LAMPIRAN

LAMPIRAN 1

Sertifikat Pabrik *(Mill Certificate)* dari Baja Lembaran

JFE スチール 株式会社 東日本製鉄所(京浜)
JFE Steel Corporation East Japan Works(Keihin)
JFE

検査証明書
INSPECTION CERTIFICATE

需要家 Customer :PT.KATSUSHIRO INDONESIA
需要家管理番号 Customer's Control No. : 2M3356
注文者 Shipper :METAL ONE CORPORATION
注文者照合番号 Reference No. :ISF -8AP379J11
品名 Commodity & 規格 Specification : HOT ROLLED STEEL PLATE JFE-HITEN780S

証明書番号 Certificate No. : ASHEX-1212
日付 Date :2008-11-04
船番 Ship No. :
工事番号 Construction No. :
注文番号 Order No. :8G0047J

製品番号 #1 Roll No. / 鋼番 Heat No.	行番 Item No.	需要家管理番号 Customer's Control No. / 寸法 Size (MM) T X W X L	員数 Quantity	質量 Mass (CAL)	C	SI	MN	P	S	NB / MO	V	NI	CR	TI	B	CEQ2 #3	#4	Y.P./Y.S. (N/MM2)	T.S. (N/MM2)	EL #5 %	YR %	BT #6	UST	#4	Impact test	AVE	Notch temp.	
					X100	X100	X100	X1000	X1000	X100	X100	X100	X100	X1000	X10	X100												
SPECIFIED VALUE (STANDARD)			LADLE :	MIN.														685	780	16							2MM V	
				MAX.														-	930	-				1J	MIN.	35	-20°C	AVE.
				MIN.	-	-	-	-	-	-	-		-	5	-	-												
				MAX.	25	55	160	30	15	30	10		70	20	50	53												
MG37201 18127	001	40 X 1829 X 6096	1	3501	15	36	137	8	3	2 / 12	4	1	16	13	11	46	TC	808	853	20	E	G		TL 1J		178	2MM V -20°C	
		HARDNESS TEST (HBW)																							(1) 283	(2) 273	(3) 274	
		TOTAL	1	3501KG																								

VISUAL & DIMENSIONS : GOOD
HEAT TREATMENT CONDITION FOR BOTH PLATE AND TEST SPECIMEN
QUENCHED AND TEMPERED

(注) (Notes)
#1 厚板製品番号の表示方法. Indication of Plate Roll Number
:上5桁:圧延番号. 2 letters&the 1st 3 figures:mother Plate Numbers
:下2桁:分割番号. the last 2 figures:divided Plate Numbers
#2 DG:脱ガス. Degassed

#4 位置. Position
T:頭部. Top F:フランジ. Flange
B:底部. Bottom W:ウェブ. Web
方向. Direction
L:圧延方向. Longitudinal
C:直角. Transverse
Z:厚. Through-thickness

衝撃試験片寸法. Size of Impact Test Specimen
1:10X10mm 2:7.5X10mm 3:2/3X10mm 4:5X10mm
5:1/3X10mm 6:2.5X10mm 7:ThicknessX10mm
衝撃試験値特性単位. Unit of Impact Test Property
吸収エネルギー. Absorbed Energy:K:kgf.m C:kgf.m/cm², J:Joule.
U:J/cm², F:ft. lbf. L:ft. lbf/cm²
破面率. Fracture; S:延性. Shear B:脆性. Brittle
横膨出量. Lateral Expansion; M:mm I:mil

#5 標点距離. Gauge Length
A:200mm (■) D:50mm (■)
E:50mm (●) H:8" (■)
J:2" (●) K:5D (●)
M:5.65√A (●) P:5.65√A (■)
R:4D (●) S:80mm (■)
U:100mm (■) Y:2" (■)
T:70mm (●)

#6 BT :曲げ試験. Bend Test
UST:超音波探傷. Ultrasonic Examination
G :合格. Good

#3 CEQ2=C+MN/6+SI/24+NI/40+CR/5+MO/4+V/14

上記商品は検査の結果指定の規格に合格していることを証明いたします。

WE HEREBY CERTIFY THAT THE MATERIAL DESCRIBED HEREIN HAS BEEN TESTED AND INSPECTED WITH SATISFACTORY RESULTS IN ACCORDANCE WITH THE REQUIREMENTS OF THE ABOVE SPECIFICATION.

(5BDI930011BA)
SA121 A07

東日本製鉄所 (京浜) : 〒210-0868神奈川県川崎市川崎区扇島1番地1 East Japan Works (Keihin) :1-1, OHGISHIMA, KAWASAKI 210-0868 JAPAN

S. Okitsu

東日本製鉄所 品質保証室
Quality Assurance Section
East Japan Works

This Inspection Certificate is printed with special forgery proof technology.
このミルシートは特殊偽造防止技術を使用しております。

LAMPIRAN 2

Parameter Pengelasan

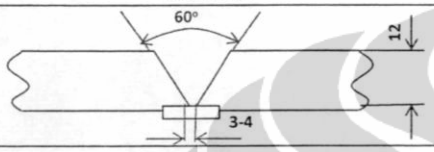
WELDING PROCEDURE SPECIFICATION

Manufacturer's Welding Procedure Specification (WPS)
Location : Jakarta
Reference : 02/WPS/2009
WPAR No : 02/WPAR/2009
Manufacturer : PPIKI
Welding Process : Gas Metal Arc Welding (GMAW)
Joint Type : Single V Butt Weld (Back Plate)

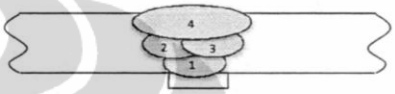
Examiner or Examining Body : Mr. X
Method of Preparation and Cleaning : Flame Cutting
Parent Metal Specification : SHT 780
Material Thickness : T.12
Outside Diameter : -
Welding Position : Downhand Position

Welding Preparation Details (Sketch)

Joint Design



Welding Sequence



Welding Parameter

Run	Process	Size of Filler Metal	Current (A)	Voltage (v)	Type of Current Polarity	Wire Feed Speed	Travel Speed (mm/sec)	Heat Input (J/mm)
1	GMAW	1.2 mm	280	30	DCRP	-	4.84	1562.40
2	GMAW	1.2 mm	280	30	DCRP	-	7.79	970.20
3	GMAW	1.2 mm	280	30	DCRP	-	6.86	1101.24
4	GMAW	1.2 mm	290	31	DCRP	-	2.88	2812.97

Welding Consumables

Type, Designation Trade Name:	AWS ER70S-6	Othet Information*) e.g :	-
Any Special Baking or Drying :	No	Weaving (Maximum Width of Run) :	Yes
Gas Flux:	80% CO_2 + 20 % Ar	Oscillation (Amplitudo, Frequency Dwell Time :	-
Gas Flow Rate : Shield	25 lt/min	Pulse Welding Details :	-
Backing	No	Contact Tube to be Workpiece Distance :	10-15 mm
Tungsten Electrode Type/Size :	No	Plasma Welding Details :	-
Details of Back Gouging/Backing :	No	Torch Angle :	90°
Preheat Temperature :	170 - 190 °C		
Interpass Temperature :	170 - 190 °C		
Post Weld Heat Treatment :	Not Required		
Time, Temperature, Methode :			
Heating and Cooling Rate*) :			

LAMPIRAN 3

Sertifikat Pabrik *(Mill Certificate)* dari Kawat Las

SM-70

AWS ER70S-6
BS A18
JIS YGW12

For welding mild and 50kgf/mm² class high tensile steel

- **Applications**

  Butt and fillet welding of vehicles, buildings, ships, machinery and bridges.

- **Characteristics on usage**

  ①As the deposition rate is high and penetration is quite deep which is common features of soflid wire, highly efficient welding can be performed.
  ②As the deposition efficiency is hgih because of no slag formation, the welding time is saved.
  ③Arc is stable and spatter loss is low.

- **Notes on usage**

  ①Use welding grade CO_2 gas.
  ②Flow quantity of shielding gas should be 25ℓ/min. generally.
  ③Use the wind-screen against wind.
  ④Keep the distance between tip and mother plate within 6~15mm for 250A, and under or within 15~25mm for more than 250 Amp. of welding current.

- **Typical chemical composition of weld metal (%)**

C	Si	Mn	P	S
0.09	0.41	1.10	0.012	0.011

- **Typical mechanical properties of weld metal**

YP N/mm² (kgf/mm²)	TS N/mm² (kgf/mm²)	EL (%)	IV J (kgf.m) (0°C)
430(44)	540(55)	30	120(12.1)

- **Sizes available and recommended currents (DC+)**

Dia. (mm)		0.9	1.2	1.6
A	F	50 ~ 200	80 ~ 350	170 ~ 550
	OH	50 ~ 120	50 ~ 140	–
	VU	50 ~ 140	50 ~ 160	–
	VD	50 ~ 200	50 ~ 250	–

SM-70·G

AWS ER70S-G
JIS YGW11

For high efficient welding of mild and 50kgf/mm² class high tensile steel.

- **Applications**

  Flat and horizontal fillet welding of construction machinery, structural steels, bridges, ships, vehicles and steel fabrications.

- **Characteristics on usage**

  ① SM-70·G is a solid wire for flat and horizontal fillet welding which has been designed to get good weldability and good notch toughness.
  ② As the deposition rate is high and penetration is quite deep, highly efficient welding can be performed.
  ③ In the high current welding (more than 300 Amp.), arc stability is excellent and spatter loss is comparatively low.
  ④ As the wire contains special elements, its weldability and impact values are extremely good.

- **Notes on usage**

  ① Use welding grade CO_2 gas only.
  ② For other notes, refer "Notes on Usage" of SM-70.

- **Typical chemical composition of weld metal (%)**

C	Si	Mn	P	S
0.09	0.52	1.07	0.015	0.009

- **Typical mechanical properties of weld metal**

YP N/mm² (kgf/mm²)	TS N/mm² (kgf/mm²)	EL (%)	IV J(kgf·m) (0°C)
450(46)	560(57)	30	140(14)

- **Sizes available recommended currents (DC+)**

Dia. (mm)		1.2	1.6	2.0
A	F	200~350	300~550	400~650
	HF	200~350	300~550	400~650

LAMPIRAN 4

Spesifikasi Teknis SHT780

KES	HIGH TENSILE ROLLED STEEL PLATES FOR WELDED STRUCTURES OF 780N/mm^2 CLASS SHT780 (W)	07.(MATERIAL) 116 (2008)

1. SCOPE Of high-tensile rolled steel plates for welded structure of good weldability (hereafter referred to as steel plates), steel plates of tensile strength class of 780N/mm^2{80kg/mm^2} shall conform to this standard.

Remark The figures and units in the brackets { } are for reference.

2. SELECTION OF STEEL PLATES Conform to **KES 45.200.7** (SELECTION OF IRON AND STEEL MATERIALS).

3. PRODUCTION METHOD The standard steel plate shall be quenched and tempered steel plate after rolling a slab of killed steel, which shall be produced by a steel converter and ladle scouring with degassing and grain refining. The slab shall be continuous-casted with electromagnetic mixing.

Though it is permissible for the steel plate to be produced by an electric furnace, or be casted as an ingot, or be produced without degassing and grain refining, each influence shall be confirmed according to **KES 07.103.2** (EXAMINATION PROCEDURE OF USE PROPRIETY OF IRON AND STEEL MATERIAL) if it is used for a structural member.

4. QUALITY

4.1 The steel plates shall be well finished, uniform in quality, and free from detrimental defects in use.

4.2 Symbol, chemical compositions and heat treatment Conform to **Table 1**.

Table 1

Symbols	Equivalent old symbols	Chemical composition% C	Si	Mn	P	S	Heat treatment	Welding crack sensitivity index (Chemical composition term) PCM	Applicable thickness mm
SHT780A*	SHT80・SHT80A	0.10 to 0.22	0.15 to 0.55	1.00 to 1.60	0.025 MAX	0.015 MAX	Quenched and tempered after rolling	0.30 MAX	6 to 19
SHT780B*	SHT80・SHT80B	0.10 to 0.16		0.90 to 1.50				0.30 MAX	22 to 60

* These symbols are peculiar to **KES** and not specified in **JIS**.

Remarks 1. Chemical compositions in **Table 1** show fundamental compositions; if required, variation within the range of the compositions in **Table 1** is permissible, and alloy elements other than those in **Table 1** may be included.

The following alloy elements are added other than the ones listed in **Table 1**.

Cr and B in specification SHT780A

Cr, Mo, B and Ni and Cu according to the application or the plate thickness in SHT780B

2. Welding crack sensitivity index (Chemical composition term) PCM is the index for the welding crack in a steel plate for welded structural use. The calculation formula is as follows :

$$PCM = C + \frac{Si}{30} + \frac{Mn + n + Cr}{20} + \frac{Ni}{60} + \frac{Mo}{15} + \frac{V}{10} + 5 \times B$$

In addition to PCM, the quantity of the hydrogen diffused in a deposited metal zone and its degree of constraint affect the welding crack. In general, however, pre-and post-heating shall not be required in CO^2 gas welding with a PCM value of 0.30 and below. Where the PCM value is over 0.30, consult with the departments in charge of design and welding to determine the appropriate welding method.

3. The values of the chemical compositions are those obtained by a ladle analysis.

The product analysis shall conform to **JIS G 0321** (Product analysis and its tolerance for wrought steel).

LAMPIRAN 5

Spesifikasi Teknis S45C

KES	CARBON STEEL FOR MACHINE STRUCTURAL USE S-C (W)	07.(MATERIAL) 211.1 (2007)

1. SCOPE The standard stipulates the production method, quality, testing, and inspection of carbon steel (hereafter referred to as steel product) for machine structural parts. The carbon steel for gears and swing circles shall conform to **KES 07.211.12** (CARBON STEEL FOR GEARS).

The steel product of which the forging ratio is 4S or less shall conform to **KES 07.211.14** (LOW FORGING-RATIO STEEL).

2. PRODUCTION METHOD

2.1 The standard steel product shall be rolled (forged) killed slabs or killed ingots of steel that is melted in a converter or electric furnace and refined in a ladle refining/degassing furnace and cast with continuous casting or ingot casting method afterwards.

2.2 The steel product shall be produced from steel slabs or ingots from which flaws have been cut off and its surfaces and internal structures free from harmful defects in the production process.

2.3 The forging ratio of the steel product produced from ingots, in principle, shall be 4S and above for forging, and 7S and above for direct machining.

2.4 The steel product shall be rolled or forged unless otherwise specified.

2.5 It is desirable to understand the production method and process as they affect the steel product quality.

3. QUALITY

3.1 Kinds and chemical composition The steel product shall undergo the test specified in **5.1** and shall conform to the following.

(1) Molten steel analysis values shall conform to **Table 1**.

(2) Product analysis tolerance shall conform to **Table 2** in **JIS G 0321** (Product analysis and its tolerance for wrought steel).

Table 1

Symbol	Chemical composition%					Example of applicable parts
	C	Si	Mn	P	S	
S22C	0.20 to 0.25	0.15 to 0.35	0.30 to 0.60	0.030 or less	0.035 or less	Brackets
S25C	0.22 to 0.28					Lock nuts
S35C	0.32 to 0.38					Idler rims and flanges
(S43C)	0.40 to 0.46					-
S45C	0.42 to 0.48		0.60 to 0.90			General shafts and bosses
S53C	0.50 to 0.56					Pins and bosses

Remark. The chemical composition of impurity for all steel products shall be the following: Cu≤0.30%, Ni≤0.20%, Cr≤0.20% and Ni+Cr≤0.35%.

3.2 Macrostructure The steel product shall undergo the test specified in **5.2** and shall conform to the following.

The steel product shall be free from air bubbles, pipes, hair cracks, and forging cracks. The acceptance limit of each uneven structure such as looseness, ingot pattern, white band, or segregation that is harmful in use shall conform to **KES 86.220** (MACROSTRUCTURE OF STEEL).

3.3 Grain size The steel product shall undergo the test specified in **5.3** and shall conform to the following.

The austenite grain size shall be uniform and GH5.0 and above in size without mixed grain sizes.

3.4 Allowable limit of non-metallic inclusion The steel product shall undergo the test specified in **5.3** and shall conform to the following.

The cleanliness shall be dT=0.25% or less.

Attached Table 1 Conditions for heat treatment of S48C-KN and S50C-KN to be used for induction hardening gears

Type of steel	Type of heat treatment	Heat treatment number	Pre-treatment	Quenching temperature °C	Surface hardness after hardening	Tempering temperature °C	Tempering hardness of surface	Applied thickness (Dia.) mm			Mechanical property				Example of applicable parts
								Oil cooling	Water cooling	Water injection	Yield point N/mm² {kg/mm²}	Tensile strength N/mm² {kg/mm²}	Elongation %	Impact value (Charpy) J/cm² {kgm/cm²}	
(S43C) S45C	Quenching and tempering of raw material	1121001900	The structure of gear material before the heat treatment shall be equivalent to or better than normalized structure if necessary.	Water quenching: 810 to 850 Oil quenching: 830 to 860	MIN 30HRC	500 to 600	201 to 255 HB	-	-	-	MIN 490 {50}	MIN 686 {70}	MIN 20	MIN 78 {8}	General gears
S48C-KN S50C-KN							229 to 277 HB								Final reduction gears for bulldozers (small through large size) Final reduction gears for superbulldozers
(S43C) S45C	Induction quenching and tempering	2146191100 2146192100	1121001900	840 to 910	MIN 55HRC	180 to 210 155 to 165	52 to 60 HRC	-	-	-	-	-	-	-	General gears
S48C-KN S50C-KN		2146191100				180 to 210 155 to 165 145 to 155	55 to 60 HRC 55 to 62 HRC								Ring gear for large bulldozers
		2146192100 2146102600													Final reduction gears for bulldozers (small through large size) Final reduction gears for superbulldozers

Remark 1. Viewed in quenching crack prevention and distortion suppression, it is desirable to use the water soluble coolant.

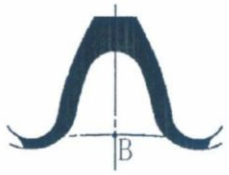
2. One-shot hardening shall be applied to S48C-KN and S50C-KN in principle. If it is impossible to do so, then determine in consultation with the department in charge of heat treatment.
   Also, in order to prevent quenching crack and to maintain the hardened layer, it is recommended that preheating is performed at the time of induction hardening.

3. S50C-KN is used for further hardening in the surface, so tempering temperature shall be 145 to 155°C.

4. Regarding S48C-KN and S50C-KN, **KES 04.015.31 Annex** has already been formulated in accordance with the actual results of material, surface hardness, matrix hardness and hardened layer depth, refer to this for the selection of material and heat treatment.

5. The hardness measuring point of gear shall conform to the following.
   (1) Surface hardness Refer to **KES 86.222.01** (Hardness measuring positions of gears) for the hardness of the tooth tip, pitch circle, root circle.
   (2) Matrix hardness This shall be measured at point B (intersecting point of the root circle and the center line of the tooth thickness) shown in **Attached figure 1**, and shall conform to **Attached Table 2**.
   However, when the upper limit specified in existing drawings is less than the value shown in **Attached Table 2**, the part criterion shall be performed according to **Attached Table 2**. **Attached Table 2** shall be used for new design.

Attached figure 1
Measuring point of matrix hardness



Attached Table 2

Material	Module	Matrix hardness
(S43C) S45C	Under 6	-
	MIN 6	201 to 277HB
S48C-KN	5.5 to 8	229 to 362HB
	MIN 9	229 to 331HB
S50C-KN	MIN 10	229 to 294HB

LAMPIRAN 6

Spesifikasi Teknis SS400

KES	ORDINARY ROLLED STEELS FOR WELDED STRUCTURES OF 400N/mm^2 SS400•SM400B (W)	07.7 (MATERIAL) 111.1 (2008)

1. SCOPE This standard stipulates steel plates used for structures and steel bars and shapes used for structures without being subject to heat treatment of construction machinery, industrial vehicles, industrial machines, etc.

Remark 1. Use **SMM400B** stipulated in **KES 07.115.2** (STEEL PLATE FOR ROPS) for ROPS.

2. The figures and units in the brackets { } are for reference.

2. PRODUCTION METHOD Steel plates shall be produced, in principle, by rolling a slab which was made into an ingot in a converter and cast by continuous casting. Use of those produced from being made into an ingot in an electric furnace and those rolled from a steel ingot shall require approval by material experts. Steel bars and shape steel, and flat steel shall be produced by being made into an ingot in a converter or an electric furnace and by rolling from a slab or steel ingot. They shall be all made of killed steel.

SM400B, especially, shall be made of aluminum-killed steel.

3. SYMBOL Conform to **Table 1**.

Table 1

Symbols	Equivalent old symbols	Application	Reference
SS400(1)	SS41 SE400P SE41P	Main structures	When identifying steel plate, flat steel, shape steel, and steel bar, the letters P, F, A and B shall be suffixed to the symbol, respectively. Shape steel: Equal angle steel, unequal angle steel, channel steel, unequal and uneven thickness angle steel, I-steel, bulb flats, T-steel and H-steel
SM400B(2)	SM41B WS41P	General welded structures	Steel sheet
SSC400	SSC41	Auxiliary structures	Light section steel: Light-gage channel, light Z-steel and hat-steel

Note(1) Although this is the same material symbol as it is in **JIS**, specifications which are peculiar to **KES** are added.

(2) Use **SM400B** to indicate the material symbol to designate the use in extremely cold regions (see **4.2** and **7**).

Although it is permissible to use the relevant brands of old SE400P for **SS400** described in **7** for extremely cold regions because they satisfy the impact strength of **SM400B** as stipulated in **4.2**, it is necessary for the purchasing department to pay attention to the applicable steel products.

4. QUALITY

4.1 Chemical composition Conform to **Table 2**.

Table 2

Symbols	Chemical composition %					Pcm(2)	Applicable plate thickness t
	C	Si	Mn	P	S		
SS400P(1)	0.05 to 0.25	0.55 or less	0.30 to 1.60	0.035 or less	0.035 or less	0.30 or less	(4.5, 6) to 100
SM400B			2.5×C				
SS400A, F, B **SSC400**	---	---	---	0.050 or less	0.050 or less	---	---

Note(1) Ni, V, Nb, Cu, B, etc. may be added as necessary.

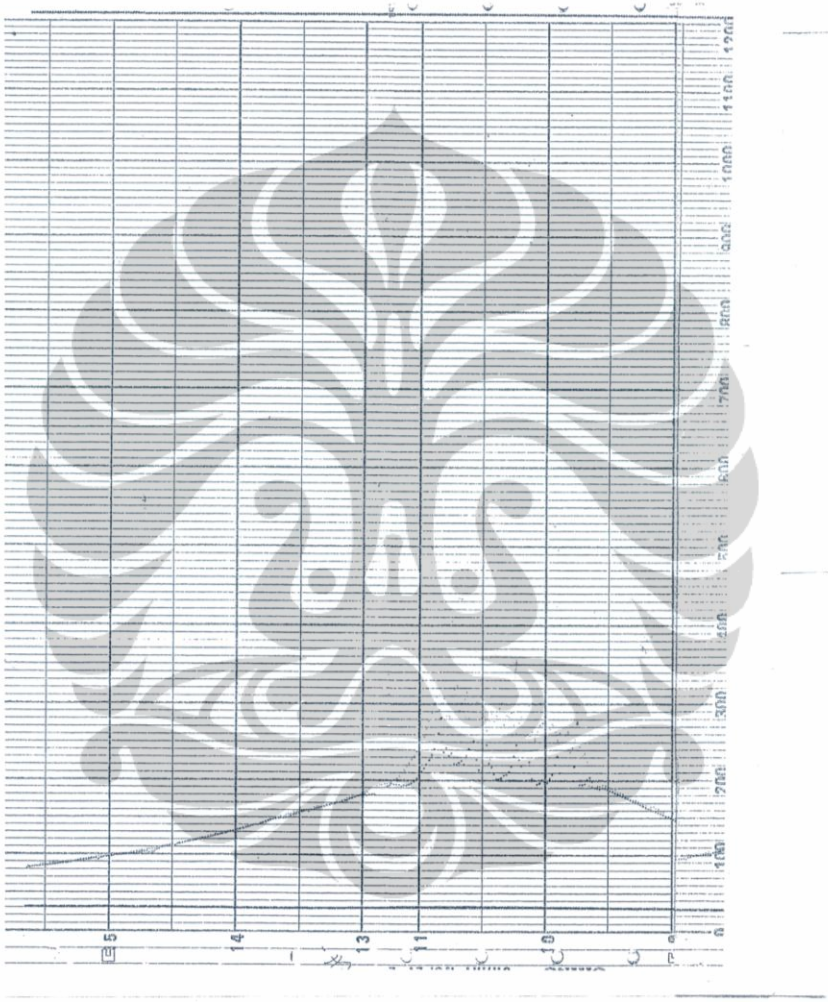
(2) Welding crack sensitivity index (chemical composition term) is the index for welding cracks in a steel plate for welded structural use. The calculation formula is as follows:

$$P_{CM} = C + \frac{Si}{30} + \frac{Mn + Cu + Cr}{20} + \frac{Ni}{60} + \frac{Mo}{15} + \frac{V}{10} + 5 \times B$$

LAMPIRAN 7

Hasil Pengukuran Laju Pendinginan

MEDIA PENDINGINAN *HEATER* 1



MEDIA PENDINGINAN *HEATER* 2