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GLYCOL / WATER SOLAR SERVICE WATER HEATING SYSTEM WITH INTERNAL HEAT EXCHANGER

2 equilibrium

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HOT WATER

RETURN OR COLD WATER MAKEUP

NO.	Description	Date				
02		06/10/2017				
02	ISSUED FOR REVIEW	20/09/2017				
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	INTERPRETIVE CENTER					
SOLAR DHW SYSTEM						
Project number 2017.091-EKI						
Project	number 2017	7.091-EKI				
Project Date	number 2017 21	7.091-EKI /09/2017				
Project Date Drawn b	number 2017 21	7.091-EKI /09/2017 WM				
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INDOOR HEAT PUMP SCHEDULE								
Mark	Manufactur er	Model	Maximum Air Flow	Nominal Cooling Capacity (Tons)	Nominal Heating Capacity	Voltage	Phase	Minimum Circuit Amps
IH-1	Daikin	FXMQ12P BVJU	450	1	13500.0 Btu/h	240 V	1	1 A
IH-3	Daikin	FXMQ48P BVJU	1377	4	54000.0 Btu/h	240 V	1	3 A
IH-2	Daikin	FXMQ24P BVJU	688	2	27000.0 Btu/h	240 V	1	2 A
IH-2	Daikin	FXMQ24P BVJU	688	2	27000.0 Btu/h	240 V	1	2 A
IH-2	Daikin	FXMQ24P BVJU	688	2	27000.0 Btu/h	240 V	1	2 A

OUTDOOR HEAT PUMP SCHEDULE									
vv	Manufactur er	Model	Nominal Cooling Capacity (Tons)	Nominal Heating Capacity	Voltage	Phase	Minimum Circuit Amps		
OH-1	Daikin	RXTQ48TA VJU	4	52500.0 Btu/h	240 V	1	29 A		
OH-1	Daikin	RXTQ48TA VJU	4	52500.0 Btu/h	240 V	1	29 A		
OH-1	Daikin	RXTQ48TA VJU	4	52500.0 Btu/h	240 V	1	29 A		

ENERGY RECOVERY VENTILATOR										
TAG	Manufactur er	Model	Supply CFM	Exhaust CFM	Exhaust Motor HP	Supply Motor HP	Voltage	MCA	MOCP	FLA
ERV-1	fantech	SER 6004	0	0	0.45	0.45	120 V	0	0	0
ERV-1	fantech	SER 6004	0	0	0.45	0.45	120 V	0	0	0

GRILLS & DIFFUSER SCHEDULE							
Mark	Manufacturer	Model	Connection Size	Туре	Comments		
LV-1	Price Industries		12"x18"	Standard			
R-1	Price Industries	DLSS Series	8"x12"	Standard			
R-2	Price Industries	DLSS Series	11"x37"	Standard			
R-3	Price Industries	DLSS Series	11"x18"	Standard			
R-4	Price Industries	DLSS Series	18"x12"	Standard			
S-1	Price Industries	DLSS Series	6"ø	610 mmx610 mm Face 150 mm Neck - Hosted			
S-2	Price Industries	DLSS Series	8"ø	610 mmx610 mm Face 200 mm Neck - Hosted			

<u>METAL</u> PART

<u>META</u>	L DUCTS - LOW PRESSURE TO 500Pa	PART	2EXECUTION
PART	1 PRODUCTS	2.1 .1	MANUFACTURER'S INSTRUCTIONS Compliance: comply with manufacturer's written recomm
1.1	SEAL CLASSIFICATION	handlir 22	ng, storage and installation instructions, and datasheet.
.2	Seal classification:	.1	Install in accordance with CSA B52, EPS1/RA/1 and ASI
	.1 Class A: longitudinal seams, transverse joints, duct wall penetrations and connections made airtight with sealant and tape. .2 Class B: longitudinal seams, transverse joints and connections made airtight with sealant tape or combination thereof.	2.3 .1	BRAZING PROCEDURES Bleed inert gas into pipe during brazing.
	.3 Class C: transverse joints and connections made air tight with gaskets, sealant tape or combination thereof. Longitudinal seams	.2	Remove valve internal parts, solenoid valve coils, sight g
1.2	SEALANT	2.4	PIPING INSTALLATION
.1 1.3	Sealant: oil resistant, polymer type flame resistant duct sealant. Temperature range of minus 30°C to plus 93°C. TAPE	.1	General: .1 Soft annealed copper tubing: bend without crimp
.1	Tape: polyvinyl treated, open weave fiberglass tape, 50 mm wide.	use of	fittings.
1.4 .1	In accordance with SMACNA HVAC Duct Leakage Test Manual.	.2	.1 Pitch at least 1:240 down in direction of flow to p
1.5	FITTINGS Fabrication: to SMACNA.	.3	.2 Provide trap at base of risers greater than 1800 Provide inverted deep trap at top of risers.
.2	Radiused elbows:	.4	Provide double risers for compressors having capacity m
	.2 Round: smooth radius or five piece. Centreline radius: 1.5 times diameter.		.2 Small riser: size for 5.1 m/s at minimum load. Co
.3	Mitred elbows, rectangular: .1 To 400 mm; with single thickness turning vanes.	2.5 .1	PRESSURE AND LEAK TESTING Close valves on factory charged equipment and other eq
1	.2 Over 400 mm: with double thickness turning vanes.	.2	Leak test to CSA B52 before evacuation to 2MPa and 1M
.+	.1 Rectangular main and branch: with radius on branch 1.5 times width of duct or 45° entry on branch.	2.6	FIELD QUALITY CONTROL
	.2 Round main and branch: enter main duct at 45° with conical connection. .3 Provide volume control damper in branch duct near connection to main duct.	.1	.1 Close service valves on factory charged equipm
5	.4 Main duct branches: with volume control damper.	.2	Ambient temperatures to be at least 13 degrees C for at
.0	.1 Diverging: 20 ⁰ maximum included angle.	.4	Use two-stage vacuum pump with gas ballast on 2 nd stage
.6	.2 Converging: 30° maximum included angle. Offsets:	.5 .6	Triple evacuate system components containing gases ot
7	.1 Full short radiused elbows as indicated.		.1 Twice to 14 Pa absolute and hold for 4 h. 2 Break vacuum with refrigerant to 14 KPa
1.6	FIRESTOPPING		.3 Final to 5 Pa absolute and hold for at least 12 h.
.1 .2	Retaining angles around duct, on both sides of fire separation. Firestopping material and installation must not distort duct.		.4 Isolate pump from system, record vacuum and the system. Submit test results to Owner's Representative.
1.7 1	GALVANIZED STEEL	.7	Charging:
.2	Thickness, fabrication and reinforcement: to SMACNA.	h a fa sa	.2 With compressors off, charge only amount neces
.3 seal.	Joints: to SMACNA or proprietary manufactured duct joint. Proprietary manufactured flanged duct joint to be considered to be a class A	before	3 Re-purge charging line if refrigerant container is
1.8 1	STAINLESS STEEL	.8	Checks: 1 Make checks and measurements as per manufa
.2	Finish: No 4. finish on exposed side of duct in finished area's, No. 3 finish or lower where concealed.	0	.2 Record and report measurements to Owner's Re
.3 .4	Thickness, fabrication and reinforcement: to SMACNA. Joints: to SMACNA and be continuous inert gas welded.	.9	.1 Have manufacturer of products, supplied under t
1.9 1	ALUMINUM	installa of worl	ation/application, protection and cleaning, of its products k with Contract
.2	Thickness, fabrication and reinforcement: to SMACNA.	of	.2 Provide manufacturer's field services consisting
.3 1.10	Joints: to SMACNA and be continuous weld. HANGERS AND SUPPORTS	of proc	.3 Schedule site visits, to review work, at stages lis
.1 hanger	Strap hangers: of same material as duct but next sheet metal thickness heavier than duct. Maximum size duct supported by strap	Sectio	.1 After delivery and storage of products, a complete but before installation
.2	Hanger configuration: to SMACNA.	000110	.2 Twice during progress of work at 25% at
.3 .4	Hangers: galvanized steel angle with black steel rods to ASHRAE or SMACNA following table: Upper hanger attachments:		.4 Obtain reports, within three (3) working of
	.1 For joist: manufactured joist clamp steel plate washer.	2.7 .1	DEMONSTRATION Instructions:
			.1 Post instructions in frame with glass cover in acc
<u>PART</u> 2.1	2EXECUTION GENERAL	manuf	acturer's recommendations.
.1	Do work in accordance with NFPA 90A, NFPA 90B, and SMACNA.	rubbisl	.2 On completion and verification of perform
.2 .3	Support risers in accordance with SMACNA.		
.4 sleeve	Install breakaway joints in ductwork on sides of fire separation. Do not place fire stopping material in expansion space between damper and fire partition.		
.5	Install proprietary manufactured flanged duct joints in accordance with manufacturer's instructions.	DUCT	INSULATION
2.2	HANGERS	<u></u>	
.1 .2	Strap hangers: install in accordance with SMACNA. Angle hangers: complete with locking nuts and washers.	<u>PART</u> 1.1	FIRE AND SMOKE RATING
.3 2 2	Hanger spacing: in accordance with SMACNA or as follows:		.1 In accordance with CAN/ULC-S102:
.1	Provide watertight duct for:		.2 Maximum smoke developed rating: 50.
.2	.1 Fresh air intake. Form bottom of horizontal duct without longitudinal seams. Solder or weld joints of bottom and side sheets. Seal other joints with duct	1.2	.1 Mineral fibre: as specified includes glass fibre, ro
sealer.	Slope berizental branch ductwork down towards fume boods served. Slope booder ducts down toward risers		.2 Thermal conductivity ("k" factor) not to exceed s with ASTM C335
.4	Fit base of riser with 150 mm deep drain sump and NPS 1 ½ drain connected, with deep seal trap and valve and discharging to open		.3 TIAC Code C-1: Rigid mineral fibre board to AST
tunnel 2.4	drain or service sink or as approved by Owner's Representative. SEALING AND TAPING		.4 TIAC Code C-2: Mineral fibre blanket to ASTM C
.1	Apply sealant to outside of joint to manufacturer's recommendations. Bod tape in sealant and recent with minimum of one cost of sealant to manufacturors recommendations. Sealant and tape to be applied		GP-52Ma (as scheduled in PART 3 of this section).
to full	perimeter of duct.		.2 Jacket: to CGSB 51-GP-52Ma.
2.5	LEAKAGE TESTS/COMMISSIOONING	1.3	JACKETS
.1 2	In accordance with SMACNA HVAC Duct Leakage Test Manual.		.1 Canvas: .1 220 gm/m ² cotton plain weave treated to
.2	Make trial leakage tests as instructed to demonstrate workmanship.		.2 Lagging adhesive: Compatible with insulation.
.4 .5	Install no additional ductwork until trial test has been passed. Test section minimum of 30 m long with not less then three branch takeoffs and two 90° elbows.	1.4	.1 Vapour retarder lap adhesive:
.6	Complete test before insulation or concealment.		.1 Water based, fire retardant type, compa 2 Indoor Vapour Betarder Finish
			.1 Vinyl emulsion type acrylic, compatible w
REFRI	GERANT PIPING		.3 Insulating Cement: hydraulic setting on mineral v .4 ULC Listed Canvas Jacket:
DADT			.1 220 gm/m ² cotton, plain weave, treated desive to ASTM C921
1.1	TUBING		.5 Tape: self-adhesive, aluminum, reinforced, 75 m
.1	Processed for refrigeration installations, deoxidized, dehydrated and sealed.		.7 Canvas adhesive: washable.
	.2 Annealed copper: to ASTM B280, with minimum wall thickness as per CSA B52 and ASME B31.5.		.8 Tie wire: 1.5 mm stainless steel. 9 Banding: 12 mm wide 0.5 mm thick stainless ste
1.2 .1	FITTINGS Service: design pressure 2070 kPa and temperature 121°C.		.10 Facing: 25 mm galvanized steel hexagonal wire
.2	Brazed:	PART	.11 Fasteners: 4 mm diameter pins with 35 mm dian 2EXECUTION
	.2 Joints: silver solder, 45% Ag - 80% Cu - 5% P and non-corrosive flux for copper to steel or brass; Silfoss-15	2.1	PRE-INSTALLATION REQUIREMENTS
tor cop .3	pper to copper. Flared:		.2 Surfaces clean, dry, free from foreign material.
19	.1 Bronze or brass, for refrigeration, to ASME B16.26.	2.2	INSTALLATION .1 Install in accordance with TIAC National Standar
.1	Hard copper or steel, sized to provide 6 mm clearance between sleeve and uninsulated pipe or between sleeve and		.2 Apply materials in accordance with manufacturer
insulati 1.4	ion. VALVES		.4 Maintain uninterrupted continuity and integrity of
.1	7/8 ODS and under: Class 500, 3.5 MPa, globe or angle non-directional type, diaphragm, packless type, with forged		.1 Hangers, supports to be outside vapour .5 Supports. Hangers in accordance with Section 2
urass l	oouy and bonnet, moistureproor sear or below reezing applications, prazed connections.		.1 Apply high compressive strength insulati
.2 to 149	Check valves 3/8 ODS to 7/8 ODS: brass construction, Teflon seal, removable piston, maximum WP 3.5 kPa, -40°C C, suitable for high side, low side and hot gas. UL and CSA approved. maximum opening pressure 3.5 kPa	2.3	DUCTWORK INSULATION SCHEDULE
			.1 Insulation types and thicknesses: Conform to foll
			2 Use TIAC code C-2 insulation. For Boun

with manufacturer's written recommendations or specifications, including product technical bulletins,

with CSA B52, EPS1/RA/1 and ASME B31.5.

al parts, solenoid valve coils, sight glass.

d copper tubing: bend without crimping or constriction, hard drawn copper tubing: do not bend. Minimize

1:240 down in direction of flow to prevent oil return to compressor during operation. at base of risers greater than 1800 mm high and at each 6000 mm thereafter.

for compressors having capacity modulation.

size for 5.1 m/s at minimum load. Connect upstream of traps on large riser.

bry charged equipment and other equipment not designed for test pressures. before evacuation to 2MPa and 1MPa on high and low sides respectively. I pressure up to 35 kPa using nitrogen leave for 8 hours.

e valves on factory charged equipment.

s to be at least 13 degrees C for at least 12 hours before and during dehydration. largest practical size to reduce evacuation time. Im pump with gas ballast on 2nd stage capable of pulling 5 Pa absolute and filled with dehydrated oil. ssure with vacuum gauge. Take readings with valve between vacuum pump and system closed. em components containing gases other than correct refrigerant or having lost holding charge as follows:

from system, record vacuum and time readings until stabilization of vacuum.

em through filter-drier and charging valve on high side. Low side charging not permitted. ssors off, charge only amount necessary for proper operation of system. If system pressures equalize charged, close charging valve and start up. With unit operating, add remainder of charge to system. arging line if refrigerant container is changed during charging process.

and measurements as per manufacturer's operation and maintenance instructions. report measurements to Owner's Representative.

acturer of products, supplied under this Section, review work involved in the handling,

ction and cleaning, of its products and submit written reports, in acceptable format, to verify compliance ufacturer's field services consisting of product use recommendations and periodic site visits for inspection accordance with manufacturer's instructions.

visits, to review work, at stages listed: delivery and storage of products, and when preparatory work, or other work, on which the work of this complete but before installation begins. e during progress of work at 25% and 60% complete.

completion of the work, after cleaning is carried out.

in reports, within three (3) working days of review, and submit, immediately, to Owner's Representative.

ions in frame with glass cover in accordance with Section 01 78 00 – Closeout Submittals and CSA B52. orm cleaning operations as specified in Section 01 74 11 – Cleaning and in accordance with

ompletion and verification of performance of installation, remove surplus materials, excess materials,

as specified includes glass fibre, rock wool, slag wool.

ductivity ("k" factor) not to exceed specified values at 24°C mean temperature when tested in accordance C-1: Rigid mineral fibre board to ASTM C612, with factory applied vapour retarder jacket to CGSB 51-C-2: Mineral fibre blanket to ASTM C553 faced with factory applied vapour retarder jacket to CGSB 51-

gm/m² cotton, plain weave, treated with dilute fire retardant lagging adhesive to ASTM C921.

er based, fire retardant type, compatible with insulation.

emulsion type acrylic, compatible with insulation. ement: hydraulic setting on mineral wool, to ASTM C449.

gm/m² cotton, plain weave, treated with dilute fire retardant lagging a

thesive, aluminum, reinforced, 75 mm wide minimum.

mm wide, 0.5 mm thick stainless steel. Im galvanized steel hexagonal wire mesh stitched on one face of insulation. 1 mm diameter pins with 35 mm diameter or square clips, length to suit thickness of insulation.

ting of ductwork systems complete, witnessed and certified.

ordance with TIAC National Standards.

als in accordance with manufacturer's instructions and as indicated. rs with staggered joints when required nominal thickness exceeds 75 mm. terrupted continuity and integrity of vapour retarder jacket and finishes.

gers, supports to be outside vapour retarder jacket. ngers in accordance with Section 23 05 29 - Hangers and Supports for HVAC Piping and Equipment high compressive strength insulation where insulation may be compressed by weight of ductwork. 300 mm oc in horizontal and vertical directions, minimum two rows each side.

bes and thicknesses: Conform to following Table: TIAC code C-1 insulation, For Rectangular ducts TIAC code C-2 insulation, For Round ducts

Exposed round ducts 600 mm and larger, smaller sizes where subject to abuse: .1 Use TIAC code C-1 insulation, scored to suit diameter of duct.

Description Date ISSUED FOR TENDER 06/10/2017 02 ISSUED FOR REVIEW 01 20/09/2017 INTERPRETIVE CENTER SCHEDULES & DETAILS 2017.091-EKI Project number 21/09/2017 Date

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M-03

Scale

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