SAMSUNG

## PLAN HISTORY

| Rev. | Date | Reason for Issue | Prepared by | Checked by | Approved by |
|---|---|---|---|---|---|
| - | 15 Oct. 2010 | Issued for approval | H. B. Choi | Y. S. Park | Y. S. Kim |
| A | 03 Dec. 2010 | Revised in accordance with Buyer's comment. | H. B. Choi | Y. S. Park | Y. S. Kim |
| B | 25 Jan. 2011 | Revised acc. to Buyer's comment, Class comment, Maker's recommendation and design improvement. | H. B. Choi | Y. S. Park | Y. S. Kim |
| C | 13 May 2011 | Revised acc. to Buyer's comment, Class comment, Maker's recommendation and design improvement. | H. B. Choi | Y. S. Park | Y. S. Kim |

*** List of Reference Documents**

| Document No. | Document Title |
|---|---|
| MB00110 | Engine Room Arrangement |
| MB60100 | Piping Diagram of Hull Part |
| MF60020 | Piping Practice (Engine Room, Hull and Accomodation) |



**Classification ; LR**

✠100A1, Double Hull Oil Tanker, CSR, ESP, ShipRight (ACS(B), CM), L1, ✠LMC, UMS, ShipRight SCM, IWS (no seachest blanking device), EP

**Registration; Singapore**

(53) sheets with a cover

| | |
|---|---|
| 1965 | 9594858 |
| 1964 | 9594846 |
| 1963 | 9594834 |
| 1962 | 9594822 |
| Hull No | IMO No |



| | | |
|---|---|---|
| Department; **Outfitting System Design 1** | Ship Type; **157,000DWT Crude Oil Tanker** | Class.; **LR** |
| Hull No.; **1962/63/64/65** | Ship Name; | |
| Approved by ; Y. S. Kim<br>Checked by ; Y. S. Park<br>Prepared by ; H. B. Choi (T.5572) | Document Title; **PIPING DIAGRAM OF ENGINE ROOM** | |
| | Buyer's Document No.; | |
| **SAMSUNG HEAVY IND. CO., LTD.**<br>**GEOJE SHIPYARD, KOREA** | Builder's Document No.; **MB10100** | Rev. No.; **C** |
| | Scale; NONE / Unit; - / Consolidated No.; | - |

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**Unauthorized use or disclosure of this material results in civil or criminal liabilities.**

| SAMSUNG HEAVY INDUSTRIES | PIPING DIAGRAM FOR ENGINE ROOM<br>(PIPING GENERAL FOR ENGINE ROOM) | HULL NO. | DRAWING NO. | PAGE |
|---|---|---|---|---|
| | | 1962/63/64/65 | MB101.01 | 1 / 8 |

REVISION HISTORY ( 1/ 1 )

HULL NO.: 1962/63/64/65

| REV. NO. | REVISED BY | REV. NO. | REVISED BY |
|---|---|---|---|
| A | AUTHORITY REQUEST | F | DETAIL CALCULATION BY YARD |
| B | OWNER'S REQUEST | G | OTHER DESIGN SECTION AT YARD |
| C | CLASSIFICATION REQUEST | M | DESIGN MISTAKE |
| D | DETAIL ARRANGEMENT AT YARD | V | DESIGN IMPROVEMENT |
| E | EQUIPMENT MAKER'S RECOMMENDATION | | |

| ALT. NO. | REV. NO. | DESCRIPTION | PAGE |
|---|---|---|---|
| A | B-1 | The following 4th step was included in Dead Ship starting arrangements. "Changing one(1) set of main air receiver to proper level for main engine starting." | 3/8 |
| | B-2 | Pipe table for Copper pipe, stainless steel pipe, Al-brass pipe, Cu-Ni pipe was changed as per specification | 4/8 |



SAMSUNG
AET/LR



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1. Piping general and specification

(1) General note for L.R.S

Lloyd Register of Shipping,
※100A1, Double Hull Oil Tanker, CSR, ESP, ShipRight(ACS(B), CM), LI, ※LMC, UMS, ShipRight SCM, IWS(no seachest blanking device), EP

1) Material

a. The carbon contents of SS400 is to be less than 0.23%.
b. The elongation of ductile graphite cast iron is not to be less than 12%. also, FCD390 as equivalent material can be used.
c. All flexible hoses, butterfly valves and level gauges on oil tanks are to be of classification society's approved type (or to be provided with certificate) for the intended service.
d. All glasses on level gauges fitted to oil tanks are to be of flat and heat resistant type.
e. The sight glass fitted to oil line is to be of fire / heat resistance material.
f. The material of orifice plate to be SUS316 for sea water and SUS304 for other system.

2) Test

a. Burst pressure of the hose is not to be less than four times the relief valve setting of the system. In addition, non-metallic hoses for oil service are to be fire-resistant and reinforced with wire braid or other suitable material in accordance with the rules.
b. Pipes, valves and fittings for class I & II piping systems, ship side and the collision bulkhead are to be manufactured and tested in accordance with the appropriate requirements of classification society.

2)-1. At Shop

Test of pipe spools which is classified I(1) and II(2) at shop can apply 100% of NDE instead of Hydraulic test under agreement and/or approval as follows.

aa) Classified I(1) pipe spools shall apply 100% of R.T & M.T or P.T which depends on raw material as it is in accordance with rule and regulations.
bb) Classified II(2) pipe spools shall apply 10% of R.T and 100% of M.T or P.T other than R.T to avoid duplication of NDE.

2)-2. At Onboard

All class I(1) and II(2) pipes and their integral fittings are to be tested by hydraulic pressure to the surveyor's satisfaction in accordance with rule and regulation.

3) Fittings

a. Class approved type short sounding pipes for oil tanks in E/R to be installed.
b. The coupling of hose valves for compressed air system, fresh water service system and steam service system is to be of JIS type thread. (M42)
c. Sounding pipes for all tanks are to be fitted in a small diameter self closing test cock in accordance with the rule.

4) Operation

a. Emergency shut-off valves are to be operated from outside the machinery space as well as at local position. These are to be closed by spring return force by using of compressed air from the air bottle located outside E/R.
The capacity of the air bottle for em'cy shut off valves is to be sufficient to cycle all connected loads without recharging i.e. min. 2 times.
b. Detail of dead ship start arrangement is as follows in accordance with the rules.
<< When black out/dead ship condition >>
1st : The emergency generator engine to be started by primary starting of automatic battery device ( 3 starts at one charging ) and secondary starting of manual mechanical device in accordance with rule request.
The fuel oil service tank for em'cy G/E are to be provided with min.18 hours running continuously in connection with the rule.
2nd : No.1 Main air compressor with emergency power source, the lub. oil priming pump and also, the diesel oil supply pump for generator engine to be started. It can be operated automatically or manually by select switch.
3rd : The auxiliary generator engine to be started.
A B-1 4th : Charging one(1) set of main air receiver to proper pressure level for main engine starting.
c. F.O pumps and L.O service pumps are to be capable of being stopped from outside the machinery space.
d. Valves with remote control are to be arranged for local manual operation as per 5,13,2.3.2.
e. Further consideration will be given to the position of remote control stands for UMS operation of sea inlet and overboard discharge valves, when flooding calculations are submitted. Main sea inlet and overboard discharge valves are to be fitted with local controls as per 5,13,2.5.7 and UMS controls as per 6,1,4.6.2.
The flooding time to be applied minimum 20 minutes.

5) Installation

a. Thermometers and other temperature sensing devices registering through pressure boundaries are to be provided with instrument wells.
b. Pressure sensing devices are to be provided with valve arrangements to allow for instrument isolation and removal without impairing the pressurized system's integrity.
c. Air vent pipes led to exposed deck are to be of substantial thickness for penetration.
d. Ship side valves and pipe connections fitted between the shell and the valves are to be in accordance with 5,13,2.5 of the rules.
e. The relief valves fitted on the oil side of heaters are to be adjusted to operate as per 5,14,4.10.1

6) General

a. The unit of pressure gauge : SI unit (Pa, kPa, MPa)
b. The positions of pipe branches and pipe sizes shown in this diagram may be changed to other suitable ones according to machinery and detail piping arrangement.
c. Details of machinery and concerned diagram may be changed according to manufacture's recommendation.
d. Motors below the level of the floor plates are to be water proof(IP44) in accordance with rule requirements.
e. The ventilation dampers and exhaust air louver are to be closed by spring return force and fail of supplied compressed air at fire control station in accordance with rule requirements.

(2) PIPE TABLE

1) STEEL PIPE

| Nom dia | Out dia | SPP | Pipe wall thickness (mm) | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 7.9 mm *1 | Sch. 40 | 9.5 mm *2 | | | Sch. 80 | 12.7 mm *3 | | | 16.0 mm *4 | | | Sch. 40 | Sch. 80 | Sch. 100 | Sch. 120 | Sch. 160 |
| 10 | 17.3 | 2.35 | - | 2.3 | - | - | - | 3.2 | - | - | - | - | - | - | 2.3 | 3.2 | - | | - |
| 15 | 21.7 | 2.65 | - | 2.8 | - | - | - | 3.7 | - | - | - | - | - | - | 2.8 | 3.7 | - | - | 4.7 |
| 20 | 27.2 | 2.65 | - | 2.9 | - | - | - | 3.9 | - | - | - | - | - | - | 2.9 | 3.9 | - | - | 5.5 |
| 25 | 34.2 | 3.25 | - | 3.4 | - | - | - | 4.5 | - | - | - | - | - | - | 3.4 | 4.5 | - | - | 6.4 |
| 32 | 42.7 | 3.25 | - | 3.6 | - | - | - | 4.9 | - | - | - | - | - | - | 3.6 | 4.9 | - | - | 6.4 |
| 40 | 48.6 | 3.25 | - | 3.7 | - | - | - | 5.1 | - | - | - | - | - | - | 3.7 | 5.1 | - | - | 7.1 |
| 50 | 60.5 | 3.65 | - | 3.9 | - | - | - | 5.5 | - | - | - | - | - | - | 3.9 | 5.5 | - | - | 8.7 |
| 65 | 76.3 | 3.65 | - | 5.2 | - | - | - | 7.0 | - | - | - | - | - | - | 5.2 | 7.0 | - | - | 9.5 |
| 80 | 89.1 | 4.05 | - | 5.5 | - | - | - | 7.6 | - | - | - | - | - | - | 5.5 | 7.6 | - | - | 11.1 |
| 100 | 114.3 | 4.50 | - | 6.0 | - | - | - | 8.6 | - | - | - | - | - | - | 6.0 | 8.6 | - | 11.1 | 13.5 |
| 125 | 139.8 | 4.85 | - | 6.6 | - | - | - | 9.5 | - | - | - | - | - | - | 6.6 | 9.5 | - | 12.7 | 15.9 |
| 150 | 165.2 | 4.85 | - | 7.1 | - | - | - | 11.0 | - | - | - | - | 16.0 | - | 7.1 | 11.0 | - | 14.3 | 18.2 |
| 200 | 216.3 | 5.85 | - | 8.2 | - | - | - | 12.7 | - | - | - | - | 16.0 | - | 8.2 | 12.7 | 15.1 | 18.2 | 23.0 |
| 250 | 267.4 | 6.4 | - | 9.3 | - | - | - | - | 12.7 | 12.7 | - | - | 16.0 | - | 9.3 | 15.1 | 18.2 | 21.4 | 28.6 |
| 300 | 318.5 | 7.0 | - | - | 9.5 | 9.5 | - | - | 12.7 | 12.7 | - | - | 16.0 | - | 10.3 | 17.4 | 21.4 | 25.4 | 33.3 |
| 350 | 355.6 | 7.9 | - | - | 9.5 | 9.5 | - | - | 12.7 | 12.7 | - | 16.0 | 16.0 | - | 11.1 | 19.0 | 23.8 | 27.8 | 35.7 |
| 400 | 406.4 | 7.9 | - | - | 9.5 | 9.5 | - | - | 12.7 | 12.7 | - | 16.0 | 16.0 | - | 12.7 | 21.4 | 26.2 | 30.9 | 40.5 |
| 450 | 457.2 | 7.9 | - | - | 9.5 | - | - | - | 12.7 | - | - | 16.0 | - | - | - | - | - | - | - |
| 500 | 508.0 | 7.9 | - | - | 9.5 | - | - | - | 12.7 | - | - | 16.0 | - | - | - | - | - | - | - |
| 550 | 558.8 | 7.9 | - | - | 9.5 | - | - | - | 12.7 | - | - | 16.0 | - | - | - | - | - | - | - |
| 600 | 609.6 | 7.9 | - | - | 9.5 | - | - | - | 12.7 | - | - | 16.0 | - | - | - | - | - | - | - |
| 650 | 660.4 | - | - | - | - | - | 9.5 | - | - | - | 12.7 | - | - | 16.0 | - | - | - | - | - |
| 700 | 711.2 | - | - | - | - | - | 9.5 | - | - | - | 12.7 | - | - | 16.0 | - | - | - | - | - |
| 750 | 762.0 | - | - | - | - | - | 9.5 | - | - | - | 12.7 | - | - | 16.0 | - | - | - | - | - |
| 800 | 812.8 | - | - | - | - | - | 9.5 | - | - | - | 12.7 | - | - | 16.0 | - | - | - | - | - |
| 850 | 863.6 | - | - | - | - | - | 9.5 | - | - | - | 12.7 | - | - | 16.0 | - | - | - | - | - |
| 900 | 914.4 | - | - | - | - | - | 9.5 | - | - | - | 12.7 | - | - | 16.0 | - | - | - | - | - |
| 950 | 965.2 | - | - | - | - | - | 9.5 | - | - | - | 12.7 | - | - | 16.0 | - | - | - | - | - |
| 1000 | 1016.0 | - | - | - | - | - | 9.5 | - | - | - | 12.7 | - | - | 16.0 | - | - | - | - | - |
| 1050 | 1066.8 | - | - | - | - | - | 9.5 | - | - | - | 12.7 | - | - | 16.0 | - | - | - | - | - |
| 1100 | 1117.6 | - | - | - | - | - | 9.5 | - | - | - | 12.7 | - | - | 16.0 | - | - | - | - | - |
| 1150 | 1168.4 | - | - | - | - | - | 9.5 | - | - | - | 12.7 | - | - | 16.0 | - | - | - | - | - |
| 1200 | 1219.2 | - | - | - | - | - | 9.5 | - | - | - | 12.7 | - | - | 16.0 | - | - | - | - | - |
| SPP ERW | | O | | | | | | | | | | | | | | | | | |
| STPG 370 | ERW | | | O | O | | | | O | O | | | O | | | | | | |
| | *5 ERW 350~600 | | | | | | | | | | | | O | | | | | | |
| | SMLS | | | O | | O | | | O | | O | | | O | | | | | |
| | *5 SMLS 150~300 | | | | | | | | | | | | | O | | | | | |
| STPY 400 | SAW | | O | | | | O | | | | O | | | O | | | | | |
| | *5 SAW 650~1200 | | | | | | | | | | | | | O | | | | | |
| STPT370 SMLS | | | | | | | | | | | | | | | O | O | O | O | O |
| STS 370 | SMLS | | | | | | | | | | | | | | O | O | | | O |
| | *5 SMLS 25~125 | | | | | | | | | | | | | | | | | | O |
| STPA22 SMLS | | | | | | | | | | | | | | | O | O | O | O | O |

Note *1 For SPP piping System
*2 For SCH 40 Piping System
*3 For SCH 80 Piping System
*4 For SCH 160 Piping System
*5 For Ship Side Distance Piping System

A B-2

2)AL-BRASS PIPE

Unit in mm

| Nominal diameter (mm) | Outside diameter (mm) | Pipe wall thickness (mm) | Weight (kg/m) |
|---|---|---|---|
| 10 | 15.0 | 1.0 | 0.41 |
| 15 | 20.0 | 1.0 | 0.51 |
| 20 | 25.0 | 1.2 | 0.76 |
| 25 | 30.0 | 1.5 | 1.14 |
| 32 | 38.0 | 1.5 | 1.85 |
| 40 | 44.5 | 2.0 | 2.27 |
| 50 | 57.0 | 2.0 | 2.94 |
| 65 | 76.1 | 2.0 | 3.88 |
| 80 | 88.9 | 2.5 | 5.66 |
| 100 | 108.0 | 2.5 | 6.93 |
| 125 | 133.0 | 2.5 | 8.72 |
| 150 | 159.0 | 2.5 | 10.20 |
| 200 | 219.0 | 3.0 | 17.0 |
| 250 | 267.0 | 3.0 | 20.70 |
| 300 | 323.9 | 4.0 | 34.20 |
| 350 | 368.0 | 4.0 | 38.91 |
| 400 | 419.0 | 4.0 | 44.37 |

3) Cu-Ni (90/10) PIPE

Unit in mm

| Normal inch | Normal ND | OD (mm) | 10 Bar *1 T (mm) | 10 Bar *1 Wt (kg/m) | 14 Bar *2 T (mm) | 14 Bar *2 Wt (kg/m) | 16 Bar *3 T (mm) | 16 Bar *3 Wt (kg/m) | 20 Bar *3 T (mm) | 20 Bar *3 Wt (kg/m) |
|---|---|---|---|---|---|---|---|---|---|---|
| Seam Welded or Seamless | | | | | | | | | | |
| 1/8 | - | 10.0 | 1.0 | 0.26 | 1.0 | 0.26 | 1.0 | 0.26 | 1.0 | 0.26 |
| 1/4 | - | 12.0 | | 0.31 | | 0.31 | | 0.31 | | 0.31 |
| 3/8 | 10 | 16.0 | | 0.42 | | 0.42 | | 0.79 | | 0.79 |
| 1/2 | 15 | 20.0 | | 0.53 | | 0.53 | 2.0 | 1.01 | 2.0 | 1.01 |
| 3/4 | 20 | 25.0 | | 0.99 | | 0.99 | | 1.30 | | 1.30 |
| 1 | 25 | 30.0 | | 1.20 | | 1.20 | | 1.93 | | 1.93 |
| 1 1/4 | 32 | 38.0 | 1.5 | 1.54 | 1.5 | 1.54 | | 2.50 | | 2.50 |
| 1 1/2 | 40 | 44.5 | | 1.81 | | 1.81 | 2.5 | 2.95 | 2.5 | 2.95 |
| 2 | 50 | 57.0 | | 2.34 | | 2.34 | | 3.83 | | 3.83 |
| 2 1/2 | 65 | 76.1 | 2.0 | 4.16 | 2.0 | 4.16 | | 5.17 | | 5.17 |
| 3 | 80 | 88.9 | | 4.88 | 2.5 | 6.07 | | 6.07 | | 6.07 |
| 4 | 100 | 108.0 | | 7.41 | | 7.41 | | 8.85 | | 8.85 |
| 5 | 125 | 133.0 | 2.5 | 9.16 | 3.0 | 10.95 | 3.0 | 10.95 | 3.0 | 10.95 |
| 6 | 150 | 159.0 | | 10.99 | | 13.14 | | 13.14 | | 13.14 |
| 8 | 200 | 219.1 | 3.0 | 18.21 | 3.5 | 21.19 | 4.0 | 24.17 | 4.5 | 27.12 |
| 10 | 250 | 267.0 | | 22.64 | 4.0 | 29.55 | 4.5 | 30.98 | 5.5 | 40.59 |
| Seam Welded | | | | | | | | | | |
| 12 | 300 | 323.9 | 4.0 | 35.94 | 5.0 | 44.78 | 5.5 | 49.18 | 7.0 | 62.30 |
| 14 | 350 | 368.0 | | 40.82 | 5.5 | 50.80 | 6.5 | 59.99 | 8.0 | 80.89 |
| 16 | 400 | 419.1 | | 46.62 | 6.0 | 58.02 | 7.20 | 81.00 | 9.0 | 103.64 |
| 18 | 450 | 457.2 | 4.5 | 50.91 | | 76.03 | 8.0 | 100.93 | 9.5 | 119.45 |
| 20 | 500 | 508.0 | | 63.63 | 6.5 | 91.53 | 8.5 | 119.54 | 11.0 | 153.54 |
| 22 | 550 | 559.0 | 5.0 | 77.41 | 8.0 | 123.19 | 10.5 | 160.95 | 13.0 | 198.36 |
| 24 | 600 | 610.0 | | 84.56 | | 135.56 | 12.5 | 194.29 | | 217.97 |
| 26 | 650 | 660.0 | 6.0 | 109.65 | 9.0 | 163.74 | 12.0 | 217.31 | 15.0 | 270.38 |
| 28 | 700 | 711.0 | | 118.80 | | 177.45 | | 235.58 | | 293.22 |
| 30 | 750 | 762.0 | | 126.76 | 10.0 | 210.15 | 13.5 | 262.59 | 17.0 | 333.94 |
| 32 | 800 | 813.0 | | 135.99 | | 225.53 | | 333.14 | | 380.06 |
| 34 | 850 | 864.0 | 8.0 | 191.59 | 11.0 | 262.22 | 15.5 | 367.54 | 19.0 | 448.67 |
| 36 | 900 | 914.0 | | 203.57 | | 278.68 | | 392.14 | | 477.60 |

Note
*1 DIN 86018(welded) or 86019(seamless) Standard
*2 SHIS Standard
*3 EEMUA 144 Standard

4) COPPER PIPE

Unit in mm

| Nominal dimension (mm) | Outside diameter (mm) | Pipe wall thickness (mm) 3.0 Mpa | 7.0 Mpa | 14.0 Mpa |
|---|---|---|---|---|
| 4 | 6 | 1.0 | - | - |
| 5 | 8 | 1.2 | - | - |
| 6 | 10 | 1.2 | 2.0 | 3.0 |
| 8 | 12 | 1.2 | - | - |
| 10 | 15 | 1.5 | 2.3 | 4.0 |
| 15 | 20 | 1.5 | 3.0 | 5.0 |
| 20 | 25 | 1.8 | 3.5 | 6.0 |
| 25 | 30 | 1.8 | 4.0 | - |
| 32 | 35 | 2.0 | - | - |
| 40 | 45 | 2.0 | - | - |
| 50 | 55 | 2.3 | - | - |

Note
1) Material : JIS H3300, seamless
2) N.D. 10 & below : C1220T - O
(except 70K, 140K: C1220T - 1/2H)
2) N.D. 15 & above : C1220T - 1/2H

5) STAINLESS STEEL PIPE

Unit in mm

| Nominal diameter | Outside diameter | Pipe wall thickness Sch.5S ERW | Sch.5S SMLS | Sch.10S ERW | Sch.10S SMLS | Sch.20S ERW | Sch.20S SMLS | Sch.40 ERW | Sch.40 SMLS | Sch.80 ERW | Sch.80 SMLS | Sch.160 ERW | Sch.160 SMLS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| A | (mm) | ERW | SMLS | ERW | SMLS | ERW | SMLS | ERW | SMLS | ERW | SMLS | ERW | SMLS |
| 6 | 10.5 | - | - | - | 1.2 | - | 1.5 | - | 1.7 | - | 2.4 | - | - |
| 8 | 13.8 | - | - | - | 1.65 | - | 2.0 | - | 2.2 | - | 3.0 | - | - |
| 10 | 17.3 | - | - | 1.65 | 1.65 | 2.0 | 2.0 | 2.3 | 2.3 | - | 3.2 | - | - |
| 15 | 21.7 | 1.65 | 1.65 | 2.1 | 2.1 | 2.5 | 2.5 | 2.8 | 2.8 | 3.7 | 3.7 | - | 4.7 |
| 20 | 27.2 | 1.65 | 1.65 | 2.1 | 2.1 | 2.5 | 2.5 | 2.9 | 2.9 | 3.9 | 3.9 | - | 5.5 |
| 25 | 34.0 | 1.65 | 1.65 | 2.8 | 2.8 | 3.0 | 3.0 | 3.4 | 3.4 | 4.5 | 4.5 | - | 6.4 |
| 32 | 42.7 | 1.65 | 1.65 | 2.8 | 2.8 | 3.0 | 3.0 | 3.6 | 3.6 | 4.9 | 4.9 | - | 6.4 |
| 40 | 48.6 | 1.65 | 1.65 | 2.8 | 2.8 | 3.0 | 3.0 | 3.7 | 3.7 | 5.1 | 5.1 | - | 7.1 |
| 50 | 60.5 | 1.65 | - | 2.8 | 2.8 | 3.5 | 3.5 | 3.9 | 3.9 | 5.5 | 5.5 | - | 8.7 |
| 65 | 76.3 | 2.1 | - | 3.0 | 3.0 | 3.5 | 3.5 | 5.2 | 5.2 | - | 7.0 | - | 9.5 |
| 80 | 89.1 | 2.1 | - | 3.0 | 3.0 | 4.0 | 4.0 | 5.5 | 5.5 | - | 7.6 | - | 11.1 |
| 100 | 114.3 | 2.1 | - | 3.0 | 3.0 | 4.0 | 4.0 | 6.0 | 6.0 | - | - | - | - |
| 125 | 139.8 | 2.8 | - | 3.4 | - | 5.0 | - | 6.6 | - | - | - | - | - |
| 150 | 165.2 | 2.8 | - | 3.4 | - | 5.0 | - | 7.1 | - | - | - | - | - |
| 200 | 216.3 | 2.8 | - | 4.0 | - | 6.5 | - | 8.2 | - | - | - | - | - |
| 250 | 267.4 | 3.4 | - | 4.0 | - | 6.5 | - | - | - | - | - | - | - |
| 300 | 318.5 | 4.0 | - | 4.5 | - | 6.5 | - | - | - | - | - | - | - |
| SUS304 / SUS304L | | O | O | O | O | O | O | O | O | O | O | | O |
| | | | | | | | | | | | | | |
| SUS316L / SUS316L | | O | O | O | O | O | O | O | O | O | O | | O |
| | | | | | | | | | | | | | |

Note
Material : JIS G3459 or equivalent

PIPING GENERAL FOR ENGINE ROOM (MB101.01)

(3) SYMBOL AND IDENTIFICATION

1) PIPING SYMBOL

| DIV. | SYMBOL | DESCRIPTION |
|---|---|---|
| PIPES AND PIPE JOINS | | NOT CONNECTED CROSSING PIPES |
| | | CONNECTED CROSSING PIPES |
| | | TEE PIPE |
| | | FLEXIBLE JOINT<br>FLEXIBLE PIPE JOINT |
| | | FLANGED JOINT |
| | | SLEEVE JOINT |
| | | REDUCER (CONCENTRIC / ECCENTRIC) |
| | | SCREWED JOINT |
| | | WELDED JOINT |
| | | SLEEVE TYPE EXPANSION JOINT |
| | | DRESSER TYPE EXPANSION JOINT |
| | | BELLOWS TYPE EXPANSION JOINT |
| | | RUBBER COMPENSATOR |
| | | EXPANSION PIPE JOINT |
| | | BLANK(BLIND) FLANGE |
| | | SPOOL PIECE |
| | | CAP NUT |
| | (OPEN) (CLOSE) | SPECTACLE FLANGE |
| | | PENETRATING WATERTIGHT BULKHEAD & DECK CROSSING |
| | | PENETRATING NON-WATERTIGHT BULKHEAD & DECK CROSSING |
| | | TO BILGE |
| | | FIXED BAND (ANCHOR POINT) |
| | | |
| | | |

| DIV. | SYMBOL | DESCRIPTION |
|---|---|---|
| PIPES AND PIPE JOINS | | DECK PENETRATION (UP) |
| | | DECK PENETRATION (DOWN) |
| | | DECK PENETRATION (UP & DOWN) |
| | (PLAN) | PIPE DOWNWARD |
| | | |
| CONTROL AND REGULATION PARTS | | HAND-OPERATED |
| | | REMOTE CONTROL |
| | | SPRING |
| | | WEIGHT |
| | | FLOAT |
| | | PISTON (HYDRAULIC / AIR) |
| | | DIAPHRAGM MEMBRANE |
| | | DIAPHRAGM WITH POSITIONER |
| | M | ELECTRIC MOTOR DRIVEN |
| | | AIR MOTOR DRIVEN |
| | S | SOLENOID DRIVEN |
| | W | WAX DRIVEN |
| | | DECK STAND FOR REACH ROD |
| | | DECK STAND FOR MANUAL HYDRAULIC OPERATED |
| | | EDUCTOR |
| | | |
| | | |
| | | |
| | | |

| DIV. | SYMBOL | DESCRIPTION |
|---|---|---|
| VALVES AND COCKS | | GLOBE / ANGLE — STOP VALVE |
| | | 3-WAY VALVE |
| | | GLOBE / ANGLE — LIFT CHECK VALVE (ARROWHEAD MAY BE OMITTED) |
| | | GLOBE / ANGLE — SCREW DOWN STOP CHECK VALVE (ARROWHEAD MAY BE OMITTED) |
| | | SWING CHECK VALVE (ARROWHEAD MAY BE OMITTED) |
| | | PRESSURE REDUCING VALVE |
| | | SPRING LOADED CHECK VALVE (FLAP) (ARROWHEAD MAY BE OMITTED) |
| | | FLAP SWING CHECK VALVE (ARROWHEAD MAY BE OMITTED) |
| | | GLOBE / ANGLE — SAFETY VALVE (ARROWHEAD MAY BE OMITTED) |
| | | GLOBE / ANGLE — SELF CLOSING VALVE (ARROWHEAD MAY BE OMITTED) |
| | | REGULATING VALVE |
| | | BUTTERFLY VALVE (WAFER) |
| | | BUTTERFLY VALVE (FLANGED OR LUGGED) |
| | | GATE VALVE |
| | | BREATHER VALVE |
| | | GLOBE / ANGLE — HOSE VALVE |
| | | FOOT VALVE (ARROWHEAD MAY BE OMITTED) |
| | | |

| DIV. | SYMBOL | DESCRIPTION |
|---|---|---|
| VALVES AND COCKS | | GLOBE — STORM VALVE (WITH HANDLE / WITHOUT HANDLE) (ARROWHEAD MAY BE OMITTED) |
| | | ANGLE — STORM VALVE (WITH HANDLE / WITHOUT HANDLE) (ARROWHEAD MAY BE OMITTED) |
| | | GLOBE / ANGLE — NEEDLE VALVE |
| | | GLOBE / ANGLE — RELIEF VALVE |
| | | COCK |
| | | 3-WAY COCK (L-PORT) |
| | | 3-WAY COCK (T-PORT) |
| | | LOCKED COCK |
| | | BALL VALVE |
| | | 3-WAY BALL VALVE (L-PORT) |
| | | 3-WAY BALL VALVE (T-PORT) |
| | | BALL FLOAT VALVE |
| | | MANIFOLD VALVE (STOP) |
| | | MANIFOLD VALVE (CHECK) |
| | | REMOTE OPERATED VALVE |
| | | EMERGENCY SHU OFF VALVE (REMOTE OPERATED) |
| | | AIR MOTOR VALVE |
| | | ELECTRIC MOTOR VALVE |
| | | PISTON VALVE |
| | | SOLENOID VALVE |
| | | DIAPHRAGM OPERATED VALVE |
| | | EMERGENCY OPEN VALVE |

SAMSUNG HEAVY INDUSTRIES

# PIPING DIAGRAM FOR ENGINE ROOM
## (PIPING GENERAL FOR ENGINE ROOM)

| HULL NO. | DRAWING NO. | PAGE |
|---|---|---|
| 1962/63/64/65 | MB101.01 | 6 / 8 |

| DIV. | SYMBOL | DESCRIPTION |
|---|---|---|
| VALVES AND COCKS | | WAX DRIVEN 3-WAY VALVE |
| | | STRAIGHT — BALL FLOAT CHECK VALVE |
| | | ANGLE — BALL FLOAT CHECK VALVE |
| | | BACKFLOW PREVENTER |
| | | 3-WAY SOIL BRANCH VALVE |
| | | FLOW REGULATING VALVE |
| | | |
| | | |
| VALVES AND COCKS | | FLANGED END |
| | | SCREWED END |
| | | WELDING END |
| | | |
| | | |
| | | LOCKED CLOSED ( ) |
| | | LOCKED OPEND ( ) |
| | | MAKER'S SUPPLY ITEM ( ) |
| | LC | LOCKED CLOSED |
| | LO | LOCKED OPEND |
| | NO | NORMAL OPEND |
| | NC | NORMAL CLOSED |
| | | |
| | | |
| | | |

| DIV. | SYMBOL | DESCRIPTION |
|---|---|---|
| PIPE FITTINGS | | ROSE BOX |
| | | MUD BOX |
| | | SIMPLEX STRAINER |
| | | DUPLEX STRAINER |
| | | SEPARATOR |
| | | DRAIN TRAP(DISC) |
| | | DRAIN TRAP(BALL FLOAT) |
| | | Y TYPE STRAINER |
| | | HOPPER |
| | | HOPPER WITH COVER |
| | | AIR VENT PIPE |
| | (ELEVATION) (PLAN) | SOUNDING HEAD WITH CAP (DECK STAND TYPE) |
| | (ELEVATION) (PLAN) | SOUNDING HEAD WITH SELF-CLOSING VALVE & TEST COCK |
| | (ELEVATION) (PLAN) | SCUPPER |
| | | SCUPPER WITH WATER SEAL |
| | | AIR FILTER / REGULATOR |
| | | ORIFICE |
| | | HOSE COUPLING |
| | | DRAIN SILENCER |
| | | EXHAUST GAS SILENCER |
| | | HULL DISTANCE PIECE |
| | | BILGE HAT |
| | | SIGHT GLASS |
| | | OBSERVATION GLASS |

| DIV. | SYMBOL | DESCRIPTION |
|---|---|---|
| PIPE FITTINGS | | FLOWMETER |
| | | FUSIBLE PLUG |
| | | THERMOMETER POCKET |
| | | BOSS |
| | | BOSS & PLUG |
| | | ROSE PLATE |
| | | CHANGE PIECE, CHANGE OVER PIECE |
| | | GOOSE NECK TYPE AIR PIPE HEAD (WITHOUT WIRE NET) |
| | | BONNET TYPE AIR PIPE HEAD (WITHOUT WIRE NET) |
| | | GOOSE NECK TYPE AIR PIPE HEAD (WITH WIRE NET) |
| | | BONNET TYPE AIR PIPE HEAD (WITH WIRE NET) |
| | | OIL TRAY COAMING |
| | | BELLMOUTH |
| | | |
| CONTROL AND INSTRUMENTATION | | SELF POWERED CONTENT DIAL TYPE LEVEL GAUGE |
| | | AIR PURGE TYPE REMOTE LEVEL GAUGE |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |

| DIV. | SYMBOL | DESCRIPTION |
|---|---|---|
| CONTROL AND INSTRUMENTATION | | OFF CONNECTION |
| | | OFF PAGE CONNECTION |
| | | TRANSMITTER |
| | | SEAL POT |
| | | LOOP SEAL |
| | | GLASS LEVEL GAUGE — ○ WITHOUT VALVE ● WITH VALVE ●W WITH SELF CLOSING VALVE |
| | | FLAT GLASS OIL LEVEL GAUGE |
| | | FLOAT TYPE LEVEL GAUGE |
| | | MANOMETER |
| | | INNER FLOAT TYPE LEVEL GAUGE |
| | | OUTER FLOAT TYPE LEVEL GAUGE |
| | HB | HOSE BOX |
| | HR | HOSE REEL |
| | FB | FOAM BOX |
| | | HORN (PHONE) |
| | | ACUMMULATOR |
| | | VACUUM BREAKER |
| | | |

PIPING GENERAL FOR ENGINE ROOM (MB101.01)

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2) Instrumentation symbol

A. 1st letter

| | | |
|---|---|---|
| D | : | DENSITY ( OIL ) |
| DP | : | PRESSURE DIFFERENTIAL |
| DT | : | DEVIATION TEMPERATURE |
| F | : | FLOW |
| L | : | LEVEL |
| P | : | PRESSURE |
| S | : | SALINITY |
| T | : | TEMPERATURE |
| V | : | VISCOSITY |
| X | : | GENERAL FAILURE |
| Z | : | LIMIT (OR POSITION ) |

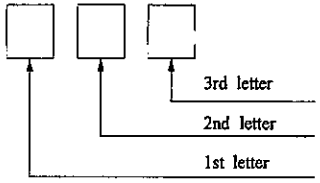
B. 2nd letter

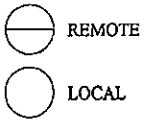
| | | |
|---|---|---|
| A | : | ALARM |
| C | : | CONTROL |
| I | : | INDICATION |
| S | : | SWITCH |
| T | : | TRANSMITTER |
| R | : | RECORDING |
| SH | : | SHUT DOWN |
| SL | : | SLOW DOWN |
| IA | : | INDICATION AND ALARM |

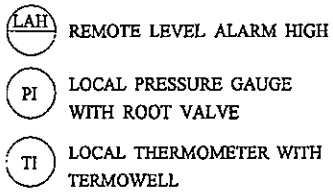
C. 3rd and 4th letter

| | | |
|---|---|---|
| H | : | HIGH |
| L | : | LOW |

D. Example



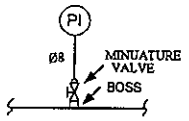
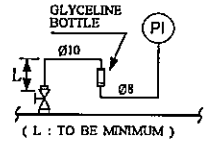
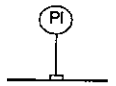
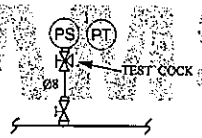
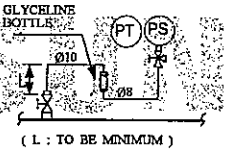
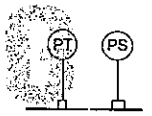
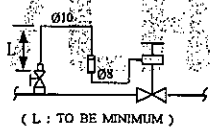
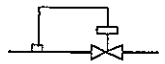
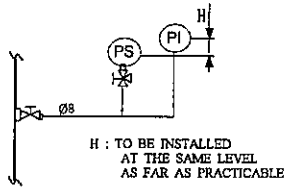
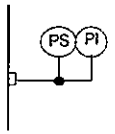




3) Application of local instrument tubing

① Guidance

All the instruments(in E/R) furnished by yard are to be installed as per the following table.

| NO. | ITEM | GENERAL (1) | HEAVY FUEL OIL & SLUDGE (2) | REMARK (IN PIPING DIAGRAM) |
|---|---|---|---|---|
| 1 | PRESSURE GAUGE |   |   |   |
| 2 | PRESSURE SWITCH/ TRANSMITTER |   |   |   |
| 3 | EXTERNAL SENSING TYPE PRESSURE CONTROL VALVE |   |   |  |
| 4 | "PI" "PS" INSTALLED AT THE SAME TIME |   | |   |

NOTE)

1) All gauges installed in sludge and H.F.O. systems shall be furnished with oil interface to prevent direct contact of fluid with gauge internals.
2) Glycerine bottle shall not be applied to the gauges which are directly mounted on pump bed with gauge board by pump maker.

| SAMSUNG HEAVY INDUSTRIES | PIPING DIAGRAM FOR ENGINE ROOM (PIPING GENERAL FOR ENGINE ROOM) | HULL NO. | DRAWING NO. | PAGE |
|---|---|---|---|---|
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## 4) PIPE TREATMENT SYMBOL

| NO | MARK | DESCRIPTION | REMARK |
|---|---|---|---|
| 1 | A | ACID PICKLING + PHOSPHATE | |
| 2 | AA | ACID PICKLING + ANTI RUST OIL | |
| 3 | AG | ACID PICKLING + GALVANIZING | |
| 4 | AL | ALUMA COATING | |
| 5 | AP | ACID PICKLING + PAINTING | |
| 6 | BP | BLASTING + PAINTING | |
| 7 | GF | GLASS FLAKE COATING | |
| 8 | NO | NO TREATMENT | |
| 9 | NP | NEOPRENE COATING | |
| 10 | PE | POLYETHYLENE LINING | |
| 11 | PPT | ACID PICKLING + ANTI RUST OIL (LOW MELTING POINT) | |
| 12 | RL | RUBBER LINING | |
| 13 | TE | TAR EPOXY COATING | |

NOTE : 1) REFER TO "PAINTING SPEC. (DWG NO. SD901.10)" FOR FURTHER DETAILS OF PAINTING SYSTEM

## 5) MATERIAL SYMBOL

| USE | MATERIAL SYMBOL | REFERENCE NO. OF JIS OR KS | DESCRIPTION |
|---|---|---|---|
| PIPES | SPP (SGP) | D 3507 (G3452) | CARBON STEEL PIPES FOR ORDINARY SERVICE |
| | STPG 370 | G 3454 | CARBON STEEL PIPES FOR PRESSURE SERVICE |
| | STPT 370 | G 3456 | CARBON STEEL PIPES FOR HIGH TEMPERATURE SERVICE |
| | STPY 400 | G 3457 | ARC WELDED CARBON STEEL PIPES |
| | STPA22 | G 3458 | ALLOY STEEL PIPE(Cr-Mo STEEL PIPE) |
| | SUS304 TP/ SUS316 TP | G 3459 | STAINLESS STEEL PIPES |
| | GRP(RTR) | | FIBRE GLASS RE-INFORCED PIPE (RE-INFORCED THERMOSETTING RESIN) |
| | C 1201 T<br>C 1220 T<br>C 1221 T | H 3300 | COPPER AND COPPPER ALLOY-SEAMLESS PIPES AND TUBES (COPPER PIPE) |
| | C 6871 T | H 3300 | PIPES AND TUBES (AL-BRASS PIPE) |
| | Cu - Ni | | COPPER - NICKEL PIPE |
| PIPING COMPONENTS (FLANGE, FITTING) | BC | H 5111 | BRONZE CASTING |
| | BS | H 3250 | COPPER AND COPPER ALLOY-RODS AND BARS (NAVAL BRASS) |
| | FC | G 5501 | GREY IRON CASTING |
| | FCD | G 5502 | SPHEROIDAL GRAPHITE IRON CASTING |
| | SC | G 5101 | CARBON STEEL CASTING |
| | SF440 | G 3201 | CARBON STEEL FORGING FOR GENERAL USE |
| | SS400 | G 3101 | ROLLED STEEL FOR GENERAL STRUCTURE |
| | S 25C<br>S 35C<br>S 45C | G 4501 | CARBON STEEL FOR MACHINE STRUCTURE USE |
| | SNB 7 | G 4107 | ALLOY STEEL BOLTING MATERIAL FOR HIGH TEMPERATURE SERVICE |
| | SCS | G 5121 | STAINLESS STEEL CASTING |
| | SUS | G 4303<br>G 4304<br>G 4305 | STAINLESS STEEL BAR/ SHEET AND PLATE |

## 6) IDENTIFICATION OF PIPING

### ① IDENTIFICATION OF PIPING

| MARK | SYSTEM | MARK | SYSTEM | MARK | SYSTEM |
|---|---|---|---|---|---|
| AC | CONTROL AIR PIPING | CG | FUEL GAS PIPING | CN | NITROGEN SERVICE PIPING |
| AH | ACETYLENE PIPING | GE | EXHAUST GAS PIPING | ST | STEAM SERVICE PIPING |
| AR | GENERAL SERV. AIR PIPING | HG | HYDRAULIC OIL PIPING | VA | AIR VENT PIPING |
| AS | STARTING AIR PIPING | OD | DIESEL OIL PIPING | VS | SOUNDING PIPING |
| BA | BLLLAST WATER PIPING | OF | FUEL OIL PIPING | WC | COLD WATER PIPING |
| BC | GREY WATER PIPING | OL | LUB. OIL PIPING | WF | COOL. FRESH WATER PIPING |
| BD | SCUPPER PIPING | OX | OXYGEN PIPING | WG | GEN. SERV. WATER PIPING |
| BS | SANITARY DISCHARGE PIPING | RF | AIR CON. & REFRIG. PIPING | WH | HOT F.W. SERVICE PIPING |
| BG | BILGE WATER PIPING | SB | BOILER FEED WATER PIPING | WP | POTABLE WATER PIPING |
| FC | $CO_2$ PIPING | SD | CONDENSATE WATER PIPING | WS | COOLING SEA WATER PIPING |
| FD | FIRE, DECK WASH PIPING | SE | EXHAUST STEAM PIPING | FA | FORCED DRAFT AIR PIPING |
| DS | DESUPERHEATED STM PIPING | SS | SUPERHEATED STEAM PIPING | BV | BOILER MAKER'S SUPPLY |

### ② NUMBERING OF PIPE LINE

80 AS 001
- 80 : NOM. DIA
- AS : SYSTEM MARK
- 001 : PIPE NO.

### ③ NUMBERING OF VALVE & FITTING

AS 001 F
- AS : SYSTEM MARK
- 001 : V/V & FITTING NO.
- F : IDENTIFICATION MARK OF VALVE & FITTING

## 7) ABBREVIATION & DEFINITION

| ABBREVIATION | DEFINITION | ABBREVIATION | DEFINITION | ABBREVIATION | DEFINITION | ABBREVIATION | DEFINITION |
|---|---|---|---|---|---|---|---|
| A/B | ABOVE BASE LINE | DK. | DECK | GEN. | GENERATOR | NOM. | NOMINAL |
| ACCOM. | ACCOMMODATION | D.O. | MARINE DIESEL OIL | G/S | GENERAL SERICE | OBS. | OBSERVATION |
| A/E | AUXILIARY ENGINE | DRN | DRAIN | H.F.O | HEAVY FUEL OIL FOR MARINE USE | P | PORT |
| A.P.T | AFT PEAK TANK | DMCR | DERATED MAXIMUM CONTINUOUS RATING | H/T | HIGH TEMPERATURE | P/P | PUMP |
| AUTO | AUTOMATIC | | | HTR | HEATER | PURIF. | PURIFIER |
| B.W.L | BALLAST WATER LINE | | | HYD. | HYDROPHORE OR HYDRAULIC | RM | ROOM |
| | | DWG | DRAWING | | | Q 'TY | QUANTITY |
| C/D | COFFERDAM | ESCR | ENGINE SUB CONTROL ROOM | INCIN. | INCINERATOR | R.W | ROCK WOOL |
| CENT. | CENTRIFUGAL | | | K | KG/cm².G (1KG/CM ² ≒ 0,981 BAR) | SEPTR | SEPARATOR |
| CH-VR | CHANGE-OVER | EL. | ELECTRIC EMERGENCY | | | SERV. | SERVICE |
| CIRC. | CIRCULATING | EM 'CY | | | | SETT. | SETTLING |
| CLR | COOLER | | | L.O | MARINE LUBRICATION OIL | S/T | STERN TUBE |
| COMP. | COMPRESSOR | ENG. | ENGINE | L/T | LOW TEMPERATURE | S | STARBOARD |
| CONN. | CONNECTION | E/R | ENGINE ROOM | L.W.L | LOAD WATER LINE | ST-BY | STAND-BY |
| COOL. | COOLING | E.R.W. | ELECTRIC RESISTANCE WELDING PIPE | M/E | MAIN PROPULSION ENGINE | STR 'G | STEERING |
| C.P.P | CONTROLLABLE PITCH PROPELLER | EXH. | EXHAUST | | | SUC. | SUCTION |
| | | | | MCR | MAXIMUM CONTINUOUS RATING | SYS. | SYSTEM |
| CST | CENTISTOKES | EXP 'N FM | EXPANSION FROM | | | T/C | TURBO CHARGER |
| D.B.T. | DOUBLE BOTTOM TANK | F.O | FUEL OIL | MIN. | MINIMUM | TEMP. | TEMPERATURE |
| DET. | DETAIL | F.P.T | FORE PEAK TANK | NCR | NORMAL CONTINUOUS RATING | THK. | THICKNESS |
| DIAM. | DIAMETER | F.W | FRESH WATER | NO. | NUMBER | TK | TANK |
| DISCH. | DISCHARGE | FWD | FORWARD | | | T.S.W.T | TOP SIDE WING TANK |
| | | GALV. | GALVANIZING | | | TYP. | TYPICAL |
| | | G.C | GLASS CLOTH | | | SMLS | SEAMLESS |
| | | G/E | GENERATOR ENGINE | | | | |

SAMSUNG

# PIPING DESIGN SPECIFICATION
## (DESIGN CONDITION, APPLICATION OF PIPE, PIPE JOINT & VALVES)

| HULL NO. | DWG NO. | SYSTEM DWG. PAGE |
|---|---|---|
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| SYSTEM | PIPE, VALVE & FITTING NO. | Work. Temp. [℃] | DESIGN PRESS. [MPa] Work | DESIGN PRESS. [MPa] MAX | CLASS(LR) | HYD. TEST [MPa] SHOP | HYD. TEST [MPa] ON-BOARD | PIPE SPECIFICATION N.D [A] | MATERIAL | THICK | TREAT. ★2 IN. | TREAT. ★2 OUT. | PIPE JOINT SPECIFICATION TYPE ★1 | RATE (JIS) | MATE -RIAL | INSULATION ★3 | VALVE SPECIFIACTION N.D [A] | RATE (JIS) | MATERIAL BODY | MATERIAL STEM | MATERIAL DISC & SEAT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SYSTEM DWG. PAGE : S01 ~ S02 | SANITARY AND F.W. SYSTEM (F.W. SERVICE, SANITARY DISCHARGE) | | | | | | | | | | | | | | | | | | | | |
| DISTILLED WATER (FROM F.W. GEN. TO TANK) | WG001-049 | - | 0.3 | 0.33 | III | - | Work. Cond. | ≥15 | COPPER (C1220T) | Pipe Table | NO | NO | F/S/U ★5 | 5K | YBSC2/ BRASS | - | ≥15 | 5K | BC | BS | BC |
| F.W. SERVICE (DISTILLED WATER) | WG050-099 | - | 0.3 | 0.33 | III | - | Work. Cond. | ≥15 | SPP | Pipe Table | AG | AG | F/S ★5 | 5K | SS400 | - | ≥50<br>≤40 | 5K<br>5K | FC<br>BC | BS<br>BS | BC<br>BC |
| DRINKING WATER | WP050-099 | - | 0.6 | 0.66 | III | - | Work. Cond. | ≥15 | SPP | Pipe Table | AG | AG | F/S ★5 | 5K | SS400 | - | ≥50<br>≤40 | 5K<br>5K | FC<br>BC | BS<br>BS | BC<br>BC |
| GENERAL FRESH WATER | WG100-299 | - | 0.6 | 0.66 | III | - | Work. Cond. | ≥15 | SPP | Pipe Table | AG | AG | F/S ★5 | 5K | SS400 | - | ≥50<br>≤40 | 5K<br>5K | FC<br>BC | BS<br>BS | BC<br>BC |
| HOT WATER | WH001-099 | 70 | 0.6 | 0.66 | III | - | Work. Cond. | ≥15 | COPPER (C1220T) | Pipe Table | NO | NO | F/S/U ★5 | 5K | YBSC2/ BRASS | R.W /G.C | ≥15 | 5K | BC | BS | BC |
| GREY & BLACK WATER DRAIN | BC001-049<br>BS001-049 | - | - | - | III | - | Work. Cond. | ≥15 | STPG370-E | Sch 40 | AG | AG | F/S ★5 | 5K | SS400 | - | ≥50<br>≤40 | 5K<br>5K | FC<br>BC | BS<br>BS | BC<br>BC |
| GREY & BLACK WATER SUBSTANTIAL THICKNESS PIECE | BC100-199<br>BS100-199 | - | - | - | III | - | Work. Cond. | ≥15 | STPG370-E | Sch 80 | AG | AG | F | 5K | SS400 | - | ≥50<br>≤40 | 5K<br>5K | FC<br>BC | BS<br>BS | BC<br>BC |
| SHIP SIDE LINE FOR GREY & BLACK WATER OVERBOARD | BC480-499<br>BS480-499 | - | - | - | III | - | Work. Cond. | ≤125 | STS370-S | Sch 160 | TE | AP | F | 10K | SF440 | - | ★6 | | | | |
| AIR VENT & OVERFLOW (EXCEPT OIL TANK INSIDE) | VA001-099 | - | - | - | III | - | Work. Cond. | ≥100<br>65, 80<br>≤50 | SPP<br>STPG370-E<br>STPG370-E | Pipe Table<br>Sch 40<br>Sch 80 | AG | AG | F/S ★5 | 5K | SS400 | - | - | - | - | - | - |
| SOUNDING (EXCEPT OIL TANK INSIDE) | VS001-099 | - | - | - | III | - | Work. Cond. | ≥100<br>65, 80<br>≤50 | SPP<br>STPG370-E<br>STPG370-E | Pipe Table<br>Sch 40<br>Sch 80 | AG | AG | F/S ★5 | 5K | SS400 | - | - | - | - | - | - |
| SYSTEM DWG. PAGE : S03 | SANITARY AND F.W. SYSTEM (WATER BASED LOCAL FIRE FIGHTING SYSTEM) | | | | | | | | | | | | | | | | | | | | |
| FIXED WATER BASED LOCAL FIRE FIGHTING SYSTEM (PUMP SUCTION) | SP001-049 | - | - | - | III | - | Work. Cond. | ≥15 | STPG370-E | Sch 40 | AG | AG | F/S ★5 | 5K | SS400 | - | ≥50<br>≤40 | 5K<br>5K | FC<br>BC | BS<br>BS | BC<br>BC |
| FIXED WATER BASED LOCAL FIRE FIGHTING SYSTEM (PUMP DISCHARGE) | SP100-149 | - | 1.02 | 1.32 | III E-1 | - | Work. Cond. ★7 | ≥15 | STPG370-E | Sch 40 | AG | AG | F/S ★5 | 16K | SF440 | - | ≥50<br>≤40 | 5K<br>5K | FC<br>BC | BS<br>BS | BC<br>BC |

B

REMARKS :

★1 : TYPE OF PIPE JOINTS
① F: FLANGE ② S: SLEEVE ③B: BUTT WELDING ④ U: BITE UNION ⑤ SWF: SOCKET WELD FLANGE ⑥ SJW: SOCKET JOINT WELD ⑦ NF: NECK WELD FLANGE ⑧ LF: L-TYPE SLIP ON FLANGE ⑨ SF: SQUARE FLANGE

★2 : REFER TO PIPING GENERAL 1-(3)-4), FOR "PIPE TREATMENT SYMBOL".

3. ★3 : INSULATION
① R.W : ROCK WOOL ② G.C : GLASS CLOTH ③ C.S : PRE-FORMED CALCIUM SILICATE ④ G.C.F.: GLASS CLOTH COVERED WITH ALUMINIUM FOIL(0.3T)

4. ★4: NDE CAN BE APPLIED INSTEAD OF HYDRAULIC TEST UNDER AGREEMENT AND/OR APPROVAL, DETAIL METHOD IS MENTIONED ON PIPING GENERAL AND SPECIFICATION 1-(1)-2 FOR "TEST".

5. ★5 : THE PIPE JOINT EACH SYSTEM WILL BE DECIDED/SELECTED ACCORDING TO ACTUAL PIPING ARRANGEMENT FROM ONE OF THE TYPES MENTIONED IN PIPE JOINT TYPE COLUMN.

7. ★7 : AT BLOCK STAGE, EACH CONCERNED PIPE SHALL BE CARRIED OUT COMPRESSED AIR BLOWN WITHOUT NOZZLE FITTING UNDER CLASS INSPECTION FOR CLEANING CHECK. AFTER THIS CLEANING, NOZZLE SHALL BE FITTED. AFTER COMPLETION OF ALL BLOCKS AND ELECTED IN THE DOCK, WHOLE SYSTEM SHALL BE BLOWN WITH COMPRESSED AIR(7K).

6. ★6 : SHIP'S SIDE VALVE
① GENERAL VALVE
- ≥50 : BODY : SC(RUBBER LINED) OR BC, STEM : SUS316L OR BS, DISC & SEAT : SUS316L OR BC
- ≤40 : BODY : BC, STEM : BS, DISC & SEAT : BC

② BUTTERFLY VALVE FOR SHIPSIDE VALVE
- BODY : CAST STEEL(FLANGE ), STEM : SUS316L, DISC : SUS316L, SEAT : NBR

③ THE MAIN COOL. S.W P/P TO CENT. F.W COOLER IN/OUTLET VALVES
- BODY : CAST IRON, STEM : SUS316L, DISC : SUS316L, SEAT : NBR

### REVISION HISTORY

| Rev. No. | REVISED BY | Rev. No. | REVISED BY |
|---|---|---|---|
| A | -AUTHORITY REQUEST | F | -DETAIL CALCULATION BY YARD |
| B | -OWNER REQUEST | G | -OTHER DESIGN SECTION AT YARD |
| C | -CLASSFICATION REQUEST | M | -DESIGN MISTAKE |
| D | -DETAIL ARRANGEMENT AT YARD | V | -DESIGN IMPROVEMENT |
| E | -EQUIPMENT MAKER'S RECOMMEND. | | |

| ALT. NO. | Rev. NO. | DESCRIPTION | SYS/ PAGE |
|---|---|---|---|
| B | E-1 | - Design press of Fixed water based local fire fighting system (pump discharge) was changed. | PS(1), S03 |
| | E-2 | - The total nozzle Q'ty of Main Engine was changed to 12ea from 9ea and relevant pipe line size was changed. | S03 |
| | V-1 | - The sounding pipe size of M.E. A/C chemical cleaning tank was increased to 50A from 40A. | S01 |
| | V-2 | - F.W. Service line for 4th deck (S) was provided. | S01 |
| C | E-1 /G-1 | - The maker of Sewage Treatment Plant was changed to "EAVC" from "JETS" and relevant pipe was modified. | S01,S02 |
| | E-2 | - Capacity of rehardling filter was chaged to 3m3/h from 2m3/h. | S01 |
| | E-3 | - Isolating valve was deleted as per maker's confirmation. | S03 |

PIPING DESIGN SPECIFICATION (PS1) (1/1)
(SANITARY AND F.W. SYSTEM) (MB101.10) (S01~S03)



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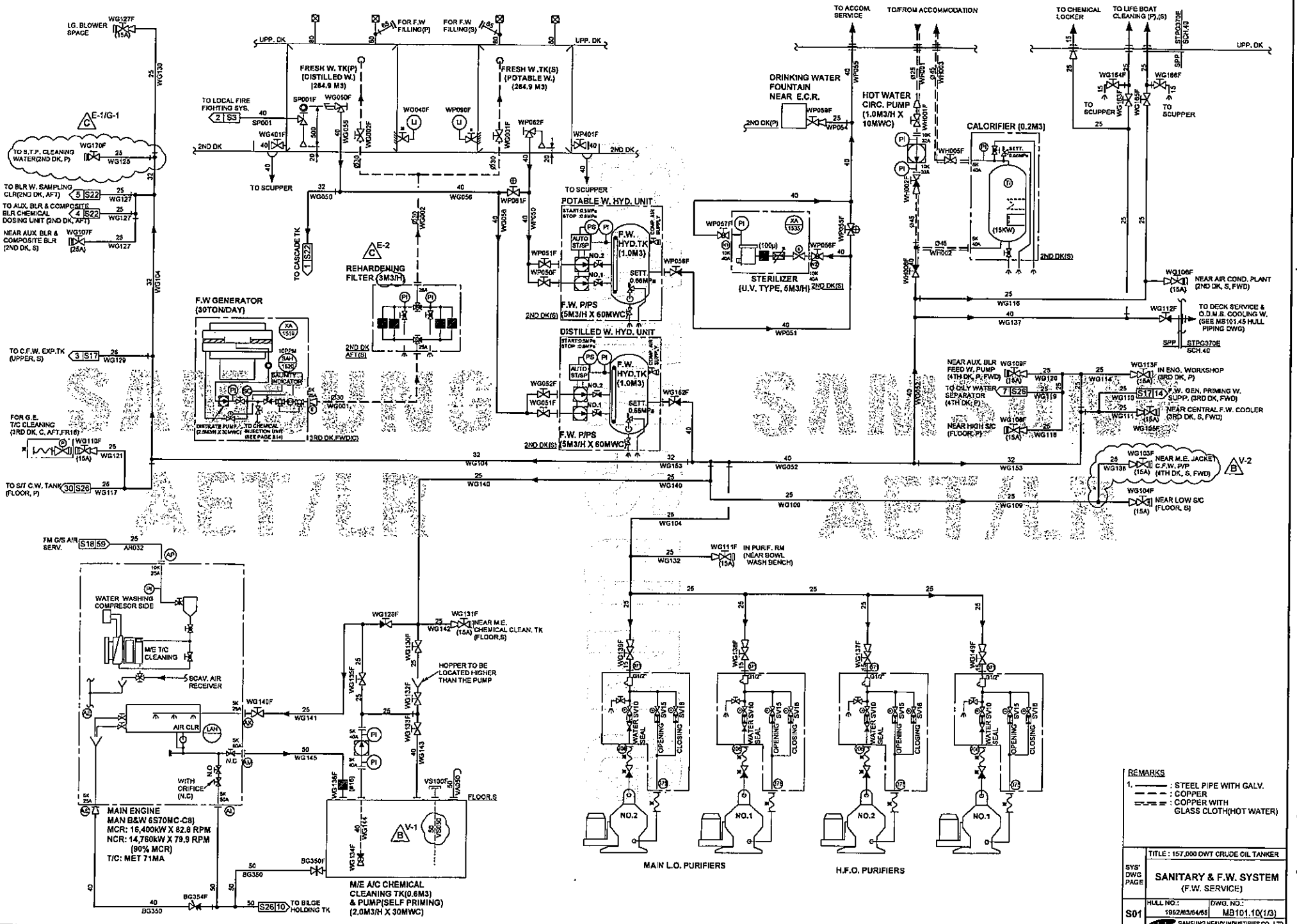
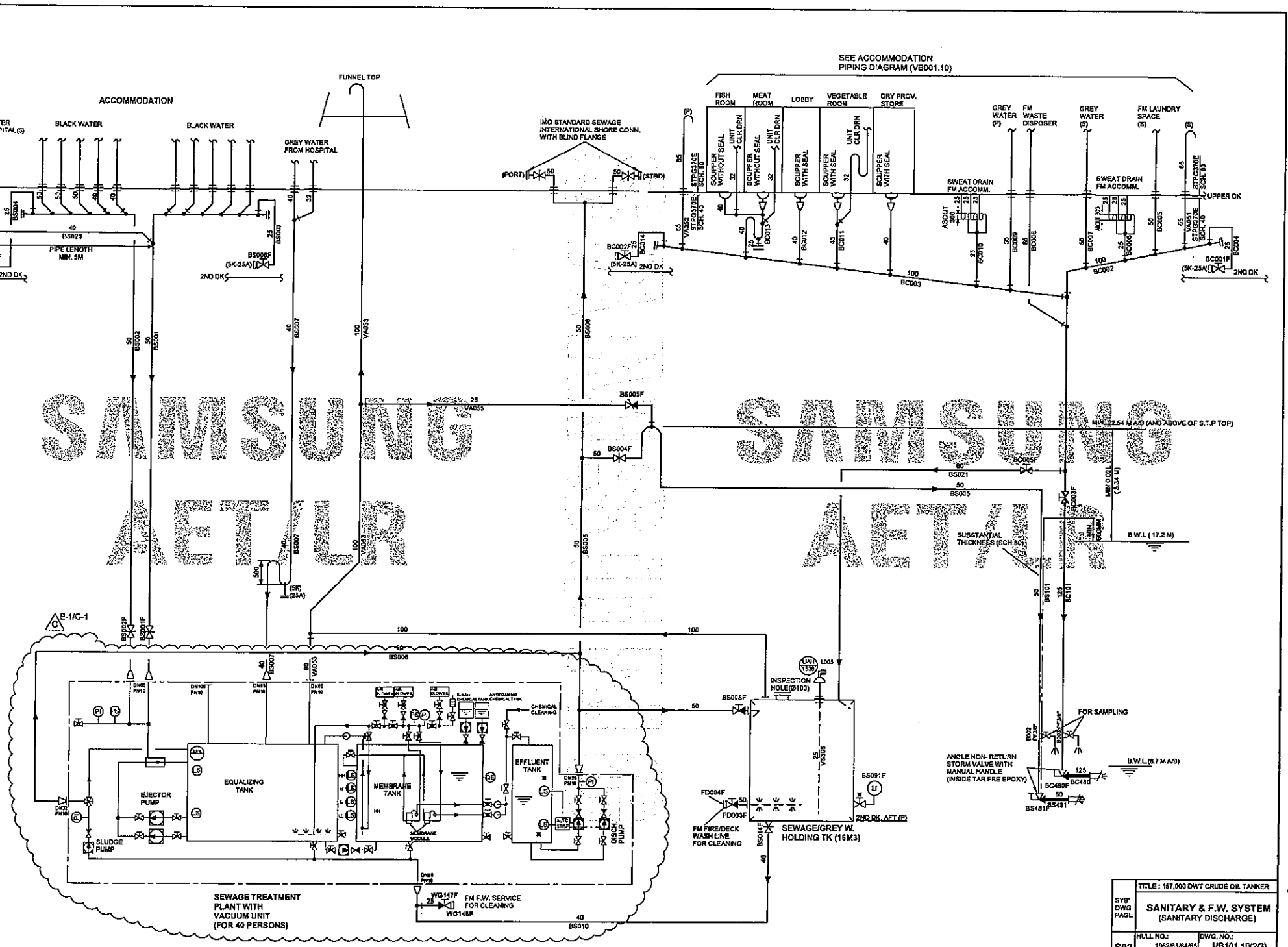


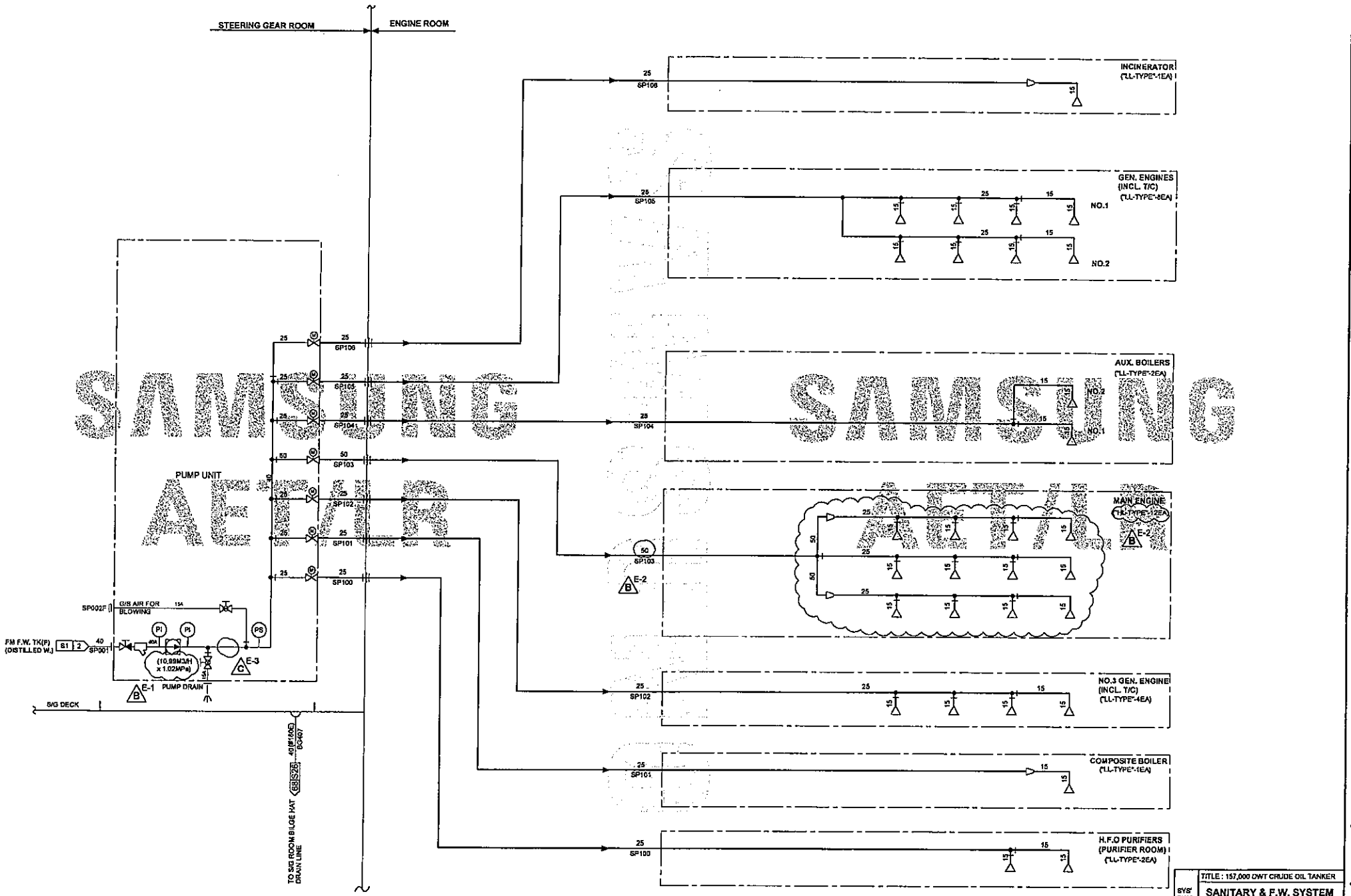







DWG. SIZE: A2(420X594)








* THE Q'TY AND THE DETAIL ARRAGNEMENT OF NOZZLES FOR LOCAL FIRE FIGHTING SYSTEM SHALL BE FOLLOWED AS PER MAKER'S DRAWING.

| | |
|---|---|
| | TITLE : 157,000 DWT CRUDE OIL TANKER |
| SYS/ DWG PAGE | SANITARY & F.W. SYSTEM (WATER BASED LOCAL FIRE FIGHTING SYSTEM) |
| S03 | HULL NO.: 1952/53/54/55 |
| | DWG. NO.: MB101.10(3/3) |
| | SAMSUNG HEAVY INDUSTRIES CO., LTD |

SAMSUNG

# PIPING DESIGN SPECIFICATION
## (DESIGN CONDITION, APPLICATION OF PIPE, PIPE JOINT & VALVES)

| HULL NO. | DWG NO. | SYSTEM DWG. PAGE |
|---|---|---|
| 1962/63/64/65 | MB101.20 | PS(2) (1/2) |

| SYSTEM | PIPE, VALVE & FITTING NO. | Work. Temp. [℃] | DESIGN PRESS. [MPa] Work | DESIGN PRESS. [MPa] MAX | CLASS(I,R) | HYD. TEST [MPa] SHOP | HYD. TEST [MPa] ON. BOARD | PIPE SPECIFICATION N.D [A] | MATERIAL | THICK | TREAT. ★2 IN. | TREAT. ★2 OUT. | PIPE JOINT SPECIFICATION TYPE ★1 | RATE (JIS) | MATE -RIAL | INSULATION ★3 | VALVE SPECIFIACTION N.D [A] | RATE (JIS) | MATERIAL BODY | MATERIAL STEM | MATERIAL DISC & SEAT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SYSTEM DWG. PAGE : S04 ~ S09 | FUEL OIL SYSTEM | | | | | | | | | | | | | | | | | | | | |
| TRANSFER/FILLING & PUMP SUCTION & RETURN (CLASS III) | OF001-049 | ≤60 | 0.3 | 0.45 | III | 0.68 ★4 | 0.68 | ≥15 | SPP | Pipe Table | A | AP | F/S ★5 | 5K | SS400 | R.W / G.C | ≥50 ≤40 | 5K 5K | FC BC | BS BS | BC BC |
| | | | | | | | | | | | | | | | | | ≥50 (B/F V/V) | 5K | FC | SUS -304 | Disc: AL-BC Seat: RTFE |
| | OD001-049 | ≤60 | 0.3 | 0.45 | III | 0.68 ★4 | 0.68 | E-1 ≥15 | SPP | Pipe Table | A | AP | F/S ★5 | 5K | SS400 | - | ≥50 ≤40 | 5K 5K | FC BC | BS BS | BC BC |
| PUMP SUCTION & RETURN (CLASS II) | OF050-099 | >60 | 0.25 | 0.35 | II | 0.53 ★4 | 0.53 | ≥15 | STPG370-S | Sch 40 | A | AP | F | 5K | SS400 | R.W / G.C | ≥50 ≤40 | 10K 5K | SC BC | SUS BS | SCS BC |
| H.F.O. PURIFIER FEED PUMP DISCHARGE | OF100-149 | MAX. 98 | 0.25 | 0.35 | II | 0.53 ★4 | 0.53 | ≥15 | STPG370-S | Sch 40 | A | AP | F | 5K | SS400 | R.W / G.C | ≥50 ≤40 | 10K 5K | SC BC | SUS BS | SCS BC |
| G.E. F.O. SUPPLY P/P TO G.E. F.O. CIRC. P/P | OF150-179 | MAX. 90 | 0.4 | 0.5 | II | 0.75 ★4 | 0.75 | ≥15 | STPG370-S | Sch 40 | A | AP | F | 10K | SS400 | R.W / G.C | ≥50 ≤40 | 10K 16K | SC BC | SUS BS | SCS BC |
| G.E. F.O. CIRC. P/P TO G.E. F.O. OUT ISOL'G V/V | OF180-219 | MAX. 150 | 0.8 | 1.4 | II | 2.1 ★4 | 2.1 | ≥80 ≤65 | STPG370-S | Sch 40 | AA | AP | LF F | 16K | SF440 | R.W / G.C | ≥50 ≤40 | 20K 16K | SC BC | SUS BS | SCS BC |
| G.E. F.O. RETURN FM G.E. F.O. OUT ISOL'G V/V TO RETURN PIPE | OF220-229 | MAX. 150 | 0.4 | 0.55 | II | 0.83 ★4 | 0.83 | ≥15 | STPG370-S | Sch 40 | A | AP | F | 10K | SS400 | R.W / G.C | ≥50 ≤40 | 10K 16K | SC BC | SUS BS | SCS BC |
| M.E F.O. SUPPLY P/P TO M.E. F.O CIRC. P/P | OF230-259 | MAX. 90 | 0.4 | 0.5 | II | 0.75 ★4 | 0.75 | ≥15 | STPG370-S | Sch 40 | A | AP | F | 10K | SS400 | R.W / G.C | ≥50 ≤40 | 10K 16K | SC BC | SUS BS | SCS BC |
| M.E. F.O. CIRC. P/P TO M.E. F.O. OUT ISOL'G V/V | OF260-289 | MAX. 150 | 1.0 | 1.45 | II | 2.2 ★4 | 2.2 | ≥80 ≤65 | STPG370-S | Sch 40 | AA | AP | LF F | 16K | SF440 | R.W / G.C | ≥50 ≤40 | 20K 16K | SC BC | SUS BS | SCS BC |
| M.E. F.O. RETURN FM M.E. F.O. OUT ISOL'G V/V TO RETURN PIPE | OF290-299 | MAX. 150 | 0.4 | 0.55 | II | 0.83 ★4 | 0.83 | ≥15 | STPG370-S | Sch 40 | A | AP | F | 10K | SS400 | R.W / G.C | ≥50 ≤40 | 10K 16K | SC BC | SUS BS | SCS BC |
| G.E. D.O. PUMP FOR G.E. D.O. SERVICE | OD150-199 | - | 0.7 | 0.8 | II | 1.2 ★4 | 1.2 | ≥80 ≤65 | STPG370-S | Sch 40 | AA | AP | LF F | 10K | SS400 | - | ≥50 ≤40 | 10K 16K | SC BC | SUS BS | SCS BC |
| AUX. BOILER F.O. BOOST PUMP TO AUX. BOILER F.O. OUTLET ISOLATING VALVE | OF300-339 | MAX. 145 | 2.5 | 2.85 | I | 4.28 ★4 | 4.28 | ≥15 | STPG370-S | Sch 40 | A | AP | F | 30K | SF440 | R.W / G.C | ≥32 ≤25 | 30K 30K | SC SF | SUS SUS | SCS SCS |
| COMPOSITE BOILER F.O BOOST PUMP TO COMPOSITE BOILER F.O . OUTLET ISOLATING VALVE | OF340-349 | MAX. 90 | 3.3 | 3.6 | I | 5.4 ★4 | 5.4 | ≥15 | STPG370-S | Sch 40 | A | AP | F | 30K | SF440 | R.W / G.C | ≤32 ≤25 | 30K 30K | SC SF | SUS SUS | SCS SCS |
| BOILER D.O. IGNITION PUMP DISCHARGE | OD300-339 | - | 0.7 | 0.77 | II | 1.16 ★4 | 1.16 | ≤10 | SUS304 | 10S | - | - | U | - | SUS304 | - | ≥50 ≤40 | 10K 16K | SC BC | SUS BS | SCS BC |
| AUX. BOILER L.S. M.D.O. SUPPLY PUMP TO AUX. BOILER | OD200-209 | - | 2.5 | 2.85 | I | 4.28 ★4 | 4.28 | ≥15 | STPG370-S | Sch 40 | A | AP | F | 30K | SF440 | - | ≤32 ≤25 | 30K 30K | SC SF | SUS SUS | SCS SCS |
| INCINERATOR D.O. P/P TO INCIN. D.O. SUPPLY | OD360-369 | - | 0.3 | 0.33 | III | - | 0.5 | ≥15 | SPP | Pipe Table | A | AP | F | 5K | SS400 | - | ≥50 ≤40 | 10K 5K | SC BC | SUS BS | SCS BC |
| INCINERATOR WASTE OIL SERVICE | OF360-369 | MAX. 90 | 0.2 | 0.3 | II | 0.45 ★4 | 0.45 | ≥15 | STPG370-S | Sch 40 | A | AP | F | 5K | SS400 | R.W / G.C | ≥50 ≤40 | 10K 5K | SC BC | SUS BS | SCS BC |
| EM'CY G.E. D.O. SERVICE | OD340-359 | - | - | - | III | - | 0.41 | ≥15 | SPP | Pipe Table | A | AP | F | 5K | SS400 | - | ≥50 <40 | 5K 5K | FC BC | BS BS | BC BC |

### REVISION HISTORY

| Rev. No. | REVISED BY | Rev. No. | REVISED BY |
|---|---|---|---|
| A | -AUTHORITY REQUEST | F | -DETAIL CALCULATION BY YARD |
| B | -OWNER REQUEST | G | -OTHER DESIGN SECTION AT YARD |
| C | -CLASSFICATION REQUEST | M | -DESIGN MISTAKE |
| D | -DETAIL ARRANGEMENT AT YARD | V | -DESIGN IMPROVEMENT |
| E | -EQUIPMENT MAKER'S RECOMMEND. | | |

| ALT. NO. | Rev. NO. | DESCRIPTION | SYS. PAGE |
|---|---|---|---|
| A | B-1 | - Air vent pipe for F.O. overflow tank was added. | S04 |
| | B-2 | - By-pass line with valve was provided with No.1 HFO Purifier Heater for MDO operation. | S05 |
| | B-3 | - Instrument for Purifier sludge tank was changed to LIAH from LAH. | S05 |
| | B-4 | - M.E. F.O. supply pumps abnormal alarm(XA-0208) and G.E. F.O. supply pumps abnormal alarm(XA-0213) was provided. | S06, S07 |
| B | B-1 | - The cross connection line with valve between No.1 H.F.O. purifier heater outlet line and No.2 H.F.O. purifier heater outlet line was provided. | S05 |
| | B-2 | - By-pass line with valve for M.E. F.O heater was provided. | S06 |
| | B-3 | - By-pass line with valve for G.E. F.O. heater was provided. | S07 |
| | B-4 | - By-pass line with valve for Aux. Boiler F.O. heater was provided. | S08-1 |
| | C-1 | - Low level alarm(LAL) for D.O. Serv. tank and L.S.M.D.O. Serv. tank was provided. | S04 |
| | D-1 | - The installation location of Homogenizer was moved to incinerator outside from inside. | S09 |
| | E-1 | - Following piping design specification was changed as below.<br>- Transfer/filling & pump suction & return (classIII).<br>- Pump suction & return (classII).<br>- H.F.O. purifier feed pump discharge.<br>- G.E. F.O. supply p/p to G.E. F.O. Circ. p/p.<br>- G.E. F.O. return from G.E. F.O. out isolating v/v to return pipe.<br>- M.E. F.O suuply p/p to M.E. F.O. Circ. p/p.<br>- M.E. F.O. Circ. p/p to M.E. F.O. out isolating v/v.<br>- M.E. F.O. return from M.E. F.O. out isolating v/v to return pipe.<br>- G.E. D.O. pump for G.E. D.O. service.<br>- Composite boiler F.O. boost pump to composite boiler F.O. outlet isolating valve. | PS(2) |
| | E-2 | - Internal drawing of homogenizer was changed. | S05, S09 |
| | E-3 | - Internal drawing of Composite boiler F.O. booster pumps was changed becuase the supply scope of Composite boiler F.O. booster pumps was changed to "Composite boiler-AALBORG" from "Displacement pump-IMO". | S08-2 |
| | E-4 | - The pipie line size of No.1/2 H.F.O. Purifier sludge discharge was changed to 100A from 125A. | S05 |
| | E-5 | - Sampling valve was provided. | S08-2 |
| | E-6 | - Internal drawing of Composite boiler was changed. | S08-2 |
| | E-7 | - Internal drawing of Incinerator was changed. | S09 |
| | ~~E-8~~ | ~~- Position of G.E. M.D.O. cooler was moved to G.E. inlet from outlet.~~ | ~~S07~~ |
| | V-1 | - The pipe line of " To M.E. M.D.O. cooler unit" was moved between M.E. F.O. Circ. pumps and M.E. F.O. heaters. | S06 |
| | V-2 | - The sounding pipe size of following tanks was changed to 50A from 40A.<br>- L.S. M.D.O. STOR. tank.<br>- D.O. STOR. tank.<br>- EM'CY G.E. D.O. tank. | S04,S09 |

PIPING DESIGN SPECIFICATION (PS2) (1/2)
(FUEL OIL SYSTEM) (MB101.20) (S04~S09)



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# PIPING DESIGN SPECIFICATION
## (DESIGN CONDITION, APPLICATION OF PIPE, PIPE JOINT & VALVES)

| HULL NO. | DWG NO. | SYSTEM DWG. PAGE |
|---|---|---|
| 1962/63/64/65 | MB101.20 | PS(2) (2/2) |

| SYSTEM | PIPE, VALVE & FITTING NO. | Work. Temp. [℃] | DESIGN PRESS. [MPa] Work | DESIGN PRESS. [MPa] MAX | CLASS(DNV) | HYD. TEST [MPa] SHOP | HYD. TEST [MPa] ON-BOARD | PIPE SPECIFICATION N.D [A] | MATERIAL | THICK | TREAT. ★2 IN. | TREAT. ★2 OUT. | PIPE JOINT SPECIFICATION TYPE ★1 | RATE (JIS) | MATE -RIAL | INSULATION ★3 | VALVE SPECIFIACTION N.D [A] | RATE (JIS) | MATERIAL BODY | MATERIAL STEM | MATERIAL DISC & SEAT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SYSTEM DWG. PAGE : S04 ~ S09 | FUEL OIL SYSTEM | | | | | | | | | | | | | | | | | | | | |
| F.O. & SLUDGE DRAIN LINE | OF400-479 | - | - | - | III | - | Work. Cond. | ≥15 | SPP | Pipe Table | A | AP | F/S ★5 | 5K | SS400 | R.W / G.C ★7 | ≥50<br>≤40<br>≥50 (B/F V/V) | 5K<br>5K<br>5K | FC<br>BC<br>FC | BS<br>BS<br>SUS304 | BC<br>BC<br>Disc: AL-BC Seat: NBR |
| D.O. DRAIN LINE | OD400-479 | - | - | - | III | - | Work. Cond. | ≥15 | SPP | Pipe Table | A | AP | F/S ★5 | 5K | SS400 | | ≥50<br>≤40<br>≥50 (B/F V/V) | 5K<br>5K<br>5K | FC<br>BC<br>FC | BS<br>BS<br>SUS304 | BC<br>BC<br>Disc: AL-BC Seat: NBR |
| AIR VENT & OVERFLOW (EXCEPT OIL TANK INSIDE) | VA001-099 | - | - | - | III | - | Work. Cond. | ≥100<br>65, 80<br>≤50 | SPP<br>STPG370-E<br>STPG370-E | Pipe Table<br>Sch 40<br>Sch 80 | AG | AG | F/S ★5 | 5K | SS400 | - | - | - | - | - | - |
| AIR VENT & OVERFLOW (PASSING THROUGH OTHER FUEL OIL TANK) | VA200-219 | - | - | - | III | - | Work. Cond. | ≥250<br>≤200<br>≤50 | STPG370-E<br>STPG370-E<br>STPG370-E | Sch 40<br>Sch 80<br>Sch 160 | A | AA | F/S ★5 | 5K | SS400 | V-3 B | - | - | - | - | - |
| AIR VENT & OVERFLOW (OIL TANK INSIDE) | VA220-249 | - | - | - | III | - | Work. Cond. | ≥100<br>65, 80<br>≤50 | SPP<br>STPG370-E<br>STPG370-E | Pipe Table<br>Sch 40<br>Sch 80 | A | AA | F/S ★5 | 5K | SS400 | - | - | - | - | - | - |
| SOUNDING (EXCEPT OIL TANK INSIDE) | VS001-099 | - | - | - | III | - | Work. Cond. | ≥100<br>65, 80<br>≤50 | SPP<br>STPG370-E<br>STPG370-E | Pipe Table<br>Sch 40<br>Sch 80 | AG | AG | F/S ★5 | 5K | SS400 | - | - | - | - | - | - |
| SOUNDING (PASSING THROUGH OTHER FUEL OIL TANK) | VS200-219 | - | - | - | III | - | Work. Cond. | ≥250<br>≤200<br>≤50 | STPG370-E<br>STPG370-E<br>STPG370-E | Sch 40<br>Sch 80<br>Sch 160 | A | AA | F/S ★5 | 5K | SS400 | V-3 B | - | - | - | - | - |
| SOUNDING (OIL TANK INSIDE) | VS220-249 | - | - | - | III | - | Work. Cond. | ≥100<br>65, 80<br>≤50 | SPP<br>STPG370-E<br>STPG370-E | Pipe Table<br>Sch 40<br>Sch 80 | A | AA | F/S ★5 | 5K | SS400 | - | - | - | - | - | - |
| AIR PURGE LINE FOR REMOTE LEVEL GAUGE (OIL TANK) | VS300-349 | - | - | - | III | - | Work. Cond. | ≤50<br>≥15 | STPG370-E | Sch 80 | A | AA | F/S ★5 | 5K | SS400 | - | - | - | - | - | - |

REMARKS :

1. ★1 : TYPE OF PIPE JOINTS
   ① F: FLANGE ② S: SLEEVE ③B: BUTT WELDING ④ U: BITE UNION ⑤ SWF: SOCKET WELD FLANGE ⑥ SJW: SOCKET JOINT WELD ⑦ NF: NECK WELD FLANGE ⑧ LF: L-TYPE SLIP ON FLANGE ⑨ SF: SQUARE FLANGE
2. ★2 : REFER TO PIPING GENERAL 1-(3)-4), FOR "PIPE TREATMENT SYMBOL".
3. ★3 : INSULATION
   ① R.W : ROCK WOOL ② G.C : GLASS CLOTH ③ C.S : PRE-FORMED CALCIUM SILICATE ④ G.C.F.: GLASS CLOTH COVERED WITH ALUMINIUM FOIL(0.3T)
4. ★4: NDE CAN BE APPLIED INSTEAD OF HYDRAULIC TEST UNDER AGREEMENT AND/OR APPROVAL, DETAIL METHOD IS MENTIONED ON PIPING GENERAL AND SPECIFICATION 1-(1)-2 FOR "TEST".
5. ★5 : THE PIPE JOINT EACH SYSTEM WILL BE DECIDED/SELECTED ACCORDING TO ACTUAL PIPING ARRANGEMENT FROM ONE OF THE TYPES MENTIONED IN PIPE JOINT TYPE COLUMN.
7. ★7 : ONLY HORIZONTAL INSTALLED DRAIN PIPES TO BE STEAM TRACED AND INSULATED.

6. ★6 : SHIP'S SIDE VALVE
   ① GENERAL VALVE
   - ≥50 : BODY : SC(RUBBER LINED) OR BC, STEM : SUS316L OR BS, DISC & SEAT : SUS316L OR BC
   - ≤40 : BODY : BC, STEM : BS, DISC & SEAT : BC
   ② BUTTERFLY VALVE FOR SHIPSIDE VALVE
   - BODY : CAST STEEL(FLANGE ), STEM : SUS316L, DISC : SUS316L, SEAT : NBR
   ③ THE MAIN COOL. S.W P/P TO CENT. F.W COOLER IN/OUTLET VALVES
   - BODY : CAST IRON, STEM : SUS316L, DISC : SUS316L, SEAT : NBR

### REVISION HISTORY

| Rev. No. | REVISED BY | Rev. No. | REVISED BY |
|---|---|---|---|
| A | -AUTHORITY REQUEST | F | -DETAIL CALCULATION BY YARD |
| B | -OWNER REQUEST | G | -OTHER DESIGN SECTION AT YARD |
| C | -CLASSFICATION REQUEST | M | -DESIGN MISTAKE |
| D | -DETAIL ARRANGEMENT AT YARD | V | -DESIGN IMPROVEMENT |
| E | -EQUIPMENT MAKER'S RECOMMEND. | | |

| ALT. NO. | Rev. NO. | DESCRIPTION | SYS. PAGE |
|---|---|---|---|
| B | V-3 | - The pipe thickness for vent, sounding and overflow passing through other fuel tank was identified. | PS(2) |
| | V-4 | - TIAH for H.F.O storage tanks was provided. | S04 |
| | V-5 | - Position of Aux. Boiler M.D.O. supply flowmeter was moved to Aux. Boiler M.D.O. supply pumps suction side. | S08-1 |
| C | B-1 | - Position of G.E. M.D.O. Cooler was changed after G.E. F.O. heater. | S07 |
| | C-1 | - Isolating valve on the line of OD002 after intersection was provided. | S04 |
| | E-1 | - Valve's supply scope was changed to builder from maker. | S05 |
| | E-2 | - Supply scope of pressure control valve was changed. | S06,S07 |
| | E-3 | - Capacity of Aux. boiler M.D.O supply pumps was changed to 6.8m3/h from 11.7m3/h. | S08-1 |
| | E-4 | - Capacity of incinerator was changed to 850,000kcal/h from 800,000kcal/h. | S09 |
| | E-5 | - Filter mesh size of G.E. F.O. filter was changed to 25μ from 10μ. | S07 |
| | V-1 | - Following items were modified .<br>- L.S. M.D.O. supply/return line and revelant pipe , valve was modified in order to prevention of D.O/L.S. M.D.O contamination.<br>- Quick closing valve unit(G472) was changed. | S05, S08-1 |

PIPING DESIGN SPECIFICATION (PS2) (2/2)
(FUEL OIL SYSTEM) (MB101.20) (S04~S09)



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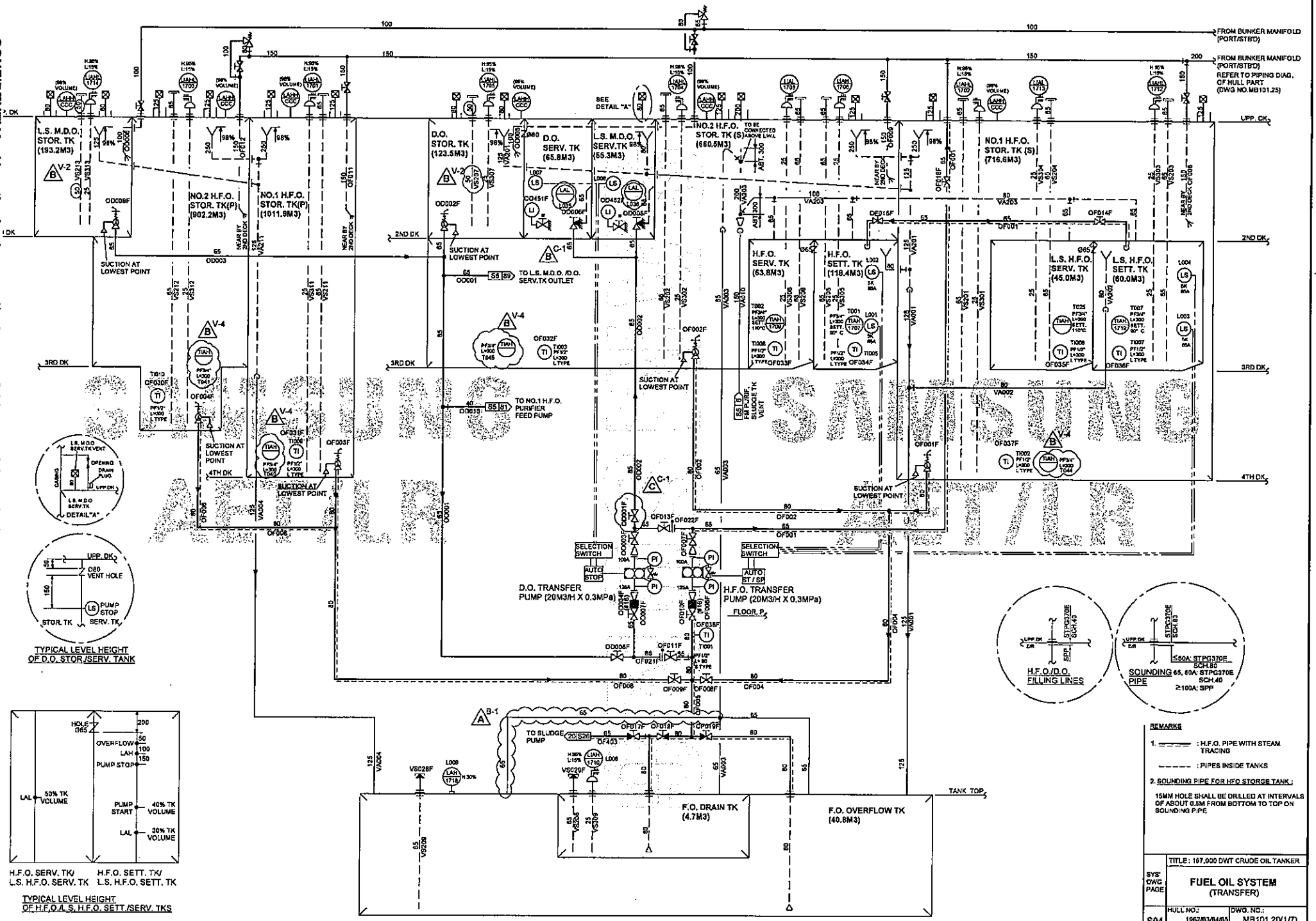
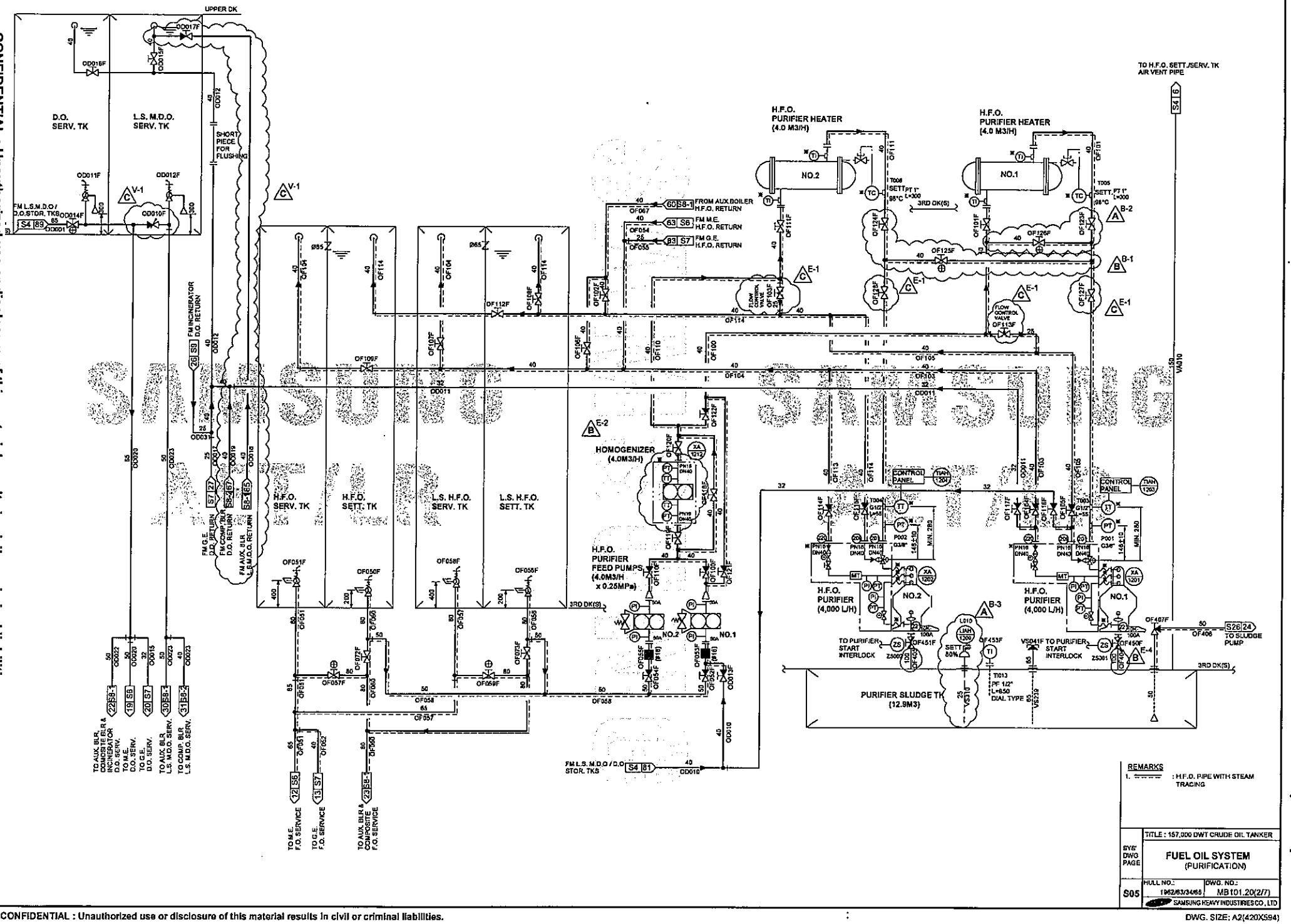





CONFIDENTIAL : Unauthorized use or disclosure of this material results in civil or criminal liabilities.

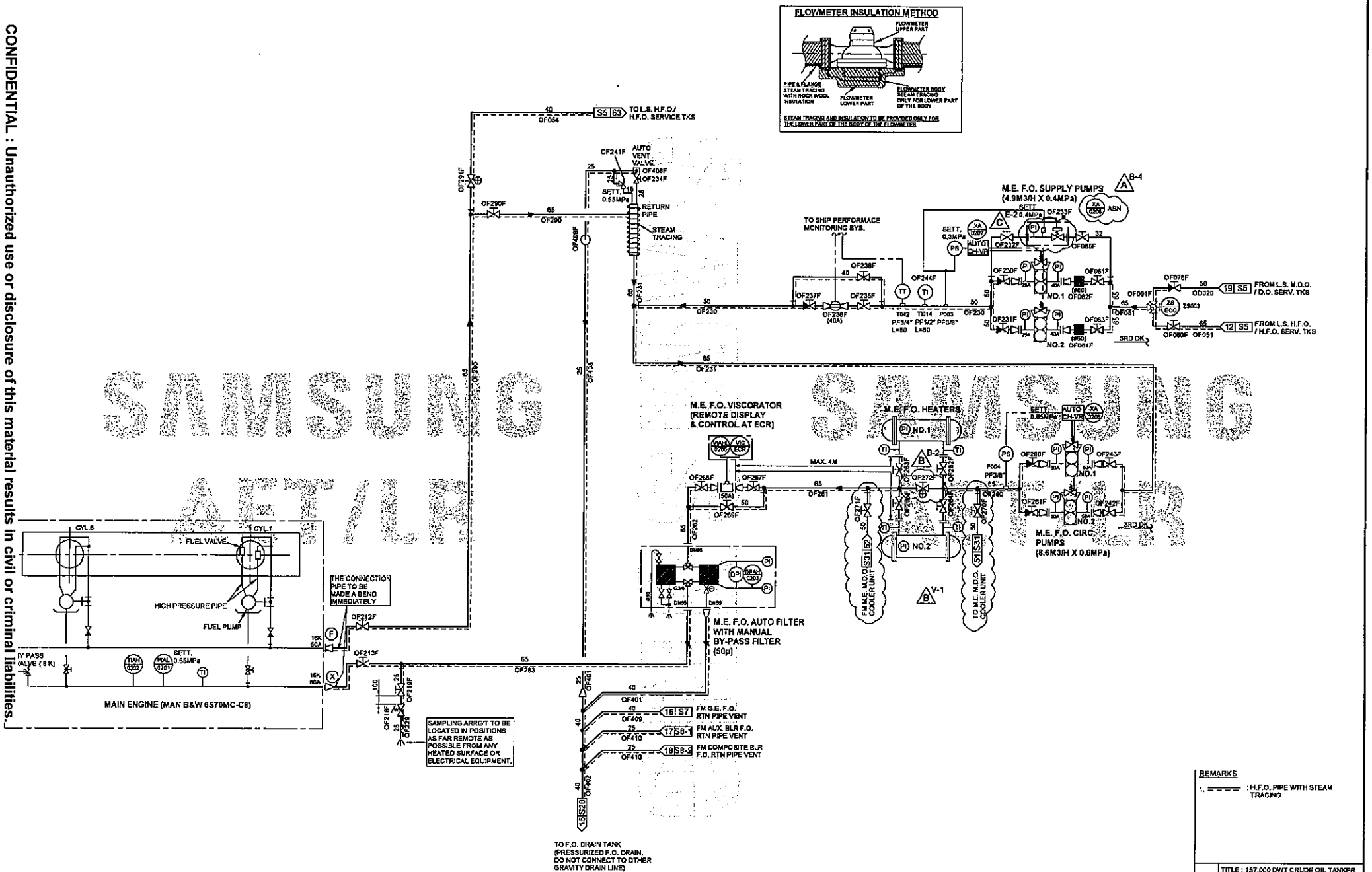
DWG. SIZE: A2(420X594)




REMARKS
1. ——— : H.F.O. PIPE WITH STEAM TRACING

| | |
|---|---|
| SYS/DWG/PAGE | S05 |
| TITLE : 157,000 DWT CRUDE OIL TANKER | |
| FUEL OIL SYSTEM (PURIFICATION) | |
| HULL NO.: | 1962/63/64/65 |
| DWG. NO.: | MB101.20(2/7) |
| SAMSUNG HEAVY INDUSTRIES CO., LTD | |

DWG. SIZE: A2(420X594)







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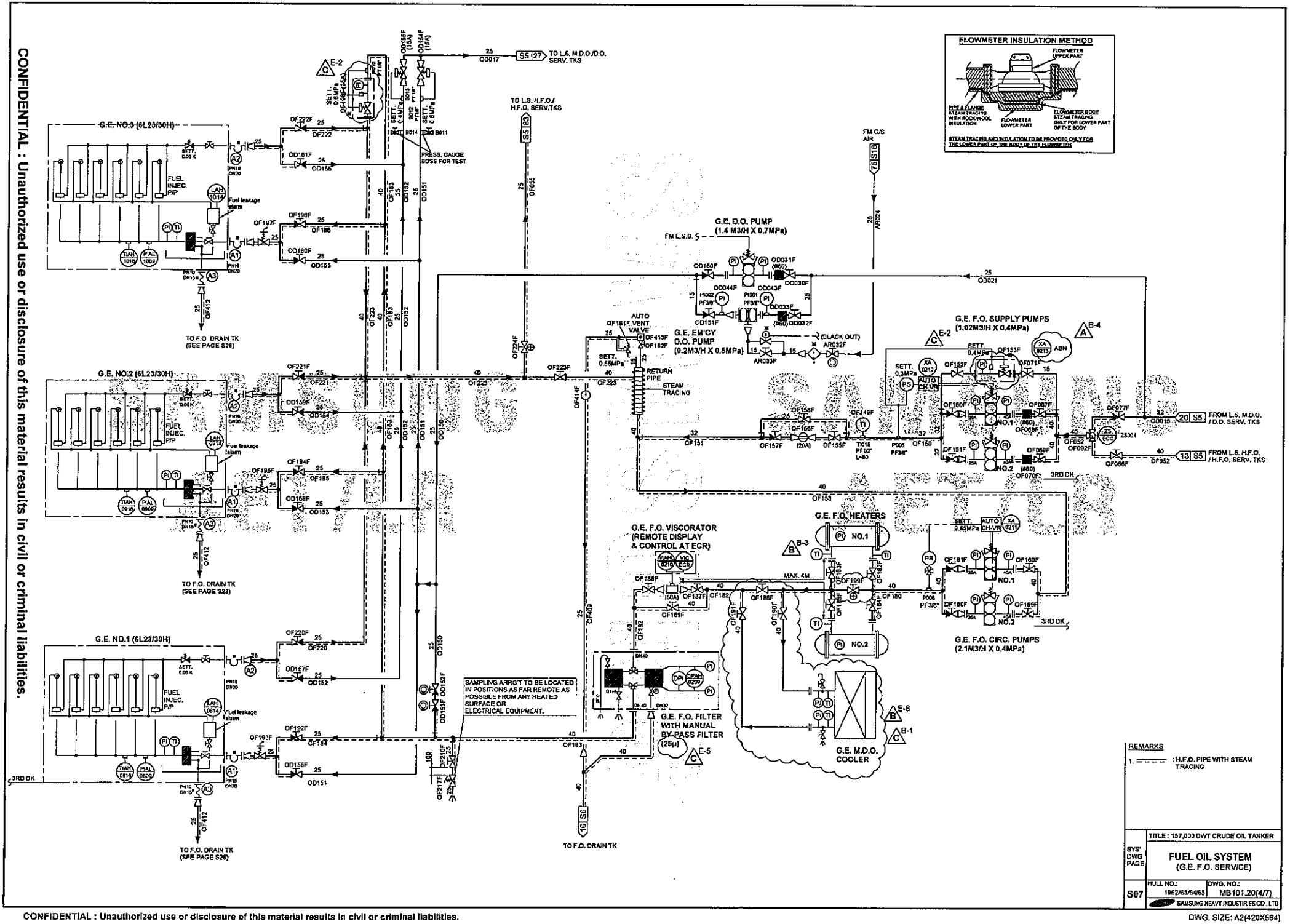




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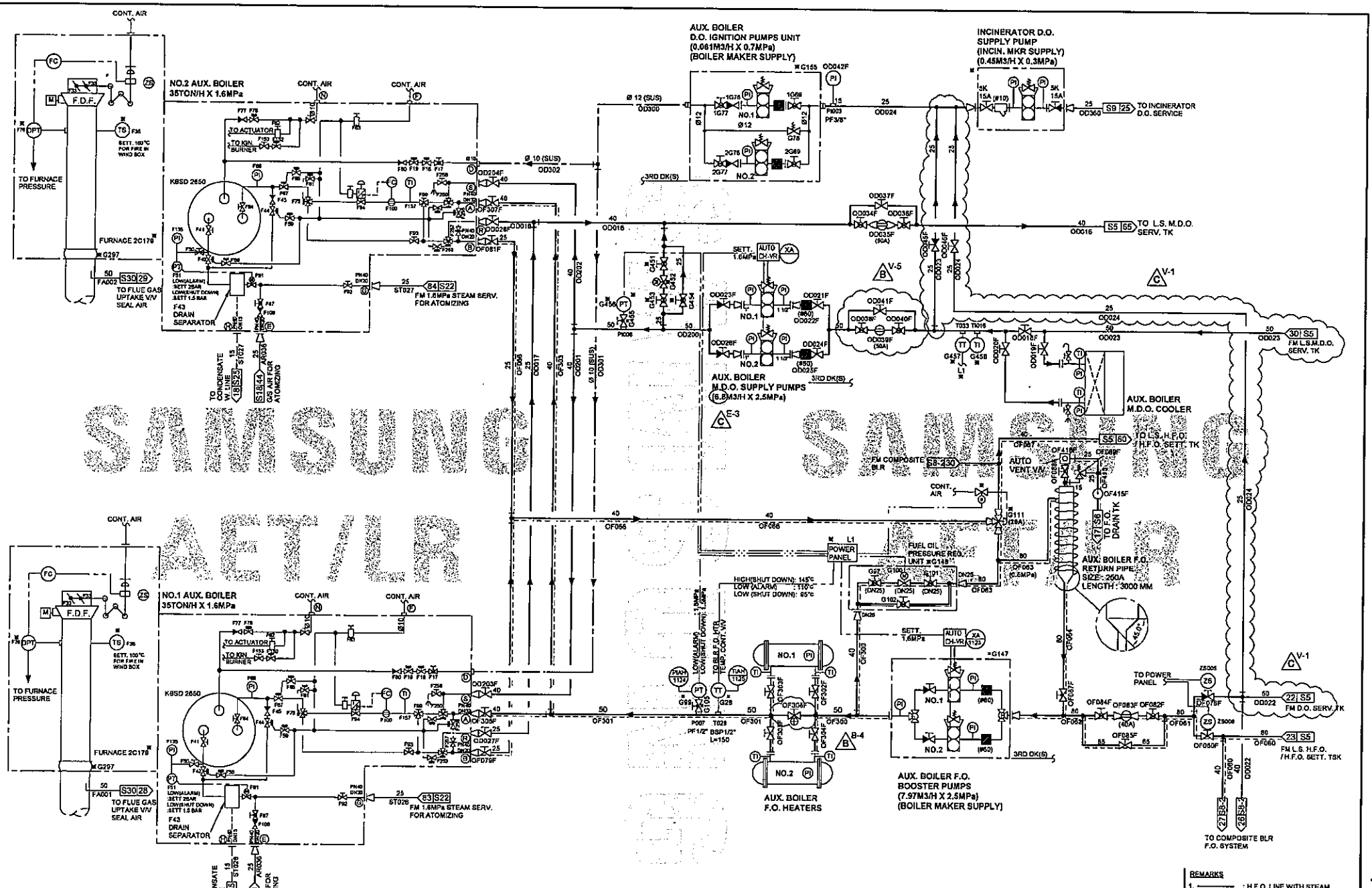
DWG. SIZE: A2(420X594)

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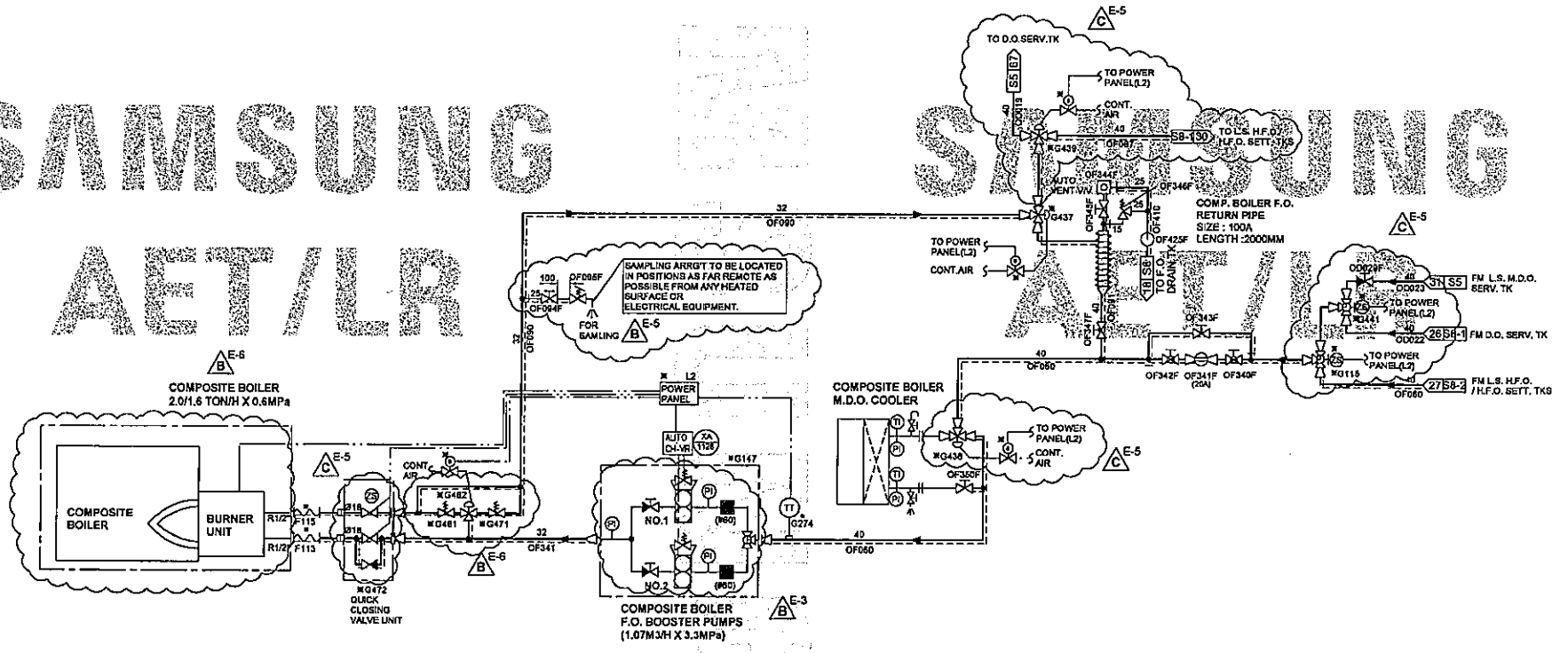
REMARKS
1. ------ : H.F.O. LINE WITH STEAM TRACING

| | |
|---|---|
| SYS' DWG PAGE | TITLE : 157,000 DWT CRUDE OIL TANKER |
| | FUEL OIL SYSTEM (AUX. BOILER F.O. SERVICE) |
| S08-1 | HULL NO.: 1962/63/64/65 |
| | DWG. NO.: MB101.20(5/7) |
| | SAMSUNG HEAVY INDUSTRIES CO., LTD |

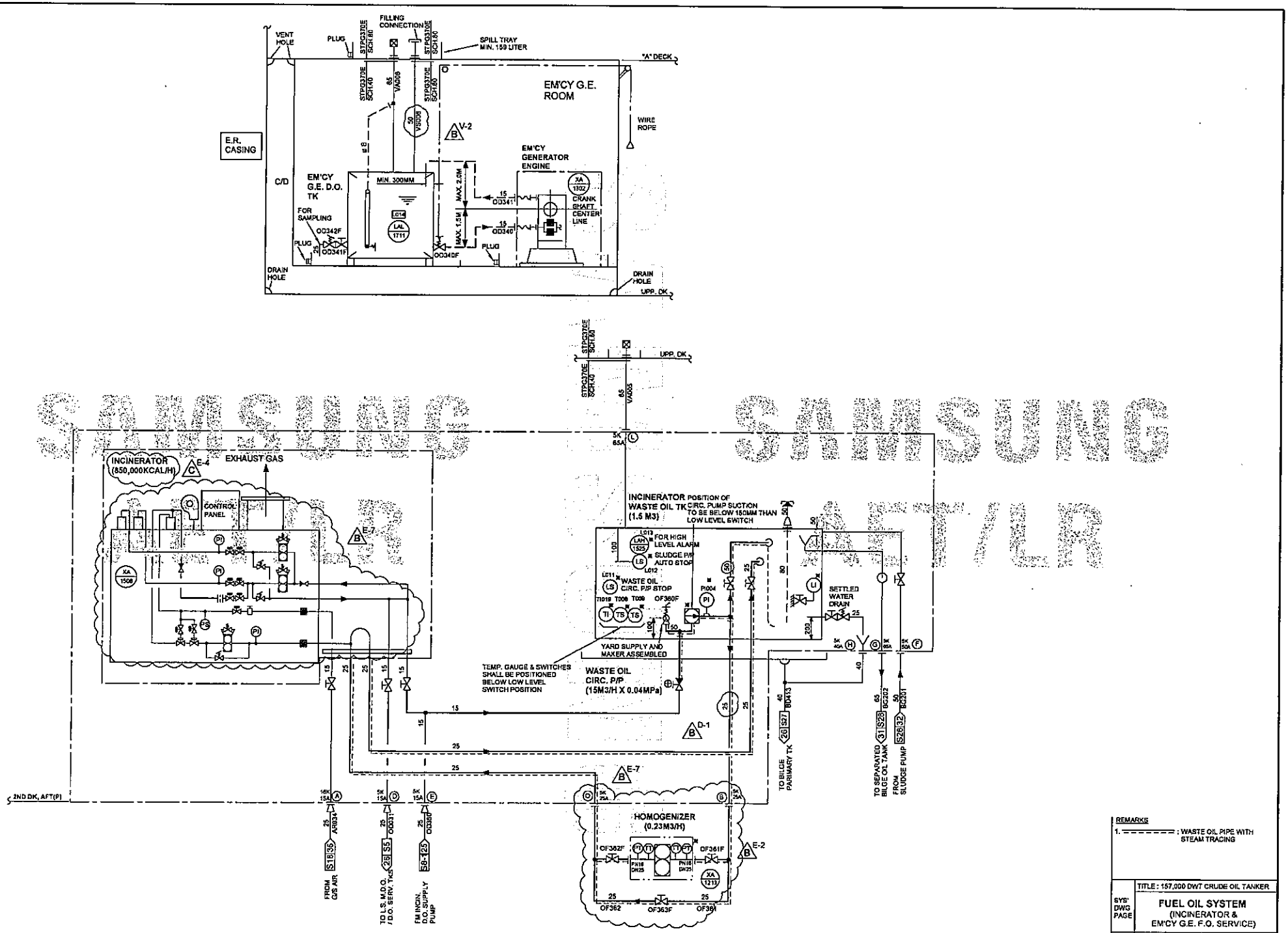
DWG. SIZE: A2(420X594)






REMARKS
1. ═══ : H.F.O. LINE WITH STEAM TRACING

| | |
|---|---|
| SYS' DWG PAGE | TITLE : 157,000 DWT CRUDE OIL TANKER |
| | FUEL OIL SYSTEM (COMPOSITE F.O. SERVICE) |
| S08-2 | HULL NO.: 1952/53/54/55 |
| | DWG. NO.: MB101.20(6/7) |
| | SAMSUNG HEAVY INDUSTRIES CO., LTD |




REMARKS

1. ——— : WASTE OIL PIPE WITH STEAM TRACING

| | | |
|---|---|---|
| SYS' DWG PAGE | TITLE : 157,000 DWT CRUDE OIL TANKER<br>FUEL OIL SYSTEM (INCINERATOR & EM'CY G.E. F.O. SERVICE) | |
| S09 | HULL NO.: 1982/83/84/85 | DWG. NO.: MB101.20(7/7) |
| | SAMSUNG HEAVY INDUSTRIES CO., LTD | |

DWG. SIZE: A2(420X594)



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SAMSUNG

# PIPING DESIGN SPECIFICATION
## (DESIGN CONDITION, APPLICATION OF PIPE, PIPE JOINT & VALVES)

| HULL NO. | DWG NO. | SYSTEM DWG. PAGE |
|---|---|---|
| 1962/63/64/65 | MB101.30 | PS(3) |

| SYSTEM | PIPE, VALVE & FITTING NO. | Work. Temp. [℃] | DESIGN PRESS. [MPa] Work | DESIGN PRESS. [MPa] MAX | CLASS(LR) | HYD. TEST [MPa] SHOP | HYD. TEST [MPa] ON-BOARD | PIPE SPECIFICATION N.D [A] | PIPE SPECIFICATION MATERIAL | PIPE SPECIFICATION THICK | PIPE SPECIFICATION TREAT. ★2 IN. | PIPE SPECIFICATION TREAT. ★2 OUT. | PIPE JOINT SPECIFICATION TYPE ★1 | PIPE JOINT SPECIFICATION RATE (JIS) | PIPE JOINT SPECIFICATION MATE -RIAL | INSULATION ★3 | VALVE SPECIFIACTION N.D [A] | VALVE SPECIFIACTION RATE (JIS) | VALVE SPECIFIACTION MATERIAL BODY | VALVE SPECIFIACTION MATERIAL STEM | VALVE SPECIFIACTION MATERIAL DISC & SEAT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SYSTEM DWG.PAGE : S10 ~ S13 | LUBE OIL SYSTEM | | | | | | | | | | | | | | | | | | | | |
| L.O. FILLING LINE(65A,80A) | OL001~009 | - | 0.30 | 0.35 | III | - | Work. Cond. | 65, 80 | SPP | Pipe Table | A | AP | F | 10K | SS400 | - | 65,80<br>65,80 (B/F V/V) | 10K | FC<br>FC | BS<br>SUS304 | BC<br>Disc: Al-BC Seat :NBR |
| L.O. FILLING(≤50), TRANSFER & PURIF. HEATER INLET | OL020~099 | - | 0.30 | 0.35 | III | - | Work. Cond. | ≥15 | SPP | Pipe Table | A | AP | F | 5K | SS400 | - | ≥50<br>≤40 | 5K<br>5K | FC<br>BC | BS<br>BS | BC<br>BC |
| L.O. LINE BETWEEN HEATER AND PURIFIER | OL100-119 | MAX. 95 | 0.25 | 0.3 | II | 0.45 ★4 | Work. Cond. | ≥15 | STPG370-S | Sch 40 | A | AP | F | 5K | SS400 | R.W /G.C | ≥50<br>≤40 | 10K<br>5K | SC<br>BC | SUS<br>BS | SCS<br>BC |
| L.O. PURIFIER OUTLET | OL120-149 | MAX. 95 | 0.25 | 0.3 | II | 0.45 ★4 | Work. Cond. | ≥15 | STPG370-S | Sch 40 | A | AP | F | 5K | SS400 | - | ≥50<br>≤40 | 10K<br>5K | SC<br>BC | SUS<br>BS | SCS<br>BC |
| M.E. L.O. SERVICE | OL200-239 | 45 | 0.45 | 0.50 | III | - | Work. Cond. | ≥80<br>≤65 | SPP | Pipe Table | PPT | AP | LF<br>F | 5K | SS400 | M-1 C | ≥50<br>≤40<br>≥50 (B/F V/V) | 5K<br>5K<br>5K | FC<br>BC<br>FC | BS<br>BS<br>SUS304 | BC<br>BC<br>Disc: Al-BC Seat :NBR |
| TM CYL. OIL STOR. TK TO CYL. OIL BOOSTER UNIT | OL250-269 | - | - | - | III | - | Work. Cond. | ≥80<br>≤65 | SPP | Pipe Table | PPT | AP | LF<br>F | 5K | SS400 | R.W /G.C | ≥50<br>≤40 | 5K | FC<br>BC | BS<br>BS | BC<br>BC |
| STERN TUBE L.O. SERVICE | OL320-369 | - | 0.25 | 0.30 | III | - | Work. Cond. | ≥80<br>≤65 | SPP | Pipe Table | PPT | AP | LF<br>F | 5K | SS400 | - | ≥50<br>≤40 | 5K<br>5K | FC<br>BC | BS<br>BS | BC<br>BC |
| STERN TUBE L.O SERVICE (S/T C.F.W TANK INSIDE) | OL370-379 | - | - | - | III | - | Work. Cond. | ≥65<br>≤50 | STPG370-E<br>STPG370-E | Sch 80<br>Sch 160 | PPT | AP | SJW | - | - | - | - | - | - | - | - |
| STERN TUBE AIR SEAL | AR100-119 | - | - | - | III | - | Work. Cond. | ≥15 | SUS304-S | Sch 10S | NO | NO | F/U ★5 | 5K | SUS304 | - | ≤40 | 5K | BC | BS | BC |
| T.C.P.TURBINE L.O. SERVICE | OL380-399 | - | - | - | III | - | Work. Cond. | ≥15 | SPP | Pipe Table | PPT | AP | F | 5K | SS400 | - | ≥50<br>≤40 | 5K<br>5K | FC<br>BC | BS<br>BS | BC<br>BC |
| L.O. DRAIN LINE | OL400-479 | - | - | - | III | - | Work. Cond. | ≥15 | SPP | Pipe Table | A | AP | F/S ★5 | 5K | SS400 | - | ≥50<br>≤40 | 5K<br>5K | FC<br>BC | BS<br>BS | BC<br>BC |
| AIR VENT, OVERFLOW SOUNDING (EXECPT OIL TANK INSIDE) | - VA001-099<br>- VS001-099 | - | - | - | III | - | Work. Cond. | ≥100<br>65, 80<br>≤50 | SPP<br>STPG370-E<br>STPG370-E | Pipe Table<br>Sch 40<br>Sch 80 | AG | AG | F/S ★5 | 5K | SS400 | - | - | - | - | - | - |
| AIR VENT, OVERFLOW SOUNDING (OIL TANK INSIDE) | - VA220-249<br>- VS220-249 | - | - | - | III | - | Work. Cond. | ≥100<br>65, 80<br>≤50 | SPP<br>STPG370-E<br>STPG370-E | Pipe Table<br>Sch 40<br>Sch 80 | A | AA | F/S ★5 | 5K | SS400 | - | - | - | - | - | - |
| AIR PURGE LINE FOR REMOTE LEVEL GAUGE (OIL TANK) | VS300-349 | - | - | - | III | - | Work. Cond. | ≤50 | STPG370-E | Sch 80 | A | AA | F/S ★5 | 5K | SS400 | - | - | - | - | - | - |

### REVISION HISTORY

| Rev. No. | REVISED BY | Rev. No. | REVISED BY |
|---|---|---|---|
| A | -AUTHORITY REQUEST | F | -DETAIL CALCULATION BY YARD |
| B | -OWNER REQUEST | G | -OTHER DESIGN SECTION AT YARD |
| C | -CLASSFICATION REQUEST | M | -DESIGN MISTAKE |
| D | -DETAIL ARRANGEMENT AT YARD | V | -DESIGN IMPROVEMENT |
| E | -EQUIPMENT MAKER'S RECOMMEND. | | |

| ALT. NO. | REV. NO. | DESCRIPTION | SYS. PAGE |
|---|---|---|---|
| B | B-1 | - The cross connection line with valve between No.1 L.O. purifier heater outlet line and No.2 L.O. purifier heater outlet line was provided. | S10 |
| | B-2 | - The isolating valve was provided. | S12 |
| | B-3 | - Following L.O. tanks were provided with Self powered content dial type level gauge.<br>- Main L.O. settling tank.<br>- Low TBN cyl. oil storaget tank.<br>- G.E. L.O. storage tank.<br>- Low TBN G.E. L.O. storage tank.<br>- Turbine L.O. storage tank. | S10<br>S11<br>S12 |
| | C-1 | - M.E. mist vent vent pipe and G.E. mist vent vent pipe were provided separately. | S11 |
| | G-1 | - The relevant pipe was added and pipe line size was changed. | S13 |
| | G-2 | - Stem tube section (View"Y") was changed as per " SHAFTING PLAN (DWG No.: MF00310). | S13 |
| | M-1 | - Self powered content dial type level gauge was provided as per specification. | S11 |
| | V-1 | - The sounding pipe size of following tanks was changed to 50A from 40A.<br>- Main L.O. sump tank.<br>- Low TBN G.E. L.O. storage tank.<br>- G.E. L.O. storage tank.<br>- G.E. L.O. settling tank.<br>- Main L.O. settling tank.<br>- Main L.O. storage tank. | S10 |
| C | E-1 | - Level switches for S/T L.O. tank unit were provided separately by maker. | S13 |
| | E-2/G-1 | - The emergency line height range for S/T L.O system was changed to 18.0 ~ 20.2 from 14.3 ~ 16.5 as per maker's recommendation. | S13 |
| | M-1 | - M.E. Cyliner oil service line(from cylinder oil storage tank to cylinder oil boosting unit inlet was provided with steam tracing and insulation. | PS(3), S11 |
| | M-2 | - Air vent pipe for Low TBN G.E. L.O. STOR. tank was provided. | S10 |
| | M-3 | - Sampling valve was provided by maker. | S11 |

REMARKS :

1. ★1 : TYPE OF PIPE JOINTS
   ① F: FLANGE ② S: SLEEVE ③B: BUTT WELDING ④ U: BITE UNION ⑤ SWF: SOCKET WELD FLANGE ⑥ SJW: SOCKET JOINT WELD
   ⑦ NF: NECK WELD FLANGE ⑧ LF: L-TYPE SLIP ON FLANGE ⑨ SF: SQUARE FLANGE
2. ★2 : REFER TO PIPING GENERAL 1-(3)-4), FOR "PIPE TREATMENT SYMBOL".
3. ★3 : INSULATION
   ① R.W : ROCK WOOL ② G.C : GLASS CLOTH ③ C.S : PRE-FORMED CALCIUM SILICATE ④ G.C.F.: GLASS CLOTH COVERED WITH ALUMINIUM FOIL(0.3T)
4. ★4: NDE CAN BE APPLIED INSTEAD OF HYDRAULIC TEST UNDER AGREEMENT AND/OR APPROVAL, DETAIL METHOD IS MENTIONED ON PIPING GENERAL AND SPECIFICATION I-(1)-2 FOR "TEST".
5. ★5 : THE PIPE JOINT EACH SYSTEM WILL BE DECIDED/SELECTED ACCORDING TO ACTUAL PIPING ARRANGEMENT FROM ONE OF THE TYPES MENTIONED IN PIPE JOINT TYPE COLUMN.
6. ★6 : SHIP'S SIDE VALVE
   ① GENERAL VALVE
   - ≥50 : BODY : SC(RUBBER LINED) OR BC, STEM : SUS316L OR BS, DISC & SEAT : SUS316L OR BC
   - ≤40 : BODY : BC, STEM : BS, DISC & SEAT : BC

   ② BUTTERFLY VALVE FOR SHIPSIDE VALVE
   - BODY : CAST STEEL(FLANGE ), STEM : SUS316L, DISC : SUS316L, SEAT : NBR

   ③ THE MAIN COOL. S.W P/P TO CENT. F.W COOLER IN/OUTLET VALVES
   - BODY : CAST IRON, STEM : SUS316L, DISC : SUS316L, SEAT : NBR





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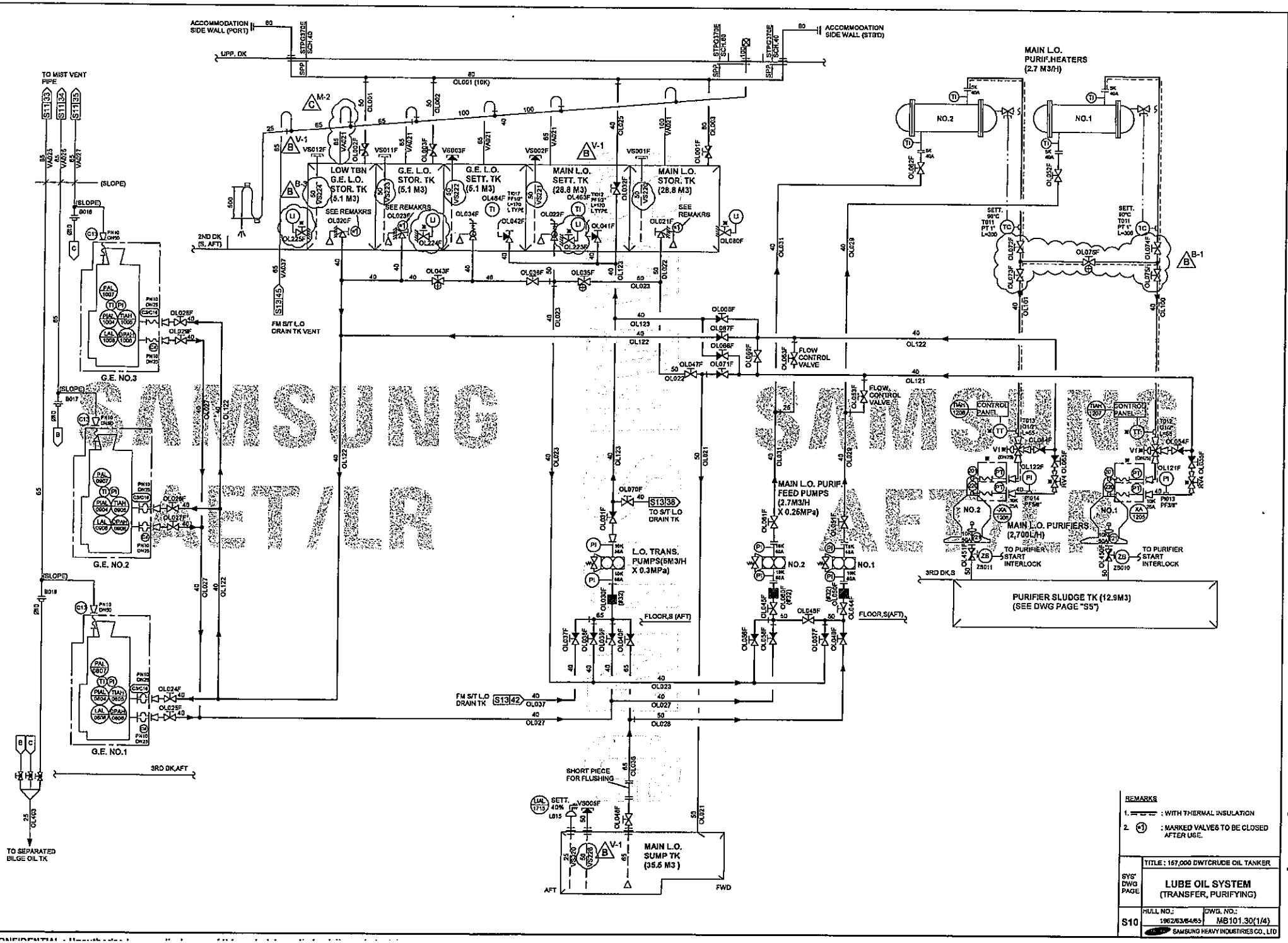

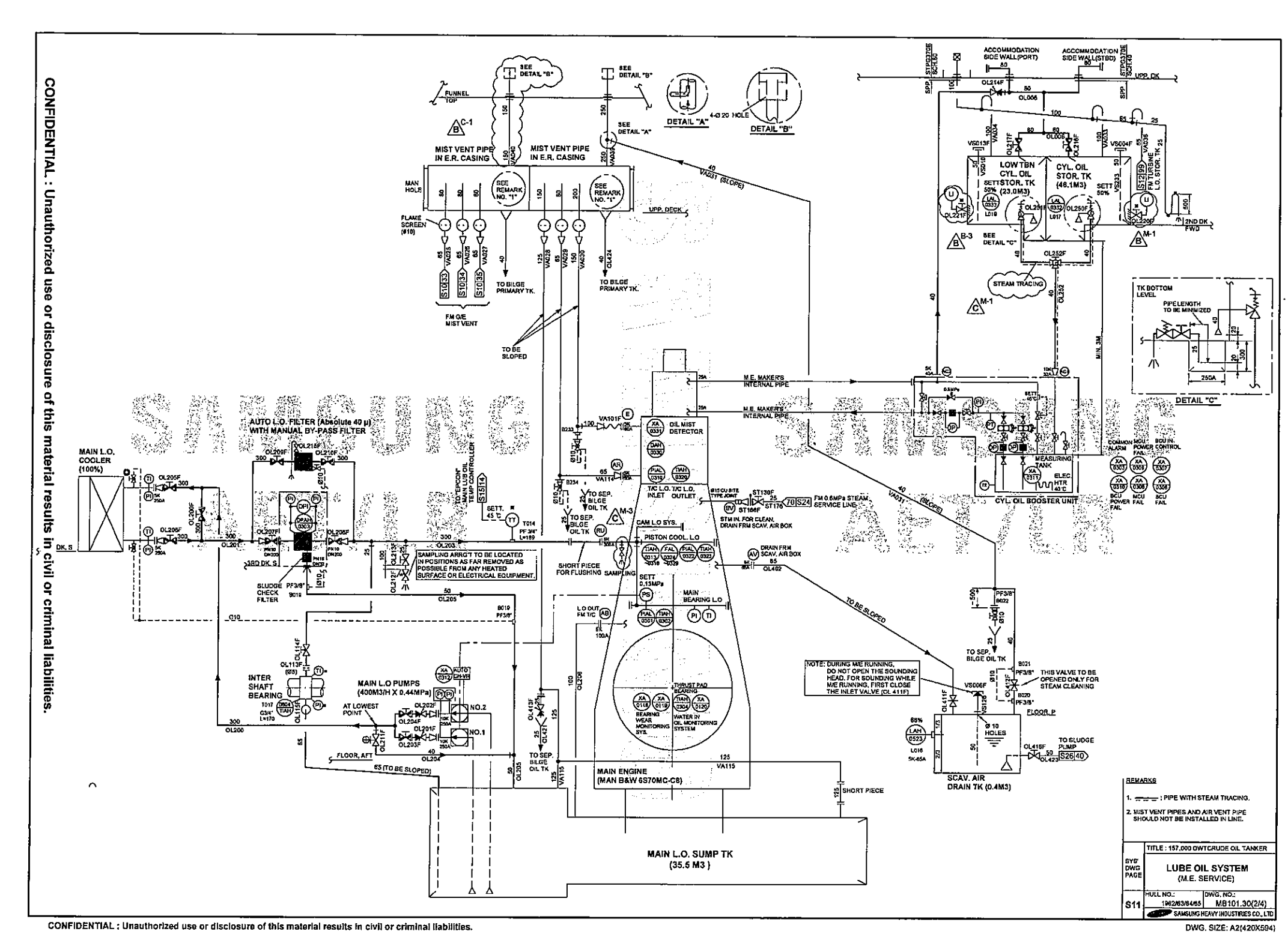




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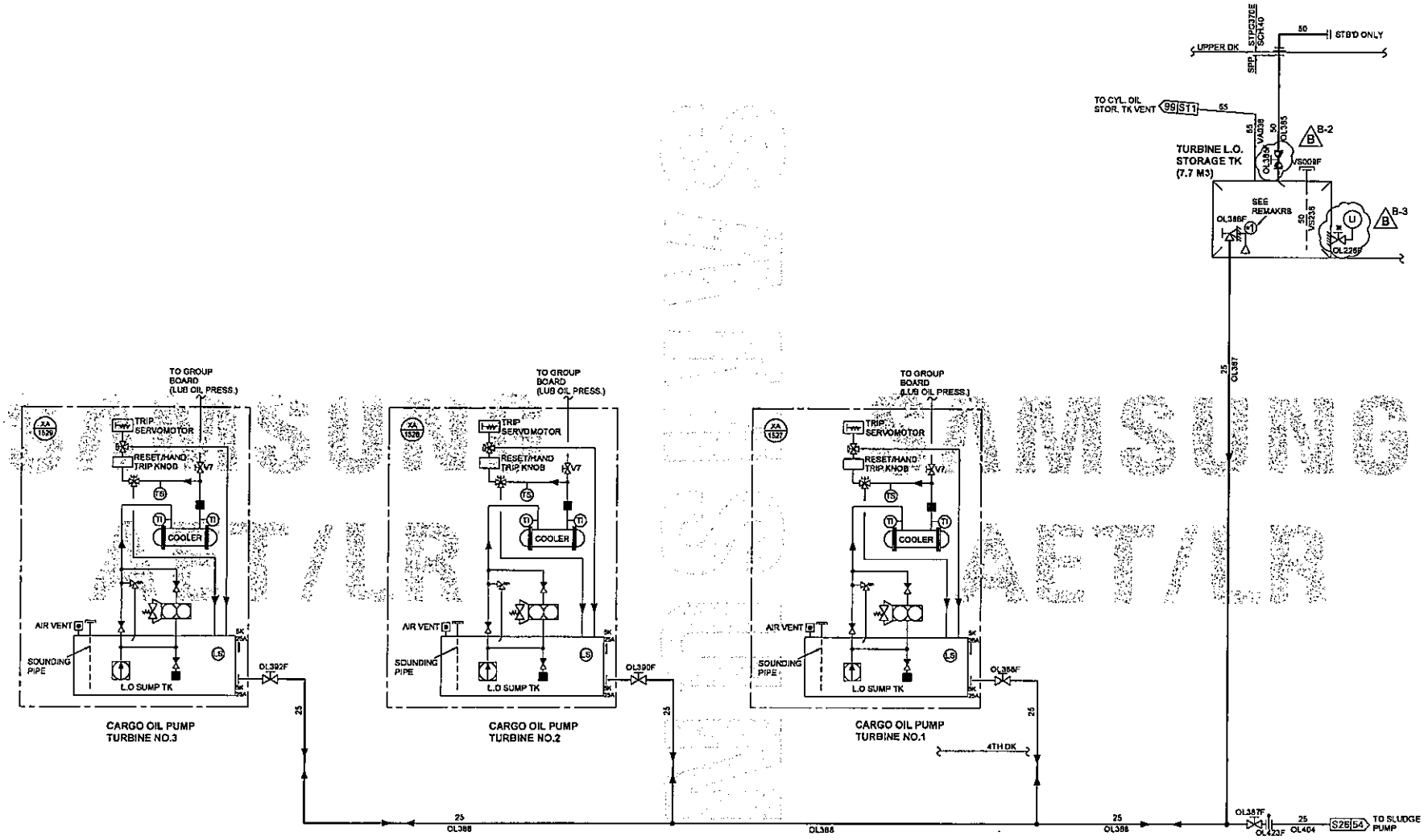



REMARKS

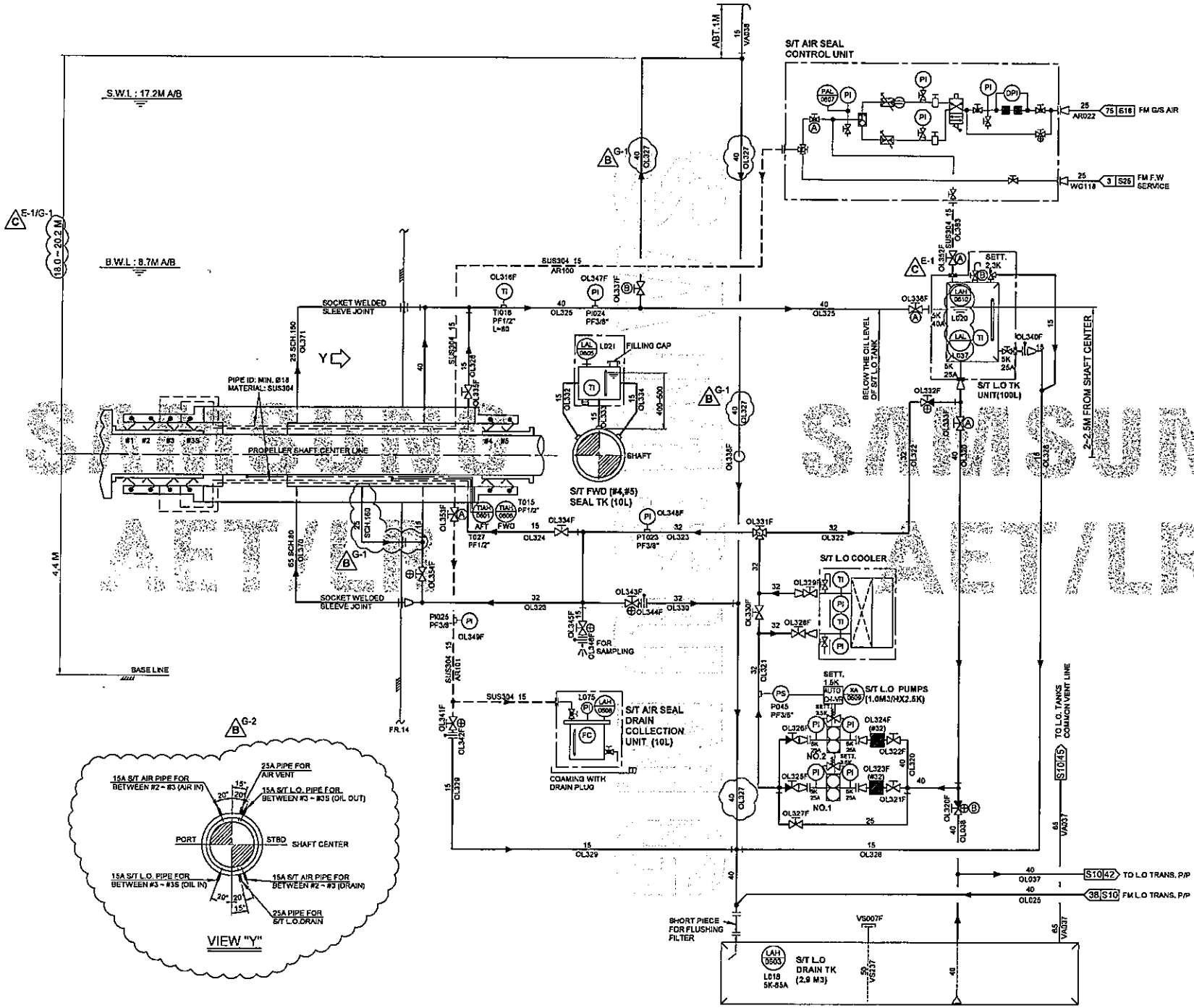
1 ⊖1 : MARKED VALVES TO BE CLOSED AFTER USE.

| | |
|---|---|
| SYS' DWG PAGE | TITLE : 157,000 DWT CRUDE OIL TANKER |
| | LUBE OIL SYSTEM (STEAM TURBINE SERVICE) |
| S12 | HULL NO.: 1962/63/64/65 |
| | DWG. NO.: MB101.30(3/4) |
| | SAMSUNG HEAVY INDUSTRIES CO., LTD |

조용호(삼성중공업)2011-07-08



DWG. SIZE: A2(420X594)




<EM'CY S/T OIL LUBRICATING METHOD>
Ⓐ MARKED VALVES TO BE CLOSED AND
Ⓑ MARKED VALVES TO BE OPENED FOR EM'CY S/T OIL LUBRICATING.

<FOR SPARE SEAL(#3S) OPERATION>
OL334F AND OL335F TO BE CLOSED

| | |
|---|---|
| | TITLE : 167,000 DWTCRUDE OIL TANKER |
| SYS' DWG PAGE | LUBE OIL SYSTEM (STERN TUBE SERVICE) |
| S13 | HULL NO.: 1962/63/64/65 |
| | DWG. NO.: MB101.30(4/4) |
| | SAMSUNG HEAVY INDUSTRIES CO., LTD |

DWG. SIZE: A2(420X594)

SAMSUNG

# PIPING DESIGN SPECIFICATION
## (DESIGN CONDITION, APPLICATION OF PIPE, PIPE JOINT & VALVES)

| HULL NO. | DWG NO. | SYSTEM DWG. PAGE |
|---|---|---|
| 1962/63/64/65 | MB101.40 | PS(4) |

| SYSTEM | PIPE, VALVE & FITTING NO. | Work. Temp. [℃] | DESIGN PRESS. [MPa] Work | DESIGN PRESS. [MPa] MAX | CLASS(LR) | HYD. TEST [MPa] SHOP | HYD. TEST [MPa] ON-BOARD | PIPE SPECIFICATION N.D [A] | MATERIAL | THICK | TREAT. ★2 IN. | TREAT. ★2 OUT. | PIPE JOINT SPECIFICATION TYPE ★1 | RATE (JIS) | MATE -RIAL | INSULATION ★3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SYSTEM DWG. PAGE : S14 ~ S17 | COOLING WATER SYSTEM | | | | | | | | | | | | | | | |
| MAIN CROSS-OVER & SEA WATER COOLING & SERVICE | WS001-099 | 32 | 0.53 | 0.64 | III | - | Work. Cond. | ≥650 | STPY400 | 9.5t | PE | BP | F/S ★5 | 5K | SS400 | ★7 |
| | | | | | | | | ≤600 | SPP | Pipe Table | PE | BP | | | | |
| | WS100-149 | | | | | | | ≤40 | STPG370-E | Sch 80 | AG | AG | | | | |
| I.G. SCRUBBER P/P DISCHARGE | WS200-249 | 32 | 0.53 | 0.64 | III | - | Work. Cond. | ≥50 | SPP | Pipe Table | PE | BP | F | 5K | SS400 | ★7 |
| DECK W. SEAL P/P DISCHARGE | WS280-299 | 32 | 0.53 | 0.64 | III | - | Work. Cond. | ≤40 | STPG370-E | Sch 80 | AG | AG | F | 5K | SS400 | ★7 |
| OVERBOARD FROM I.G. SCUBBER & BLOWER | WS300-369 | 32 | - | - | III | - | Work. Cond. | ≥300 | STPG370-E | 9.5t | PE | BP | F | 5K | SS400 | ★7 |
| | | | | | | | | ≤250 | STPG370-E | Sch 40 | | | | | | |
| | WS370-399 | 32 | - | - | III | - | Work. Cond. | ≤50 | STPG370-E | Sch 40 | AG | AG | F | 5K | SS400 | |
| SHIP SIDE FOR SEA WATER LINE | WS480~499 | - | - | - | III | - | - | ≤600 | STPG370-E | 16.0t | TE | AP | F | 10K | SF440 | - |
| | | | | | | | | ≤300 | STPG370-S | 16.0t | | | | | | |
| | | | | | | | | ≤125 | STS370-S | Sch 160 | | | | | | |
| CENTRAL COOLING F.W. | WF001-299 | 36 | 0.46 | 0.56 | III | - | Work. Cond. | ≥15 | STPG370-E | Sch 40 | A | AP | F | 5K | SS400 | - |
| JACKET COOLING F.W. (M.E. & G.E.) | WF300-399 | 82 | 0.46 | 0.56 | III | - | Work. Cond. | ≥15 | STPG370-E | Sch 40 | A | AP | F | 5K | SS400 | - |
| -AIR VENT, OVERFLOW -SOUNDING (EXCEPT OIL TANK INSIDE) | - VA001-099 - VS001-099 | - | - | - | III | - | Work. Cond. | ≥100 | SPP | Pipe Table | AG | AG | F/S ★5 | 5K | SS400 | - |
| | | | | | | | | 65, 80 | STPG370-E | Sch 40 | | | | | | |
| | | | | | | | | ≤50 | STPG370-E | Sch 80 | | | | | | |

| VALVE SPECIFIACTION N.D [A] | RATE (JIS) | MATERIAL BODY | MATERIAL STEM | MATERIAL DISC & SEAT |
|---|---|---|---|---|
| ≥125 | 5K | FC (RUBBER LINING) | BS | BC |
| ≤100 | 5K | BC | BS | BC |
| ≥50 (B/F V/V) (★6) | 5K | FC | SUS304 | Disc: Al-BC Seat: NBR |
| ★6 | | | | |
| ≥50 | 5K | FC | BS | BC |
| ≤40 | 5K | BC | BS | BC |
| ≥50 (B/F V/V) | 5K | FC | SUS304 | Disc: Al-BC Seat: NBR |
| ≥50 | 5K | FC | BS | BC |
| ≤40 | 5K | BC | BS | BC |
| ≥50 (B/F V/V) | 5K | FC | SUS304 | Disc: Al-BC Seat: EPDM |
| - | - | - | - | - |

### REVISION HISTORY

| Rev. No. | REVISED BY | Rev. No. | REVISED BY |
|---|---|---|---|
| A | -AUTHORITY REQUEST | F | -DETAIL CALCULATION BY YARD |
| B | -OWNER REQUEST | G | -OTHER DESIGN SECTION AT YARD |
| C | -CLASSFICATION REQUEST | M | -DESIGN MISTAKE |
| D | -DETAIL ARRANGEMENT AT YARD | V | -DESIGN IMPROVEMENT |
| E | -EQUIPMENT MAKER'S RECOMMEND. | | |

| ALT. NO. | Rev. NO. | DESCRIPTION | SYS. PAGE |
|---|---|---|---|
| A | B-1 | - Steam blow connection for sea chest(P,S) was provided. | S14 |
| | B-2 | - Wheel house unit cooler was changed to air cooled type from water cooled type. | S15 |
| B | B-1 | - Isolating valves for Vacuum condenser and Air jector condenser S.W. inlet was provided. | S14 |
| | C-1/ F-1 | - Remote manual open/close device of shipside valve was applied as per " Flooding calculation for E/R shipside valves". | S14 |
| | E-1 | - The internal drawing of Ref. plants for provision store was changed. | S15 |
| | V-1 | - The DPS(Differential Pressure Switch) was provided with each main cool. S.W. pumps . | S14 |
| C | B-1 | - The strainer on I.G. Scrubber S.W. suction pipe was provided | S14 |
| | D-1 | - The suction pipe to bile, fire & G/S pump was increased to 300A from 200A. | S14 |
| | D-2 | - Following C.F.W. pipe line was changed as per actual arrangement. - Compoisie boiler M.D.O. Cooler. - Main Air compressor. - Topping-up air compressor. - Oil cooler for AFT power pack for windlasses winches in S/G room. | S15, S16 |

☞ REMARKS :

1. ★1 : TYPE OF PIPE JOINTS
   ① F: FLANGE ② S: SLEEVE ③B: BUTT WELDING ④ U: BITE UNION ⑤ SWF: SOCKET WELD FLANGE ⑥ SJW: SOCKET JOINT WELD
   ⑦ NF: NECK WELD FLANGE ⑧ LF: L-TYPE SLIP ON FLANGE ⑨ SF: SQUARE FLANGE
2. ★2 : REFER TO PIPING GENERAL 1-(3)-4), FOR "PIPE TREATMENT SYMBOL".
3. ★3 : INSULATION
   ① R.W : ROCK WOOL ② G.C : GLASS CLOTH ③ C.S : PRE-FORMED CALCIUM SILICATE ④ G.C.F.: GLASS CLOTH COVERED WITH ALUMINIUM FOIL(0.3T)
4. ★4: NDE CAN BE APPLIED INSTEAD OF HYDRAULIC TEST UNDER AGREEMENT AND/OR APPROVAL, DETAIL METHOD IS MENTIONED ON PIPING GENERAL AND SPECIFICATION 1-(1)-2 FOR "TEST".
5. ★5 : THE PIPE JOINT EACH SYSTEM WILL BE DECIDED/SELECTED ACCORDING TO ACTUAL PIPING ARRANGEMENT FROM ONE OF THE TYPES MENTIONED IN PIPE JOINT TYPE COLUMN.
7. ★7: SEA WATER PIPE LINE RUNNING ABOVE THE ELECTRIC EQUIPMENT SHALL HAVE A SWEAT PROTECTION OF FIBER GLASS WOOL CLOTH.

6. ★6 : SHIP'S SIDE VALVE
   ① GENERAL VALVE
   - ≥50 : BODY : SC(RUBBER LINED) OR BC, STEM : SUS316L OR BS, DISC & SEAT : SUS316L OR BC
   - ≤40 : BODY : BC, STEM : BS, DISC & SEAT : BC
   ② BUTTERFLY VALVE FOR SHIPSIDE VALVE
   - BODY : CAST STEEL(FLANGE ), STEM : SUS316L, DISC : SUS316L, SEAT : NBR
   ③ THE MAIN COOL. S.W P/P TO CENT. F.W COOLER IN/OUTLET VALVES
   - BODY : CAST IRON, STEM : SUS316L, DISC : SUS316L, SEAT : NBR





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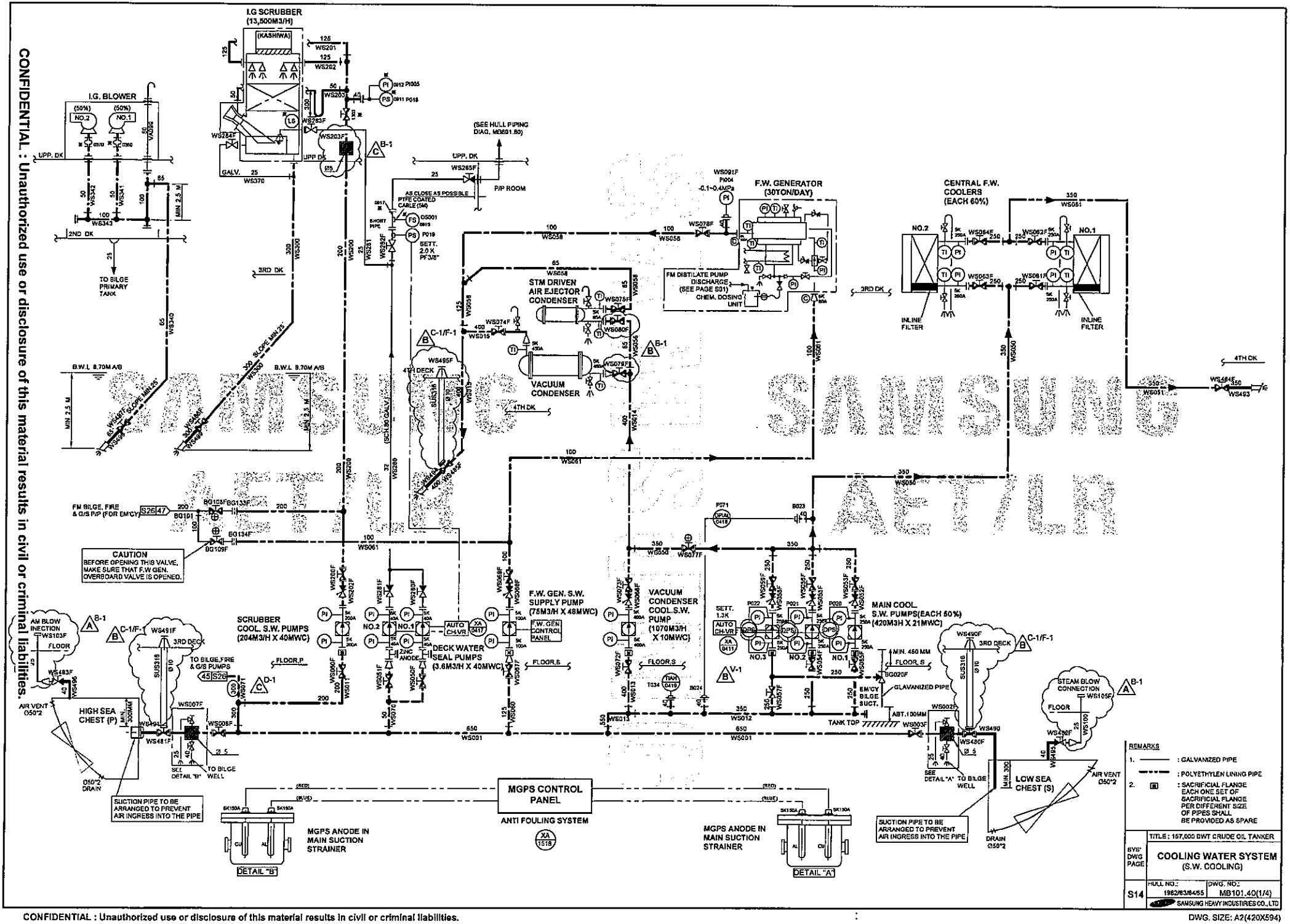








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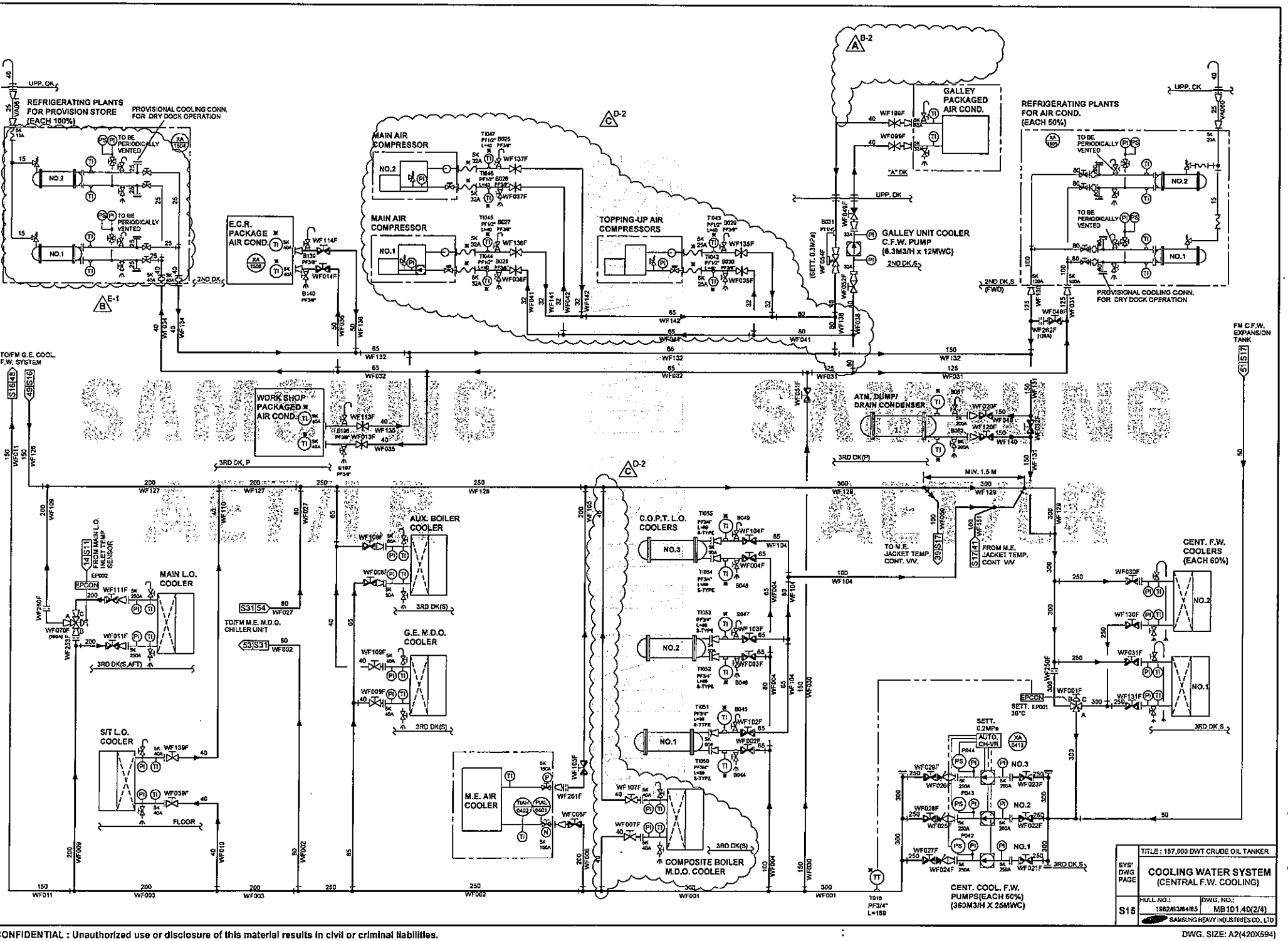








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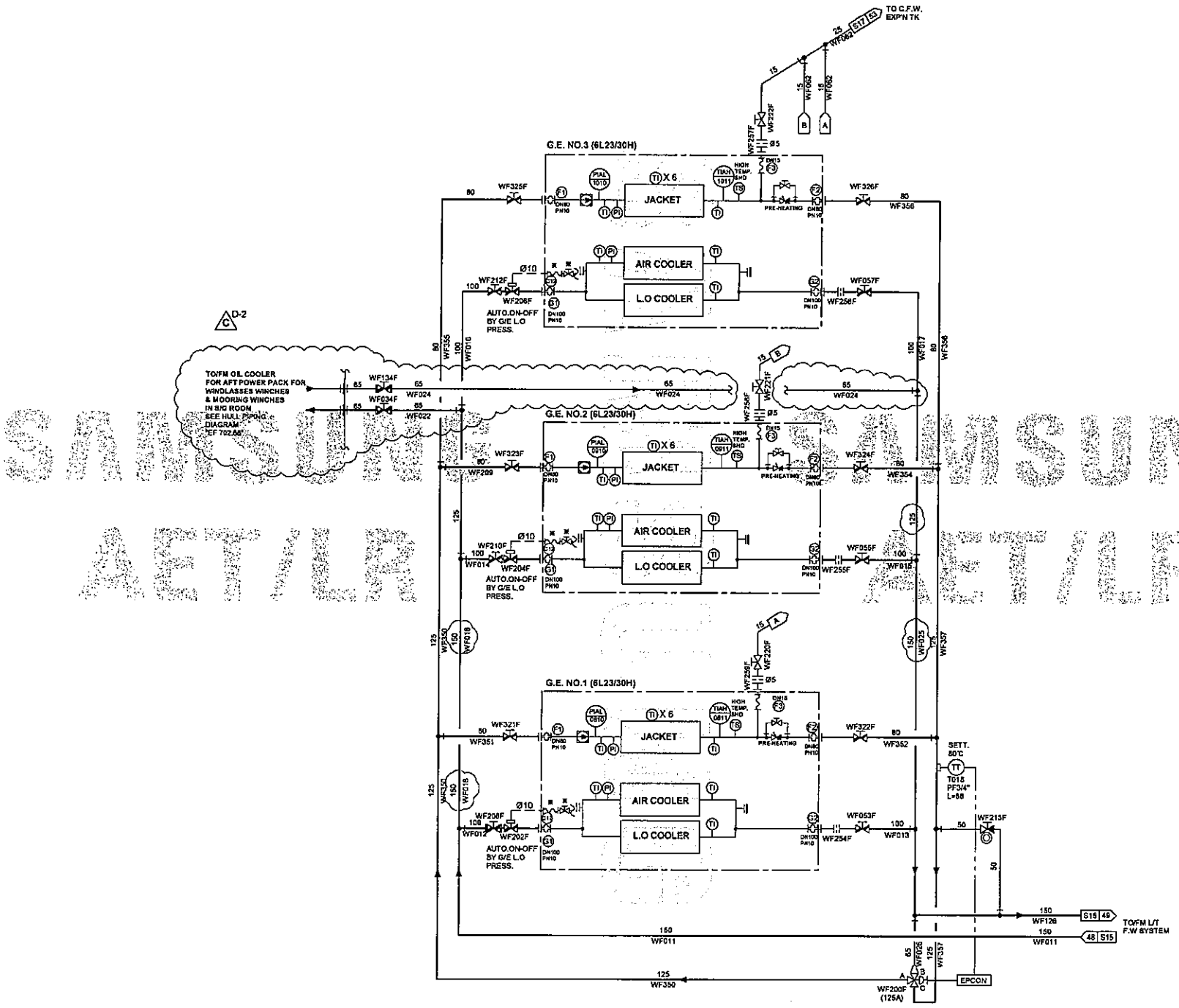




| | |
|---|---|
| SYS' DWG PAGE | TITLE : 157,000 DWT CRUDE OIL TANKER |
| | COOLING WATER SYSTEM (G.E. L/T & H/T F.W. COOLING) |
| S16 | HULL NO.: 1952/53/54/55 |
| | DWG. NO.: MB101.40(3/4) |
| | SAMSUNG HEAVY INDUSTRIES CO., LTD |

DWG. SIZE: A2(420X594)



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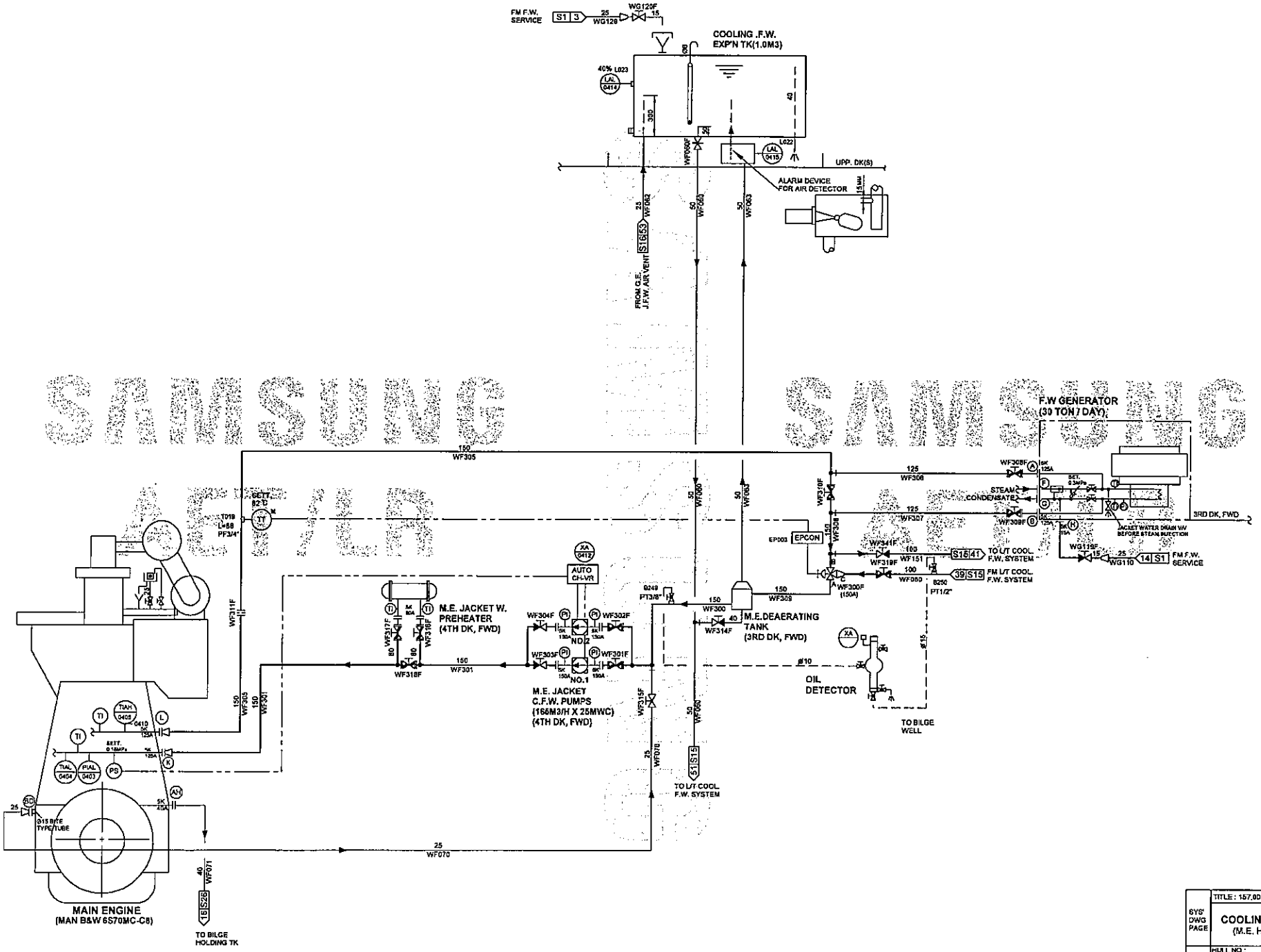


| | |
|---|---|
| | TITLE : 157,000 DWT CRUDE OIL TANKER |
| 6YS' DWG PAGE | COOLING WATER SYSTEM (M.E. H/T F.W. COOLING) |
| S17 | HULL NO.: 1952/53/54/55 DWG. NO.: MB101.40(4/4) |
| | SAMSUNG HEAVY INDUSTRIES CO., LTD |

조윤호[삼관기공]2011-07-08



DWG. SIZE: A2(420X594)

SAMSUNG

# PIPING DESIGN SPECIFICATION
## (DESIGN CONDITION, APPLICATION OF PIPE, PIPE JOINT & VALVES)

| HULL NO. | DWG NO. | SYSTEM DWG. PAGE |
|---|---|---|
| 1962/63/64/65 | MB101.50 | PS(5) |

| SYSTEM | PIPE, VALVE & FITTING NO. | Work. Temp. [℃] | DESIGN PRESS. [MPa] Work | DESIGN PRESS. [MPa] MAX | CLASS(LR) | HYD. TEST [MPa] SHOP | HYD. TEST [MPa] ON-BOARD | PIPE SPECIFICATION N.D [A] | PIPE SPECIFICATION MATERIAL | PIPE SPECIFICATION THICK | PIPE SPECIFICATION TREAT. ★2 IN. | PIPE SPECIFICATION TREAT. ★2 OUT. | PIPE JOINT SPECIFICATION TYPE ★1 | PIPE JOINT SPECIFICATION RATE (JIS) | PIPE JOINT SPECIFICATION MATE -RIAL | INSULATION ★3 | VALVE SPECIFIACTION N.D [A] | VALVE SPECIFIACTION RATE (JIS) | VALVE SPECIFIACTION MATERIAL BODY | VALVE SPECIFIACTION MATERIAL STEM | VALVE SPECIFIACTION MATERIAL DISC & SEAT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SYSTEM DWG. PAGE : S18~S20 | COMPRESSED AIR SYSTEM | | | | | | | | | | | | | | | | | | | | |
| 3.0MPa STARTING AIR SERVICE | AS001-099 | - | 3.0 | 3.30 | II | 4.95 ★4 | Work Cond. | ≥15 | STPG370-S | Sch 40 | A | AP | F | 30K | SF440 | - | ≥32 | 30K | SC | SUS | C6782 BD or HBsC2 |
| | | | | | | | | | | | | | | | | | ≤25 | 40K | SF | SUS | SCS |
| M.E. CONTROL/SAFETY AIR SERVICE | AS100-109 | - | 0.7 | 0.77 | III | 1.16 ★4 ★7 | Work Cond. | ≥15 | COPPER (C1220T) | Pipe Table | NO | NO | F/S/U ★5 | 10K | YBSC2/ BRASS | - | - | - | - | - | - |
| GEN. AIR SERVICE | AR001-099 | - | 0.7 | 0.77 | III | 1.16 ★4 | Work Cond. | ≥15 | STPG370-E | Sch 40 | A | AP | F | 10K | SS440 | - | ≥50 | 10K | FC | BS | BC |
| | | | | | | | | | | | | | | | | | ≤40 | 16K | BC | BS | BC |
| CONTROL AIR | AC001-099 | - | 0.7 | 0.77 | III | 1.16 ★4 ★7 | Work Cond. | ≥15 | STPG370-E | Sch 40 | A | AP | F | 10K | SS400 | - | ≥50 | 10K | FC | BS | BC |
| | | | | | | | | | | | | | | | | | ≤40 | 16K | BC | BS | BC |
| CONTROL AIR (COPPER TUBE) | AC001-099 | - | 0.7 | 0.77 | III | 1.16 ★4 ★7 | Work Cond. | <15 | COPPER (C1220T) | Pipe Table | NO | NO | U | 10K | YBSC2/ BRASS | - | - | - | - | - | - |
| SAFETY VALVE OUTLET FROM COMP. AIR SYS. | AC100-149 | - | - | - | III | - | - | ≥15 | SPP | Pipe Table | A | AP | F/S ★5 | 5K | SS400 | - | - | - | - | - | - |

### REVISION HISTORY

| Rev. No. | REVISED BY | Rev. No. | REVISED BY |
|---|---|---|---|
| A | -AUTHORITY REQUEST | F | -DETAIL CALCULATION BY YARD |
| B | -OWNER REQUEST | G | -OTHER DESIGN SECTION AT YARD |
| C | -CLASSFICATION REQUEST | M | -DESIGN MISTAKE |
| D | -DETAIL ARRANGEMENT AT YARD | V | -DESIGN IMPROVEMENT |
| E | -EQUIPMENT MAKER'S RECOMMEND. | | |

| ALT. NO | Rev. NO | DESCRIPTION | SYS. PAGE |
|---|---|---|---|
| A | B-1 | - Valve type(N2) for Main air receivers was changed to non return valve from stop valve . | S18 |
| B | B-1 | - The following damper number was changed.<br>- E/R supply fan No.3(SD03)→E/R supply fan No.2(SD02)<br>- E/R supply fan No.2(SD02)→E/R supply fan No.3(SD03) | S20 |
| | E-1 | - Control air line for M.E. M.D.O. chiller unit was provided. | S19 |
| | E-2 | - Control air line for G.Es was deleted. | S19 |
| | E-3 | - Control air line for O.D.M.S was identified in detail. | S19 |
| | E-4 | - Control air line for A.U.S.(Automatic Unloading System) was identified in detail. | S19 |
| | E-5 | - Control air line for Composite Boiler 3-way control were provided. | S19 |
| | M-1 | - Control air line for Economizer was deleted. | S19 |
| C | E-1 | - Control air lines for Composite Boiler 3-way control(G436,G439) were provided. | S19 |

☞ REMARKS :

1. ★1 : TYPE OF PIPE JOINTS
   ① F: FLANGE ② S: SLEEVE ③B: BUTT WELDING ④ U: BITE UNION ⑤ SWF: SOCKET WELD FLANGE ⑥ SJW: SOCKET JOINT WELD
   ⑦ NF: NECK WELD FLANGE ⑧ LF: L-TYPE SLIP ON FLANGE ⑨ SF: SQUARE FLANGE
2. ★2 : REFER TO PIPING GENERAL 1-(3)-4), FOR "PIPE TREATMENT SYMBOL".
3. ★3 : INSULATION
   ① R.W : ROCK WOOL ② G.C : GLASS CLOTH ③ C.S : PRE-FORMED CALCIUM SILICATE ④ G.C.F.: GLASS CLOTH COVERED WITH ALUMINIUM FOIL(0.3T)
4. ★4: NDE CAN BE APPLIED INSTEAD OF HYDRAULIC TEST UNDER AGREEMENT AND/OR APPROVAL, DETAIL METHOD IS MENTIONED ON PIPING GENERAL AND SPECIFICATION 1-(1)-2 FOR "TEST".
5. ★5 : THE PIPE JOINT EACH SYSTEM WILL BE DECIDED/SELECTED ACCORDING TO ACTUAL PIPING ARRANGEMENT FROM ONE OF THE TYPES MENTIONED IN PIPE JOINT TYPE COLUMN.
7. ★ 7 : HYDRAULIC TEST OF THE CONTROL AIR LINE TO BE CARRIED OUT WITH NITROGEN INSTEAD OF WATER TO PREVENT RESIDUAL WATER FROM CAUSING MALFUNCTIONING OF SOME SENSORS ACCORDING TO "LR" ACCEPTANCE.
6. ★6 : SHIP'S SIDE VALVE
   ① GENERAL VALVE
   - ≥50 : BODY : SC(RUBBER LINED) OR BC, STEM : SUS316L OR BS, DISC & SEAT : SUS316L OR BC
   - ≤40 : BODY : BC, STEM : BS, DISC & SEAT : BC

   ② BUTTERFLY VALVE FOR SHIPSIDE VALVE
   - BODY : CAST STEEL(FLANGE ), STEM : SUS316L, DISC : SUS316L, SEAT : NBR

   ③ THE MAIN COOL S.W P/P TO CENT. F.W COOLER IN/OUTLET VALVES
   - BODY : CAST IRON, STEM : SUS316L, DISC : SUS316L, SEAT : NBR





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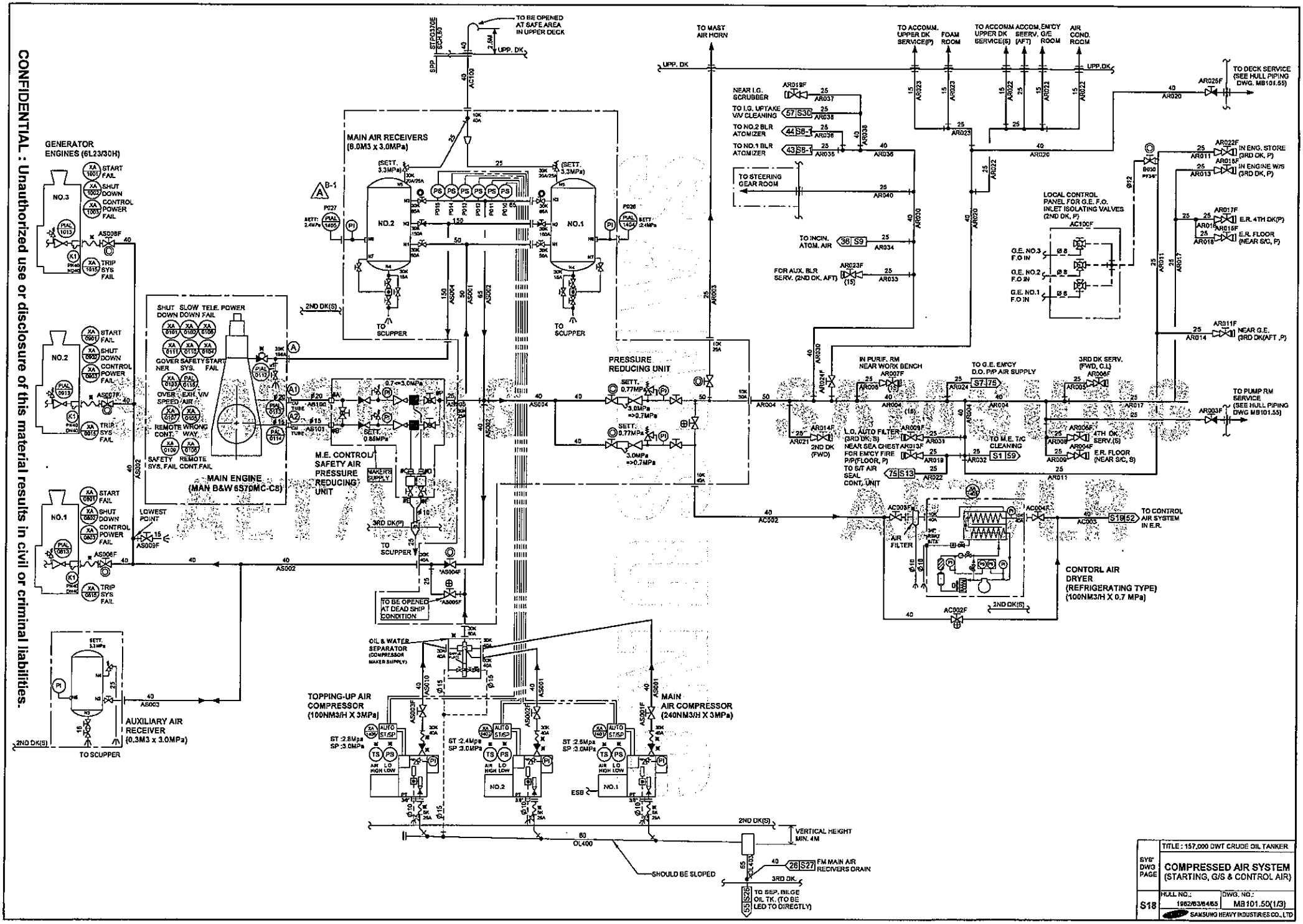


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DWG. SIZE: A2(420X594)

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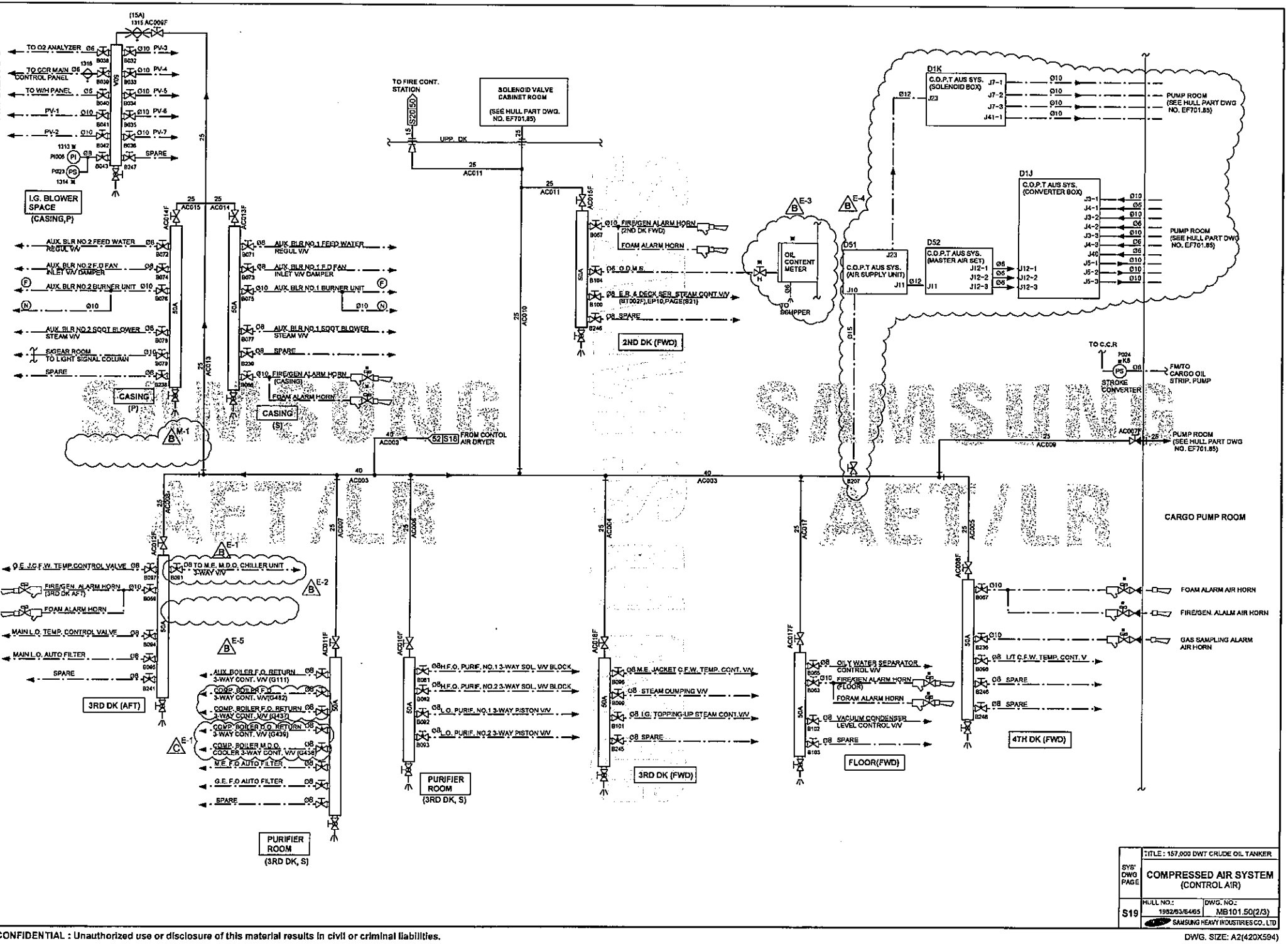




| | |
|---|---|
| | TITLE : 157,000 DWT CRUDE OIL TANKER |
| SYS' DWG PAGE | COMPRESSED AIR SYSTEM (CONTROL AIR) |
| S19 | HULL NO.: 1952/53/54/55 |
| | DWG. NO.: MB101.50(2/3) |
| | SAMSUNG HEAVY INDUSTRIES CO., LTD |

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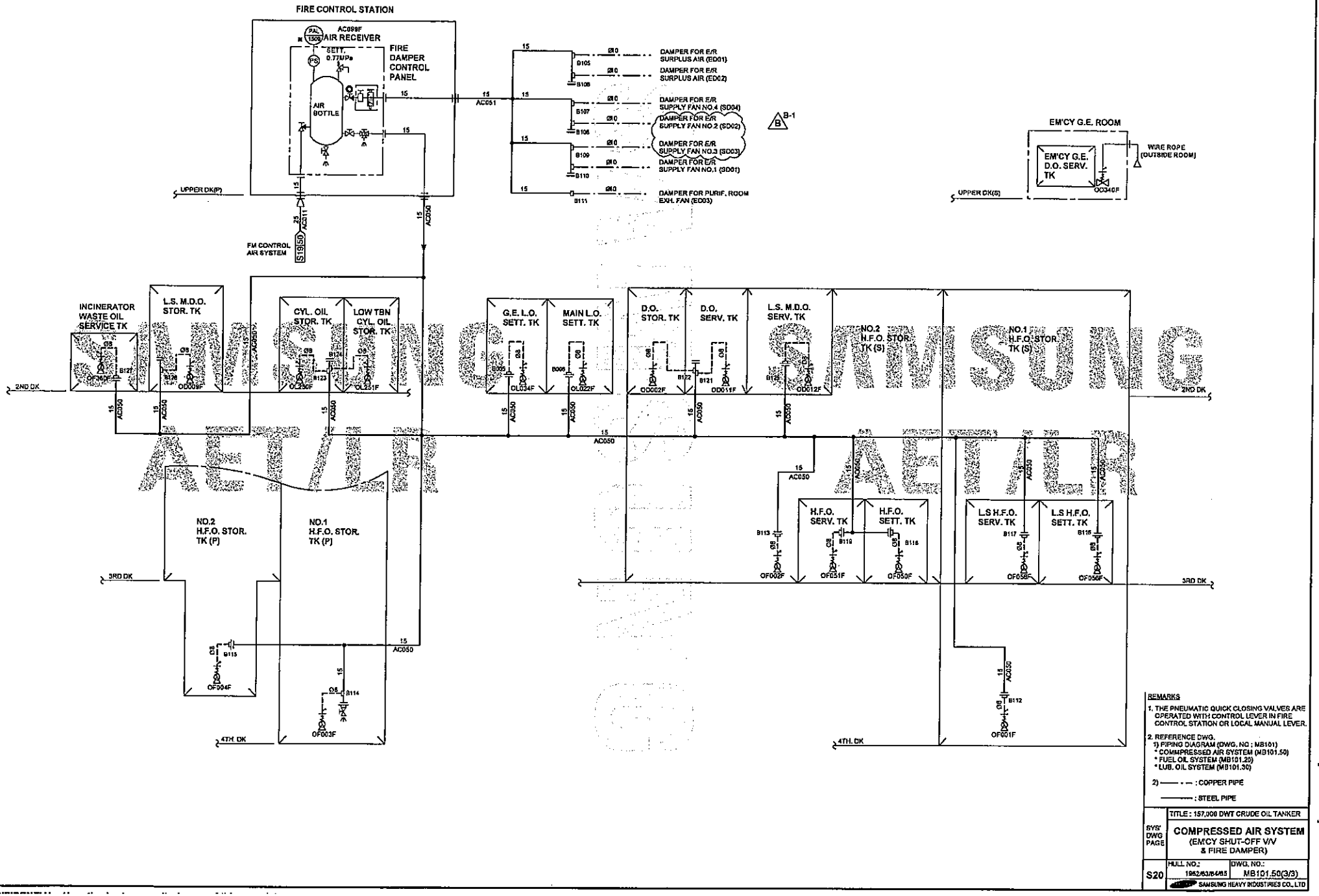
DWG. SIZE: A2(420X594)






REMARKS

1. THE PNEUMATIC QUICK CLOSING VALVES ARE OPERATED WITH CONTROL LEVER IN FIRE CONTROL STATION OR LOCAL MANUAL LEVER.
2. REFERENCE DWG.
   1) PIPING DIAGRAM (DWG. NO. : MB101)
   * COMPRESSED AIR SYSTEM (MB101.50)
   * FUEL OIL SYSTEM (MB101.20)
   * LUB. OIL SYSTEM (MB101.30)
   2) —— · —— : COPPER PIPE
   ——— : STEEL PIPE

| | | |
|---|---|---|
| SYS/DWG PAGE | TITLE : 157,000 DWT CRUDE OIL TANKER | |
| | COMPRESSED AIR SYSTEM (EM'CY SHUT-OFF V/V & FIRE DAMPER) | |
| S20 | HULL NO.: 1962/63/64/65 | DWG. NO.: MB101.50(3/3) |
| | SAMSUNG HEAVY INDUSTRIES CO., LTD | |

SAMSUNG

# PIPING DESIGN SPECIFICATION
## (DESIGN CONDITION, APPLICATION OF PIPE, PIPE JOINT & VALVES)

| HULL NO. | DWG NO. | SYSTEM DWG. PAGE |
|---|---|---|
| 1962/63/64/65 | MB101.60 | PS(6) |

| SYSTEM | PIPE, VALVE & FITTING NO. | Work. Temp. [℃] | DESIGN PRESS. [MPa] Work | DESIGN PRESS. [MPa] MAX | CLASS(LR) | HYD. TEST [MPa] SHOP | HYD. TEST [MPa] ON-BOARD | PIPE SPECIFICATION N.D [A] | PIPE SPECIFICATION MATERIAL | PIPE SPECIFICATION THICK | PIPE SPECIFICATION TREAT. ★2 IN. | PIPE SPECIFICATION TREAT. ★2 OUT. | PIPE JOINT SPECIFICATION TYPE ★1 | PIPE JOINT SPECIFICATION RATE (JIS) | PIPE JOINT SPECIFICATION MATE -RIAL | INSULATION ★3 | VALVE SPECIFIACTION N.D [A] | VALVE SPECIFIACTION RATE (JIS) | VALVE SPECIFIACTION MATERIAL BODY | VALVE SPECIFIACTION MATERIAL STEM | VALVE SPECIFIACTION MATERIAL DISC & SEAT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SYSTEM DWG PAGE : S21 | EXHAUST GAS SYSTEM | | | | | | | | | | | | | | | | | | | | |
| EXHAUST GAS PIPE | GE001-099 | MAX. 400 | - | - | III | - | Work. Cond. | ≥550 | STEEL PLATE WELDED | 6t | NO | NO | F/S/B ★5 | SHI's pratice | SS400 | R.W / Galv. Steel Sheet ★7 | - | - | - | - | - |
| | GE100-199 | MAX. 400 | - | - | III | - | Work. Cond. | ≤500 | SPP | Pipe Table | NO | NO | F/S/B ★5 | SHI's pratice | SS400 | R.W / Galv. Steel Sheet ★7 | - | - | - | - | - |
| EXHAUST GAS PIPE ON FUNNEL TOP EXPOSED TO THE WEATHER | GE200-249 | MAX. 400 | - | - | III | - | Work. Cond. | ≥300 | Corten Steel | 6t | NO | NO | F/S/B ★5 | SHI's pratice | SS400 | - | - | - | - | - | - |
| EXHAUST GAS PIPE DRAIN | GE400-429 | - | - | - | III | - | Work. Cond. | ≥15 | STPG370-E | Sch 40 | AG | AG | F/S ★5 | 5K | SS400 | - | ≥50 ≤40 | 5K 5K | FC BC | BS BS | BC BC |
| SOOT DRAIN TK DRAIN (EDUCTOR SUC. ) | GE430-449 | - | - | - | III | - | Work. Cond. | ≥15 | STPG370-E | Sch 80 | AG | AG | F/S ★5 | 5K | SS400 | - | ≥50 | 5K | FC (Tar Epoxy) | BS | BC |
| SOOT DRAIN TK DRAIN (AFTER EDUCTOR) | GE450-459 | - | - | - | III | - | Work. Cond. | ≥15 | STPG370-E | Sch 80 | AG | AG | F/S ★5 | 16K | SS400 | - | ≥50 | 16K | FC (Tar Epoxy) | BS | BC |
| SHIP SIDE LINE FOR SOOT EDUCTOR OVBD | GE480-499 | - | - | - | III | - | - | ≤125 | STS370S | Sch 160 | TE | AP | F | 10K | SF440 | - | ★6 | | | | |
| EXPOSED DK SCUPPER (ABOVE UPP. DECK) | BD300-399 | - | - | - | III | - | Work. Cond. | ≥15 | STPG370-E | Sch 40 | AG | AG | F/S ★5 | 5K | SS400 | - | - | - | - | - | - |
| ECONO. SOOT BLOWER SEALING AIR SUPPLY | FA001-049 | - | - | - | III | - | Work. Cond. | ≥15 | STPG370-E | Sch 40 | AG | AG | F/S ★5 | 5K | SS400 | - | ≥50 ≤40 | 5K 5K | FC BC | BS BS | BC BC |

☞ REMARKS :

1. ★1 : TYPE OF PIPE JOINTS
   ① F: FLANGE ② S: SLEEVE ③B: BUTT WELDING ④ U: BITE UNION ⑤ SWF: SOCKET WELD FLANGE ⑥ SJW: SOCKET JOINT WELD
   ⑦ NF: NECK WELD FLANGE ⑧ LF: L-TYPE SLIP ON FLANGE ⑨ SF: SQUARE FLANGE
2. ★2 : REFER TO PIPING GENERAL 1-(3)-4), FOR "PIPE TREATMENT SYMBOL".
3. ★3 : INSULATION
   ① R.W : ROCK WOOL ② G.C : GLASS CLOTH ③ C.S : PRE-FORMED CALCIUM SILICATE ④ G.C.F.: GLASS CLOTH COVERED WITH ALUMINIUM FOIL(0.3T)
4. ★4: NDE CAN BE APPLIED INSTEAD OF HYDRAULIC TEST UNDER AGREEMENT AND/OR APPROVAL, DETAIL METHOD IS MENTIONED ON PIPING GENERAL AND SPECIFICATION 1-(1)-2 FOR "TEST".
5. ★5 : THE PIPE JOINT EACH SYSTEM WILL BE DECIDED/SELECTED ACCORDING TO ACTUAL PIPING ARRANGEMENT FROM ONE OF THE TYPES MENTIONED IN PIPE JOINT TYPE COLUMN.
7. ★7 : EXHAUST GAS PIPE IN THE FUNNEL SHALL BE INSULATED UP TO 2.0m HEIGHT FROM THE FUNNEL BASE.

6. ★6 : SHIP'S SIDE VALVE
   ① GENERAL VALVE
   - ≥50 : BODY : SC(RUBBER LINED) OR BC, STEM : SUS316L OR BS, DISC & SEAT : SUS316L OR BC
   - ≤40 : BODY : BC, STEM : BS, DISC & SEAT : BC

   ② BUTTERFLY VALVE FOR SHIPSIDE VALVE
   - BODY : CAST STEEL(FLANGE ), STEM : SUS316L, DISC : SUS316L, SEAT : NBR

   ③ THE MAIN COOL. S.W P/P TO CENT. F.W COOLER IN/OUTLET VALVES
   - BODY : CAST IRON, STEM : SUS316L, DISC : SUS316L, SEAT : NBR

### REVISION HISTORY

| Rev. No. | REVISED BY | Rev. No. | REVISED BY |
|---|---|---|---|
| A | -AUTHORITY REQUEST | F | -DETAIL CALCULATION BY YARD |
| B | -OWNER REQUEST | G | -OTHER DESIGN SECTION AT YARD |
| C | -CLASSFICATION REQUEST | M | -DESIGN MISTAKE |
| D | -DETAIL ARRANGEMENT AT YARD | V | -DESIGN IMPROVEMENT |
| E | -EQUIPMENT MAKER'S RECOMMEND. | | |

| ALT. NO. | Rev. NO. | DESCRIPTION | SYS. PAGE |
|---|---|---|---|
| B | C-1/E-1 | - The thermometer for exhaust gas T/C inlet was provided from Main Engine maker. | S21 |
| | E-2/F-1 | - Exhaust pipe size of G.Es was increased to 400A from 350A and internal drawing of G.Es was changed. | S21 |
| | E-3/F-2 | - Smoke uptake pipe size of Composite boiler was increased to 350A from 300A and internal drawing of Composite boiler was changed. | S21 |
| | E-4 | - Detail drawing for Smoke indicator was revised. | S21 |
| | F-3 | - Exhaust pipe size of M.E was increased to 1450A from 1400A. | S21 |
| C | E-1 | - Temp. sensor for M.E. turbo charger out was provided from loose supply by maker. | S21 |
| | V-1 | - The isloating valves on G.E. exhaust gas pipe drain line were provided. | S21 |

PIPING DESIGN SPECIFICATION (PS6) (1/1)
(EXHUAST GAS SYSTEM) (MB101.60) (S21)



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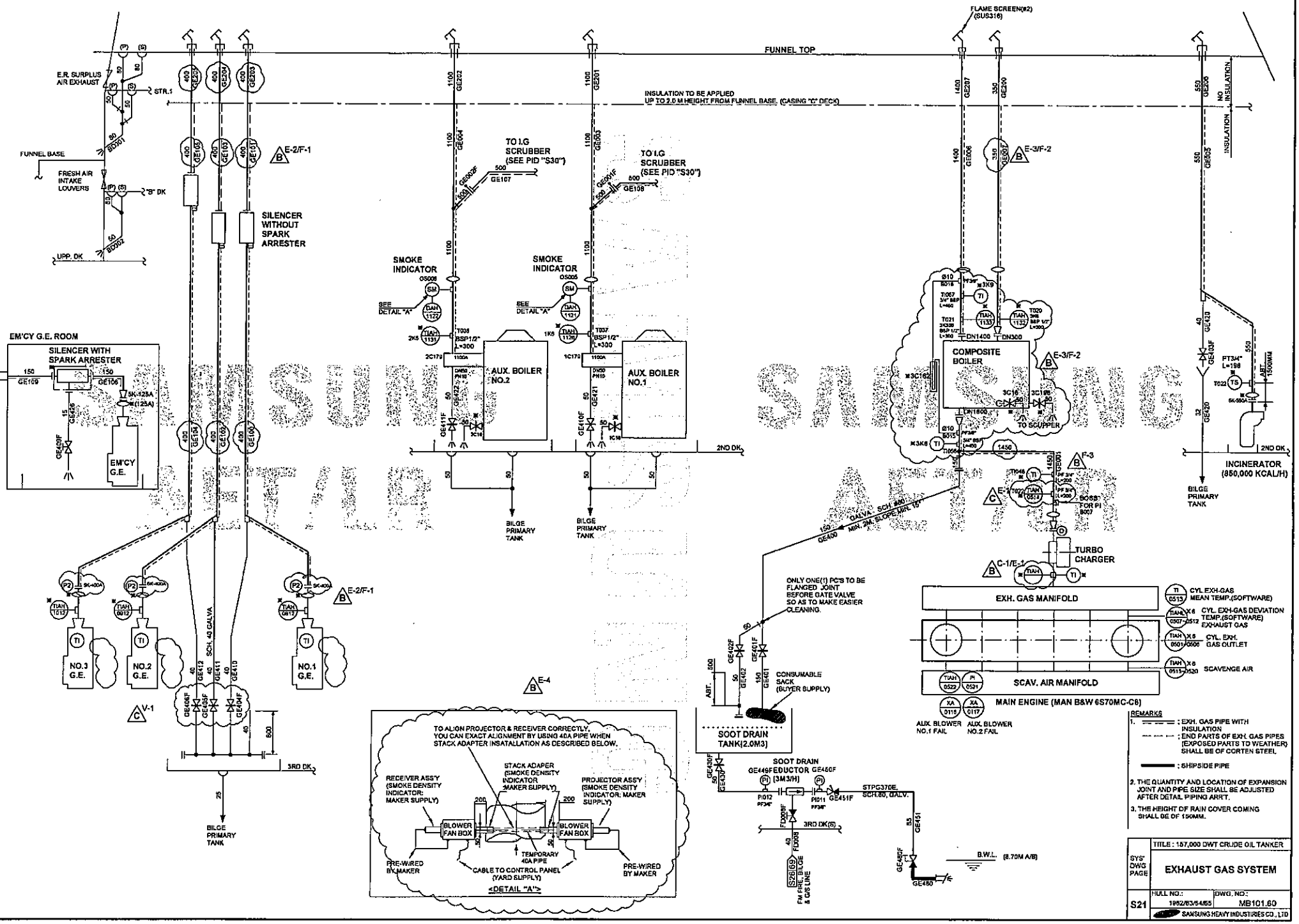






DWG. SIZE: A2(420X594)

SAMSUNG

# PIPING DESIGN SPECIFICATION
## (DESIGN CONDITION, APPLICATION OF PIPE, PIPE JOINT & VALVES)

| HULL NO. | DWG NO. | SYSTEM DWG. PAGE |
|---|---|---|
| 1962/63/64/65 | MB101.70 | PS(7) |

| SYSTEM | PIPE, VALVE & FITTING NO. | Work. Temp. [℃] | DESIGN PRESS. [MPa] Work | DESIGN PRESS. [MPa] MAX | CLASS(I,R) | HYD. TEST [MPa] SHOP | HYD. TEST [MPa] ON-BOARD | PIPE SPECIFICATION N.D [A] | PIPE SPECIFICATION MATERIAL | PIPE SPECIFICATION THICK | PIPE SPECIFICATION TREAT. ★2 IN. | PIPE SPECIFICATION TREAT. ★2 OUT. | PIPE JOINT SPECIFICATION TYPE ★1 | PIPE JOINT SPECIFICATION RATE (JIS) | PIPE JOINT SPECIFICATION MATE -RIAL | INSULATION ★3 | VALVE SPECIFIACTION N.D [A] | VALVE SPECIFIACTION RATE (JIS) | VALVE SPECIFIACTION MATERIAL BODY | VALVE SPECIFIACTION MATERIAL STEM | VALVE SPECIFIACTION MATERIAL DISC & SEAT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| YSTEM DWG. PAGE : S2Z ~ S25 | STEAM, FEED WATER & CONDENSATE SYSTEM | | | | | | | | | | | | | | | | | | | | |
| 6MPa STEAM<br>JP TO STEAM TRAP) | ST001-099 | MAX. 209 | 1.6 | 1.8 | I | 2.7 ★4 | Work. Cond. | ≥300 | STPG370-S | 9.5t | A | AP | F | 20K | SF440 | R.W /G.C | ≥32 | 20K | SC | SUS | SCS |
| | | | | | | | | ≤250 | STPG370-E | Sch 40 | | | | | | | ≤25 | 20K | SF | SUS | SCS |
| 6MPa STEAM<br>JP TO STEAM TRAP) | ST100-299 | MAX. 168 | 0.6 | 0.66 | III | 0.99 ★4 | Work. Cond. | ≥15 | SPP | Pipe Table | A | AP | F | 10K | SS400 | R.W /G.C | ≥50 | 10K | SC | SUS | SCS |
| | | | | | | | | | | | | | | | | | ≤40 | 16K | BC | BS | BC |
| EATING COIL | SH001-099 | MAX. 168 | 0.6 | 0.66 | III | - | 0.99 | 50A | STPG370-S BARE TUBE or CYLINDRICAL TYPE HEATER | Sch 80 | A | AA | S | - | - | - | - | - | - | - | - |
| TEAM TRACING | SH001-099 | MAX. 168 | 0.6 | 0.66 | III | - | Work. Cond. | φ10 | COPPER (C1220T) | Pipe Table 30K | NO | NO | U | - | YBSC2/ BRASS | - | - | - | - | - | - |
| UX. BOILER & COMPOSITE<br>OILER<br>EED W. PUMP SUCTION | SB001-049 | 80 | - | - | III | - | Work. Cond. | ≥15 | SPP | Pipe Table | A | AP | F | 5K | SS400 | G.C ★7 | ≥50 | 5K | FC | BS | BC |
| | | | | | | | | | | | | | | | | | ≤40 | 5K | BC | BS | BC |
| UX. BOILER FEED W.<br>JMP DISCHARGE | SB050-099 | 80 | 2.4 | 2.64 | II | 3.96 ★4 | Work. Cond. | ≥15 | STPG370-S | Sch 40 | A | AP | F | 20K | SF440 | G.C ★7 | ≥32 | 20K | SC | SUS | SCS |
| | | | | | | | | | | | | | | | | | ≤25 | 20K | SF | SUS | SCS |
| OMPOSITE BOILER FEED W.<br>JMP DISCHARGE | SB250-299 | 80 | 1.2 | 1.32 | II | 1.98 ★4 | Work. Cond. | ≥15 | STS370-S | Sch 40 | A | AP | F | 20K | SF440 | G.C ★7 | ≥32 | 20K | SC | SUS | SCS |
| | | | | | | | | | | | | | | | | | ≤25 | 20K | SF | SUS | SCS |
| OILER BLOW OFF &<br>EED W. SAMPLING | SB300-349 | MAX. 209 | 1.6 | 1.8 | II | 2.7 ★4 | Work. Cond. | ≥15 | STPG370-S | Sch 40 | A | AP | F | 20K | SF440 | G.C ★7 | ≥32 | 20K | SC | SUS | SCS |
| | | | | | | | | | | | | | | | | | ≤25 | 20K | SF | SUS | SCS |
| OILER CHEMICAL<br>'ATER TO BOILER<br>EED WATER | SB350-399 | 50 | 2.5 | 2.75 | II | 4.13 ★4 | Work. Cond. | ≥15 | STPG370-S | Sch 40 | A | AP | F | 20K | SF440 | - | ≤25 | 20K | SF | SUS | SCS |
| IIP SIDE FOR BLOW<br>OWN LINE | SB480~499 | - | - | - | III | - | - | ≤125 | STS370-S | Sch 160 | TE | AP | F | 20K | SF440 | - | ★6 | | | | |
| TEAM TURBINE<br>XHAUST STEAM | SE001-099 | MAX. 70 | 530 mmHgV | - | III | - | Work. Cond. | ≥15 | SPP | Pipe Table | A | AP | F | 5K | SS400 | G.C ★7 | ≥50 | 5K | FC | BS | BC |
| | | | | | | | | | | | | | | | | | ≤40 | 5K | BC | BS | BC |
| AFETY VALVE OUTLET | SE400-479 | - | - | - | III | - | Work. Cond. | ≥15 | SPP | Pipe Table | A | AP | F/S ★5 | 10K | SS400 | G.C ★7 | - | - | - | - | - |
| ONDENSATE WATER<br>ROM STEAM TRAP | SD001-199 | MAX. 133 | 0.1 | 0.2 | III | - | Work. Cond. | ≥15 | SPP | Pipe Table | A | AP | F/S ★5 | 5K | SS400 | G.C ★7 | ≥50 | 5K | FC | BS | BC |
| | | | | | | | | | | | | | | | | | ≤40 | 5K | BC | BS | BC |
| IR VENT, OVERFLOW<br>OUNDING<br>XCEPT OIL TANK INSIDE) | - VA001-099<br>- VS001-099 | - | - | - | III | - | Work. Cond. | ≥100 | SPP | Pipe Table | AG | AG | F/S ★5 | 5K | SS400 | - | - | - | - | - | - |
| | | | | | | | | 65, 80 | STPG370-E | Sch 40 | | | | | | | | | | | |
| | | | | | | | | ≤50 | STPG370-E | Sch 80 | | | | | | | | | | | |

### REVISION HISTORY

| Rev. No. | REVISED BY | Rev. No. | REVISED BY |
|---|---|---|---|
| A | -AUTHORITY REQUEST | F | -DETAIL CALCULATION BY YARD |
| B | -OWNER REQUEST | G | -OTHER DESIGN SECTION AT YARD |
| C | -CLASSFICATION REQUEST | M | -DESIGN MISTAKE |
| D | -DETAIL ARRANGEMENT AT YARD | V | -DESIGN IMPROVEMENT |
| E | -EQUIPMENT MAKER'S RECOMMEND. | | |

| ALT. NO. | Rev. NO. | DESCRIPTION | SYS' PAGE |
|---|---|---|---|
| A | B-1 | - Seprate isolating valves for instruments PT, PI and PS (maker' supply) was provided. | S22 |
| | B-2 | - Pipe line of the bottom and top surface blow down for Aux. boiler No.1 was changed as like Aux. boiler No.2. | S22 |
| B | B-1 | - The low level alarm was provided. | S23 |
| | B-2 | - Two(2) sets of heating for No.1/2 H.F.O. storage tanks were provided. | S24/S25 |
| | B-3 | - F.W. service connection was provided. | S22 |
| | E-1 | - The return line to cascade tank from compoiste boiler feed water pumps was provied. | S22 |
| | E-2 | - Internal drawing and relevant pipe line of Composite boiler was changed . | S22 |
| | E-3 | - Steam service line and condensate line for Composite boiler were provided. | S22/S25 |
| | E-4 | - Interanl drawing for Aux. boiler was changed. | S22 |
| | E-5 | - Internal draiwng and relevant pipe line for C.O.P.T was changed and condensater line for C.O.P.T was provided with steam trap. | S23/25 |
| | V-1 | - I.G. topping up pipe line size was increase to 150A from 80A. | S23 |
| C | D-1 | - The drain line was deleted as per actual arrangement. | S22 |
| | G-1 | - Condensate water line for accomodation to air condition plant was modified. | S25 |
| | V-1 | - Steam supply line to cargo oil stripping pump was increased to 100A from 80A. | S22 |

REMARKS :

1. ★1 : TYPE OF PIPE JOINTS
   ① F: FLANGE ② S: SLEEVE ③B: BUTT WELDING ④ U: BITE UNION ⑤ SWF: SOCKET WELD FLANGE ⑥ SJW: SOCKET JOINT WELD ⑦ NF: NECK WELD FLANGE ⑧ LF: L-TYPE SLIP ON FLANGE ⑨ SF: SQUARE FLANGE
2. ★2 : REFER TO PIPING GENERAL 1-(3)-4), FOR "PIPE TREATMENT SYMBOL".
3. ★3 : INSULATION
   ① R.W : ROCK WOOL ② G.C : GLASS CLOTH ③ C.S : PRE-FORMED CALCIUM SILICATE ④ G.C.F.: GLASS CLOTH COVERED WITH ALUMINIUM FOIL(0.3T)
4. ★4: NDE CAN BE APPLIED INSTEAD OF HYDRAULIC TEST UNDER AGREEMENT AND/OR APPROVAL, DETAIL METHOD IS MENTIONED ON PIPING GENERAL AND SPECIFICATION 1-(1)-2 FOR "TEST".
5. ★5 : THE PIPE JOINT EACH SYSTEM WILL BE DECIDED/SELECTED ACCORDING TO ACTUAL PIPING ARRANGEMENT FROM ONE OF THE TYPES MENTIONED IN PIPE JOINT TYPE COLUMN.
7. ★7 : TO BE INSULATED WITH GLASS CLOTH FOR FREQUENTLY TOUCHED PART.

6. ★6 : SHIP'S SIDE VALVE
   ① GENERAL VALVE
   - ≥50 : BODY : SC(RUBBER LINED) OR BC, STEM : SUS316L OR BS, DISC & SEAT : SUS316L OR BC
   - ≤40 : BODY : BC, STEM : BS, DISC & SEAT : BC
   ② BUTTERFLY VALVE FOR SHIPSIDE VALVE
   - BODY : CAST STEEL(FLANGE ), STEM : SUS316L, DISC : SUS316L, SEAT : NBR
   ③ THE MAIN COOL. S.W P/P TO CENT. F.W COOLER IN/OUTLET VALVES
   - BODY : CAST IRON, STEM : SUS316L, DISC : SUS316L, SEAT : NBR

PIPING DESIGN SPECIFICATION (PS7) (1/1)
(STEAM, FEED WATER & CONDENSATE SYSTEM) (MB101.70) (S22~S25)



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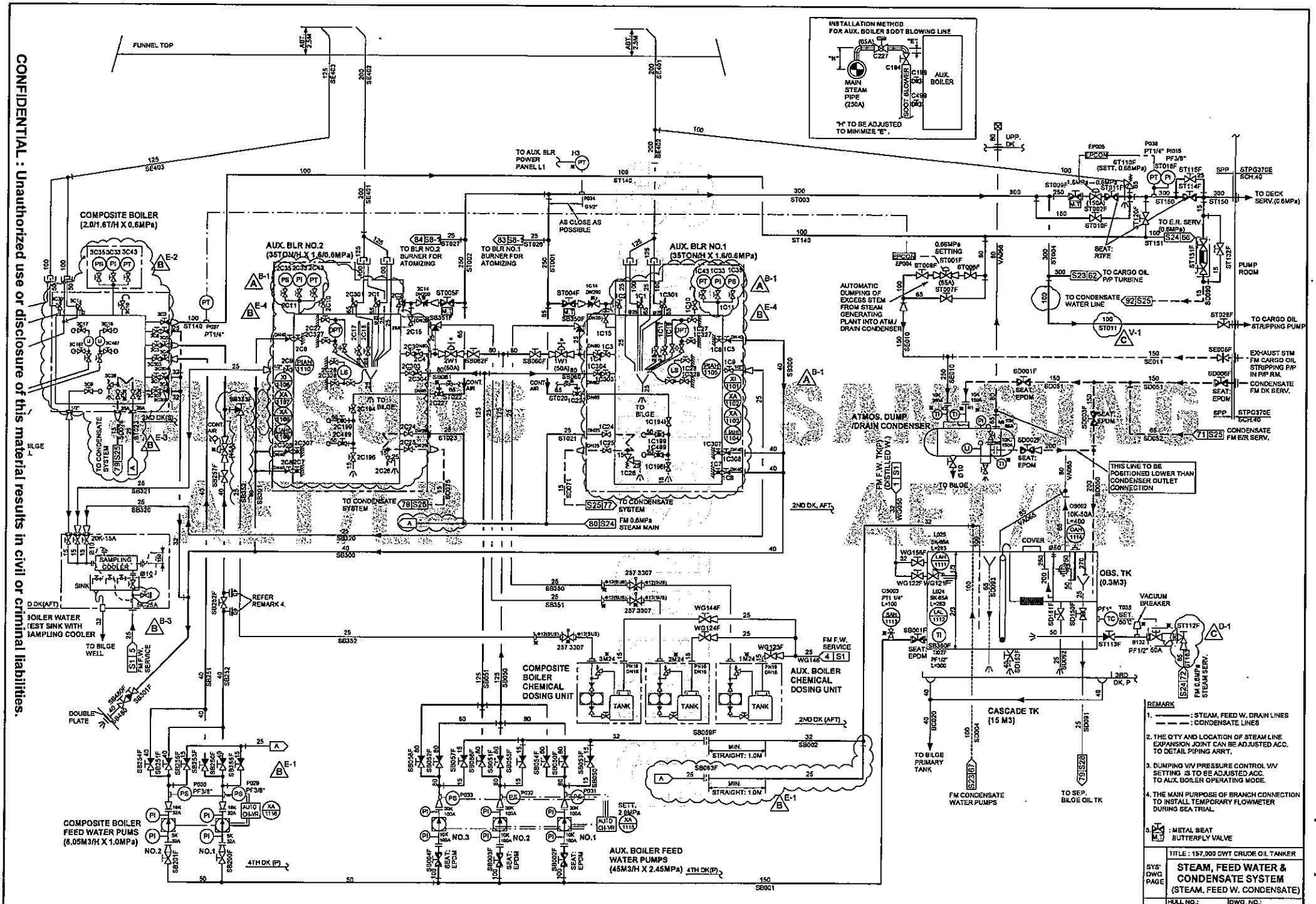
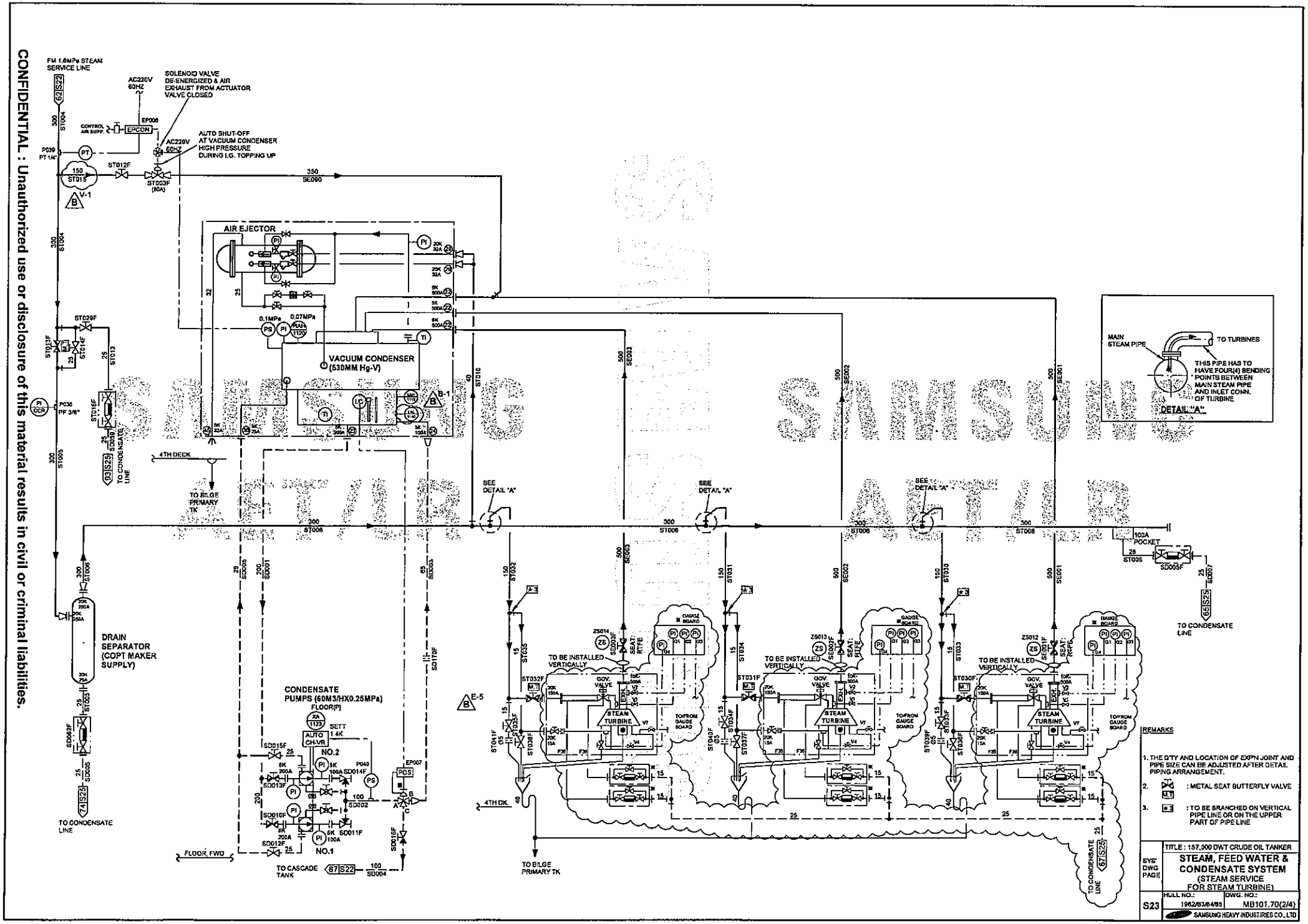







DWG. SIZE: A2(420X594)



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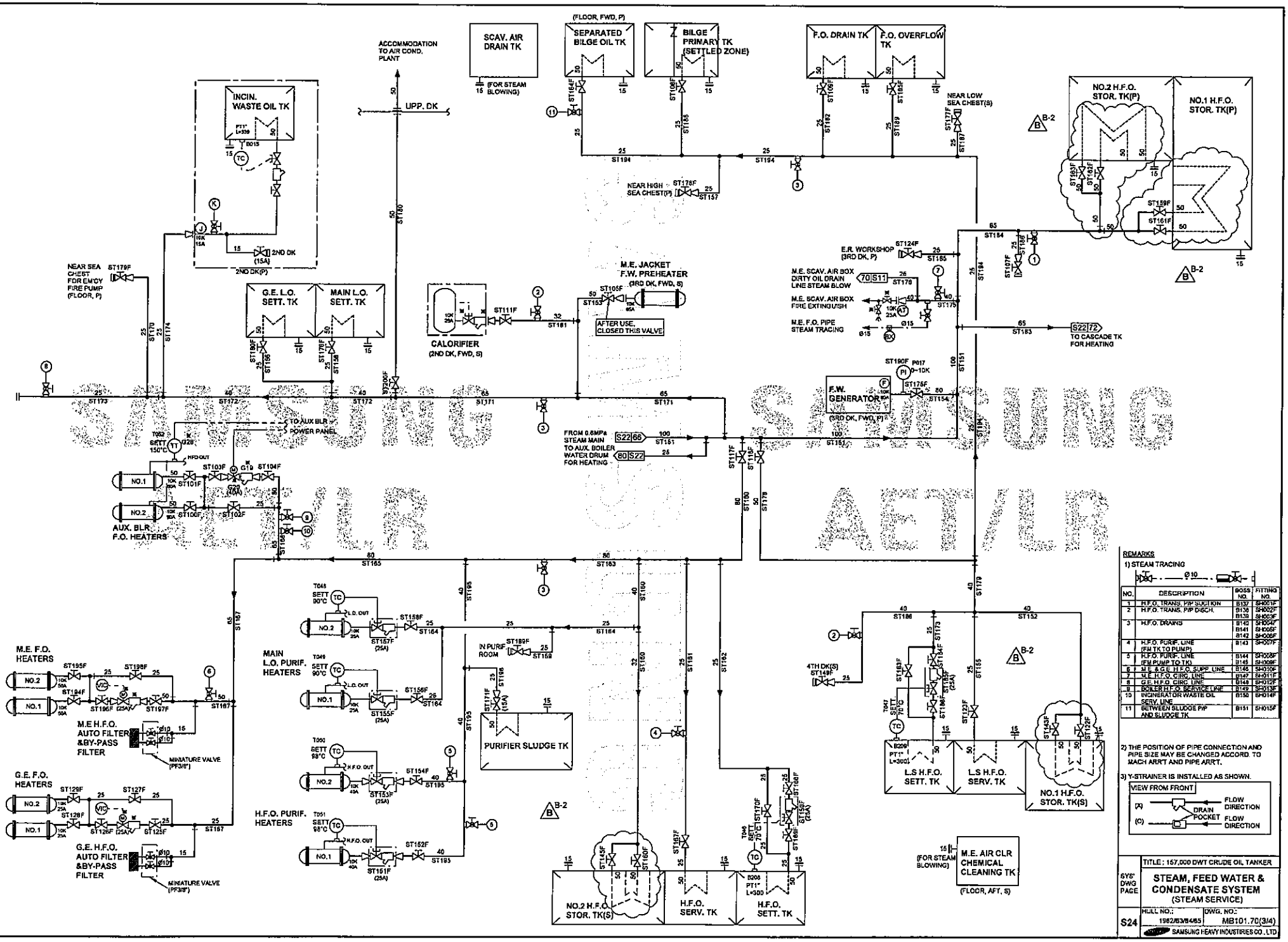
DWG. SIZE: A2(420X594)

조유호[삼관기공]2011-07-08

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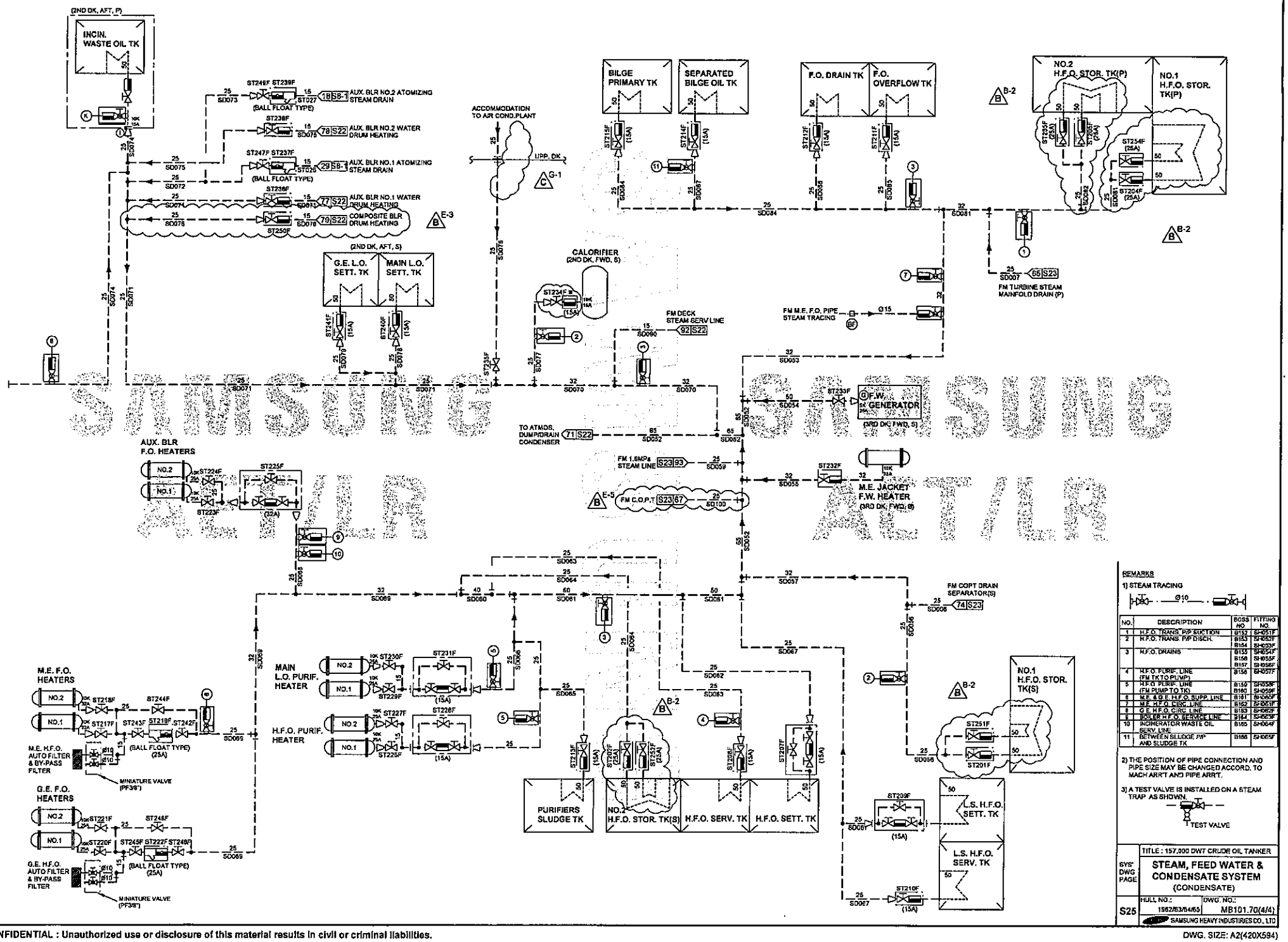


REMARKS

1) STEAM TRACING

| NO. | DESCRIPTION | BOSS NO. | FITTING NO. |
|---|---|---|---|
| 1 | H.F.O. TRANS. P/P SUCTION | B152 | SH-0651F |
| 2 | H.F.O. TRANS. P/P DISCH. | B153 | SH-0652F |
| | | B154 | SH-0653F |
| 3 | H.F.O. DRAINS | B155 | SH-0654F |
| | | B156 | SH-0655F |
| | | B157 | SH-0656F |
| 4 | H.F.O. PURIF. LINE (FM TK TO PUMP) | B158 | SH-0657F |
| 5 | H.F.O. PURIF. LINE (FM PUMP TO TK) | B159 | SH-0658F |
| 6 | M.E. & G.E. H.F.O. SUPP. LINE | B160 | SH-0659F |
| 7 | M.E. H.F.O. CIRC. LINE | B161 | SH-0660F |
| 8 | G.E. H.F.O. CIRC. LINE | B162 | SH-0661F |
| 9 | BOILER H.F.O. SERVICE LINE | B163 | SH-0662F |
| 10 | INCINERATOR WASTE OIL SERV. LINE | B164 | SH-0663F |
| 11 | BETWEEN SLUDGE P/P AND SLUDGE TK | B165 | SH-0664F |
| | | B166 | SH-0665F |

2) THE POSITION OF PIPE CONNECTION AND PIPE SIZE MAY BE CHANGED ACCORD. TO MACH ARRT AND PIPE ARRT.

3) A TEST VALVE IS INSTALLED ON A STEAM TRAP AS SHOWN.

TEST VALVE

| | |
|---|---|
| | TITLE : 157,000 DWT CRUDE OIL TANKER |
| SYS' DWG. PAGE | STEAM, FEED WATER & CONDENSATE SYSTEM (CONDENSATE) |
| S25 | HULL NO.: 1562/63/64/65 DWG. NO.: MB101.70(4/4) |
| | SAMSUNG HEAVY INDUSTRIES CO., LTD |

DWG. SIZE: A2(420X594)



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**PIPING DESIGN SPECIFICATION**
**(DESIGN CONDITION, APPLICATION OF PIPE, PIPE JOINT & VALVES)**

| HULL NO. | DWG NO. | SYSTEM DWG. PAGE |
|---|---|---|
| 1962/63/64/65 | MB101.80 | PS(8) (1/2) |

| SYSTEM | PIPE, VALVE & FITTING NO. | Work. Temp. [℃] | DESIGN PRESS. [MPa] Work | DESIGN PRESS. [MPa] MAX | CLASS(LR) | HYD. TEST [MPa] SHOP | HYD. TEST [MPa] ON-BOARD | PIPE SPECIFICATION N.D [A] | PIPE SPECIFICATION MATERIAL | PIPE SPECIFICATION THICK | PIPE SPECIFICATION TREAT. ★2 IN. | PIPE SPECIFICATION TREAT. ★2 OUT. | PIPE JOINT SPECIFICATION TYPE ★1 | PIPE JOINT SPECIFICATION RATE (JIS) | PIPE JOINT SPECIFICATION MATE -RIAL | INSULATION ★3 | VALVE SPECIFICATION N.D [A] | VALVE SPECIFICATION RATE (JIS) | VALVE SPECIFICATION MATERIAL BODY | VALVE SPECIFICATION MATERIAL STEM | VALVE SPECIFICATION MATERIAL DISC & SEAT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SYSTEM DWG. PAGE → S26~S28 | BILGE, FIRE, DECK WASH WATER & DRAIN SYSTEM | | | | | | | | | | | | | | | | | | | | |
| BILGE, FIRE & G/S PUMP DISCHARGE TO FIRE MAIN LINE | FD001-099 | 32 | 1.0 | 1.44 | III | - | 2.16 | ≥15 | STPG370-E | Sch 40 | AG | AG | F | 16K | SF440 | ★7 | ≥50 | 16K | FC (RUBBER LINED) | BS | BC |
| EMERGENCY FIRE PUMP SUCTION | FD100-109 | 32 | - | - | III | - | 0.4 | ≥15 | STPG370-E | Sch 80 | AG | AG | DS | 5K | SS400 | ★7 | ≥50<br>≤40 | 10K<br>16K | SC<br>BC | SUS<br>BS | SCS<br>BC |
| BILGE, FIRE & G/S P/P SUCTION FROM BILGE | BG001-099 | - | - | - | III | - | 0.4 | ≥15 | STPG370-E | Sch 40 | AG | AG | F | 5K | SS400 | ★7 | ≥50 | 5K | FC (TAR FREE EPOXY) | BS | BC |
| BILGE FIRE & G/S PUMP DISCHARGE TO BILGE OVERBOARD & A.P. TANK | BG100-199 | - | 0.4 | 0.45 | III | - | 0.68 | ≥15 | STPG370-E | Sch 40 | AG | AG | F | 10K | SS400 | ★7 | ≥50 (★5) | 10K | FC (TAR FREE EPOXY) | BS | BC |
| SLUDGE PUMP SUCTION & DISCHARGE | BG200-249 | - | 0.40 | 0.45 | III | - | Work. Cond. | ≥15 | STPG370-E | Sch 40 | A | AP | F | 5K | SS400 | - | ≥50<br>≤40 | 5K<br>5K | FC<br>BC | BS<br>BS | BC<br>BC |
| SLUDGE PUMP SUCTION WITH INSULATION. | BG250-299 | 50.0 | - | - | III | - | Work. Cond. | ≥15 | STPG370-E | Sch 40 | A | AP | F | 5K | SS400 | R.W /G.C | ≥50<br>≤40 | 5K<br>5K | FC<br>BC | BS<br>BS | BC<br>BC |
| BILGE PUMP SUCTION/DISCHARGE & BILGE DRAIN | BG300-399 | - | 0.3 | 0.35 | III | - | 0.53 | ≥15 | STPG370-E | Sch 40 | AG | AG | F | 5K | SS400 | - | ≥50<br>≤40 | 5K<br>5K | FC (TAR FREE EPOXY)<br>BC | BS<br>BS | BC<br>BC |
| BILGE DRAIN IN A.P. TK | BG400-409 | - | - | - | III | - | Work. Cond. | ≥65<br>≤50 | STPG370-E<br>STPG370-E | Sch 80<br>Sch 160 | AG | AG | SJW | - | - | - | - | - | - | - | - |
| WATER DRAINS, COAMING DRAINS & DECK SCUPPER | BD001-299 | - | - | - | III | - | Work. Cond. | ≥15 | SPP | Pipe Table | AG | AG | F/S ★5 | 5K | SS400 | - | ≥50<br>≤40 | 5K<br>5K | FC<br>BC | BS<br>BS | BC<br>BC |
| EXPOSED DK SCUPPER (ABOVE UPP. DECK) | BD300-399 | - | - | - | III | - | Work. Cond. | ≥15 | STPG370-E | Sch 40 | AG | AG | F/S ★5 | 5K | SS400 | - | ≥50<br>≤40 | 5K<br>5K | FC<br>BC | BS<br>BS | BC<br>BC |
| EXPOSED DK SCUPPER (BELOW UPP. DECK) | BD400-479 | - | - | - | III | - | Work. Cond. | ≥15 | STPG370-E | Sch 80 | AG | AG | F | 5K | SS400 | - | ≥50<br>≤40 | 5K<br>5K | FC<br>BC | BS<br>BS | BC<br>BC |
| F.O. DRAIN LINE | OF400-479 | - | - | - | III | - | Work. Cond. | ≥15 | SPP | Pipe Table | A | AP | F/S ★5 | 5K | SS400 | R.W /G.C ★8 | ≥50<br>≤40 | 5K<br>5K | FC<br>BC | BS<br>BS | BC<br>BC |
| D.O. DRAIN LINE | OD400-479 | - | - | - | III | - | Work. Cond. | ≥15 | SPP | Pipe Table | A | AP | F/S ★5 | 5K | SS400 | - | ≥50<br>≤40 | 5K<br>5K | FC<br>BC | BS<br>BS | BC<br>BC |
| L.O. DRAIN LINE | OL400-479 | - | - | - | III | - | Work. Cond. | ≥15 | SPP | Pipe Table | A | AP | F/S ★5 | 5K | SS400 | - | ≥50<br>≤40 | 5K<br>5K | FC<br>BC | BS<br>BS | BC<br>BC |
| -AIR VENT, OVERFLOW -SOUNDING (EXECPT OIL TANK INSIDE) | - VA001-099 - VS001-099 | - | - | - | III | - | Work. Cond. | ≥100<br>65, 80<br>≤50 | SPP<br>STPG370-E<br>STPG370-E | Pipe Table<br>Sch 40<br>Sch 80 | AG | AG | F/S ★5 | 5K | SS400 | - | - | - | - | - | - |
| -AIR VENT, OVERFLOW -SOUNDING (OIL TANK INSIDE) G-1 C | - VA220-249 - VS220-249 | - | - | - | III | - | Work. Cond. | ≥100<br>65, 80<br>≤50 | SPP<br>STPG370-E<br>STPG370-E | Pipe Table<br>Sch 40<br>Sch 80 | A | AA | F/S ★5 | 5K | SS400 | - | - | - | - | - | - |
| AIR PURGE LINE FOR REMOTE LEVEL GAUGE (A.P. TANK) | VS350-359 | - | - | - | III | - | Work. Cond. | ≥15 | SUS316L | Sch 80 | NO | NO | F/S ★5 | 5K | SUS316 | - | - | - | - | - | - |
| SHIP SIDE LINE FOR BILGE OVBD | BG480~499 | - | - | - | III | - | - | ≤300 | STPG370-S | 16.0t | TE | AP | F | 10K | SF440 | - | ★6 | | | | |
| SHIP SIDE LINE FOR AFTER DRAFT | VS480~499 | - | - | - | III | - | - | ≤125 | STS370-S | Sch 160 | TE | AP | F | 10K | SF440 | - | ★6 | | | | |

**REVISION HISTORY**

| Rev. No. | REVISED BY | Rev. No. | REVISED BY |
|---|---|---|---|
| A | -AUTHORITY REQUEST | F | -DETAIL CALCULATION BY YARD |
| B | -OWNER REQUEST | G | -OTHER DESIGN SECTION AT YARD |
| C | -CLASSFICATION REQUEST | M | -DESIGN MISTAKE |
| D | -DETAIL ARRANGEMENT AT YARD | V | -DESIGN IMPROVEMENT |
| E | -EQUIPMENT MAKER'S RECOMMEND. | | |

| ALT. NO. | REV. NO. | DESCRIPTION | SYS. PAGE |
|---|---|---|---|
| A | B-1 | - Steam blow connection for Em'cy fire pump sea chest was provided. | S26 |
| | B-2 | - Water drain connection was provided for M.E L.O SETT. TK. | S28 |
| B | C-1 | - The hopper and valve were provided on Oily water separator recirculation line. | S26 |
| | D-1 | - Interanl overflow connection was changed due to narrow of tank inside. | S27 |
| | D-2 | - Drain line for sunken part of Purifier room was provided. | S27 |
| | E-1 | - Maker drawing for Oily Water Separator was changed and the relevant pipe line size was changed. | S26 |
| | E-2 | - Drain scuppers for G.Es were provided. | S27 |
| | E-3 | - Following G.E. drain line was identified.<br>- L.O. drain (D8)<br>- Crank case drain(D7)<br>- Oil vapour discharger drain(D3) | S28 |
| | V-1 | - The sounding pipe size of following tanks was increased to 50A from 40A.<br>- SEP. bilge oil tank.<br>- Bilge holding tank<br>- A.P. tank. | S26 |
| | V-2 | - The sounding pipe size of cofferdam was changed to 50A from 40A. | S26 |
| C | D-1 | - The valve type was change to stop valve and swing check valve instead of screw down stop check valve. | S26 |
| | D-2 | - The relevant pipe line of Bilge, fire &G/S pumps suction/discharge was modified as per actaul arrangement. | S26 |
| | E-1 | - Following item of Oily Water Separater was changed as below.<br>- Dry running protection of oily water separater pump was provided.<br>- Common drain pipe size was changed to DN40 from DN50. | S26 |
| | G-1 | - Pipe specification of Air purge line for remote level gauge (A.P. tank) was changed as below.<br>- Pipe material: STPG370E→SUS316L.<br>- Pipe treatment: AG→NO.<br>- Pipe joint meaterial: SS400→SUS316 | PS(8) |
| | V-1 | - Drain line for A.P. tank was provided. | S26 |

**PIPING DESIGN SPECIFICATION (PS8) (1/2)**
**(BILGE, FIRE, DECK WASH WATER & DRAIN SYSTEM) (S26~S28)**



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# PIPING DESIGN SPECIFICATION
## (DESIGN CONDITION, APPLICATION OF PIPE, PIPE JOINT & VALVES)

| HULL NO. | DWG NO. | SYSTEM DWG. PAGE |
|---|---|---|
| 1962/63/64/65 | MB101.80 | PS(8) (2/2) |

| SYSTEM | PIPE, VALVE & FITTING NO. | Work. Temp. [℃] | DESIGN PRESS. [MPa] Work | DESIGN PRESS. [MPa] MAX | CLASS(DNV) | HYD. TEST [MPa] SHOP | HYD. TEST [MPa] ON-BOARD | PIPE SPECIFICATION N.D [A] | MATE -RIAL | THICK | TREAT. ★2 IN. | TREAT. ★2 OUT. | PIPE JOINT SPECIFICATION TYPE ★1 | RATE (JIS) | MATE -RIAL | INSULATION ★3 | VALVE SPECIFIACTION N.D [A] | RATE (JIS) | MATERIAL BODY | MATERIAL STEM | MATERIAL DISC & SEAT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SYSTEM DWG. PAGE S26~S28 | BILGE, FIRE, DECK WASH WATER & DRAIN SYSTEM | | | | | | | | | | | | | | | | | | | | |

| REVISION HISTORY | | | |
|---|---|---|---|
| Rev. No. | REVISED BY | Rev. No. | REVISED BY |
| A | -AUTHORITY REQUEST | F | -DETAIL CALCULATION BY YARD |
| B | -OWNER REQUEST | G | -OTHER DESIGN SECTION AT YARD |
| C | -CLASSFICATION REQUEST | M | -DESIGN MISTAKE |
| D | -DETAIL ARRANGEMENT AT YARD | V | -DESIGN IMPROVEMENT |
| E | -EQUIPMENT MAKER'S RECOMMENDATION | | |

| ALT. NO. | REV. NO. | DESCRIPTION | SYS. PAGE |
|---|---|---|---|

☞ REMARKS :

1. ★1 : TYPE OF PIPE JOINTS
   ① F: FLANGE ② S: SLEEVE ③B: BUTT WELDING ④ U: BITE UNION ⑤ SWF: SOCKET WELD FLANGE ⑥ SJW: SOCKET JOINT WELD ⑦ NF: NECK WELD FLANGE
   ⑧ LF: L-TYPE SLIP ON FLANGE ⑨ SF: SQUARE FLANGE ⑩ DS: DOUBLE SLEEVE
2. ★2 : REFER TO PIPING GENERAL 1-(3)-4), FOR "PIPE TREATMENT SYMBOL".
3. ★3 : INSULATION
   ① R.W : ROCK WOOL ② G.C : GLASS CLOTH ③ C.S : PRE-FORMED CALCIUM SILICATE ④ G.C.F.: GLASS CLOTH COVERED WITH ALUMINIUM FOIL(0.3T)
4. ★4: NDE CAN BE APPLIED INSTEAD OF HYDRAULIC TEST UNDER AGREEMENT AND/OR APPROVAL, DETAIL METHOD IS MENTIONED ON PIPING GENERAL AND SPECIFICATION 1-(1)-2 FOR "TEST".
5. ★5 : THE PIPE JOINT EACH SYSTEM WILL BE DECIDED/SELECTED ACCORDING TO ACTUAL PIPING ARRANGEMENT FROM ONE OF THE TYPES MENTIONED IN PIPE JOINT TYPE COLUMN.
7. ★7: SEA WATER PIPE LINE RUNNING ABOVE THE ELECTRIC EQUIPMENT SHALL HAVE A SWEAT PROTECTION OF FIBER GLASS WOOL CLOTH.
8. ★8: ONLY HORIZONTAL INSTALLED DRAIN PIPES TO BE STEAM TRACED AND INSULATED.

6. ★6 : SHIP'S SIDE VALVE
   ① GENERAL VALVE
   - ≥50 : BODY : SC(RUBBER LINED) OR BC, STEM : SUS316L OR BS, DISC & SEAT : SUS316L OR BC
   - ≤40 : BODY : BC, STEM : BS, DISC & SEAT : BC

   ② BUTTERFLY VALVE FOR SHIPSIDE VALVE
   - BODY : CAST STEEL(FLANGE), STEM : SUS316L, DISC : SUS316L, SEAT : NBR

   ③ THE MAIN COOL. S.W P/P TO CENT. F.W COOLER IN/OUTLET VALVES
   - BODY : CAST IRON, STEM : SUS316L, DISC : SUS316L, SEAT : NBR

9. CALCULATION SHEET FOR SLUDGE TANKS AND PUMP CAPACITY
   (MARPOL 73/78ANNEX I REG. 17 (1) (2).): It shall be applied to all vessels keel-laid on or after 31st December 1990.

1) SLUDGE TANK CAPACITY

FORMULA : $V1 = K1 \times C \times D$ ($m^3$)

where : K1 = 0.015 ( Heavy fuel oil is purified for main engine )

C = Daily fuel oil consumption = $[(a \times b \times 1.03)/(10^6 \times g) \times h]$ = 63.1 ($m^3$/day)

where : a = Main engine kW at N.C.R ( 14,760 kW )

b = F.O. consumption rate ( 169.5 g/kW.h )

h = Running hour per day ( 24 Hr )

g = Fuel oil specific gravity ( 0.98 )

D = Precise data of maximum length of voyage

= ( 18,500 miles / 15.9 knots ) / 24 Hr = 48.5 days

Note : Incinerator will be provided.

( i.e., 50% volume applied of calculated volume )

so, V1 = ( 0.015 × 63.1 × 48.5 days ) / 2 = 23.0 $m^3$

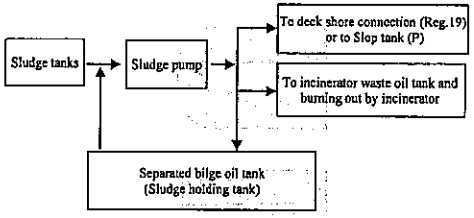
Therefore, the sludge tanks and volume will be applied as follows.

| NO. | TANK | VOLUME | REMARKS |
|---|---|---|---|
| 1 | PURIFIER SLUDGE TANKS | 14.5 $m^3$ | |
| 2 | WASTE OIL TANKS FOR INCINERATOR | 1.5 $m^3$ | |
| 3 | SEPARATED BILGE OIL TANKS | 26.4 $m^3$ | |
| | *SUM.* | *42.4 $m^3$* | *184%* |

2) PUMP CAPACITY AND HEAD

PUMP CAPACITY WHICH *10 $m^3$/H x 0.4MPa.* WILL BE APPLIED IN ACCORDANCE WITH BUILDING SPECIFICATION.

For your reference, the sludge pumping condition is as follows :




10. SIZE OF MAIN BILGE LINE AND BRANCH BILGE LINE (ACCORDING TO Pt.5, Ch.13 Sec.5, 5.1/5.2 & 5.4 of LRS RULES)

1) SIZE OF E.R. BRANCH BILGE LINE

$D_s = 2.15\sqrt{l(B+D)} + 25$

$= 2.15\sqrt{24.8(49+23.3)} + 25$

$= 116$

PROPOSED 125A (I.D 126.6 mm)

2) SIZE OF E.R. MAIN BILGE LINE

$d_m = \sqrt{2} \times D_s$

$= \sqrt{2} \times 116$

$= 164$

PROPOSED 200A (I.D 199.9 mm)

11. CAPACITY OF MAIN BILGE PUMP (ACCORDING TO Pt.5 Ch.13 Sec.6, 6.3 of LRS RULES)

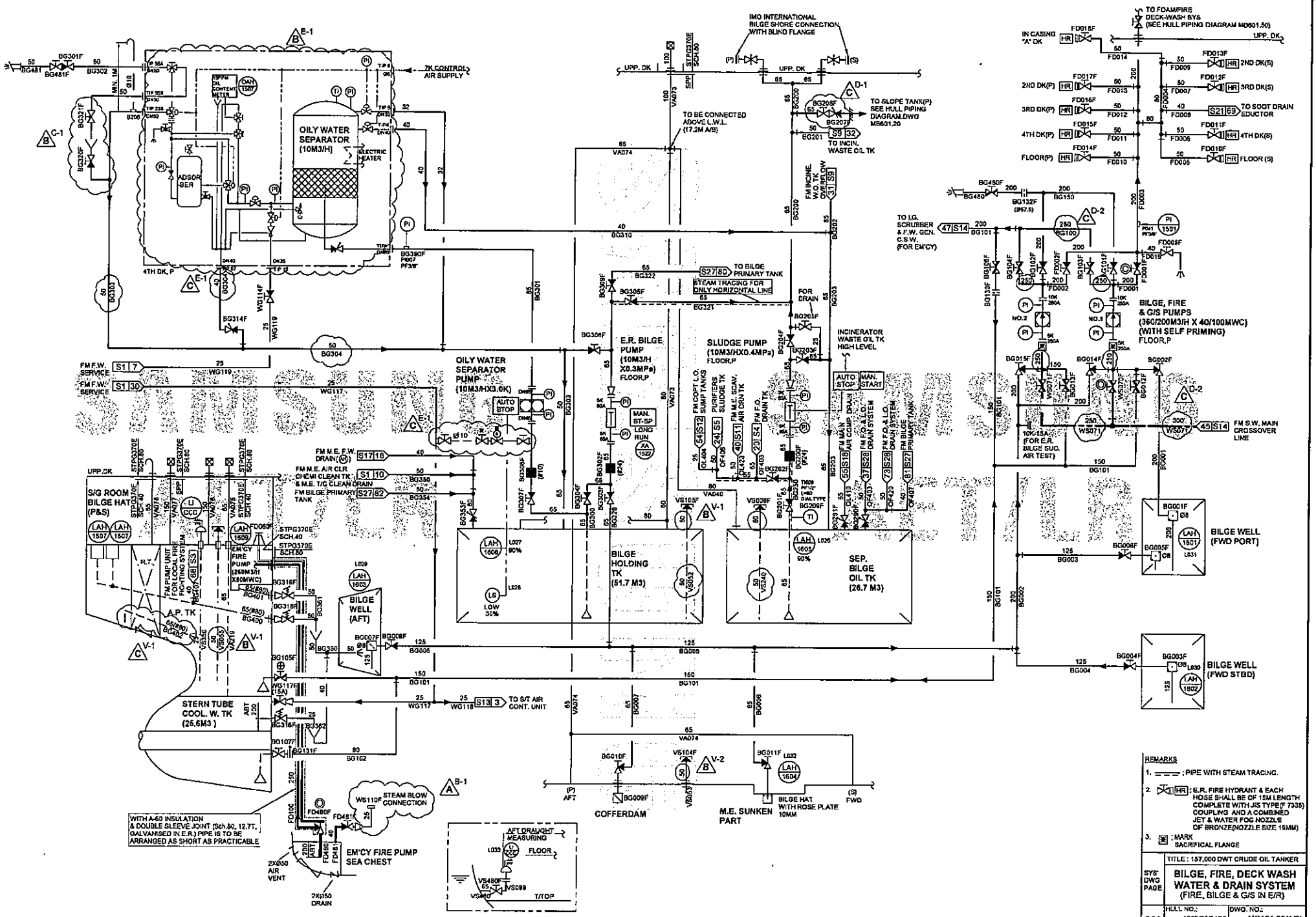
$Q = 5.75 \times d_m^2 / 10^3$

$= 5.75 \times 164^2 / 10^3$

$= 154.7$

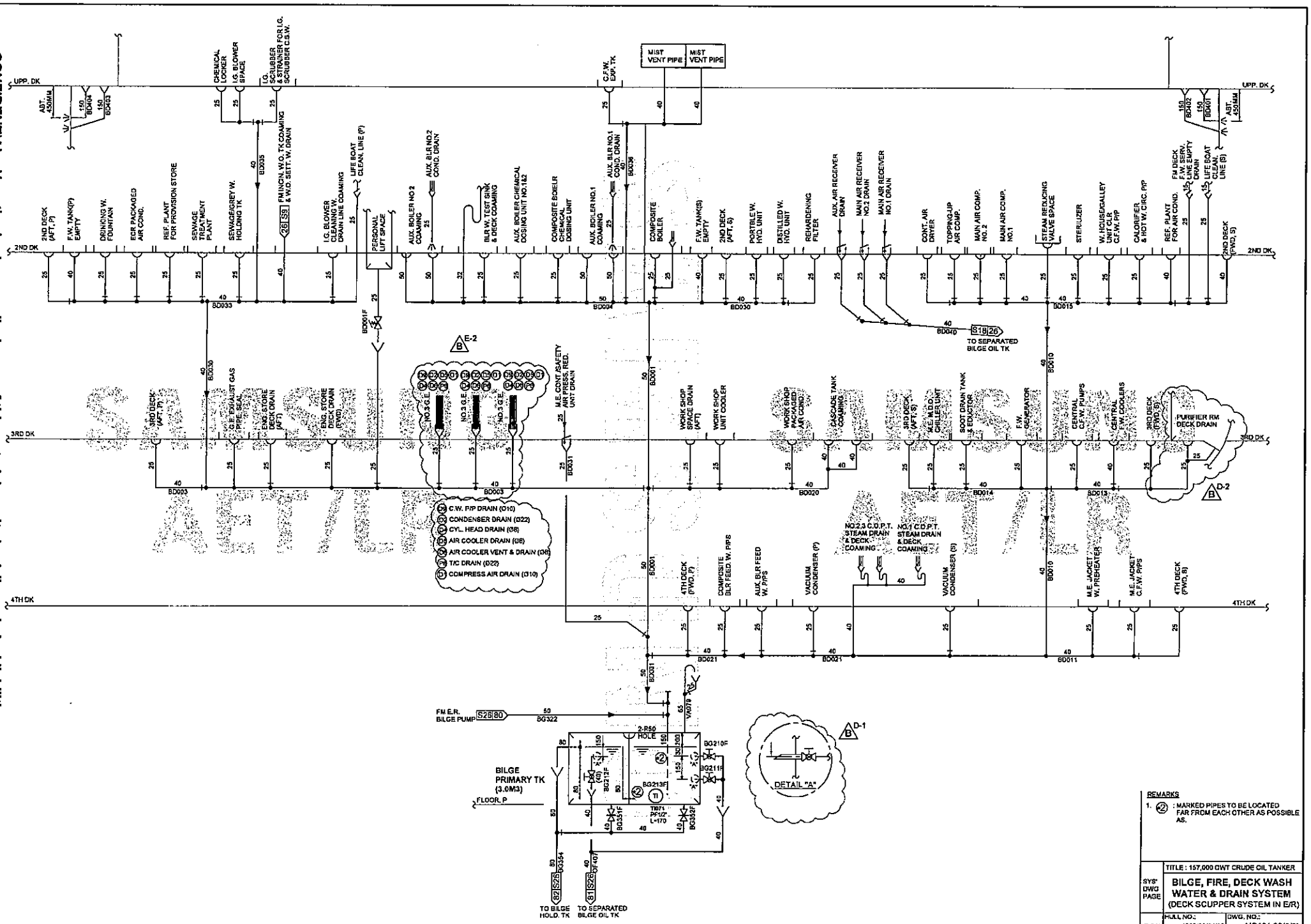
PROPOSED 360 M³/H X 2 SETS

PIPING DESIGN SPECIFICATION (PS8) (2/2)
(BILGE, FIRE, DECK WASH WATER & DRAIN SYSTEM) (S26~S28)






DWG. SIZE: A2(420X594)



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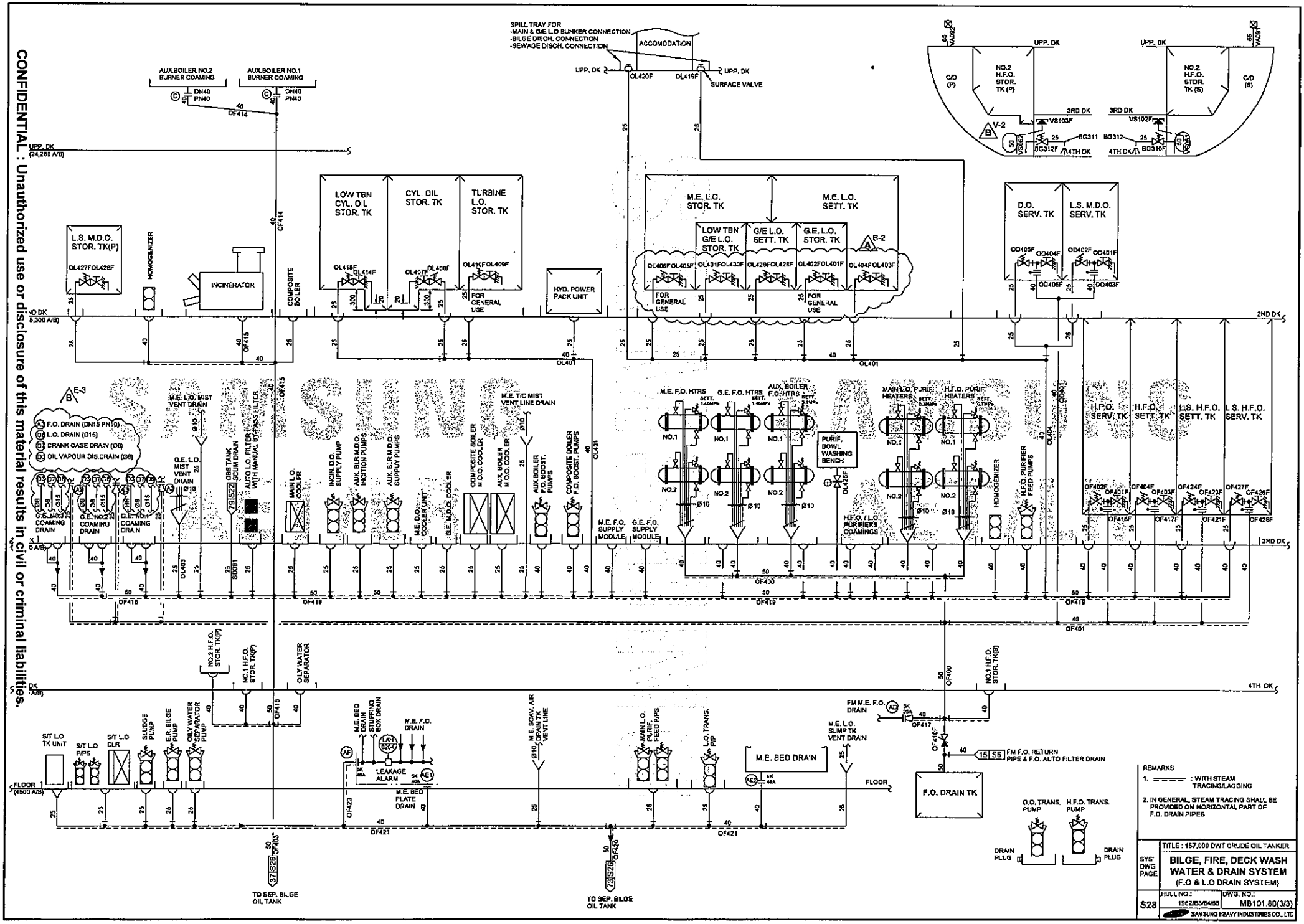
DWG. SIZE: A2(420X594)



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DWG. SIZE: A2(420X594)

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# PIPING DESIGN SPECIFICATION
## (DESIGN CONDITION, APPLICATION OF PIPE, PIPE JOINT & VALVES)

| HULL NO. | DWG NO. | SYSTEM DWG. PAGE |
|---|---|---|
| 1962/63/64/65 | MB601.84 ~ 87 | PS(9) |

| SYSTEM | PIPE, VALVE & FITTING NO. | Work. Temp. [℃] | DESIGN PRESS. [MPa] Work | DESIGN PRESS. [MPa] MAX | CLASS(LR) | HYD. TEST [MPa] SHOP | HYD. TEST [MPa] ON-BOARD | PIPE SPECIFICATION N.D [A] | MATERIAL | THICK | TREAT. ★2 IN. | TREAT. ★2 OUT. | PIPE JOINT SPECIFICATION TYPE ★1 | RATE (JIS) | MATE -RIAL | INSULATION ★3 | VALVE SPECIFIACTION N.D [A] | RATE (JIS) | MATERIAL BODY | MATERIAL STEM | MATERIAL DISC & SEAT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SYSTEM DWG. PAGE : S29 ~ S32 | MISCELLANEOUS SYSTEM | | | | | | | | | | | | | | | | | | | | |
| AIR COND. & REF. PROV. PLANT SYSTEM (E-2, B) | RF001-099 | 40.0 | - | 2.2 | II | 3.3 ★4 | Work. Cond. | ≥15 | COPPER (C1220T) | Pipe Table 30K | NO | NO | SJW | - | YBSC2/BR ASS | R.W(50mm)/G. C with alum. foil | - | - | - | - | - |
| I.G. UPTAKE PIPE TO I.G. SCRUBBER | GE001-099 | MAX. 400 | - | - | III | - | Work. Cond. | ≥550 | STEEL PLATE WELDED | 6t | NO | NO | F/S/B ★5 | SHI's pratice | SS400 | R.W / Galv. Steel Sheet | - | - | - | - | - |
| I.G. UPTAKE PIPE (FROM I.G. SCRUBBER TO I.G. BLOWER) | GE300-329 | 35 | - | - | III | - | Work. Cond. | ≥300 | STPG370-E | 9.5t | TE ★7 | AP | F/S ★5 | 5K | SS400 | - | - | - | - | - | - |
| | | | | | | | | ≤250 | STPG370-E | Sch 40 | | | | | | | | | | | |
| | | | | | | | | ≤125 | STPG370-E | Sch 40 | AG | AG | | | | | | | | | |
| I.G. VENT TO ATMOSPHERE (B-2, C) | GE330-349 | 35 | - | - | III | - | Work. Cond. | ≥300 | STPG370-E | 9.5t | TE ★7 | AP | F/S ★5 | 5K | SS400 | - | - | - | - | - | - |
| M.E. M.D.O. CHILLER UNIT COOLING | RL001-019 | - | 0.2 | 0.4 | III | | - | ≥15 | SPP | Pipe Table | A | AP | F | 5K | SS400 | R.W./G.C with alum. foil | - | - | - | - | - |
| OXYGEN | OX001-019 | - | 1.0 | 2.0 | II | - | 3.0 | ≥15 | STPG370-S | Sch 40 | A | AP | B/SJW ★5 | - | - | - | - | - | - | - | - |
| ACETYLENE | AH001-019 | - | 0.15 | 0.2 | III | - | 0.3 | ≥15 | STPG370-S | Sch 40 | A | AP | B/SJW ★5 | - | - | - | - | - | - | - | - |
| FOAM FIRE FIGHTING SYSTEM IN E/R | FM001-099 | - | - | - | III | - | 0.7MPa air blowing | ≥20 | STPG370-E | Sch 40 | AG | AG | F/S ★5 | 10K | SS400 | - | ≥50 ≤40 | 10K 16K | FC BC | BS BS | BC BC |
| HYD. OIL LINE FOR V/V CONTROL SUPPLY (G-1/M-1, C) | HG001-009 | - | 13.0 | 14.3 | I | 21.5 ★4 | Functional test | ≥15 | STPG370-S | Sch 80 | PPT | AP | SWF | 210K | SF440 | - | - | - | - | - | - |
| HYD. OIL LINE FOR V/V CONTROL RETURN | HG010-020 | - | 0.6 | 1.0 | II | 1.5 | Functional test | ≤65 | STPG370-E | Sch 80 | PPT | AP | F | 10K | SS400 | - | - | - | - | - | - |
| HYD. OIL LINE FOR DECK MACH. SUPPLY | HG021-029 | - | 21.4 | 24.5 | I | 36.8 ★4 | Functional test | ≥15 | STPGS370-S | Sch 160 | PPT | AP | SWF | 280K | SF440 | - | - | - | - | - | - |
| HYD. OIL LINE FOR DECK MACH. RETURN | HG030-039 | - | 0.7 | 1.0 | II | 1.50 | Functional test | ≤65 | STPG370-E | Sch 80 | PPT | AP | F | 10K | SS400 | - | - | - | - | - | - |

☞ REMARKS :

1. ★1 : TYPE OF PIPE JOINTS
   ① F: FLANGE ② S: SLEEVE ③B: BUTT WELDING ④ U: BITE UNION ⑤ SWF: SOCKET WELD FLANGE ⑥ SJW: SOCKET JOINT WELD ⑦ NF: NECK WELD FLANGE ⑧ LF: L-TYPE SLIP ON FLANGE ⑨ SF: SQUARE FLANGE
2. ★2 : REFER TO PIPING GENERAL I-(3)-4), FOR "PIPE TREATMENT SYMBOL".
3. ★3 : INSULATION
   ① R.W : ROCK WOOL ② G.C : GLASS CLOTH ③ C.S : PRE-FORMED CALCIUM SILICATE ④ G.C.F.: GLASS CLOTH COVERED WITH ALUMINIUM FOIL(0.3T)
4. ★4: NDE CAN BE APPLIED INSTEAD OF HYDRAULIC TEST UNDER AGREEMENT AND/OR APPROVAL, DETAIL METHOD IS MENTIONED ON PIPING GENERAL AND SPECIFICATION I-(1)-2 FOR "TEST".
5. ★5 : THE PIPE JOINT EACH SYSTEM WILL BE DECIDED/SELECTED ACCORDING TO ACTUAL PIPING ARRANGEMENT FROM ONE OF THE TYPES MENTIONED IN PIPE JOINT TYPE COLUMN.
7. ★7: TAR FREE EPOXY COATING, 2 COATS x150μ

6. ★6 : SHIP'S SIDE VALVE
   ① GENERAL VALVE
   - ≥50 : BODY : SC(RUBBER LINED) OR BC, STEM : SUS316L OR BS, DISC & SEAT : SUS316L OR BC
   - ≤40 : BODY : BC, STEM : BS, DISC & SEAT : BC

   ② BUTTERFLY VALVE FOR SHIPSIDE VALVE
   - BODY : CAST STEEL(FLANGE ), STEM : SUS316L, DISC : SUS316L, SEAT : NBR

   ③ THE MAIN COOL S.W P/P TO CENT. F.W COOLER IN/OUTLET VALVES
   - BODY : CAST IRON, STEM : SUS316L, DISC : SUS316L, SEAT : NBR

## REVISION HISTORY

| Rev. No. | REVISED BY | Rev. No. | REVISED BY |
|---|---|---|---|
| A | -AUTHORITY REQUEST | F | -DETAIL CALCULATION BY YARD |
| B | -OWNER REQUEST | G | -OTHER DESIGN SECTION AT YARD |
| C | -CLASSFICATION REQUEST | M | -DESIGN MISTAKE |
| D | -DETAIL ARRANGEMENT AT YARD | V | -DESIGN IMPROVEMENT |
| E | -EQUIPMENT MAKER'S RECOMMEND. | | |

| ALT. NO. | Rev. NO. | DESCRIPTION | SYS. PAGE |
|---|---|---|---|
| B | E-1 | - Internal drawing of Ref. provision plant and Air condition plant was changed. | S29 |
| | E-2 | - Following pipe design specification was changed.<br>- M.E. M.D.O. Chiller unit cooling<br>- Air cond. & Ref. Prov. plant system<br>- Oxygen, Acetylene<br>- Hyd. oil line for valve control return<br>- Hyd. oil line for deck Mach. supply | PS(9),S31 |
| | E-3 | - The relevant drawing for M.E. M.D.O. Chiller unit was changed. | S31 |
| | E-4/G-1 | - Pipe line size of High expansion foam fire extinguishing system was incresed as below.<br>- To Engine Room: 200A from 150A.<br>- Through Engine Room to Pump Room: 100A from 65A. | S32 |
| | E-5/M-1 | - The vent line of safety for Acetylene/Oxygen bottle was provided. | S32 |
| C | B-1 | - I.G.Scrubber inlet exhaust gas pressure remote indication was provided in CCR. | S30 |
| | B-2 | - Design pressure of M.E. M.D.O. Chiller unit was changed. | PS(9) |
| | E-1 | - Following item was provided by builder instead of maker.<br>- two(2) valves from M.D.O cooler outlet to evaporator.<br>- two(2) valves & pressure gauge on cooling water to condenser. | S31 |
| | E-2 | - Maker recommendation for foam generator arrangement was indicated. | S32 |
| | G-1/M-1 | - Hyd. test for Hyd. oil line was changed to functional test. | PS(9) |

PIPING DESIGN SPECIFICATION (PS9) (1/1)
(MISCELLANEOUS SYSTEM) (S29~S32)



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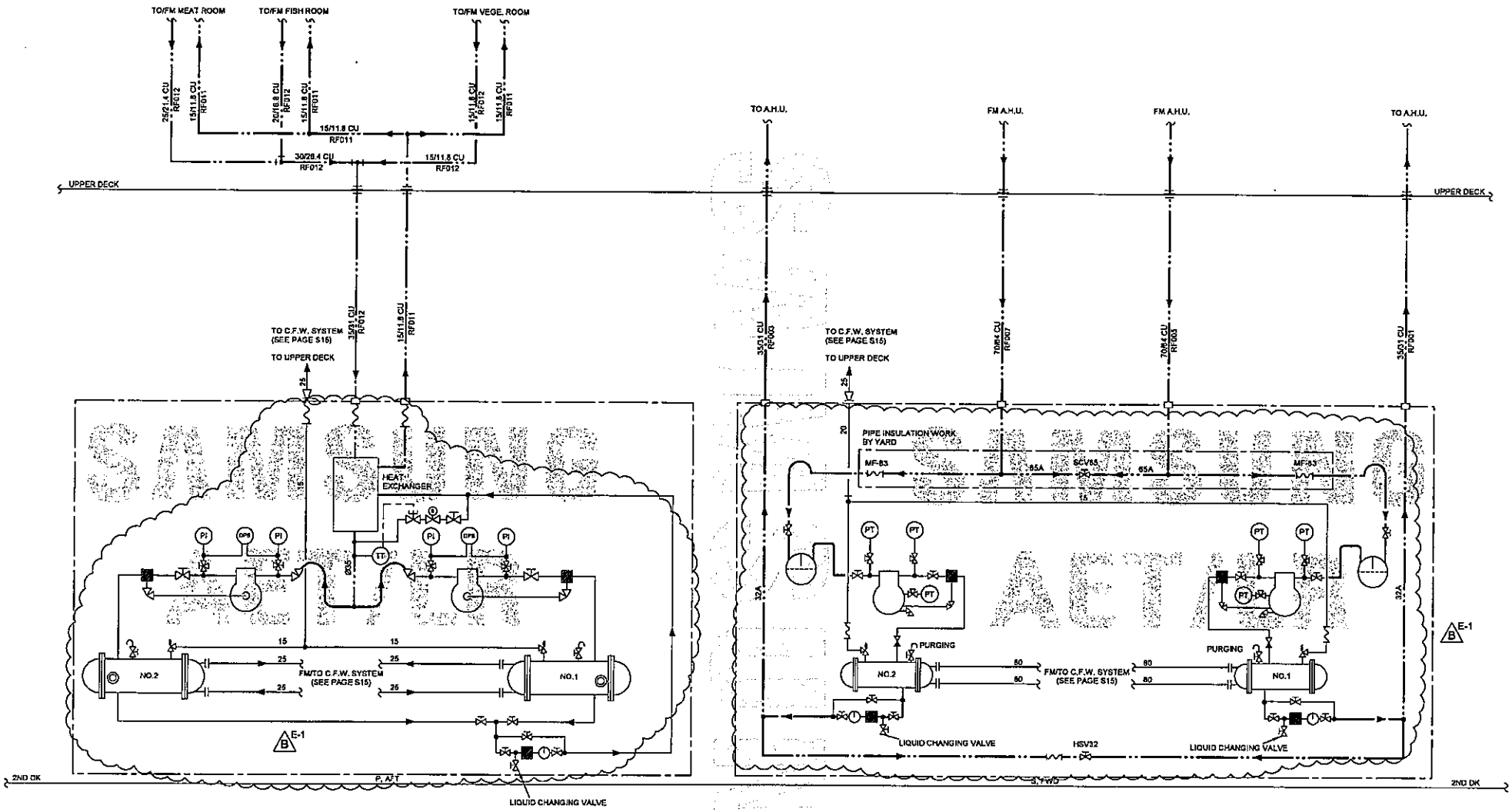



REFRIGERANT DIAGRAM FOR REF. PROVISION PLANT

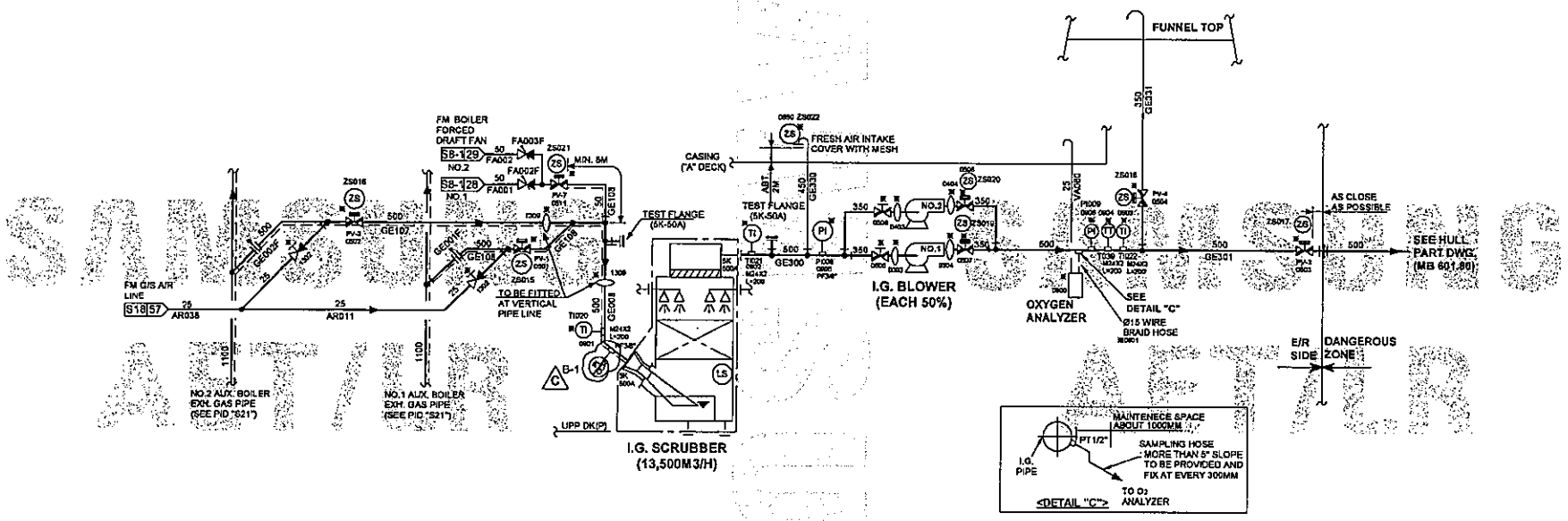
REFRIGERANT DIAGRAM FOR AIR CONDITIONING PLANT

REMARKS
1. ——·——·—— : REFRIGERANT PIPE WITH INSULATION

| SYS' DWG PAGE | TITLE : 157,000 DWT CRUDE OIL TANKER<br>MISCELLANEOUS SYSTEM<br>(AIR COND. & REF. RROV. PLANT REFIGENANT) | |
|---|---|---|
| S29 | HULL NO.: 1962/63/64/65 | DWG. NO.: ME601.84 |
| | SAMSUNG HEAVY INDUSTRIES CO., LTD | |



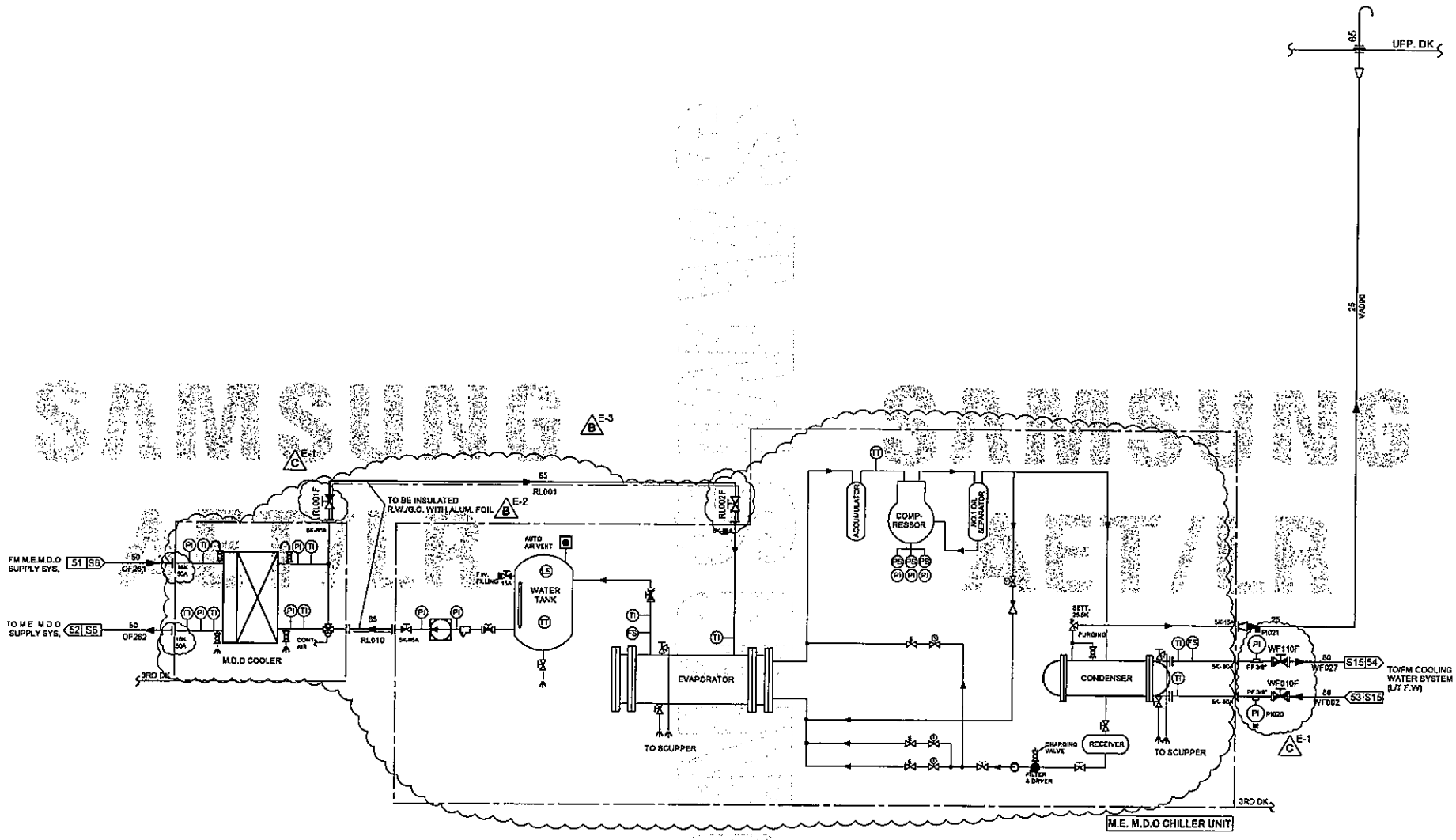
DWG. SIZE: A2(420X594)




| | |
|---|---|
| SYS' DWG PAGE | TITLE : 157,000 DWT CRUDE OIL TANKER |
| | MISCELLANEOUS SYSTEM (INERT GAS SYSTEM) |
| S30 | HULL NO.: 1662/63/64/65 |
| | DWG. NO.: MB801.85 |
| | SAMSUNG HEAVY INDUSTRIES CO., LTD |



DWG. SIZE: A2(420X594)




| | |
|---|---|
| SYS' DWG PAGE | TITLE : 157,000 DWT CRUDE OIL TANKER |
| | M.E. M.D.O. CHILLER UNIT SYSTEM |
| S31 | HULL NO.: 1962/63/64/65 |
| | DWG. NO.: MB601.66 |
| | SAMSUNG HEAVY INDUSTRIES CO., LTD |

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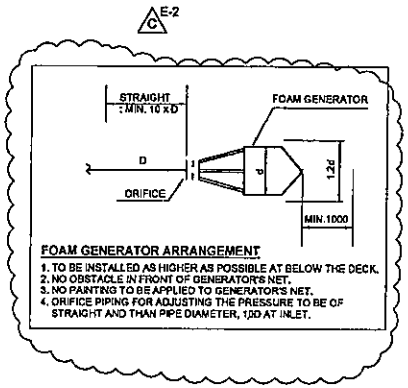
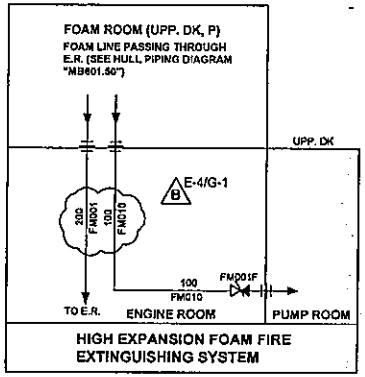
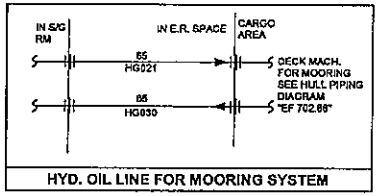
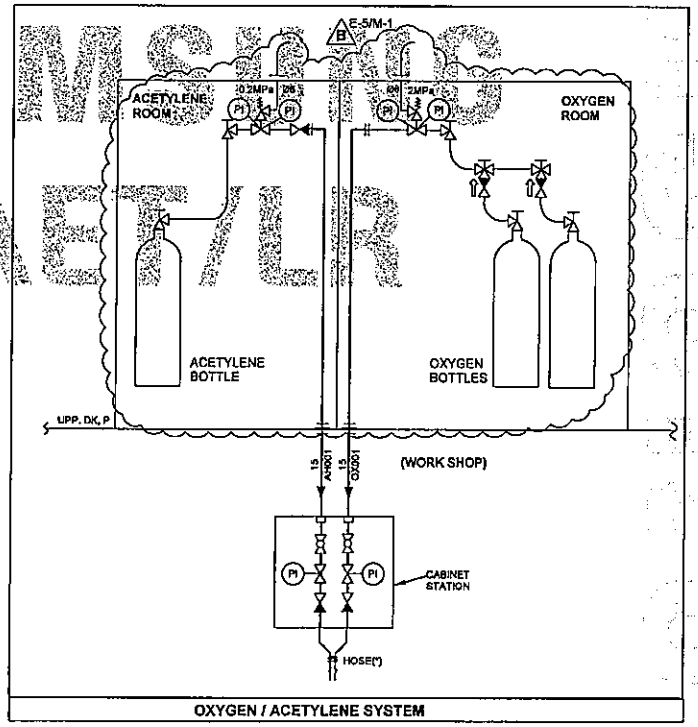
DWG. SIZE: A2(420X594)

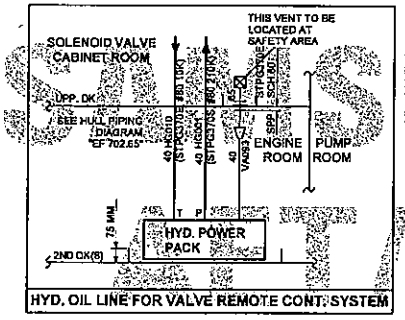
조윤호[삼광기공]2011-07-08






| | | |
|---|---|---|
| SYS' DWG PAGE | TITLE : 157,000 DWT CRUDE OIL TANKER<br>MISCELLANEOUS SYSTEM<br>(OX/AC, HYD. OIL & FOAM FIRE FIGHTING) | |
| S32 | HULL NO.: 1982/83/84/85 | DWG. NO.: MB601.87 |
| | SAMSUNG HEAVY INDUSTRIES CO., LTD | |