COMPONENTS LIST

ITEM	DESCRIPTION	CONNECTION SIZE
MCP	Main Control PC	NON PIPE CONNECTION
MPC	Main Power Cabinet	NON PIPE CONNECTION
MCC	Main Control Cabinet	NON PIPE CONNECTION
HGU	Hypochlorite Generation Unit	INLET/OUTLET FLANGE JIS 10K-65A
PRM	Power Rectifier Module	NON PIPE CONNECTION
DMU	Degas Module Unit	INLET/OUTLET FLANGE JIS 10K-65A (VENT LINE 10K-200A)
GDS	Gas Detection Sensor	NON PIPE CONNECTION
FMU	Flow Meter Unit	INLET/OUTLET FLANGE JIS 5K~600A, 10K-80A
FCV	Flow Control Valve	INLET/OUTLET FLANGE JIS 10K-80A
CIP	Chemical Injection Pipe	INLET/OUTLET FLANGE JIS 10K-100A (ORIFICE 10K~600A)
NIU	Neutralization Injection Unit	INLET/OUTLET FLANGE JIS 10K-40A / 10K-15A
DTS	DPD TRO Sensor	INLET SUS TUBE Φ6 / OUTLET SUS TUBE Φ10
DTU	Drain Tank Unit	INLET/OUTLET FLANGE JIS 5K-15A
APU	Air Pump Unit	INLET/OUTLET FLANGE JIS 10K-15A (AIR LINE Φ12/Φ10)
FP	Feeder Pump	INLET/OUTLET FLANGE JIS 16K-65A
IFP	Inverter For Feeder Pump	NON PIPE CONNECTION
ST	Strainer	INLET/OUTLET FLANGE JIS 10K-80A
CPP	Conductivity & Pressure pipe assy	INLET/OUTLET FLANGE JIS 10K-80A
AC01V (Safety Fail Closed Valve)		INLET/OUTLET FLANGE JIS 10K-80A
AC02V (Safety Fail Closed Valve)		INLET/OUTLET FLANGE JIS 10K-80A
EWU	EM Washing Unit	INLET/OUTLET FLANGE JIS 10K-32A
SWH	Sea Water Heater	INLET/OUTLET FLANGE JIS 10K-50A

THE DRAWING IS BASED ON THE POS AND MAKER STANDARD,
IF ANY ADDITIONAL EQUIPMENT IS REQUIRED BY SHIPYARD OR SHIP'S OWNER REQUIREMENTS,
THE EXTRA COST CAN BE OCCURED.

SYMBOL

ITEM	DESCRIPTION	ITEM	DESCRIPTION
*	MAKER (TECHCROSS) SUPPLY	N.C	TO BE CLOSED ALWAYS EXCEPT MAINTENANCE OF ECU
	BUTTERFLY VALVE		3-WAY COCK VALVE
	REMOTE BUTTERFLY VALVE	LD	LOCKING DEVICE
	THROTTLING VALVE	PT	PRESSURE TRANSMITTER
	GLOBE VALVE	CI	COMPOUND INDICATOR
	CHECK VALVE	FS	FLOW SWITCH
	CHECK VALVE WITHOUT HANDLE	GS	GAS SENSOR
	BALL VALVE	AV	AIR VENT VALVE
	DIAPHRAGM VALVE		BLOWER
	ANGLE VALVE		HOPPER
S	SOLENOID VALVE		ORIFICE
	CROSSING PIPES CONNECTED		CPVC PIPE LINE
	CROSSING PIPES NOT CONNECTED		PE COATING PIPE LINE
	BRANCH PIPES		
	TEE PIECE (FLANGE END)		
	REDUCER		
	EDUCTOR		
	BLIND FLANGE		
	CLOSED PIPE CONNECTION		
	BOSS WITH BLANK FLANGE		
	PUMP		
	STRAINER		
	Y-STRAINER		
	FILTER		
	SIGNAL		
	SCUPPER		
	PRESS REGULATOR		
ZS	LIMIT SWITCH		
M	PUMP MOTOR		
	RECEPTACLE		
	PLUG		
PI	PRESSURE INDICATOR		
PS	PRESSURE SWICH		
LS	LEVEL SWITCH		
TI	THERMOMETER (TEMPERATURE INDICATOR)		
TS	TEMPERATURE SWITCH		
N.O	TO BE OPENED ALWAYS EXCEPT MAINTENANCE OF ECU		

HISTORY OF P&ID FOR BWTS

DATE	REV.	REVISION DESCRIPTION	DSGN	CHKD	APPD
25.11.27.	0	PREPARED FOR APPROVAL.	S.M.KIM	E.K.OH	S.J.LEE

NOTE OF P&ID FOR BWTS

1. SYSTEM
 1) VALVE SIGNAL IS USED TO OPERATE ECS-HYCHLOR 2.0 SYSTEM.
 2) GENERAL ECS-HYCHLOR 2.0 COULD BE USED IN COMBINATION OF NON-EXPLOSION PROOF TYPE AND EXPLOSION PROOF TYPE DEPENDING ON THE VESSEL CONDITION.

2. G-2 SAMPLING PORT
 1) G-2 SAMPLING PORT SHALL BE COMPLIED WITH IMO REGULATION.
 2) G2 SAMPLING PORT(S) MUST BE PLACED AT HORIZONTAL OR UP-STREAM OF VERTICAL MAIN BALLAST WATER PIPE. IT SHALL NOT BE INSTALLED AT THE DOWN-STREAM OF VERTICAL MAIN BALLAST WATER PIPE.

3. DTS
 1) BETWEEN DTS SAMPLING PORT AND APU TO BE ARRANGED AS SHORT AS POSSIBLE(WITHIN 5M).
 2) DTS SAMPLING PORT(S) MUST BE PLACED AT HORIZONTAL OR UP-STREAM OF VERTICAL MAIN BALLAST WATER PIPE. IT SHALL NOT BE INSTALLED AT THE DOWN-STREAM OF VERTICAL MAIN BALLAST WATER PIPE.
 3) KEEP MIN' 5D INSTALLATION POSITION DISTANCE BETWEEN DTS SAMPLING PORT AND CIP PART.
 4) THE VALVE OF TSU SAMPLING LINE SHOULD BE ARRANGED NEAR TSU.
 5) THE MATERIAL FOR PIPE AND VALVE OF TSU SAMPLING LINE SHOULD BE SUS316L.

4. NIU
 1) BETWEEN NIU INJECTION PORT AND NIU TO BE ARRANGED AS SHORT AS POSSIBLE(WITHIN 10M).
 1-1) IF NIU DOSING LINE IS FAR(ABT.10M) FROM THE NIU, THE "PREPARATION" BUTTON IN ANU ICON OF HMI SHALL BE CLICKED BY THE CREW TO FILL THE NEUTRALIZING AGENT IN THE DOSING LINE.
 2) NIU INJECTION PORT(S) MUST BE PLACED AT HORIZONTAL OR UP-STREAM OF VERTICAL MAIN BALLAST WATER PIPE. IT SHALL NOT BE INSTALLED AT THE DOWN-STREAM OF VERTICAL MAIN BALLAST WATER PIPE.
 3) KEEP MIN' 5D INSTALLATION POSITION DISTANCE BETWEEN DTS PORT AND NIU PORT.
 4) THE VALVE OF NIU INJECTION PIPE SHOULD BE ARRANGED NEAR NIU.
 5) IN CASE OF EACH OF THE NIU INJECTION PIPE IS CONNECTED TO ONE, THIS SHOULD BE INCLINED AS SHOWN IN THE DETAIL "D". (IF NECESSARY)
 6) EXCESSIVE VACUUM MAY BE FOUND IN THE NIU PIPES WHEN SHIFTING THE NEUTRALIZATION REAGENT DOWNSTREAM FROM AN ELEVATED PLACE, HENCE COUNTERMEASURES SUCH AS INSTALLATION OF VACUUM VALVES SHOULD BE CONSIDERED.
 7) THE MATERIAL FOR PIPE AND VALVE OF NIU DOSING LINE SHOULD BE SUS316L.

5. GDS
 1) GDS SHOULD BE INSTALLED ABOVE HGU OUTLET FLANGE AND DMU OUTLET FLANGE.
 2) GDS SHALL BE PROVIDED BY MAKER, BUT THE INSTALLATION WORK SHALL BE CARRIED OUT BY YARD. (IF NECESSARY)

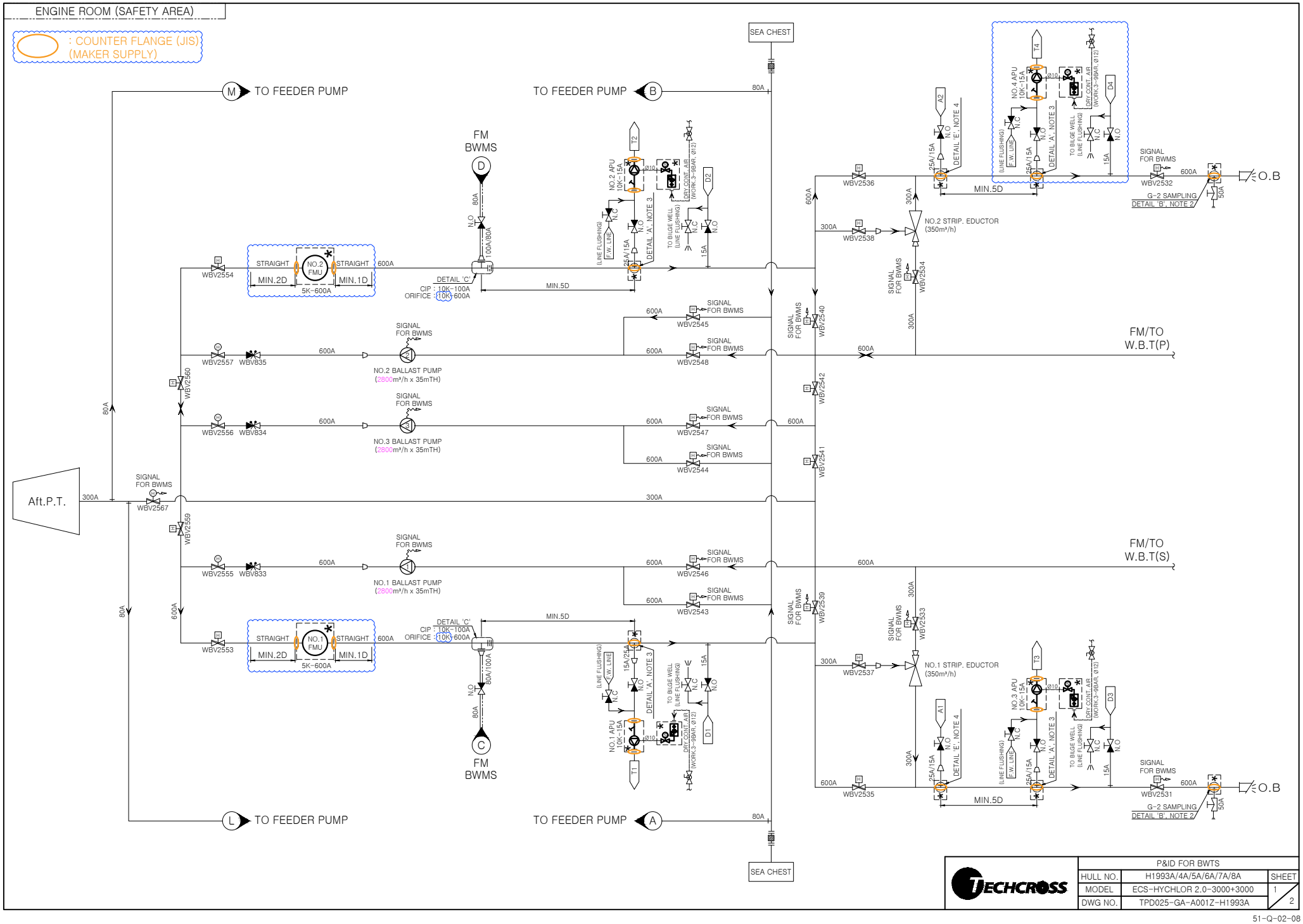
6. DTU, DMU
1) DTU : THE AREA WITHIN 3 METERS AROUND THE VENT OUTLET IS TO BE HAZARDOUS AREA.
 DMU : THE AREA WITHIN 5 METERS AROUND THE VENT OUTLET IS TO BE HAZARDOUS AREA.
2) FLANGE JOINT SHALL BE APPLIED ON MAIN BRANCH CONNECTION ONLY AND WELDING JOINT (E.G. BUTT WELDING OR SLEEVE WELDING) SHALL BE APPLIED.
3) ARRANGEMENT OF VENT PIPES SHALL BE ASCENDING.

7. EWU
 1) FRESH WATER SUPPLY LINE AND DRAIN CONNECTION LINE FOR EWU(EM WASHING UNIT) SHOULD BE ARRANGED WITHIN APPROXIMATELY 3 METER AROUND HGU.
 2) THE USED EM CLEANING WATER CONTAINING CHEMICAL AGENT SHOULD BE STORED IN EWU TANK AND DISCHARGED AT SEA MORE THAN 12 NAUTICAL MILES AND 25M IN DEPTH.

8. SEA WATER HEATING SOLUTION
 IF SEA WATER IS BELOW 3 DEGREE CELSIUS, THE SEA WATER HEATER CAN BE APPLIED.
 S.W.TEMP' SHOULD BE MONITORED FROM BWMS.

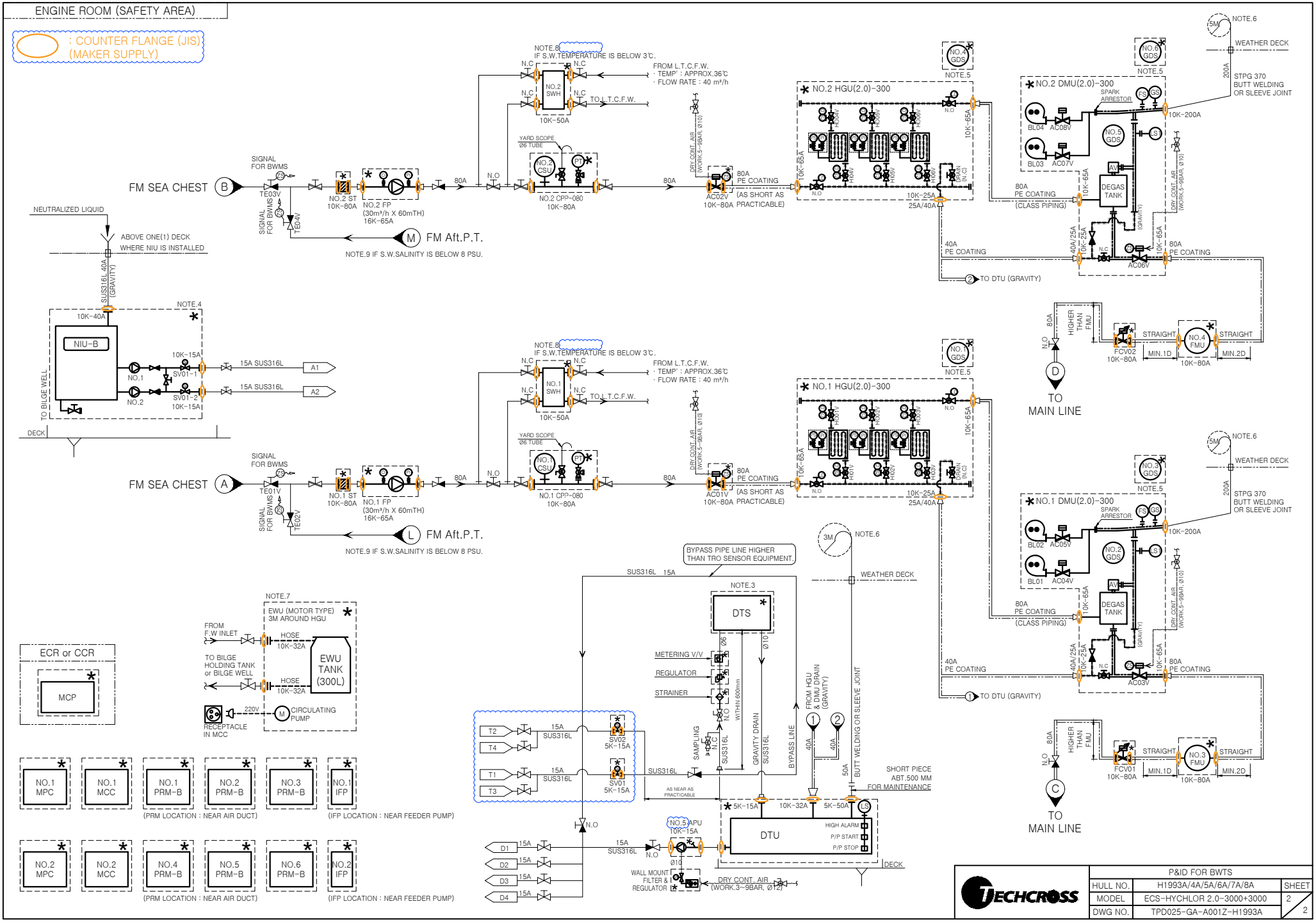
9. BALLASTING OPERATION AT LOW SALINITY AREA (<8PSU)
 1) THE VOLUME OF SEA WATER(AT LEAST 8PSU SEA WATER) HOLDING TANK SHALL BE MINIMUM 1% OF TOTAL BALLASTING CAPACITY.
 2) THE SUCTION LINE OF FEEDER PUMP SHOULD BE ARRANGED TO BE FILLED FULLY WITH SEA WATER.

10. FMU
 1) FMU OUTLET PIPE SHOULD BE ARRANGED HIGHER THAN FMU IN ORDER TO KEEP FULL WATER INSIDE FMU.



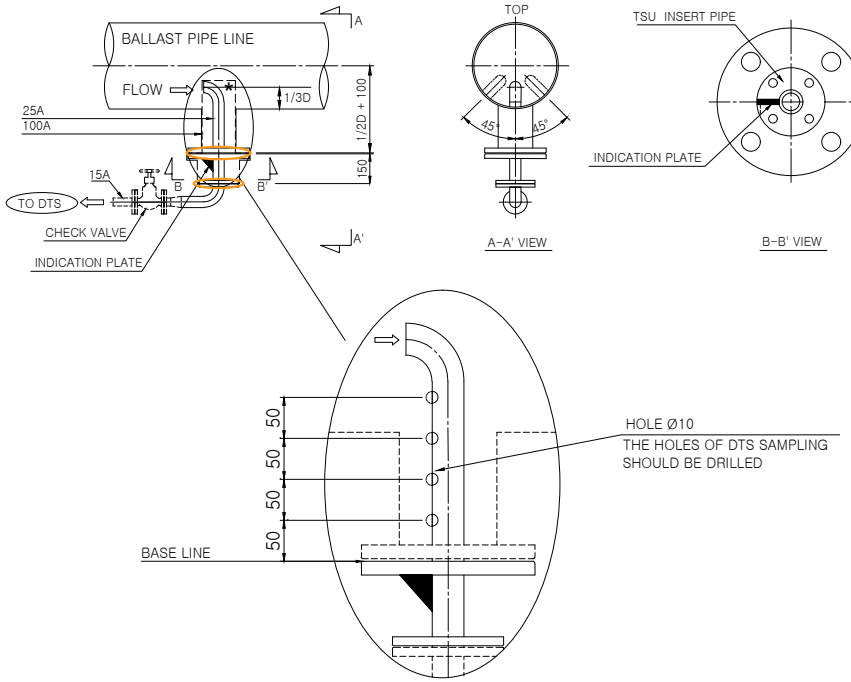
TECHCROSS	P&ID FOR BWTS	
	HULL NO.	H1993A/4A/5A/6A/7A/8A
	MODEL	ECS-HYCHLOR 2.0-3000+3000
	DWG NO.	TPD025-GA-A001Z-H1993A
	SHEET	1 / 2

51-Q-02-08


ENGINE ROOM (SAFETY AREA)
: COUNTER FLANGE (JIS)
(MAKER SUPPLY)
FM SEA CHEST B
FM SEA CHEST A
SIGNAL FOR BWMS
TE03V
TE04V
TE01V
TE02V
NO.2 ST 10K-80A
NO.2 FP (30m³/h X 60mTH) 16K-65A
NO.1 ST 10K-80A
NO.1 FP (30m³/h X 60mTH) 16K-65A
FM Aft.P.T.
NOTE.9 IF S.W.SALINITY IS BELOW 8 PSU.
NOTE.8 IF S.W.TEMPERATURE IS BELOW 3℃.
FROM L.T.C.F.W. · TEMP' : APPROX.36℃ · FLOW RATE : 40 m³/h
TO L.T.C.F.W.
NO.2 SWH
NO.1 SWH
10K-50A
YARD SCOPE Ø6 TUBE
NO.2 CSU
NO.1 CSU
NO.2 CPP-080 10K-80A
NO.1 CPP-080 10K-80A
DRY CONT. AIR (WORK.5~9BAR, Ø10)
AC02V 10K-80A
AC01V 10K-80A
80A PE COATING (AS SHORT AS PRACTICABLE)
NO.2 HGU(2.0)-300
NO.1 HGU(2.0)-300
NO.4 GDS
NO.1 GDS
NOTE.5
10K-65A
10K-25A 25A/40A
80A PE COATING (CLASS PIPING)
NO.2 DMU(2.0)-300
NO.1 DMU(2.0)-300
SPARK ARRESTOR
NO.5 GDS
NO.2 GDS
NO.6 GDS
NO.3 GDS
BL04 AC08V
BL03 AC07V
BL02 AC05V
BL01 AC04V
10K-200A
DEGAS TANK
AV
LS
FS
GS
AC06V
AC03V
40A/25A 10K-25A
40A PE COATING
80A PE COATING
TO DTU (GRAVITY)
NOTE.6
5M
3M
WEATHER DECK
200A
STPG 370 BUTT WELDING OR SLEEVE JOINT
HIGHER THAN FMU
FCV02 10K-80A
FCV01 10K-80A
STRAIGHT
NO.4 FMU
NO.3 FMU
MIN.1D
MIN.2D
10K-80A
TO MAIN LINE
NEUTRALIZED LIQUID
ABOVE ONE(1) DECK WHERE NIU IS INSTALLED
SUS316L 40A (GRAVITY)
NOTE.4
10K-40A
NIU-B
10K-15A
NO.1
NO.2
SV01-1
SV01-2
15A SUS316L
A1
A2
TO BILGE WELL
DECK
NOTE.7
EWU (MOTOR TYPE) 3M AROUND HGU
FROM F.W INLET
TO BILGE HOLDING TANK or BILGE WELL
HOSE 10K-32A
EWU TANK (300L)
220V
CIRCULATING PUMP
RECEPTACLE IN MCC
ECR or CCR
MCP
NO.1 MPC
NO.1 MCC
NO.1 PRM-B
NO.2 PRM-B
NO.3 PRM-B
NO.1 IFP
(PRM LOCATION : NEAR AIR DUCT)
(IFP LOCATION : NEAR FEEDER PUMP)
NO.2 MPC
NO.2 MCC
NO.4 PRM-B
NO.5 PRM-B
NO.6 PRM-B
NO.2 IFP
BYPASS PIPE LINE HIGHER THAN TRO SENSOR EQUIPMENT.
NOTE.3
DTS
METERING V/V
REGULATOR
STRAINER
SUS316L 15A
T1
T2
T3
T4
SV01 5K-15A
SV02 5K-15A
SAMPLING
GRAVITY DRAIN
BYPASS LINE
FROM HGU & DMU DRAIN (GRAVITY)
WITHIN 600mm
AS NEAR AS PRACTICABLE
BUTT WELDING OR SLEEVE JOINT
SHORT PIECE ABT.500 MM FOR MAINTENANCE
DTU
HIGH ALARM
P/P START
P/P STOP
NO.5 APU 10K-15A
WALL MOUNT FILTER & REGULATOR
DRY CONT. AIR (WORK.3~9BAR, Ø12)
D1
D2
D3
D4
DECK
TECHCROSS
P&ID FOR BWTS
HULL NO. H1993A/4A/5A/6A/7A/8A
MODEL ECS-HYCHLOR 2.0-3000+3000
DWG NO. TPD025-GA-A001Z-H1993A
SHEET 2/2
51-Q-02-08

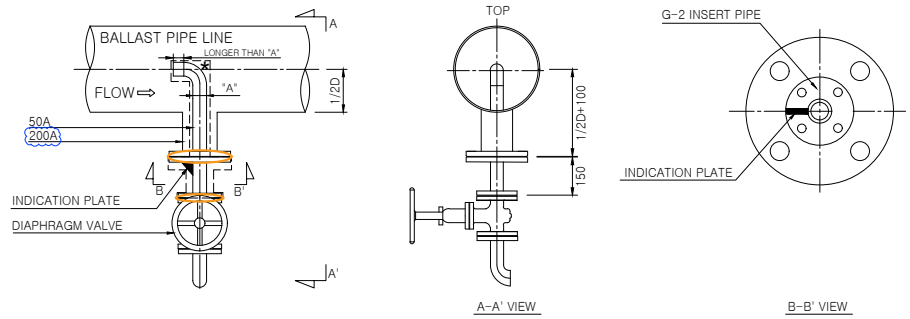
DETAIL 'A' DTS SAMPLING PORT (MAKER SCOPE)

1) DTS SAMPLING PORT SHOULD BE INSTALLED AT THE BOTTOM OF BALLAST PIPE LINE.
2) THE INDICATION PLATE IS FOR INDICATION OF INSERT PIPE DIRECTION. THIS SHOULD BE INSTALLED IN THE SAME DIRECTION WITH SAMPLING PORT.



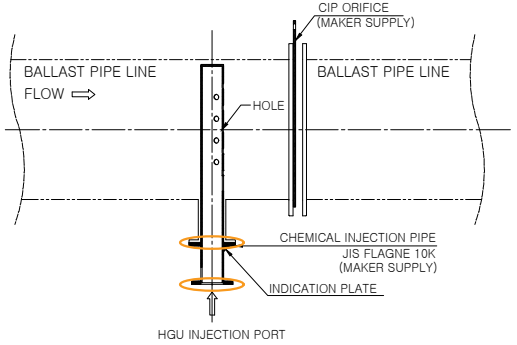
DETAIL 'B' G2 SAMPLING PORT (MAKER SCOPE)

1) WHEN THE SIZE OF G-2 SAMPLING PORT PIPE IS 50A, THE SIZE OF BRANCH PIPE FROM BALLAST PIPE LINE SHOULD BE MORE THAN 150A.
2) G2 SAMPLING PORT SHOULD BE INSTALLED AT THE BOTTOM OR SIDE OF BALLAST PIPE LINE.
3) THE INDICATION PLATE IS FOR INDICATION OF INSERT PIPE DIRECTION. THIS SHOULD BE INSTALLED IN THE SAME DIRECTION WITH SAMPLING PORT.

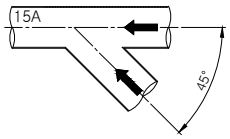


DETAIL 'C' CHEMICAL INJECTION PIPE ASSY (MAKER SCOPE)

1) THE BALLAST PIPE IS NOT SUPPLIED BY THE MAKER.
2) THE THICKNESS OF THE BALLAST PIPE SHOULD BE ASSEMBLED BASED ON SCH #40.
   IF PIPE THICKNESS APPLIED OVER SCH #40, IT IS NOT POSSIBLE TO ASSEMBLY WITH CHEMICAL INJECTION PIPE.
3) THE FLANGE SPEC OF PIPE COULD BE CHANGED ACCORDING TO YARD CONDITION.
4) THE INDICATION PLATE IS FOR INDICATION INSERT PIPE DIRECTION.

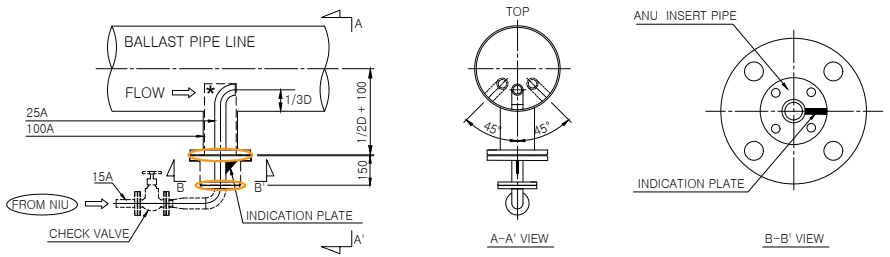


DETAIL 'D' PIPE CONNECTION PARTS (IF APPLICABLE)



DETAIL 'E' NIU DOSING PORT (MAKER SCOPE)

1) NIU DOSING PORT SHOULD BE INSTALLED AT THE BOTTOM OF BALLAST PIPE LINE.
2) THE INDICATION PLATE IS FOR INDICATION OF INSERT PIPE DIRECTION. THIS SHOULD BE INSTALLED IN THE SAME DIRECTION WITH DOSING PORT.



: COUNTER FLANGE (JIS) (MAKER SUPPLY)

TECHCROSS

SAMPLING DETAIL DRAWING		
HULL NO.	H1993A/4A/5A/6A/7A/8A	SHEET
MODEL	ECS-HYCHLOR 2.0-3000+3000	1 / 1
DWG NO.	TPDHY2025-GA-A001A-SAMPLING	