G. ALL PRESSURIZED PIPING TO BE TESTED HYDROSTATICALLY TO 150 PSI OR 150% OF OPERATING PRESSURE, WHICHEVER IS GREATER, BUT NEVER EXCEED TEST PRESSURE ANSI B16.1 BASIS. TEST DURATION TO BE 2 HOURS WITH NO PRESSURE CHANGE CORRECTED FOR TEMPERATURE CHANGE. REPAIR OR REPLACE LEAKS OR DEFECTS WITHOUT ADDITIONAL COST.

H. EXPANSION COMPENSATION:

1) ALL PIPING SHALL BE INSTALLED TO COMPENSATE FOR EXPANSION TO PROTECT THE BUILDING, EQUIPMENT AND PIPING SYSTEMS, PROVIDE ALL GUIDES, ANCHORS, EXPANSION LOOPS, SUPPLEMENTAL STEEL AND APPROVED TYPE EXPANSION JOINTS AS INDICATED OR REQUIRED FOR CONTROL OF EXPANSION.

SYSTEM FILLING:

1) SYSTEMS OR PORTIONS OF SYSTEMS TO BE TESTED SHALL HAVE PROVISIONS FOR FILLING, VENTING (AIR REMOVAL), DRAINAGE AND TEST PRESSURE CONNECTION.

2) LIQUID USED FOR TESTING SHALL BE CLEAN CITY WATER MIXED WITH CHEMICALS SPECIFIED BY THE BASE BUILDING WATER TREATMENT CONTRACTOR. THE HVAC CONTRACTOR SHALL HIRE THE SERVICES OF THE BUILDING WATER TREATMENT CONTRACTOR AND PROVIDE ALL REQUIRED LABOR. PROVIDE TEMPORARY METERING AND MIXING DEVICES AS REQUIRED. THE HVAC CONTRACTOR SHALL OBTAIN ALL REQUIREMENTS FROM THE BUILDING MANAGEMENT.

J. FLUSHING AND CLEANING AND TREATMENT:

1) AFTER COMPLETION OF HYDROSTATIC TESTS AND EMPTYING, PROVIDE LABOR FOR INITIAL FLUSHING, CLEANING, AND PASSIVATING IN ACCORDANCE WITH THE OWNER'S WATER TREATMENT SPECIFICATION, THE HVAC CONTRACTOR SHALL HIRE THE SERVICES OF THE BASE BUILDING WATER TREATMENT CONTRACTOR AND PROVIDE ALL LABOR. COORDINATE WITH THE OWNER'S WATER TREATMENT COMPANY AND PROVIDE ALL SPECIFICATION REQUIREMENTS AND REQUIRED LABOR. COORDINATE ALL REQUIREMENTS WITH BASE BUILDING MANAGEMENT FOR BASE BUILDING VENDOR.

a. PROVIDE ONE YEAR'S SUPPLY OF NECESSARY WATER TREATMENT CHEMICALS FOR NEW SYSTEM TO THE OWNER OR TENANT INCLUDING THE FOLLOWING:

b. CLOSED SYSTEM TREATMENT (CHILLED WATER, SECONDARY WATER. CLOSED CONDENSER WATER AND HOT WATER). PROVIDE AGENTS TO REDUCE SCALE DEPOSITS, TO ADJUST PH AND TO INHIBIT CORROSION. TREATMENT SHALL NOT CONTAIN ANY CHROMATE'S OR OTHER TOXIC SUBSTANCES, USE PROPER CHEMISTRY TO PROVIDE BACTERIA COUNTS BELOW 103 COLONIES PER MILLILITER (AEROBIC & NON AEROBIC). PH LEVELS TO BE BETWEEN 7.0 AND 9.0. CORROSION RATE TO BE LESS THAN 1/2 MILS/YEAR STEEL, 1/10 MILS/YEAR COPPER.

c. OPEN SYSTEM TREATMENT (CONDENSER WATER)PROVIDE AGENTS TO REDUCE SCALE DEPOSITS, TO ADJUST PH AND TO INHIBIT CORROSION.TREATMENT SHALL NOT CONTAIN ANY CHROMATE'S OR OTHER TOXIC SUBSTANCES. USE PROPER CHEMISTRY TO PROVIDE BACTERIA COUNTS BELOW 105 COLONIES PER MILLIMETER (AEROBIC AND NON-AEROBIC). PH TO BE BETWEEN 7.5 AND 8.5. CORROSION RATES TO BE LESS THAN 1 MILS/YEAR -STEEL AND 1/10 MILS/YEAR COPPER.

K. PROVIDE BRASS UNIONS WHERE DISSIMILAR METALS ARE TO BE JOINED.

L. DRAIN DOWN FOR NEW PIPING CONNECTION INTO EXISTING:

1) CONTRACTOR TO OBTAIN SCHEDULE AND COORDINATE WITH BUILDING MANAGEMENT FOR SYSTEM DRAIN DOWN AND CONNECTION INTO EXISTING BUILDING PIPING. ALL COSTS ASSOCIATED WITH DRAIN DOWN ARE TO BE INCLUDED AS PART OF BID.

M. ALL INSTRUMENTATION (PRESSURE GAUGES AND THERMOMETERS) SHALL BE RATED FOR THE SAME PRESSURE AND TEMPERATURE AS PIPING SYSTEM AND RATED SPECIFICALLY FOR THE SAME SERVICE AS THE PIPING. PRESSURE GAUGES ARE TO BE LIQUID FILLED WITH 1% ACCURACY. SELECT GAUGES AND THERMOMETERS SO THAT THE MID-POINT IS AT THE WORKING PRESSURE AND TEMPERATURE. INSTRUMENTS TO BE MANUFACTURED BY WEISS INSTRUMENTS OR APPROVED EQUAL.

1) PROVIDE THERMOMETERS IN PIPING AS INDICATED ON THE DRAWINGS AND AT THE INLET AND OUTLET OF EACH HYDRONIC COIL, HEAT EXCHANGER AND PIECE OF EQUIPMENT THAT INVOLVES A DIFFERENTIAL TEMPERATURE. THERMOMETERS TO BE ORGANIC LIQUID FILLED.

2) PROVIDE PRESSURE GAUGES IN PIPING AS INDICATED ON THE DRAWINGS AND AT SUCTION AND DISCHARGE OF EACH PUMP AND AT INLETS AND OUTLETS OF EACH HYDRONIC COIL, HEAT EXCHANGER AND PIECE OF EQUIPMENT THAT INVOLVES A DIFFERENTIAL PRESSURE.

N. PIPE SUPPORTS:

1) PROVIDE ADEQUATE SUPPORT FOR PIPE AND CONTENTS TO PREVENT SAGGING, VIBRATION, OR SWAYING AND ALLOW FOR EXPANSION AND CONTRACTION. PROVIDE SUPPLEMENTAL STEEL AS REQUIRED WHERE STRUCTURE CANNOT SUPPORT POINT LOADS.

2) HORIZONTAL PIPING TO BE SUPPORTED BY FORGED STEEL ADJUSTABLE CLEVIS TYPE HANGER. MAXIMUM SPACING AS FOLLOWS:

a. STEEL 1 INCH AND SMALLER: 6 FEET.

b. STEEL 1-1/4 INCH AND LARGER: 10 FEET.

c. COPPER 1 INCH AND SMALLER: 5 FEET.

d. COPPER 1-1/2 IN to 2-1/2 INCH: 8 FEET.

e. COPPER 3 INCH: 10 FEET. e. PROVIDE ADDITIONAL SUPPORTS AT CHANGES IN DIRECTION, BRANCH PIPING AND RUNOUTS OVER 5 FEET AND CONCENTRATE LOADS DUE TO

VALVES, STRAINERS AND OTHER SIMILAR ITEMS.

ROD SIZE

a. PIPE 2 IN AND SMALLER: 3/8 IN

b. PIPE 2-1/2 IN TO 3 IN: 1/2 IN

c. PIPE 4 TO 8 IN: 3/4 IN d. PIPE 10 IN TO 12 IN: 7/8 IN

4) VERTICAL PIPING:

BASE ELBOW SUPPORT WITH BEARING PLATE ON STRUCTURAL SUPPORT.

b. GUIDES AT EVERY SECOND FLOOR (SPACING NOT TO EXCEED 25 FEET)

c. TOP SUPPORT HANGER OR SADDLE IN HORIZONTAL CONNECTION WITH PROVISIONS FOR EXPANSION.

d. INTERMEDIATE STEEL RISER CLAMP SUPPORT BOLTED AND WELDED TO PIPE BEARING ON STRUCTURAL STEEL OR BEARING PLATE AT FLOOR.

e. FOR MULTIPLE PIPES, COORDINATE GUIDES, BEARING PLATES AND ACCESSORY STEEL.

O. VALVES - GENERAL REQUIREMENTS

1) VALVE PRESSURE AND TEMPERATURE RATINGS: NOT LESS THAN INDICATED AND AS REQUIRED FOR SYSTEM PRESSURES AND TEMPERATURES.

2) VALVE SIZES: SAME AS UPSTREAM PIPING UNLESS OTHERWISE INDICATED.

3) VALVE-END CONNECTIONS: a. FLANGED: WITH FLANGES ACCORDING TO ASME B16.1 FOR IRON VALVES.

b. FLANGED: WITH FLANGES ACCORDING TO ASME B16.5 FOR STEEL VALVES.

c. FLANGED: WITH FLANGES ACCORDING TO ASME B16.24 FOR BRONZE VALVES

d. SOLDER JOINT: WITH SOCKETS ACCORDING TO ASME B16.18.

e. THREADED: WITH THREADS ACCORDING TO ASME B1.20.1

f. VALVE BYPASS AND DRAIN CONNECTIONS: MSS SP-45.

4) GENERAL-DUTY VALVE APPLICATIONS: UNLESS OTHERWISE INDICATED, USE THE FOLLOWING VALVE TYPES:

a. SHUTOFF SERVICE EXCEPT STEAM: BALL, BUTTERFLY OR GATE VALVES.

b. SHUTOFF SERVICE, STEAM: GATE VALVES. c. THROTTLING SERVICE EXCEPT STEAM: BALL, BUTTERFLY, PLUG VALVES.

d. THROTTLING SERVICE, STEAM: GLOBE VALVES.

5) INSTALL SHUTOFF DUTY VALVES AT EACH BRANCH CONNECTION TO SUPPLY MAINS. AT SUPPLY CONNECTION TO EACH PIECE OF EQUIPMENT, UNLESS ONLY ONE PIECE OF EQUIPMENT IS CONNECTED IN THE BRANCH LINE. INSTALL THROTTLING DUTY VALVES AT EACH BRANCH CONNECTION TO RETURN MAINS, AT RETURN CONNECTIONS TO EACH PIECE OF EQUIPMENT, AND ELSEWHERE AS INDICATED

6) INSTALL CALIBRATED BALANCING VALVES IN THE RETURN WATER LINE OF EACH HEATING OR COOLING ELEMENT AND ELSEWHERE AS REQUIRED TO FACILITATE SYSTEM BALANCING.

7) THREADED CONNECTIONS ARE NOT TO BE USED FOR GLYCOL SYSTEMS.

14. LOW PRESSURE STEAM SYSTEM, NOT EXCEEDING 15 PSIG:

A. LOW PRESSURE STEAM PIPE: STEEL, SCHEDULE 40 SEAMLESS, WELDED IN ACCORDANCE WITH ASTM A53 OR AL20.

B. LOW PRESSURE CONDENSATE RETURN PIPE: STEEL, SCHEDULE 80, SEAMLESS, IN ACCORDANCE WITH ASTM A120.

C. FITTINGS:

1) 2 INCH AND SMALLER: SCREWED JOINTS, 125 LB WSP CAST IRON FITTINGS.

2) 2-1/2 AND LARGER: 150 LB WSP FLANGED OR BUTT-WELDED FITTINGS.

1) GATE VALVES

D. VALVES:

a. 2 INCH AND SMALLER, MSS SP 25, MSS SP-70 TYPE 1, CLASS 125

PSI STEAM, 200 PSI COLD WORKING PRESSURE (CWP), ASTM A 126 CLASS B CAST-IRON BODY AND BONNET, BOLTED BONNET, OUTSIDE SCREW & YOKE, RISING STEM, SOLID BRONZE DISC, BRONZE STEM, RENEWABLE BRONZE SEAT RINGS, THREADED END CONNECTION, NON-ASBESTOS PACKING AND GASKETS, ALUMINUM OR MALLEABLE-IRON HANDWHEEL.

(1) MANUFACTURERS - IRON GATE VALVES, CRANE CO.; CRANE VALVE GROUP; CRANE VALVES, STOCKHAM DIVISION, NIBCO INC.

b. 2 1/2 INCH TO 12 INCH, MSS SP 25, MSS SP-70 TYPE 1, CLASS 125 PSI STEAM, 200 PSI COLD WORKING PRESSURE (CWP), ASTM A 126 CLASS B CAST-IRON BODY AND BONNET, BOLTED BONNET, OUTSIDE SCREW & YOKE, RISING STEM, SOLID BRONZE DISC, STEEL STEM, RENEWABLE BRONZE SEAT RINGS, ANSI 125 FLAT FACE FLANGED ENDS, NON-ASBESTOS PACKING AND GASKETS, ALUMINUM OR MALLEABLE-IRON HANDWHEEL.

(1) MANUFACTURERS - IRON GATE VALVES, CRANE CO.: CRANE VALVE GROUP; CRANE VALVES, STOCKHAM DIVISION, NIBCO INC.

GLOBE VALVES

a. 2 INCHES AND SMALLER, BRONZE GLOBE VALVES MSS SP-80 TYPE 3, CLASS 150 PSI STEAM, 300 PSI COLD WORKING PRESSURE (CWP), ASTM B 62 CAST-BRONZE BODY AND BONNET, UNION BONNET, STAINLESS STEEL DISC, STAINLESS STEEL SEAT, COPPER-SILICON ALLOY RISING STEM, TEFLON-IMPREGNATED PACKING WITH BRONZE PACKING NUT, THREADED END CONNECTION, ALUMINUM OR MALLEABLE-IRON HANDWHEEL.

(1) MANUFACTURERS - BRONZE GLOBE VALVES, CRANE CO; CRANE VALVE GROUP; JENKINS VALVES, CRANE VALVES, STOCKHAM DIVISION, GRINNELL CORPORATION, WALWORTH COMPANY, NIBCO INC.

b. 3 INCHES TO 10 INCHES, IRON GLOBE VALVES MSS SP-85, CLASS 125 PSI STEAM, 200 PSI COLD WORKING PRESSURE (CWP), ASTM A 126 CLASS B CAST-IRON BODY AND BONNET, BOLTED BONNET, OUTSIDE SCREW & YOKE, RISING STEM, 6 INCH AND SMALLER: SOLID BRONZE DISC, 8 INCH AND LARGER: CAST IRON DISC WITH BRONZE FACING, BOTTOM GUIDED DISC, BRASS ALLOY STEM, RENEWABLE BRONZE SEAT, ANSI 125 FLAT FACEFLANGED ENDS, NON-ASBESTOS PACKING AND GASKETS, ALUMINUM, STEEL, OR CAST IRON HANDWHEEL.

(1) MANUFACTURERS - IRON GLOBE VALVES, CRANE CO.; CRANE VALVE GROUP: JENKINS VALVES, CRANE VALVES, STOCKHAM DIVISION, GRINNELL CORPORATION, CINCINNATI VALVE CO., NIBCO INC.

3) SWING CHECK VALVES

a. 2 INCHES AND SMALLER, BRONZE CHECK VALVES MSS SP-80, CLASS 150 PSI STEAM, BRONZE CHECK VALVES 300 PSI COLD WORKING PRESSURE (CWP), ASTM B 62 CAST-BRONZE BODY AND CAP, "Y" PATTERN, STAINLESS STEEL FREE FLOATING HINGE PIN. THREADED CAP, REGRINDING SEAT.

BRONZE DISC, THREADED (STEEL PIPING) END CONNECTION

(1) MANUFACTURERS - BRONZE CHECK VALVES, HORIZONTAL AND VERTICAL, HORIZONTAL, CRANE CO.; CRANE VALVE GROUP; JENKINS VALVES, STOCKHAM DIVISION, GRINNELL CORPORATION, WALWORTH COMPANY, NIBCO INC., VERTICAL, CINCINNATI VALVE CO.

b. 2½ INCH TO 12 INCH, IRON SWING CHECK VALVES, ASME B16.10, CLASS 125 PSI STEAM, 200 PSI COLD WORKING PRESSURE (CWP), CAST IRON BODY AND CAP, REPLACEABLE BRONZE SEAT RING, 6 INCH AND SMALLER: SOLID BRONZE DISC, 8 INCH AND LARGER: CAST IRON DISC WITH BRONZE FACING, REPLACEABLE BRASS HINGE PIN, FLANGED ENDS

(1) MANUFACTURERS - IRON SWING CHECK VALVES, CRANE CO.; CRANE VALVE GROUP: JENKINS VALVES, CRANE VALVES, STOCKHAM DIVISION. GRINNELL CORPORATION, CINCINNATI VALVE CO, NIBCO INC.

4) Y-PATTERN STRAINERS

a. LOW PRESSURE STEAM, LOW PRESSURE CONDENSATE AND PUMPED CONDENSATE SYSTEMS OF STEEL CONSTRUCTION 15 PSIG AND BELOW.

b. WORKING PRESSURE: TO 250 PSIG WSP @ 406F. SIZES: 1/4 INCH TO 2 INCHES: ANSI 250 LB CLASS. CONNECTIONS: THREADED. BODY: CAST IRON, ASTM A 126, CLASS B, WITH MACHINED SEAT FOR SCREEN RETENTION. GALVANIZED AS REQUIRED TO MATCH CONNECTING PIPING. COVER: CAST IRON GASKETED. SCREEN: 3/64 INCH PERFORATIONS, 304 STAINLESS STEEL, ASTM 240, FREE AREA NOT LESS THAN 2.5 TIMES INLET AREA BLOWOFF OUTLET: WITH FEMALE MPT TAPPING, MUELLER MODEL NO. 11 BC.

c. WORKING PRESSURE: FOR SIZES 2-1/2 INCHES TO 12 INCHES: TO 250 PSIG WSP @ 450F. FOR SIZES 14 INCHES TO 24 INCHES: TO 200 PSIG WSP @ 406F. CONNECTIONS: FLANGED. BODY: CAST IRON, ASTM A 126, CLASS B, WITH MACHINED SEAT FOR SCREEN RETENTION, GALVANIZED AS REQUIRED TO MATCH CONNECTING PIPING. COVER FLANGE: CAST IRON, ASTM A 126, CLASS B, WITH MACHINED SEAT FOR SCREEN RETENTION, WITH FEMALE TAPPED NPT BLOWOFF CONNECTION, WITH EPDM O-RING SEAL SCREEN: TO 8 INCHES: 3/64 INCH PERFORATIONS.; 10 INCHES AND LARGER: 1/16 INCH PERFORATIONS, 304 STAINLESS STEEL, ASTM 240, FREE AREA NOT LESS THAN 2.5 TIMES INLET AREA. BLOWOFF OUTLET: WITH FEMALE NPT TAPPING, MUELLER MODEL NO. 752.

E. STEAM TRAPS:

1) TRAPS: 125 PSIG WORKING PRESSURE, BASED AT 300 PERCENT MAXIMUM LOAD, MAXIMUM 1 PSIG PRESSURE DIFFERENTIAL, 1/2 INCH MINIMUM SIZE AND CONDENSATE AT STEAM TEMPERATURE..

2) THERMOSTATIC TRAPS: BODY AND CAP SHALL BE CAST BRASS, OR STAINLESS STEEL. THERMOSTATIC ELEMENT SHALL BE PHOSPHOR BRONZE MONEL METAL OR STAINLESS STEEL WITH BALANCED PRESSURE CORRUGATED BELLOWS OR DUPLEX DIAPHRAGM. THERMOSTATIC TRAPS SHALL BE REPLACEABLE AS UNIT WITHOUT FIELD ADJUSTMENT. VALVE HEADS SHALL BE PERMANENTLY ADJUSTED, SELF-ALIGNING, STAINLESS STEEL. VALVE SEAT SHALL BE RENEWABLE, SHARP EDGED, STAINLESS STEEL, SIMILAR TO

SARCO CO.: TYPE TB-25. 3) FLOAT AND THERMOSTATIC TRAPS: BODY SHALL BE CAST IRON. BELLOWS SHALL BE BALANCED PRESSURE, BRONZE, MONEL METAL, OR STAINLESS STEEL. FLOAT SHALL BE STAINLESS STEEL OR SEAMLESS COPPER. WATER VALVE AND SEAT SHALL BE STAINLESS STEEL. VALVE OPERATING PARTS SHALL BE DOUBLE FULCRUM TYPE, STAINLESS STEEL AUTOMATIC AIR VENTS SHALL BE MULTIPLE BELLOWS, STAINLESS STEEL VALVE AND SEAT. INTEGRAL PARTS SHALL BE REMOVABLE AND REPLACEABLE WITHOUT BREAKING PIPE CONNECTIONS. PROVIDE TRAPS SIMILAR TO SARCO CO. FTB.

4) INVERTED BUCKET TRAPS: BODY AND CAP SHALL BE CAST IRON. INLET SHALL BE WROUGHT IRON. VALVE AND SEAT SHALL BE CHROME STEEL. GUIDE PIN ASSEMBLY, LEVER, BUCKET, VALVE RETAINER AND BODY THIMBLE SHALL BE STAINLESS STEEL. STRAINER BUSHING GASKET AND COVER BASKET SHALL BE NON-ASBESTOS TYPE ELASTOMETER. INTERNAL PARTS SHALL BE REMOVABLE AND REPLACEABLE WITHOUT BREAKING PIPE CONNECTIONS. CAST IRON TRAPS SIMILAR TO SARCO B SERIES.

F. PITCH STEAM AND CONDENSATE 1 INCH IN 40 FEET DOWN IN DIRECTION OF FLOW. STEAM RISER BRANCHES AND UNDRIPPED CONNECTIONS 1 INCH IN 10 FEET UP IN DIRECTION OF STEAM FLOW.

G. INSTALL PIPING TO PERMIT FREE EXPANSION AND CONTRACTION WITHOUT DAMAGING PIPING OR CONSTRUCTION. PROVIDE 3 ELBOW TYPE SWING JOINTS AT CONNECTION TO EQUIPMENT AND PIPING SYSTEMS. PROVIDE 12 INCH LONG DIRT POCKETS AT BOTTOM OF EACH RISER SAME SIZE AS RISER. PROVIDE DRIPS AT MAXIMUM 75 FEET INTERVALS, AT BOTTOM OF VERTICAL LINES AND AT RISING POINTS IN PIPING.

15. LOW TEMPERATURE WATER SYSTEMS, BELOW 100 PSIG, -20 TO 200 DEG F OPERATING TEMPERATURES.

A. MATERIAL SHALL BE STEEL IN ACCORDANCE WITH ASTM A 53, SEAMLESS, GRADES A OR B. OR TYPE L COPPER FOR PIPING 4 INCH AND BELOW.

1) WALL THICKNESS SHALL BE:

a. TO 2 INCH: SCHEDULE 40 WITH THREADED ENDS OR SCHEDULE 40 WITH SOCKET WELD ENDS.

b. 2-1/2 INCH TO 10 INCH: SCHEDULE 40, BUTT WELD ENDS ONLY. c. 12 INCH AND LARGER: 0.375 INCH WALL THICKNESS UP TO 250 PSIG, BUTT WELD ENDS ONLY.

d. 4 INCH AND SMALLER TYPE L, DRAWN-TEMPER COPPER TUBING, WROUGHT-COPPER FITTINGS, AND BRAZED JOINTS

d. NO THREADED JOINTS ARE ALLOWED IN GLYCOL SYSTEMS B. IRON BUTTERFLY VALVES

1) 200 PSI COLD WORKING PRESSURE (CWP), 2 INCH TO 24 INCH, ASTM A126 CAST IRON BODY, ANSI 125/150 PATTERN, FULLY LUGGED, AND TAPPED BODY STYLE, CLOSED WATER SYSTEMS-ALUMINUM BRONZE DISC, OPEN WATER SYSTEMS-316 STAINLESS STEEL DISC, STAINLESS STEEL

STEM, RESILIENT EPDM SEAT, BRONZE STEM BUSHING, STAINLESS STEEL DISC SCREWS OR TAPER PINS

a. MANUFACTURERS - IRON BUTTERFLY VALVES, KEYSTONE DIVISION OF TYCO FLOW CONTROL, BRAY VALVE & CONTROLS, ABZ VALVES & CONTROLS

C. CAST IRON PLUG VALVES

1) 2 INCH AND SMALLER, MSS SP 25, MSS SP-78, 200 PSI COLD WORKING PRESSURE (CWP), ASTM A 126 GRAY IRON BODY, REGULAR PATTERN, SCREWED GLAND, BUNA-N GLAND AND STEM SEALS, GRAY IRON LUBRICATED TAPERED PLUG, CARBON STEEL SEALANT FITTING, 1 YEAR SUPPLY LUBRICANT PER VALVE 1 LUBRICATING GUN WITH 15,000 PSI GAUGE AND 12 INCH CONNECTION HOSE PER 10 VALVES, 1 WRENCH OPERATOR PER 10 VALVES, THREADED END CONNECTION

2) 2 1/2 INCH TO 4 INCH, MSS SP 25, MSS SP-78, 200 PSI COLD, WORKING PRESSURE (CWP), ASTM A 126 GRAY IRON BODY, REGULAR PATTERN, SCREWED GLAND. BUNA-N GLAND AND STEM SEALS, GRAY IRON LUBRICATED TAPERED PLUG, CARBON STEEL SEALANT FITTING. 1 YEAR SUPPLY LUBRICANT PER VALVE. 1 LUBRICATING GUN WITH 15,000 PSI GAUGE AND 12 INCH CONNECTION HOSE PER 10 VALVES, 1 WRENCH OPERATOR PER 10 VALVES, ANSI 125 FLANGED ENDS

3) 5 TO 12 INCH, MSS SP 25, MSS SP-78, 200 PSI COLD WORKING PRESSURE (CWP), ASTM A 126 GRAY IRON BODY, SHORT PATTERN, BOLTED GLAND, BUNA-N GLAND AND STEM SEALS, GRAY IRON LUBRICATED TAPERED PLUG, CARBON STEEL SEALANT FITTING, 1 YEAR SUPPLY LUBRICANT PER VALVE, 1 LUBRICATING GUN WITH 15,000 PSI GAUGE AND 12 INCH CONNECTION HOSE PER 10 VALVES, WRENCH OPERATOR PER 10 VALVES, ANSI 125 FLANGED ENDS

4) MANUFACTURERS - CAST IRON PLUG VALVES, NORDSTROM VALVE INC., WALWORTH COMPANY, R&M ENERGY SYSTEMS (TOMBALL TX), OLSON TECHNOLOGIES; HOMESTEAD DIV.

D. BALL VALVES

1) 3 INCHES AND SMALLER- THREADED OR SOLDERED, 3 PIECE, CLASS 150 PSI STEAM, 600 PSI COLD WORKING PRESSURE (CWP), FULL PORT ASTM B584 CAST BRONZE BODY, CHROME PLATED BRASS BALL WITH BRASS STEM, BLOW OUT PROOF STEM DESIGN, PTFE SEATS, PTFE STEM PACKING, ZINC PLATED STEEL LEVER WITH VINYL COVERED GRIP, THREADED ENDS OR SOLDER ENDS AS REQUIRED BY PIPING SYSTEM.

2) GLYCOL, 2 INCHES AND SMALLER- SOCKET WELDED - 3 PIECE, CLASS 150 PSI STEAM, 1000 PSI COLD WORKING PRESSURE (CWP), FULL PORT, 2 INCHES AND SMALLER, ASTM A108 CARBON STEEL BODY, ASTM A108 CHROME PLATED BALL AND STEM. BLOW OUT PROOF STEM DESIGN. PTFE SEATS. PTFE STEM PACKING, ZINC PLATED STEEL LEVER WITH VINYL COVERED GRIP, SOCKET WELD ENDS

a. MANUFACTURERS - BRONZE BALL VALVES, CONBRACO INDUSTRIES INC., APOLLO DIVISION, CRANE CO.: CRANE VALVE GROUP: JENKINS VALVES. STOCKHAM DIVISION, JAMESBURY INC., MILWAUKEE VALVE COMPANY

3) GREATER THAN 3 INCH- FLANGE, ANSI FLANGED, CLASS 150 PSI STEAM, 285 PSI COLD WORKING PRESSURE (CWP), REDUCED PORT, 21/2 INCHES ITO 10 INCHES, ASTM A216 WCB CAST CARBON STEEL BODY, ASTM A216 WCB CHROME PLATED BALL, ASTM A108 CARBON STEEL STEM, BLOW OUT PROOF STEM DESIGN, PTFE SEATS, GRAPHITE STEM PACKING, GALVANIZED PIPE LEVER, RAISED FACE FLANGE ENDS.

a. MANUFACTURERS - STEEL BALL VALVES, CONBRACO INDUSTRIES INC.; APOLLO DIVISION, CRANE CO.; CRANE VALVE GROUP; STOCKHAM DIVISION, JAMESBURY INC., COOPER CAMERON CORP.; COOPER CAMERON VALVES DIV., MILWAUKEE VALVE COMPANY

E. SPRING LOADED LIFT DISC CHECK VALVES

1) 2 INCH AND SMALLER, 200 PSI COLD WORKING PRESSURE (CWP) UP TO 150°F, CAST IRON BODY AND CAP, SCREWED CAP, EPDM SEAL, STAINLESS STEEL STEM, STAINLESS STEEL SPRING, BRASS DISC, THREADED ENDS.

2) 2½ INCH TO 12 INCH, 200 PSI COLD WORKING PRESSURE (CWP) UP TO 150°F, ASTM A126 GRADE B CAST IRON, GLOBE STYLE, BODY, ASTM B62 BRONZE DISC AND SEAT, STAINLESS STEEL SPRING, SILICON BRONZE GUIDE PINS AND BUSHINGS, ANSI CLASS 125 FLANGED END CONNECTIONS.

3) MANUFACTURERS - SPRING LOADED LIFT DISC CHECK VALVES, MUELLER STEAM SPECIALTY CO., MILWAUKEE VALVE CO., TITAN FLOW CONTROL, INC.

F. SWING CHECK VALVES

1) 2 INCHES AND SMALLER, BRONZE SWING CHECK VALVES, MSS SP-80, CLASS 150 PSI STEAM, 300 PSI COLD WORKING PRESSURE (CWP), ASTM B 62 CAST - BRONZE BODY AND CAP, "Y" PATTERN, STAINLESS STEEL FREE FLOATING HINGE PIN, THREADED CAP, REGRINDING SEAT, BRONZE DISC, THREADED (STEEL PIPING) END CONNECTION OR SOLDERED (COPPER PIPING) END CONNECTION AS REQUIRED BY PIPING SYSTEM.

a. MANUFACTURERS - BRONZE CHECK VALVES, HORIZONTAL AND VERTICAL, HORIZONTAL, CRANE CO.; CRANE VALVE GROUP; JENKINS VALVES, CRANE VALVES, STOCKHAM DIVISION, GRINNELL CORPORATION WALWORTH COMPANY, NIBCO INC, VERTICAL, CINCINNATI VALVE CO

2) 2½ INCH TO 12 INCH, ASME B16.10, IRON SWING CHECK VALVES. CLASS 125 PSI STEAM, 200 PSI COLD WORKING PRESSURE (CWP), CAST IRON BODY AND CAP, REPLACEABLE BRONZE SEAT RING, 6 INCH AND SMALLER: SOLID BRONZE DISC, 8 INCH AND LARGER: CAST IRON DISC WITH BRONZE FACING, REPLACEABLE BRASS HINGE PIN, FLANGED ENDS

a. MANUFACTURERS - IRON SWING CHECK VALVES, CRANE CO.; CRANE VALVE GROUP; JENKINS VALVES, STOCKHAM DIVISION, GRINNELL CORPORATION, CINCINNATI VALVE CO., NIBCO INC.

G. BALANCING VALVES

1) 2 INCH AND SMALLER, 300 PSI COLD WORKING PRESSURE (CWP) UP TO 250°F, BRONZE BODY, "Y" PATTERN GLOBE STYLE DESIGN, EPDM O-RING SEALS, 4 TURN DIGITAL HANDWHEEL FOR BALANCING, HIDDEN MEMORY FEATURE WITH LOCKING TAMPER-PROOF SETTING.

2) 21/2 INCH AND LARGER, 300 PSI COLD WORKING PRESSURE (CWP) UP TO 250°F, BRONZE BODY, "Y" PATTERN GLOBE STYLE DESIGN, EPDM O-RING SEALS. 8, 12, OR 16 TURN DIGITAL HANDWHEEL FOR BALANCING, HIDDEN MEMORY FEATURE WITH LOCKING TAMPER-PROOF SETTING. ANSI CLASS 125 FLANGED END CONNECTIONS

3) MANUFACTURERS - BALANCING VALVES, TOUR AND ANDERSSON, MACON

ARMSTRONG. H. Y STRAINERS

1) SYSTEMS OF STEEL CONSTRUCTION, WORKING PRESSURE: TO 250 PSIG, NON-SHOCK. SIZES: 1/4 INCH TO 2 INCH: ANSI 250 LB. CLASS. CONNECTIONS: THREADED. BODY: CAST IRON, ASTM A126, CLASS B. WITH MACHINED SEAT FOR SCREEN RETENTION, GALVANIZED AS REQUIRED TO MATCH CONNECTING PIPING. CAP: BRONZE, GASKETED. SCREEN: 20 MESH, 304 STAINLESS STEEL, ASTM 240. FREE AREA NOT LESS THAN 2-1/2 TIMES INLET AREA. BLOWOFF OUTLET: WITH FEMALE NPT TAPPING., MUELLER MODEL NO. 11 MFCB.

2) SYSTEMS OF STEEL CONSTRUCTION: WORKING PRESSURE: TO 250 PSIG, NON-SHOCK SIZES 2-1/2 INCH TO 24 INCH: CLASS 250. CONNECTIONS: FLANGED. BODY: CAST IRON, ASTM A126, CLASS B. WITH MACHINED SEAT FOR SCREEN RETENTION, GALVANIZED AS REQUIRED TO MATCH CONNECTING PIPING. COVER FLANGE: CAST IRON, ASTM A126, CLASS B, WITH MACHINED SEAT FOR SCREEN RETENTION. WITH FEMALE TAPPED NPT BLOWOFF CONNECTION. WITH EPDM O-RING SEAL. SCREEN TO 8 INCH: 1/8 INCH PERFORATIONS, 304 STAINLESS STEEL, ASTM 240. FREE AREA NOT LESS THAN 2-1/2 TIMES INLET AREA. SCREEN 10 INCH AND LARGER: 5/32 INCH PERFORATIONS, 304 STAINLESS STEEL, ASTM 240. FREE AREA NOT LESS THAN 2-1/2 TIMES INLET AREA. MAGNETS: PROVIDE MAGNETS FOR STRAINERS. ALL 8 INCH AND LARGER. AT EACH PUMP SUCTION. WITH CONTINUOUS MAGNETIC FIELD AROUND ENTIRE CIRCUMFERENCE OF SCREEN. WITH REMOVABLE CAST ALNICO NO. 5 CHANNEL MAGNETS WITH ACCEPTABLE BASKETS CONSTRUCTED OF MAGNETIC ALLOY. SECURED WITH STAINLESS STEEL RETAINING LUGS AND THREADED RODS. BLOWOFF OUTLET: WITH FEMALE NPT TAPPING., MUELLER MODEL NO.752.

3) SYSTEMS OF COPPER CONSTRUCTION, WORKING PRESSURE: TO 250 PSIG, NON-CHOCK. SIZES 1/4 INCH TO 2 INCH: CLASS 250. CONNECTIONS: THREADED. BODY: BRONZE, ASTM B62, WITH MACHINED SEAT FOR SCREEN RETENTION. CAP: BRONZE, ASTM B62, WITH MACHINED SEAT FOR SCREEN RETENTION. SCREEN: 20 MESH, 304 STAINLESS STEEL, ASTM 240. FREE AREA NOT LESS THAN 2-1/2 TIME INLET AREA.

BLOWOFF OUTLET: WITH FEMALE NPT TAPPING, MUELLER MODEL NO. 352M 4) SYSTEMS OF COPPER CONSTRUCTION, WORKING PRESSURE TO 225 PSIG CLASS 150; TO 400 PSIG CLASS 300. SIZES 2-1/2 INCH TO 12 INCH: CONNECTIONS: FLANGED, BODY: BRONZE, ASTM B62 (85-5-5-5) OR BRONZE ASTM B61. ALUMINUM BRONZE ASTM A148-90 FOR SIZES 8 INCH AND LARGER. WITH MACHINED SEAT FOR SCREEN RETENTION. COVER: MATERIAL TO MATCH BODY. WITH MACHINED SEAT FOR SCREEN RETENTION. SCREEN TO 8 INCH: 1/8 INCH PERFORATIONS, 304 STAINLESS STEEL. ASTM 240. FREE AREA NOT LESS THAN 2-1/2 TIMES INLET AREA. SCREEN 10 INCH AND LARGER: 5/32 INCH PERFORATIONS, 304 STAINLESS STEEL, ASTM 240. FREE AREA NOT LESS THAN 2-1/2 TIMES INLET AREA. BLOWOFF OUTLET: WITH FEMALE NPT TAPPING., MUELLER MODEL NO. 851 OR 851M FOR CLASS 150, MUELLER MODEL, NO. 852 FOR CLASS 300.

I. PROVIDE 1/2 INCH DRAIN VALVE WITH CAPPED HOSE CONNECTION AT ALL LOW POINTS. PROVIDE 3/4 INCH GATE VALVE TO DRAIN SYSTEMS IN EQUIPMENT ROOMS.

J. PROVIDE MANUAL AIR VENTS LINE SIZE AIR CHAMBER WITH 1/2 INCH GLOBE VALVE AT ALL HIGH POINTS AND WHERE FLOW DIRECTION CHANGES FROM HORIZONTAL TO DOWNWARD.

1) UP TO 1 INCH: 1 INCH IN 40 FEET. 2) 1-1/2 INCH AND LARGER: 1 INCH IN 100 FEET.

K. PITCH WATER PIPING EXCEPT AS NOTED:

L. CONDENSATE DRAIN PIPING

1) PIPE: ASTM B88, HARD DRAWN COPPER TUBING TYPE "L'

2) FITTINGS: SOLDERED JOINT FITTINGS, 95/5 SOLDER.

PITCH, EXCEPT AS NOTED:

a. 1 INCH IN 4 FEET PREFERRED b. 1 INCH IN 8 FEET MINIMUM.

POWER TO EQUIPMENT.

PROJECT ELECTRICAL SPECIFICATIONS.

16. ELECTRICAL WORK

A. GENERAL: 1) ELECTRICAL POWER WIRING SHALL BE PROVIDED BY THE ELECTRICAL CONTRACT. CONTROL WIRING SHALL BE PROVIDED BY THE HVAC CONTRACT. CONTROL WIRING SHALL BE DEFINED AS ANY WIRING 120V AND BELOW INSTALLED FOR PURPOSES OTHER THAN PROVIDING PRIMARY ELECTRICAL

2) DUCT MOUNTED SMOKE DETECTORS, WHERE REQUIRED, SHALL BE PROVIDED BY AND WIRED BY THE ELECTRICAL CONTRACTOR, AND MOUNTED BY THE HVAC CONTRACTOR.

a. THIS CONTRACTOR SHALL INSTALL THE SMOKE DETECTOR SAMPLING TUBES IN THE DUCT AS COORDINATED IN THE FIELD.

TESTING THE DUCT-MOUNTED SMOKE DETECTION SYSTEM. 3) ALL ELECTRICAL CONTROL WIRING SHALL COMPLY WITH LOCAL ELECTRICAL CODE, ALL AUTHORITIES HAVING JURISDICTION AND THE

b. THIS CONTRACTOR SHALL ASSIST THE ELECTRICAL CONTRACTOR IN

4) MECHANICAL CONTRACTOR TO OBTAIN QUANTITY OF CONTROLLERS REQUIRED AND COORDINATE WITH ELECTRICAL CONTRACTOR FOR ALL OPERATING REQUIREMENTS, INTERLOCKS AND CONNECTIONS FOR STARTERS 5) THE MECHANICAL CONTRACTOR SHALL PREPARE AND SUBMIT FOR

TO BE PERFORMED BY THE ELECTRICAL CONTRACTOR. 6) WHERE EXISTING STARTERS ARE TO BE REUSED. THIS CONTRACTOR SHALL MAINTAIN ALL EXISTING CONTROL CONNECTIONS. WHERE NEW STARTERS ARE TO BE PROVIDED TO REPLACE EXISTING, THIS CONTRACTOR SHALL SURVEY THE EXISTING CONTROL CONNECTIONS AND PREPARE AN EXISTING CONTROL WIRING DIAGRAM PRIOR TO DEMOLITION FOR SUBMITTAL TO THE ENGINEER. THE NEW STARTERS SHALL BE PROVIDED WITH THE NECESSARY CONTACTS AND RELAYS REQUIRED TO RECONNECT THE EXISTING

CONTROLS. PROVIDE ALL REQUIRED CONTACTS FOR START/STOP AND FIRE ALARM.

APPROVAL POINT TO POINT, COMPLETELY COORDINATED WIRING DIAGRAMS

AND INDICATE ALL SOURCE POWER REQUIREMENTS AND ALL FIELD WIRING

17. EQUIPMENT, DUCT, AND PIPING TAGS AND LABELS

A. METAL LABELS FOR EQUIPMENT: 1. INSTALL LABELS ON EACH MAJOR ITEM OF MECHANICAL EQUIPMENT.

2. MATERIAL AND THICKNESS: BRASS, 0.032-INCH MINIMUM THICKNESS, AND HAVING PREDRILLED OR STAMPED HOLES FOR ATTACHMENT HARDWARE.

3. MINIMUM LABEL SIZE: LENGTH AND WIDTH VARY FOR REQUIRED LABEL CONTENT, BUT NOT LESS THAN 2-1/2 BY 3/4 INCH. 4. MINIMUM LETTER SIZE: 1/4 INCH FOR NAME OF UNITS IF VIEWING

DISTANCE IS LESS THAN 24 INCHES (600 MM), 1/2 INCH FOR VIEWING DISTANCES UP TO 72 INCHES, AND PROPORTIONATELY LARGER LETTERING FOR GREATER VIEWING DISTANCES. INCLUDE SECONDARY LETTERING TWO-THIRDS TO THREE-FOURTHS THE SIZE OF PRINCIPAL LETTERING.

5. FASTENERS: STAINLESS-STEEL RIVETS OR SELF-TAPPING SCREWS. 6. ADHESIVE: CONTACT-TYPE PERMANENT ADHESIVE, COMPATIBLE WITH LABEL AND WITH SUBSTRATE.

7. LABEL CONTENT: INCLUDE EQUIPMENT'S DRAWING DESIGNATION OR

UNIQUE EQUIPMENT NUMBER, DRAWING NUMBERS WHERE EQUIPMENT IS

INDICATED (PLANS, DETAILS, AND SCHEDULES), PLUS THE SPECIFICATION SECTION NUMBER AND TITLE WHERE EQUIPMENT IS SPECIFIED. 8. EQUIPMENT LABEL SCHEDULE: FOR EACH ITEM OF EQUIPMENT TO BE LABELED. ON 8-1/2-BY-11-INCH BOND PAPER. TABULATE EQUIPMENT IDENTIFICATION NUMBER AND IDENTIFY DRAWING NUMBERS WHERE EQUIPMENT IS INDICATED (PLANS, DETAILS, AND SCHEDULES), PLUS THE SPECIFICATION SECTION NUMBER AND TITLE WHERE EQUIPMENT IS SPECIFIED. EQUIPMENT

SCHEDULE SHALL BE INCLUDED IN OPERATION AND MAINTENANCE DATA.

B. PIPE AND DUCT LABELS 1) PIPE AND DUCT LABELS SHALL BE INSTALLED AT MAXIMUM INTERVALS OF 50 FEET ON STRAIGHT RUNS AND 25 FEET IN AREAS OF CONGESTED

PIPING AND EQUIPMENT. 2) GENERAL REQUIREMENTS FOR MANUFACTURED PIPE LABELS: PREPRINTED, COLOR-CODED, WITH LETTERING INDICATING SERVICE, AND

SHOWING FLOW DIRECTION. 3) SELF-ADHESIVE PIPE AND DUCT LABELS: PRINTED PLASTIC WITH

CONTACT-TYPE, PERMANENT-ADHESIVE BACKING.

4) PIPE AND DUCT LABEL CONTENTS: INCLUDE IDENTIFICATION OF PIPING SERVICE USING SAME DESIGNATIONS OR ABBREVIATIONS AS USED ON DRAWINGS, PIPE SIZE, AND AN ARROW INDICATING FLOW DIRECTION. a. FLOW-DIRECTION ARROWS: INTEGRAL WITH PIPING OR DUCT SYSTEM

UNIT ON EACH PIPE OR DUCT LABEL TO INDICATE FLOW DIRECTION.

SERVICE LETTERING TO ACCOMMODATE BOTH DIRECTIONS, OR AS SEPARATE

b. LETTERING SIZE: AT LEAST 1-1/2 INCHES HIGH.

C. VALVE TAGS 1) INSTALL TAGS ON VALVES AND CONTROL DEVICES IN PIPING SYSTEMS, EXCEPT CHECK VALVES; VALVES WITHIN FACTORY-FABRICATED EQUIPMENT UNITS: SHUTOFF VALVES: FAUCETS: CONVENIENCE AND LAWN-WATERING HOSE CONNECTIONS; AND HVAC TERMINAL DEVICES AND SIMILAR ROUGHING-IN CONNECTIONS OF END-USE FIXTURES AND UNITS. LIST

TAGGED VALVES IN A VALVE SCHEDULE. 2) VALVE TAGS: STAMPED OR ENGRAVED WITH 1/4-INCH LETTERS FOR

PIPING SYSTEM ABBREVIATION AND 1/2-INCH NUMBERS. a. TAG MATERIAL: BRASS, 0.032-INCH MINIMUM THICKNESS, AND HAVING PREDRILLED OR STAMPED HOLES FOR ATTACHMENT HARDWARE b. FASTENERS: BRASS WIRE-LINK OR BEADED CHAIN; OR S-HOOK.

SHOWN ON VALVE TAG), LOCATION OF VALVE (ROOM OR SPACE), NORMAL-OPERATING POSITION (OPEN, CLOSED, OR MODULATING), AND VARIATIONS FOR IDENTIFICATION. MARK VALVES FOR EMERGENCY SHUTOFF AND SIMILAR SPECIAL USES. VALVE TAG SCHEDULE SHALL BE INCLUDED IN

D. VALVE SCHEDULES

EQUIPMENT A. PROVIDE ALL EQUIPMENT AND ACCESSORIES OF THE SIZES AND

CAPACITIES AS SCHEDULED AND AS INDICATED ON THE DRAWINGS.

OPERATION AND MAINTENANCE DATA.

1) FOR EACH PIPING SYSTEM, ON 8-1/2-BY-11-INCH BOND PAPER,

TABULATE VALVE NUMBER, PIPING SYSTEM, SYSTEM ABBREVIATION (AS

B. INSTALL EQUIPMENT IN ACCORDANCE WITH APPROVED SHOP DRAWINGS, MANUFACTURERS INSTRUCTIONS AND ALL CODES AND REGULATIONS WHICH APPLY.

C. REUSE OF EXISTING EQUIPMENT: 1) EXISTING SYSTEM SURVEY

> a. PRIOR TO START OF CONSTRUCTION, CONTRACTOR TO PERFORM EXISTING CONDITIONS SURVEY OF SYSTEMS TO BE REUSED AND PREPARE COMPLETE REPORT INDICATING PHYSICAL CONDITION OF UNITS AND ACCESSORIES AND NOTE ANY REPAIRS REQUIRED BEYOND TEMS INCLUDED IN DESIGN DOCUMENTS TO RESTORE EQUIPMENT TO A FULLY OPERATIONAL CONDITION. REPORT TO BE SUBMITTED TO ENGINEER FOR REVIEW AND ANY CORRECTIVE ACTION. COORDINATE THIS WORK WITH ANY NEW OR REFURBISHMENT WORK LISTED IN THE SPECIFICATIONS OR PLANS.

b. PROVIDE A UNIT PRICE LIST TO BE SUBMITTED WITH YOUR BID FOR THE REPAIR OF ALL INTERNAL COMPONENTS OF ALL EQUIPMENT TO BE REUSED AS WELL AS ALL ACCESSORIES. UPON COMPLETION OF THE PROJECT, THE CONTRACTOR SHALL WARRANTY ALL REUSED EQUIPMENT FOR ONE (1) YEAR.

D. VARIABLE AIR VOLUME (VAV) TERMINAL UNITS:

EXCEED SPECIFIED SPACE NC LEVELS.

1) VAV BOXES SHALL BE SINGLE DUCT, PRESSURE INDEPENDENT, ELECTRONIC DDC BOXES, BOXES SHALL BE PROVIDED WITH ALL SENSORS, CONTROLS, TRANSFORMERS, HOT WATER REHEAT COILS, DAMPERS AND ACTUATORS AS REQUIRED.

2) SUBMIT DISCHARGE AND RADIATED SOUND POWER LEVELS, LEVELS NOT TO

3) UNITS ARE TO HAVE NORMALLY OPEN DAMPERS (ON A NO-FLOW CONDITION) WITH A MINIMUM AIR QUANTITY SETTING OF 20% OF THE DESIGN AIR QUANTITY. MINIMUM/MAXIMUM SETTING SHALL BE USER ADJUSTABLE.

MANUFACTURER FOR MOUNTING. ALL CONTROLS SHALL BE MOUNTED IN A

SINGLE ENCLOSURE, DDC CONTROLS SHALL BE FIELD CALIBRATED BY ATC

4) CONTROLLER, ACTUATOR SHALL BE SHIPPED TO TERMINAL UNIT

CONTRACTOR. SIMILAR TO ANEMOSTAT MODEL EZTS.

5) HOT WATER REHEAT COILS SHALL BE ENCLOSED IN A MINIMUM 20-FOR ATTACHMENT TO METAL DUCTWORK, COILS SHALL BE FACTORY INSTALLED ON THE TERMINAL DISCHARGE. FINS SHALL BE RIPPLED AND TO 300 PSI WITH MINIMUM BURST PRESSURE OF 1800 PSI AT AMBIENT DATA SHALL BE BASED ON TESTS RUN IN ACCORDANCE WITH ARI STANDARD 410.

6) PROVIDE WITH ACCESS PANEL UPSTREAM OF REHEAT COIL. ACCESS PANEL SHALL BE GASKETED AND SHALL HAVE CAM LATCHES FOR ACCESS.

STEEL. INTERNAL LINING SHALL BE UL 181 AND NFPA 90A COMPLIANT. BOXES SHALL BE LINED WITH 1 INCH FIBER FREE INSULATION WITH 1-1/2 LB DENSITY. EXPOSED FIBERGLASS IS NOT ACCEPTABLE. INSULATION SHALL BE MECHANICALLY FASTENED TO THE UNIT CASING.

2. AUTOMATIC CONTROLS - GENERAL REQUIREMENTS

1) FURNISH AND INSTALL AS HEREIN SPECIFIED, A COMPLETE AUTOMATIC

3) PROVIDE POWER FOR PANELS AND CONTROL DEVICES FROM A SOURCE

4) COORDINATE INSTALLATION SCHEDULE WITH THE MECHANICAL

5) FURNISH, MOUNT, AND WIRE ALL ASSOCIATED PANELS AND DEVICES

FOR THE SYSTEM TO BE COMPLETELY OPERATIONAL REGARDLESS OF

SIDES AND BOTTOMS OF CONTROL CABINETS, NOT THROUGH THE TOP.

6) REMOVE ALL UNUSED OLD CONTROLS, DEVICES, WIRING AND EBI POINTS.

STARTUP INSTRUCTIONS FOR EACH TYPE OF PRODUCT INDICATED.

a. SCHEMATIC FLOW DIAGRAMS SHOWING FANS, COILS, DAMPERS,

b. WIRING DIAGRAMS: POWER, SIGNAL, AND CONTROL WIRING.

c. DETAILS OF CONTROL PANEL FACES, INCLUDING CONTROLS,

d. UPGRADE EXISTING FLOOR GRAPHICS WITH CORRECT ROOM NUMBERS.

MAINE MEDICAL'S HVAC LEADMAN SHALL SIGN OFF ON ALL HONEYWELL EBI

1) INSTALLER QUALIFICATIONS: A QUALIFIED INSTALLER WHO IS AN AUTHORIZED

REPRESENTATIVE OF THE AUTOMATIC CONTROL SYSTEM MANUFACTURER FOR

BOTH INSTALLATION AND MAINTENANCE OF UNITS REQUIRED FOR THIS PROJECT

MANUFACTURERS REGULARLY ENGAGED IN PRODUCTION AND INSTALLATION OF

AUTOMATIC TEMPERATURE CONTROL SYSTEMS AND SHALL BE MANUFACTURER'S

1) VARIABLE AIR VOLUME (VAV) TERMINAL UNITS WITH IN-DUCT HOT WATER COILS:

(1) AS THE SPACE TEMPERATURE RISES ABOVE THE SPACE COOLING

LATEST STANDARD DESIGN THAT COMPLIES WITH THE SPECIFICATION REQUIREMENTS.

SETPOINT, THE VAV BOX DAMPER SHALL MODULATE OPEN FROM THE MINIMUM

(2) ON A DROP IN SPACE TEMPERATURE BELOW THE SPACE HEATING SETPOINT, THE

VAV BOX DAMPER SHALL MODULATE CLOSED TO THE MINIMUM CFM VALUE. ON A

CONTINUED DROP IN SPACE TEMPERATURE, THE REHEAT COIL SHALL MODULATE OPEN.

(3) FOR SPACES WHERE THERMOSTAT ALSO CONTROLS PERIMETER HEAT, THE PERIMETER

HEAT CONTROL VALVE SHALL MODULATE OPEN IN UNISON WITH VAV BOX REHEAT CONTROL

CFM VALUE UP TO THE MAXIMUM CFM VALUE TO PROVIDE SPACE COOLING.

(4) WHENEVER THE OUTDOOR AIR TEMPERATURE IS ABOVE 60°F, THE PERIMETER

(6) THE ASSOCIATED RETURN VAV BOX SHALL TRACK THE ASSOCIATED SUPPLY BOX(ES)

AS REQUIRED TO MAINTAIN THE CFM DIFFERENTIAL LISTED ON THE DRAWINGS BETWEEN

THE MAXIMUM AND MINIMUM CFM'S. THE FOLLOWING BOXES ARE TRACKED TOGETHER:

(1) ISOLATION ROOMS SHALL HAVE NEGATIVE DIFFERENTIAL PRESSURE MONITORS (DPM'S.)

(2) DPM'S SHALL BE EQUAL TO TSI MODEL RPM 20 WITH AUDIBLE VISUAL ALARM. MONITOR TO

(3) THE DPM DISPLAY AND ALARM SHALL BE LOCATED OUTSIDE THE ISOLATION ROOM

DOOR, ALL ALARMS SHALL ALSO ALARM THE DDC FRONT END. THE DIFFERENTIAL

PRESSURE MONITORS SHALL COME WITH A DOOR SWITCH TO PREVENT ALARMS

(4) THE VAV SUPPLY BOX WILL MAINTAIN A CONSTANT SUPPLY CFM. THE SPACE

THERMOSTAT SHALL MODULATE THE HOT WATER REHEAT CONTROL VALVE AS

INCLUDE OPTIONAL ANALOG OUTPUT TO DDC SYSTEM FOR ROOM PRESSURE DIFFERENTIAL

HEAT VALVES SHALL BE CLOSED.

RETURN SUPPLY

VAV-1 VAV - 8, 10, & 16

AS LOW PRESSURE ALARM.

IF A DOOR IS OPEN.

VAV-7 VAV - 11, 12, 13 & 14

VAV-18 VAV - 9 & EXIST. CONF. ROOM

REQUIRED TO MAINTAIN SPACE TEMPERATURE.

VAV-2 VAV - 3 & 4

VAV-17 VAV - 15

2) ISOLATION ROOMS

a. ENABLED MODE

REGULATIONS INCLUDING UL, NFPA, THE LOCAL BUILDING CODE, NEC, ETC.

3) MATERIALS AND EQUIPMENT SHALL BE THE CATALOGUED PRODUCTS OF

2) COMPLY WITH ALL CURRENT GOVERNING CODES, ORDINANCES, AND

VALVES, AND CONTROL DEVICES.

INSTRUMENTS, AND LABELING.

C. QUALITY ASSURANCE

D. SEQUENCE OF OPERATIONS

a. ENABLED MODE

GRAPHICS, BEFORE FINAL BILLING.

2) SHOP DRAWINGS: DETAIL EQUIPMENT ASSEMBLIES AND INDICATE

FUNCTION OR VOLTAGE, UNLESS OTHERWISE STATED. PIPE CONDUITS INTO

1) PRODUCT DATA: INCLUDE MANUFACTURER'S TECHNICAL LITERATURE FOR EACH

DIMENSIONS, WEIGHTS, LOADS, REQUIRED CLEARANCES, METHOD OF FIELD

CONTROL DEVICE INDICATED, LABELED WITH SETTING OR ADJUSTABLE RANGE

OF CONTROL. INDICATE DIMENSIONS, CAPACITIES, PERFORMANCE CHARACTERISTICS

ELECTRICAL CHARACTERISTICS. FINISHES FOR MATERIALS, AND INSTALLATION AND

ASSEMBLY, COMPONENTS, AND LOCATION AND SIZE OF EACH FIELD CONNECTION.

DESIGNATED BY THE ELECTRICAL CONTRACTOR

CONTRACTOR AND GENERAL CONTRACTOR.

TEMPERATURE CONTROL SYSTEM. MANUFACTURER SHALL BE HONEYWELL.

2) PROVIDE A SUBMITTAL THAT MEETS THE REQUIREMENTS BELOW FOR APPROVAL.

A. WORK INCLUDED

B. SUBMITTALS

GAUGE GALVANIZED STEEL CASING WITH SLIP AND DRIVE CONSTRUCTION CORRUGATED HEAVY GAUGE ALUMINUM, MECHANICALLY BONDED TO TUBES. TUBES SHALL BE COPPER WITH MINIMUM WALL THICKNESS OF 0.016-INCH WITH MALE SOLDER HEADER CONNECTIONS. COILS SHALL BE LEAK TESTED TEMPERATURE. NUMBER OF COIL ROWS AND CIRCUITS SHALL BE SELECTED TO PROVIDE PERFORMANCE AS REQUIRED PER THE PLANS. COIL PERFORMANCE

7) CASING SHALL BE SOLID DOUBLE WALL MINIMUM 22-GAUGE GALVANIZED

Maine Medical

MMC - PICU

PERKINS

225 Franklin Street, Suite 1100

Boston, MA 02110

t 617.478.0300

f 617.478.0321

www.perkinswill.com

22 Bramhall Street, Portland,

MEP ENGINEER AKF GROUP, LLC

99 Bedford Street, 2nd Floor

Boston, MA 02111

t 617.737.1111

f 617.737.4311

ISSUED FOR PERMIT 06-08-15 ADDENDUM NO. 2 06-03-15 ADDENDUM NO. 1 05-22-15 ISSUE DATE Sheet Information MAY 1,2015

Job Number B140185-000 Checked

SPECIFICATIONS

MECHANICAL

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