

THE RECIPIENT AGREES NOT TO REPRODUCE, COPY, USE OR TRANSMIT THIS DOCUMENT AND/OR THE INFORMATION THERIN CONTAINED, IN WHOLE OR IN PART, OR TO SUFFER SUCH ACTION BY OTHERS, FOR ANY PURPOSE, EXCEPT WITH THE WRITTEN PERMISSION OF TTF ENGINEERING AND FURTHER AGREES TO SURRENDER SAME TO TTF ENGINEERING UPON DEMAND. COPYRIGHT TTF ENGINEERING HVAC LEGEND ITEM DESCRIPTION NEW SQUARE DIFFUSER 'A' INDICATES DIFFUSER TYPE (REFER TO SPEC) ## INDICATES AIRFLOW (CFM) LOUVERED RETURN GRILLE 'B' INDICATES GRILLE TYPE (REFER TO SPEC) 1 <u>__</u> THERMOSTAT C/W CONTROL WIRING S SPEED CONTROLLER EXISTING DUCTWORK NEW DUCTWORK DUCTWORK C/W 1" ACOUSTIC INSULATION ACOUSTICALLY INSULATED RETURN TRANSFER DUCT ∕ → 'B' INDICATES GRILLE TYPE (REFER TO SPEC) BD 🖵 BALANCING DAMPER FD 🖵 FIRE DAMPER \bigotimes DESTRATIFICATION FAN ##____BB HYDRONIC BASEBOARD HEATER ## – LENGTH (FT) FE FIRE EXTINGUISHER LINETYPE LEGEND — NEW — EXISTING - - - - - - - - DEMOLITION 2 FEB 27/18 ISSUED FOR TENDER 1 DEC 19/17 ISSUED FOR PERMIT DATE REVISIONS No. STAM PROJECT NORTH III: **TTF** ENGINEERING TTF Engineering Unit 205 - 1600 Merivale Road Ottawa, ON K2G 5J8 Tel. 613-592-1677 PROJECT Mills Phase Three 411 Country Street ALMONTE, ONTARIO DRAWING NEW HVAC LAYOUT -FLOOR PLAN DRAWN: DRAWING No. M.E. APPROVED: T.V. DATE: DEC 14/17 **M-1** SCALE: AS SHOWN

ARCH D - 24"X36"





NEW HYDRONIC PIPING SCHEMATIC

DUCTLESS SPLIT UNIT SCHEDULE										
TAG	MANUFACTURER & MODEL	AIR FLOW E.S.	E.S.P.	NOM CAPA (MBH)	INAL CITY	POWER	CONDENSING UNIT TAG	ENSING CONDENSING UNIT CU POWER AG MANUFACTURER (// PH / HZ)		COMMENTS
IU-1	MITSUBISHI PKA-SERIES	-	-	36000	3	208/1/60	OU-1	MITSUBISHI PUY SERIES	208/1/60	SINGLE DUCTLESS SPLIT SYSTEM. INDOOR UNIT TO BE WALL MOUNTED. PROVIDE REMOTE CONTROLLER ON WALL FOR CONTROL.
IU-2	MITSUBISHI PKA-SERIES	_	-	24000	2	208/1/60	OU-2	MITSUBISHI PUY SERIES	208/1/60	SINGLE DUCTLESS SPLIT SYSTEM. INDOOR UNIT TO BE WALL MOUNTED. PROVIDE REMOTE CONTROLLER ON WALI FOR CONTROL.

COIL SCHEDULE									
	MANUFACTURER	SERVING	USAGE	LOAD (BTU/H)	FLUID				
COMPONENT ID	& MODEL NUMBER				FLOW RATE (GPM)	ENTERING /LEAVING TEMP (°F)	WORKING FLUID	HEAD LOSS (FT)	
IHL -2	LUVATA	HRV-1	HEATING	34,470	4	150°F/130°F	ETHYLENE GLYCOL 50%	6	
IHL -3	THE UNICO SYSTEM V2430 HOT WATER COIL	AHU-1	HEATING	32,100	4	150°F/130°F	ETHYLENE GLYCOL 50%	2	

BOILER SCHEDULE										
	MANUFACTURER & MODEL NUMBER	TYPE	FUEL TYPE	OUTPUT LOAD (BTU/H)	FLUID				ELEC	
COMPONENT ID					FLOW RATE (GPM)	ENTERING /LEAVING TEMP (°F)	WORKING FLUID	HEAD LOSS (FT)	(VOLT	
B-1	IBC BOILERS SL-115G2	GAS FIRED CONDENSING BOILER	NATURAL GAS	109,000	10	150°F/130°F	ETHYLENE GLYCOL 50%	4	120V	

PUMP SCH							
COMPONENT ID	MANUFACTURER & MODEL NUMBER	SERVING	FLOW RAT (GPM)				
P-1	WILO STAR S 33FC	INFLOOR HEATING	4				
P-2	WILO STAR S 21 F	BOILER	10				
P-3	WILO STAR S 21 F	HYDRONIC BASEBOARD	2				
P-4	WILO STAR S 21 F	HRV HOT WATER COIL	4				
P-5	WILO STAR S 21 F	AHU HOT WATER COIL	4				

		EXPA	NSION	
COMPONENT ID	MANUFACTURER & MODEL NUMBER	SERVING	TYPE	
ET-1	CALEFACTIO HGT-90	BOILER	FIXED BLAD	



4 GPM 120°F 🗼 ↓101.7°F <u>3</u>"∅

GENERAL NOTES:

|HL-4|

27000 BTU/H

- (1) PROVIDE ALL NEW HYDRONIC SUPPLY & RETURN PIPING.
- 2 WORKING HYDRONIC FLUID TO BE 50% ETHYLENE GLYCOL.

DRAWING NOTES:

- 1 PROVIDE TRENCH FOR HYDRONIC SUPPLY & RETURN PIPING TO BASEBOARD & HOT WATER COIL, HWC-1.
- 2 PROVIDE HYDRONIC SUPPLY & RETURN RISERS FROM TRENCH, THROUGH WALL, TO CEILING PLENUM AND MAKE CONNECTION TO HOT WATER COIL, HWC-1, SERVING HRV.

MECHANICAL SPECIFICATIONS

DOCUMENTATION

- THESE DOCUMENTS ARE AN INTEGRAL PART OF THE CONTRACT DOCUMENTS. THE INSTRUCTIONS TO BIDDERS AND GENERAL CONDITIONS OF THE ARCHITECTURAL DOCUMENTS ARE FULLY BINDING TO THE MECHANICAL CONTRACT.
 REFER TO OTHER DIVISIONS TO ENSURE FULL COORDINATION.
- 3. "PROVIDE" IN THIS DIVISION MEANS TO "SUPPLY AND INSTALL."

COMMISSIONING

1. PLAN, ORGANIZE AND IMPLEMENT THE COMMISSIONING PROCESS FOR MECHANICAL SYSTEMS AND EQUIPMENT. SUPPLY COMPLETE INSTRUCTIONS AND INFORMATION RELATING TO THE OPERATION AND MAINTENANCE OF ALL EQUIPMENT AND SYSTEMS. DELIVER A SYSTEM WHICH PERFORMS IN ACCORDANCE WITH THE CONTRACT DOCUMENTS AND EQUIPMENT MANUFACTURER'S REQUIREMENTS.

MECHANICAL SYSTEM SUPPORT, AND ANCHORAGE (SEISMIC)

- 1. PROVIDE SUPPORT, ANCHORAGE AND RESTRAINT OF MECHANICAL DISTRIBUTION SYSTEMS AND EQUIPMENT, DESIGNED AND CONSTRUCTED IN ACCORDANCE WITH THE LATEST EDITION OF THE ONTARIO BUILDING CODE; ASHRAE APPLICATIONS, SMACNA DUCT CONSTRUCTION STANDARDS; AND ANSI/NFPA 13 INSTALLATION OF SPRINKLER SYSTEMS.
- COORDINATE MECHANICAL SYSTEM SUPPORT, ANCHORAGE, AND RESTRAINT SYSTEM WITH THE REQUIREMENTS AND CONSTRAINTS OF THE STRUCTURE, VIBRATION ISOLATION SYSTEMS, AND THE SUPPORT. ANCHORAGE, AND RESTRAINT SYSTEMS FOR ELECTRICAL AND ARCHITECTURAL COMPONENTS OF THE BUILDING.
- 3. CONTRACTOR TO ALLOW FOR SEISMIC REVIEW OF ALL NEW INSTALLATIONS AND PROVIDE ENGINEER-STAMPED DOCUMENTS OUTLINING SEISMIC MEASURES TAKEN.

PROJECT SCHEDULE

1. PHASE WORK IN ACCORDANCE WITH DIVISION 1. PROVIDE CONSULTANT WITH MATERIAL DELIVERY SCHEDULE WITHIN ONE(1) WEEK OF EXECUTING THE AGREEMENT.

DRAWINGS AND MEASUREMENTS

- DRAWINGS DO NOT INDICATE EXACT ARCHITECTURAL, STRUCTURAL OR ELECTRICAL FEATURES. EXAMINE DRAWINGS PRIOR TO LAYING OUT, FABRICATING AND INSTALLING
- WORK TO ENSURE NO INTERFERENCE EXISTS. REPORT CONFLICT WITH WORK TO CONSULTANT 2. DRAWINGS SHOW GENERAL DESIGN AND ARRANGEMENT OF MECHANICAL SYSTEM
- INSTALLATION, AND ARE DIAGRAMMATIC IN SOME DETAILS. COORDINATE WITH ALL TRADES FOR COMPLETE OPERATIONAL SYSTEM.
- 3. DO NOT SCALE DRAWINGS TO ORDER MATERIAL. TAKE FIELD MEASUREMENTS BEFORE ORDERING MATERIALS AND MAKE MATERIAL CONFORM TO SITE CONDITIONS.

EXAMINATION

1. THIS PROJECT INVOLVES RENOVATIONS TO AN EXISTING BUILDING. EXAMINE THE SITE AND MAKE ALLOWANCE FOR ALL LOCAL CONDITIONS AFFECTING WORK UNDER THIS CONTRACT PRIOR TO SUBMITTING FINAL PRICE.

PERMITS AND FEES

1. GIVE ALL NECESSARY NOTICE, OBTAIN ALL PERMITS AND PAY ALL FEES IN ORDER THAT THE WORK SPECIFIED HEREIN MAY BE COMPLETED.

CODES AND BY-LAWS

 COMPLY WITH ALL CODES AND BY-LAWS RELATING TO INSTALLATION AND EQUIPMENT. PROVIDE CERTIFICATES TO VERIFY THAT THE WORK INSTALLED CONFORMS WITH THE LAWS AND REGULATIONS OF ALL AUTHORITIES HAVING JURISDICTION.

SHOP DRAWINGS

1. PRIOR TO MANUFACTURE, SUBMIT THREE (3) COPIES OF SHOP DRAWINGS OF SPECIFIED EQUIPMENT FOR REVIEW. DRAWINGS WILL BE REVIEWED FOR SPECIFICATION COMPLIANCE AND ARE TO BE REVISED AS OFTEN AS NECESSARY TO SATISFACTION OF CONSULTANT.

INTERRUPTION OF EXISTING SERVICES

1. ARRANGE SCHEDULE AND PERFORM WORK WITH MINIMUM DISTURBANCE TO EXISTING FACILITIES AND SERVICES. NOTIFY CONSULTANT AND LANDLORD IN WRITING AT LEAST 48 HOURS IN ADVANCE OF PLANNED INTERRUPTION TO EXISTING SERVICE.

REMOVAL AND REUSE OF EXISTING SERVICES

 PRESENT EXISTING MATERIAL AND EQUIPMENT REMOVED FROM WORK BUT NOT IDENTIFIED FOR RE-USE ON SITE TO OWNER/OTHERS. WHERE DEEMED UNSUITABLE, REMOVE FROM SITE.

PROTECTION OF WORK

- 1. PROTECT ALL FINISHED AND UNFINISHED WORK FROM DAMAGE. REPAIR DAMAGE CAUSED TO SURFACES OF BUILDING WITHOUT COST TO OWNER AND TO SATISFACTION OF CONSULTANT.
- 2. BE RESPONSIBLE FOR CONDITION OF ALL MATERIALS AND EQUIPMENT SUPPLIED AND/OR INSTALLED. PROVIDE PROTECTION PRIOR TO, DURING AND AFTER INSTALLATION UNTIL TAKEOVER BY OWNER.

CLEANING

1. DURING COURSE OF CONSTRUCTION AND UPON COMPLETION, REMOVESITE ALL RUBBISH AND WASTE RESULTING FROM THIS WORK TO COMPLETE FROM PROJECT SATISFACTION OF THE CONSULTANT .

CUTTING AND PATCHING

1. ALL CUTTING AND PATCHING REQUIRED TO PERFORM WORK TO BE THE RESPONSIBILITY OF THE GENERAL CONTRACTOR MECHANICAL CONTRACTOR TO IDENTIFY LOCATIONS FOR ALL OPENINGS FOR PIPES, DUCTS, ETC., AND PROVIDE SLEEVES REQUIRED TO EXECUTE THE MECHANICAL INSTALLATION.

OPERATIONAL TESTS

- 1. PERFORM SYSTEMATIC CHECK, TEST COMPONENTS IN ALL SYSTEMS, ENSURE THAT EACH SYSTEM FUNCTIONS CORRECTLY BEFORE COMMENCING BALANCING WORK. PROVIDE ALL PRIMARY ELEMENTS, TEST WELLS, BALANCING DAMPERS, BALANCING VALVES AND PARTS WHICH ARE REQUIRED FOR TESTING AND BALANCING.
- 2. RECORD ALL CHECKS AND TESTS. MANUFACTURER OR SUPPLIER OF THE COMPONENT TESTED TO SIGN FORM INDICATING THAT INSTALLATION IS IN ACCORDANCE WITH THEIR WRITTEN RECOMMENDATION. COUNTERSIGN AS CONTRACTOR.

TEMPORARY AND TRIAL USE

- 1. OBTAIN WRITTEN PERMISSION FROM CONSULTANT TO USE AND TEST PERMANENT EQUIPMENT AND SYSTEMS PRIOR TO SUBSTANTIAL PERFORMANCE.
- 2. PROVIDE LABOUR, MATERIAL AND INSTRUMENTS REQUIRED FOR TESTING. RECTIFY INCOMPLETE WORK IMMEDIATELY TO SATISFACTION OF CONSULTANT . CLEAN AND RENEW EQUIPMENT AND SYSTEM USED PRIOR TO ACCEPTANCE.

BALANCING

- 1. BALANCING TO BE PERFORMED BY A CERTIFIED BALANCING COMPANY.
- 2. BALANCE AND ADJUST ALL AIR HANDLING SYSTEMS, EQUIPMENT, DUCTWORK, DIFFUSERS, REGISTERS, ETC., TO OBTAIN AIR QUANTITIES INDICATED. ADJUST FAN SPEEDS AS REQUIRED TO ACHIEVE BALANCE, INCLUDING PROVISION OF REPLACEMENT SHEAVES AND BELTS AS REQUIRED. BALANCE AND ADJUST ALL WATER SYSTEMS TO WATER FLOWS INDICATED.
- 3. COMPILE DATA FOR ALL TESTING AND BALANCING AND SUBMIT TWO DOCUMENTS TO CONSULTANT.

RECORD DRAWINGS

- 1. AFTER AWARD OF CONTRACT, CONSULTANT WILL PROVIDE CONTRACTOR WITH A SET OF DRAWINGS FOR PURPOSE OF MAINTAINING RECORD DRAWINGS. ACCURATELY AND NEATLY RECORD DEVIATIONS FROM CONTRACT DOCUMENTS WHICH ARE THE RESULT OF SITE CONDITIONS AND CHANGE ORDERS. RECORD CHANGES IN SAME SCALE AND QUALITY OF ORIGINAL DRAWINGS. IDENTIFY ALL REVISIONS MADE TO CONTRACT DRAWINGS AND REFERENCE FABRICATION DRAWINGS INCLUDED.
- 2. ON COMPLETION OF WORK AND PRIOR TO FINAL INSPECTION, SUBMIT RECORD DOCUMENTS TO CONSULTANT

OPERATING AND INSTRUCTION MANUALS

1. FURNISH CONSULTANT WITH 3 COPIES OF SERVICE, MAINTENANCE, SPARE PARTS AND OPERATING INSTRUCTIONS, SHOP DRAWINGS AND BULLETINS FOR ALL ITEMS INSTALLED. SUBMIT BALANCING REPORT. SUBMIT IN LOOSE-LEAF BINDERS. PROVIDE BINDERS WITH PROPER INDEX AND LIST OF MANUFACTURER'S SERVICE REPRESENTATIVES, INCLUDING ADDRESS AND PHONE NUMBER. PROVIDE STEP-BY-STEP SEQUENCE OF OPERATION DESCRIPTION FOR AUTOMATIC CONTROL SYSTEM.

INSTRUCTION OF OPERATING STAFF

1. PROVIDE TRAINED PERSONNEL TO INSTRUCT OPERATING STAFF IN MAINTENANCE, ADJUSTMENT AND OPERATION OF MECHANICAL EQUIPMENT. PROVIDE INSTRUCTION DURING REGULAR WORK HOURS PRIOR TO ACCEPTANCE AND TURNOVER TO OPERATING STAFF. USE OPERATION AND MAINTENANCE DATA MANUAL AND UPDATED RECORD DRAWINGS FOR INSTRUCTION PURPOSES.

INSULATION

- HOT PIPING: RIGID GLASS FIBRE, PREFORMED SECTIONAL, [88 KG/M³] [5 LB/FT³], [316°C] [600°F], [0.035 W/M°C @ 24°C] [0.250 BTU.IN./HR.FT² @ 75°F]. THICKNESS: [25 MM] [1"].
- COLD PIPING: RIGID GLASS FIBRE, PREFORMED SECTIONAL, [88 KG/M³] [5 LB/FT³], [316°C] [600°F], [0.035 W/M°C @ 24°C] [0.250 BTU.IN./HR.FT² @ 75°F], WITH FACTORY APPLIED VAPOUR BARRIER JACKET. THICKNESS: [25 MM] [1"].
- DUCTWORK, THERMAL, ROUND [AND RECTANGULAR] DUCT: FLEXIBLE GLASS FIBRE [16 KG/M³] [1 LB/FT³], [120°C] [250°F], [0.036 W/M°C @ 24°C] [0.250 BTU.IN./HR.FT² @ 75°F], WITH FACTORY APPLIED VAPOUR BARRIER JACKET. THICKNESS: [25 MM] [1"].
- 4. DUCTWORK, THERMAL, RECTANGULAR DUCT: RIGID GLASS FIBREBOARD, [72 KG/M³] [4.5 LB/FT³], [120°C] [250°F], [0.032 W/M°C @ 24°C] [0.220 BTU.IN./HR.FT² @ 75°F], WITH FACTORY APPLIED VAPOUR BARRIER JACKET. THICKNESS: [25 MM] [1"] EXCEPT FOR OUTSIDE AIR AND EXHAUST DUCTWORK PROVIDE [50 MM] [2"]. PROVIDE AS INDICATED EXCEPT FOR OUTSIDE AIR AND EXHAUST. PROVIDE ON OUTSIDE AIR UP TO AIR HANDLING UNIT. FOR EXHAUST PROVIDE FOR [2 M] [6'-6"] FROM LOUVRE.

AS-CONSTRUCTED DRAWINGS

- AFTER AWARD OF CONTRACT, CONSULTANT WILL PROVIDE CONTRACTOR WITH A SET OF DRAWINGS FOR PURPOSE OF MAINTAINING AS-CONSTRUCTED DRAWINGS. ACCURATELY AND NEATLY RECORD DEVIATIONS FROM CONTRACT DOCUMENTS WHICH ARE THE RESULT OF SITE CONDITIONS AND CHANGE ORDERS. RECORD CHANGES IN SAME SCALE AND QUALITY OF ORIGINAL DRAWINGS. IDENTIFY ALL REVISIONS MADE TO CONTRACT DRAWINGS AND REFERENCE FABRICATION DRAWINGS INCLUDED.
- 2. ON COMPLETION OF WORK AND PRIOR TO FINAL INSPECTION, SUBMIT DOCUMENTS TO CONSULTANT.

TESTS

- 1. GIVE WRITTEN NOTICE 48 HOURS IN ADVANCE OF SCHEDULED TEST DATES. BEAR ALL COSTS IN CONNECTION WITH EQUIPMENT AND SYSTEM TESTS. ALL TESTS TO BE PERFORMED TO SATISFACTION OF CONSULTANT BEFORE BACKFILLING OR FURRING
- PRESSURE TEST

 PRESSURE TEST
 DOMESTIC WATER PIPING: TEST TO 1-1/2 TIMES MAXIMUM WORKING PRESSURE OR [<1034 KPA> <<150 PSI>>] WATER PRESSURE MEASURED AT SYSTEM LOW POINT.
- .2 DRAINAGE SYSTEMS: TEST BY FILLING WITH WATER TO PRODUCE WATER PRESSURE OF [<30 KPA> <<10 FT>>] MINIMUM AND [<75 KPA> <<25 FT>>] MAXIMUM. CHECK FOR
- PROPER GRADE AND OBSTRUCTION BY BALL TEST.
 .3 STANDPIPE SYSTEM: TEST TO [<2070 KPA> <<300 PSI>>] WATER PRESSURE AT THE VALVE.
- .4 REFRIGERANT PIPING: TEST WITH [NITROGEN] [REFRIGERANT] TO [<2070 KPA> <<300 PSI>>] ON HIGH PRESSURE SIDE AND [<1035 KPA> <<150 PSI>>] ON LOW SIDE AND REFRIGERANT HALIDE TORCH TEST.
- .5 LOW PRESSURE DUCTS: TEST FOR TIGHTNESS SUCH THAT LEAKAGE IS INAUDIBLE AND NOT DETECTABLE BY FEEL. [CHECK FOR AUDIBLE LEAKS AT [<500 KPA> <<2 INCHES WG>>] ABOVE DUCT DESIGN OPERATING PRESSURE.]
- .6 MEDIUM AND HIGH PRESSURE DUCTWORK: CHECK FOR AUDIBLE LEAKS. TEST FOR TIGHTNESS AS SPECIFIED BY THE SMACNA MANUALS WITH MAXIMUM LEAKAGE OF 1/2% AT ANY BRANCH OR MAIN DUCT AT [<3 KPA> <<12 INCHES WG>>] STATIC PRESSURE.
- .7 MAINTAIN TEST PRESSURE WITHOUT LOSS FOR 4 HOURS. REPAIR LEAKS AND DEFECTS. RETEST UNTIL ACCEPTED.
- 3. FLUSHING AND CLEANING: AFTER PRESSURE TESTS ARE COMPLETED AND ACCEPTED, PRIOR TO START-UP AND PLACING INTO OPERATION, FLUSH AND CLEAN OUT PIPING SYSTEMS.

PLUMBING

- 1. MATERIALS AND INSTALLATION TO COMPLY TO ONTARIO BUILDING CODE PART 7.
- 2. CONNECTIONS BETWEEN DISSIMILAR METALS TO BE BY MEANS OF DIELECTRIC COUPLINGS.

- 3. DOMESTIC HOT AND COLD WATER PIPING TO BE TYPE 'M' STANDARD STREAMLINED COPPER PIPE WITH CAST BRASS SOLDER FITTINGS. SOLDER TO BE 95/5.
- 4. SANITARY DRAINAGE PIPING TO BE DWV PIPES CERTIFIED TO CSA B181.2 & LISTED TO ULC S102.2 TO EXHIBIT FLAME SPREAD RATING OF NOT GRATER THAN 25 & A SMOKE DEVELOPED CLASSFICATION OF NOT GRATER THAN 50. PIPE TO BE MADE TO SCHEDULE 40 THICKNESS. SPECIFIED PRODUCT: IPEX SYSTEM XFR SERIES.
- VALVES

 ALL VALVES TO BE FROM ONE MANUFACTURER AND BE CLASS [860/1380 KPA] [125/200 PSI].
- .2 GATE VALVES TO BE BRONZE, SOLDER END, NON-RISING STEM:SPRINKLERS INCLUDING ALL LABOUR, VALVES, PIPING, HEADS, HANGERS, LARGER TO BE IRON BODY, WEDGE DISK, OS&Y TYPE, BRONZE TRIMMED, CRANE 465 1/2, JENKINS 454J.
- .3 GLOBE VALVES TO BE BRONZE, SOLDER END: CRANE 1310; KITZ 10; TOYO 222; JENKINS 106BPJ.
- .4 BALL VALVES TO BE BRONZE/BRASS, TWO PIECE BODY, CHROME PLATED BALL, PTFE SEAT AND LEVER ACTUATOR WITH MEMORY STOP: CRANE F9202; KITZ 58 OR 59; TOYO 5044A; JENKINS 201J.
- .5 CHECK VALVES TO BE Y-PATTERN, BRONZE SWING TYPE: CRANE 1342;KITZ 23; TOYO 237; JENKINS 4093J.
- FIXTURES:
 .1 REFER TO PLUMBING FIXTURE SCHEDULE ON DRAWINGS.

HEATING AND COOLING

- HEATING AND CHILLED WATER PIPING: [NPS 2][2"] AND SMALLER TO BE SCHEDULE 40 STEEL PIPE TO ASTM A53; MALLEABLE IRON FITTINGS, [1034 KPA] [150 PSI], THREADED. [NPS 2 1/2] [2 1/2"] AND LARGER TO BE SCHEDULE 40 SEAMLESS STEEL PIPE TO ASTM A53; SCHEDULE 40 FORGED STEEL FITTINGS, WELDED.
- VALVES:

 PROVIDE VALVES CONFORMING TO APPROPRIATE MMS-SP STANDARDS,[860 KPA] [125 PSI].[NPS 2][2"] AND SMALLER TO BE THREADED, [NPS 2 1/2][2 1/2"] AND LARGER TO BE FLANGED; COPPER TO HAVE SOLDER ENDS.
- .2 GATE VALVES: [NPS 2][2"] AND SMALLER TO BE BRONZE, WEDGE DISK TYPE, CRANE 1700, JENKINS 990 AJ. [NPS 2 1/2][2 1/2"] AND LARGER TO BE IRON BODY, WEDGE DISK, OS&Y TYPE, BRONZE TRIMMED, CRANE 465 1/2, JENKINS 454J.
- .3 GLOBE VALVES: [NPS 2][2"] AND SMALLER TO BE BRONZE WITH STAINLESS STEEL PLUG DISK AND SEAT RING, CRANE 14 1/2 P, JENKINS 594J.[NPS 2 1/2][2 1/2"] AND LARGER TO BE IRON BODY,OS&Y TYPE, BRONZE TRIMMED, CRANE 351, JENKINS 2342J.
- .4 BALL VALVES: [NPS 2][2"] AND SMALLER TO BE BRONZE/BRASS TWO PIECE WITH CHROM BALL, PTFE SEAT AND LEVER ACTUATOR WITH MEMORY STOP, CRANE F9202, JENKINS 201J.
- i. INSTALLATION TO CONFORM TO ANSI REQUIREMENTS AND FOLLOW BUILDING LINES. PROVIDE NECESSARY SUPPORTS, SLOPE FOR DRAINAGE, PROVIDE DIELECTRIC COUPLINGS WHERE REQUIRED.

DUCTWORK

- RECTANGULAR DUCTWORK: CONSTRUCT DUCTWORK AND FITTINGS TO SMACNA AND ASHRAE STANDARDS FOR LESS THAN [500 PA] [2"] W.G. DUCT STATIC PRESSURE RANGE, [1.0 M/S] [2000 FPM] MAXIMUM VELOCITY. USE LOCK FORMING QUALITY GALVANIZED STEEL WITH G90 DESIGNATION ZINC COATING TO ASTM A525-75.
- ROUND DUCTWORK: GALVANIZED STEEL WITH G90 DESIGNATION, ZINC COATING TO ASTM A525-75. ROUND FITTINGS TO BE OF WELDED CONSTRUCTION FABRICATED FROM [1.0 MM] [20 GAUGE] GALVANIZED STEEL SHEETS. TEES, REDUCERS, Y-BRANCHES AND OTHER FITTINGS TO BE AS INDICATED ON THE DRAWINGS AND CONFORM TO ASHRAE AND SMACNA STANDARDS.
- 3. FLEXIBLE DUCTWORK: DUCTWORK AND CONNECTORS TO COMPLY WITH OR EXCEED THE REQUIREMENTS OF UL "STANDARDS FOR SAFETY AIR DUCTS", UL-181, CLASS 1 AND NFPA 90A. FLEXIBLE DUCT LENGTHS NOT TO EXCEED [1500 MM] [5 FT.].FLEXIBLE DUCTWORK: DUCTWORK AND CONNECTORS TO COMPLY WITH OR EXCEED THE REQUIREMENTS OF UL "STANDARDS FOR SAFETY AIR DUCTS", UL-181, CLASS 1 AND NFPA 90A. FLEXIBLE DUCT LENGTHS NOT TO EXCEED [1500 MM] [5 FT.].
- 4. KITCHEN EXHAUST DUCTWORK: WELDED GREASE EXHAUST DUCTWORK INSTALLED IN ACCORDANCE WITH NFPA-96. ALL KITCHEN EXHAUST DUCTWORK TO BE INSULATED IN A 3" THICK LAYER OF ZERO CLEARANCE FIRE BARRIER DUCT WRAP RATED FOR USE WITH NFPA-96 GREASE DUCTWORK. SPECIFIED PRODUCT: 3M FIREMASTER DUCTWRAP
- ALTERNATIVE: PRE-MANUFACTURED NFPA-96 RATED DUCTWORK CAN BE USED IN PLACE OF WELDED GREASE EXHAUST DUCTWORK WITH WRAP PRE-MANUFACTURED DUCTWORK SHALL BE CONSTRUCTED OF A CODE COMPLIENT 16 GAUGE STEEL INNER LINER & AN IMPACT RESISTANT METAL OUTER CASING RESULTING IN A WALL THICKNESS OF 3.75"
- SPECIFIED PRODUCT: DURADUCT KEX ZERO CLEARANCE KITCHEN EXHAUST DUCT.5. ALL DUCTWORK & PLENUMS TO BE SEALED AND PRESSURE TESTED IN ACCORDANCE WITH ASHRAE 90.1

GRILLES AND DIFFUSERS

- PROVIDE GRILLES AND DIFFUSERS COMPLETE WITH ACCESSORIES AS INDICATED ON DRAWINGS. POSITIONS INDICATED ARE APPROXIMATE ONLY. MECHANICAL CONTRACTOR TO VERIFY LOCATION OF ALL OUTLETS AND MAKE SUCH ADJUSTMENTS AS NECESSARY TO CONFORM WITH ARCHITECTURAL FIXTURES.
- 2. TYPE 'A': SQUARE DIFFUSER 24" X 24", FIXED DIFFUSION TYPE, 8" DIAMETER NECK, E.H. PRICE SCD.
- TYPE 'B': LOUVERED RETURN GRILLE, ALUMINUM,0° OR 45° FIXED BLADES,¹/₂" OR ³/₄" BLADE SPACING, SIZES AS INDICATED, FOR SIDE WALL MOUNTING.
 C/W FRAME AND FLANGE BORDER.
- SPECIFIED PRODUCT: EH PRICE 600 SERIES

AUTOMATIC CONTROLS

- BASE BUILDING CONTROL MODIFICATIONS FOR RELOCATING EXISTING THERMOSTATS IS TO BE COMPLETED BY QUALIFIED AND EXPERIENCED CONTROL COMPANY.
 NEW CONTROLS FOR SPECIFIC EQUIPMENT IS TO BE PROVIDED AS SPECIFIED.
 RELOCATE OR MODIFY EXISTING CONTROLS ON EXISTING PERIMETER HEATING AND EXISTING FAN COILS AS DESCRIBED.
- 2. MECHANICAL CONTRACTOR IS RESPONSIBLE FOR ALL ELECTRICAL WORK REQUIRED FOR

THE INSTALLATION OF CONTROLS FOR MECHANICAL EQUIPMENT. THIS INCLUDES BUT IS NOT LIMITED TOO LOW VOLTAGE TRANSFORMERS, LINE VOLTAGE SENSORS OR CONTROLLERS, RIGID CONDUIT, ETC.

NATURAL GAS SYSTEM

- 1. PROVIDE COMPLETE NATURAL GAS SYSTEM TO CSA REQUIREMENTS INCLUDING SEAMLESS BLACK STEEL PIPING, SCHEDULE 40, TO ASTM A53, FITTINGS, SHUT-OFF VALVES, PRESSURE REDUCING VALVES, PRESSURE RELIEF VALVES, ISOLATION COCKS, DRIP AND DIRT POCKETS, AND HARDWARE AND SUPPORTS.
- 2. FITTINGS:
- .1 2" AND SMALLER: MALLEABLE IRON, THREADED TO ANSI STANDARD B16.3
 2 CARBON STEEL 'PRESS-FIT' FITTINGS CAN BE USED AS AN ALTERNATIVE FOR BOTH STANDARD & HIGH PRESSURE APPLICATIONS. SPECIFIED PRODUCT: VIEGA MEGAPRESS
 G OR EQUIVALENT
- 3. GAS VALVES: CHROME PLATED BRASS, TWO PIECE FULL BORE PAD LOCKABLE TO CSA 3.16. SPECIFIED PRODUCT: HATTERESLEY - MILLIKEN MODEL PB-500.
- 4. GAS PRV: REDUCE NATURAL GAS TO REQUIRED UNIT PRESSURE WITH PRESSURE REDUCING VALVE. PRV TO PROVIDE 100% SAFETY RELIEF ON EXCESS PRESSURE ABOVE CONTROL SETTING. SPECIFIED PRODUCT: FISHER.
- 5. PROVIDE NATURAL GAS PIPING AS INDICATED TO ALL GAS FIRED EQUIPMENT. CONFORM TO CSA B149.1 AND ALL SUPPLEMENTARY REGULATIONS.
- PERFORM ALL TESTS IN CONFORMANCE WITH ONTARIO GAS UTILIZATION REGULATIONS.
 PIPING TO BE PROTECTED AGAINST CORROSION. COAT WITH TWO APPLICATIONS OF PAINT TO CGSB 1-GP-60M IN PRIMARY YELLOW COLOUR.
- 8. PROVIDE ALL REQUIRED GAS TRAINS FOR EQUIPMENT. PIPE VENTS TO ATMOSPHERE.
- 9. PROVIDE APPROPRIATE SQUARE HEAD OR FLAT HEAD WRENCH FOR EACH STOP COCK.

FIRE EXTINGUISHERS.

1. MULTI-PURPOSE DRY CHEMICAL: PRESSURIZED 10LB CAPACITY SUITABLE FOR CLASS A, B, AND C FIRES WITH MOUNTING BRACKETS.

INTEGRITY OF FIRE SEPARATIONS

1. THE CONTRACTOR IS RESPONSIBLE FOR MAINTAINING THE INTEGRITY AND FIRE RATING OF ANY FIRE SEPARATION PENETRATED DURING THE COURSE OF THE SCOPE OF WORK DEFINED HEREIN. THIS INCLUDES, BUT IS NOT LIMITED TO, DUCTWORK, PIPING, OTHER MECHANICAL EQUIPMENT, FASTENERS, ETC.

2. DEFINITIONS:

- FIRE SEPARATION CONSTRUCTED ASSEMBLY THAT ACTS AS A BARRIER AGAINST THE SPREAD OF FIRE.
 FIRESTOPPING - MATERIAL OR COMBINATION OF MATERIALS USED TO RETAIN INTEGRITY OF FIRE-RATED CONSTRUCTION BY MAINTAINING AN EFFECTIVE BARRIER AGAINST THE SPREAD OF FLAME, SMOKE, WATER, AND HOT GASES THROUGH PENETRATIONS IN FIRE RATED ASSEMBLIES.
- FIRESTOP TESTED SYSTEMS SHALL BE USED WHEN A FIRE SEPARATION IS PENETRATED BY A COMPONENT OF A MECHANICAL OR ELECTRICAL SYSTEM. FIRESTOPPING PRODUCTS SHALL BE CERTIFIED TO CAN/ULC-S115 AND INSTALLED AS PER THE MANUFACTURER'S INSTRUCTIONS.
 FIRESTOPPING PRODUCTS SHALL MATCH THE FIRE RATING OF THE SEPARATION BEING PENETRATED, AND SHALL BE RATED FOR USE IN THE CONDITIONS AND WITH THE MATERIAL S SPECIFIC TO FACH CIRCUMSTANCE

THERMOSTATS

- 1. ROOM THERMOSTATS WITH CELSIUS SCALE, SINGLE TEMPERATURE, GRADUAL-ACTING, ADJUSTABLE SENSITIVITY, MINIMUM [<6 DEGREES C> <<10 DEGREES F>>] SET POINT ADJUSTMENT. PROVIDE COVERS WITH CONCEALED SET POINT ADJUSTMENT AND SETPOINT INDICATION WITH THERMOMETER. PROVIDE GUARDS FOR THERMOSTATS IN
- UNSUPERVISED OR PUBLIC AREAS.
 2. REMOTE BULB THERMOSTATS WITH EITHER AVERAGING TYPE ELEMENT OF SUITABLE LENGTH FOR AIR OR RIGID BULB FOR LIQUIDS, WITH FLANGES TO SUPPORT ELEMENTS IN DUCTS AND SEPARATE SOCKETS IN LIQUIDS.

DAMPERS

- 1. DAMPERS: [<1.6 MM> <<16 GA>>] GALVANIZED STEEL OR EXTRUDED ALUMINUM MULTIPLE BLADE MOUNTED IN [<2.8 MM> <<12 GA>>] STEEL OR EXTRUDED ALUMINUM FLANGED FRAME. INDIVIDUAL BLADES SHALL NOT EXCEED [<150 MM> <<6 INCHES>>] IN WIDTH OR [<1200 MM> <<48 INCHES>>] IN LENGTH WITH INTERLOCKING EDGES AND COMPRESSIBLE SEALS. PROVIDE OIL IMPREGNATED BRONZE OR NYLON BEARINGS WITH ADDITIONAL THRUST BEARINGS FOR VERTICAL BLADES. PRIME COAT STEEL DAMPERS.
- PROVIDE MIXING DAMPERS OF [OPPOSED] [PARALLEL] BLADE CONSTRUCTION ARRANGED TO MIX STREAMS. DAMPERS SHALL HAVE MAXIMUM 1% LEAKAGE AT [<1494 KPA> <<6 INCH SP>>].

FIRE DAMPERS

- 1. FABRICATE TO NFPA 90A, UL 555, CAN/ULC-S112 AND CAN/ULC-S112.2 AS INDICATED.
- FUSIBLE LINKS, ULC-S505, SHALL SEPARATE AT [<71 DEGREES C> <<160 DEGREES F>>] [<100 DEGREES C> <<212 DEGREES F>>]. PROVIDE ADJUSTABLE LINK STRAPS FOR COMBINATION FIRE/BALANCING DAMPERS.

BACK DRAFT DAMPERS

- 1. GRAVITY BACK DRAFT DAMPERS, SIZE [<450 X 450 MM> <<18 X 18 INCHES>>] OR SMALLER, FURNISHED WITH AIR MOVING EQUIPMENT, MAY BE AIR MOVING EQUIPMENT MANUFACTURERS STANDARD CONSTRUCTION.
- 2. FABRICATE MULTI-BLADE, PARALLEL ACTION GRAVITY BALANCED BACK DRAFT DAMPERS OF GALVANIZED STEEL OR EXTRUDED ALUMINUM, WITH [CENTRE] PIVOTED BLADES WITH FELT OR FLEXIBLE VINYL SEALED EDGES, LINKED TOGETHER WITH STEEL BALL BEARINGS AND PLATED STEEL PIVOT PIN.

FLEXIBLE DUCT CONNECTIONS

1. UL LISTED FIRE-RETARDANT NEOPRENE COATED WOVEN GLASS FIBRE FABRIC TO NFPA 90A, APPROXIMATELY [<75 MM> <<3 INCHES>>] WIDE, CRIMPED INTO METAL EDGING STRIP.

DUCT ACCESS DOORS

ACCEPTABLE

 FABRICATE IN ACCORDANCE WITH SMACNA HVAC DUCT CONSTRUCTION STANDARD METAL AND FLEXIBLE.
 ACCESS DOORS SMALLER THAN [<300 MM> <<12 INCHES>>] SQUARE MAY BE SECURED WITH SASH LOCKS. ACCESS DOORS WITH SHEET METAL SCREW FASTENERS ARE NOT IN CONSIDERATION OF THE RECEIPT OF THIS DOCUMENT, THE RECIPIENT AGREES NOT TO REPRODUCE, COPY, USE OR TRANSMIT THIS DOCUMENT AND/OR THE INFORMATION THERIN CONTAINED, IN WHOLE OR IN PART, OR TO SUFFER SUCH ACTION BY OTHERS, FOR ANY PURPOSE, EXCEPT WITH THE WRITTEN PERMISSION OF TTF ENGINEERING AND FURTHER AGREES TO SURRENDER SAME TO TTF ENGINEERING UPON DEMAND.

COPYRIGHT TTF ENGINEERING

HEAT RECOVERY VENTILATION

- HEAT RECOVERY VENTILATION UNIT IN A GALVANIZED STEEL CASE. INSULATED WITH FOIL FACED INSULATION. INCLUDES CORE, MOTORS, BLOWERS, FILTERS.TO BE SUSPENDED WITHIN CEILING SPACE. DESIGN FLOWRATE: 350CFM @0.1"W.G. ESP
- SPECIFIED PRODUCT: LIFEBREATH 350DCS ALTERNATIVE PRODUCTS TO BE CONSIDERED.

2. DIGITAL CONTROL

- HRV C/W DIGITAL CONTROL COMPATIBLE WITH WIRELESS TIMER. 3 WIRE CONNECTION, 5 SELECTABLE OPERATIONAL MODES. 20/40/60 MIN. WITH HIGH SPEED OVERRIDE BUTTON.
- SPECIFIED PRODUCT: LIFEBREATH WIRELESS TIMER. MODEL 99-DET02

3. TIMER

WIRELESS 20/40/60 MINUTE TIMER. SPECIFIED PRODUCT: LIFEBREATH WIRELESS TIMER. MODEL 99-DET02

WEATHERHOOD KIT

PROVIDE NEW WEATHERHOOD FOR HRV-1 INTAKE & EXHAUST. C/W BIRDSCREEN, DUCT COLLAR & WALL SLEEVE FOR CONNECTION TO INTAKE AND EXHAUST DUCTWORK. BIRDSCREEN TO HAVE A MINIMUM ¼" MESH.

SPECIFIED PRODUCT: LIFEBREATH WEATHERHOOD KITS

ALTERNATIVE PRODUCTS TO BE CONSIDERED.

GLYCOL FILL TANK

SYSTEM SHALL INCLUDE 6.6 U.S GALLON STORAGE/MIXING TANK WITH MOLDED-IN LEVEL GAUGE, 5" FILL/ACCESS OPENING AND COVER; PUMP SUCTION HOSE WITH INLET STRAINER & CHECK VALVE; PRESSURE PUMP WITH FUSE PROTECTION; LOW FLUID LEVEL PUMP CUT-OFF FLOAT SWITCH; MANUAL DIVERTER VALVE FOR PURGING AIR AND AGITATING CONTENTS OF STORAGE TANKS. FACTORY CUT OUT PRESSURE SET TO 17PSIG AND LIQUID FILLED PRESSURE GAUGE. UNIT TO BE UL LISTED. FEEDER SHALL BE COMPATIBLE WITH GLYCOL SOLUTIONS UP TO 50% CONCENTRATION.

ELECTRICAL REQUIREMENTS: 115V/1PH/60HZ

SPECIFIED PRODUCT: AXIOM INDUSTRIES HYDRONIC MINI SYSTEM FEEDER: MF200

ALTERNATIVE PRODUCTS TO BE CONSIDERED.

HYDRAULIC SEPARATOR

PROVIDED WITH AN EPOXY RESIN PAINTED STEEL BODY, HDPE INTERNAL COALESCING ELEMENTS - REMOVABLE FOR CLEANING, A BRASS BLOW DOWN DRAIN VALVE ON THE BOTTOM OF THE SEPARATOR WITH HOSE CONNECTIONSAND AUTOMATIC AIR VENT ON THE TOP. PARTICLE SEPERATING CAPACITY TO 5 MICRONS (0.2MIL). MAGNETIC PARTICLE (FERROUS OXIDE) SEPERATION RATING UP TO 95% REMOVAL. MAXIMUM WORKING PRESSURE 150PSI, WORKING TEMPERATURE RANGE: 32°F TO 210°F. SUITABLE FLUIDS: WATER OR 50% MAXIMUM GLYCOL SOLUTION.

SPECIFIED PRODUCT: CALEFFI 5495 SERIES SEP4

3-WAY MIXING VALVE

3-WAY MIXING VALVE TO BE BRASS. MAXIMUM LEAK THROUGH RATE TO BE 1% TO ALLOW WATER EXPANSION DURING TEMPERATURE CHANGE. CONNECTION TO PIPE TO BE MADE USING STANDARD FEMALE NPT THREAD. VALVE TO C/W MIXING CONTROLLER CAPABLE OF CONTROLLING SLAB TEMPERATURE FOR IN-FLOOR RADIANT HEATING SYSTEMS.

SPECIFIED PRODUCT: TEKMAR 3 -WAY MIXING VALVE C710 MIXING CONTROLLER: TEKMAR MIXING CONTROL 362

ALTERNATIVE PRODUCT TO BE CONSIDERED

HOT WATER COILS

SERPENTINE TYPE WITH RETURN BENDS ON SMALLER SIZES AND RETURN HEADERS ON LARGER SIZES. HEADERS TO BE CAST IRON WITH TUBES EXPANDED INTO HEADER, SEAMLESS COPPER TUBE WITH SILVER BRAZED JOINTS OR PRIME COATED STEEL PIPE WITH BRAZED JOINTS. REFER TO DRAWING M-2 FOR SPECIFIED PRODUCTS.

HYDRONIC BASEBOARD

¹" COPPER TUBING MECHANICALLY EXPANDED INTO FLANGED COLLARS OF EVENLY SPACED ALUMINUM FIN, ONE TUBE END BELLED. ENCLOSURE TO BE MINIMUM 22GAUGE STEEL WITH BACK AND TOP OF ONE PIECE, FRONT PANEL, END PANEL, CAPS, CORNERS, JOINER PIECES AND FULL LENGTH DAMPER. HEAT CAPACITY PER LINEAR FT TO BE AS SPECIFIED IN DRAWING M-1. REFER TO DRAWING M-1 FOR SPECIFIED PRODUCT. ALTERNATIVE PRODUCT TO BE CONSIDERED.

BOILER

1. PROVIDE GAS-FIRED HOT WATER CONDENSING HEATING BOILER. BOILER SHALL BE FABRICATED OF HIGH GRADE STAINLESS STEEL. THE HEAT EXCHANGER SHALL UTILIZE THE HEATING SURFACE FOR MAXIMUM HEAT TRANSFER AND CONDENSATION FOR OPTIMUM ENERGY SAVINGS. THE BOILER SHALL INCORPORATE A MODULATING COMPACT CYLINDRICAL STAINLESS STEEL GAS BURNER WITH A HIGH ALLOY STAINLESS STEEL SURFACE CAPABLE OF OPERATING WITH CONSISTENTLY HIGH EFFICIENCY. THE BURNER SHALL BE EQUIPPED WITH A COMBUSTION FAN FOR QUIET AND ECONOMICAL OPERATION. VENT AS PER MANUFACTURERS INSTRUCTIONS. REFER TO DRAWING M-2 FOR BOILER SCHEDULE AND SPECIFIED PRODUCT. ALTERNATIVE PRODUCTS TO BE CONSIDERED.

PUMPS

CIRCULATION PUMP SHALL BE RATED TO A MAXIMUM WORKING PRESSURE OF 140PSI AND TEMPERATURE OF 230°F.CIRCULATING PUMP SHALLL BE CONSTRUCTED WITH CAST IRON BODIES. STANDARD SHAFT OFFERING SHALL BE CONSTRCUTED OF HIGH QUALITY, HARDENED STAINLESS STEEL. CHECK VALVE SHALL BE RATED TO A MAXIMUM TEMPERATURE OF 261° AND IS FIELD INSATALLABLE. ROTOR ASSEMBLY TO BE FACTORY BALANCED. THREE SPEED PUMPS SHALL HAVE A MANUALLY ADJUSTABLE SPEED SWITCH INTEGRAL WITH THE PUMP. REFER TO PUMP SCHEDULE ON DRAWING M-2 FOR FURTHER DETAILS AND SPECIFIED PRODUCT. ALTERNATIVE PRODUCTS TO BE CONSIDERED.

EXPANSION TANK

EXPANSION TANK TO BE BLADDER TYPE. WELDED CONSTRUCTION ABLE TO WITHSTAND HIGH PRESSURE. TANK TO BE COMPATIBLE WITH WATER/GLYCOL MIXTURE UP TO 50%. REFER TO EXPANSION TANK SCHEDULE ON DRAWING M-2 FOR FURTHER DETAILS AND SPECIFIED PRODUCT. ALTERNATIVE PRODUCT TO BE CONSIDERED.

DESTRATIFICATION FAN

DESTRATIFICATION FAN TO COME WITH STATOR, MOTOR AND HOUSING. FAN TO COME WITH WALL MOUNTED VARIABLE SPEED CONTROLLER. FAN MOST CONFORM TO UL 507 AND BE ETL LISTED. ELECTRICAL REQUIREMENTS: 120V/1¢/60HZ.

SPECIFIED PRODUCT: AIRIUS PEAR 10-SP DESTRATIFICATION FAN

