 CWI: 17050871 DIRECTOR			
		Rev Date					



Manufacturer : **GAS TECHNICAL AND MECHANICAL
ENGINEERING COMPANY LIMITED**
Add: 2274/9/12 NGUYEN VAN TAO ST, APT 18, HIEP PHUOC
COMMUNE, HO CHI MINH CITY, VIETNAM
PROCEDURE QUALIFICATION RECORD (PQR)

Aluminium Alloy

Code : **ASME IX-2025**

PROCEDURE QUALIFICATION RECORD No:

PQR-GASTECH-05

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SUPPORTED TO WELDING PROCEDURE SPECIFICATION No:

WPS-GASTECH-05

QW-410 Technique	Welding process :			GTAW +SMAW	
	.1	NE	String/weave method	String/Weave	
	.3	NE	Orifice, cup or nozzle size	5	
	.5	NE	Method of initial and interpass cleaning	Grinding / Brushing	
	.6	NE	Method of back gouging	N/A	
	.7	NE	Oscillation / bead width	low / max 14 mm	
	.8	NE	Contact tube to work dist. (stick out)	N/A	
	.9	NE	Multiple or single pass (per side)	Multiple	
	.10	SE	Single or multiple electrodes	Single	
	.11	E	Closed to out chamfer	N/A	
	.15	NE	Electrode spacing	N/A	
	.25	NE	Manual or Automatic	Manual	
	.26	NE	Peening	N/A	
	.64	E	Use of thermal processes	N/A	
	.87	SE	Multiple or single pass (per side)	Multiple	

QW-409 Electrical Characteristics	Welding process			GTAW				
	.4/.30	NE	Current or polarity	AC	.8	NE	Amperes (A)	See Welding monitoring report
	.3	NE	Pulsing	N/A		NE	Volts (V)	
	.12	NE	Tungsten Electrode (type)	Lanthanated 2%			Welding speed (cm/min)	
			Tungsten Electrode (Ø mm)	2.4	.1	SE	Energy UxIx60/V (kJ/cm)	

STENSILE TESTS (QW-150), Report No: 05/01/26-05./KQTN

Specimen No.	Width (mm)	Thickness (mm)	Area (mm ²)	Ultimate Total Load (KN)	Stress (N/mm ²)	Failure and Location
TS1	25.03	10	250.3	101.1	404	Ductile/Base Metal
TS2	25.14	10	251.4	100.2	399	

GUIDE BEND TESTS (QW-160), Report No: 05/01/26-05./KQTN

Type and Figure No.	Thickness x Width (mm)	Result
Side Bend 1	10.36x10.36	Acceptable (no crack)
Side Bend 1	10.47x10.24	Acceptable (no crack)
Side Bend 1	10.13x10.19	Acceptable (no crack)
Side Bend 1	10.28x10.29	Acceptable (no crack)

TOUGHNESS TESTS (QW-170) Report No.: N/A

FILLET WELD TEST (QW-180) Ref. Report No.: N/A

Visual Examination : Acceptable , Report: N/A

Radiographic or Ultrasonic Examination : Acceptable , Report:

GTC-GT-WPS-RT-001

Deposit Analysis

Other:

CERTIFICATE OF COMPLIANCE

Laboratory Agency name:	HOA BINH LAB	Date Test:	5/Jan/2026
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We certify that the statements in this record are correct and that the test joints were prepared, fused, and tested in accordance with the requirements of Section IX of the ASME Boiler and Pressure Vessel Code.

Notes :

- 1/ E = Essential variable : Can not be changed / SE = Supplementary Essential variable : Can not be changed on impact tested welds
NE = Non Essential Variable : Guideline, could be changed with QAQC approval, if permitted by Client

0	8/Jan/2026	Manufacturer	GTC TECHNICAL CONSULTANCY CO., LTD.
		Prepared by:	Reviewed by: BUI VAN THAO Approved by: Ho Van Truong
Rev	Date		GTC CSWIP 3.2: 3487002 CWI: 17050871

DIRECTOR

WELDER, WELDING OPERATOR QUALIFICATION TEST CERTIFICATE

Applicable Code/Standard: ASME Section IX, 2025 Edition	WPQ Certificate number: WE-GT-26-05	
Employer's name: GAS TECHNICAL AND MECHANICAL ENGINEERING COMPANY LIMITED	Welder name: HUYNH VAN CHIEN (GT-03)	
Address: 274/9/12 NGUYEN VAN TAO ST, APT 18, HIEP PHUOC COMMUNE, HO CHI MINH CITY, VIETNAM	Identification number: 083093011733	
	Test date: 29-Dec-2025	

Test Description

Identification of PQR followed: **PQR-GASTECH-05** Revision No.: **0** ☒ Test coupon ☐ Production weld
Specification and type/grade or UNS Number of base material(s): **A6061 T6** Thickness: **10** mm

Testing Variables and Qualification Limits

Welding Variables (QW-403)	Actual Values	Range Qualified
Welding process (es)	GTAW	GTAW
Type (i.e.; manual, semi-automatic) used	Manual	Manual
Backing (with/ without)	With	With (for CJP)
☒ Plate ☐ Pipe (enter diameter if pipe or tube)		Plate and Pipe
Base metal P-Number to P-Number	A6061 T6	A6061 T6
Filler metal or electrode specification(s) (SFA) (info. only)	-	
Filler metal or electrode classification(s) (info. only)	ER5356	ER5356
Filler metal F-Number(s)	22	
Consumable insert (GTAW or PAW)	N/A	N/A
Filler Metal Product Form (solid/metal or flux-cored/powder)	-	-
Deposit thickness for each process	-	-
Process 1 GTAW 3 layers minimum ☐ Yes ☒ No	10 mm	Max: 20 mm
Process 2 3 layers minimum ☐ Yes ☐ No	-	-
Position qualified (2G, 6G, 3F, etc.) (Table QW-461.9)	1G	Groove: F for Plate & Pipe (OD ≥ 73 mm). Fillet: F; H for Plate and Pipe
Vertical progression (uphill or downhill)	N/A	N/A
Type of fuel gas (OFW)	N/A	N/A
Inert gas backing (GTAW, PAW, GMAW)	N/A	N/A
Transfer mode (Spray/globular or pulse to short circuit-GMAW)	N/A	N/A
GTAW Welding current type/polarity (AC, DCEP, DCEN)	DCEN	DCEN

RESULTS

Visual examination of the completed weld (QW-302.4): **ACCEPTED**
☐ Transverse face and root bends [QW-462.3(a)] ☒ Side bends (QW-462.2) , Report: **05/01/26-05./KQTN**
☐ Pipe bend specimen, corrosion-resistant overlay [QW-462.5(c)] ☐ Plate bend specimen, corrosion-resistant overlay [QW-462.5(d)]
☐ Pipe specimen, macro test for fusion [QW-462.5(b)] ☐ Plate specimen, macro test for fusion [QW-462.5(e)]

Type	Result	Type	Result	Type	Result	Type	Result
-	-	-	-	-	-	-	-

Alternative volumetric examination results (QW-191): **RT** ☒ or **UT** ☒ Report No.: **GTC-GT-WPS-RT-001**
Fillet weld – fracture test (QW-181.2): **N/A** Length and percent of defects: **N/A**
☐ Fillet welds in plate [QW-462.4(b)] Report: ☐ Fillet welds in pipe [QW-462.4(c)]
Other tests: **N/A**
Film or specimens evaluated by: **Nguyen Tan Sang** Company: **GTC CO., LTD**
Mechanical tests conducted by: **Nguyen Trong Thai** Laboratory test no.: **HOA BINH LAB (LAS-XD 265)**
Welding supervised by: **Nguyen Dac**

We, the undersigned, certify that the statements in this record are correct and that the test welds were prepared, welded, and tested in accordance with the requirements of section IX of the ASME BOILER AND PRESSURE VESSEL CODE.

GAS TECHNICAL AND MECHANICAL ENGINEERING COMPANY LIMITED	GTC TECHNICAL CONSULTANCY CO., LTD.
Full Name:	Verified by: Inspector: BUI VAN THAO
Signature:	GTC CSWIP 3.2: 348700/2 CWI: 17050871
Date: 14- Jan- 2026	Date: 14- Jan- 2026
	Approved by: Ho Van Truong DIRECTOR



WELDING MONITORING REPORT

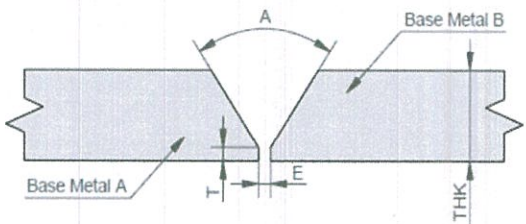
ASME IX-2025

GAS TECHNICAL AND MECHANICAL ENGINEERING COMPANY LIMITED

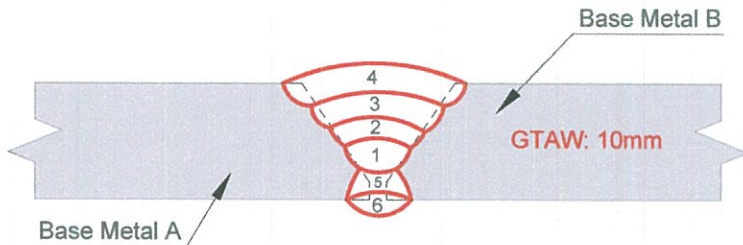
Add: 274/9/12 NGUYEN VAN TAO ST, APT 18, HIEP PHUOC COMMUNE, HO CHI MINH CITY, VIETNAM

PQR no: PQR-GASTECH-05 Support for WPS: WPS-GT-05	Welding Process: GTAW	Welder Name: HUYNH VAN CHIEN	Welder Stamp : 083093011733
Clampmeter No. (calibrated machine) Kyoritsu KEW 2055	Thermometer No. FLUKE 62 MAX	Oxygenmeter N° : N/A	Weld Machine S/N°. WAVE-315D
Shielding Gas: Argon	Backing Gas: Argon	Shield. Gas Flow Rate: 10-15 l/min	Backing Gas Flow Rate: N/A
Welding Position: 1G			
Monitored by: GTC TECHNICAL CONSULTANCY CO., LTD.	Position : TPI INSPECTOR	Name : NGUYEN DAC	Signature :
		Monitoring Date: 29-Dec-2025	

T= 0.5 E= 3.5 A= 60 Bevel: 30



Material: ASTM A240 Gr 304/304L, Plate 14mm



Weld preparation

Welding Sequence

Travel Speed= Length(cm) / Time(min)

Arc Energy= 0,06xVolts(V)xAmps(A) / Travel Speed (mm/min)

Layer / Pass nº	Filler Metal		Interpass Temp. (°C)	Amps (A)	Volts (V)	Weld Length (mm)	Welding Arc Time (min)		Travel Speed (mm/min)	Heat Input (kJ/cm)	Bead Width (mm)	Remark
	AWS Class	Diameter (mm)					Minutes	Second				
Side 1:												
1	ER 5356	2.4		155	15.0	450	8	41	52	2.69	5	
2	ER 5356	2.4	65	155	15.0	450	7	12	63	2.23	7	
3	ER 5356	2.4	80	155	15.0	450	6	14	72	1.93	9	
4	ER 5356	2.4	120	160	15.0	450	6	15	72	2.00	14	

Side 2: after backgouging & grinding

5	ER 5356	2.4	80	160	15.0	450	6	20	71	2.03	8	
6	ER 5356	2.4	110	160	15.0	450	6	15	72	2.00	10	

Comments: Consummable, GTAW :
SAW

KOVET-T308
ER308L (TIEN TAI) TW-308L/TFS300



CÔNG TY CỔ PHẦN TƯ VẤN THIẾT KẾ KIỂM ĐỊNH XÂY DỰNG HÒA BÌNH
Địa chỉ: Số 964/1 Đường Lò Gốm, Phường Bình Tiên, Tp.Hồ Chí Minh
PHÒNG THÍ NGHIỆM VẬT LIỆU VÀ KIỂM ĐỊNH CÔNG TRÌNH XÂY DỰNG LAS-XD 265
Địa chỉ: 161B/81/2A Lạc Long Quân, Phường Bình Thới, Tp.Hồ Chí Minh
Email: Las265.hoabinh@gmail.com - Hotline: 0937836265 - 0962109262

Số: 05/01/26-04 ./KQTN

PHIẾU KẾT QUẢ THÍ NGHIỆM

Trang: 1/2

Số PYC: 050126-04

PHIẾU KẾT QUẢ THÍ NGHIỆM / TEST REPORT

XÁC ĐỊNH CƠ LÝ VẬT LIỆU THÉP/ DETERMINING MECHANICAL OF STEEL MATERIAL

- Đơn vị yêu cầu / Client : GASTECHNICAL AND MECHANICAL ENGINEERING COMPANY LIMITED
- Địa điểm / Location : 274/9/12 NGUYEN VAN TAO, St, APT 18, HIEP PHUOC COMMUNE, HO CHI MINH CITY, VIET NAM
- P.Pháp thử/ Test method : TCVN 197-2014, TCVN 198-2008, ASME IX_2025
- Thiết bị TN / Test Equipment : Máy kéo -nén- uốn thép WA-1000B, thước lá, cân kỹ thuật, một số dụng cụ khác...
- Ngày nhận mẫu / Recrived : 05/01/2026
- Ngày thí nghiệm / Tested : 05/01/2026
- Tên mẫu/Name of sample : MỐI HÀN THÉP TẮM / WELDING STEEL PLATE
- : MẪU QUY TRÌNH HÀN/ PQR NO : PQR-GASTECH-05
- : TÊN THỢ HÀN/ WELDER NAME : HUYNH VAN CHIEN
- : MÃ SỐ THỢ HÀN/ WELDER ID : 083093011733
- : PHƯƠNG PHÁP HÀN/ WELDING PROCESS :GTAW
- : VẬT LIỆU/ MATERIAL : A6061 T6
- : VỊ TRÍ HÀN/ WELDING POSITION : 1G
- : CHIỀU DÀY/ THICKNESS: 10 mm
- Số lượng/Quantity (mẫu) : 01 (Thép tấm : 450x400X10 mm)

Kết quả thí nghiệm xem trang sau / experimental results see next page:

TP.Hồ Chí Minh, ngày 05 tháng 01 năm 2026

CÔNG TY CP TV TK KIỂM ĐỊNH XÂY DỰNG HOÀ BÌNH

ĐD thí nghiệm

T. Phòng Thí Nghiệm

Tổng Giám Đốc

Tested by

Laboratory

Director

Nguyễn Trọng Thái

KS. Nguyễn Ngọc Linh

Nguyễn Việt Chánh

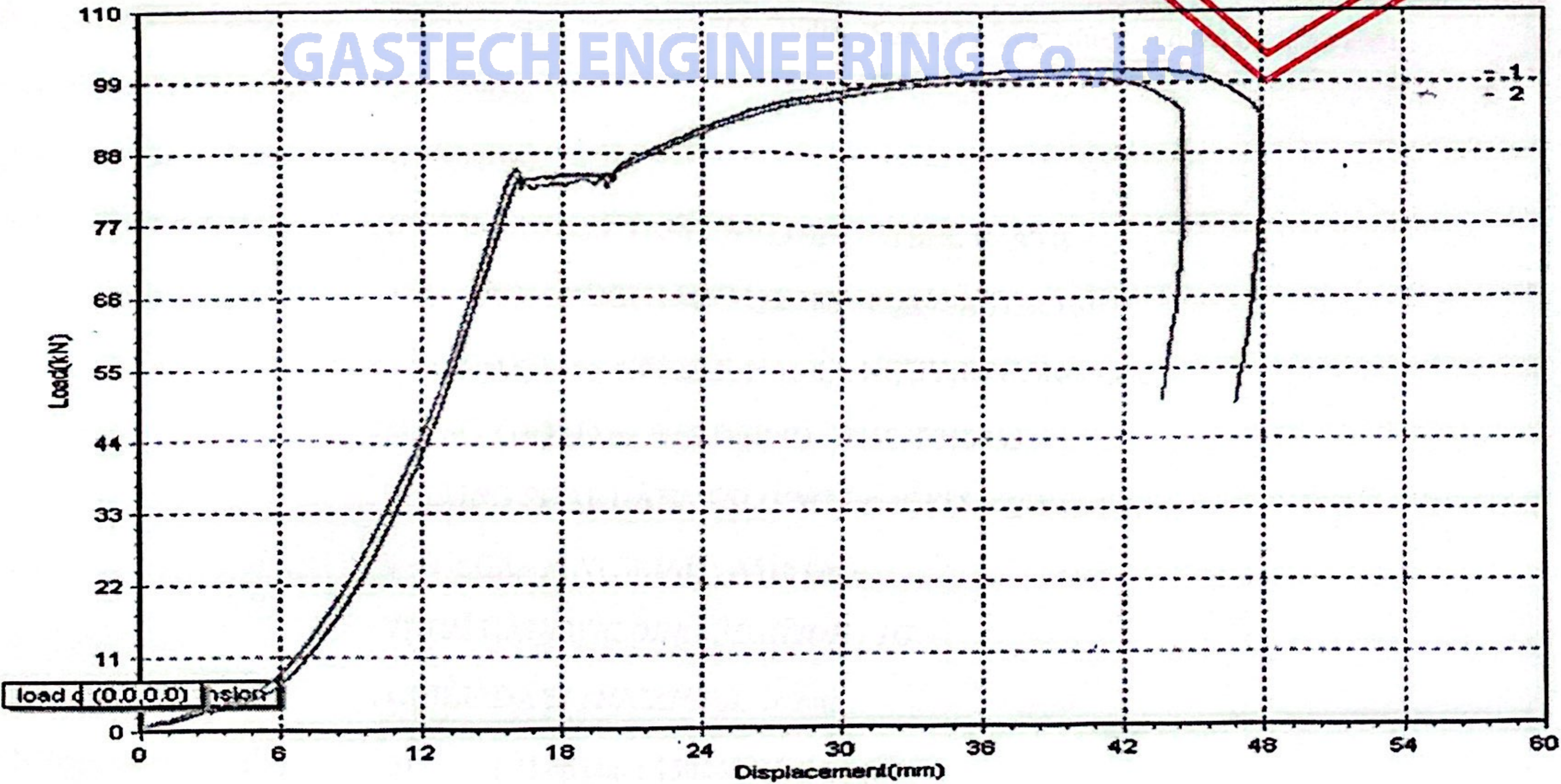
Ghi chú/ Notice

: 1. Mẫu do khách hàng cung cấp, kết quả chỉ có giá trị trên mẫu thử /

Specimens were supplied by client, test result is valid namely submitted specimens only

2 Các thông tin về mẫu, tên công trình, tên khách hàng, hạng mục do khách hàng cung cấp /

Information of specimens , project , client , item , were supplied by client

Số/Ref:...../KQTN		PHIẾU KẾT QUẢ THÍ NGHIỆM TEST REPORT				Trang/Page:.....	
II. KẾT QUẢ THÍ NGHIỆM/ TEST RESULTS (tt):							
STT	Mẫu thép Test Specimen	Mặt cắt ngang	Lực kéo chảy	Giới hạn chảy	Lực kéo đứt	Giới hạn bền	Vị trí bị đứt
No	(Bề dày) x (C. rộng) Thick x Width	Cross Section	Force at yield point	Yield Strength	Maximum force	Tensile Strength	Notice
	mm x mm	(mm ²)	(kN)	(N/mm ²)	(kN)	(N/mm ²)	
1	10.00 x 25.03	250.3	83.14	332	101.1	404	(3)
2	10.00 x 25.14	251.4	82.32	327	100.2	399	(3)
Ghi chú/ Notice: Mẫu được thử nghiệm với sự chứng kiến của các bên liên quan/ Test was witnessed in the presence of Concerned Parties.							
(1) :Đứt tại mối hàn/ Weld Metal (2) :Đứt ở vùng ảnh hưởng nhiệt/ Fractured at heat affected zone (3) Đứt tại vật liệu cơ bản/ Base Metal							
							
II. KẾT QUẢ THỬ UỐN NGUỘI / TEST RESULT OF BEND :							
Stt/	Mẫu thử/ Specimens			Số lượng	Góc uốn	Đường kính gối uốn	Kết quả thử uốn nguội
No	Ký hiệu mẫu	Dày	Rộng	Quantity	Bending angle	Diameter of angle	Test Result of bend
	Sample ID	Thickness	width	Thanh/ Bars	(Độ/ Degree)	(mm)	
1	Side bend	10.36	10.36	1	180°	40	Không Nứt / No Crack
2	Side bend	10.47	10.24	1	180°	40	Không Nứt / No Crack
3	Side bend	10.13	10.19	1	180°	40	Không Nứt / No Crack
4	Side bend	10.28	10.29	1	180°	40	Không Nứt / No Crack