CERTIFICATES OF COMPETENCY IN THE MERCHANT NAVY - MARINE ENGINEER OFFICER

EXAMINATIONS ADMINISTERED BY THE
SCOTTISH QUALIFICATIONS AUTHORITY
ON BEHALF OF THE
MARITIME AND COASTGUARD AGENCY

STCW 78 as amended MANAGEMENT ENGINEER REG. III/2 (UNLIMITED)

040-36 - ENGINEERING, DRAWING AND SHIP SYSTEMS

WEDNESDAY, 13 DECEMBER 2017

1315 - 1615 hrs

Examination paper inserts:

DRG - 020
DRG - 021
DRG - 022
DRG - 030
DRG - 038

Notes for the guidance of candidates:

1. Non-programmable calculators may be used.
2. All formulae used must be stated and the method of working and ALL intermediate steps must be made clear in the answer.

Materials to be supplied by colleges:

ENGINEERING, DRAWING AND SHIP SYSTEMS

Attempt ALL questions

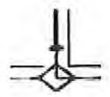
Marks for each part question are shown in brackets

Section A

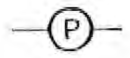
1. Piping Systems - DRG. 020

Describe the device, stating its functions for EACH of the following symbols:

(a) (2)



(b) (2)



(c) (2)

(d) (2)

(e) (2)

2. Mechanical Assembly - DRG 021

(a) State the device and describe the function of 503; (2)

(b) State the device and describe the function of 235; (2)

(c) State the device and describe the function of 020; (2)

(d) Identify the main casing sections that make up the pump assembly. (4)

[OVER

3. Ship's Construction Drawing - DRG 022

(a) State the frame numbers at which the fore and aft engine room bulkheads are located. (2)

(b) Identify, using frame numbers, the start of the flat bottom of the hull. (2)

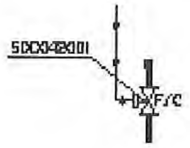
(c) State the depth of the double bottom tanks in the engine room. (2)

(d) State the specification of the main plate sections used on the flat bottom of the hull ford between frame 40 and 54. (2)

(e) State the maximum sounding of the aft peak W.B. tank. (2)

4. Hydraulic and Pneumatic System Drawings - DRG 030

(a) Describe the following device, stating its function: (2)



(b) Describe the location of any pressure alarms on the control air system. (2)

(c) Detail the possible sources of supply for the control air system. (2)

(d) Whilst at sea, the control air pressure low alarm sounds. The fault identified is a leaking safety valve on the control air bottle. Detail the actions required to allow continuous operation of the propulsion plant, whilst repairs are carried out. (4)

5. Electrical Power Systems and Control Drawings - DRG 038

(a) Describe item 'A', identified on the drawing. (2)

(b) State the purpose of air circuit breakers B and C. (2)

(c) On the main and emergency switchboards, both 440 V and 220 V, name the distribution breakers that should remain closed during normal operation, and those that should remain open. (6)

Section B

6. Drawing 022.

On inspection in dry dock, two sections of damage were found on the ship's hull, which have been identified on the shell expansion as 'A' and 'B'.

(a) The first section, 'A', was found to be 300 mm deep.

(i) Using drawing references, identify the location and approximate dimensions of the damaged section. (5)

(ii) State what steels are involved in the repairs, and what complications are evident from the drawing (10)

(b) The second section, 'B', was found to be 200 mm deep.

(i) Using drawing references, identify the location and approximate dimensions of the damaged section. (5)

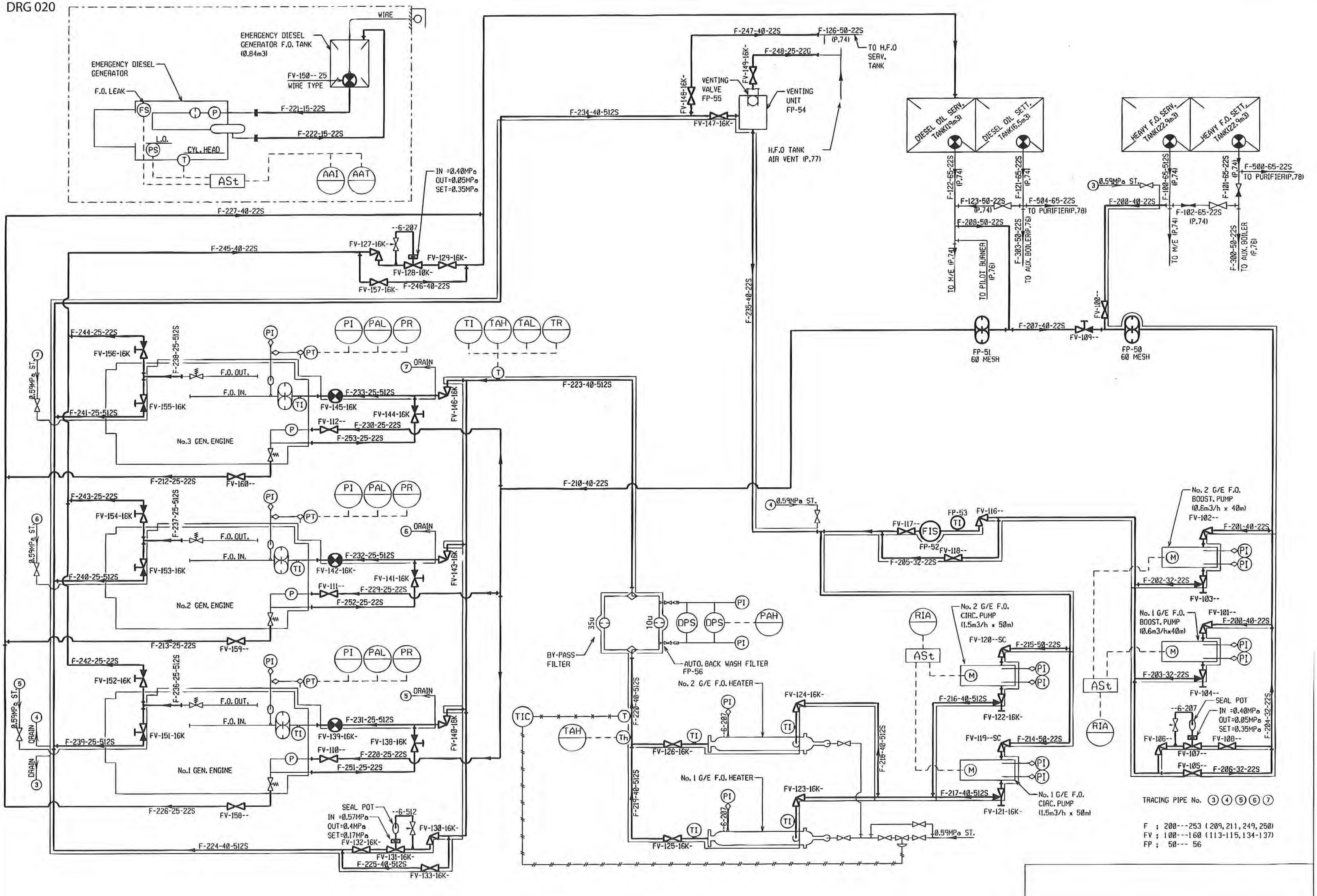
(ii) State what steels are involved in the repairs, and what complications are evident from the drawing. (5)

7. Drawing 020.

(a) Describe the flow path and valve configuration required to enable all generators to run on HFO. (15)

(b) Describe the procedure, including flow path and change of valve configuration, required to change over No.2 generator to MDO, when all generators are currently set up to run on HFO. (10)

DRG 020



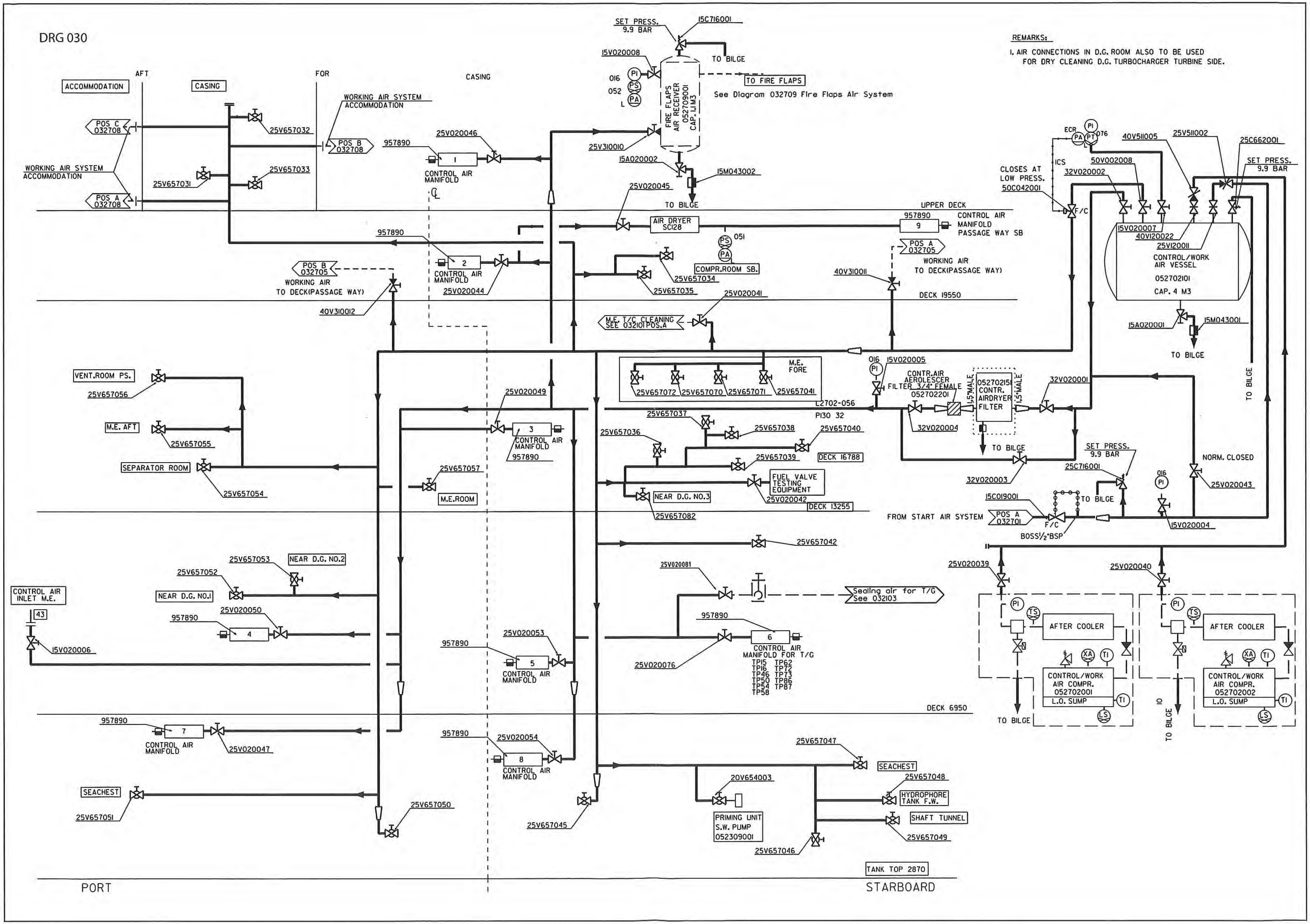
TRACING PIPE No. ③ ④ ⑤ ⑥ ⑦

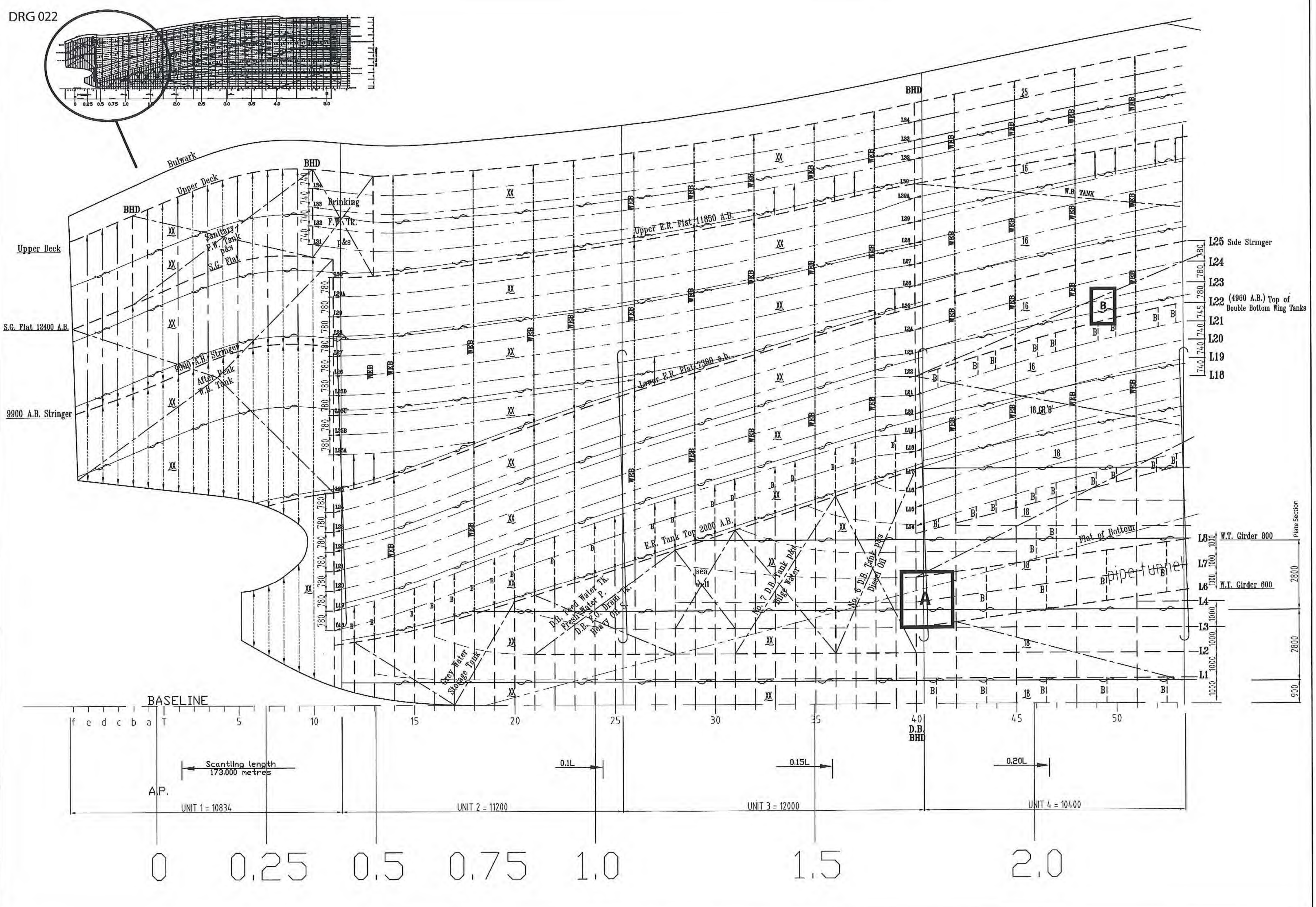
F ; 200---253 (209, 211, 249, 250)
FV ; 100---160 (113-115, 134-137)
FP ; 50--- 56

DRG 030

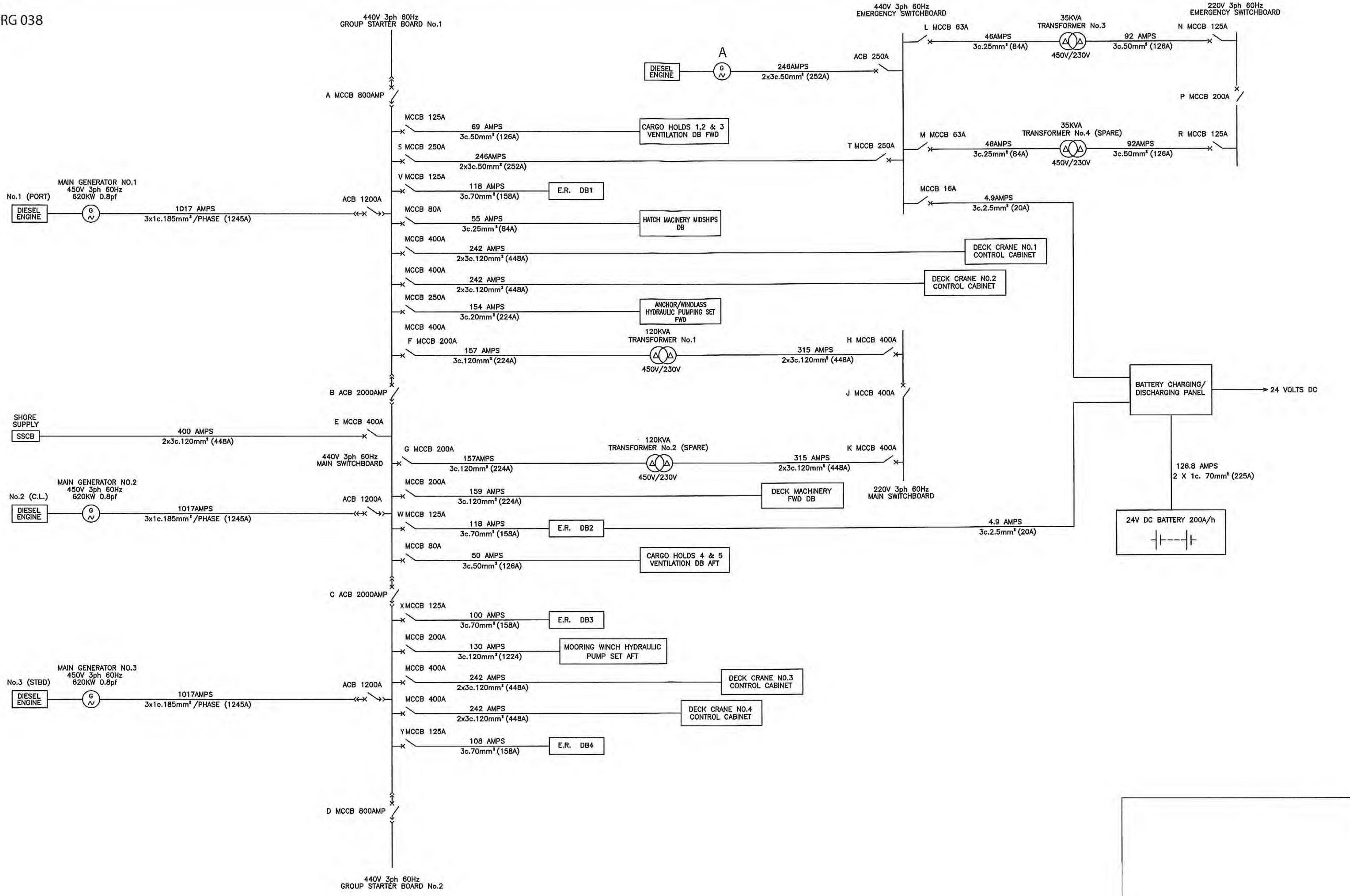
REMARKS:

1. AIR CONNECTIONS IN D.G. ROOM ALSO TO BE USED FOR DRY CLEANING D.G. TURBOCHARGER TURBINE SIDE.

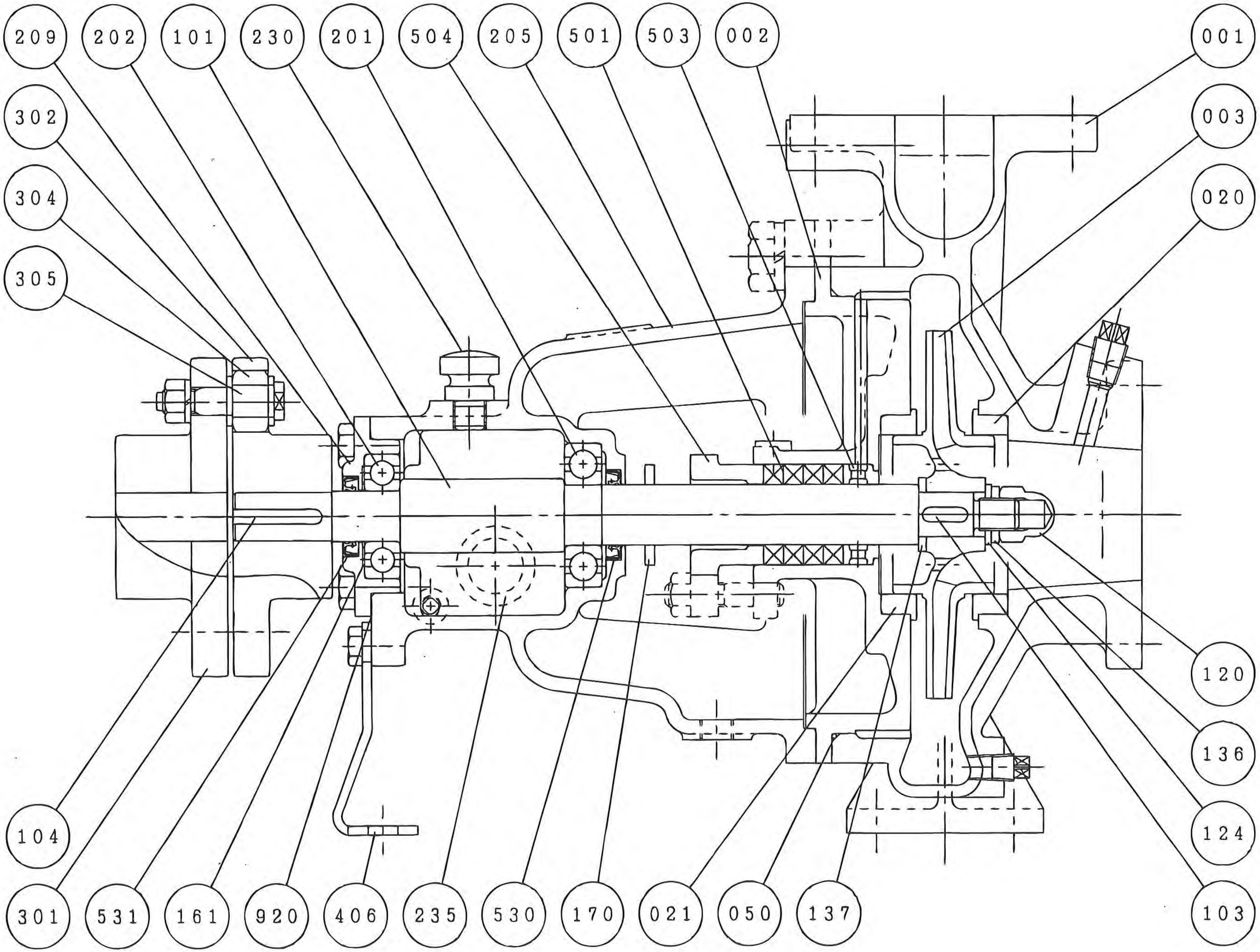



DRG 022
Bulwark
Upper Deck
BHD
Upper Deck
S.G. Flat 12400 A.B.
9900 A.B. Stringer
Sanitary F.W. Tank P&S
S.G. Flat
9900 A.B. Stringer
After Peak W.B. Tank
Drinking F.W. Tk. P&S
Upper E.R. Flat 11850 A.B.
Lower E.R. Flat 7300 a.b.
E.R. Tank Top 2000 A.B.
W.B. TANK
18 GR 'B'
WEB
XX
B
A
Flat of Bottom
pipe tunnel
Grey Water Storage Tank
D.B. Feed Water TK. Fresh Water P. D.B. F.O. Drain Tk. Heavy Oil S.
Sea Well
No. 7 D.B. Tank P&S Bilge Water
No. 6 D.B. Tank P&S Diesel Oil
L25 Side Stringer
L24
L23
L22 (4960 A.B.) Top of Double Bottom Wing Tanks
L21
L20
L19
L18
L8 W.T. Girder 800
L7
L6 W.T. Girder 600
L4
L3
L2
L1
Plate Section
2800
2800
900
BASELINE
f e d c b a T
5
10
15
20
25
30
35
40
45
50
D.B. BHD
Scantling length 173.000 metres
A.P.
0.1L
0.15L
0.20L
UNIT 1 = 10834
UNIT 2 = 11200
UNIT 3 = 12000
UNIT 4 = 10400
0
0.25
0.5
0.75
1.0
1.5
2.0

DRG 038


440V 3ph 60Hz
GROUP STARTER BOARD No.1
A MCCB 800AMP
MCCB 125A
69 AMPS
3c.50mm² (126A)
CARGO HOLDS 1,2 & 3 VENTILATION DB FWD
S MCCB 250A
246AMPS
2x3c.50mm² (252A)
V MCCB 125A
118 AMPS
3c.70mm² (158A)
E.R. DB1
MCCB 80A
55 AMPS
3c.25mm² (84A)
HATCH MACINERY MIDSHIPS DB
MCCB 400A
242 AMPS
2x3c.120mm² (448A)
DECK CRANE NO.1 CONTROL CABINET
MCCB 400A
242 AMPS
2x3c.120mm² (448A)
DECK CRANE NO.2 CONTROL CABINET
MCCB 250A
154 AMPS
3c.20mm² (224A)
ANCHOR/WINDLASS HYDRAULIC PUMPING SET FWD
MCCB 400A
F MCCB 200A
157 AMPS
3c.120mm² (224A)
120KVA
TRANSFORMER No.1
450V/230V
315 AMPS
2x3c.120mm² (448A)
H MCCB 400A
J MCCB 400A
MAIN GENERATOR NO.1
450V 3ph 60Hz
620KW 0.8pf
No.1 (PORT)
DIESEL ENGINE
G
1017 AMPS
3x1c.185mm² /PHASE (1245A)
ACB 1200A
B ACB 2000AMP
SHORE SUPPLY
SSCB
400 AMPS
2x3c.120mm² (448A)
E MCCB 400A
440V 3ph 60Hz
MAIN SWITCHBOARD
G MCCB 200A
157AMPS
3c.120mm² (224A)
120KVA
TRANSFORMER No.2 (SPARE)
450V/230V
315 AMPS
2x3c.120mm² (448A)
K MCCB 400A
220V 3ph 60Hz
MAIN SWITCHBOARD
MCCB 200A
159 AMPS
3c.120mm² (224A)
DECK MACHINERY FWD DB
MAIN GENERATOR NO.2
450V 3ph 60Hz
620KW 0.8pf
No.2 (C.L.)
DIESEL ENGINE
1017AMPS
3x1c.185mm² /PHASE (1245A)
ACB 1200A
W MCCB 125A
118 AMPS
3c.70mm² (158A)
E.R. DB2
4.9 AMPS
3c.2.5mm² (20A)
MCCB 80A
50 AMPS
3c.50mm² (126A)
CARGO HOLDS 4 & 5 VENTILATION DB AFT
C ACB 2000AMP
X MCCB 125A
100 AMPS
3c.70mm² (158A)
E.R. DB3
MCCB 200A
130 AMPS
3c.120mm² (1224)
MOORING WINCH HYDRAULIC PUMP SET AFT
MAIN GENERATOR NO.3
450V 3ph 60Hz
620KW 0.8pf
No.3 (STBD)
DIESEL ENGINE
1017AMPS
3x1c.185mm² /PHASE (1245A)
ACB 1200A
MCCB 400A
242 AMPS
2x3c.120mm² (448A)
DECK CRANE NO.3 CONTROL CABINET
MCCB 400A
242 AMPS
2x3c.120mm² (448A)
DECK CRANE NO.4 CONTROL CABINET
Y MCCB 125A
108 AMPS
3c.70mm² (158A)
E.R. DB4
D MCCB 800AMP
440V 3ph 60Hz
GROUP STARTER BOARD No.2
A
DIESEL ENGINE
246AMPS
2x3c.50mm² (252A)
ACB 250A
440V 3ph 60Hz
EMERGENCY SWITCHBOARD
L MCCB 63A
46AMPS
3c.25mm² (84A)
35KVA
TRANSFORMER No.3
450V/230V
92 AMPS
3c.50mm² (126A)
N MCCB 125A
220V 3ph 60Hz
EMERGENCY SWITCHBOARD
P MCCB 200A
T MCCB 250A
M MCCB 63A
46AMPS
3c.25mm² (84A)
35KVA
TRANSFORMER No.4 (SPARE)
450V/230V
92AMPS
3c.50mm² (126A)
R MCCB 125A
MCCB 16A
4.9AMPS
3c.2.5mm² (20A)
BATTERY CHARGING/ DISCHARGING PANEL
24 VOLTS DC
126.8 AMPS
2 X 1c. 70mm² (225A)
24V DC BATTERY 200A/h

DRG 021


209
202
101
230
201
504
205
501
503
002
001
302
003
304
020
305
120
136
104
124
301
531
161
920
406
235
530
170
021
050
137
103