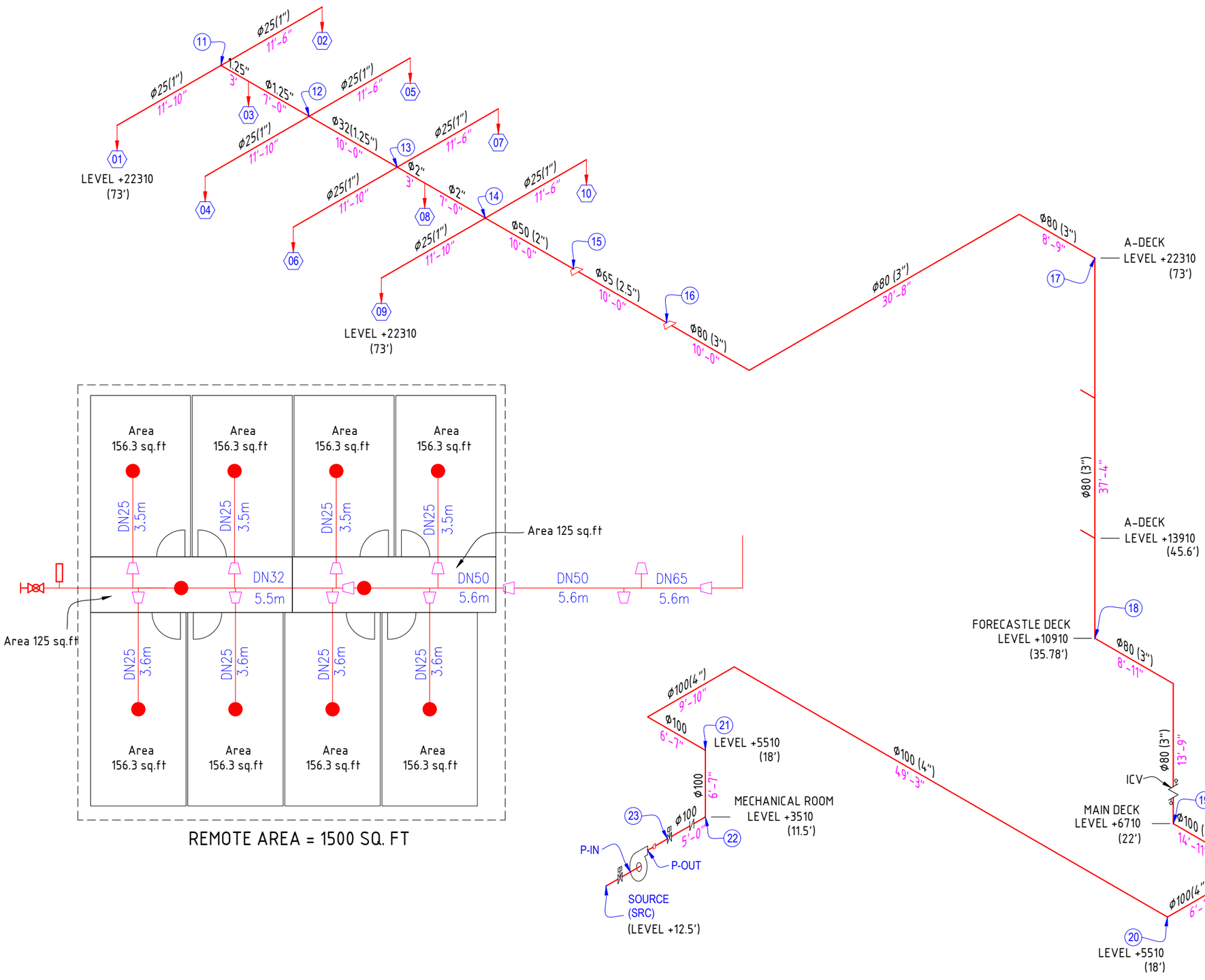

HYDRAULIC CALCULATIONS - GENERAL NOTES

DESIGN CRITERIA:

Remote Area Location: C-DECK

System Type: Wet Pipe Sprinkler System

Hazard Classification: Light Hazard Occupancy

Design Density: 0.1 gpm per square foot

Remote Area Size: 1,500 square feet

Sprinkler Classification: Standard Response

Sprinkler K-Factor: K5.6

Maximum Sprinkler Coverage: 225 sq. ft per sprinkler head

SPRINKLER SYSTEM FLOW CALCULATION:
The required flow for each sprinkler is determined using the K-factor formula:

$Q = K \sqrt{P}$

Q = Flow (gpm)
K = Sprinkler K-factor (K5.6)
P = Minimum pressure (psi)

Minimum operating pressure per sprinkler is calculated using the design flow for light hazard occupancy at the specified density of 0.1 gpm/sq. ft.

MINIMUM FLOW REQUIREMENT PER SPRIKLER HEAD:

The total water demand in the remote area is calculated as:

Sprinkler Flow=Density×Area Covered by one Sprinkler

Sprinkler Flow=0.1×156.3

=15.63 gpm

CACLULATING END SPRINKLER PRESSURE

Using equation.

$Q = K \times \sqrt{P}$

Q = 15.63 gpm

K = 5.6

Pressure required at end sprinkler = $(\frac{15.63}{5.6})^2$

= 7.79 psi.

Therefore, our calculation shall start at

Pressure P = 7.79 psi.

This pressure shall be inserted into hydraulic calculation software of minimum end conditions.

T30 101-010 HA 002	TELFORD 30 GENERAL ARRANGEMENT					
T30 811-003 HF 002	FIRE CONTROL AND SAFETY PLAN ACCOMODATION MODE					
J30-101-010 HA 001	GENERAL ARRANGEMENT					
T30-803-001 MP 001	BILGE SYSTEM					
T30-732-001 MP 001	SERVICE AIR PIPING DIAGRAM					
T30-581-001 MP	SANITARY SUPPLY PIPING DIAGRAM					
T30-813-002 MP 001	FIRE FIGHTING AND WASH DOWN SYSTEM					
DRAWING NO.	DRAWING TITLE					
REFERENCES						
1	IFA	25.07.2024	ISSUED FOR APPROVAL	CZB	NHA	RMI
0	IFA	02.06.2021	ISSUED FOR APPROVAL	NHA	DBI	BHO
REV	STATUS	DATE	DESCRIPTION	BY	ENGR	APPR

VESSEL: TELFORD 30

PROJECT: DP3/ PIPELAY/ CONSTRUCTION/ ACCOMODATION/ HOOK UP VESSEL

TITLE: HYDRAULIC CALCULATIONS ISOMETRIC DIAGRAM

HULL NO: CPL105 | SCALE: N.T.S.

CLASS: ABS | REV.: 1

DRAWING NO.: T30-813-004-MP-P-001 | SHEET: Isometric of 2

TELFORD OFFSHORE
MAZAYA AA1, 10TH FLOOR, OFFICE 1004, P.O. BOX 337673
JUMEIRAH LAKES TOWERS, DUBAI, UNITED ARAB EMIRATES
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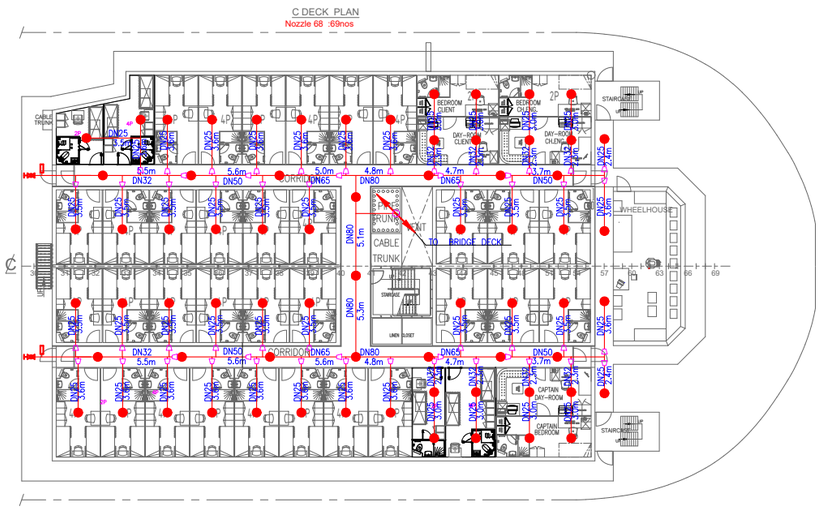
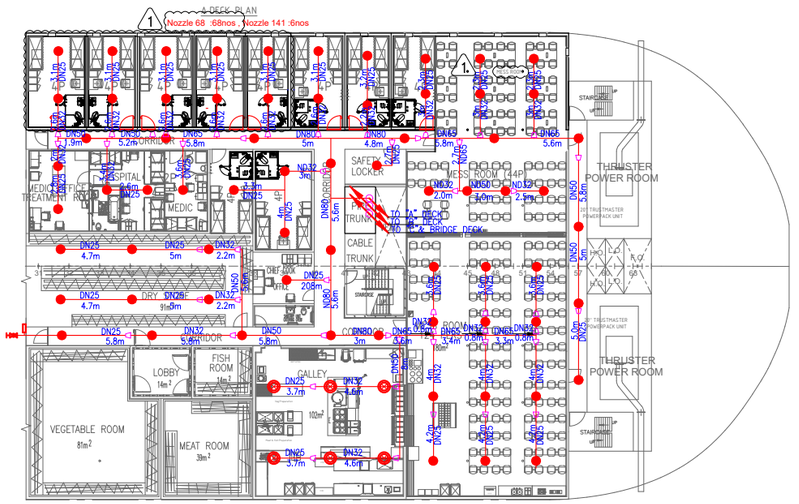
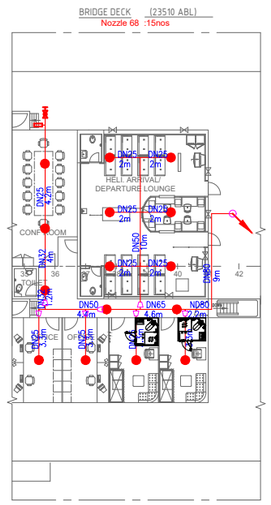
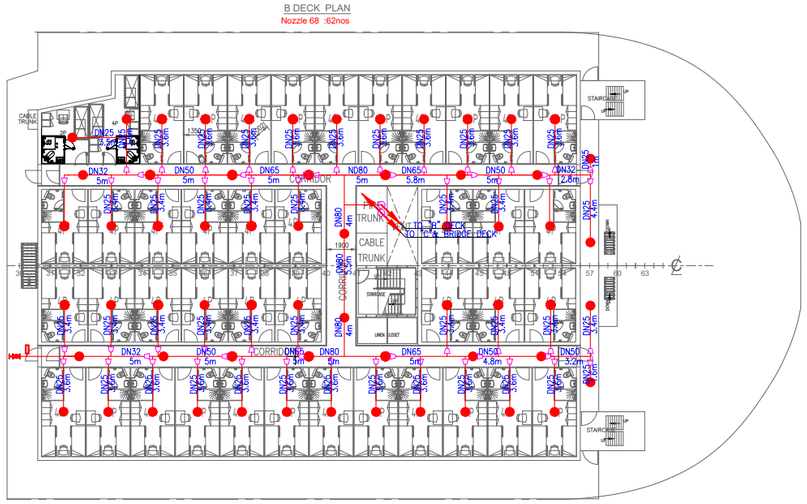
www.telfordoffshore.com

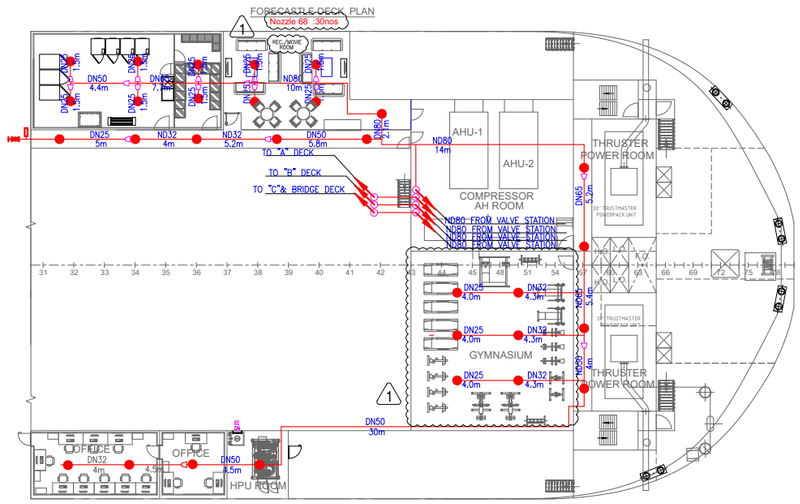
CAD DWG SIZE: A1
UNIT: mm

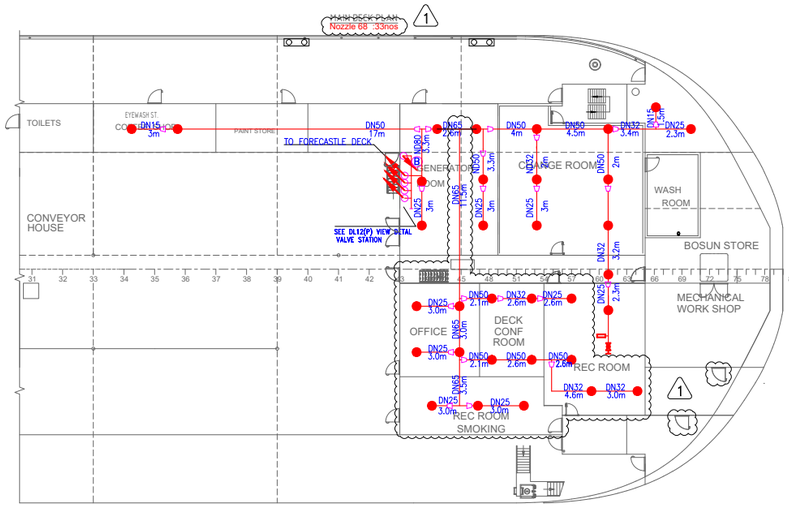












DESIGN CRITERIA:

DESIGN PRESSURE : 8.0 Barg
WORKING PRESSURE : 7.0 Barg
TEST PRESSURE : 12.0 Barg
TEST TEMPERATURE : 32.0 °C

FLANGES:

FLANGES : PN10

GASKETS:

PN10 GRAPHITED BOTH SIDES
ASBESTOS FREE, C/W FIRE SAFE CERTIFICATES

FITTINGS

ND25 TO ND40 : SOCKET WELD
ABOVE ND40 : BUTT WELD
FOR NOZZLE CONN. : THREADED

BOLTING:

STUB BOLTS, ELECTRO-GALVANIZED
NUTS, ELECTRO-GALVANIZED

VALVES:

BALL VALVES,(FULL BORE)
BODY : CAST IRON
BALL : AISI 316
STEM : AISI 316
STEM SEAL : NDR
SEAT RING : PTFE (GRAPHITED)

VALVE LIST

Fitting No.	Tag	Destination	Location	Nominal Dia DN	Nominal Dia inch	Description
813-04-V-001-01	SPKLR. P/P SUCT.	S.W INLET TO SPRINKLER P/P FROM THE SEA CHEST	COMPRESSOR ROOM	100	4"	GATE VALVE
813-04-V-001-02	SPKLR. P/P DISCH.	S.W OUTLET FROM SPRINKLER PUMP	COMPRESSOR ROOM	100	4"	GATE VALVE
813-04-V-001-03	SPKLR. P/P DISCH.	S.W OUTLET FROM SPRINKLER PUMP TO SPRINKLERS	COMPRESSOR ROOM	100	4"	GATE VALVE
813-04-V-001-04	SPKLR. TK. OUTL. TO SPKLR.S	S.W OUTLET FROM SPRINKLER TANK TO THE SPRINKLERS	COMPRESSOR ROOM	100	4"	GATE VALVE
813-04-V-002-01	SPKLR P/P DISCH TO SPKLRS	S.W SUPPLY FROM SPRINKER PUMP TO SPRINKLERS	COMPRESSOR ROOM	100	4"	CHECK VALVE
813-04-V-002-02	SPKLR P/P DISCH TO SPKLRS	S.W SUPPLY FROM SPRINKER PUMP TO SPRINKLERS	COMPRESSOR ROOM	100	4"	CHECK VALVE
813-04-V-002-03	SPKLR TK OVBD DISCH.	S.W DISCH. TO OVERBOARD FROM SPRINKLER TK.	COMPRESSOR ROOM	100	4"	CHECK VALVE
813-04-V-002-04	SPKLR. TK. OUTL. TO SPKLT	S.W OUTLET FROM SPRINKLER TANK TO THE SPRINKLERS	COMPRESSOR ROOM	100	4"	CHECK VALVE
813-04-V-003-01	S.W. FM F\F SYS-SPKLR'S	S.W FROM FIRE FIGHTING LINE TO SPRINKLER P\P DISCH.	COMPRESSOR ROOM	100	4"	SDNR VALVE
813-04-V-004	SPKLR P/P TO OVBD.	S.W FROM SPRINKLER P\P TO OVERBOARD DISCH.	COMPRESSOR ROOM	80	3"	GATE VALVE
813-04-V-005-01	SPKLR TK. TO OVBD	OVERBOARD BYPASS FROM SPRINKLER TK. DISCH. LINE	COMPRESSOR ROOM	50	2"	GATE VALVE
813-04-V-005-02	SPKLR TK. TO OVBD	OVERBOARD DISCH. FROM SPRINKLER TK.	COMPRESSOR ROOM	50	2"	GATE VALVE
813-04-V-006	SPKLR JOCKEY P/P DISCH	OUTLET FROM SPRINKLER JOCKEY PUMP	COMPRESSOR ROOM	32	¼"	SDNR VALVE
813-04-V-007	SPKLR JOCKEY P\P DISCH	DISCHARGE FROM SPRINKLER JOCKEY PUMP	COMPRESSOR ROOM	32	¼"	CHECK VALVE
813-04-V-008-01	MAIN DK. SPKLR LINE TEST	TESTING & RINSING OF MAIN DK. SPRINKLER LINES	MAIN DECK	15	½"	GLOBE VALVE
813-04-V-008-02	F'CLE DK. SPKLR LINE TEST	TESTING & RINSING OF F'CLE DK. SPRINKLER LINES	F'CLE DECK	15	½"	GLOBE VALVE
813-04-V-008-03	A- DK. SPKLR LINE TEST	TESTING & RINSING OF A- DK. SPRINKLER LINES	A- DECK	15	½"	GLOBE VALVE
813-04-V-008-04	B- DK. SPKLR LINE TEST	TESTING & RINSING OF B- DK. SPRINKLER LINES	B- DECK	15	½"	GLOBE VALVE
813-04-V-008-05	C- DK. SPKLR LINE TEST	TESTING & RINSING OF C- DK. SPRINKLER LINES	C- DECK	32	¼"	GLOBE VALVE
813-04-V-008-06	C- DK. SPKLR LINE TEST	TESTING & RINSING OF C- DK. SPRINKLER LINES	C- DECK	32	¼"	GLOBE VALVE
813-04-V-008-07	BRIDGE- DK. SPKLR LINE TEST	TESTING & RINSING OF BRIDGE- DK. SPRINKLER LINES	BRIDGE - DECK	15	½"	GLOBE VALVE

PUMP LIST

PUMP No.	Tag	Destination	Location	Capacity	Description
813-04-P001S1	SPRINKLER JOCKEY PUMP	SUPPLY TO SPRINKLER TANK FROM SANITARY SYSTEM	CO2 ROOM	0m3/Hr @ 7 Bar	
813-04-P002S1	SPRINKLER PUMP	SUPPLY TO SPRINKLER TANK FROM SEACHEST	COMPRESSOR ROOM	0m3/Hr @ 7 Bar	

PIPE LIST

SIZE	DIMENSION	MATERIAL	SCH	REMARKS
ND80 (3")	ø89 x 5.5	410 GB5312-99	40	GALV.
ND65 (2 1/2")	ø76x 5.5	410 GB5312-99	40	GALV.
ND50 (2")	ø60 x 4	410 GB5312-99	40	GALV.
ND40 (1 1/2")	ø48 x 4	410 GB5312-99	40	GALV.
ND32 (1 1/4")	ø42 x 4	410 GB5312-99	40	GALV.
DN25 (1/2")	ø22 x 3.5	410 GB5312-99	40	GALV.

LEGENDS :

- BALL VALVE
- AIR ELIMINATOR (YARD SUPPLY)
- SPRINKLER NOZZLE (68°C)
- PIPE PENETRATING LOWER DECK
- SPRINKLER NOZZLE (141°C)
- PIPE PENETRATING UPPER DECK

ABS PIPING CLASS: CLASS III
MATERIALS : 410 GB5312-99 (eq.to CARBON STEEL SEAMLESS PIPE ANSI A106 Gr.B)
ALL C.S. PIPES & FITTING TO BE HOT DIP GALVANISED

T30 101-010 HA 002	TELFORD 30 GENERAL ARRANGEMENT
T30 811-003 HF 002	FIRE CONTROL AND SAFETY PLAN ACCOMODATION MODE
J30-101-010 HA 001	GENERAL ARRANGEMENT
T30-803-001 MP 001	BILGE SYSTEM
T30-732-001 MP 001	SERVICE AIR PIPING DIAGRAM
T30-581-001 MP	SANITARY SUPPLY PIPING DIAGRAM
T30-813-002 MP 001	FIRE FIGHTING AND WASH DOWN SYSTEM
DRAWING NO.	DRAWING TITLE
	REFERENCES

REV	STATUS	DATE	DESCRIPTION	BY	ENGR	APPR
1	IFA	25.07.2024	ISSUED FOR APPROVAL	CZB	NHA	RMI
0	IFA	02.06.2021	ISSUED FOR APPROVAL	NHA	DBI	BHO

VESSEL: TELFORD 30

PROJECT: DP3/ PIPELAY/ CONSTRUCTION/ ACCOMODATION/ HOOK UP VESSEL

TITLE: WATER SPRINKLER SYSTEM ARRANGEMENT

HULL NO: CPL105 | SCALE: N.T.S.
CLASS: ABS | REV.: 1
DRAWING NO.: T30-813-004-MP-P-001
SHEET: 2 of 2

TELFORD OFFSHORE
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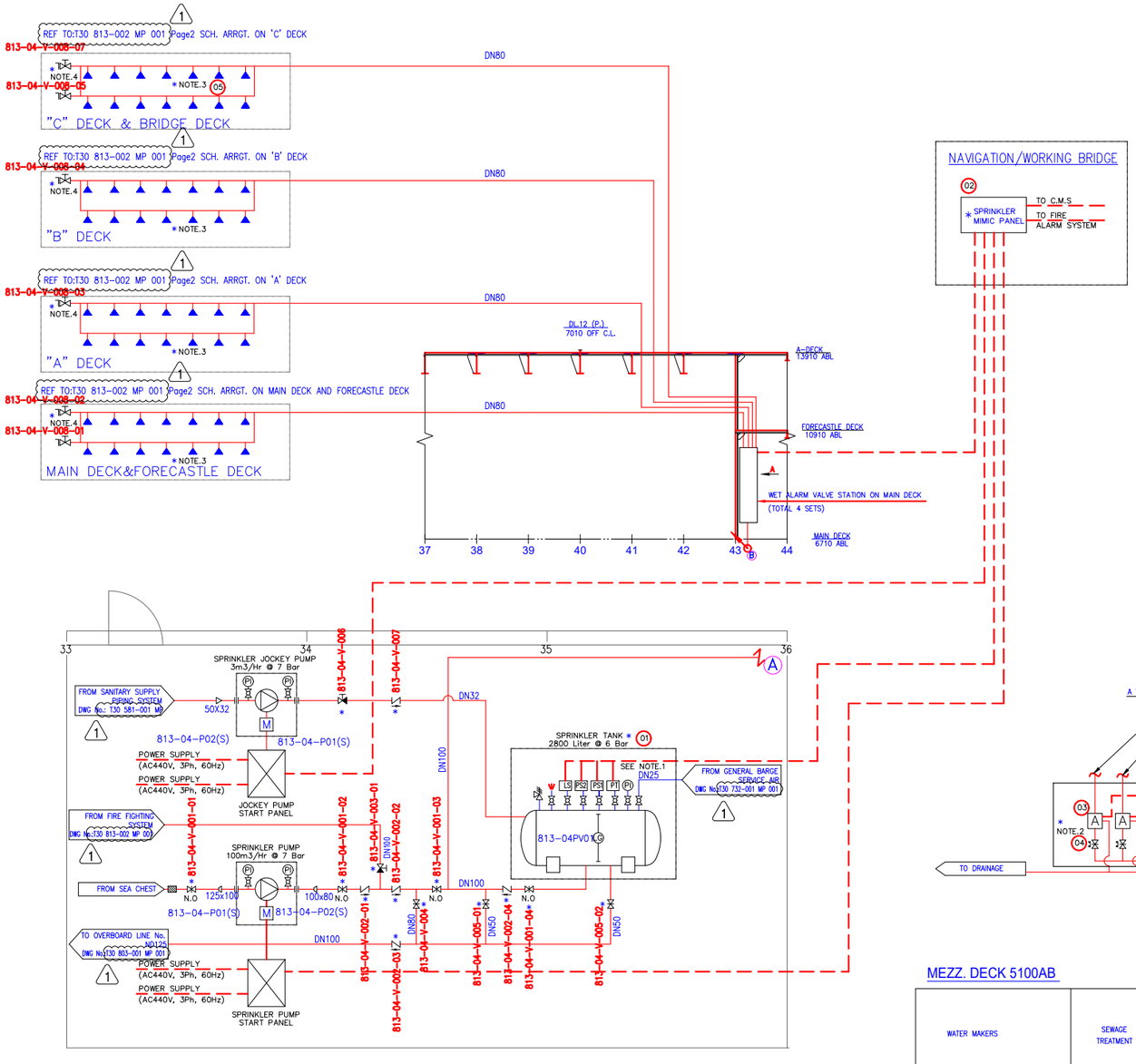
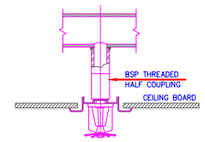
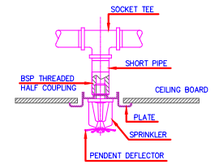
CAD DWG SIZE: A1
UNIT: mm

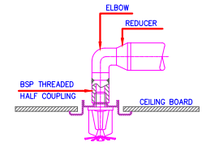




TYPICAL DETAIL OF SPRINKLER INSTALLATION (>ND40 PIPES)



TYPICAL DETAIL OF SPRINKLER INSTALLATION (<=ND40 PIPES)



TYPICAL DETAIL OF SPRINKLER INSTALLATION (PIPE END)

LEGEND:

- BALL VALVE
- CHECK VALVE
- BUTTERFLY VALVE
- SCREW DOWN NON RETURN VALVE
- GLOBE VALVE
- GATE VALVE (YARD SUPPLY)
- ANGLED RELIEF VALVE
- STRAINER (YARD SUPPLY)
- SPRINKLER NOZZLE
- CENTRIFUGAL PUMP
- AIR ELIMINATOR (YARD SUPPLY)
- LC LOCKED CLOSE
- LO LOCKED OPEN
- PIPE PENETRATING LOWER DECK
- PIPE PENETRATING UPPER DECK
- WATERTIGHT PENETRATION
- SPRINKLER PIPING
- ELECTRICAL CABLE

ABS PIPING CLASS: CLASS III
MATERIALS : 410 GB5312-99 (eq.to CARBON STEEL SEAMLESS PIPE ANSI A106 Gr.B)
ALL C.S. PIPES & FITTING TO BE HOT DIP GALVANISED

DESIGN CRITERIA:

DESIGN PRESSURE	:	10 Barg
WORKING PRESSURE	:	7.0 Barg
TEST PRESSURE	:	15 Barg
TEST TEMPERATURE	:	32.0 °C

FLANGES:

PN10

GASKETS:

PN10 GRAPHITED BOTH SIDES
ASBESTOS FREE, C/W FIRE SAFE CERTIFICATES

FITTINGS

ND25 TO ND40	:	SOCKET WELD
ABOVE ND40	:	BUTT WELD
FOR NOZZLE CONN.	:	THREADED

BOLTING:

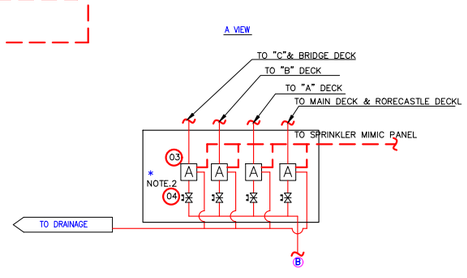
STUB BOLTS, ELECTRO-GALVANIZED
NUTS, ELECTRO-GALVANIZED

VALVES:

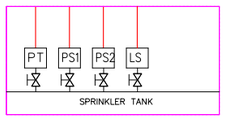
BUTTERFLY VALVES	BALL VALVES,(FULL BORE)
BODY : CAST IRON, HEAT RESISTANT	BODY CAST IRON
RUBBER LINED	BALL : AISI 316
DISC : AL-BRONZED	STEM AISI 316
SCREW-DOWN-NON-RETURN VALVE	
BODY CAST IRON, HEAT RESISTANT	
: RUBBER LINED	
DISC AL-BRONZED	

PIPE LIST

SIZE	DIMENSION	MATERIAL	SCH	REMARKS
ND125 (5")	ø140x7	410 GB5312-99(eq.to CARBON STEEL SEAMLESS PIPE ANSI A106 Gr.B)	40	GALV.
ND100 (4")	ø114x6.5	410 GB5312-99(eq.to CARBON STEEL SEAMLESS PIPE ANSI A106 Gr.B)	40	GALV.
ND80 (3")	ø89x5.5	410 GB5312-99(eq.to CARBON STEEL SEAMLESS PIPE ANSI A106 Gr.B)	40	GALV.
ND50 (2")	ø60x4	410 GB5312-99(eq.to CARBON STEEL SEAMLESS PIPE ANSI A106 Gr.B)	40	GALV.
ND25 (1")	ø34x3.5	410 GB5312-99(eq.to CARBON STEEL SEAMLESS PIPE ANSI A106 Gr.B)	40	GALV.



NOTE.1



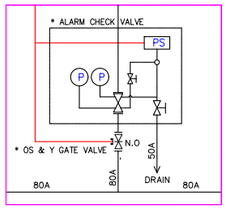
PT PRESSURE TRANSMITTER / 4~20 mA

PS1 PRESSURE SWITCH / SETTING 5 Kg/Cm2 FOR LOW PRESSURE ALARM

PS2 PRESSURE SWITCH / SETTING 3.5 Kg/Cm2 FOR SPRINKLER PUMP START

LS LEVEL SWITCH

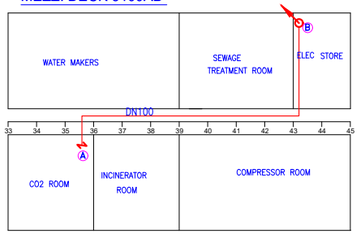
NOTE.2



NOTE.3
ALL SPRINKLER HEAD, ESCUTCHEONS

NOTE.4
TEST & RINSING VALVE
* - MAKER SUPPLY ITEM
(XX) - ITEM NO.MAKER SUPPLY

MEZZ. DECK 5100AB



TAG No.	QTY.	DESCRIPTION	CAPACITY	MAKER	REMARKS
813-04PV01	1	SPRINKLER PRESSURE TANK	2800 L @ 7 Barg.		SEAPLUS SUPPLY
813-04-P02(S)	1	SPRINKLER JOCKEY PUMP	3m³ /hr @ 7 Barg.		CPL SUPPLY
813-04-P01(S)	1	SPRINKLER PUMP	100m³ /hr @ 7 Barg.		CPL SUPPLY

Notes:
1. PIPE CLASS III.
2. WORKING PRESSURE:
   SPRINKLER SYSTEM : 10bar
3. SYSTEM DESIGN PRESSURE TEST IN WORKSHOP TEST ON THE SHIP
   SPRINKLER SYSTEM 10bar 15bar 1.25 bar
4. WHERE PIPES PENETRATE THROUGH WATER TIGHT BULKHEADS,DECKS TO BE FITTED WITH PENETRATION PIECES ACCORDING TO CB/T3480-92 TO BE ABS APPROVED.
5. THE FITTINGS MARKED WITH * OR IN DASH DOT LINE FRAME ARE SUPPLIED BY MAKER.
6. ALL PIPES TO BE HOT DIP GALVINIZED,AFTER DIPPED GALVANIZING,HEAT TREAMNET OF PIPES IS NOT ALLOWED..
7. ALL VALVES TO BE FITTED WITH BRASS NAMEPLATE.
8. NOZZLE FOR SPRINKLER ACCORDING TO TYCO'S SPECIFICATION AS FOLLOWING:
   STANDARD RESPONSE.
   PENDENT ,K FACTOR:k=5.6
   MAX AMBIENT TEMPERATURE:68 and 141.
9. SPRINKLER SYSTEM SUPPLY BY THE SEAPLUS.
10. PREVIOUS DWG. NO.: T30 813-004 MP R3 Water Sprinkler System
11. DWG REFERENCE: T30-101-010 HA 002 GENERAL ARRANGEMENT

T30 101-010 HA 002	TELFORD 30 GENERAL ARRANGEMENT
T30 811-003 HF 002	FIRE CONTROL AND SAFETY PLAN ACCOMODATION MODE
J30-101-010 HA 001	GENERAL ARRANGEMENT
T30-803-001 MP 001	BILGE SYSTEM
T30-732-001 MP 001	SERVICE AIR PIPING DIAGRAM
T30-581-001 MP	SANITARY SUPPLY PIPING DIAGRAM
T30-813-002 MP 001	FIRE FIGHTING AND WASH DOWN SYSTEM
DRAWING NO.	DRAWING TITLE

REFERENCES

REV	STATUS	DATE	DESCRIPTION	BY	ENGR	APPR
1	IFA	25.07.2024	ISSUED FOR APPROVAL	CZB	NHA	RMI
0	IFA	02.06.2021	ISSUED FOR APPROVAL	NHA	DBI	BHO

VESSEL: TELFORD 30

PROJECT: DP3/ PIPELAY/ CONSTRUCTION/ ACCOMODATION/ HOOK UP VESSEL

TITLE: WATER SPRINKLER SYSTEM ARRANGEMENT

HULL NO: CPL105 | SCALE: N.T.S.
CLASS: ABS | REV.: 1
DRAWING NO.: T30-813-004-MP-P-001 | SHEET: 1 of 2

TELFORD OFFSHORE
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JUMEIRAH LAKES TOWERS, DUBAI, UNITED ARAB EMIRATES
T: +971 4 575 5061
www.telfordoffshore.com

CAD DWG SIZE: A1
UNIT: mm

DATE: 9/16/2024\KAMAL RAM\ARVIND KAMATH\HOOK UP VESSEL HYDRAULIC CALC.SDF
JOB TITLE: Hook Up Vessel

WATER SUPPLY DATA

SOURCE NODE TAG	STATIC PRESS. (PSI)	RESID. PRESS. @ (PSI)	FLOW (GPM)	AVAIL. PRESS. (PSI)	TOTAL @ DEMAND (GPM)	REQ'D PRESS. (PSI)
SRC	(N/A)	1.0	(N/A)	1.0	210.0	0.0

AGGREGATE FLOW ANALYSIS:

TOTAL FLOW AT SOURCE	210.0 GPM
TOTAL HOSE STREAM ALLOWANCE AT SOURCE	0.0 GPM
OTHER HOSE STREAM ALLOWANCES	0.0 GPM
TOTAL DISCHARGE FROM ACTIVE SPRINKLERS	210.0 GPM

NODE ANALYSIS DATA

NODE TAG	ELEVATION (FT)	NODE TYPE	PRESSURE (PSI)	DISCHARGE (GPM)	AREA (FT^2)	DENSITY REQ. (GPM/FT^2)	DENSITY ACT. (GPM/FT^2)
1	73.0	K= 5.60	7.8	15.6	156.3	0.100	0.100
11	73.0	- - - -	8.9	- - -	- - -	- - -	- - -
2	73.0	K= 5.60	7.8	15.7	156.3	0.100	0.100
3	73.0	K= 5.60	9.6	17.4	125.0	0.100	0.139
4	73.0	K= 5.60	10.4	18.1	156.3	0.100	0.116
12	73.0	- - - -	11.9	- - -	- - -	- - -	- - -
5	73.0	K= 5.60	10.5	18.1	156.3	0.100	0.116
6	73.0	K= 5.60	17.5	23.4	156.3	0.100	0.150
13	73.0	- - - -	19.9	- - -	- - -	- - -	- - -
7	73.0	K= 5.60	17.5	23.4	156.3	0.100	0.150
8	73.0	K= 5.60	21.9	26.2	125.0	0.100	0.210
9	73.0	K= 5.60	21.6	26.0	156.3	0.100	0.167
14	73.0	- - - -	24.5	- - -	- - -	- - -	- - -
10	73.0	K= 5.60	21.7	26.1	156.3	0.100	0.167
15	73.0	- - - -	31.9	- - -	- - -	- - -	- - -
16	73.0	- - - -	35.4	- - -	- - -	- - -	- - -
17	73.0	- - - -	39.2	- - -	- - -	- - -	- - -
18	35.8	- - - -	57.7	- - -	- - -	- - -	- - -
19	22.0	- - - -	66.4	- - -	- - -	- - -	- - -
20	18.0	- - - -	69.1	- - -	- - -	- - -	- - -
21	18.0	- - - -	70.4	- - -	- - -	- - -	- - -
22	11.5	- - - -	73.4	- - -	- - -	- - -	- - -
23	11.5	- - - -	73.8	- - -	- - -	- - -	- - -
P-OUT	11.5	- - - -	73.9	- - -	- - -	- - -	- - -
P-IN	11.5	- - - -	0.3	- - -	- - -	- - -	- - -
SRC	12.5	SOURCE	0.0	210.0	- - -	- - -	- - -

DATE: 9/16/2024\KAMAL RAM\ARVIND KAMATH\HOOK UP VESSEL HYDRAULIC CALC.SDF
JOB TITLE: Hook Up Vessel

PIPE DATA

PIPE TAG / END NODES	ELEV. (FT)	NOZ. (K)	PT (PSI)	DISC. (GPM)	Q(GPM) VEL(FPS)	DIA(IN) HW(C) FL/FT	LENGTH (FT)		PRESS. SUM. (PSI)	
Pipe: 1					-15.6	1.049 PL	11.83	PF	1.1	
1	73.0	5.6	7.8	15.6	5.8	120 FTG	E	PE	0.0	
11	73.0	0.0	8.9	0.0		0.082 TL	13.83	PV		
Pipe: 2					-15.7	1.049 PL	11.50	PF	1.1	
2	73.0	5.6	7.8	15.7	5.8	120 FTG	E	PE	0.0	
11	73.0	0.0	8.9	0.0		0.083 TL	13.50	PV		
Pipe: 3					-31.3	1.380 PL	3.00	PF	0.7	
11	73.0	0.0	8.9	0.0	6.7	120 FTG	T	PE	0.0	
3	73.0	5.6	9.6	17.4		0.078 TL	9.00	PV		
Pipe: 4					-48.7	1.380 PL	7.00	PF	2.3	
3	73.0	5.6	9.6	17.4	10.4	120 FTG	T	PE	0.0	
12	73.0	0.0	11.9	0.0		0.177 TL	13.00	PV		
Pipe: 5					-18.1	1.049 PL	11.83	PF	1.5	
4	73.0	5.6	10.4	18.1	6.7	120 FTG	E	PE	0.0	
12	73.0	0.0	11.9	0.0		0.108 TL	13.83	PV		
Pipe: 6					-18.1	1.049 PL	11.50	PF	1.5	
5	73.0	5.6	10.5	18.1	6.7	120 FTG	E	PE	0.0	
12	73.0	0.0	11.9	0.0		0.108 TL	13.50	PV		
Pipe: 7					-84.9	1.380 PL	10.00	PF	7.9	
12	73.0	0.0	11.9	0.0	18.2	120 FTG	T	PE	0.0	
13	73.0	0.0	19.9	0.0		0.496 TL	16.00	PV		
Pipe: 8					-23.4	1.049 PL	11.83	PF	2.4	
6	73.0	5.6	17.5	23.4	8.7	120 FTG	E	PE	0.0	
13	73.0	0.0	19.9	0.0		0.174 TL	13.83	PV		
Pipe: 9					-23.4	1.049 PL	11.50	PF	2.4	
7	73.0	5.6	17.5	23.4	8.7	120 FTG	E	PE	0.0	
13	73.0	0.0	19.9	0.0		0.174 TL	13.50	PV		
Pipe: 10					-131.7	2.067 PL	3.00	PF	2.0	
13	73.0	0.0	19.9	0.0	12.6	120 FTG	T	PE	0.0	
8	73.0	5.6	21.9	26.2		0.156 TL	13.00	PV		
Pipe: 11					-157.9	2.067 PL	7.00	PF	2.6	
8	73.0	5.6	21.9	26.2	15.1	120 FTG	E	PE	0.0	
14	73.0	0.0	24.5	0.0		0.219 TL	12.00	PV		
Pipe: 12					-26.0	1.049 PL	11.83	PF	2.9	
9	73.0	5.6	21.6	26.0	9.7	120 FTG	E	PE	0.0	
14	73.0	0.0	24.5	0.0		0.212 TL	13.83	PV		
Pipe: 13					-26.1	1.049 PL	11.50	PF	2.9	
10	73.0	5.6	21.7	26.1	9.7	120 FTG	E	PE	0.0	
14	73.0	0.0	24.5	0.0		0.212 TL	13.50	PV		
Pipe: 14					-210.0	2.067 PL	10.00	PF	7.4	
14	73.0	0.0	24.5	0.0	20.1	120 FTG	T	PE	0.0	
15	73.0	0.0	31.9	0.0		0.371 TL	20.00	PV		

DATE: 9/16/2024\KAMAL RAM\ARVIND KAMATH\HOOK UP VESSEL HYDRAULIC CALC.SDF
JOB TITLE: Hook Up Vessel

PIPE TAG / END NODES	ELEV. (FT)	NOZ. (K)	PT (PSI)	DISC. (GPM)	Q(GPM) VEL(FPS)	DIA(IN) HW(C) FL/FT	LENGTH (FT)		PRESS. SUM. (PSI)
Pipe: 15					-210.0	2.469 PL	10.00	PF	3.4
15	73.0	0.0	31.9	0.0	14.1	120 FTG	T	PE	0.0
16	73.0	0.0	35.4	0.0		0.156 TL	22.00	PV	
Pipe: 16					-210.0	3.068 PL	49.42	PF	3.8
16	73.0	0.0	35.4	0.0	9.1	120 FTG	3E	PE	0.0
17	73.0	0.0	39.2	0.0		0.054 TL	70.42	PV	
Pipe: 17					-210.0	3.068 PL	37.33	PF	2.4
17	73.0	0.0	39.2	0.0	9.1	120 FTG	E	PE	16.1
18	35.8	0.0	57.7	0.0		0.054 TL	44.33	PV	
Pipe: 18					-210.0	3.068 PL	22.66	PF	2.7
18	35.8	0.0	57.7	0.0	9.1	120 FTG	2EA	PE	6.0
19	22.0	0.0	66.4	0.0		0.054 TL	49.66	PV	
Pipe: 19					-210.0	4.026 PL	25.40	PF	0.9
19	22.0	0.0	66.4	0.0	5.3	120 FTG	4E	PE	1.7
20	18.0	0.0	69.1	0.0		0.014 TL	65.40	PV	
Pipe: 20					-210.0	4.026 PL	59.66	PF	1.3
20	18.0	0.0	69.1	0.0	5.3	120 FTG	3E	PE	0.0
21	18.0	0.0	70.4	0.0		0.014 TL	89.66	PV	
Pipe: 21					-210.0	4.026 PL	6.58	PF	0.2
21	18.0	0.0	70.4	0.0	5.3	120 FTG	E	PE	2.8
22	11.5	0.0	73.4	0.0		0.014 TL	16.58	PV	
Pipe: 22					-210.0	4.026 PL	5.00	PF	0.4
22	11.5	0.0	73.4	0.0	5.3	120 FTG	CG	PE	0.0
23	11.5	0.0	73.8	0.0		0.014 TL	29.00	PV	
Pipe: 23					-210.0	4.026 PL	2.00	PF	0.0
23	11.5	0.0	73.8	0.0	5.3	120 FTG	----	PE	0.0
P-OUT	11.5	0.0	73.9	0.0		0.014 TL	2.00	PV	
Pipe: 24			FIRE PUMP		Rating:	440.0 gpm @ 101.5 psi			
P-IN	11.5	0.0	0.3	0.0	Avail.:	210.0 gpm @ 101.5 psi			
P-OUT	11.5	0.0	73.9	0.0	Req'd.:	210.0 gpm @ 73.5 psi			
Pipe: 25					-210.0	4.026 PL	5.00	PF	0.1
P-IN	11.5	0.0	0.3	0.0	5.3	120 FTG	G	PE	-0.4
SRC	12.5	SRCE	0.0	(N/A)		0.014 TL	7.00	PV	

NOTES (HASS):

(1) Calculations were performed by the HASS 2023 D computer program
in accordance with (2020)
under license no. 65699794 granted by
HRS Systems, Inc.
208 Southside Square
Petersburg, TN 37144
(931) 659-9760

(2) The system has been calculated to provide an average
imbalance at each node of 0.001 gpm and a maximum
imbalance at any node of 0.007 gpm.

(3) Total pressure at each node is used in balancing the system.
Maximum water velocity is 20.1 ft/sec at pipe 14.

(4) The Minimum pump suction pressure under maximum calculated demand is 0.33 (psi)

(5) Items listed in bold print on the cover sheet

are automatically transferred from the calculation report.

(6) Available pressure at source node SRC under full flow conditions is
1.00 psi with a flow of 270.79 gpm.

(7) PIPE FITTINGS TABLE

HASS Pipe Table Name: standard

PAGE: A MATERIAL: S40 HWC: 120

Diameter	Equivalent Fitting Lengths in Feet								
(in)	E Ell	T Tee	L LngEll	C ChkVlv	B BfyVlv	G GatVlv	A AlmChk	D DPVlv	N NTee
	F F45Ell								
1.049	2.00	5.00	2.00	5.00	6.00	1.00	10.00	2.00	5.00
	1.00								
1.380	3.00	6.00	2.00	7.00	6.00	1.00	10.00	10.00	6.00
	1.50								
2.067	5.00	10.00	3.00	11.00	6.00	1.00	10.00	10.00	10.00
	2.50								
2.469	6.00	12.00	4.00	14.00	7.00	1.00	10.00	10.00	12.00
	3.00								
3.068	7.00	15.00	5.00	16.00	10.00	1.00	13.00	13.00	15.00
	3.50								
4.026	10.00	20.00	6.00	22.00	12.00	2.00	20.00	20.00	20.00
	5.00								

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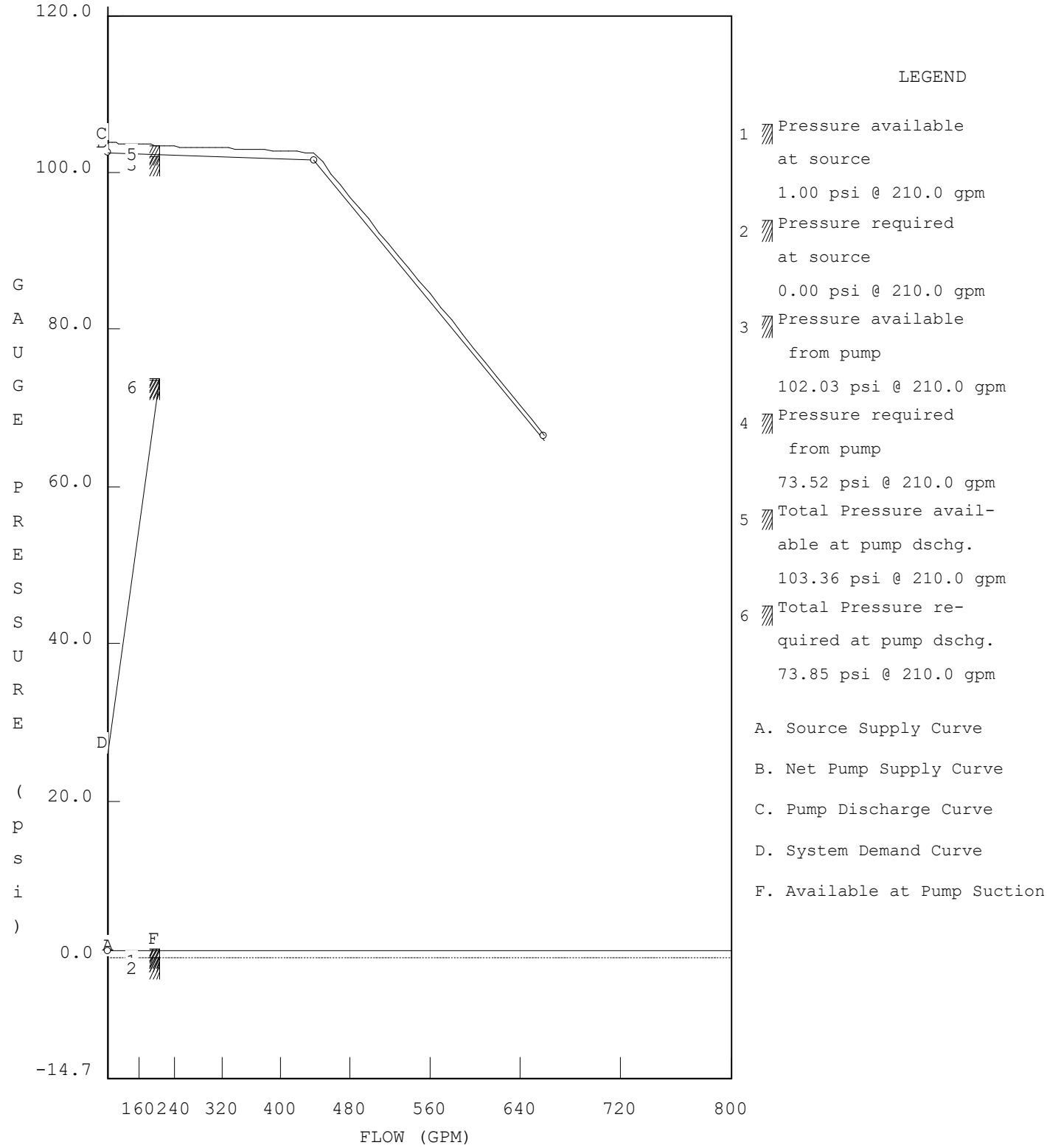
JOB TITLE: Hook Up Vessel

WATER SUPPLY ANALYSIS

Fixed Source Pressure: 1.00 psi



LEGEND

1 Pressure available at source
1.00 psi @ 210.0 gpm

2 Pressure required at source
0.00 psi @ 210.0 gpm

3 Pressure available from pump
102.03 psi @ 210.0 gpm

4 Pressure required from pump
73.52 psi @ 210.0 gpm

5 Total Pressure available at pump dschg.
103.36 psi @ 210.0 gpm

6 Total Pressure required at pump dschg.
73.85 psi @ 210.0 gpm

A. Source Supply Curve

B. Net Pump Supply Curve

C. Pump Discharge Curve

D. System Demand Curve

F. Available at Pump Suction

Note: (1) Dashed Lines indicate extrapolated values from Test Results

WATER SUPPLY CURVE

```
   12+
     |
     |
     |
   11+
     |
     |
     |
   10+
     |
     |
     |
    9+
     |
     |
     |
 P  8+
 R   |
 E   |
 S   |
 S  7+
 U   |
 R   |
 E   |
    6+
 (   |
 P   |
 S   |
 I  5+
 )   |
     |
     |
    4+
     |
     |
     |
    3+
     |
     |
     |==============================
    2+           LEGEND            "
     |                             "
     | X = Required Water Supply   "
     |    0.00 psi @ 210.0 gpm     "
    1*\\\0\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\
     | 0 = Available Water Supply  "
     |    1.00 psi @ 210.0 gpm     "
     |                             "
    0++-+X--+----+-----+------+--------+--------+---------+-----------+
       200 300  400   500    600      700      800       900        1000
                                   FLOW (GPM)
```