

Customer : Hyundai Heavy Industries Co., Ltd.

Hull No. : 3247/48/70/71

Classification : BV

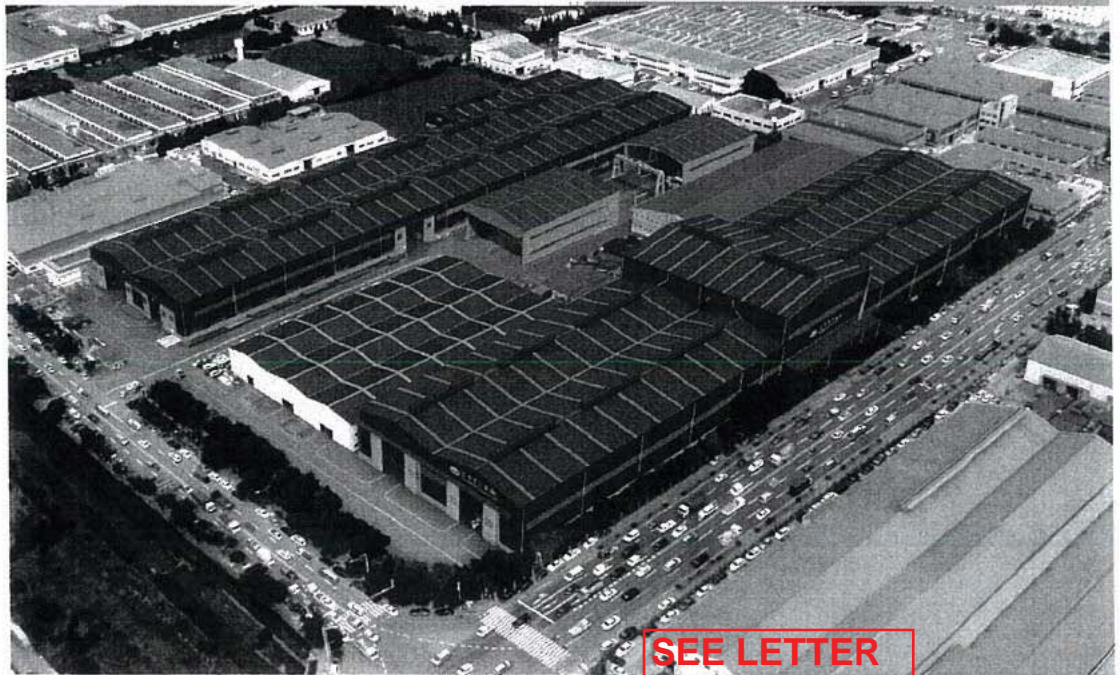
Work Order No. : IGW21HD3247/48/70/71

Specification

Model No.-IG140101x1 set(s)/ship

Capacity -18,750m3/h

Inert Gas System



**FOR CLASS
APPROVAL**



KANGRIM HEAVY INDUSTRIES CO., LTD.

Bureau Veritas Marine & Offshore

Section 39851T / 39852U / 40671K / 40672L

REVIEWED

subject to comments

**and only for parts concerning Classification,
and as per contract.**

Busan, 25-Jun-2021

[Electronic document]

The plan approval office

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*NOTE

If we may be of further assistance, please do not hesitate to contact Mr. Hwa Rang, Kim at 82-55-269-7764.

PLAN HISTORY					
0	2022.04.13	FOR FINAL	H.R.KIM	K.J.AHN	C.S.KIM
REV.	DATE	DESCRIPTION	PREPARED	CHECKED	APPROVED



1. DESIGN DATA





LIST OF DESIGN DATA FOR INERT GAS SYSTEM

NO	DRAWING NO.	TITLE	REV.
1		Technical data	0
2		Information table of instrument	0
3		General installation guide	0



Technical data

1. Design data

Nominal capacity :	18,750	m ³ /hr
(Capacity measured at 15 °C , 100 % RH and atmospheric pressure)		
Removal efficiency		
Sulphur-oxides Sox (based on 0.3% at inlet)	Max. 50	ppm

2. Flue gas data

Inlet pressure	Atmospheric
Inlet temperature	Max. 400 °C
Consumption	150 % of nominal capacity Since water vapour in the flue gas (Representing 15% in volume) will be condensed in the scrubber.

3. Consumption

3.1 Sea water for scrubber

Capacity	329	m ³ /hr
Inlet pressure	Min. 1.5	bar·G
Quality	Filtered sea water (Mesh size 5 mm)	

3.2 Sea water for deck water seal & scrubber seal

Capacity	5	m ³ /hr
Inlet pressure	Min. 1.5	bar·G
Quality	Filtered sea water (Mesh size 5 mm)	

3 Fresh water for blower impeller

Application	Rinsing
Consumption (for 30 minutes)	1 m ³ /hr

**3.4 Steam for Deck water seal**

Pressure	6	bar·G
Consumption	50	kg/hr

3.5 Instrument air

Quality	Dry, clean and free from oil	
Supply pressure	6~9	bar·G
Consumption	5	Nm ³ /hr

3.6 Compressed air for Uptake valve cleaning

Pressure	Min. 6	bar·G
Consumption (for 20 seconds)	15	kg/hr

4. Electric Power Data

4	Power supply	440V, 3ph, 60Hz
4	Control supply	220V, 3(1)ph, 60Hz / 24V DC
4	Power failure supply	24V , DC
4	I.G Blower	Rated power
	50% Blower x 3set	104 kW
5	Control system	2 kW
5	Power failure	0.05 kW

5. Ambient air

5.1	Temperature	Max. 50 °C
		Min. 0 °C
5.2	Pressure	Atmospheric
5.3	Note : Sufficient ventilation is obligatory.	



Information table of instruments

NO.	Item	Unit	Meas.Range	Part No.	Set Point	Location
1	Pressure switch for instrument air pressure low	bar	1~10	1505	(5)	Yard pipe
2	Pressure switch for scrubber sea water pressure low	bar	0~6	1703	(1.5)	Yard pipe
3	Pressure switch for deck water seal sea water low	bar	0~6	6120	(1)	Yard pipe
4	Temperature transmitter for inert gas temp. high high	℃	0~100	6063	75	Yard pipe
5	Temperature switch for inert gas temp. high	℃	20~110	6064	65	Yard pipe
6	O2 Analyzer for O2 content high high	%	-	7000/ 7100	5	O2 Analyzer
7	O2 Analyzer for O2 content high	%	-	7000/ 7100	4.8	O2 Analyzer
8	O2 Analyzer for O2 content low	%	-	7000/ 7100	1	O2 Analyzer
9	Pressure transmitter for Deck mian line pressure high	mmAq	-	6304	1200	Deck trensmmitter Panel
10	Pressure transmitter for Deck mian line pressure low	mmAq	-	6304	200	Deck trensmmitter Panel
11	Pressure switch for Deck mian line pressure low low	mmAq	-	6306	100	Deck trensmmitter Panel

* NOTE : () ~ PRESETTED. IT SHOULD BE ADJUSTED BY COMMISSIONING.

** NOTE : REGARDING THE ALARM & SAFETY TABLE, PLEASE SEE PART4-CONTROL PANEL.



1. No welding to be permitted on the scrubber, Deck water seal and PV breaker etc. as it might damage the internal coating.
2. All piping connected Scrubber & Deck water seal should be tension free. Otherwise, Internal coating of Scrubber & Deck water seal may be damaged.
3. Acid-resisting steel is recommended to use as a piping material of Hot gas line.
4. Seawater pipes must be protected against corrosion.
5. The seawater supply pressure should remain as constant as possible($\pm 20\%$). If seawater pressure varies with ship draft, the seawater pressure must be adjusted by throttling the seawater discharge valve or other equipment.
6. In order to prevent clogging of the water spray nozzles of Scrubber, provide strainer (filtered to 5 mm) on water supply line. and any foreign material and other dust in seawater can damage internal coating of scrubber or corrode internals such as demister etc..
7. Supply air for the pneumatic control equipment to be dry and oil free otherwise the oil mist separator to be provided.
8. Before first initial operating, make sure the pipelines are clean. Any foreign material such as pipe scale, metal chips, welding slag, welding rods, etc., can damage internal coating of scrubber or corrode internals such as demister etc..
9. Before and after commissioning, Checks should be made for corrosion attacks, fouling and damage to :
 - Scrubber shell and bottom
 - Cooling water pipes and spray nozzles(fouling)
 - Other internals such as trays and demister filters
10. Inert gas system power should be on before operating the equipment connected or related with Inert gas system. Otherwise, It's vulnerable to accidents as safety device to protect the equipment is not working. For example, Scrubber will be damaged due to vacuum in case that the scrubber seawater pump is working while the Inert gas system power is off.



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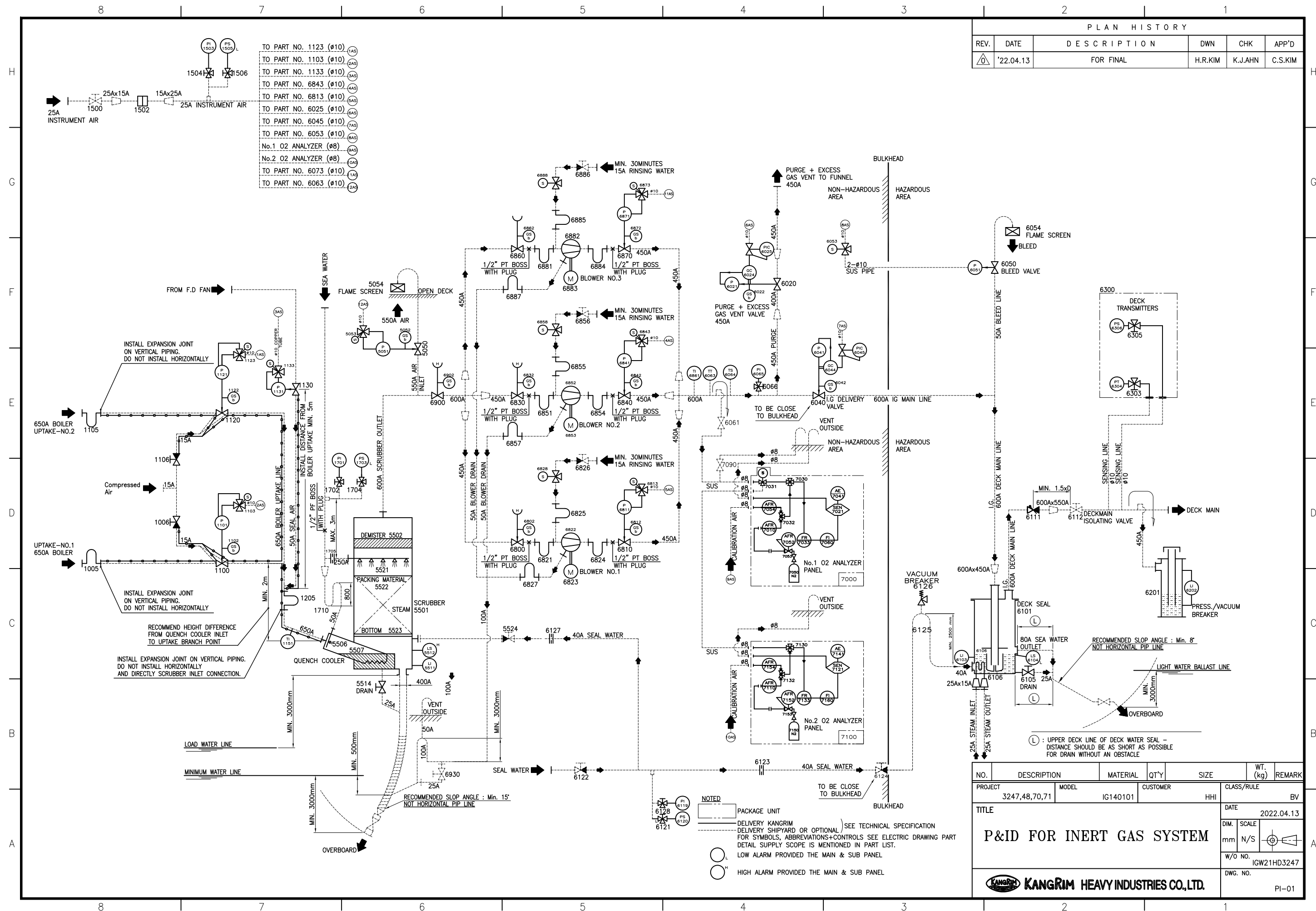
2. DRAWINGS

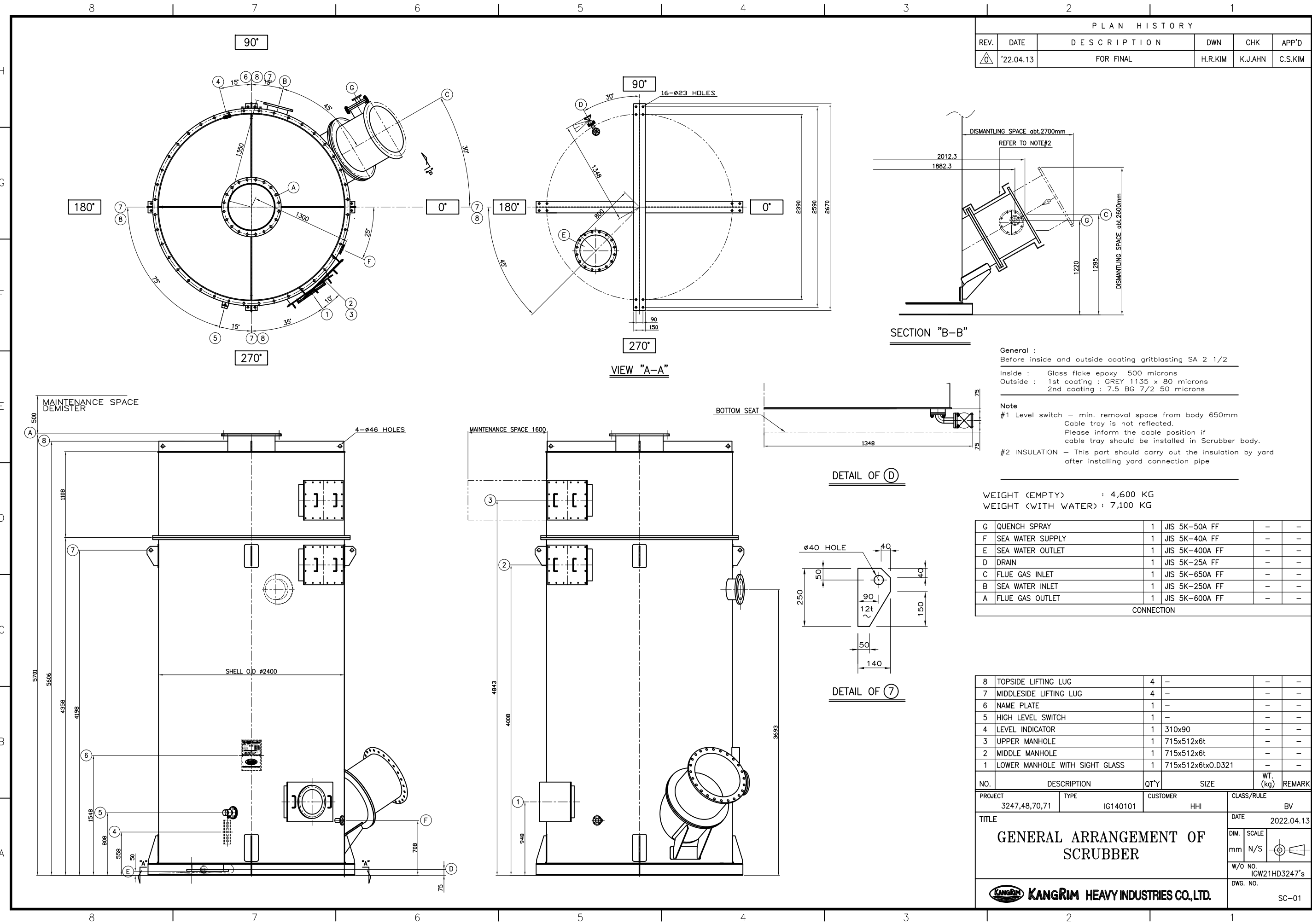




LIST OF DRAWING FOR INERT GAS SYSTEM

NO	DRAWING NO.	TITLE	REV.
1	PI-1	P&I DIAGRAM	0
2	SC-1	GENERAL ARRANGEMENT OF SCRUBBER	0
3	DW-1	GENERAL ARRANGEMENT OF DECK WATER SEAL	0
4	PV-1	GENERAL ARRANGEMENT OF P/V BREAKER	0





PLAN HISTORY					
REV.	DATE	DESCRIPTION	DWN	CHK	APP'D
△	'22.04.13	FOR FINAL	H.R.KIM	K.J.AHN	C.S.KIM

General :
Before inside and outside coating gritblasting SA 2 1/2
Inside : Glass flake epoxy 500 microns
Outside : 1st coating : GREY 1135 x 80 microns
2nd coating : 7.5 BG 7/2 50 microns

Note
#1 Level switch - min. removal space from body 650mm
Cable tray is not reflected.
Please inform the cable position if
cable tray should be installed in Scrubber body.
#2 INSULATION - This part should carry out the insulation by yard
after installing yard connection pipe

WEIGHT <EMPTY> : 4,600 KG
WEIGHT <WITH WATER> : 7,100 KG

G	QUENCH SPRAY	1	JIS 5K-50A FF	-	-
F	SEA WATER SUPPLY	1	JIS 5K-40A FF	-	-
E	SEA WATER OUTLET	1	JIS 5K-400A FF	-	-
D	DRAIN	1	JIS 5K-25A FF	-	-
C	FLUE GAS INLET	1	JIS 5K-650A FF	-	-
B	SEA WATER INLET	1	JIS 5K-250A FF	-	-
A	FLUE GAS OUTLET	1	JIS 5K-600A FF	-	-

CONNECTION

8	TOPSIDE LIFTING LUG	4	-	-	-
7	MIDDLESIDE LIFTING LUG	4	-	-	-
6	NAME PLATE	1	-	-	-
5	HIGH LEVEL SWITCH	1	-	-	-
4	LEVEL INDICATOR	1	310x90	-	-
3	UPPER MANHOLE	1	715x512x6t	-	-
2	MIDDLE MANHOLE	1	715x512x6t	-	-
1	LOWER MANHOLE WITH SIGHT GLASS	1	715x512x6tx0.D321	-	-

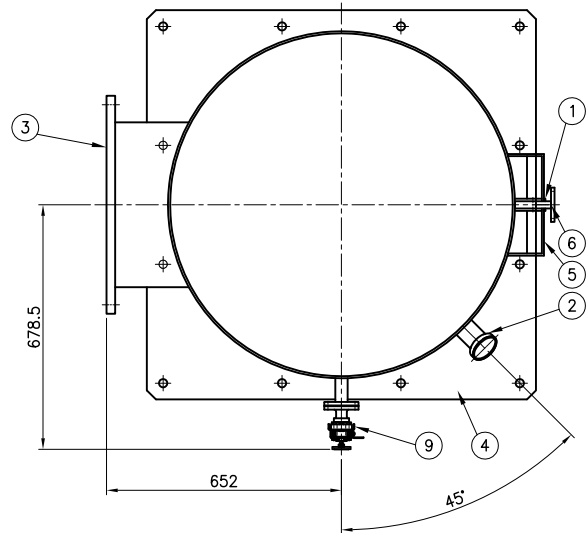
NO.	DESCRIPTION	QT'Y	SIZE	WT. (kg)	REMARK
PROJECT		TYPE	CUSTOMER	CLASS/RULE	
3247,48,70,71		IG140101	HHI	BV	
TITLE				DATE	2022.04.13
GENERAL ARRANGEMENT OF SCRUBBER				DIM. SCALE	N/S
W/O NO.				IGW21HD3247's	
DWG. NO.				SC-01	



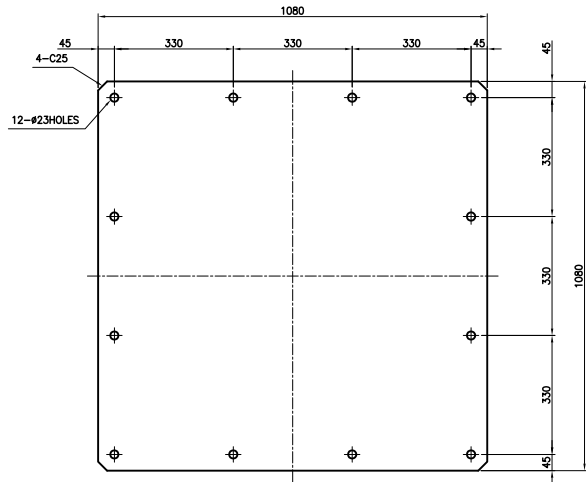
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8 7 6 5 4 3 2 1

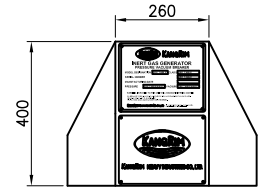
PLAN HISTORY					
REV.	DATE	DESCRIPTION	DWN	CHK	APP'D
△	'22.04.13	FOR FINAL	H.R.KIM	K.J.AHN	C.S.KIM



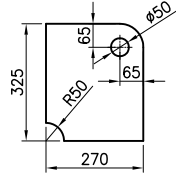
SECTION "A-A"



DETAIL OF ④



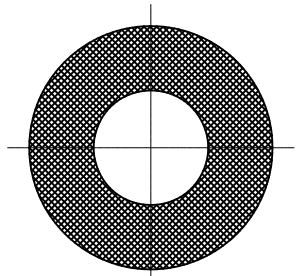
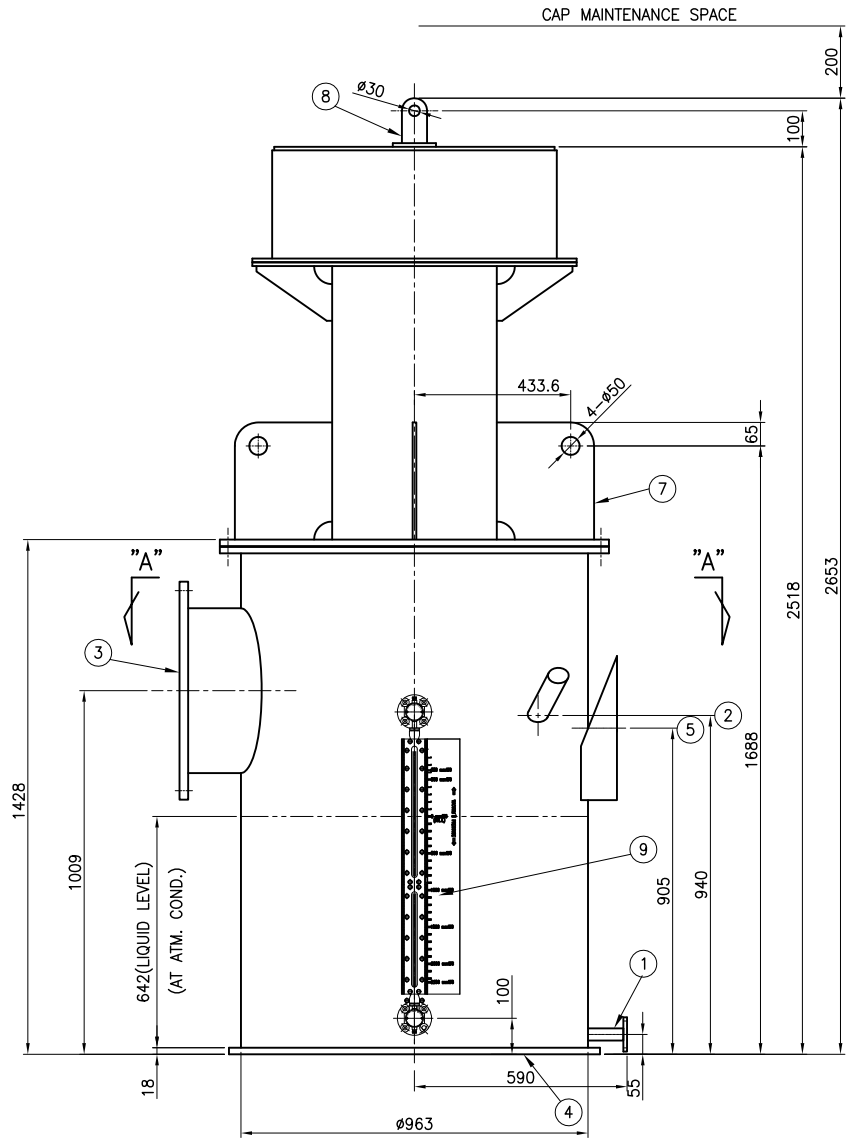
DETAIL OF ⑤





DETAIL OF ④

NOTE :

- Before inside and outside coating, blasting.
- Coating
 - Inside
Pure epoxy coating 250 microns
 - Outside
1st EP1760(GREY 1135) 100 microns
2nd SIGMACOVER 456 (GREY 5163) 100 microns
- Setting
 - Press. setting 2,250 mmAq
 - Vac. setting 630 mmAq
- Filling
 - 50% H₂O + 50% Glycol
 - Density 1.07 kg/ltr
 - Freezing point -37°C
- Weight
 - Empty abt.1,070 kg
 - WITH FILLING abt.1,552 kg



DOUBLE MESH #30, #10

9	LEVEL GAUGE	1	—	—	—
8	LUG-3	1	10t	—	—
7	LUG-2	4	10t	—	—
—	—	—	—	—	—
5	NAME PLATE SEAT	1	—	—	—
4	FOUNDATION SEAT	1	1030x1030x20t	—	—
3	INLET NOZZLE	1	JIS 5K-450A SOFF	—	—
2	FILLING NOZZLE	1	50A WITH CAP	—	—
1	FLANGE FOR DRAIN NOZZLE	1	5K-25A	—	—
NO.	DESCRIPTION	QT'Y	SIZE	WT. (kg)	REMARK
PROJECT 3247,48,70,71		TYPE IG140101		CUSTOMER HHI	
TITLE GENERAL ARRANGEMENT OF P/V BREAKER				CLASS/RULE BV	
				DATE 2022.04.13	
				DIM. mm	SCALE N/S
					
				w/o NO. IGW21HD3247's	
				DWG. NO. PV-1	
 KANGRIM HEAVY INDUSTRIES CO.,LTD.					



3. ACCESSORIES





PART LIST OF ACCESSORIES FOR INERT GAS SYSTEM

PART NO.	DRAWING NO.	TITLE	TYPE/SPEC.	QT'y	REV.
<Loose supply List >					
5501	SC-1	Scrubber	18,750 m3/hr	1	0
6101	DS-1	Deck water seal	Semi-dry type	1	0
6201	PV-1	P/V breaker	P:2250mmAq, V:630mmAq	1	0
6822	BL-1	No.1 inert gas blower	9,375 m3/hr	1	0
6852	BL-1	No.2 inert gas blower	9,375 m3/hr	1	0
6882	BL-1	No.3 inert gas blower	9,375 m3/hr	1	0
7000	O2-1	No.1 O2 analyzer panel	Single +sol	1	0
7010	O2-2	No.2 O2 analyzer panel	Single	1	0
1005	IG-1005	Expansion joint	JIS 5K-650A	1	0
1006	IG-1006	Check globe valve	JIS 16K-15A	1	0
1100	IG-1100	Shut off valve for uptake	JIS 5K-650A	1	0
1105	IG-1005	Expansion joint	JIS 5K-650A	1	0
1106	IG-1006	Check globe valve	JIS 16K-15A	1	0
1120	IG-1100	Shut off valve for uptake	JIS 5K-650A	1	0
1130	IG-1130	Shut off valve for Sealing air	JIS 5K-50A	1	0
1151	IG-1151	Thermometer	PF 1/2"	1	0
1205	IG-1005	Expansion joint	JIS 5K-650A	1	1
1502	IG-1502	Air filter for instrument air	PT 1/2"	1	0
1503	IG-1503	Pressure gauge	PF 1/4"	1	0
1504	IG-1504	3-way test cock	PF 1/4"	1	0
1505	IG-1505	Pressure switch	PF 3/8"	1	0
1506	IG-1506	3-way test cock	PF 3/8"	1	0

**PART LIST OF ACCESSORIES FOR INERT GAS SYSTEM**

PART NO.	DRAWING NO.	TITLE	TYPE/SPEC.	QT'y	REV.
<Loose supply List >					
1701	IG-1503	Pressure gauge	PF 1/4"	1	0
1702	IG-1504	3-way test cock	PF 1/4"	1	0
1703	IG-1505	Pressure switch	PF 3/8"	1	0
1704	IG-1506	3-way test cock	PF 3/8"	1	0
1705	IG-1705	Orifice for sea water inlet	JIS 5K-250A	1	0
6020	IG-6020	Control valve for I.G purge	JIS 5K-400A	1	0
6040	IG-6040	Control valve for I.G delivery	JIS 5K-600A	1	0
6050	IG-6050	Shut off valve for I.G bleed	JIS 5K-50A	1	0
6053	IG-6053	Solenoid valve for bleed valve	24V DC	1	0
6054	IG-6054	Flame screen	JIS 5K-50A	1	0
6063	IG-6063	Temperature transmitter	PF 1/2"	1	0
6064	IG-6064	Temperature switch	PF 1/2"	1	0
6065	IG-1503	Pressure gauge	PF 3/8"	1	0
6066	IG-1506	3-way test cock	PF 3/8"	1	0
6111	IG-6111	Non return valve	JIS 5K-600A	1	0
6119	IG-1503	Pressure gauge	PF 1/4"	1	0
6120	IG-1505	Pressure switch	PF 3/8"	1	0
6121	IG-1506	3-way test cock	PF 3/8"	1	0
6128	IG-1504	3-way test cock	PF 1/4"	1	0
6126	IG-6126	Vacuum breaker	JIS 5K-25A	1	0
6300	IG-6300	Press transmitter& switch	10 SUS316L tube	1	0
6800	IG-6800	Manual valve for blower inlet	JIS 5K-450A	1	0
6810	IG-6840	Shut off valve for blower outlet	JIS 5K-450A	1	0

**PART LIST OF ACCESSORIES FOR INERT GAS SYSTEM**

PART NO.	DRAWING NO.	TITLE	TYPE/SPEC.	QT'y	REV.
<Loose supply List >					
6821	IG-6821	Flexible joint	JIS 5K-450A	1	0
6824	IG-6821	Flexible joint	JIS 5K-450A	1	0
6825	IG-6825	Flexible hose	JIS 5K-15A SORF	1	0
6827	IG-6826	Flexible hose	JIS 5K-50A SORF	1	0
6830	IG-6800	Manual valve for blower inlet	JIS 5K-450A	1	0
6840	IG-6840	Shut off valve for blower outlet	JIS 5K-450A	1	0
6851	IG-6821	Flexible joint	JIS 5K-450A	1	0
6854	IG-6821	Flexible joint	JIS 5K-450A	1	0
6855	IG-6825	Flexible hose	JIS 5K-15A SORF	1	0
6857	IG-6825	Flexible hose	JIS 5K-50A SORF	1	0
6860	IG-6800	Manual valve for blower inlet	JIS 5K-450A	1	0
6870	IG-6840	Shut off valve for blower outlet	JIS 5K-450A	1	0
6881	IG-6821	Flexible joint	JIS 5K-450A	1	0
6884	IG-6821	Flexible joint	JIS 5K-450A	1	0
6885	IG-6825	Flexible hose	JIS 5K-15A SORF	1	0
6887	IG-6825	Flexible hose	JIS 5K-50A SORF	1	0
6861	IG-1151	Thermometer	PF 1/2"	1	0
6900	IG-6900	Manual valve for Capacity control	JIS 5K-600A	1	0
6127	IG-1705	Orifice for sea water inlet	JIS 5K-40A	1	0
6123	IG-1705	Orifice for sea water inlet	JIS 5K-40A	1	0
5050	IG-5050	Shut off valve for Fresh air	JIS 5K-550A	1	0
5054	IG-5051	Flame screen	JIS 5K-550A	1	0
6828	IG-6828	Solenoid valve for blower rinsing	PF 1/2"	1	0

[illegible]



PART LIST OF ACCESSORIES FOR INERT GAS SYSTEM

PART NO.	DRAWING NO.	TITLE	TYPE/SPEC.	QT'y	REV.
<Mounting List>					
5512	IG-5512	Level switch for scrubber	PF3/4"	1	0
5511	IG-5511	Level indicator for scrubber	310x90mm	1	0
6104	IG-6104	Level switch for deck water seal	PF3/4"	1	0
6105	IG-5514	Gate valve for deck water seal	JIS 5K-25A	1	0
6103	IG-6103	Level indicator for deck water seal	380x74mm	1	0
6202	IG-6202	Level gauge for P/V breaker	-	1	0
5514	IG-5514	Gate valve for Scrubber	JIS 5K-25A	1	0

**PART LIST OF ACCESSORIES FOR INERT GAS SYSTEM**

PART NO.	DRAWING NO.	TITLE	TYPE/SPEC.	QT'y	REV.
<Yard supply >					
1500	-	Shut-off valve	JIS 10K-25 A	1	0
1710	-	U-Seal	50A	1	0
5524	-	Check valve	JIS 5K-40 A	1	0
6061	-	Shut-off valve	Ø 8	1	0
6122	-	Check valve	JIS 5K-40 A	1	0
6124	-	Check valve	JIS 5K-40 A	1	0
6125	-	Waterseal	40A	1	0
6826	-	Check valve	JIS 5K-15 A	1	0
6856	-	Check valve	JIS 5K-15 A	1	0
6886	-	Check valve	JIS 5K-15 A	1	0
6930	-	Shut-off valve	JIS 5K-25 A	1	0
7090	-	Shut-off valve	Ø 8	1	0
6112	-	Deck main Isolating valve	JIS 5K-600 A	1	0