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0	0	0	0	0	REV				
1UH	1CH	1(B)DH	1(A)DH	1DH	SHT				
0	0	0	0	0	1	0	1	REV	
9	8	7	6	5	4	3	2	1	SHT
REVISION STATUS									

FRV40 CLASS 63m FISHERIES RESEARCH VESSEL

H.V.A.C. HEATER LIST

SHEET 1 OF Index

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		A	JOB: NOAA FRV40 CLASS 63m VESSEL
		REV 0	
		FSCM:	DRAWING NO.: M284-512-FV05
		SCALE: N/A	SWBS:
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REVISIONS

REV	SHT #	DESCRIPTION
1	ALL	1. REVIEWED AND REVISED ALL APPLICABLE SHEETS FOR INCORPORATION OF CHANGE ORDER ECP-056C.

BY: VES/CMW

DATE: 12-18-2008

1. DATE: 12-18-2008 2. BY: VES/CMW 3. DATE: 12-18-2008	
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REFERENCES				
REV	NO	TITLE	DRAWING NO.	
	1	HVAC LOAD CALCULATIONS	M283-512-FV01	
	2	HVAC DIAGRAM	M283-512-FV02	
			<div>A</div> <div>JOB: NOAA FRV40 CLASS 63m VESSEL</div> <div>REV 0</div>	
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GENERAL NOTES

A. GENERAL

1. HEATER SIZES INDICATED ARE IN ACCORDANCE WITH REFERENCE (1). LOCATIONS ARE SHOWN ON REFERENCE (2).
2. EACH ELECTRIC HEATER SHALL COMPLY WITH U.S.C.G. REGULATIONS (46 CFR 111.87) & SHALL COMPLY WITH UL STANDARDS.
3. HEATERS SHALL BE SUITABLE FOR MARINE USE.

B. ELECTRIC DUCT HEATERS

1. ELECTRIC PREHEATERS SHALL BE OF SHAPE AND SIZE TO FIT DIMENSIONS. FULL FLANGES (ALL SIDES) SHALL BE PROVIDED ON BOTH INLET AND OUTLET END OF HEATER.
2. ELECTRIC PREHEATERS SHALL HAVE CASINGS OF AT LEAST NO. 16 USCG SHEET STAINLESS STEEL OR EQUIVALENT AND SHALL BE REINFORCED TO PROVIDE ADEQUATE STRENGTH. HEATERS, 24 INCHES OR LONGER, SHALL BE STIFFENED WITH CORNER BRACING AND A CROSSBRACE FOR STRENGTH. CASING MAY BE OF 300 SERIES CRES.
3. HEATERS SHALL BE PROVIDED WITH PREWIRED AND PREPIPED AIRFLOW SWITCH MOUNTED ON THE HEATER. HEATERS SHALL BE DEENERGIZED UPON LOSS OF AIRFLOW.
4. THE FOLLOWING UL REQUIRED CUTOUPS WILL BE PROVIDED IN THE HEATERS AS FOLLOWS: A) A KLIXON TYPE AUTOMATIC THERMAL CUTOUT MOUNTED IN THE TOP OF THE DUCT HEATER FRAME; B) AN AUTOMATIC RESET LINEAR LIMIT TYPE THERMAL CUTOUT; AND, C) A MANUAL RESET LINEAR LIMIT TYPE THERMAL CUTOUT. BY HAVING THESE THREE UL REQUIRED CUTOUPS AS LISTED ABOVE, THE HEATERS SHALL HAVE THE ADDITIONAL ADVANTAGE PER UL STANDARD 1096 OF BEING LISTED FOR 'ZERO CLEARANCE TO COMBUSTIBLE SURFACES'. THIS TRANSLATES TO A MAXIMUM HEATER FRAME TEMPERATURE OF 197°F AT A MAXIMUM OUTLET TEMPERATURE OF 200°F (BASED ON 80°F AMBIENT)."

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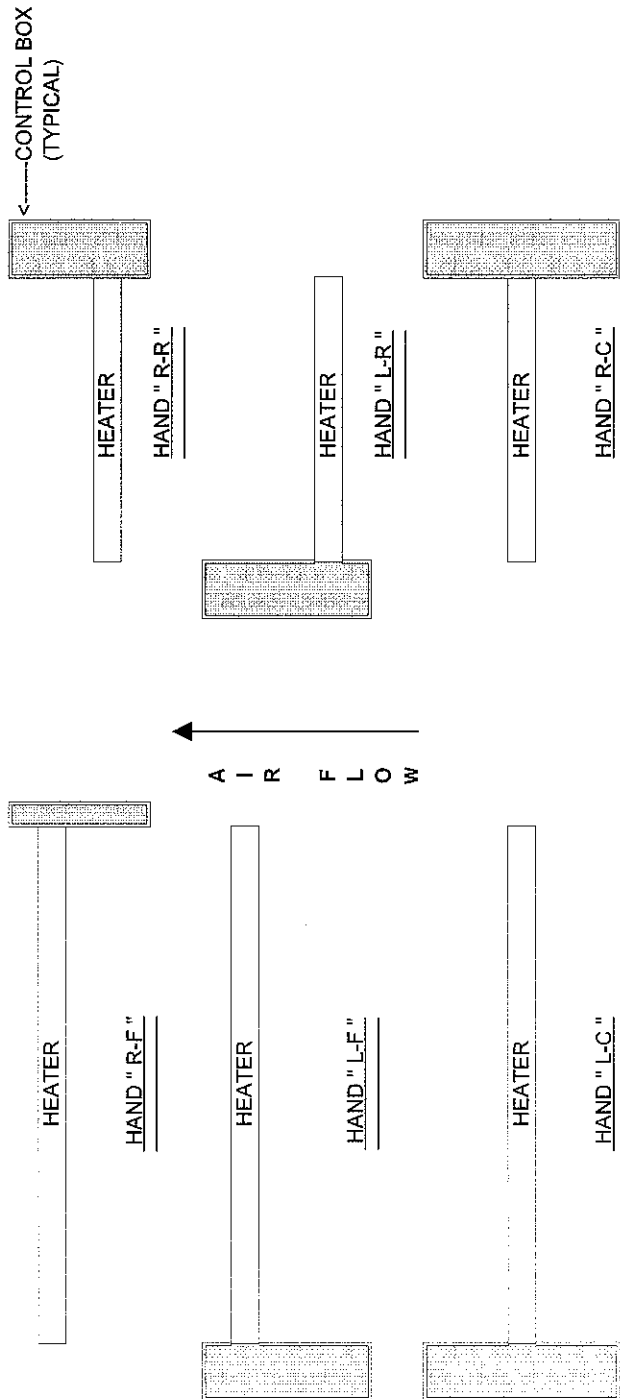
GENERAL NOTES

5. HEATING ELEMENTS SHALL BE DESIGNED AND CONSTRUCTED USING THE SAME REQUIREMENTS FOR ELECTRIC CONVECTION HEATERS.
6. HEATERS, 2.5 KW AND ABOVE, SHALL BE SUITABLE TO OPERATE ON 600V/3 PHASE/60Hz ELECTRIC POWER. HEATERS BELOW 2.5 KW SHALL BE SUITABLE TO OPERATE ON 115V/SINGLE PHASE/60Hz ELECTRIC POWER.
7. HEATERS SHALL BE COMPLETE WITH ALL NECESSARY CONTACTORS AND STEP DOWN TRANSFORMERS FOR EXTERNAL CONTROL SIGNAL FROM ASSOCIATED THERMOSTATIC CONTROL EQUIPMENT. THE HEATERS SHALL BE COMPLETE WITH ALL NECESSARY INTERNAL THERMOSTATS AS REQUIRED BY REGULATORY BODIES, AIR FLOW SWITCHES, THERMAL BLOCKS (FOR EXTERNAL BULKHEAD MOUNTED THERMOSTATS, ETC) ALL PREWIRED BY VENDOR, AND BULKHEAD MOUNTED ROOM THERMOSTATS.
8. ALL HEATERS ARE TO BE PROVIDED WITH TERMINAL BLOCKS TO RECEIVE EXTERNAL WIRING.
9. ALL HEATERS SHALL BE OF DRIPPROOF CONSTRUCTION, EXCEPT FOR DUCT HEATER ITEM #3DH & THE REMOTE PANEL FOR DUCT HEATER ITEM #4DH, WHICH SHALL BE NEMA 4X.
10. PREHEATERS SHALL BE CONTROLLED BY DUCT THERMOSTATS IN THE HEATER LEAVING AIR STREAM AND REHEATERS SHALL BE CONTROLLED BY ROOM THERMOSTATS. THE THERMOSTATS SHALL BE WIRED THROUGH THE HEATER CONTROL PANELS WHICH SHALL HOUSE CONTACTORS, FUSES AND CONTROL VOLTAGE TRANSFORMERS.
11. ACCESS COVERS ON THE DUCT HEATER CONTROL BOXES SHALL BE OF THE "SLIDE" TYPE FOR ITEM NOS. 1DH, 2DH, 7DH & 11DH. ALL OTHERS SHALL BE LEFT-HANDED "HINGED" TYPE.

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GENERAL NOTES

12. THE "HAND" OF THE DUCT HEATERS SHALL BE DETERMINED AS FOLLOWS: WHEN FACING IN THE DIRECTION OF THE AIR FLOW, THE "HAND" IS DETERMINED BY THE SIDE OF THE CONTROL BOX, AS ILLUSTRATED BELOW:



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GENERAL NOTES

C. ELECTRIC UNIT HEATERS

1. UNIT HEATERS SHALL BE EQUAL TO INDEECO "TRIAD" UNIT HEATERS.
2. SUITABLE MEANS SHALL BE PROVIDED FOR ATTACHMENT TO SHIPYARD FOUNDATION, FOR OVERHEAD OR BHD. MOUNTING.
3. ELECTRIC UNIT HEATERS SHALL BE OF QUALITY SUITABLE FOR MARINE USE IN ACCORDANCE WITH THE REQUIREMENTS OF THE USCG AND IEEE STANDARD 45.
4. UNIT HEATERS SHALL BE RUGGED CONSTRUCTION, OVERHEAD MOUNTED AND OPERATING ON 480V/ SINGLE PHASE/60Hz A/C CURRENT COMPLETE WITH 115V/SINGLE PHASE/60Hz BUILT IN STEP DOWN TRANSFORMERS.
5. UNIT HEATERS SHALL BE FURNISHED WITH BUILT-IN AUTOMATIC RESET AND MANUAL RESET TYPE THERMAL OVERHEAT PROTECTION, AN ADJUSTABLE KNOB-TYPE THERMOSTAT, AND ELECTRICAL CONTACTORS SHALL BE PROVIDED AND INSTALLED FOR EACH HEATER.
6. REMOTE DISCONNECT SWITCH WILL BE FURNISHED AND INSTALLED BY THE SHIPYARD.
7. THE FANS SHALL HAVE #18 GAGE EPOXY COATED ALUMINUM BLADES WITH EPOXY COATED CAST ALUMINUM HUBS. THE HUBS SHALL BE PROPERLY SECURED TO THE MOTOR SHAFTS.
8. HEATING ELEMENTS SHALL BE OF THE FIN TUBE TYPE AND SHALL BE CONSTRUCTED THE SAME AS REQUIRED FOR THE ELECTRIC CONVECTION HEATERS. SEE ITEM D.3 BELOW.
9. HEATERS, 1.0 KW AND ABOVE, SHALL BE SUITABLE TO OPERATE ON 480V/3 PHASE/60Hz ELECTRIC POWER. HEATERS BELOW 1.0 KW SHALL BE SUITABLE TO OPERATE ON 115V/SINGLE PHASE/60Hz ELECTRIC POWER.

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GENERAL NOTES

D. ELECTRIC EXPLOSION-PROOF CONVECTION HEATERS

1. ELECTRIC CONVECTION HEATERS SHALL BE OF THE SURFACE BULKHEAD MOUNTED TYPE OF GOOD COMMERCIAL QUALITY, EQUAL TO INDEECO EXPLOSION PROOF CONVECTOR MODEL 254-F08.
2. HEATERS SHALL BE PROVIDED WITH INTEGRAL, ADJUSTABLE, TEMPERATURE CONTROL (THERMOSTAT), AUTOMATIC RESET AND MANUAL RESET THERMAL CUTOUTS FOR SINGLE PHASE HEATERS OR INTEGRAL CONTROL TRANSFORMER AND CONTACTOR WITH HOLDING COILS FOR THREE PHASE HEATERS, ELECTRIC CONTACTORS TO BE SUPPLIED IF REQUIRED.
3. HEATING ELEMENTS SHALL BE OF THE FIN TUBE TYPE. HEATING BANKS SHALL CONSIST OF ELECTRIC SHOCKPROOF SHEATH ENCLOSED HEATING ELEMENTS OF HIGH QUALITY WIRE CENTERED WITHIN THE SHEATH AND IMBEDDED IN ELECTRICAL INSULATING AND HEAT CONDUCTING REFRACTORY MATERIAL. EACH TERMINAL END SHALL BE SEALED TO PREVENT THE ENTRANCE OF MOISTURE. HEATING ELEMENT SUPPORT FLANGES AND FINS SHALL BE PERMANENTLY ATTACHED BY AN APPROVED METHOD TO THE SHEATH FOR RIGID SUPPORT AND RAPID HEAT TRANSFER. EACH SHEATH AND FIN SHALL BE CONTINUOUSLY COATED WITH A SUITABLE MATERIAL CAPABLE OF RESISTING CORROSION FROM HIGH HUMIDITY OR SEAWATER ENVIRONMENT WITHOUT CRACKING, CHECKING OR SPALLING UNDER ALL DESIGN OPERATING CONDITIONS.
4. THE CABINET SHALL BE OF HEAVY GAUGE STEEL AND PAINTED WITH A BEIGE POWDER COAT FOR DURABILITY. CABINET SHALL BE MOUNTED AT LEAST 6" ABOVE THE DECK. FACTORY MOUNTED WALL BRACKETS FOR INSTALLATION SHALL BE FURNISHED.
5. HEATERS, 1.0 KW AND ABOVE, SHALL BE SUITABLE TO OPERATE ON 480V/3 PHASE/60Hz ELECTRIC POWER. HEATERS BELOW 1.0 KW SHALL BE SUITABLE TO OPERATE ON 115V/SINGLE PHASE/60Hz ELECTRIC POWER.

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- 2,050 CFM MAXIMUM AIR FLOW THRU HEATER.
- 1,468 CFM USE TO SIZE CAPACITY OF HEATER
- 1,165 CFM MINIMUM AIR FLOW THRU HEATER

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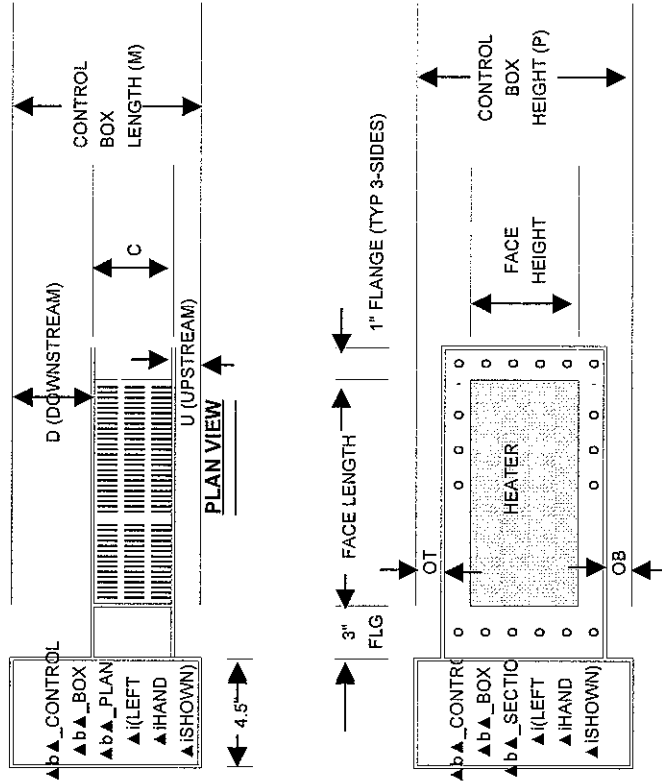
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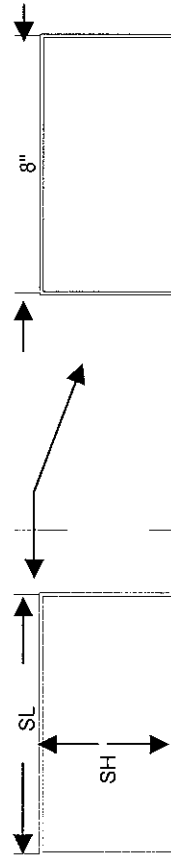
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ELECTRIC DUCT HEATER LIST (CONTINUED)

ITEM NO.	DEPTH C (")	CONTROL BOX SIZE & LOCATION (INCHES)					SECONDARY PANEL *	
		P	M	U	D	OB	OT	REQ'D ? Y/N
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								



* NOTE: IF SECONDARY PANEL REQUIRED, IT SHALL BE SEPARATELY MOUNTED IN VICINITY OF CONTROL BOX AND WIRED TO CONTROL BOX BY SHIPYARD.



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ELECTRIC CONVECTOR HEATER LIST

ITEM NO.	HTR NO.	MODEL NO.	ROOM LOAD (BTU/HR)	REQ'D KW per UNIT	RATED KW per Unit	SPACES SERVED	DECK	FRAMES	VOLT/ Hz/PHASE	QUANTITY	REMARKS
1	1CH	BROAN MODEL NO. 161	284	0.083	0.25	CHIEF ENGR. T/S	02	35-37 P	50Hz/1Ø	1	
2	2CH	BROAN MODEL NO. 161	0	0.000	0.25	SR T/S	02	35-37 S	50Hz/1Ø	1	
3	3CH	BROAN MODEL NO. 161	0	0.000	0.25	T/S	02	35-37 S	50Hz/1Ø	1	
4	4CH	BROAN MODEL NO. 161	284	0.083	0.25	SR T/S	02	43-46 P	50Hz/1Ø	1	
5	5CH	BROAN MODEL NO. 161	447	0.131	0.25	T/S	02	42-44 S	50Hz/1Ø	1	
6	6CH	BROAN MODEL NO. 161	87	0.026	0.25	SR T/S	02	44-46 P	50Hz/1Ø	1	
7	7CH	BROAN MODEL NO. 161	86	0.025	0.25	SR T/S	02	45-47 S	50Hz/1Ø	1	
8	8CH	BROAN MODEL NO. 161	793	0.232	0.25	HOSPITAL T/S	02	50-53 S	50Hz/1Ø	1	
9	9CH	BROAN MODEL NO. 161	81	0.024	0.25	DECK TOILET	02	50-53 CL	50Hz/1Ø	1	
10	10CH	BROAN MODEL NO. 161	795	0.233	0.25	SR T/S	01	21-23 P	50Hz/1Ø	1	
11	11CH	BROAN MODEL NO. 163	1208	0.354	0.50	SR T/S	01	24-26 P	50Hz/1Ø	1	
12	12CH	BROAN MODEL NO. 161	0	0.000	0.25	SR T/S	01	30-32 P	50Hz/1Ø	1	
13	13CH	BROAN MODEL NO. 161	0	0.000	0.25	SR T/S	01	33-35 P	50Hz/1Ø	1	
14	14CH	BROAN MODEL NO. 161	-98	-0.029	0.25	DECK TOILET	MAIN	63-65 P	50Hz/1Ø	1	
15	15CH	BROAN MODEL NO. 161	0	0.000	0.25	DECK TOILET	MAIN	43-45 P	50Hz/1Ø	1	
16	16CH	BROAN MODEL NO. 163	2054	0.301	0.50	EXERCISE RM T/S	2ND	19-22 S	50Hz/1Ø	2	
17	17CH	BROAN MODEL NO. 161	644	0.189	0.25	T/S	2ND	26-29 P	50Hz/1Ø	1	
18	18CH	BROAN MODEL NO. 161	345	0.101	0.25	T/S	2ND	26-29 S	50Hz/1Ø	1	
19	19CH	BROAN MODEL NO. 161	110	0.032	0.25	T/S	2ND	29-32 P	50Hz/1Ø	1	
20	20CH	BROAN MODEL NO. 161	110	0.032	0.25	T/S	2ND	31-34 S	50Hz/1Ø	1	
21	21CH	BROAN MODEL NO. 163	1128	0.331	0.50	T/S	2ND	29-32 S	50Hz/1Ø	1	
22	22CH	BROAN MODEL NO. 161	92	0.027	0.25	T/S	2ND	36-39 P	50Hz/1Ø	1	
23	23CH	BROAN MODEL NO. 161	110	0.032	0.25	T/S	2ND	39-41 P	50Hz/1Ø	1	
24	24CH	BROAN MODEL NO. 161	545	0.160	0.25	T/S	2ND	39-41 S	50Hz/1Ø	1	
25	25CH	BROAN MODEL NO. 161	232	0.068	0.25	T/S	2ND	44-49 P	50Hz/1Ø	1	
26	26CH	BROAN MODEL NO. 161	232	0.068	0.25	T/S	2ND	46-49 S	50Hz/1Ø	1	
27	27CH	INDEECO #254-F0840324U	1398	2.70	3.20	HAZMAT/PAINT LKR	MAIN	78-82 P	50Hz/3Ø	1	NON-SPK & X-PRF

NOTES:

* Class 1, Division 1, Group D

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