

NOTES

- 1. ALL HIGH PRESSURE PIPELINE TO BE IN ACCORDANCE WITH LLOYDS RULES FOR SPECIAL SERVICE CRAFT 2009, CLASS I.
- 2. THE TEST PRESSURE IS TO BE 1.5 TIMES THE DESIGN PRESSURE, IN ACCORDANCE WITH LLOYDS RULES FOR SPECIAL SERVICE CRAFT 2009, PART 14, CHAPTER 1, SECTION 4.
- 3. THE DESIGN TEMPERATURE IS TO BE TAKEN AS THE MAXIMUM TEMPERATURE OF THE INTERNAL FLUID BUT IN NO CASE IS IT TO BE LESS THAN 50°C.
- 4. ALL PIPEWORK TO BE THOROUGHLY CLEANED PRIOR TO INSTALLATION
- 5. ALL CUSTOMER EQUIPMENT DETAILS SHOWN IN THIS DIAGRAM ARE FOR INDICATION PURPOSES ONLY. FOR EQUIPMENT SPECIFIC DIAGRAMS ALWAYS REFER TO THE MANUFACTURERS DRAWING AS DETAIL.
- 6. HELM PUMP SHOWN FROM REAR VIEW. RESERVOIR AND MANIFOLD SHOWN FROM FRONT VIEW.
- 7. FILL SYSTEM WITH ISO 32 HYDRAULIC FLUID.
- 8. SEE INDIVIDUAL COMPONENT DRAWINGS FOR LOCATIONS OF PRESSURE AND FLOW ADJUSTMENTS AS WELL AS ELECTRICAL CONNECTIONS.
- 9. SHIPYARD IS RESPONSIBLE FOR PLACING IDENTIFICATION LABELS ON ALL MAIN AND AUXILIARY 3-WAY AND DARB ISOLATION VALVES ONCE INSTALLATION IS COMPLETE.
- 10. HEADER TANK TO BE LOCATED AT HIGHEST POINT IN STEERING SYSTEM.

CALCULATION OF STEEL PIPE THICKNESS

THE MINIMUM THICKNESS, t, OF STRAIGHT STEEL PRESSURE PIPES IS TO BE DETERMINED BY THE FOLLOWING FORMULA, ACCORDING TO Lloyd's Register Rules and Regulations - Rules and Regulations for the Classification of Special Service Craft, July 2008 - Part.15 Piping Systems and Pressure Plant - Chapter 1 - Piping Design Requirements - Section 5 - Carbon and low alloy steels - 5.1.2:

$$t = \left(\frac{p \cdot D}{20 \cdot \sigma \cdot e + p} \cdot (1 + D / 2.5 \cdot R) + c \right) \cdot \frac{100}{100 - a} \text{ mm}$$

- THE MINIMUM CALCULATED THICKNESS "t" for ND 15 PIPE
$$t = \left(\frac{129 \cdot 20}{20 \cdot 113.5 \cdot 1 + 129} \cdot (1 + 1 / 2.5 \cdot 3) + 0.3 \right) \cdot \frac{100}{100 - 0.08} = 1.52 \text{ mm} \quad , \text{ adopted } 20 \times 2.0 \text{ PIPE}$$

- THE MINIMUM CALCULATED THICKNESS "t" for ND 20 PIPE
$$t = \left(\frac{129 \cdot 25}{20 \cdot 113.5 \cdot 1 + 129} \cdot (1 + 1 / 2.5 \cdot 3) + 0.3 \right) \cdot \frac{100}{100 - 0.08} = 1.83 \text{ mm} \quad , \text{ adopted } 25 \times 2.0 \text{ PIPE}$$

- THE MINIMUM CALCULATED THICKNESS "t" for ND 25 PIPE
$$t = \left(\frac{129 \cdot 28}{20 \cdot 113.5 \cdot 1 + 129} \cdot (1 + 1 / 2.5 \cdot 3) + 0.3 \right) \cdot \frac{100}{100 - 0.08} = 2.0 \text{ mm} \quad , \text{ adopted } 28 \times 2.0 \text{ PIPE}$$

LEGEND:

	Ball Valve STR		Pipe flow direction
	Gear pump		Connection
	Manual pump (hand driven pump)		Reduction piece
	Electromotor		Save all with drain plug
	Hose	N.O.	Normally Open
	Pipe crossover	N.C.	Normally Closed
	Pipe intersection	—	High pressure pipeline
	Self closing valve (spring)	- - - -	Low pressure pipeline
	Level gauge		

REFERENCE DOCUMENTS TABLE

NO.	DRAWING TITLE	DOCUMENT NUMBER
1	GENERAL ARRANGEMENT	AF6094-89940-02
2	STEERING GEARS ROOM ARRANGEMENT PLAN	AF6094-56100-03
3	PIPING DIAGRAM FOR TWIN S2-25-1-35 STEERING GEAR	D-601654 JASTRAM SUPPLIER
4	HYDRAULIC SCHEMATIC FOR TWIN S2-X-1-X	D-611520 JASTRAM SUPPLIER
5	PUMP AND 2.0 HP MOTOR ASSEMBLY O.A.D.	C-521316 JASTRAM SUPPLIER
6	STEERING GEAR ARRANGEMENT FOR S2-25-1-35	D-651482 JASTRAM SUPPLIER
7	RESERVOIR AND MANIFOLD ASS'Y OVERALL DIMENSIONS	B-521319 JASTRAM SUPPLIER
8	H26/36/58 HELM PUMP OVERALL DIMENSIONS	D-331003 JASTRAM SUPPLIER
9	HEADER TANK - 1.5 L OVERALL DIMENSIONS	B-521011 JASTRAM SUPPLIER
10	3 WAY SHUT OFF VALVE	C-421008 JASTRAM SUPPLIER

PIPE DIMENSIONS

ND	Tube sizes	Standard	Material	Remarks	Demountable joints
8	12 x 2	DIN 2391	ST 37.4 DIN 1630 normal annealed		
15	20 x 2.0	DIN 2391	ST 37.4 DIN 1630 normal annealed		
-	22 x 2.0	DIN 2391	ST 37.4 DIN 1630 normal annealed	for 561-124-20 & 561125-20 pipelines only	
20	25 x 2.0	DIN 2391	ST 37.4 DIN 1630 normal annealed		
25	28 x 2.0	DIN 2391	ST 37.4 DIN 1630 normal annealed		

NOTE: * Pipe joints will be according to DIN standards

VALVE MATERIALS

ND	PN	Temp	Valve type	Material			LR class
				Body	Stem	Closing part	
15	129	50	Ball Valve	Steel			CLASS I
25	129	50	Ball valve	Steel			CLASS I
20	129	50	Ball valve	Steel			CLASS I
20	-	-	Self-closing valve	Steel			CLASS III




EQUIPMENT TABLE

ITEM	DESCRIPTION	QTY pcs	CHARACTERISTICS	REMARKS
E561101	FLEX. HOSE - 1/2" NOM.	4	ALL SAME LENGTH	JASTRAM SUPPLY
E561102	FLEX. HOSE - 1/2" NOM. WITH ELBOW	8	ALL SAME LENGTH	JASTRAM SUPPLY
E561103	DOUBLE ACTING RELIEF AND BYPASS	1	10 GPM CAPACITY	JASTRAM SUPPLY
E561104	DOUBLE ACTING RELIEF AND BYPASS	1	10 GPM CAPACITY	JASTRAM SUPPLY
E561105	HEADER TANK	1	V = 1.5 L	JASTRAM SUPPLY
E561106	H-58 HELM PUMP	1		JASTRAM SUPPLY
E561107	RESERVOIR & MANIFOLD ASSEMBLY	1	10 GAL PSM200	JASTRAM SUPPLY
E561108	RESERVOIR & MANIFOLD ASSEMBLY	1	10 GAL PSM200	JASTRAM SUPPLY
E561109	PUMP & MOTOR ASSEMBLY	1	Q=6.6 l/min, H= 10.3 MPa, P=2 HP	JASTRAM SUPPLY
E561110	PUMP & MOTOR ASSEMBLY	1	Q=6.6 l/min, H= 10.3 MPa, P=2 HP	JASTRAM SUPPLY
E561111	PUMP & MOTOR ASSEMBLY	1	Q=6.6 l/min, H= 10.3 MPa, P=2 HP	JASTRAM SUPPLY
E561112	PUMP & MOTOR ASSEMBLY	1	Q=6.6 l/min, H= 10.3 MPa, P=2 HP	JASTRAM SUPPLY
E561113	HYDRAULIC OIL STORAGE TANK	1	V = 110 L	SHIPYARD
E561114	MANUAL PUMP	1	Q= abt.1 mch Hand operated	AZCUE
E561115	FILLER BREATHER FBB-15-40	1		
E561116	3 WAY SHUT OFF VALVE	8		JASTRAM SUPPLY

TEST PRESSURE TABLE

PIPELINE	DESIGN PRESSURE (MPa)	TEST PRESSURE		
		In workshop (MPa)	On board (MPa)	WORKINGPRESSURE (MPa)
HIGH PRESSURE PIPELINES	12.9	19.35	12.9	10.3

CCGS PRIVATE ROBERTSON V.C

AF	04/29/12	AS FITTED			TK	FP	BF
Rev	Date	Description			Perform	Check	Appr.
Client:					Title:		
CANADIAN COAST GUARD					STEERING SYSTEM		
 international contract engineering					SCHEMATIC OF THE HYDRAULIC SYSTEM		
 IRVING SHIPBUILDING INC.					MID-SHORE PATROL VESSEL		
P.O. Box 9110, 3099 Barrington Street, Halifax NS, Canada ~~~~~ B3K 5M7, Tel: 902.423.9271, Fax: 902.429.4510					Scale:	Size: A1	Project No: 6094
					Drawn by: D.MONU	Checked by: E.ZAINESCU	Dwg. date: 07/07/2011
Draw.no:					AF6094-56100-02		Rev. AF
Contract No. F7045-06001/002/NQ					Proj. 		Sheet: 1 of 1
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STEERING GEAR TORQUE: 17,930 lb.ft (2.5 Tm) AT ±35°
MAX. SYSTEM PRESSURE: 1875 PSI (12.9 MPa) - SET AT ITEMS E561103, E561104 DARB VALVE
NORMAL WORKING PRESSURE: 1500 PSI (10.3 MPa) - SET AT ITEMS E561107, E561108, RESERVOIR & MANIFOLD ASS'Y
FLOW RATE: 1.7 GPM (6.6 L/min) - SET THRU CONTROL SYSTEM

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