

Inspection Item List

Project : HX-127

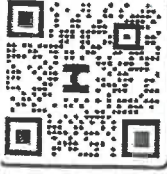
T-401

No.	Equip.	Item	Material	Description	Q'ty	Heat No.	Remark
1	HX-127	TUBE SHEET	SA350 LF2 CL1	OD 650 x 60T	2	S85072	
2	HX-127	BAFFLE	SA516 Gr.70	OD 595 x 10T	8	SF46385	
3	HX-127	2:1 ELLIP.HEAD	SA516 Gr.70N	ID 925 x Min.12T x SF50	2	WK649236	
4	HX-127	2:1 ELLIP.HEAD	SA516 Gr.70N	ID 600 x Min.10T x SF50	2	SF41975	
TOTAL					14		

REVIEWED BY
WITNESSED BY
2024 .11. 05
S. M. KIM

검사증명서

MILL TEST CERTIFICATE



당진제철소 : 충남 당진시 송악읍 북부신원로 1480
1480 Bolkusanup-Ro, Songak-Eup, Dengjin-Si, Chungnam, Korea



: D2311009267

: Slab

: ASTM A105-A350LF2

고객사

Customer : 현대이이에프씨㈜

주문자

Contractor : 현대이이에프씨㈜

증명서 번호 : 20231024-CN-0003-001
Certificate No.

발행일자 : 2023-10-24
Date of Issue

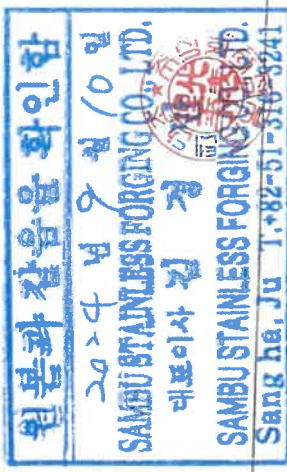
제품번호 Dimension	수량 Quantity	중량 Weight (Kg)	지간번호 Heat No.	제품번호 Product No.	화학성분 Chemical Composition(%)																		
					C	Si	Mn	P	S	Cr	Ni	B	Ca	Cu	Mo	Nb	Ti	V	Sd	CEQ			
300x2000x5940	1	27,510	S85072	S85072 01	4	3	3	4	4	2	2	4	4	3	2	4	3	3	3	3	3	3	
300x2000x5930	1	27,460	S85072	S85072 04	L	1,963	230	1,002	115	25	2	2	3	1	15	0	44	0	1	3	46	370	
300x2000x5930	1	27,460	S85072	S85072 05	L	1,963	230	1,002	115	25	2	2	3	1	15	0	44	0	1	3	46	370	
*** Sub Total(001) ***					3	82,430(Kg)																	
*** Grade Total ***					3	82,430(Kg)	Ceq(Ce)/G=C+(Mn/6)+(N+O)/15+(Cr+Mo)/5																
*** Last Item ***																							

606-81-95003

(주)평산엠텍 신진옥

부산광역시 강서구 녹산화전로 93(상계동)

제조도매 청강빌딩구조재
부흥산 배매, 입대



REVIEWED BY
WITNESSED BY D
2024. 11. 29.
S. M. KIM

WITNESSED BY
PMS
REVIEWED BY
Q.A
Junk

Signature
Ju. Hee Jun
Chief Of Steel Making Quality Team

* Division - P: Product analysis, L: Ladle analysis

* THE SLAB IS FULLY KILLED, FINE-GRAIN PRACTICE. BASIC OXYGEN PROCESS AND VACUUM DEGASSING PROCESS WERE APPLIED.
* ANY WELDING SHALL NOT BE PERFORMED FOR THE ORDERED MATERIAL.
* The Certificate has been issued in compliance with EN 10204 Type 3.1

WE HEREBY CERTIFY THAT THE MATERIAL HAS BEEN MADE AND TESTED IN ACCORDANCE WITH THE ABOVE SPECIFICATION AND THE REQUIREMENTS.
상기의 제품은 검사의 결과 지점된 규격에 합격한 것을 증명합니다.

* 본 검사증명서는 원본 및 전자문서(전자서명 정보 포함)로만 유효합니다. 전자문서의 내용을 원본과 비교하여 확인하십시오. (http://sm.hyundai-steel.com/cew/login.jsp)
* This Mill Test Certificate is a copy that has been printed from original electronic document with digital signing. You are able to check an original electronic document at Hyundai's customer portal (http://sm.hyundai-steel.com/cew/login.jsp)
* 시공 후의 안전을 위하여, 본 검사증명서에 결함이 발견될 시 즉시 제품순환 및 안전성 문제가 발생될 수 있습니다. (Caution for use! Damage on products and safety problems may arise if used other than the intended purpose.)

NOTE

HEAT TREATMENT REPORT

SAMBU STAINLESS FORGING CO.,LTD 17,Hwajeonsandan 5-ro 14beon-gil, Gangseo-gu, Busan, Korea Tel : 051)316-3241 Fax : 051)316-3242	REPORT NO	HTR202409-128-001
	ISSUE DATE	2024/09/10
	CUSTOMER	피엠에스(주)

MATERIAL	SA350LF2CL1	HEAT ID NO	SEE BELOW
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DATE OF WORK	2024.09.03		
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JOB NO	SBQ2024090301		
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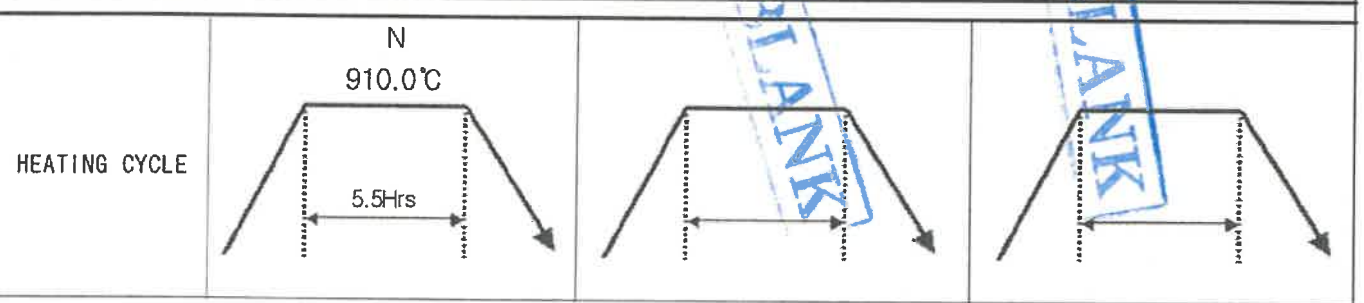
H/T METHOD	N		
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HOLDING TEMP	910.0°C		
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HOLDING TIME	5.5Hrs		
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COOLING METHOD	A.C		
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N:Normalizing, A:Annealing, Q:Quenching, T:Tempering, S:Solution, P:PWHT Simulation, S.R:Stress Relieved, S.T:Stabilization Heat Treatment, A.C:Air Cooled, F.C:Furnace Cooled, W.C:Water Cooled, O.C:Oil Cooled, AC.C:Accelerated Cooled



* Description	2EA	S85072	A202408-315-001
OD650*T60	2EA	S85072	A202408-315-002
OD760*ID600*T90			

* Remark

REVIEWED BY	WITNESSED BY
S. M. KIM	

PMS	<input type="checkbox"/> WITNESSED BY
Q.A	<input checked="" type="checkbox"/> REVIEWED BY

REVIEWED BY <input type="checkbox"/>			
WITNESSED BY <input type="checkbox"/>	_____ Surveyor	General Manager of QM Dep't	

N: 910CK Fc Fhrs AC

NO.	ITEM	DESCRIPTION	REMARKS	DATE	BY	REVIEWED BY	DATE	BY
1	1.0	GENERAL REQUIREMENTS						
2	1.1	1.1.1. Material						
3	1.1.2	1.1.2. Heat Treatment						
4	1.1.3	1.1.3. Mechanical Properties						
5	1.1.4	1.1.4. Surface Finish						
6	1.1.5	1.1.5. Dimensional Accuracy						
7	1.1.6	1.1.6. Marking						
8	1.1.7	1.1.7. Packaging						
9	1.1.8	1.1.8. Storage						
10	1.1.9	1.1.9. Inspection						
11	1.1.10	1.1.10. Delivery						
12	1.2	1.2.1. Material						
13	1.2.2	1.2.2. Heat Treatment						
14	1.2.3	1.2.3. Mechanical Properties						
15	1.2.4	1.2.4. Surface Finish						
16	1.2.5	1.2.5. Dimensional Accuracy						
17	1.2.6	1.2.6. Marking						
18	1.2.7	1.2.7. Packaging						
19	1.2.8	1.2.8. Storage						
20	1.2.9	1.2.9. Inspection						
21	1.2.10	1.2.10. Delivery						
22	1.3	1.3.1. Material						
23	1.3.2	1.3.2. Heat Treatment						
24	1.3.3	1.3.3. Mechanical Properties						
25	1.3.4	1.3.4. Surface Finish						
26	1.3.5	1.3.5. Dimensional Accuracy						
27	1.3.6	1.3.6. Marking						
28	1.3.7	1.3.7. Packaging						
29	1.3.8	1.3.8. Storage						
30	1.3.9	1.3.9. Inspection						
31	1.3.10	1.3.10. Delivery						
32	1.4	1.4.1. Material						
33	1.4.2	1.4.2. Heat Treatment						
34	1.4.3	1.4.3. Mechanical Properties						
35	1.4.4	1.4.4. Surface Finish						
36	1.4.5	1.4.5. Dimensional Accuracy						
37	1.4.6	1.4.6. Marking						
38	1.4.7	1.4.7. Packaging						
39	1.4.8	1.4.8. Storage						
40	1.4.9	1.4.9. Inspection						
41	1.4.10	1.4.10. Delivery						
42	1.5	1.5.1. Material						
43	1.5.2	1.5.2. Heat Treatment						
44	1.5.3	1.5.3. Mechanical Properties						
45	1.5.4	1.5.4. Surface Finish						
46	1.5.5	1.5.5. Dimensional Accuracy						
47	1.5.6	1.5.6. Marking						
48	1.5.7	1.5.7. Packaging						
49	1.5.8	1.5.8. Storage						
50	1.5.9	1.5.9. Inspection						
51	1.5.10	1.5.10. Delivery						
52	1.6	1.6.1. Material						
53	1.6.2	1.6.2. Heat Treatment						
54	1.6.3	1.6.3. Mechanical Properties						
55	1.6.4	1.6.4. Surface Finish						
56	1.6.5	1.6.5. Dimensional Accuracy						
57	1.6.6	1.6.6. Marking						
58	1.6.7	1.6.7. Packaging						
59	1.6.8	1.6.8. Storage						
60	1.6.9	1.6.9. Inspection						
61	1.6.10	1.6.10. Delivery						
62	1.7	1.7.1. Material						
63	1.7.2	1.7.2. Heat Treatment						
64	1.7.3	1.7.3. Mechanical Properties						
65	1.7.4	1.7.4. Surface Finish						
66	1.7.5	1.7.5. Dimensional Accuracy						
67	1.7.6	1.7.6. Marking						
68	1.7.7	1.7.7. Packaging						
69	1.7.8	1.7.8. Storage						
70	1.7.9	1.7.9. Inspection						
71	1.7.10	1.7.10. Delivery						
72	1.8	1.8.1. Material						
73	1.8.2	1.8.2. Heat Treatment						
74	1.8.3	1.8.3. Mechanical Properties						
75	1.8.4	1.8.4. Surface Finish						
76	1.8.5	1.8.5. Dimensional Accuracy						
77	1.8.6	1.8.6. Marking						
78	1.8.7	1.8.7. Packaging						
79	1.8.8	1.8.8. Storage						
80	1.8.9	1.8.9. Inspection						
81	1.8.10	1.8.10. Delivery						
82	1.9	1.9.1. Material						
83	1.9.2	1.9.2. Heat Treatment						
84	1.9.3	1.9.3. Mechanical Properties						
85	1.9.4	1.9.4. Surface Finish						
86	1.9.5	1.9.5. Dimensional Accuracy						
87	1.9.6	1.9.6. Marking						
88	1.9.7	1.9.7. Packaging						
89	1.9.8	1.9.8. Storage						
90	1.9.9	1.9.9. Inspection						
91	1.9.10	1.9.10. Delivery						
92	1.10	1.10.1. Material						
93	1.10.2	1.10.2. Heat Treatment						
94	1.10.3	1.10.3. Mechanical Properties						
95	1.10.4	1.10.4. Surface Finish						
96	1.10.5	1.10.5. Dimensional Accuracy						
97	1.10.6	1.10.6. Marking						
98	1.10.7	1.10.7. Packaging						
99	1.10.8	1.10.8. Storage						
100	1.10.9	1.10.9. Inspection						
101	1.10.10	1.10.10. Delivery						



원본대조필
SAMBU STAINLESS FORGING CO., LTD.
 Sambu, Incheon, Korea Tel: +82-51-316-3241

PMS	<input type="checkbox"/> WITNESSED BY
Q.A	<input checked="" type="checkbox"/> REVIEWED BY
	<i>[Signature]</i>

<input checked="" type="checkbox"/> REVIEWED BY	<input type="checkbox"/> WITNESSED BY
2024. 11. 28.	
S. M. KIM	



초음파탐상검사보고서

Ultrasonic Examination Report

Report No.: BK - PMS - U - 241015 - 01

Page No. : 1 OF 1

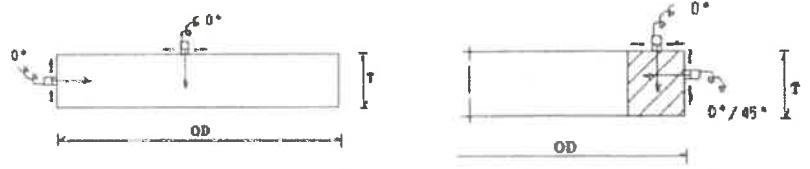
Owner/Customer (주문주/고객) Pioneer Manufacturing & Supply Co., Ltd.	Project Name (공사명) HX127	Project No. (공사번호) T-401
Item Name (제품명) SEE BELOW	Code(규격) : ASME SA388 ASME SEC.VIII DIV.2 PARA. 3.3.4.	Procedure (절차서) NEP(BK)-UT-ASME-001 Rev.1
Item No. (제품번호) SEE BELOW	Drawing No. (도면번호) N / A	Test Time (검사시기) <input checked="" type="checkbox"/> After H.T <input type="checkbox"/> Before H.T
Material (재질) SEE REMARK	Surface Condition (표면상태) <input checked="" type="checkbox"/> As Rough Machined (황삭) <input type="checkbox"/> As Welded	Couplant(접촉매질) <input checked="" type="checkbox"/> Oil(오일) <input type="checkbox"/> Water(물) <input type="checkbox"/> CMC
Maker (제조사) : G E Model (모 델) : USN 60 Control No. (관리번호) : E-20039 Due Date. (유효일자) : 15. Aug. 2025.	Test Method Mode (검사방법) <input checked="" type="checkbox"/> Straight Beam(수직) <input checked="" type="checkbox"/> Angle Beam(사각)	Test Mode (형태) <input checked="" type="checkbox"/> 접촉법(Contact) <input type="checkbox"/> 수침법(immerse)
	Standard Block(표준시험편) <input checked="" type="checkbox"/> IIW-V1(S/No.:B10265) <input type="checkbox"/> STB-A1(SS)	Reference Block (S/No.) (대비시험편) <input checked="" type="checkbox"/> Back Reference Method <input checked="" type="checkbox"/> 60°V Notch
Equipment Calibration (장비 교정) ASTM E317 FIG1,BLOCK (S/No.:21-1334)	Straight Beam Standard Sensitivity : Back Reference Method (B1: <u>80</u> %)	Straight Beam Scanning Sensitivity Level <u>+6</u> dB Above The Primary Ref' Level
Equipment Linearity (장비 직선성) A.C.L within ±10%/ S.H.L within ±5% FSH	Angle Beam Standard Sensitivity : 60° V Notch (DAC: <u>100</u> %)	Angle Beam Scanning Sensitivity Level <u>+6</u> dB Above The DAC Level

Transducer 탐촉자	Type 형태	Angle 교정각도	Frequency 주파수	Size 크기	Type 형태	Angle 교정각도	Frequency 주파수	Size 크기
		TKS2.25CFN (NCGA130)	0°	2.25MHz	Ø1"		°	Mhz
	1C20X22A45 (AAXB47)	45°	1 Mhz	20x22 mm		°	Mhz	

*UT Condition

Sketch

*EXAMINATION AREA
: ENTIRE VOLUME



Identification No. 확인번호 (Part No./ Item / Size)	Q.TY 수량	Accept 합격	Reject 불합격	Interpretation 판정	Remark (Heat No.) /Material)
1 (#1) TUBESHEET OD650 x 60T	2EA	V		NO RECORDABLE INDICATION	S85072 / SA350LF2CL.1
2 (#7) GIRTH FLANGE OD760 x ID600 x 90T	2EA	V		"	S85072 / SA350LF2CL.1
3 (#8) GIRTH FLANGE OD760 x ID600 x 90T	2EA	V		"	S98858 / SA266 Gr.2N
4 (#16) TEST FLANGE OD760 x ID600 x 65T	1EA	V		"	S98858 / SA266 Gr.2N
				-BLANK-	

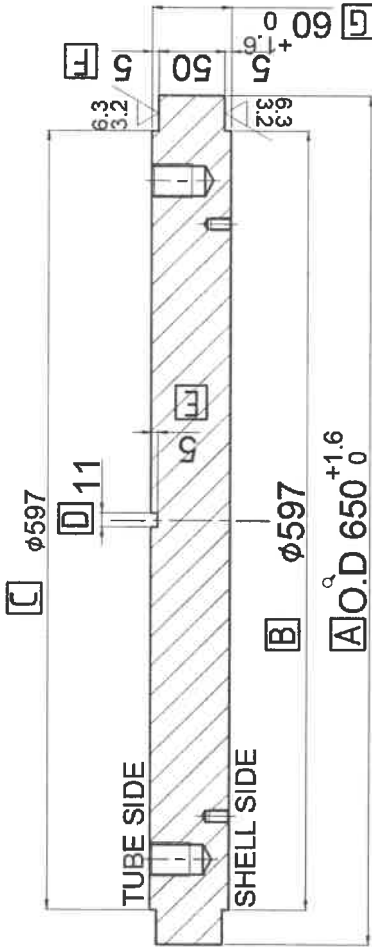
REVIEWED BY
WITNESSED BY
2024.11.28
S. M. KIM

SKETCH ON LINE, IF NECESSARY OR ATTACHED 필요시 실선안에 스케치하거나 또는 첨부할 것.

Examined by 시험자 이인섭 I. S. LEE	LEVEL II	Date of Examination 검사일자 Oct. 15. 2024.	Customer QA Manager
승인자 D. J. KIM	LEVEL III	Date of Report 보고서 일자 Oct. 15. 2024.	
FAHAMEH Eng. & Mtd. Co. Witnessed Reviewed		<input type="checkbox"/> Witnessed by 입회자 <input type="checkbox"/> Reviewed by 검토자	PMS Q.A WITNESSED BY REVIEWED BY



DIMENSION CHECK SHEET



TITLE	1) TUBE SHEET
DATE	2024-10-30
EQUIP NO.	HX-127
MATERIAL	SA350 LF2CL1
Q'TY	2 EA
HEAT NO.	S85072
HYTIE-ROD TAP	No.6-M10x1.5P
1) EYE BOLT HOLE	No.2-1"x8UNC
REMARK	

DESCRIPTION	1) OD 650 x 60T										UNIT : mm	
	A	B	C	D	E	F	G	H	I			
CHECK POINT												
TOLERANCE	+1.6 0	±0.8	±0.8	±0.4	±0.4	±0.4	+1.6 0					
STANDARD	650.0	597.0	597.0	11.0	5.0	5.0	60.0	6-M10	2-1"			
MEASUREMENT	1	651.2	597.5	597.5	10.9	4.9	60.8	OK	OK			
	2	651.3	597.4	597.5	10.8	5.0	60.6	OK	OK			
DESCRIPTION												
STANDARD												
MEASUREMENT												
*VISUAL INSPECTION : GOOD												
RESULT : ACCEPT												

REVIEWED BY
 WITNESSED BY ✓
 2024 11 19
 S. M. KIM

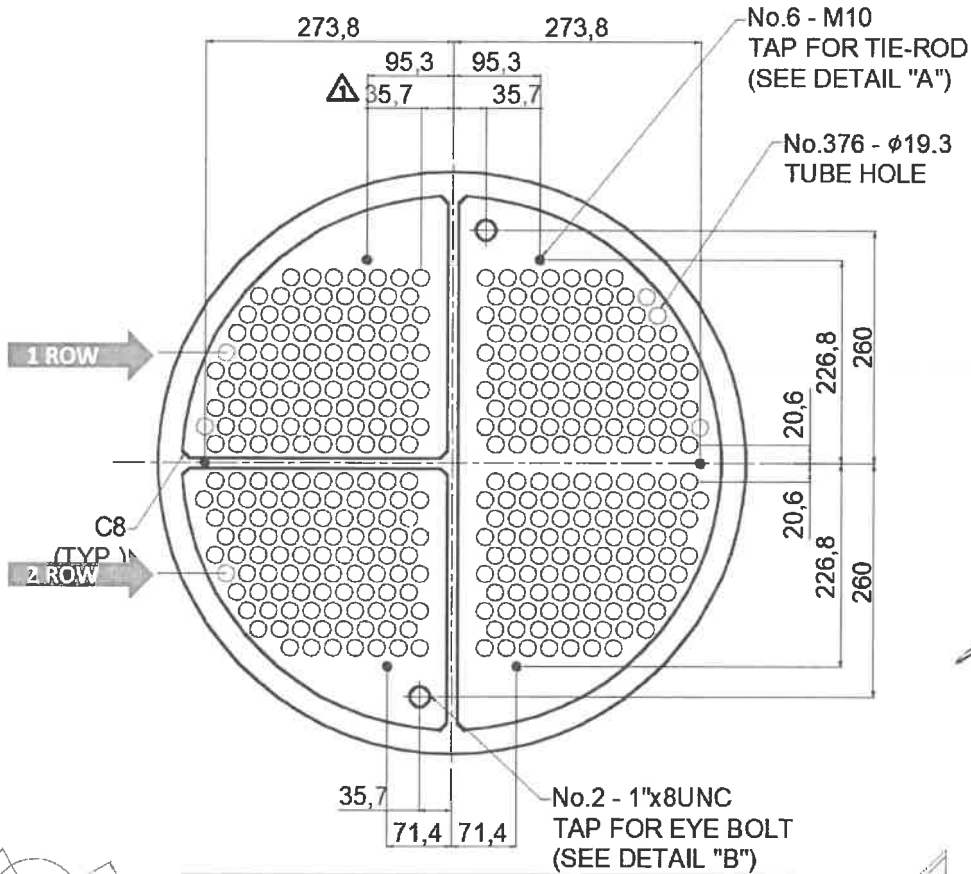
Marking : HX-127 #1, SA350 LF2CL1, S85072, 1&2	Inspected by :
Marking :	Approved by :

Pioneer Manufacturing & Supply

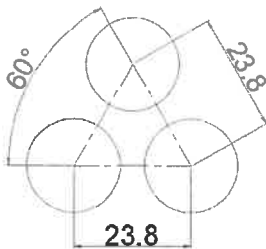
Witnessed Reviewed

DIMENSION CHECK SHEET

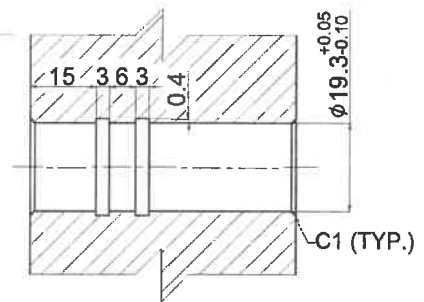
Title	1) TUBE SHEET	Date	2024-10-30
Equipment No.	HX-127	Dwg. No.	
Part No.	#1	Material	SA350 LF2CL1
Q'ty	2 EA	Size	OD 650 x 60T
Hole Size	$\varnothing 19.30^{+0.05}_{-0.1}$	Hole Pitch	\triangle 23.80



REVIEWED BY
 WITNESSED BY *e*
 2024.11.29
 S. M. KIM



TUBE HOLE PITCH



TUBE HOLE DETAIL

TOTAL HOLES : 376 / CHECKED HOLES : 40

Witnessed / Reviewed by	Approved by : _____ Reviewed by : _____ Prepared by : _____
-------------------------	---

DIMENSION CHECK SHEET

Hole Size	$\varnothing 19.30 \begin{matrix} +0.05 \\ -0.1 \end{matrix}$				Hole Pitch			Δ 23.80		
No.	1		2							
	1 ROW	2 ROW	1 ROW	2 ROW						
1	19.30	19.30	19.30	19.30						
2	19.30	19.30	19.31	19.30						
3	19.30	19.30	19.30	19.30						
4	19.30	19.30	19.30	19.30						
5	19.30	19.31	19.30	19.30						
6	19.31	19.30	19.30	19.30						
7	19.30	19.30	19.30	19.30						
8	19.30	19.30	19.30	19.30						
9	19.30	19.30	19.30	19.30						
10	19.30	19.30	19.30	19.30						
11	19.30	19.30	19.30	19.30						
12	19.30	19.30	19.30	19.31						
13	19.30	19.30	19.30	19.30						
14	19.30	19.30	19.30	19.30						
15	19.30	19.31	19.30	19.30						
16	19.30	19.30	19.30	19.30						
17	19.30	19.30	19.31	19.30						
18	19.30	19.30	19.30	19.30						
19	19.30	19.30	19.30	19.30						
20	19.30	19.30	19.30	19.30						
21										
22										
23										
24										
25										
26										
27										
28										
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30										
31										
32										
33										
34										
35										

REVIEWED BY
 WITNESSED BY ✓
 2024.11.29
 S. M. KIM

Order No./계약번호 : 01S5126117

PO No./주문번호 : P4 01S5126117(CS)(2108)

Supplier : POSCO INTERNATIONAL CORPORATION

Commodity : PLATE NACE MR0103/0175

Customer : MYUNGSUNG STEEL

Spec & Type : SA516-70 ASME 2019ED NACE MR 0103/0175

FAHAMEH
Engineering & Mtd. Co.
Witnessed
Reviewed

Size/치수	Product No. 제품번호	Quantity 수량 (kg)	Weight 중량 (kg)	Heat No. 제강번호	Position	Tensile Test 인장시험		Hardness 경도	A.G.S	Division	Chemical Composition/화합성분												
						YP (MPa)	TS (%)				EL (%)	HB	C (%)	Si (%)	Mn (%)	P (%)	S (%)	Cr (%)	Ni (%)	B (ppm)	Cu (%)	Mo (%)	Nb (%)
10x2438x12192	PC96362801-2902	2	4,666	SF46385	T	379	546	24	9.5	L	0.1867	0.334	1.330	0.0111	0.0030	0.031	0.016	0	0.017	0.006	0.002	0.0018	0.003
*** Sub Total (060) ***		2	4,666 (kg)		* B/L Date ==> 2021/10/14 CEQ (G) = C + Mn/6 + (Ni + Cu)/15 + Cr + Mg + V/5					P	0.1879	0.331	1.339	0.0110	0.0025	0.030	0.016	0	0.018	0.004	0.001	0.0022	0.002
12x2438x6096	PB60709306	1	1,400	SB28165	T	359	540	25	9.0	L	0.1883	0.345	1.350	0.0073	0.0023	0.021	0.013	0	0.021	0.004	0.002	0.0018	0.002
12x2438x6096	PB60709205-9206	2	2,800	SB28165	T	365	540	27	9.0	P	0.1884	0.341	1.352	0.0068	0.0024	0.022	0.013	1	0.018	0.006	0.002	0.0015	0.001
*** Sub Total (070) ***		3	4,200 (kg)		* B/L Date ==> 2021/10/14 CEQ (G) = C + Mn/6 + (Ni + Cu)/15 + Cr + Mg + V/5					L	0.1883	0.345	1.350	0.0073	0.0023	0.021	0.013	0	0.021	0.004	0.002	0.0018	0.002
12x2438x12192	PB60709301-9302	2	5,600	SB28165	T	359	540	25	9.0	L	0.1883	0.345	1.350	0.0073	0.0023	0.021	0.013	0	0.021	0.004	0.002	0.0018	0.002
*** Sub Total (080) ***		2	5,600 (kg)		* B/L Date ==> 2021/10/14 CEQ (G) = C + Mn/6 + (Ni + Cu)/15 + Cr + Mg + V/5					P	0.1884	0.341	1.352	0.0068	0.0024	0.022	0.013	1	0.018	0.006	0.002	0.0015	0.001

* Position - T : Top, M : Middle, B : Bottom
* Tensile Test Direction : Transversal, Gauge Length : 200 mm(Rectangular),
* YP Method : 0.2 % off-set

* A.G.S : Austenite Grain Size
* Division - L : Ladle Analysis, P : Products Analysis
* Supply Condition : As-Rolled unless otherwise Heat Treated.

REVIEWED BY
WITNESSED BY
2021. 11. 09
S. M. KIM

We hereby certify that the material herein has been made in accordance with the order and above specification.
This material has been fully killed and made by basic oxygen process. This material is fine grained steel.
This material has been made by vacuum degassing and calcium treated process.
No repair welding was performed to the products. Test Certificate is issued according to ISO 10474/EN 10204 3.1.

WITNESSED BY
PMS
Q.A
Reviewed by

본 검사증명서 위변조시 사문서 위조(형법 제231조)로 불이익을 당하실 수 있습니다.



Surveyor To :

T.C. BAE

Order No./계약번호 : 01S5126117

PO No./주문번호 : P4 01S5126117(CS)(2108)

Supplier : POSCO INTERNATIONAL CORPORATION

Commodity : PLATE NACE MR0103/0175

Customer : MYUNGSUNG STEEL

Spec & Type : SA516-70 ASME 2019ED NACE MR 0103/0175

FAHAMEH
주식회사
F&M Co.
Witnessed
Reviewed

Product No. 제품번호	Division	Sol-Al (%)	CEQ (%)	CEQ2 (%)	Weight (kg)	* B/L Date ==> 2021/10/14	
						CEQ (G) = C + Mn/6 + (Ni + Cu)/15 + (Cr + Mo + V)/5	CEQ2 (A) = C + Mn/6
PC96362901-2902	L P	0.035 0.036	0.42 0.42	0.41 0.41	2	* B/L Date ==> 2021/10/14	
*** Sub Total (060)						4,666 (kg)	CEQ (G) = C + Mn/6 + (Ni + Cu)/15 + (Cr + Mo + V)/5
PB60709306	L P	0.033 0.031	0.42 0.42	0.41 0.41	3	* B/L Date ==> 2021/10/14	
*** Sub Total (070)						4,200 (kg)	CEQ (G) = C + Mn/6 + (Ni + Cu)/15 + (Cr + Mo + V)/5
PB60709205-9206	L P	0.033 0.031	0.42 0.42	0.41 0.41	2	* B/L Date ==> 2021/10/14	
*** Sub Total (090)						5,600 (kg)	CEQ (G) = C + Mn/6 + (Ni + Cu)/15 + (Cr + Mo + V)/5

REVIEWED BY
WITNESSED BY
2024. 11. 28.
S. M. KIM

We hereby certify that the material herein has been made in accordance with the order and above specification.
This material has been fully killed and made by basic oxygen process. This material is fine grained steel.
This material has been made by vacuum degassing and calcium treated process.
No repair welding was performed to the products. Test Certificate is issued according to ISO 10474/EN 10204 3.1.

WITNESSED BY
PMS
Q.A
REVIEWED BY
Q.A



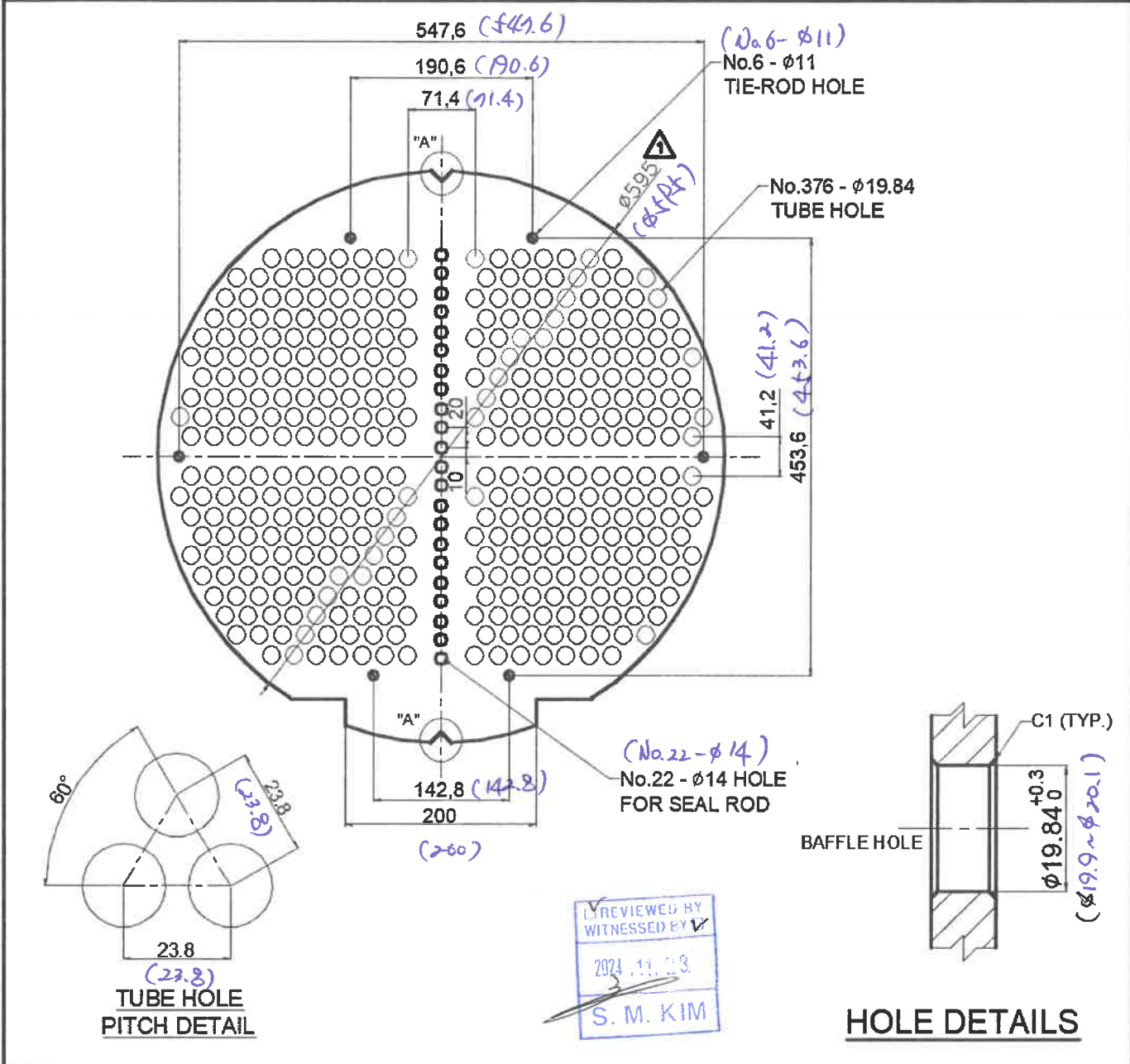
본 검사증명서 위변조시 사문서 위조(형법 제231조)로 불이익을 당하실 수 있습니다.

Surveyor To :

T.C. BAE

DIMENSION CHECK SHEET

Item	11) BAFFLE	Date	2024-10-28
Equipment No.	HX-127	Dwg. No.	
Part No.	#3	Material	SA516 Gr.70
Q'ty	8 EA	Size	OD595.2 x 10T
Hole Size	Ø19.84	+0.3 0	Hole Pitch △ 23.80



Witnessed / Reviewed by 	Approved by : _____ Reviewed by : _____ Prepared by : _____
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ORIGINAL



검사 증명서 MILL TEST CERTIFICATE

주문서/Order No. : P238400235
MYUNGSUNG STEEL
주요 품목/PO No. : MYUNGSUNG STEEL
소재명/Commodity : STEEL PLATE
규격명/Specification : ASME SA516-70 MT LTV 2021ED

검사 증명서 번호/Certificate No. : DP3-2-240129-044-003
발행 일자/Date of issue : 2024-01-29

Table with columns: Product No, Quantity, Weight, Heat No, Tensile Test, Impact Test, Hardness, Chemical Composition, Remarks. Includes sub-totals for 120mm and 150mm thicknesses.

Witnessed & Reviewed (checked)
We hereby certify that the material has been made by basic oxygen process (Fully killed steel, Fine grain practice) and satisfactorily tested in accordance with above specification requirement called for by the above order...

Administrative section including 'WITNESSED BY' and 'REVIEWED BY' stamps, signatures, and official titles of PMS and Q.A. staff.



ORIGINAL



검사증명서 MILL TEST CERTIFICATE

주문/Order No. : P23B400235
주요/PO No. : MYUNGSUNG STEEL
품명/Commodity : STEEL PLATE
규격/Specification : ASME SA516-70 MT LTV 2021ED

검사증명서번호/Certificate No. : DP3-2-240129-044-003
발행일자/Date of issue : 2024-01-29

FAHAMEH
Witnesed Reviewed

Table with columns: Product No, Quantity, Weight, Chemical Composition (Cu, Mo, Nb, Ti, V, T.Ai, S.Ai, Ceq, B, Comp1), and Remarks. Includes sub-totals and material type (MYUNGSUNG STEEL).

REVIEWED BY
WITNESSED BY
2024. 1. 29.
S. M. KIM

* Specimen No. : a-Tension, c-Impact, d-Hardness, e-Product Analysis.
* Division : L-Ladle Analysis, P-Product Analysis
* Sub(Sub Size, Real Value, mm) : Blank-Full Size, 1-7.5*10, 2-5.0*10
* GL(Gauge Length, mm) : 1-200(Rec.), 3-80(Rec.), 5-50(Round), 6-5.65(S(Converted/Rec.), 10-50(Rec.))
* T(S),Al : Total(Soluble) Al *Tr : Trace
* NRL Result : G-No Break, B-Break
* TTP(Through Thickness Position) : 1-Surface, 2-1/4T, 3-1/2T

We hereby certify that the material has been made by basic oxygen process (Fully killed steel, Fine grain practice) and satisfactorily tested in accordance with above specification requirement called for by the above order. If the amount of Cr, Ni, Cu, Mo, Ti or Si is blank, the heat analysis for that element is less than 0.02% and/or of Nb, V is blank, it is less than 0.008%. * Inspection documents : According to EN 10204 Type 3.1, No welding repair. NACE MR0175(SO15156)/MR0103 Hardness only. Vacuum degassed.

본 주문품은 상기의 규격용도 외 타용도로 사용시 제품순상 및 안전사고등의 문제가 발생할 수 있으며, 본 검사증명서를 위조 또는 변조시 형사법에 의해 처벌될 수 있습니다.

원본인증방법 : 동국제강 E-Biz 홈페이지 접속(https://ebiz.dongkuksteel.com/)
QR Code 이용 방법 : Google Play 'QReal' 검색 후 다운로드/실행 -> QR Code 스캔 / IOS : App Store 'QReal' 검색 후 다운로드/실행 -> QR Code 스캔

PMS
Q.A.
WITNESSED BY
REVIEWED BY

Handwritten signature

Surveyor to: Surveyor to: Surveyor to: Surveyor to: Surveyor to: Surveyor to:
Chief of Quality Control Team / J.W.Lee
Page : 2/2



Order No./계약번호 : 01S4937689

PO No./주문번호 : P4 INN NIPA PJT(2104)(02)

POSCO INTERNATIONAL CORPORATION

Commodity : PLATE NACE MR 0103, 0175
/품명

Customer : MYUNGSUNG STEEL
/고객사

Spec & Type : ASME SEC II PART A 19ED SA516-70N MT LTV
/규격

Product No. 제품번호	Quantity 수량 (kg)	Weight 중량 (kg)	Heat No. 제강번호	Position	Tensile Test /인장시험		Impact Test /충격시험		Hardness /경도	A.G.S	Division	Chemical Composition/화합성분											
					YP (MPa)	TS (MPa)	EL (%)	V Notch -48°C Energy (Joule)				HB	C (%)	Si (%)	Mn (%)	P (%)	S (%)	Cr (%)	Ni (%)	B (ppm)	Cu (%)	Mo (%)	Nb (%)
12x2438x12192	1	2,800	SF41975	T	360	539	25	1: 209 2: 230 3: 126 A: 188	1: 153.1 2: 152.3 3: 152.2 A: 152.5	9.3	L	0.1836	0.351	1.336	0.0076	0.0017	0.022	0.012	3	0.015	0.005	0.002	0.0022
*** Sub Total (050) ***	1	2,800 (kg)			* @/L Date ==> 2021/06/07						P	0.1859	0.354	1.344	0.0089	0.0020	0.023	0.011	2	0.014	0.005	0.001	0.0017
*** Heat Treatment ==> Normalized : 890°C 21min. ***												CEQ (G) = C + Mn/6 + (Ni + Cu)/15 + (Cr + Mo + V)/5											
*** Grade Total ***	2	4,200 (kg)																					

REVIEWED BY
WITNESSED BY
2024. 11. 29.
S. M. KIM

PMS
Q.A
WITNESSED BY
REVIEWED BY

* Position - T : Top, M : Middle, B : Bottom
* Tensile Test, Direction : Transversal, Gauge Length : 200 mm (Rectangular),
YP Method : 0.2 % off-set
* Impact Test, Direction : 1/4T Longitudinal, Full-Size : 10 mmX10 mm
* A.G.S : Austenite Grain Size.
* Division - L : Ladle Analysis, P : Products Analysis
* Supply Condition : As-Rolled unless otherwise Heat Treated.

We hereby certify that the material herein has been made in accordance with the order and above specification.
This material has been fully killed and made by basic oxygen process. This material is fine grained steel.
This material has been made by vacuum degassing and calcium treated process.
No repair welding was performed to the products. Test Certificate is issued according to ISO 10474/EN 10204 3.1.



본 검사증명서 위.변조시 사문서 위조(형법 제231조)로 불이익을 당하실 수 있습니다.

Surveyor To :

T.C. BAE

Order No./계약번호 : 01S4937689

PO No./주문번호 : P4 INN NIPA PJT(2104)(02)

POSCO INTERNATIONAL CORPORATION

Commodity / 품명 : PLATE NACE MR 0103, 0175

Customer / 고객사 : MYUNGSUNG STEEL

Spec & Type / 규격 : ASME SEC II PART A 19ED SA516-70N MT LTV

Witnessed & Reviewed
FAHAMEH Eng. & Mtd. Co.
Product No. / 제품번호

Division	V (%)	Sol-Al (%)	CEQ (%)
L	0.003	0.035	0.41
P	0.002	0.032	0.42

* B/L Date ==> 2021/06/07

1 2,800 (kg)

*** Sub Total (P50) ***

2 4,200 (kg)

*** Grade Total ***

CEQ (G) = C + Mn/6 + (Ni + Cu)/15 + (Cr + Mo + V)/5

REVIEWED BY
WITNESSED BY
2024.11.29
S. M. KIM

PMS
Q.A
WITNESSED BY
REVIEWED BY
Jank

We hereby certify that the material herein has been made in accordance with the order and above specification.
This material has been fully killed and made by basic oxygen process. This material is fine grained steel.
This material has been made by vacuum degassing and calcium treated process.
No repair welding was performed to the products. Test Certificate is issued according to ISO 10474/EN 10204 3.1.

본 검사증명서 위·변조시 사문서 위조(형법 제231조)로 불이익을 당하실 수 있습니다.



Surveyor To :

T.C. BAE



TAE HEUNG

열 처리 성적서

HEAT TREATMENT RECORD

H.T DATE	2024. 10. 23.
RECORD NO	TH-241023-01

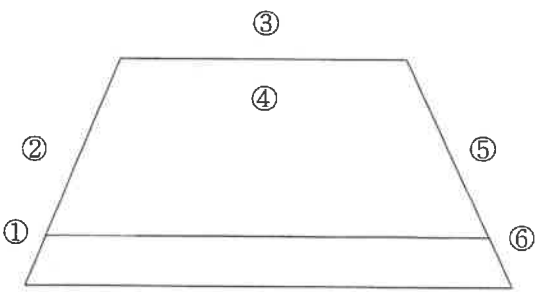
주문주: CUSTOMER: P.M.S Co., LTD.	열전대 종류: KIND OF THERMO COUPLE : K-TYPE
공사명: PROJECT NAME: N/A	온도기록계 (TEMP RECORD) 교정번호 (CERTIFICATE NO): UT24T-42538
공사번호: PJT NO: HX-127	열전대 (THERMO COUPLE) UT24T-42528 ~ UT24T-42535
부품명: PART NAME: 2:1 ELLIP HEAD	열처리로제원(FURNACE SIZE) 5.0m(H)×8.5m(L)×4.7m(W)
재질: MATERIAL: SA516-70N	가열원: HEAT SOURCE: Gas
열처리 종류: TYPE OF HEAT: STRESS RELIEF	기록지 속도: CHART SPEED: 25mm/hr

열 처리 조건 (HEAT TREATMENT CONDITION)

조건 Condition	요구치 온도 Required	실제 작업 온도 Actual	No	ITEM NO	SIZE	Q,TY
① 장입 온도 Loading Temp.	Max 425 °C	300 °C	1	HX-127	Min.10T*ID600	2EA
② 가열율 Heating Rate	Max 220 °C/hr	170 °C/hr	2	HX-127	Min.12T*ID925	2EA
③ 유지 온도 Holding Temp.	625±25 °C	629-642 °C				
④ 유지 시간 Holding Time	Min 60 min	90 min				
⑤ 냉각율 Cooling Rate	Max 280 °C/hr	150 °C/hr				
⑥ 추출 온도 Unloading Temp.	Max 425 °C	290 °C				
⑦ 가열, 냉각, 최대온도편차 Max. Allowable Variation in Temp. Heating and cooling.	Max 83 °C	20 °C				

REVIEWED BY
 WITNESSED BY
 2024. 10. 23.
 S. M. KIM

PMS WITNESSED BY
 Q.A REVIEWED BY



작성자: (Prepared By): H.S.LEE	승인자: (Approved By): C.M.YOU	REMARKS: Temp Recorder, Thermocouple expiry date : 2025. 04. 18.
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CHART NO. EH-05035-2



Witnessed Reviewed



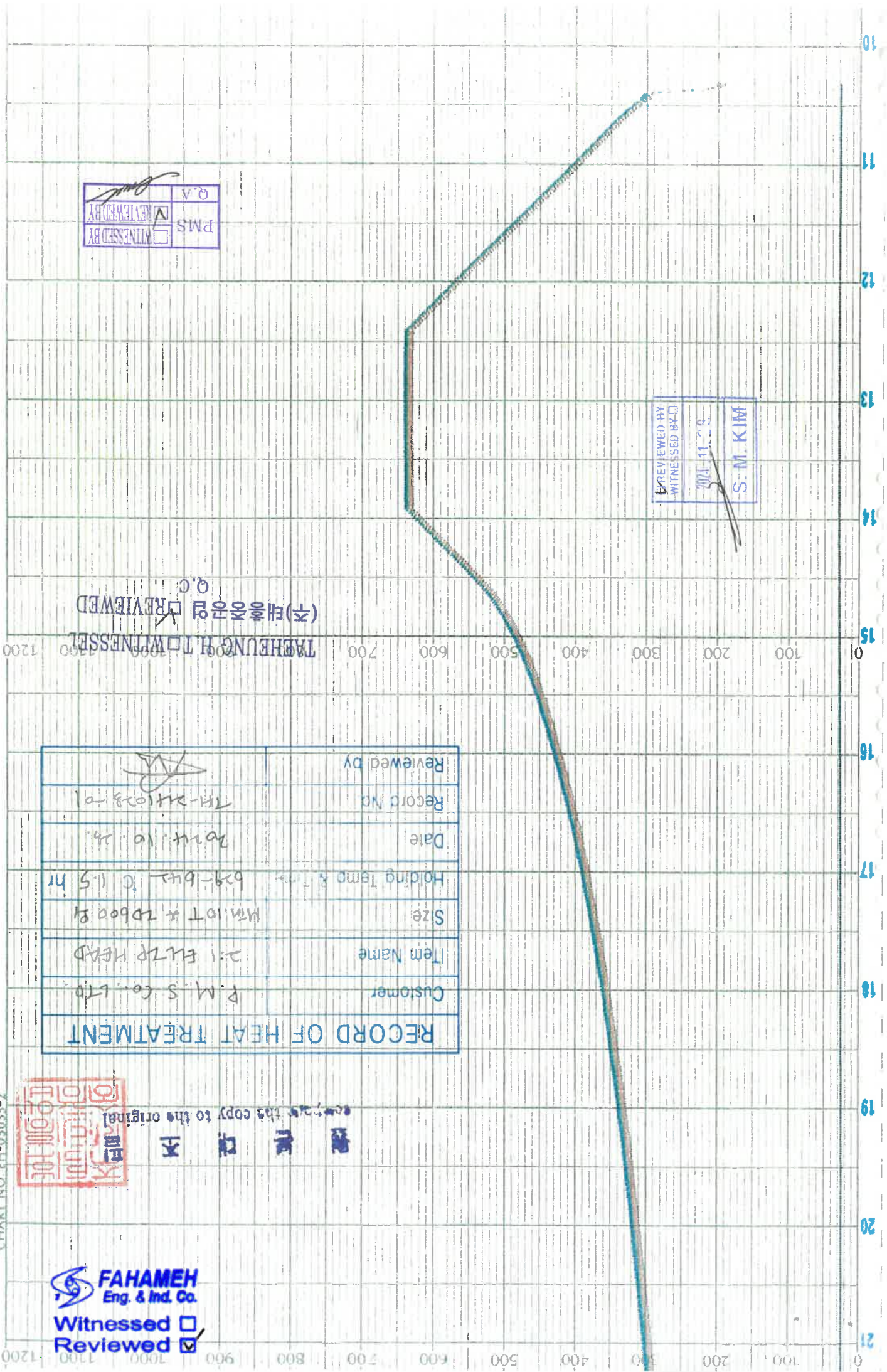
이것은 사본입니다. 원본을 참조하십시오.
This is a copy of the original.

RECORD OF HEAT TREATMENT	
Customer	P.M.S Co., Ltd.
Item Name	2:1 ELTR HEAD
Size	Max. 10T x 20600 mm
Holding Temp & Time	629-642 °C (1.5 hr)
Date	2024. 10. 24
Record No.	TR-241028-01
Reviewed by	

TAEHEUNG H. WITNESSED
(주)태웅중공업 REVIEWED
0.0 °C

REVIEWED BY
WITNESSED BY
2024. 11. 29
S. M. KIM

P.M.S. WITNESSED BY
0.0 °C REVIEWED BY





자 분 탐 상 검 사 보 고 서

Magnetic Particle Examination Report

Report No.: BK - PMS - U - 241028 - 01

Page No. : 1 OF 1

Owner/Customer (주문주/고객) Pioneer Manufacturing & Supply Co., Ltd.		Project Name (공사명) PV120		Project No. (공사번호)	
Item Name (제품명) 2:1 ELLIP HEAD		Code (규격) ASTM A275 ASME SA788 S18		Procedure (절차서) N / A	
Item No. (제품번호) SEE BELOW		Drawing No. (도면번호) P24050-E0000-06H Rev.0		Test Time (검사시기) <input checked="" type="checkbox"/> After Forming	
Material (재질) SA516 Gr.70N		Test Block (테스트 블록) <input checked="" type="checkbox"/> Pie indicator (ASTM A 275) <input checked="" type="checkbox"/> Lifting Block (Over 18Kg) (S/No.:MP19706)		Surface Condition (표면상태) <input checked="" type="checkbox"/> As Machined <input type="checkbox"/> As Grinded <input type="checkbox"/> As Welded <input type="checkbox"/>	
Yoke Equipment (요크 장비) <input type="checkbox"/> AC(교류) : 10 Lbs. <input checked="" type="checkbox"/> DC(직류) : 40 Lbs. Brand Kyung-Do Model No. MP-A2D Serial No. MP5746 Spacing 3 ~ 5 In Due date 2025. 03. 30.	Magnetization Technique (장비) <input checked="" type="checkbox"/> Yoke (요크법) <input type="checkbox"/> Prod (프로드법) <input type="checkbox"/> Coil (코일법)	Direction of Magnetic Field (자화 종류) <input checked="" type="checkbox"/> Longitudinal (선형자화) <input type="checkbox"/> Circular (원형자화) <input type="checkbox"/> Both (양쪽)	Magnetic Particle (자분, 종류) Brand : GS Chem Co., Ltd. Model No. : MPS-B Batch No. : M240114P <input type="checkbox"/> Dry(건식) <input checked="" type="checkbox"/> Wet(습식) <input checked="" type="checkbox"/> Visible(비형광) <input type="checkbox"/> Fluorescent(형광)	Illuminance Meter (조도계) Brand : TES S/N : 230607627 Model : 1330A Due Date: 2024. 12. 28. Illumination: (조명도) Min. 1100 Lux	Black Light(자외선등) <input type="checkbox"/> With(사용) <input checked="" type="checkbox"/> Without(미사용) Brand : N / A Model : N / A Serial No. : N / A Intensity : N / A Due date : N / A Demagnetization (탈자) <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
Temp Meter (온도계) Brand : TES Model : 1300	Model No : 230607462 Due Date : 2024. 12. 27	Test Temp (제품 표면 온도) <input checked="" type="checkbox"/> Ambient <input type="checkbox"/> Elev			

Sketch

*EXAMINATION AREA
: Only Knuckle Zone(Out Side & In Side) & Bevel Part

Identification No. 확인번호 (Equi. No./ Part No. / Size)	Q.TY 수량	Accept 합격	Reject 불합격	Interpretation 판정	Remark 비고
1 (HX127) ID600 x 10Min.T x SF50	2EA	V		ACCEPTABLE	
2 (HX127) ID925 x 12Min.T x SF50	2EA	V		"	
				-BLANK-	

PMS WITNESSED BY
 REVIEWED BY
Q.A. *[Signature]*

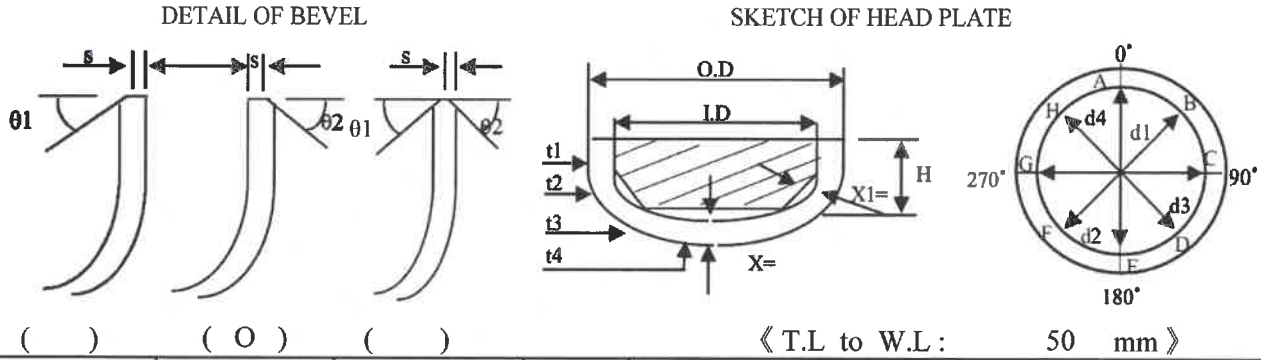
SKETCH ON DOT LINE, IF NECESSARY OR ATTACHED. 필요시 점선안에 스케치하거나 또는 첨부할것.

Examined by 이인섭 시협자 I. S. LEE	LEVEL II	Date of Examination 검사일자 Oct. 28. 2024.	Customer QA Manager
Approved by FAHAMEH Eng & Ind. Co. 승인자 D. J. Kim	LEVEL III	Date of Report 보고서 일자 Oct. 28. 2024.	<input checked="" type="checkbox"/> WITNESSED BY <input checked="" type="checkbox"/> REVIEWED BY 2024. 11. 29 S. M. KIM
		<input type="checkbox"/> Witnessed by 입회자	
		<input type="checkbox"/> Reviewed by 검토자	

INSPECTION REPORT FOR HEAD PLATE

CUSTOMER	PMS CO., LTD.			PROJECT NAME	HX-127
ITEM NAME	HEAD	P/O No.	PMS-24-050	CODE	ASME Sect. VIII, Div. 1(2023Ed.)
FORMING METHOD	COLD	HEAD TYPE	2:1 ELLIP	INSPECTION DATE	18-Oct-24
MATERIAL SPEC.	SA516 Gr.70N	QUANTITY	2EA	DWG NO.	

SKETCH Unit : mm



Description	Design Dimension	Tolerance	Mark	Actual Dimension							
				HEAD				HEAD			
Inside Diameter (Roundness)	925	Max-Min= 1% of Nominal I.D	I.D	d1	d2	d3	d4	d1	d2	d3	d4
				0	+1	+2	0	0	-3	-1	+1
Circumference	2906		π I.D	2907				2905			
Height	281	0~+1.25% X I.D	H	287				288			
Thickness	14	Min. 12		A	C	E	G	A	C	E	G
			t1	14.8	14.6	14.2	14.9	14.6	14.7	14.4	14.6
			t2	13.9	13.8	13.6	13.8	13.9	13.9	13.7	13.9
			t3	13.2	13.2	13.0	13.2	13.2	13.2	13.2	13.2
			t4	13.3	13.0	13.2	13.3	13.2	13.3	13.2	12.9
Shape deviation	R = 837	+1.25% of ID ~ -0.625% of ID		X		X1		X		X1	
	r = 160	Small Radius > r	A.E	GOOD		GOOD		GOOD		GOOD	
Bevel Angle	S= 2	± 1	S	1				1			
	$\theta 1 =$	-	$\theta 1$	N/A				N/A			
	$\theta 2 = 25^\circ$	$\pm 2.5^\circ$	$\theta 2$	GOOD				GOOD			

Plate No.

Judgment

ACCEPTABLE

ACCEPTABLE

We hereby certify that above heads made by cold forming meet all requirement of UG79(d) of ASME Sect.VIII Div.1 and heat treatment is not performed. performed

WITNESSED BY



APPROVED BY



S. J. PARK

INSPECTED BY

S. M. KIM

Y. S. PARK

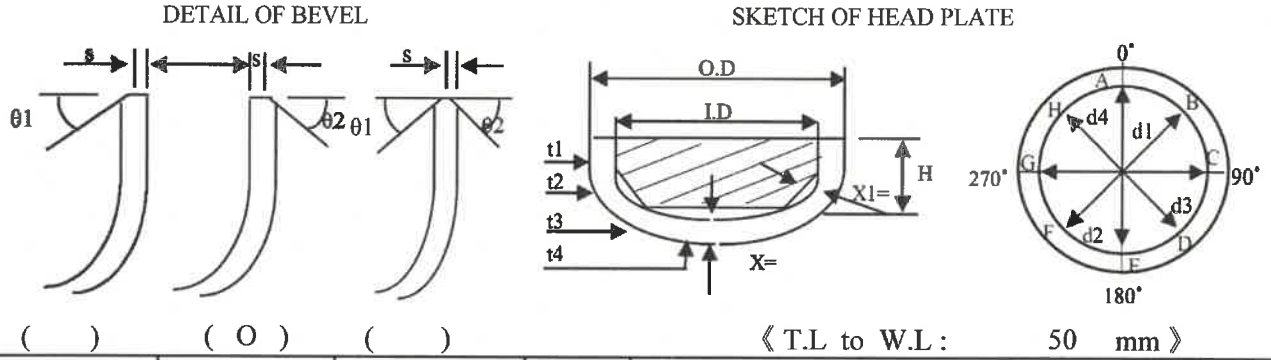


Witnessed
Reviewed

INSPECTION REPORT FOR HEAD PLATE

CUSTOMER	PMS CO., LTD.			PROJECT NAME	HX-127
ITEM NAME	HEAD	P/O No.	PMS-24-050	CODE	ASME Sect. VIII, Div. 1(2023Ed.)
FORMING METHOD	COLD	HEAD TYPE	2:1 ELLIP	INSPECTION DATE	18-Oct-24
MATERIAL SPEC.	SA516 Gr.70N	QUANTITY	2EA	DWG NO.	

SKETCH Unit : mm



Description	Design Dimension	Tolerance	Mark	Actual Dimension							
				HEAD				HEAD			
Inside Diameter (Roundness)	600	Max-Min= 1% of Nominal I.D	I.D	d1	d2	d3	d4	d1	d2	d3	d4
				0	-1	-1	0	+1	+2	-1	0
Circumference	1885		π I.D	1884				1885			
Height	200	0~+1.25% X I.D	H	205				208			
Thickness	12	Min. 10		A	C	E	G	A	C	E	G
			t1	14.3	14.1	14.2	14.6	14.8	14.9	14.3	14.8
			t2	12.6	12.8	12.8	12.8	13.0	12.9	12.8	12.9
			t3	12.3	12.1	12.3	12.2	12.3	12.4	12.2	12.3
			t4	12.3	12.1	12.0	12.1	12.1	12.0	12.2	12.0
Shape deviation	R = 543	+1.25% of ID ~ -0.625% of ID		X		X1		X		X1	
	r = 104	Small Radius > r	A.E	GOOD		GOOD		GOOD		GOOD	
Bevel Angle	S=2	± 1	S	1				1			
	$\theta 1 =$	-	$\theta 1$	N/A				N/A			
	$\theta 2 = 25^\circ$	$\pm 2.5^\circ$	$\theta 2$	GOOD				GOOD			
Plate No.											
Judgment				ACCEPTABLE				ACCEPTABLE			

We hereby certify that above heads made by cold forming meet all requirement of UG79(d) of ASME Sect.VIII Div.1 and heat treatment is not performed. performed

WITNESSED BY

PMS	<input type="checkbox"/> WITNESSED BY
Q.A	<input checked="" type="checkbox"/> REVIEWED BY

REVIEWED BY	BY L
2024.11.28	

S. J. PARK
 Y. S. PARK

INSPECTED BY	S.W. KIM
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ASNT Certification Services LLC.

Be it known that

Du Jin Kim

Has met the established and published Requirements for Certification by ASNT Certification Services LLC. as
NDT Level III

In the following Nondestructive Testing Methods:

Method	Issue Date	Expiration Date
Liquid Penetrant Testing	2/22	2/27
Magnetic Particle Testing	2/22	2/27
Radiographic Testing	2/22	2/27
Ultrasonic Testing	2/22	2/27
Visual Testing	2/22	2/27



206623

John J. Rooney

Certificate Number

Certification Management Committee
Chair

ASNT Certification Services, LLC, President

Note: All ASNT NDT Level III exams are developed and maintained in accordance with ISO/IEC 17024 guidelines for certification of persons. The following exams are currently accredited by the American National Standards Institute (ANSI) - BASIC, ET, MT, PT, RT, UT, and VT. This certificate is the property of ASNT Certification Services LLC., is not official without ASNT Certification Services LLC.'s raised gold seal, and is subject to revocation prior to the listed expiration date. This certificate shall be verified on <https://asntcertification.org> or by contacting ASNT Certification Services LLC.

Certificate No: II-2013018

New

Re



NDE CERTIFICATE

Korea Machinery Inspection E&C Co., Ltd.


That is to certify that the individual named below has successfully completed experience, training and examination requirements in accordance with the provisions of KMI E&C Co., Ltd. Procedure for NDE personnel Qualification and Certification KMIQ-P6225 (Rev.9) which meets the requirements of SNT-IC-1A & CP-189 (2016 Ed.).

In Sub, Lee


is hereby certified to perform the following Nondestructive Examination Method(s)

Method	Technique	Level	Limitation (if any)	Certification Date	Expiration Date
Radiographic Testing	Radiography	II	-	03/04/2022	03/03/2027
Ultrasonic Testing	Manual	II	-	03/04/2022	03/03/2027
Magnetic Particle Testing	-	II	-	03/04/2022	03/03/2027
Liquid Penetrant Testing	-	II	-	03/04/2022	03/03/2027
Visual Testing	-	II	-	03/04/2022	03/03/2027

REVIEWED BY
 WITNESSED BY
 2021.11.09
S. M. KIM

Du Jin, Kim
 (ASNT CERT NO:206623)

 Qualified by Designated NDE Level III

03/04/2022
 Date

Moo Ung, Yoon

 President of KMI E&C Co., Ltd
 Date

Calibration Certificate

Q & Q Corporation

58, Hwajeonsandan 3-ro, Gangseo-gu, Busan, Korea
Tel : 051-292-0395, Fax : 051-292-0397

Certificate No : Q2403326-106-001

Page (1) of (2)



1. Client

Name : P.M.S Co., LTD

Address : 296, Dae Dong-Ro, Sasang-Gu, Busan, Korea

2. Calibration Subject

Description : Inside/Outside Caliper(Digital type)

Manufacturer & Type : Mitutoyo / (0 ~ 300) mm, 0.01 mm

Serial Number : 0023118

3. Date of Calibration : 12. Apr. 2024

4. Environment

Temperature : (20.7 ± 0.1) °C

Humidity : (48 ± 2) % R.H.

Location : Permanent Calibration Lab

Mobile Lab

On Site Calibration

[Address : 58, Hwajeonsandan 3-ro, Gangseo-gu, Busan, Korea]



5. Traceability

Calibration method and/or brief description

The above instrument has been calibrated according to the calibration instruction of Inside/Outside Calipers (QECI - LE601) using the below standard instrument which is established a traceability to National Metrology Institute.

List of used standards/specifications

Description	Manufacturer and Model	Serial Number	The due date of next calibration	Calibration laboratory
Caliper Checker	Mitutoyo, 660 mm	559	18. Sep. 2026.	Q & Q Corp.
Surface Plate	Kumsung, (1 000 × 750) mm	260919	21. Jan. 2025.	Q & Q Corp.
Surface Thermometer	TES, 1300	990407368	29. Jun. 2024.	Q & Q Corp.

6. Calibration result : Refer to the attached Calibration Result.

7. Measurement uncertainty : Refer to the attached Calibration Result.

Affirmation	Measurements performed by Name : Hyung Kyu Kim (signature)	Approved by Title : Technical Manager Name : Myeon Keol Kim (signature)
-------------	---	---

The above certificate of calibration is the accredited calibration items by Korea Laboratory Accreditation Scheme, which signed the ILAC-MRA.

15. Apr. 2024.

Q & Q Corporation
Accredited by KOLAS, Republic of Korea



(NOTE) If any significant instability or other adverse factor(overload, temperature, humidity etc.) manifests itself before, during or after calibration, and is likely to affect the validity of the calibration.

QE-R-001-1 (Rev. 3)

FAHAMEH
Eng. & Ind. Co.

Witnessed
Reviewed

verify No.454458123126

(210 × 297) mm

Calibration Result

Q & Q Corporation

58, Hwajeonsandan 3-ro, Gangseo-gu, Busan, Korea
Tel : 051-292-0395, Fax : 051-292-0397

Certificate No : Q2403326-106-001

Page (2) of (2)



- * Manufacturer : Mitutoyo
- * Model Name : (0 ~ 300) mm, 0.01 mm
- * Serial number : 0023118

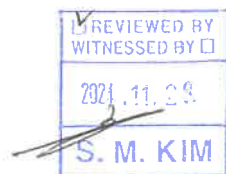
■ Inside/Outside Caliper(Digital type) Calibration

Graduation value (mm)	Correction value (mm)	
	Outside	Intside
0	0.00	-
20	-0.01	0.00
50	-0.01	0.00
100	0.00	0.00
150	0.00	-0.01
200	0.00	-0.01
300	-0.01	-0.02

Measurement uncertainty : 0.01 mm

(Coverage probability of approximately 95 % , $k = 2$)

※ The calibration value is obtained by adding the correction value to the graduation value.
The end.



* The recommended calibration interval is 12 month according to the KOLAS guide (KOLAS-G-008).

QE-R-002-1 (Rev. 3)



Witnessed
Reviewed

(210 × 297) mm

Calibration Certificate

Q & Q Corporation

Certificate No : Q2407384-106-002



58, Hwajeonsandan 3-ro, Gangseo-gu, Busan, Korea
Tel : 051-292-0395, Fax : 051-292-0397

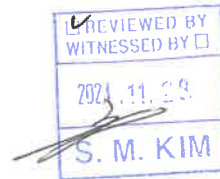
Page (1) of (2)

1. Client

Name : P.M.S Co., LTD
Address : 296, Dae Dong-Ro, Sasang-Gu, Busan, Korea

2. Calibration Subject

Description : Inside/Outside Caliper
Manufacturer & Type : YJ / (0 ~ 1 000) mm, 0.05 mm
Serial Number : L15071701



3. Date of Calibration : 13. Aug. 2024

4. Environment

Temperature : (20.7 ± 0.1) °C Humidity : (48 ± 2) % R.H.
Location : Permanent Calibration Lab Mobile Lab On Site Calibration
[Address : 58, Hwajeonsandan 3-ro, Gangseo-gu, Busan, Korea]

Calibration method and/or brief description

The above instrument has been calibrated according to the calibration instruction of Inside/Outside Calipers (QECl - LB601) using the below standard instrument which is established a traceability to National Metrology Institute.

List of used standards/specifications

Description	Manufacturer and Model	Serial Number	The due date of next calibration	Calibration laboratory
Gauge Block	Mitutoyo, (0.5 ~ 100) mm	1403078	20. Oct. 2026.	Q & Q Corp.
Long Gauge Block	Mitutoyo, (125 ~ 500) mm	1202813	17. Nov. 2026.	Q & Q Corp.
Long Gauge Block	None, (600 ~ 1 000) mm	2013	12. Jun. 2026.	KRISS
Gauge Block Accessory	N/A, None	None	12. Oct. 2026.	KTL
Surface Plate	Kumsung, (1 000 × 750) mm	260919	21. Jan. 2025.	Q & Q Corp.
Surface Thermometer	TES, 1300	990407368	28. Jun. 2025.	Q & Q Corp.

6. Calibration result : Refer to the attached Calibration Result.

7. Measurement uncertainty : Refer to the attached Calibration Result.

Affirmation	Measurements performed by Name : Hyung Kyu Kim (signature)	Approved by Title : Technical Manager Name : Myeon Keol Kim (signature)
-------------	---	---

The above certificate of calibration is the accredited calibration items by Korea Laboratory Accreditation Scheme, which signed the ILAC-MRA.

13. Aug. 2024.

Q & Q Corporation
Accredited by KOLAS, Republic of KOREA



(NOTE) If any significant instability or other adverse factor(overload, temperature, humidity etc.) manifests itself before, during or after calibration, and is likely to affect the validity of the calibration.



Witnessed
Reviewed

verify No.448001749585

(210 × 297) mm

Calibration Result

Q & Q Corporation

Certificate No : Q2407384-106-002



58, Hwajeonsandan 3-ro, Gangseo-gu, Busan, Korea
Tel : 051-292-0395, Fax : 051-292-0397

Page (2) of (2)

- * Manufacturer : YJ
- * Model Name : (0 ~ 1 000) mm, 0.05 mm
- * Serial number : L15071701

■ Inside/Outside Caliper Calibration

Graduation value (mm)	Correction value (mm)	
	Outside	Intside
0	-0.40	-
100	-0.40	-0.20
200	-0.40	-0.20
300	-0.40	-0.20
400	-0.40	-0.20
500	-0.40	-0.20
600	-0.40	-0.20
700	-0.40	-0.20
800	-0.40	-0.20
900	-0.40	-0.20
1 000	-0.40	-0.20

Measurement uncertainty : 0.03 mm
(Coverage probability of approximately 95 % , $k = 2$)

※ The calibration value is obtained by adding the correction value to the graduation value.
The end.

REVIEWED BY
WITNESSED BY
2024.11.23
S. M. KIM

* The recommended calibration interval is 12 month according to the KOLAS guide (KOLAS-G-008).

FAHAMEH
Eng. & Ind. Co.

Witnessed
Reviewed

(210 × 297) mm

Calibration Certificate

Q & Q Corporation

Certificate No : Q2403326-106-003



58, Hwajeonsandan 3-ro, Gangseo-gu, Busan, Korea
Tel : 051-292-0395, Fax : 051-292-0397

Page (1) of (2)

1. Client

Name : P.M.S Co., LTD

Address : 296, Dae Dong-Ro, Sasang-Gu, Busan, Korea

2. Calibration Subject

Description : Cylinder Gauge

Manufacturer & Type : Mitutoyo , (18 ~ 35) mm, 0.01 mm

Serial Number : 2150402



3. Date of Calibration : 12. Apr. 2024.

4. Environment

Temperature : (20.7 ± 0.1) °C

Humidity : (48 ± 2) % R.H.

Location : Permanent Calibration Lab

Mobile Lab

On Site Calibration

[Address : 58, Hwajeonsandan 3-ro, Gangseo-gu, Busan, Korea]

5. Traceability

Calibration method and/or brief description

The above instrument has been calibrated according to the calibration instruction of Cylinder Gauges (QECI - LE603) using the below standard instrument which is established a traceability to National Metrology Institute.

List of used standards/specifications

Description	Manufacturer and Model	Serial Number	The due date of next calibration	Calibration laboratory
Dial Gauge Tester	Mitutoyo, (0 ~ 25) mm, 0.001 mm	200489	18. Aug. 2025.	Q & Q Corp.
Surface Thermometer	TES, 1300	990407368	29. Jun. 2024.	Q & Q Corp.

6. Calibration result : Refer to the attached Calibration Result.

7. Measurement uncertainty : Refer to the attached Calibration Result.

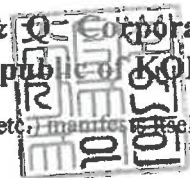
Affirmation	Measurements performed by Name : Hyung Kyu Kim (signature)	Approved by Title : Technical Manager Name : Myeon Keol Kim (signature)
-------------	---	---

The above certificate of calibration is the accredited calibration items by Korea Laboratory Accreditation Scheme, which signed the ILAC-MRA.



15. Apr. 2024.

Q & Q Corporation
Accredited by KOLAS , Republic of KOREA



(NOTE) If any significant instability or other adverse factor (overload, temperature, humidity etc.) manifests itself before, during or after calibration, and is likely to affect the validity of the calibration.

QE-R-001-1 (Rev. 3)



Witnessed
Reviewed

verify No.096707674728

(210 × 297) mm

Calibration Result

Q & Q Corporation

Certificate No : Q2403326-106-003

58, Hwajeonsandan 3-ro, Gangseo-gu, Busan, Korea
Tel : 051-292-0395, Fax : 051-292-0397

Page (2) of (2)



Dial Gauge			Cylinder Gauge		
Manufacturer	Model Name	Serial number	Manufacturer	Model Name	Serial number
Mitutoyo	(0 ~ 10) mm	QWB117	Mitutoyo	(18 ~ 35) mm	2150402

1. Dial Gauge Calibration

Graduation value (mm)	Correction value (μm)	
	Forward	Backward
0.0	0	0
0.1	0	0
0.2	0	0
0.3	0	0
0.4	-4	-4
0.5	0	0
2.0	0	0
4.0	-2	-2
6.0	0	0
8.0	-2	-2
10.0	0	0

Measurement uncertainty : 1.5 μm (Coverage probability of approximately 95 % , $k = 2$)

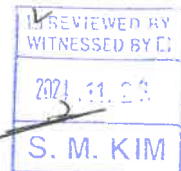
2. Cylinder Gauge Calibration

Graduation value (mm)	Correction value (μm)
2.0	0
2.1	0
2.2	0
2.3	0
2.4	0
2.5	-2
2.6	0
2.7	-2
2.8	-2
2.9	-2
3.0	-2

Measurement uncertainty : 1.5 μm (Coverage probability of approximately 95 % , $k = 2$)

*** Technical Note:**

The above calibration results are obtained by mounting the Cylinder Gauge when the needle of the Dial Gauge indicates 1.9 mm, and setting it to 0 when the needle indicates 2 mm. The end.



* The recommended calibration interval is 12 month according to the KOLAS guide (KOLAS-G-008).

QE-R-002-1 (Rev. 3)
FAHAMEH
Eng. & Ind. Co.

Witnessed
Reviewed

(210 × 297) mm

CALIBRATION CERTIFICATE

Q & Q Corporation

Certificate No : Q2403326-105-005



58, Hwajeonsandan 3-ro, Gangseo-gu, Busan, Korea
Tel : 051-292-0395, Fax : 051-292-0397

page (1) of (2)

1. Client

Name : P.M.S Co., LTD
Adress : 296, Dae Dong-Ro, Sasang-Gu, Busan, Korea

2. Calibration Subject

Description : Stylus type roughness tester
Manufacturer and Model Name : Mitutoyo, SJ-210
Serial Number : 200741305



3. Date of Calibration 12. Apr. 2024.

4. Environment

Temperature : (20.7 ± 0.1) °C Humidity : (47 ± 2) % R.H.
Location : Permanent Calibration Lab Mobile Lab On Site Calibration
[Address : 58, Hwajeonsandan 3-ro, Gangseo-gu, Busan, Korea]

5. Traceability

Calibration method and/or brief description

The above Calibration object has been calibrated according to the Q&Q's calibration method for Stylus type roughness tester(QECI-SR517) with below Standards having traceability to National Measurement Institute (KRISS).

List of used standards / specifications

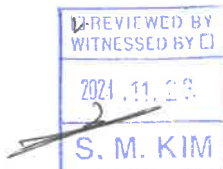
Description	Manufacturer and Model	SerialNumber	The due date of next Calibration	Calibration laboratory
Roughness standard specimen	Mitutoyo, Ra 2.94 μm, Rmax 9.3 μm	332260804	28. Jun. 2025.	Q&Q Corp
Surface Thermometer	TES, 1300	990407368	29. Jun. 2024.	Q&Q Corp.

6. Calibration result : Refer to the attached Calibration Result

7. Measurement uncertainty : Refer to the attached Calibration Result

affirmation	Measurements performed by	Approved by
	Name : Kwang Woo Son (signature)	Title : Technical Cal. Manager Name : Myeon Keol Kim (signature)

The above calibration certificate is the accredited calibration items by Korea Laboratory Accreditation Scheme, which signed the ILAC - MRA



15. Apr. 2024.

Q & Q Corporation
Accredited by KOLAS , Republic of KOREA



(NOTE) If any significant instability or other adverse factor(overload, temperature, humidity, etc.) manifests itself before, during or after calibration, and is likely to affect the validity of the calibration.

QE-R-001-1 (Rev. 3)



Witnessed
Reviewed

verify No.999218626876 (210 × 297) mm

CALIBRATION RESULT

Q & Q Corporation

Certificate No : Q2403326-105-005



58, Hwajeonsadan 3-ro, Gangseo-gu, Busan, Korea
Tel : 051-292-0395, Fax : 051-292-0397

page (2) of (2)

- * Manufacturer : Mitutoyo
- * Model Name : SJ-210
- * Serial Number : 200741305

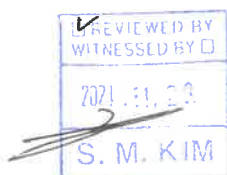
1. Calibration Condition

- * Probe Radius : 5 μm
- * Length of Measurement : 12.5 mm
- * Cutoff : 2.5 mm
- * Filter : Gaussian

2. Calibration Result

Parameter	Roughness Standard value (μm)	Indication value (μm)	Deviation (μm)	Uncertainty (CL \approx 95 %)
Ra	2.865	2.934	0.069	0.140 μm ($k = 2$)
Rz	9.030	9.228	0.198	0.459 μm ($k = 2$)
Rsm	99.798	109.9	10.102	1.702 μm ($k = 2$)

The end.



* The recommended calibration interval is 24 month according to the KOLAS guide (KOLAS-G-008).

02-00 FAHAMEH
Eng. & Ind. Co.

Witnessed
Reviewed

(210 × 297) mm

CALIBRATION CERTIFICATE



CALITECH CO., LTD. 67, Hwajeonsandan 2-ro, Gangseo-gu, Busan, Korea Tel : 051)973~3839, Fax : 051)973~3841	Certificate No : C23679-1 Page (1) of (2)	 
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1. Client

Name : SUNG WON -STEE CO.,LTD
 Address : #7, Noksansandan 262-ro 59beon-gil, Gangseo-Gu, Busan, Korea.

2. Calibration Subject

Description : Ultrasonic thickness gauges
 Manufacturer and Model Name : AND, AD3253
 Serial Number : K1401988

REVIEWED BY
 WITNESSED BY
 2021.11.23
 S. M. KIM

3. Date of Calibration 13. Dec. 2023.

4. Environment conditions

Temperature : (20.0 ± 0.2) °C Humidity : (42 ± 2) % R.H.
 Location : Permanent Calibration Lab Mobile Lab On Site Calibration
 (Address : 67, Hwajeonsandan 2-ro, Gangseo-gu, Busan, Korea)

5. Traceability

Calibration method and/or brief description
 The above Calibration object has been calibrated according to the CALITECH's calibration method for Ultrasonic thickness gauges(CTCI-10234) with below Standards having traceability to National Measurement Institute (KRISS).

List of used standards / specifications

Description	Manufacturer and Model	Serial Number	The due date of next Calibration	Calibration laboratory
Ultrasonic test blocks	None, (2 ~ 500) mm	UTB-001	11. Aug. 2025.	CALITECH Co., Ltd.
Precision surface plates	ZUNG WOO, 2 000 mm × 1 500 mm	100315010	13. Jan. 2026.	CALITECH Co., Ltd.
Digital Thermometer	Testo, 922	33636643/701	12. May. 2024.	CALITECH Co., Ltd.

6. Calibration result : Refer to the attached Calibration Result
 7. Measurement uncertainty : Refer to the attached Calibration Result

affirmation	Measurements performed by Name : Sang-Yeup Kim (signature)	Approved by Title : Technical Manager Name : Yun-Geon Lee (signature)
-------------	---	---

The above calibration certificate is the accredited calibration items by Korea Laboratory Accreditation Scheme, which signed the ILAC - MRA.

18. Dec. 2023.

CALITECH CO., LTD.
 Accredited by KOLAS, Republic of KOREA



(NOTE1) If any significant instability or other adverse factor(overload, temperature, humidity, etc.) manifests itself before, during or after calibration, and is likely to affect the validity of the calibration.

FAHAMEH Eng. & Ind. Co. 원위 확인은 홈페이지(http://www.calitech.co.kr/) 고객센터 > 공지사항 참조.



210 mm × 297 mm

CALIBRATION RESULT

CALITECH CO., LTD.

Certificate No : C23679-1



67, Hwajconsandan 2-ro, Gangseo-gu, Busan, Korea
Tel : 051)973-3839, Fax : 051)973-3841

Page (2) of (2)

- * Description : Ultrasonic thickness gauges
- * Manufacturer : AND
- * Model Name : AD3253
- * Serial Number : K1401988

(Calibration Value) = (Scale Value) + (Correction Value)

Scale Value(mm)	Correction Value(mm)	Uncertainty (CL≒95 %, k = 2)
4	-0.4	$\sqrt{70^2 + 0.0043^2 \times l^2} \mu\text{m}$ (l : mm)
6	-0.3	
8	-0.3	
10	-0.3	
25	-0.2	
50	-0.1	
75	-0.1	
100	-0.2	
200	-0.7	

The end.

REVIEWED BY
 WITNESSED BY
 2024.11.28
 S. M. KIM