GENERAL SPECIFICATIONS:

DIVISION 15 – MECHANICAL

PART 1 GENERAL

CONDITIONS OF THE CONTRACT AND ARCHITECTURAL SECTIONS APPLY TO THIS SECTION.

1.01 DESCRIPTION
A. PROVIDE MATERIALS, EQUIPMENT, LABOR AND SERVICES NECESSARY FOR THE INSTALLATION AND PLACING INTO OPERATION, COMPLETE HEATING, VENTILATING, AIR-CONDITIONING, PLUMBING AND FIRE PROTECTION SYSTEMS AS SPECIFIED AND SHOWN.

1.02 GENERAL REQUIREMENTS
A. EQUIPMENT AND SYSTEMS FURNISHED SHALL FIT IN AVAILABLE SPACE. WITH ADEQUATE SPACE FOR OPERATION AND SERVICING. THE DRAWINGS ARE GENERALLY DIAGRAMMATIC, CONTRACTOR SHALL VERIFY EXACT CONDITIONS.

1.03 REFERENCES
A. ARI 210/240 – UNITARY AIR-CONDITIONING EQUIPMENT.
B. ARI 270 – SOUND RATING OF OUTDOOR UNITARY EQUIPMENT.
C. ASME B16.1 – CAST IRON PIPE FLANGES AND FLANGED FITTINGS.
D. ASME B16.3 – MALLEABLE IRON THREADED FITTINGS.
E. ASME B16.4 – CAST IRON THREADED FITTINGS.
F. ASME B16.5 – PIPE FLANGES AND FLANGED FITTINGS.
G. ASME B16.9 – FACTORY-MADE WROUGHT STEEL BUTTWELDING FITTINGS.
H. ASME B16.11 – FORGED STEEL FITTINGS, SOCKET WELDED & THREADED.
I. ASME B16.18 – CAST COPPER ALLOY SOLDER JOINT PRESSURE FITTINGS.
J. ASME B16.22 – WROUGHT COPPER AND SOLDER PRESSURE FITTINGS.
K. ASME B16.25 – BUTTWELDING ENDS.
L. ASME B31.9 – BUILDING SERVICES PIPING.
M. ASME B36.10 – WELDED AND SEAMLESS WROUGHT STEEL PIPE.
N. ASTM A47 – MALLEABLE IRON CASTINGS.
O. ASTM A53 – PIPE, STEEL, BLACK AND ZINC-COATED, WELDED, SEAMLESS.
P. ASTM A74 – CAST IRON SOIL PIPE AND FITTINGS.
Q. ASTM A90 – WEIGHT OF COATING ON GALVANIZED STEEL ARTICLES.
R. ASTM A135 – ELECTRIC-RESISTANCE-WELDED STEEL PIPE.
S. ASTM A234 – PIPING FITTINGS OF WROUGHT CARBON STEEL AND ALLOY...
T. ASTM A527 – STEEL SHEET, HOT-DIP GALVANIZED, LOCK-FORMING.
U. ASTM A653 – STEEL SHEET, ZINC-COATED (GALVANIZED) OR ZINC-IRON...
V. ASTM A795 – BLACK AND GALVANIZED WELDED AND SEAMLESS PIPE...
W. ASTM B32 – SOLDER METAL.
X. ASTM B88 – SEAMLESS COPPER WATER TUBE.
Y. ASTM C534 – PERFORMED FLEXIBLE ELASTOMERIC CELLULAR THERMAL...
Z. ASTM C552 – CELLULAR GLASS BLOCK AND PIPE THERMAL INSULATION.
AA. ASTM C553 – STANDARD SPECIFICATION FOR MINERAL FIBER BLANKET...
BB. ASTM C564 – RUBBER GASKETS FOR CAST IRON SOIL PIPE.
CC. ASTM C612 – MINERAL FIBER BLOCK AND BOARD THERMAL INSULATION.
DD. ASTM C921 – PROPERTIES OF JACKETING MATERIALS FOR THERMAL...
EE. ASTM D2564 – SOLVENT CEMENTS FOR PVC PLASTIC PIPE AND FITTINGS.
FF. ASTM D2665 – PVC PLASTIC DRAIN, WASTE, AND VENT PIPE AND FITTINGS.
GG. ASTM D2855 – MAKING SOLVENT-CEMENTED JOINTS WITH PVC PIPE...
HH. NAIMA – NATIONAL INSULATION STANDARDS.
II. NFPA 13 – INSTALLATION OF SPRINKLER SYSTEMS.
JJ. NFPA 90 – INSTALLATION OF AIR-CONDITIONING AND VENTILATING SYSTEMS.
KK. SMACNA – HVAC DUCT CONSTRUCTION STANDARDS.

PART 2 PRODUCTS

2.01 PIPE HANGERS AND SUPPORTS
A. HANGERS FOR PIPE SIZES 1/2 INCH TO 1-1/2 INCH: MALLEABLE IRON OR CARBON STEEL, ADJUSTABLE, SWIVEL SPLIT RING.
B. HANGERS FOR PIPE SIZES 2 INCH & OVER: CARBON STEEL, ADJUSTABLE CLEVIS.
C. COPPER PIPE SUPPORTS SHALL BE COPPER PLATED.
D. FIRE PROTECTION PIPING SUPPORTED PER NFPA 13.
E. PLUMBING PIPING SUPPORTED PER ASME B31.9.

2.02 SLEEVES
A. SLEEVES FOR PIPES THROUGH NON RATED WALLS: STEEL PIPE OR 18 GAGE GALVANIZED STEEL.
B. SLEEVES FOR PIPES THROUGH RATED WALLS: PREFABRICATED FIRE RATED SLEEVES INCLUDING SEALS, UL LISTED.
C. SLEEVES FOR ROUND DUCTWORK: GALVANIZED STEEL.
D. SLEEVES FOR RECTANGULAR DUCTWORK: GALVANIZED STEEL OR WOOD.
E. FIRE STOPPING INSULATION: GLASS FIBER TYPE, NON-COMBUSTIBLE.

2.03 PIPING INSULATION
A. A. WATER AND CONDENSATE PIPING: 1/2" CELLULAR FOAM, ASTM C534, FLEXIBLE, CELLULAR, ELASTOMERIC, MOLDED SHEET, JOINTS SEALED WITH WATERPROOF ADHESIVE.

2.04 DUCTWORK INSULATION
A. RETURN DUCTS SHALL BE LINED WITH 1" RIGID GLASS FIBER, ASTM C612, NONCOMBUSTIBLE BOARD WITH POLYVINYL ACETATE POLYMER IMPREGNATED SURFACE AND EDGE COAT. ADHESIVE AND FASTENERS SHALL BE INSTALLED ACCORDING TO NAIMA STANDARDS.
B. SUPPLY DUCTS SHALL BE EXTERNALLY WRAPPED WITH 2" FLEXIBLE GLASS FIBER, ASTM C553, NONCOMBUSTIBLE BLANKET. VAPOR BARRIER JACKET SHALL BE KRAFT PAPER, WITH GLASS FIBER YARN, BONDED TO ALUMINIZED FILM. FASTEN AND TAPE ACCORDING TO NAIMA STANDARDS.

2.05 FIRE PROTECTION PIPING
A. BLACK STEEL PIPE, ASTM A53, ASTM A795, ASTM A135, ANSI B36.10M, SCHEDULE 10 OR 40, GALVANIZED REQUIRED FOR DRY PIPE SYSTEMS.
B. STEEL FITTINGS: ASME B16.9, WROUGHT STEEL, BUTT WELDED; ASME B16.25, BATTLED ENDS; ASTM A234, WROUGHT CARBON STEEL AND ALLOY STEEL; ASME B16.5, STEEL FLANGES AND FITTINGS; ASTM B16.11, FORGED STEEL SOCKET WELDED AND THREADED.
C. CAST IRON FITTINGS: ASME B16.1, FLANGES AND FITTINGS, ASME B16.4, SCREWED FITTINGS.
D. MALLEABLE IRON FITTINGS: ASME B16.3, SCREWED TYPE, ASTM A47.
E. MECHANICAL GROOVED COUPLINGS: MALLEABLE IRON HOUSING CLAMPS TO ENGAGE AND LOCK, "C" SHAPED COMPOSITION SEALING GASKET, STEEL BOLTS, NUTS, AND WASHERS; VICTAULIC FLUSH SEAL GASKET REQUIRED FOR DRY PIPE SYSTEMS.
F. FITTING TYPE TO MATCH PIPE
G. EMPLOY LANDLORD'S APPROVED CONTRACTOR FOR ALL SPRINKLER WORK ANDSUBMIT PLANS TO LANDLORD'S INSURER FOR APPROVAL.

2.06 SPRINKLER HEADS
A. RECESSED PENDANT SPRINKLER, UL 199 FOR FINISHED CEILING AREAS. 1/2 OR 3/4 INCH NPT, CHROME HEAD FINISH, TWO-PIECE CHROME ESCUTCHEON FUSIBLE SOLDER OR GLASS BULB FUSIBLE LINK, RATED 165°F, 5.3 – 5.8 K FACTOR.
B. STANDARD SPRINKLER, UL 199 FOR EXPOSED AREAS, SAME AS RECESSED HEAD WITHOUT ESCUTCHEON, BRASS HEAD FINISH, RATED 212°F.
C. SIDEWALL SPRINKLER FOR LIGHTWELLS, SAME AS RECESSED, RATED 212° F.
D. HIGH TEMPERATE RATED SPRINKLER HEAD NEAR OVEN
E. PROVIDE A NON-FREEZE SYSTEM (DRY PIPE) IN ANY AREA SUBJECT TO FREEZING.

2.07 DOMESTIC WATER PIPING
A. COPPER TUBING, ASTM B88, TYPE L, HARD DRAWN.
B. FITTINGS: ASME B16.18, CAST COPPER ALLOY OR ASME B16.22, WROUGHT COPPER AND BRONZE.
C. JOINTS: ASTM B32, SOLDER, GRADE 95TA.

2.08 SANITARY SEWER AND VENT PIPING
A. CAST IRON PIPE: ASTM A74, SERVICE WEIGHT. FITTINGS: CAST IRON. JOINTS: ASTM C564, NEOPRENE GASKET SYSTEM OR LEAD AND OAKUM.
B. PVC PIPE: ASTM D2665. PVC FITTINGS. JOINTS: ASTM D2855, SOLVENT WELD WITH ASTM D2564 SOLVENT CEMENT. USE ONLY WHERE ALLOWED BY AUTHORITY HAVING JURISDICTION. DO NOT INSTALL PVC PIPING ABOVE GRADE.

2.09 CONDENSATE DRAIN PIPING
A. COPPER TUBING, ASTM B88, TYPE L, HARD DRAWN.
B. FITTINGS: ASME B16.18, CAST COPPER ALLOY OR ASME B16.22, WROUGHT COPPER AND BRONZE.
C. JOINTS: ASTM B32, SOLDER, GRADE 95TA.

2.10 DUCTWORK
A. ALL DUCTWORK SHALL BE FABRICATED, INSTALLED, AND SEALED IN ACCORDANCE WITH SMACNA HVAC DUCT CONSTRUCTION STANDARDS. DUCT SIZES ARE INSIDE CLEAR DIMENSIONS, OUTSIDE DIMENSION SHALL BE ADJUSTED FOR DUCT LINER.
B. INCREASE DUCT SIZES GRADUALLY, NOT EXCEEDING 30 DEGREES DIVERGENCE. PROVIDE 45 DEGREE LATERAL WYE TAKEOFFS UNLESS OTHERWISE INDICATED. PROVIDE TURNING VANES IN RECTANGULAR ELBOWS.
C. GALVANIZED STEEL DUCTS SHALL BE ASTM A525 AND ASTM A527 GALVANIZED STEEL SHEET, LOCK-FORMING QUALITY, HAVING G60 ZINC COATING IN CONFORMANCE WITH ASTM A90.
D. ROUND DUCT MATERIAL THICKNESS: 28 GAGE UP TO 8 INCHES, 26 GAGE FOR 9 INCHES TO 14 INCHES DIAMETER.
E. RECTANGULAR DUCT MATERIAL THICKNESS: 26 GAGE UP TO 12 INCHES, 24 GAGE FOR 13 INCHES TO 30 INCHES.
F. HANGER SUPPORTS FOR RECTANGULAR SHEET METAL DUCTWORK SHALL BE TRAPEZE HANGER SUPPORTS ACCORDING TO SMACNA STANDARDS.

2.11 FLEXIBLE DUCTWORK
A. TWO PLY ALUMINIZED FOIL FILM SUPPORTED BY HELICALLY WOUND SPRING STEEL WIRE, FIBERGLASS INSULATION, VAPOR BARRIER FILM, PRESSURE RATING: 10 INCHES W.G. POSITIVE AT 1.0 INCHES W.G. NEGATIVE.

2.12 AIR DEVICES
A. REGISTERS, GRILLES AND DIFFUSERS SHALL BE PROVIDED IN SIZES SHOWN ON DRAWINGS. PROVIDE DAMPERS AND OTHER INDICATED ACCESSORIES. AIR DEVICES SHALL BE SPECIFIED MANUFACTURER AND MODEL.
B. ALL AIR DEVICES SHALL BE INSTALLED IN ACCORDANCE WITH MANUFACTURER'S SPECIFICATIONS. INSTALL WITH AN AIRTIGHT CONNECTION TO DUCTWORK. INSTALL PLUMB, LEVEL AND PARALLEL WITH BUILDING WALLS. ADJUST POSITION IF NECESSARY TO CONFORM WITH ARCHITECTURAL FEATURES, SYMMETRY OR LIGHTING ARRANGEMENT.

2.13 DUCTWORK ACCESSORIES
A. PROVIDE FLEXIBLE DUCT CONNECTIONS AT DUCT CONNECTIONS TO EACH FAN OR AIR HANDLER. CONNECTOR SHALL BE UL LISTED FIRE RETARDANT NEOPRENE COATED WOVEN GLASS FIBER TO NFPA 90A. CONNECTOR WIDTH SHALL BE 3" WITH DUCT SUPPORTED TO ACHIEVE 1" OF SLACK.
B. VOLUME CONTROL DAMPERS FABRICATED PER SMACNA STANDARDS

2.14 DUCTWORK INSULATION
A. GLASS FIBER, FLEXIBLE
1. MANUFACTURER: OWENS-CORNING. MODEL TYPE IV.
2. OTHER ACCEPTABLE MANUFACTURERS OFFERING EQUIVALENT PRODUCTS:
A. KNAUF.
B. MANVILLE
3. INSULATION: ASTM C553; FLEXIBLE, NONCOMBUSTIBLE BLANKET.
A. 'K' VALUE: ASTM C518, 0.31 AT 75 DEGREES F.
B. MAXIMUM SERVICE TEMPERATURE: 250 DEGREES F.
C. MAXIMUM MOISTURE ABSORPTION: 0.20 PERCENT BY VOLUME.
4. VAPOR BARRIER JACKET:
A. KRAFT PAPER WITH GLASS FIBER YARN AND BONDED TO ALUMINIZED FILM.
B. MOISTURE VAPOR TRANSMISSION: ASTM E96; 0.02 PERM.
C. SECURE WITH PRESSURE SENSITIVE TAPE.
5. VAPOR BARRIER TAPE: KRAFT PAPER REINFORCED WITH GLASS FIBER YARN AND BONDED TO ALUMINIZED FILM, WITH PRESSURE SENSITIVE RUBBER BASED ADHESIVE.
B. JACKETS
1. CANVAS JACKET: UL LISTED. FABRIC: ASTM C921, 6 OZ/SQ YD, PLAIN WEAVE COTTON TREATED WITH DILUTE FIRE RETARDANT LAGGING ADHESIVE.
C. GLASS FIBER DUCT LINER, FLEXIBLE
1. INSULATION: ASTM C1071; FLEXIBLE, NONCOMBUSTIBLE BLANKET WITH FIRE RESISTANT, POLYVINYL ACETATE POLYMER IMPREGNATED SURFACE AND EDGE COAT. ALL LINERS SHALL BE COATED WITH AN ANTIMICROBIAL AGENT.
A. 'K' VALUE: ASTM C1071, 0.31 AT 75 DEGREES F.
D. MAXIMUM SERVICE TEMPERATURE: 250 DEGREES F.
C. MAXIMUM VELOCITY ON COATED AIR SIDE: 5,000 FPM.
D. MINIMUM NOISE REDUCTION CRITERIA: ASTM C1071, 2 INCH THICKNESS.
2. ADHESIVE: WATERPROOF, ASTM E162 FIRE-RETARDANT TYPE.
3. LINER FASTENERS: GALVANIZED STEEL, SELF-ADHESIVE PAD IMPACT APPLIED WITH INTEGRAL HEAD.
E. INSULATION RATINGS
1. FLAME SPREAD SHALL BE 25 OR LESS IN ACCORDANCE WITH ASTM E84.
2. SMOKE DEVELOPED SHALL BE 50 OR LESS IN ACCORDANCE WITH ASTM E84.

2.15 CONTROLS
A. GUARANTEE: THE CONTROLS SHALL BE FREE OF DEFECTS IN WORKMANSHIP AND MATERIAL UNDER NORMAL USE AND SERVICE, AND SHALL BE REPLACED AT NO ADDITIONAL COST TO OWNER FOR A PERIOD OF 12 MONTHS AFTER FINAL ACCEPTANCE.
B. SERVICE: CONTRACTOR SHALL PROVIDE ANY SERVICE INCIDENTAL TO PROPER PERFORMANCE OF THE CONTROLS FOR A PERIOD OF ONE YEAR.
C. THE CONTRACTOR SHALL PLACE CONTROLS IN OPERATING CONDITION SUBJECT TO THE APPROVAL OF THE OWNER.
D. THERMOSTATS, REFER TO DRAWINGS FOR MANUFACTURER AND MODEL.
E. INSTALL IN ACCORDANCE WITH REQUIREMENTS OF AUTHORITY HAVING JURISDICTION AND HEATING/COOLING UNIT MANUFACTURER RECOMMENDATIONS.

2.16 FLASHING
A. ARCHITECTURAL SPECIFICATIONS SUPERCEDE THIS SECTION.
B. FLASH VENT PIPES PROJECTING 3 INCHES MINIMUM ABOVE FINISHED ROOF SURFACE WITH 5 POUND PER SQUARE FOOT LEAD FLASHING WORKED ONE INCH MINIMUM INTO HUB, 8 INCHES MINIMUM CLEAR ON SIDES WITH 24x24 INCH SHEET SIZE.
C. FLASH EQUIPMENT CURBS WITH 26 GAGE GALVANIZED STEEL, COUNTERFLASH WITH 22 GAGE GALVANIZED STEEL, SEAL WATERTIGHT. ATTACH COUNTERFLASHING TO MECHANICAL EQUIPMENT AND LAP BASE FLASHING ON ROOF CURBS, FLATTEN AND SOLDER JOINTS.

2.17 EQUIPMENT CURBS
A. ARCHITECTURAL SPECIFICATIONS SUPERCEDE THIS SECTION.
B. WELDED 18 GAGE GALVANIZED STEEL SHELL AND BASE, MITERED 3 INCH CANT, VARIABLE SLOPE TO MATCH ROOF, MINIMUM HEIGHT 14 INCHES, 1-1/2 INCH THICK INSULATION, FACTORY INSTALLED WOOD NAILER (NAILER IF REQUIRED FOR ROOFING MATERIAL).
C. DIMENSIONS PER EQUIPMENT MANUFACTURER.

2.18 NATURAL GAS PIPING
A. IN ACCORDANCE WITH NFPA 54 AND LOCAL REQUIREMENTS.
B. STEEL PIPE: ASTM A53, SCHEDULE 40 BLACK. FITTINGS: MALLEABLE IRON.
C. JOINTS: NFPA 54, THREADED.

2.19 FLOOR DRAINS
A. ANSI A112.21.1, REFER TO DRAWINGS.

2.20 PLUMBING FIXTURES
A. WATER CLOSETS/URINALS: ADA, ASME 112.19.2 & 112.19.5, REFER TO DRAWINGS.
B. LAVATORIES: ADA, ASME 112.6.1, REFER TO DRAWINGS.
C. VERIFY THAT WALLS AND FLOOR FINISHES ARE PREPARED AND READY FOR INSTALLATION OF FIXTURES.
D. INSTALL EACH FIXTURE WITH TRAP, EASILY REMOVABLE FOR SERVICING AND CLEANING.
E. PROVIDE CHROME PLATED RIGID OR FLEXIBLE SUPPLIES TO FIXTURES WITH WHEEL STOPS, REDUCERS, AND ESCUTCHEONS.
F. INSTALL COMPONENTS LEVEL AND PLUMB.
G. INSTALL AND SECURE FIXTURES IN PLACE WITH WALL SUPPORTS AND BOLTS.
H. SEAL FIXTURES TO WALL AND FLOOR SURFACES WITH SEALANT AS SPECIFIED IN DIVISION 7, COLOR TO MATCH FIXTURE.
I. SOLIDLY ATTACH WATER CLOSETS TO FLOOR WITH LAG SCREWS. LEAD FLASHING IS NOT INTENDED TO HOLD FIXTURE IN PLACE.
J. CLEAN PLUMBING FIXTURES AND EQUIPMENT.

2.21 HEAT PUMP UNITS
A. MANUFACTURER/MODEL: REFER TO DRAWINGS.
B. UNITS SHALL BE U.L. LISTED AND A.G.A. APPROVED.
C. PERFORMANCE: ARI 210 AS STATED ON DRAWINGS.
D. UNITS ABOVE 5-TONS SHALL BE TWO-STAGE HEATING AND TWO-STAGE COOLING.
E. UNITS SHALL BE COMPATIBLE WITH THERMOSTAT.
F. UNITS SHALL BE EQUIPPED TO SHUT DOWN UPON SENSING OF SMOKE BY UNIT MOUNTED SMOKE DETECTOR.
G. UNITS SHALL BE EQUIPPED WITH CRANKCASE HEATERS.
H. UNITS SHALL MEET ARI 270 SOUND PERFORMANCE AS STATED IN MANUFACTURER PRODUCT DATA.
K. ECONOMIZER DAMPER AND CONTROLS: UNITS SCHEDULES ON THE DRAWINGS AS EQUIPPED WITH ECONOMIZERS SHALL BE EQUIPPED AS FOLLOWS:
1. FACTORY-INSTALLED, FULLY MODULATING ECONOMIZER DAMPER WITH PRESSURE RELIEF DAMPER.
2. FACTORY-INSTALLED DIFFERENTIAL ENTHALPY CONTROLS.
3. CAPABLE OF CLOSING OUTSIDE AIR INTAKES DURING UNOCCUPIED HOURS.
M. PIPING MATERIALS
1. COPPER TUBE AND FITTINGS
A. DRAWN-TEMPER COPPER TUBING: ASTM B 88, TYPE L.
B. ANNEALED-TEMPER COPPER TUBING: ASTM B 88, TYPE K.

2.22 CENTRIFUGAL EXHAUST FANS
A. MANUFACTURER/MODEL: REFER TO DRAWINGS.
B. OTHER ACCEPTABLE MANUFACTURES OFFERING EQUIVALENT PRODUCTS:
1. ACME.
2. GREENHECK.
3. PENN.
C. PERFORMANCE; REFER TO DRAWINGS.
D. PERFORMANCE RATING: CONFORM TO AMCA 21D.
E. SOUND RATING: AMCA 301, TESTED TO AMCA 300.
F. FABRICATION: CONFORM TO AMCA 99.
G. ACCESSORIES: REFER TO DRAWINGS.

PART 3 INSTALLATION

3.01 TESTING, ADJUSTING AND BALANCING:
A. TESTING AND BALANCING SHALL BE PERFORMED BY AN INDEPENDENT, AABC OR NEBB CERTIFIED AIR BALANCE CONTRACTOR.
B. PROVIDE INSTRUMENTS REQUIRED FOR TESTING, ADJUSTING, AND BALANCING OPERATIONS. ALL INSTRUMENTS SHALL BE RECENTLY TESTED AND CALIBRATED.
C. VERIFY THAT SYSTEMS ARE COMPLETE AND OPERABLE BEFORE COMMENCING WORK.
D. ADJUST AIR HANDLING AND DISTRIBUTION SYSTEMS TO PROVIDE REQUIRED OR DESIGN SUPPLY AND RETURN AIR QUANTITIES.
E. SUBMIT FIELD REPORTS: REPORT DEFECTS AND DEFICIENCIES NOTED DURING PERFORMANCE OF SERVICES WHICH PREVENT SYSTEM BALANCE.
F. SUBMIT DRAFT COPIES OF REPORT TO THE BUILDING MANAGEMENT FOR REVIEW AND APPROVAL PRIOR TO FINAL ACCEPTANCE OF PROJECT. PROVIDE FINAL COPIES FOR ARCHITECT/ENGINEER AND FOR INCLUSION IN OPERATING AND MAINTENANCE MANUALS. PROVIDE 2 COPIES OF FINAL CERTIFIED REPORT TO BUILDING OWNER.

3.02 GUARANTEE:
A. THE CONTRACTOR SHALL PROVIDE SPECIFIED EQUIPMENT WARRANTIES AND GENERAL WARRANTY AS STATED IN ARCHITECTURAL SECTIONS. THE CONTRACTOR SHALL REPLACE OR REPAIR AT NO COST ALL DEFECTIVE MATERIAL AND WORKMANSHIP DURING THE WARRANTY PERIOD.

3.03 INSTRUCTIONS:
A. THE CONTRACTOR SHALL INSTRUCT THE OWNER AND PROVIDE MANUALS FOR PROPER OPERATION AND MAINTENANCE OF THE EQUIPMENT. PROVIDE INITIAL 3 MONTH SUPPLY OF FILTERS OR OTHER COMPONENTS REPLACED DURING REGULAR MAINTENANCE.

3.04 GENERAL INSTALLATION:
A. ROUTE PIPING AND DUCTWORK IN ORDERLY MANNER AND MAINTAIN GRADIENT. ROUTE PARALLEL AND PERPENDICULAR TO WALLS. INSTALL TO MAINTAIN HEAD ROOM, GROUP WHENEVER PRACTICAL AT COMMON ELEVATIONS.
B. PROVIDE CLEARANCES FROM STRUCTURE AND OTHER EQUIPMENT FOR INSTALLATION OF INSULATION, EQUIPMENT CLEARANCES AND ACCESS TO VALVES AND DAMPERS.
C. PROVIDE ACCESS PANELS FOR VALVES AND DAMPERS THAT ARE ENCLOSED IN WALLS OR CEILINGS.
D. PROVIDE DIELECTRIC UNIONS WHEN JOINING DISSIMILAR METALS.

PART 4 VIBRATION ISOLATORS

A. OPEN SPRING ISOLATORS:
1. SPRING ISOLATORS:
A. FOR EXTERIOR AND HUMID AREAS: PROVIDE HOT DIPPED GALVANIZED HOUSINGS AND NEOPRENE COATED SPRINGS.
B. CODE: COLOR CODE SPRINGS FOR LOAD CARRYING CAPACITY.
1. SPRINGS: MINIMUM HORIZONTAL STIFFNESS EQUAL TO 75 PERCENT VERTICAL STIFFNESS, WITH WORKING DEFLECTION BETWEEN 0.3 AND 0.6 OF MAXIMUM DEFLECTION.
2. SPRING MOUNTS: PROVIDE WITH LEVELLING DEVICES, MINIMUM 0.25 INCH THICK NEOPRENE SOUND PADS, AND ZINC CHROMATE PLATED HARDWARE.
3. SOUND PADS: SIZE FOR MINIMUM DEFLECTION OF 0.05 INCH; MEET REQUIREMENTS FOR NEOPRENE PAD ISOLATORS.
C. RESTRAINED SPRING ISOLATORS:
1. SPRING ISOLATORS:
A. FOR EXTERIOR AND HUMID AREAS: PROVIDE HOT DIPPED GALVANIZED HOUSINGS AND NEOPRENE COATED SPRINGS.
B. CODE: COLOR CODE SPRINGS FOR LOAD CARRYING CAPACITY.
2. SPRINGS: MINIMUM HORIZONTAL STIFFNESS EQUAL TO 75 PERCENT VERTICAL STIFFNESS, WITH WORKING DEFLECTION BETWEEN 0.3 AND 0.6 OF MAXIMUM DEFLECTION.
3. SPRING MOUNTS: PROVIDE WITH LEVELLING DEVICES, MINIMUM 0.25 INCH THICK NEOPRENE SOUND PADS, AND ZINC CHROMATE PLATED HARDWARE.
4. SOUND PADS: SIZE FOR MINIMUM DEFLECTION OF 0.05 INCH; MEET REQUIREMENTS FOR NEOPRENE PAD ISOLATORS.
5. RESTRAINT: PROVIDE HEAVY MOUNTING FRAME AND LIMIT STOPS.
D. CLOSED SPRING ISOLATORS:
1. SPRING ISOLATORS:
A. FOR EXTERIOR AND HUMID AREAS: PROVIDE HOT DIPPED GALVANIZED HOUSINGS AND NEOPRENE COATED SPRINGS.
B. CODE: COLOR CODE SPRINGS FOR LOAD CARRYING CAPACITY.
2. TYPE: CLOSED SPRING MOUNT WITH TOP AND BOTTOM HOUSING SEPARATED WITH NEOPRENE RUBBER STABILIZERS.
3. SPRINGS: MINIMUM HORIZONTAL STIFFNESS EQUAL TO 75 PERCENT VERTICAL STIFFNESS, WITH WORKING DEFLECTION BETWEEN 0.3 AND 0.6 OF MAXIMUM DEFLECTION.
4. HOUSINGS: INCORPORATE NEOPRENE ISOLATION PAD MEETING REQUIREMENTS FOR NEOPRENE PAD ISOLATORS, AND NEOPRENE SIDE STABILIZERS WITH MINIMUM 0.25 INCH CLEARANCE.
E. RESTRAINED CLOSED SPRING ISOLATORS:
1. SPRING ISOLATORS:
A. FOR EXTERIOR AND HUMID AREAS: PROVIDE HOT DIPPED GALVANIZED HOUSINGS AND NEOPRENE COATED SPRINGS.
B. CODE: COLOR CODE SPRINGS FOR LOAD CARRYING CAPACITY.
2. TYPE: CLOSED SPRING MOUNT WITH TOP AND BOTTOM HOUSING SEPARATED WITH NEOPRENE RUBBER STABILIZERS.
3. SPRINGS: MINIMUM HORIZONTAL STIFFNESS EQUAL TO 75 PERCENT VERTICAL STIFFNESS, WITH WORKING DEFLECTION BETWEEN 0.3 AND 0.6 OF MAXIMUM DEFLECTION.
4. HOUSINGS: INCORPORATE NEOPRENE ISOLATION PAD MEETING REQUIREMENTS FOR NEOPRENE PAD ISOLATORS, AND NEOPRENE SIDE STABILIZERS WITH MINIMUM 0.25 INCH CLEARANCE AND LIMIT STOPS.
F. SPRING HANGER:
1. SPRING ISOLATORS:
A. FOR EXTERIOR AND HUMID AREAS: PROVIDE HOT DIPPED GALVANIZED HOUSINGS AND NEOPRENE COATED SPRINGS.
B. CODE: COLOR CODE SPRINGS FOR LOAD CARRYING CAPACITY.
2. SPRINGS: MINIMUM HORIZONTAL STIFFNESS EQUAL TO 75 PERCENT VERTICAL STIFFNESS, WITH WORKING DEFLECTION BETWEEN 0.3 AND 0.6 OF MAXIMUM DEFLECTION.
3. HOUSINGS: INCORPORATE [NEOPRENE ISOLATION PAD MEETING REQUIREMENTS FOR NEOPRENE PAD ISOLATORS].
4. MISALIGNMENT: CAPABLE OF 20 DEGREE HANGER ROD MISALIGNMENT.
G. NEOPRENE PAD ISOLATORS:
1. RUBBER OR NEOPRENE WAFFLE PADS.
A. 30 DUROMETER.
B. MINIMUM 1/2 INCH THICK.
C. MAXIMUM LOADING 40 PSI.
D. HEIGHT OF RIBS SHALL NOT EXCEED 0.7 TIMES WIDTH.
2. CONFIGURATION: SINGLE LAYER.1/2 INCH THICK WAFFLE PADS BONDED EACH SIDE OF 1/4 INCH THICK STEEL PLATE.
H. RUBBER MOUNT OR HANGER: MOLDED RUBBER DESIGNED FOR 0.5 INCHES (13 MM) DEFLECTION WITH THREADED INSERT.
I. GLASS FIBER PADS: NEOPRENE JACKETED PRE-COMPRESSED MOLDED GLASS FIBER.
I. SEISMIC SNUBBERS:
1. TYPE: NON-DIRECTIONAL AND DOUBLE ACTING UNIT CONSISTING OF INTERLOCKING STEEL MEMBERS RESTRAINED BY NEOPRENE ELEMENTS.
2. NEOPRENE ELEMENTS: REPLACEABLE, MINIMUM OF 0.75 INCH THICK.
3. CAPACITY: 4 TIMES LOAD ASSIGNED TO MOUNT GROUPINGS AT 0.4 INCH DEFLECTION.
4. ATTACHMENT POINTS AND FASTENERS: CAPABLE OF WITHSTANDING 3 TIMES RATED LOAD CAPACITY OF SEISMIC SNUBBER.

4.01 VIBRATION ISOLATOR INSTALLATION

A. INSTALL IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS.
B. INSTALL ISOLATION FOR MOTOR DRIVEN EQUIPMENT.
C. BASES:
1. SET STEEL BASES FOR 1 INCH CLEARANCE BETWEEN HOUSEKEEPING PAD AND BASE.
2. SET CONCRETE INERTIA BASES FOR 2 INCH CLEARANCE BETWEEN HOUSEKEEPING PAD AND BASE.
3. ADJUST EQUIPMENT LEVEL.
D. INSTALL SPRING HANGERS WITHOUT BINDING.
E. ON CLOSED SPRING ISOLATORS, ADJUST SO SIDE STABILIZERS ARE CLEAR UNDER NORMAL OPERATING CONDITIONS.
F. PRIOR TO MAKING PIPING CONNECTIONS TO EQUIPMENT WITH OPERATING WEIGHTS SUBSTANTIALLY DIFFERENT FROM INSTALLED WEIGHTS, BLOCK UP EQUIPMENT WITH TEMPORARY SHIMS TO FINAL HEIGHT. WHEN FULL LOAD IS APPLIED, ADJUST ISOLATORS TO LOAD TO ALLOW SHIM REMOVAL.
G. PROVIDE PAIRS OF HORIZONTAL LIMIT SPRINGS ON FANS WITH MORE THAN 6.0 INCH STATIC PRESSURE, AND ON HANGER SUPPORTED, HORIZONTALLY MOUNTED AXIAL FANS.
H. SUPPORT PIPING CONNECTIONS TO ISOLATED EQUIPMENT RESILIENTLY TO NEAREST FLEXIBLE PIPE CONNECTOR.AS FOLLOWS:
1. UP TO 4 INCH DIAMETER: FIRST THREE POINTS OF SUPPORT.
2. 5 TO 8 INCH DIAMETER: FIRST FOUR POINTS OF SUPPORT.
3. 10 INCH DIAMETER AND OVER: FIRST SIX POINTS OF SUPPORT.
4. SELECT THREE HANGERS CLOSEST TO VIBRATION SOURCE FOR MINIMUM 1.0 INCH STATIC DEFLECTION OR STATIC DEFLECTION OF ISOLATED EQUIPMENT. SELECT REMAINING ISOLATORS FOR MINIMUM 1.0 INCH STATIC DEFLECTION OR 1/2 STATIC DEFLECTION OF ISOLATED EQUIPMENT.
I. CONNECT WIRING TO ISOLATED EQUIPMENT WITH FLEXIBLE HANGING LOOP.

END OF DIVISION 15 SPECIFICATIONS.

12-29-10
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