

GENERAL MEP NOTES

COORDINATION

EACH CONTRACTOR SHALL COORDINATE ITS CONSTRUCTION OPERATIONS WITH THOSE OF OTHER CONTRACTORS AND ENTITIES TO ENSURE EFFICIENT AND ORDERLY INSTALLATION OF EACH PART OF THE WORK. EACH CONTRACTOR SHALL COORDINATE ITS OPERATIONS WITH OPERATIONS, INCLUDING IN DIFFERENT SECTIONS, THAT DEPEND ON EACH OTHER FOR PROPER INSTALLATION, CONNECTION, AND OPERATION.

1. SCHEDULE CONSTRUCTION OPERATIONS IN SEQUENCE REQUIRED TO OBTAIN THE BEST RESULTS WHERE INSTALLATION OF ONE PART OF THE WORK DEPENDS ON INSTALLATION OF OTHER COMPONENTS, BEFORE OR AFTER ITS OWN INSTALLATION.

2. COORDINATE INSTALLATION OF DIFFERENT COMPONENTS WITH OTHER CONTRACTORS TO ENSURE MAXIMUM PERFORMANCE AND ACCESSIBILITY FOR REQUIRED MAINTENANCE, SERVICE, AND REPAIR.

3. MAKE ADEQUATE PROVISIONS TO ACCOMMODATE ITEMS SCHEDULED FOR LATER INSTALLATION.

4. VISIT THE SITE PRIOR TO SUBMITTING A BID TO VERIFY THE EXISTING CONDITIONS AND DESIGN CONSTRAINTS. FAILURE TO MEET THIS REQUIREMENT SHALL BE NO JUSTIFICATION FOR FAULTY INSTALLATION OR ADDITIONAL COSTS.

5. SECURE ALL PERMITS AND INSPECTIONS REQUIRED FOR WORK, AND PAY ALL FEES FOR REQUIRED WORK.

6. COMPLY WITH ALL CURRENT LAWS, BUILDING CODES AND REGULATIONS FEDERAL, STATE AND LOCAL AUTHORITIES HAVING JURISDICTION. IN THE EVENT OF CONFLICT BETWEEN THE CONTRACT DOCUMENTS AND THE LOCAL AUTHORITY HAVING JURISDICTION, THE LATTER SHALL RULE. ANY CHANGES REQUIRED SHALL BE MADE WITHOUT ADDITIONAL COST TO THE OWNER OR ARCHITECT/ENGINEER. THE CONTRACTOR SHALL REPORT ANY SUCH MODIFICATIONS TO THE ARCHITECT/ENGINEER AND SECURE HIS APPROVAL BEFORE PROCEEDING. SHOULD THE REQUIREMENTS OF THE CONTRACT DOCUMENTS EXCEED THE REQUIREMENTS OF THE CODES, THE CONTRACT DOCUMENTS SHALL GOVERN, PROVIDED THESE REQUIREMENTS ARE NOT IN CONFLICT WITH THOSE CODES. ALL ITEMS OF EQUIPMENT AND ALL MATERIALS FOR WHICH APPROVAL STANDARDS HAVE BEEN ESTABLISHED BY UNDERWRITERS' LABORATORIES, INC. (UL), FACTORY MUTUAL (FM), AMERICAN STANDARD CODES, ASME, AISA, AMCA, ASA, ANS, ASHRAE, AND ARI SHALL BE SO APPROVED AND SHALL BEAR APPROVAL LABELS.

7. PENETRATIONS OF WALLS AND FLOORS OF FIRE-RATED ASSEMBLIES SHALL COMPLY WITH ASTM, U.L., AND THE AUTHORITIES HAVING JURISDICTION.

8. IF THE DRAWINGS AND SPECIFICATIONS ARE IN CONFLICT THE GREATER AMOUNT OF WORK SHALL BE PRECED. BRING THE CONFLICT TO THE ATTENTION OF THE ENGINEER AND REQUEST DIRECTION.

9. DRAWINGS ARE DIAGRAMMATIC AND ARE NOT INTENDED TO SHOW ALL FITTINGS, COMPONENTS AND OFFSETS. ETC. THE CONTRACTOR SHALL PROVIDE ALL FITTINGS, COMPONENTS, OFFSETS OR OTHER FEATURES REQUIRED FOR THE FULL OPERATION, CONDITION OF WORK.

10. CONFIRM DIMENSIONS AND LOCATIONS IN THE FIELD. DRAWINGS ARE NOT TO BE SCALED AND ARE NOT INTENDED TO SHOW EXACT LOCATIONS BASED ON SCALING DIMENSIONS.

11. GUARANTEE LABOR AND MATERIALS OF ENTIRE INSTALLATION FOR ONE YEAR. WORK BELOW FLOOR OR OVER CORRIDORS SHALL BE PERFORMED AT THE OWNER'S CONVENIENCE AND MAY BE REQUIRED TO BE DONE DURING EVENINGS AND WEEKENDS. DEMOLITION DURING TO EXISTING MATERIALS/EQUIPMENT WILL BE REPAIRED AT NO ADDITIONAL COST TO OWNER. RE-SUPPORT ANY REMAINING PIPING OR DEVICES THAT WERE SUPPORTED BY WALLS BEING REMOVED.

12. ELECTRONIC COPIES OF CAD DRAWINGS OF THE CONTRACT DRAWINGS WILL NOT BE PROVIDED BY THE ENGINEER FOR CONTRACTOR'S USE IN PREPARING SUBMITTALS OR AS-BUILT DRAWINGS.

ACOUSTIC TREATMENT

A. IT IS THE INTENT OF THESE DRAWINGS TO SPECIFY AND FOR THE CONTRACTOR TO INSTALL SYSTEMS THAT ARE QUIET AND FREE OF VIBRATION. EQUIPMENT SHALL BE BALANCED AND VIBRATION ISOLATED TO MEET THE REQUIREMENTS SPECIFIED HEREIN FOR BOTH THE EQUIPMENT ITSELF AND CONDITIONS WITHIN OCCUPIED SPACES. THIS CONTRACTOR IS RESPONSIBLE FOR OBTAINING AND INSTALLING EQUIPMENT THAT IS QUIET IN OPERATION AS COMPARED TO OTHER AVAILABLE EQUIPMENT OF ITS SIZE, CAPACITY, AND TYPE.

B. EQUIPMENT NOT MEETING THESE REQUIREMENTS SHALL BE CORRECTED BY THE CONTRACTOR TO AN ACCEPTABLE LEVEL BUT WITHIN THE REQUIREMENTS OF THE SPECIFICATIONS AT NO COST TO THE OWNER, ARCHITECT OR ENGINEER.

C. AIR DISTRIBUTION EQUIPMENT SHALL BE SOUND TESTED AT THE DESIGN OPERATING CONDITIONS AND SHALL NOT EXCEED A MAXIMUM DISCHARGE NO. RATING OF 25 OR A RADIATED NC RATING OF 30 AT RATED CFM.

D. UNLESS NOTED OTHERWISE HEREIN OR ON THE DRAWINGS, THE NOISE LEVEL IN ALL OCCUPIED SPACES SHALL NOT EXCEED THE "LOWEST VALUE IN THE RANGE" OF THE NOISE CRITERIA CURVES PUBLISHED IN THE CURRENT FUNDAMENTALS EDITION OF THE ASHRAE GUIDE AND DATA BOOK. THE NOISE CRITERIA CURVES SHALL BE BASED ON ANSI STANDARD S3.1-1967 OCTAVE BANDS AND A SOUND PRESSURE LEVEL IN DECIBELS REFERENCED TO 0.002 MICROPASCALS. SOUND LEVELS IN OCCUPIED SPACES MUST MEET THE DESIGN CRITERIA WITH ALL CONSTRUCTION IN PLACE.

E. SHOULD A QUESTION ARISE REGARDING THE ACCEPTABLE LEVEL OF NOISE OR VIBRATION IN A PARTICULAR SPACE OR PIECE OF EQUIPMENT, THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING THE SERVICES OF AN APPROVED ACOUSTICAL CONSULTANT TO DETERMINE ACTUAL NOISE/VIBRATION CONDITIONS.

SUBMITTAL ADMINISTRATIVE REQUIREMENTS

A. ELECTRONIC COPIES OF CAD DRAWINGS OF THE CONTRACT DRAWINGS WILL NOT BE PROVIDED BY THE ENGINEER FOR CONTRACTOR'S USE IN PREPARING SUBMITTALS OR AS-BUILT DRAWINGS.

B. COORDINATE PREPARATION AND PROCESSING OF SUBMITTALS WITH PERFORMANCE OF CONSTRUCTION ACTIVITIES. COORDINATE EACH SUBMITTAL WITH FABRICATION, PURCHASING, TESTING, DELIVERY, OTHER SUBMITTALS, AND RELATED ACTIVITIES THAT REQUIRE SEQUENTIAL ACTIVITY. SUBMIT ALL ITEMS REQUIRED FOR EACH SPECIFICATION SECTION CONCURRENTLY.

C. ALLOW TIME FOR SUBMITTAL REVIEW, INCLUDING TIME FOR RESUBMITTALS, AS FOLLOWS: TIME FOR REVIEW SHALL COMMENCE ON ENGINEER'S RECEIPT OF SUBMITTAL. EXTENSION OF THE CONTRACT TIME WILL BE AUTHORIZED BECAUSE OF FAILURE TO TRANSMIT SUBMITTALS ENOUGH IN ADVANCE OF THE WORK TO PERMIT PROCESSING, INCLUDING RESUBMITTALS.

1. INITIAL REVIEW: ALLOW 7 DAYS FOR INITIAL REVIEW OF EACH SUBMITTAL EXCLUSIVE OF TRAVEL TIME. ALLOW ADDITIONAL TIME IF COORDINATION WITH SUBSEQUENT SUBMITTALS IS REQUIRED.

2. RESUBMITTAL REVIEW: ALLOW 7 DAYS FOR REVIEW OF EACH RESUBMITTAL EXCLUSIVE OF TRAVEL TIME.

3. PLACE A PERMANENT LABEL OR TITLE BLOCK ON EACH PAPER COPY SUBMITTAL ITEM FOR IDENTIFICATION. INDICATE NAME OF FIRM OR ENTITY THAT PREPARED EACH SUBMITTAL ON LABEL OR TITLE BLOCK.

4. INCLUDE THE FOLLOWING INFORMATION FOR PROCESSING AND RECORDING ACTION TAKEN:

- PROJECT NAME.
- DATE OF ARCHITECT.
- NAME OF ENGINEER.
- NAME OF CONTRACTOR.
- NAME OF SUBCONTRACTOR.
- NAME OF SUPPLIER.
- NAME OF MANUFACTURER.

F. CONTRACTOR'S REVIEW: REVIEW EACH SUBMITTAL AND CHECK FOR COORDINATION WITH OTHER WORK OF THE CONTRACT AND FOR COMPLIANCE WITH THE CONTRACT DOCUMENTS. NOTE CORRECTIONS AND FIELD DIMENSIONS. MARK WITH APPROVAL STAMP BEFORE SUBMITTING TO ARCHITECT/ENGINEER.

STAMP EACH SUBMITTAL WITH A UNIFORM, APPROVAL STAMP. PROVIDE A STATEMENT CERTIFYING THAT SUBMITTAL HAS BEEN REVIEWED, CHECKED, AND APPROVED FOR COMPLIANCE WITH THE CONTRACT DOCUMENTS AND THE PHYSICAL SPACE LIMITATIONS AT THE SITE. PROVIDE A STATEMENT CERTIFYING THAT SUBMITTAL HAS BEEN REVIEWED, CHECKED, AND APPROVED FOR COMPLIANCE WITH THE CONTRACT DOCUMENTS AND THE PHYSICAL SPACE LIMITATIONS AT THE SITE.

IF THE GENERAL CONTRACTOR IS DEFERRING THE ABOVE REQUIREMENTS TO THE SUBCONTRACTOR, THEN THE SUBCONTRACTOR MUST ALSO REVIEW, STAMP AND CERTIFY THE SUBMITTAL.

G. ENGINEER'S ACTION: ENGINEER WILL NOT REVIEW SUBMITTALS THAT DO NOT BEAR CONTRACTOR'S APPROVAL STAMP AND WILL RETURN THEM. ENGINEER WILL REVIEW EACH SUBMITTAL, NOTE CORRECTIONS OR MODIFICATIONS REQUIRED, AND RETURN IT. ENGINEER WILL PROVIDE SUBMITTAL WITH AN ACTION SHEET TO INDICATE ACTION.

MECHANICAL SPECIFICATIONS

SINGLE-WALL RECTANGULAR DUCTS AND FITTINGS

A. GENERAL FABRICATION REQUIREMENTS: COMPLY WITH SMOACNA'S HVAC DUCT CONSTRUCTION STANDARDS - METAL AND FLEXIBLE" BASED ON REQUIRED STATIC-PRESSURE CLASS UNLESS OTHERWISE INDICATED.

B. TRANSVERSE JOINTS: SELECT JOINT TYPES AND FABRICATE ACCORDING TO SMOACNA'S HVAC DUCT CONSTRUCTION STANDARDS - METAL AND FLEXIBLE," FIGURE 2-1, "RECTANGULAR DUCT/TRANSVERSE JOINTS," FOR STATIC-PRESSURE CLASS, APPLICABLE SEALING REQUIREMENTS, MATERIALS INVOLVED, DUCT-SUPPORT INTERVALS, AND OTHER PROVISIONS IN SMOACNA'S HVAC DUCT CONSTRUCTION STANDARDS - METAL AND FLEXIBLE."

C. LONGITUDINAL SEAMS: SELECT SEAM TYPES AND FABRICATE ACCORDING TO SMOACNA'S HVAC DUCT CONSTRUCTION STANDARDS - METAL AND FLEXIBLE," FIGURE 2-2, "RECTANGULAR DUCT/LONGITUDINAL SEAMS," FOR STATIC-PRESSURE CLASS, APPLICABLE SEALING REQUIREMENTS, MATERIALS INVOLVED, DUCT-SUPPORT INTERVALS, AND OTHER PROVISIONS IN SMOACNA'S HVAC DUCT CONSTRUCTION STANDARDS - METAL AND FLEXIBLE."

D. ELBOWS, TRANSITIONS, OFFSETS, BRANCH CONNECTIONS, AND OTHER DUCT CONSTRUCTION: SELECT TYPES AND FABRICATE ACCORDING TO SMOACNA'S HVAC DUCT CONSTRUCTION STANDARDS - METAL AND FLEXIBLE," CHAPTER 4, "FITTINGS AND OTHER CONSTRUCTION," FOR STATIC-PRESSURE CLASS, APPLICABLE SEALING REQUIREMENTS, MATERIALS INVOLVED, DUCT-SUPPORT INTERVALS, AND OTHER PROVISIONS IN SMOACNA'S HVAC DUCT CONSTRUCTION STANDARDS - METAL AND FLEXIBLE."

SINGLE-WALL ROUND AND FLAT-OVAL DUCTS AND FITTINGS

A. GENERAL FABRICATION REQUIREMENTS: COMPLY WITH SMOACNA'S HVAC DUCT CONSTRUCTION STANDARDS - METAL AND FLEXIBLE," CHAPTER 3, "ROUND, OVAL, AND FLEXIBLE DUCT," BASED ON INDICATED STATIC-PRESSURE CLASS UNLESS OTHERWISE INDICATED.

B. FLAT-OVAL DUCTS: INDICATED DIMENSIONS ARE THE DUCT WIDTH (MAJOR DIMENSION) AND DEPTH (MINOR DIMENSION) OF THE ROUND SIDES CONNECTING THE FLAT PORTIONS OF THE DUCT (MINOR DIMENSION).

C. TRANSVERSE JOINTS: SELECT JOINT TYPES AND FABRICATE ACCORDING TO SMOACNA'S HVAC DUCT CONSTRUCTION STANDARDS - METAL AND FLEXIBLE," FIGURE 3-1, "ROUND DUCT TRANSVERSE JOINTS," FOR STATIC-PRESSURE CLASS, APPLICABLE SEALING REQUIREMENTS, MATERIALS INVOLVED, DUCT-SUPPORT INTERVALS, AND OTHER PROVISIONS IN SMOACNA'S HVAC DUCT CONSTRUCTION STANDARDS - METAL AND FLEXIBLE."

D. LONGITUDINAL SEAMS: SELECT SEAM TYPES AND FABRICATE ACCORDING TO SMOACNA'S HVAC DUCT CONSTRUCTION STANDARDS - METAL AND FLEXIBLE," FIGURE 3-2, "ROUND DUCT LONGITUDINAL SEAMS," FOR STATIC-PRESSURE CLASS, APPLICABLE SEALING REQUIREMENTS, MATERIALS INVOLVED, DUCT-SUPPORT INTERVALS, AND OTHER PROVISIONS IN SMOACNA'S HVAC DUCT CONSTRUCTION STANDARDS - METAL AND FLEXIBLE."

E. TEES AND LATERALS: SELECT TYPES AND FABRICATE ACCORDING TO SMOACNA'S HVAC DUCT CONSTRUCTION STANDARDS - METAL AND FLEXIBLE," FIGURE 3-5, "90 DEGREE TEES AND LATERALS," AND FIGURE 3-6, "CONICAL TEES," FOR STATIC-PRESSURE CLASS, APPLICABLE SEALING REQUIREMENTS, MATERIALS INVOLVED, DUCT-SUPPORT INTERVALS, AND OTHER PROVISIONS IN SMOACNA'S HVAC DUCT CONSTRUCTION STANDARDS - METAL AND FLEXIBLE."

SHEET METAL DUCTWORK

A. GENERAL MATERIAL REQUIREMENTS: COMPLY WITH SMOACNA'S HVAC DUCT CONSTRUCTION STANDARDS - METAL AND FLEXIBLE" FOR ACCEPTABLE MATERIALS, MATERIAL THICKNESSES, AND DUCT CONSTRUCTION METHODS UNLESS OTHERWISE INDICATED. SHEET METAL MATERIALS SHALL BE FREE OF FITTING, SEAM MARKS, ROLLER MARKS, STAINS, DISCOLORATIONS, AND OTHER IMPERFECTIONS.

B. GALVANIZED SHEET STEEL: COMPLY WITH ASTM A 653/6 65M.

C. SUPPLY AND RETURN DUCTWORK SHALL BE EXTERNALLY INSULATED WITH EXTERNAL BLANKET INSULATION. DUCTWORK SHALL BE INTERNALLY LINED ONLY WHERE SPECIFICALLY INDICATED.

D. DUCTWORK SHALL BE SEALED AS REQUIRED BY THE AUTHORITIES HAVING JURISDICTION AND AS REQUIRED TO LIMIT LEAKAGE. LEAKAGE IN EXCESS OF 5% SHALL NOT BE ACCEPTABLE.

E. DUCT DIMENSIONS ARE INSIDE CLEAR DIMENSIONS.

F. THE INTERIOR SURFACE OF ALL DUCTWORK SHALL BE SMOOTH WITH NO SHEETMETAL OR OTHER PARTS PROJECTING INTO THE AIR STREAM. ALL SEAMS AND JOINTS SHALL BE EXTERNAL. THE INSIDE OF ALL DUCTWORK SHALL BE THOROUGHLY CLEANED AND ALL FANS OPERATED TO REMOVE ANY DEBRIS PRIOR TO CONNECTION OF AIR DISTRIBUTION DEVICES.

G. ALL DUCTWORK DIMENSIONS ON THE DRAWINGS ARE CLEAR INSIDE.

H. INSTALL ALL DUCTWORK TIGHT TO STRUCTURE UNLESS OTHERWISE NOTED. THE MECHANICAL CONTRACTOR SHALL COORDINATE WITH ALL OTHER TRADES PRIOR TO THE CONSTRUCTION OR INSTALLATION OF DUCTWORK.

I. ALL TRANSVERSE JOINTS SHALL BE SEALED WITH A WATER BASE ADHESIVE SEALER DESIGNED FOR USE IN MEDIUM VELOCITY DUCT SYSTEMS. SEALER SHALL BE EFFECTIVE AGAINST BOTH NEGATIVE AND POSITIVE PRESSURE LOSSES. SEALER SHALL HAVE A LEAK SPREAD RATING OF 25 OR LESS AND A SMOKE DEVELOPED RATING OF 30 OR LESS. APPLY UN-THINNED WITH BRUSH, TROWEL OR CALKING GUN AS PER THE MANUFACTURER'S RECOMMENDATIONS AND ALLOW TO DRY FOR A MINIMUM OF 48 HOURS BEFORE AIR IS APPLIED TO THE SYSTEM. SEALER SHALL BE IRON PIPE DUCT SEALANT #607 AS MANUFACTURED BY HARDCAST, INC., UNM-GRP AS MANUFACTURED BY UNITED MCGILL, OR AN APPROVED EQUAL.

J. ALL ROUND TAKE-OFFS SHALL BE MADE WITH A DAMPER EXTRACTOR SPIN-IN COLLAR. SPIN-INS SHALL BE INSTALLED WITH THEIR DAMPER AXIS PARALLEL TO AIR FLOW.

K. ALL DUCTWORK SUPPORTS SHALL BE PER TABLE 5-1 OF THE SMOACNA MANUAL WITH ALL SUPPORTS DIRECTLY ANCHORED TO THE BUILDING STRUCTURE. SUPPORTS SHALL BE ON MAXIMUM 8'-0" CENTERS WITH ADDITIONAL SUPPORTS AS REQUIRED TO PREVENT SAGGING.

L. FLEXIBLE DUCT FABRIC CONNECTIONS SHALL BE INSTALLED ON THE INLET AND OUTLET CONNECTIONS TO ALL POWERED AIR MOVING EQUIPMENT WHICH IS NOT CONNECTED WITH FLEXIBLE DUCT, A MINIMUM OF 1" OF SLACK SHALL BE ALLOWED IN ALL FLEXIBLE CONNECTIONS TO INSURE VIBRATION ISOLATION. FLEXIBLE FABRIC SHALL BE A MINIMUM OF 3 INCHES WIDE WITH "GRIP-LOC" SEAM TO 24 GAUGE GALVANIZED STEEL CLIP CONNECTORS A MINIMUM OF 3 INCHES WIDE EACH. FLEXIBLE CONNECTION ARE TO FABRICATED WITH ELSEN "ZIPPERLOC" #2LN-4 NEOPRENE COATED 30 OZ. FIBERGLASS WITH 24 GAUGE GALVANIZED IRON SIDE CONNECTORS, OR DURU DYNE EXCELON "METAL-FAB" NYLON COATED 32 OZ. NYLON WITH 24 GAUGE GALVANIZED IRON SIDE CONNECTORS OR "APPROVED EQUAL."

M. INSTALL MANUAL SPLITTER DAMPERS IN BRANCH TAKE-OFFS WHERE SHOWN. SPLITTER DAMPERS SHALL BE MINIMUM 16 GAUGE GALVANIZED SHEET METAL AND SHALL BE 3/4 OF THE WIDTH OF THE SMALLEST TAKE-OFF BUT NOT LESS THAN 6" LONG. DAMPERS SHALL HAVE 1/8" OF CLEARANCE TO THE INLET IN WHICH THEY ARE INSTALLED. SPLITTER DAMPERS SHALL BE CONTROLLED BY ONE OR MORE CONTROL RODS IN ACCORDANCE WITH FIG. 2-5 OF THE SMOACNA MANUAL. WHERE SPLITTERS ARE IN CONCEALED ACCESSIBLE LOCATIONS, SUBMIT PROPOSED CONTROL ROD DETAILS FOR APPROVAL.

N. DUCTWORK WHICH IS EXPOSED TO WEATHER SHALL HAVE SOLDERED JOINTS AND SEAMS SHALL BE PAINTED WITH A SUITABLE EPOXY COATING.

HVAC FILTRATION AND AIR QUALITY

A. UNO, EACH NEW EQUIPMENT SHALL BE PROVIDED WITH A PRE-FILTER WITH A MINIMUM FILTRATION OF 90% (MERV-1) FILTER EFFICIENCY SHALL BE RATED IN ACCORDANCE WITH ASHRAE 52-76. AIRFLOW SHALL NOT BE GREATER THAN 500 FPM.

B. UNO, EACH NEW EQUIPMENT SHALL BE PROVIDED WITH A BI-POLAR IONIZATION DEVICE(S) THAT MUST MEET UL-2998 STANDARD CERTIFICATION (ENVIRONMENTAL CLAIM VALIDATION PROCEDURE (ECVP) FOR ZERO OZONE EMISSIONS FOR NON-CLEANERS). THE DEVICE(S) SHALL BE MOUNTED IN THE DOWN STREAM SPLIT DUCTWORK OR INSIDE THE EQUIPMENT, UNO, THE POWER TO THE DEVICE(S) SHALL BE COMING FROM THE EQUIPMENT'S POWER SOURCE AND INTERLOCKED WITH THE EQUIPMENT'S OPERATION. THE NUMBER OF THE DEVICES SHALL BE SELECTED AND DESIGNED PER THE MANUFACTURER'S GUIDELINES TO MEET THE DESIGN AIR FLOW CAPACITY REQUIREMENT AND AREA OF COLL. FACE COVERAGE.

FLEXIBLE DUCTWORK

A. FLEXIBLE DUCT SHALL BE USED FOR CONNECTIONS TO AIR DISTRIBUTION DEVICES WHERE SHOWN ON THE DRAWINGS OR SPECIFIED HEREIN. MAXIMUM LENGTH SHALL BE 5'-0" FOR AIR DISTRIBUTION DEVICE CONNECTIONS. WHERE LONGER RUNS ARE REQUIRED, PROVIDE RIGID DUCTWORK.

B. INSULATED FLEXIBLE DUCT SHALL BE A FACTORY FABRICATED ASSEMBLY CONSISTING OF A GALVANIZED STEEL OR SPIRAL ALUMINUM HELIX. STAINLESS INNER LINER SHALL BE COMPOSED OF 3-PLY ALUMINUM FOL. OR HEAVILY COATED FIBERGLASS WITH A MAXIMUM THERMAL CONDUCTANCE OF .23 BTU/HR/57-F". THE ASSEMBLY SHALL BE SHEATHED IN A REINFORCED METALIZED VAPOR BARRIER OUTER JACKET.

C. THE FLEXIBLE DUCT ASSEMBLY SHALL BE SUITABLE FOR A MINIMUM OF 6" WC WORKING PRESSURE AND SHALL BE LISTED CLASS 1 BY THE UNDERWRITERS LABORATORY AT A FLAME SPREAD OF NOT OVER 25 AND A SMOKE DEVELOPED RATE OF NOT OVER 50. DUCTS SHALL ALSO COMPLY WITH NFPA STANDARD 90A.

D. FLEXIBLE DUCTS SHALL BE SUPPORTED IN SUCH A MANNER TO PREVENT SAGS AND KINKS. BEYOND AN ANY LENGTH OF FLEXIBLE DUCT SHALL NOT EXCEED 90° FOR AIR DISTRIBUTION DEVICE CONNECTIONS.

E. ALL JOINTS AND CONNECTIONS SHALL BE MADE WITH 1/2" WIDE STAINLESS STEEL DUCT CLAMPS OR 100% NYLON SELF-LOCKING CLAMPS FABRICATED BY PANOUT CORPORATION OR AN APPROVED EQUAL.

F. IF IT COMPLIES WITH THESE SPECIFICATIONS, FLEXIBLE DUCTWORK OF THE FOLLOWING TYPES WILL BE ACCEPTABLE: FLEXMASTER TYPE 8M OR APPROVED EQUAL (EQUIVALENT TO 86).

CONTROLS

PROVIDE ALL TEMPERATURE CONTROLS MODIFICATIONS REQUIRED FOR A COMPLETE AND FUNCTIONING CONTROLS SYSTEM. ALL CONTROLS SHALL MATCH BUILDING STANDARD.

CHILLED WATER / CONDENSATE PIPING

A. STEEL PIPE: ASTM A 53/A 53M, BLACK STEEL WITH PLAIN ENDS.

B. CAST-IRON THREADED FITTINGS: ASME B16.4, CLASSES 125 AND 250.

C. MALLEABLE-IRON THREADED FITTINGS: ASME B16.3, CLASSES 150 AND 300.

D. MALLEABLE-IRON UNIONS: ASME B16.39, CLASSES 150, 250, AND 300.

E. CAST-IRON PIPE FLANGES AND FLANGED FITTINGS: ASME B16.1, CLASSES 25, 125, AND 250; RAISED-FACE FLOW, AND BOLT HOLES SPOT FACED.

F. WROUGHT-STEEL FITTINGS: ASTM A 234/A 234M, WALL THICKNESS TO MATCH ADJOINING PIPE.

G. WROUGHT CAST- AND FORGED-STEEL FLANGES AND FLANGED FITTINGS: ASME B16.5, INCLUDING BOLTS, NUTS AND GASKETS OF THE FOLLOWING MATERIAL GROUP, END CONNECTIONS, AND FINISHES:

1. MATERIAL GROUP: 1.1.

2. END CONNECTIONS: BUILT WELDING.

3. FINISHES: RAISED FACE.

H. GROOVED MECHANICAL-JOINT FITTINGS AND COUPLINGS: MANUFACTURERS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE PRODUCTS BY ONE OF THE FOLLOWING:

1. ANVA INTERNATIONAL, INC.

2. CENTRAL SPRINKLER COMPANY; A DIVISION OF TYCO FIRE & BUILDING PRODUCTS.

3. NATIONAL FITTINGS, INC.

4. S.P. FITTINGS: A DIVISION OF STAR PIPE PRODUCTS.

5. VICTAULIC COMPANY.

JOINT FITTINGS: ASTM A 536, GRADE 65-45-12 DUCTILE IRON; ASTM A 47/A 47M, GRADE 32510 MALLEABLE IRON; ASTM A 53/A 53M, TYPE F, E, OR S, GRADE B FABRICATED STEEL; OR ASTM A 106, GRADE B STEEL FITTINGS WITH GROOVES OR SHOULDERS.

CONNECTIONS TO ACCEPT GROOVED-END COUPLINGS, WITH NUTS, BOLTS, LOCKING PIN, LOCKING TOGGLE OR LUGS TO SECURE GROOVED PIPE AND FITTINGS.

COUPLINGS: DUCTILE-OR MALLEABLE-IRON HOUSING AND SYNTHETIC RUBBER GASKET OF COUPLINGS. LUGS TO SECURE GROOVED PIPE AND FITTINGS.

LOCKING TOGGLE, OR LUGS TO SECURE GROOVED PIPE AND FITTINGS.

L. CHILLED-WATER PIPING, ABOVEGROUND, NPS 2" (DN 50) AND SMALLER, SHALL BE THE FOLLOWING:

1. SCHEDULE 40 STEEL PIPE, CLASS 150, MALLEABLE-IRON, 250, CAST-IRON AND 300, AND THREADED JOINTS.

2. RRP PRODUCTS, INC., INSUL-MATE STRAPPING, SLIPS AND SPRINGS.

3. AMERICAN: ASTM B 209 (ASTM B 209M), ALLOY 3003, 3005, 3105, OR 5005; TEMPER H-14, 0.020 INCH (0.51 mm) THICK, 1/2 INCH (13 mm) WIDE WITH MING SEAL OR CLOSED SEAL.

4. J. CHILLED-WATER PIPING, ABOVEGROUND, NPS 2"-1/2" (DN 65) AND LARGER, SHALL BE ANY OF THE FOLLOWING:

1. SCHEDULE 40 STEEL PIPE, WROUGHT-STEEL FITTINGS AND WROUGHT-CAST OR FORGED-STEEL FLANGES AND FLANGE FITTINGS, AND WELDED AND FLANGED JOINTS.

2. SCHEDULE 40 STEEL PIPE, GROOVED, MECHANICAL JOINT COUPLING AND FITTINGS; AND GROOVED, MECHANICAL JOINTS.

K. CONDENSATE-DRAIN PIPING: TYPE M (C) DRAWN-TEMPER COPPER TUBING, WROUGHT-COPPER FITTINGS, AND SOLDERED JOINTS.

L. HANGERS AND SUPPORTS: INSTALL THE FOLLOWING PIPE ATTACHMENTS:

1. ADJUSTABLE STEEL CLEVIS HANGERS FOR INDIVIDUAL HORIZONTAL PIPING LESS THAN 20 FEET (6 m) LONG.

2. ADJUSTABLE ROLLER HANGERS AND SPRING HANGERS FOR INDIVIDUAL HORIZONTAL PIPING 20 FEET (6 m) OR LONGER.

3. PIPE ROLLER, MSS SP-58, TYPE 44 FOR MULTIPLE HORIZONTAL PIPING 20 FEET (6 m) OR LONGER, SUPPORTED ON A TRAPEZE.

4. SPRING HANGERS TO SUPPORT VERTICAL RUNS.

5. PROVIDE COPPER-CLAD HANGERS AND SUPPORTS FOR HANGERS AND SUPPORTS IN DIRECT CONTACT WITH COPPER PIPE.

M. INSTALL HANGERS FOR STEEL PIPING WITH THE FOLLOWING MAXIMUM SPACING AND MINIMUM ROD SIZES:

1. NPS 3/4 (DN 20): MAXIMUM SPAN, 7 FEET (2.1 m); MINIMUM ROD SIZE, 1/4 INCH (6.4 mm).

2. NPS 1 (DN 25): MAXIMUM SPAN, 7 FEET (2.1 m); MINIMUM ROD SIZE, 1/4 INCH (6.4 mm).

3. NPS 1-1/2 (DN 40): MAXIMUM SPAN, 8 FEET (2.4 m); MINIMUM ROD SIZE, 3/8 INCH (10 mm).

4. NPS 2 (DN 50): MAXIMUM SPAN, 10 FEET (3.0 m); MINIMUM ROD SIZE, 3/8 INCH (10 mm).

5. NPS 2-1/2 (DN 65): MAXIMUM SPAN, 11 FEET (3.4 m); MINIMUM ROD SIZE, 3/8 INCH (10 mm).

6. NPS 3 (DN 80): MAXIMUM SPAN, 12 FEET (3.7 m); MINIMUM ROD SIZE, 3/8 INCH (10 mm).

7. NPS 4 (DN 100): MAXIMUM SPAN, 14 FEET (4.3 m); MINIMUM ROD SIZE, 1/2 INCH (13 mm).

8. NPS 6 (DN 150): MAXIMUM SPAN, 17 FEET (5.2 m); MINIMUM ROD SIZE, 1/2 INCH (13 mm).

9. NPS 8 (DN 200): MAXIMUM SPAN, 19 FEET (5.8 m); MINIMUM ROD SIZE, 1/2 INCH (13 mm).

10. NPS 10 (DN 250): MAXIMUM SPAN, 20 FEET (6.1 m); MINIMUM ROD SIZE, 3/4 INCH (19 mm).

11. NPS 12 (DN 300): MAXIMUM SPAN, 23 FEET (7.0 m); MINIMUM ROD SIZE, 7/8 INCH (22 mm).

12. NPS 14 (DN 350): MAXIMUM SPAN, 25 FEET (7.6 m); MINIMUM ROD SIZE, 1 INCH (25 mm).

N. INSTALL HANGERS FOR DRAWN-TEMPER COPPER PIPING WITH THE FOLLOWING MAXIMUM SPACING AND MINIMUM ROD SIZES:

1. NPS 3/4 (DN 20): MAXIMUM SPAN, 5 FEET (1.5 m); MINIMUM ROD SIZE, 1/4 INCH (6.4 mm).

2. NPS 1 (DN 25): MAXIMUM SPAN, 6 FEET (1.8 m); MINIMUM ROD SIZE, 1/4 INCH (6.4 mm).

3. NPS 1-1/2 (DN 40): MAXIMUM SPAN, 8 FEET (2.4 m); MINIMUM ROD SIZE, 3/8 INCH (10 mm).

4. NPS 2 (DN 50): MAXIMUM SPAN, 10 FEET (3.0 m); MINIMUM ROD SIZE, 3/8 INCH (10 mm).

5. NPS 2-1/2 (DN 65): MAXIMUM SPAN, 11 FEET (3.4 m); MINIMUM ROD SIZE, 3/8 INCH (10 mm).

6. NPS 3 (DN 80): MAXIMUM SPAN, 12 FEET (3.7 m); MINIMUM ROD SIZE, 3/8 INCH (10 mm).

DUCT INSULATION

A. MINERAL-FIBER BLANKET INSULATION: MINERAL OR GLASS FIBERS BONDED WITH A THERMOSETTING RESIN. COMPLY WITH ASTM C 553, TYPE II AND ASTM C 1290, TYPE III WITH FACTORY-APPLIED FSK JACKET. EQUIVALENT TO R-6. PRODUCTS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE ONE OF THE FOLLOWING:

1. CHILERS BRAND, SPECIALTY CONSTRUCTION BRANDS, INC., A BUSINESS OF H. B. FULLER COMPANY; CP-127.

2. EAGLE BRIDGES - MARATHON INDUSTRIES; 225.

3. FOSTER BRAND, SPECIALTY CONSTRUCTION BRANDS, INC., A BUSINESS OF H. B. FULLER COMPANY; CP-127.

4. MON-ECO INDUSTRIES, INC.; 22-25.

5. FOR INDOOR APPLICATIONS, USE ADHESIVE THAT HAS A VOC CONTENT OF 80 G/L OR LESS WHEN CALCULATED ACCORDING TO 40 CFR 59, SUBPART D (EPA METHOD 24).

C. ASJ ADHESIVE, AND FSK JACKET ADHESIVE: COMPLY WITH MIL-A-3316C, CLASS 2, GRADE A FOR BONDING INSULATION JACKET LAP SEAMS AND JOINTS.

PRODUCTS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE ONE OF THE FOLLOWING:

1. CHILERS BRAND, SPECIALTY CONSTRUCTION BRANDS, INC., A BUSINESS OF H. B. FULLER COMPANY; CP-82.

2. EAGLE BRIDGES - MARATHON INDUSTRIES; 225.

3. FOSTER BRAND, SPECIALTY CONSTRUCTION BRANDS, INC., A BUSINESS OF H. B. FULLER COMPANY; CP-82.

4. MON-ECO INDUSTRIES, INC.; 22-25.

5. FOR INDOOR APPLICATIONS, USE ADHESIVE THAT HAS A VOC CONTENT OF 50 G/L OR LESS WHEN CALCULATED ACCORDING TO 40 CFR 59, SUBPART D (EPA METHOD 24).

D. MASTICS MATERIALS SHALL BE COMPATIBLE WITH INSULATION MATERIALS, JACKETS, AND SUBSTRATES; COMPLY WITH MIL-PRF-19565C, TYPE II.

1. FOR INDOOR APPLICATIONS, USE MASTICS THAT HAVE A VOC CONTENT OF 50 G/L OR LESS WHEN CALCULATED ACCORDING TO 40 CFR 59, SUBPART D (EPA METHOD 24).

E. VAPOR-BARRIER MASTIC: WATER BASED; SUITABLE FOR INDOOR USE ON BELOW AMBIENT SERVICES. PRODUCTS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE ONE OF THE FOLLOWING:

1. CHILERS BRAND, SPECIALTY CONSTRUCTION BRANDS, INC., A BUSINESS OF H. B. FULLER COMPANY; 30-80/30-90.

2. VMASCO CORPORATION; 749.

3. WATER-VAPOR PERFORMANCE: ASTM E 96/E 96M, PROCEDURE B, 0.013 PERM (0.009 metric PERM) AT 43-44 MI (1.09-mm) GYK FILM THICKNESS.

SERVICE TEMPERATURE RANGE: MINUS 20 TO PLUS 180 DEG F (MINUS 29 TO PLUS 82 DEG C).

SOLIDS CONTENT: ASTM D 1644

PLUMBING SPECIFICATIONS

DOMESTIC WATER PIPING - COPPER TUBE AND FITTINGS

- A. HARD COPPER TUBE: ASTM B 88, TYPE L (ASTM B 88M, TYPE B) WATER TUBE, DRAIN TEMPER.
- CAST-COPPER SOLDER-JOINT FITTINGS: ASME B16.18, PRESSURE FITTINGS.
 - WROUGHT-COPPER SOLDER-JOINT FITTINGS: ASME B16.22, WROUGHT-COPPER PRESSURE FITTINGS.
 - BRONZE FLANGES: ASME B16.24, CLASS 150, WITH SOLDER-JOINT ENDS.
 - COPPER UNIONS: MSS J-22, CAST-COPPER-ALLOY, HEXAGONAL-STOCK BODY, WITH BALL-AND-SOCKET, METAL-TO-METAL SEATING SURFACES, AND SOLDER-JOINT OR THREADED ENDS.
- B. SOFT COPPER TUBE: ASTM B 88, TYPE K (ASTM B 88M, TYPE A) AND ASTM B 88, TYPE L (ASTM B 88M, TYPE B) WATER TUBE, ANNEALED TEMPER. COPPER SOLDER-JOINT FITTINGS: ASME B16.22, WROUGHT-COPPER PRESSURE FITTINGS. COPPER PRESSURE-SEAL-JOINT FITTINGS: ASME B16.22, WROUGHT-COPPER PRESSURE FITTINGS. MANUFACTURERS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE PRODUCTS BY ONE OF THE FOLLOWING:
- AWWA C105; A. C. TRENKLE COMPANY; A DIVISION OF MFG INDUSTRIES, INC.
 - VEGA; PLUMBING AND HEATING SYSTEMS.
- NPS 2 (DN 50) AND SMALLER: WROUGHT-COPPER FITTING WITH EPDM-RUBBER O-RING SEAL IN EACH END. NPS 3 AND NPS 4 (DN 80 AND DN 100): CAST-BRONZE OR WROUGHT-COPPER FITTING WITH EPDM-RUBBER O-RING SEAL IN EACH END.
- C. DIELECTRIC FITTINGS: GENERAL REQUIREMENTS: ASSEMBLY OF COPPER ALLOY AND FERROUS MATERIALS WITH SEPARATING NONCONDUCTIVE INSULATING MATERIAL. INCLUDE END CONNECTIONS COMPATIBLE WITH PIPES TO BE JOINED.
- D. DRAWING PLANS, SCHEMATICS, AND DIAGRAMS INDICATE GENERAL LOCATION AND ARRANGEMENT OF DOMESTIC WATER PIPING. INDICATED LOCATIONS AND ARRANGEMENTS ARE USED TO SIZE PIPE AND CALCULATE FRICTION LOSS, EXPANSION, AND OTHER DESIGN CONSIDERATIONS. INSTALL PIPING AS INDICATED UNLESS DEVIATIONS TO LAYOUT ARE APPROVED ON COORDINATION DRAWINGS.
- E. INSTALL COPPER TUBING UNDER BUILDING SLAB ACCORDING TO CDA'S "COPPER TUBE HANDBOOK".
- F. INSTALL SHUTOFF VALVE IMMEDIATELY UPSTREAM OF EACH DIELECTRIC FITTING.
- G. INSTALL DOMESTIC WATER PIPING LEVEL WITH 0.125 PERCENT SLOPE DOWNWARD TOWARD DRAIN AND FLOOR.
- H. INSTALL PIPING CONCEALED FROM VIEW AND PROTECTED FROM PHYSICAL CONTACT BY BUILDING OCCUPANTS UNLESS OTHERWISE INDICATED AND EXCEPT IN EQUIPMENT ROOMS AND SERVICE STAIRWAYS.
- I. INSTALL PIPING INDICATED TO BE EXPOSED AND PIPING IN EQUIPMENT ROOMS AND SERVICE AREAS AT RIGHT ANGLES OR PARALLEL TO BUILDING WALLS. DIAGONAL RUNS ARE PROHIBITED UNLESS SPECIFICALLY INDICATED OTHERWISE.
- J. INSTALL PIPING ABOVE ACCESSIBLE CEILING TO ALLOW SUFFICIENT SPACE FOR CEILING PANEL REMOVAL, AND COORDINATE WITH OTHER SERVICES OCCUPYING THAT SPACE.
- K. INSTALL SPRINKLER ADJUNCT TO EQUIPMENT AND SPECIALTIES TO ALLOW SERVICE AND MAINTENANCE.
- L. INSTALL PIPING TO PERMIT VALVE SERVICING. GENERAL REQUIREMENTS: DIELECTRIC FITTINGS AND VALVES WITH PRESSURE RATINGS THE SAME AS OR HIGHER THAN SYSTEM PRESSURE RATING USED IN APPLICATIONS BELOW UNLESS OTHERWISE INDICATED.
- M. INSTALL PIPING FREE OF SAGS AND BENDS.
- N. INSTALL FITTINGS FOR CHANGES IN DIRECTION AND BRANCH CONNECTIONS.
- O. INSTALL UNIONS IN COPPER TUBING AT FINAL CONNECTION TO EACH PIECE OF EQUIPMENT, MACHINE, AND SPECIALTY.
- Q. INSTALL SLEEVES FOR PIPING PENETRATIONS OF WALLS, CEILINGS, AND FLOORS.
- R. INSTALL ESCUTOCHONS FOR PIPING PENETRATIONS OF WALLS, CEILINGS, AND FLOORS.
- S. INSTALL SHUTOFF VALVE CLOSE TO WATER MAIN ON EACH BRANCH AND RISER SERVING PLUMBING FIXTURES OR EQUIPMENT, AND ON EACH BRANCH SUPPLY TO EQUIPMENT AND ON EACH WATER SUPPLY TO PLUMBING FIXTURES THAT DO NOT HAVE SUPPLY STOPS. USE BALL VALVES FOR PIPING NPS 2 (DN 50) AND SMALLER. USE GATE VALVES FOR PIPING NPS 2-1/2 (DN 65) AND LARGER.
- T. HANGER AND SUPPORT INSTALLATION: SUPPORT VERTICAL PIPING AND TUBING AT BASE AND AT EACH FLOOR.
- U. ROD DIAMETERS MAY BE REDUCED ONE SIZE FOR DOUBLE-ROD HANGERS, TO A MINIMUM OF 3/8 INCH (10 MM).
- V. INSTALL HANGERS FOR COPPER TUBING WITH THE FOLLOWING MAXIMUM HORIZONTAL SPACING AND MINIMUM ROD DIAMETERS:
- NPS 3/4 (DN 20) AND SMALLER: 60 INCHES (1500 MM) WITH 3/8-INCH (10-MM) ROD.
 - NPS 1 AND NPS 1-1/4 (DN 25 AND DN 32): 72 INCHES (1800 MM) WITH 3/8-INCH (10-MM) ROD.
 - NPS 1-1/2 AND NPS 2 (DN 40 AND DN 50): 96 INCHES (2400 MM) WITH 3/8-INCH (10-MM) ROD.
 - NPS 2-1/2 (DN 65): 108 INCHES (2700 MM) WITH 1/2-INCH (13-MM) ROD.
 - NPS 3 TO NPS 5 (DN 80 TO DN 125): 10 FEET (3 M) WITH 1/2-INCH (13-MM) ROD.
 - NPS 6 (DN 150): 10 FEET (3 M) WITH 5/8-INCH (16-MM) ROD.
 - NPS 8 (DN 200): 10 FEET (3 M) WITH 3/4-INCH (19-MM) ROD.
- W. INSTALL SUPPORTS FOR VERTICAL COPPER TUBING EVERY 10 FEET (3 M).
- X. FIELD QUALITY CONTROL: PERFORM TESTS AND INSPECTIONS. PIPING INSPECTIONS:
- DO NOT ENCLOSE, COVER, OR PUT PIPING INTO OPERATION UNTIL IT HAS BEEN INSPECTED AND APPROVED BY AUTHORITIES HAVING JURISDICTION AT LEAST ONE DAY BEFORE INSPECTION MUST BE MADE. PREPARE TESTS SPECIFIED BELOW IN PRESENCE OF AUTHORITIES HAVING JURISDICTION.
 - ROUGH-IN-INSPECTION: ARRANGE FOR INSPECTION OF PIPING BEFORE CONCRETE OR CLOSING-IN AFTER ROUGHING-IN AND BEFORE SETTING FIXTURES.
 - FINAL INSPECTION: ARRANGE FINAL INSPECTION BY AUTHORITIES HAVING JURISDICTION TO OBSERVE TESTS SPECIFIED BELOW AND TO ENSURE COMPLIANCE WITH REQUIREMENTS.
 - REINSPECTION: IF AUTHORITIES HAVING JURISDICTION FIND THAT PIPING WILL NOT PASS TESTS OR INSPECTIONS, MAKE REQUIRED CORRECTIONS AND ARRANGE FOR REINSPECTION.
 - PREPARE INSPECTION REPORTS AND HAVE THEM SIGNED BY AUTHORITIES HAVING JURISDICTION.
- Y. PIPING TESTS:
- FILL DOMESTIC WATER PIPING. CHECK COMPONENTS TO DETERMINE THAT THEY ARE NOT AIR BOUND AND THAT PIPING IS FULL OF WATER.
 - TEST FOR LEAKS AND DEFECTS IN NEW PIPING AND PARTS OF EXISTING PIPING THAT HAVE BEEN ALTERED, EXTENDED, OR REPAIRED. IF TESTING IS PERFORMED IN SEGMENTS, SUBMIT A SEPARATE REPORT FOR EACH TEST, COMPLETE WITH DIAGRAM OF PORTION OF PIPING TESTED.
 - LEAK: NEW, ALTERED, EXTENDED, OR REPLACED DOMESTIC WATER PIPING UNCOVERED AND UNCONCEALED UNTIL IT HAS BEEN TESTED AND APPROVED. EXPOSE WORK THAT WAS COVERED OR CONCEALED BEFORE IT WAS TESTED.
 - CAP AND SUBJECT PIPING TO STATIC WATER PRESSURE OF 50 PSIG (345 KPA) ABOVE OPERATING PRESSURE, WITHOUT EXCEEDING PRESSURE RATING OF PIPING SYSTEM MATERIALS. ISOLATE TEST SOURCE AND ALLOW TO STAND FOR FOUR HOURS. LEAKS AND LOSS IN TEST PRESSURE CONSTITUTE DEFECTS THAT MUST BE REPAIRED.
 - REPAIR LEAKS AND DEFECTS WITH NEW MATERIALS AND RETEST PIPING OR PORTION THEREOF UNTIL SATISFACTORY RESULTS ARE OBTAINED.
 - PREPARE REPORTS FOR TESTS AND FOR CORRECTIVE ACTION REQUIRED.
- Z. DOMESTIC WATER PIPING WILL BE CONSIDERED DEFECTIVE IF IT DOES NOT PASS TESTS AND INSPECTIONS.
- AA. PREPARE TEST AND INSPECTION REPORTS.
- AB. CLEAN AND DISINFECT POTABLE AND NON-POTABLE DOMESTIC WATER PIPING AS FOLLOWS: AC. PURGE NEW PIPING AND PARTS OF EXISTING PIPING THAT HAVE BEEN ALTERED, EXTENDED, OR REPAIRED BEFORE USING.
- AD. USE PURGING AND DISINFECTING PROCEDURES PRESCRIBED BY AUTHORITIES HAVING JURISDICTION; IF METHODS ARE NOT PRESCRIBED, USE PROCEDURES DESCRIBED IN EITHER AWWA C651 OR AWWA C652 OR FOLLOW PROCEDURES DESCRIBED BELOW:
- FLUSH PIPING SYSTEM WITH CLEAN, POTABLE WATER UNTIL DIRTY WATER DOES NOT APPEAR AT OUTLETS.
 - FLUSH SYSTEM WITH CLEAN, POTABLE WATER UNTIL NO CHLORINE IS IN WATER COMING FROM SYSTEM AFTER THE STANDING TIME.
 - SUBMIT WATER SAMPLES IN STERILE BOTTLES TO AUTHORITIES HAVING JURISDICTION. REPEAT PROCEDURES IF BIOLOGICAL EXAMINATION SHOWS CONTAMINATION.
- AE. UNDER-BUILDING-SLAB, DOMESTIC WATER PIPING, NPS 2 (DN 50) AND SMALLER, SHALL BE THE FOLLOWING:
- SOFT COPPER TUBE, ASTM B 88, TYPE L (ASTM B 88M, TYPE B); WROUGHT-COPPER SOLDER-JOINT FITTINGS, AND BRAZED JOINTS.
- AF. ABOVEGROUND DOMESTIC WATER PIPING, NPS 2 (DN 50) AND SMALLER, SHALL BE THE FOLLOWING:
- HARD COPPER TUBE, ASTM B 88, TYPE L (ASTM B 88M, TYPE B); WROUGHT-COPPER SOLDER-JOINT FITTINGS, AND SOLDERED JOINTS.
 - COPPER PRESS FITTINGS: AT THE CONTRACTOR'S OPTION ON THE DOMESTIC HOT AND COLD WATER PIPING, COILING COIL, CONDENSATE DRAIN IN COPPER LINES 1/2" DIAMETER UP THROUGH 2-1/2" DIAMETER MECHANICAL PRESS (PRO-PRESS) JOINTS AND FITTINGS INCLUDING THE SMART CONNECTION FEATURE OPTION TO ENSURE THAT UNPRESSURED FITTING WILL EASILY BE DETECTED DURING PRESSURE TESTING AS MANUFACTURER BY VEGA, NIBCO AND APOLLO PRESS WILL BE ACCEPTABLE PROVIDED THE FITTING MANUFACTURER'S RECOMMENDED CHIPPING TOOL, WITH PROPERLY SIZED REPLACEMENT JAWS ARE UTILIZED RIGID TOOL COMPANY. INSTALLATION WILL BE IN ACCORDANCE WITH MANUFACTURER'S APPROVED PUBLISHED GUIDELINES.
- AG. ABOVEGROUND DOMESTIC WATER PIPING, NPS 2-1/2 TO NPS 4 (DN 65 TO DN 100), SHALL BE OF THE FOLLOWING:
- HARD COPPER TUBE, ASTM B 88, TYPE L (ASTM B 88M, TYPE B); CAST-COPPER SOLDER-JOINT FITTINGS, AND SOLDERED JOINTS.
 - GALVANIZED-STEEL PIPE: GROOVED-JOINT, GALVANIZED-STEEL-PIPE APPURTENANCES, AND GROOVED JOINTS.
- AH. DRAWINGS INDICATE VALVE TYPES TO BE USED. WHERE SPECIFIC VALVE TYPES ARE NOT INDICATED, THE FOLLOWING REQUIREMENTS APPLY:
- SHUTOFF DUTY: USE BALL VALVES FOR PIPING NPS 2 (DN 50) AND SMALLER. USE GATE VALVES WITH FLANGED ENDS FOR PIPING NPS 2-1/2 (DN 65) AND LARGER.
 - THROTTLING DUTY: USE BALL VALVES FOR PIPING NPS 2 (DN 50) AND SMALLER. USE BALL VALVES WITH FLANGED ENDS FOR PIPING NPS 2-1/2 (DN 65) AND LARGER.
 - HOT-WATER CIRCULATION VALVE: CALIBRATED BALANCING VALVES.
 - DRAIN DUTY: HOSE-END DRAIN VALVES.
- AI. USE CHECK VALVES TO MAINTAIN CORRECT DIRECTION OF DOMESTIC WATER FLOW TO AND FROM EQUIPMENT.
- AJ. IRON GROOVED-END VALVES MAY BE USED WITH GROOVED-END PIPING.

- AK. WATER HAMMER ARRESTERS
- MANUFACTURERS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE PRODUCTS BY ONE OF THE FOLLOWING:
 - AMTROL, INC.
 - JOSAM COMPANY.
 - MFAB, INC.
 - D. PIP INC.
 - SIOUX CHIEF MANUFACTURING COMPANY, INC.
 - WATTS DRAMA CO.; DIVISION OF SMITH INDUSTRIES, INC.
 - TYLER PIPE, WADE DIV.
 - WATTS DRAMA PRODUCTS, INC.
 - STANDARD: ASSE 101 OR PDI-WH201.
 - PIPE: COPPER SUEB (C) MATERIALS; CAST-IRON PIPE THROUGH F OR PDI-WH 201, SIZES A THROUGH F.
 - SIZES: ASSE 1010, SIZES AA AND A THROUGH F OR PDI-WH 201, SIZES A THROUGH F.
- INSTALL WATER HAMMER ARRESTERS IN WATER PIPING ACCORDING TO PDI-WH 201.
- INSTALL AIR VENTS AT HIGH POINTS OF WATER PIPING. INSTALL DRAIN PIPING AND DISCHARGE OUTDOOR DRAIN.
- SANITARY WASTE AND STORM PIPING**
- A. HUB-AND-SPOUT, CAST-IRON SOIL PIPE AND FITTINGS
- PIPE AND FITTINGS: ASTM A 74, SERVICE CLASS(E)
- GASKETS: ASTM C 564, RUBBER.
- B. HUBLESS, CAST-IRON SOIL PIPE AND FITTINGS
- PIPE AND FITTINGS: ASTM A 888 OR OSP1 301.
- STANDARDS: ASME A112.31, CAST-IRON SOIL PIPE FOR CLEANOUT TEST TEST.
- SIZE: SAME AS CONNECTED DRAINAGE PIPING.
- CLOSURE: HUBLESS-SPIGOT, CAST-IRON SOIL PIPE T-BRANCH AS REQUIRED TO MATCH CONNECTED PIPING.
- CLOSURE: COUNTERSUNK PLUG.
- CLOSURE PLUG SIZE: SAME AS OR NOT MORE THAN ONE SIZE SMALLER THAN CLEANOUT SIZE.
- CLOSURE: STAINLESS-STEEL PLUG WITH SEAL.
- C. METAL FLOOR CLEANOUTS:
- MANUFACTURERS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE PRODUCTS BY ONE OF THE FOLLOWING:
- JOSAM COMPANY; JOSAM DIV.
 - SMITH, JAY R. MFG. CO.; DIVISION OF SMITH INDUSTRIES, INC.
 - TYLER PIPE, WADE DIV.
 - ZURN PLUMBING PRODUCTS GROUP; SPECIFICATION DRAINAGE OPERATION. STANDARD: ASME A112.36.2M FOR THREADED, ADJUSTABLE HOUSING CLEANOUT. SIZE: SAME AS CONNECTED BRANCH.
- TYPE: ADJUSTABLE HOUSING THREADED, ADJUSTABLE HOUSING.
- STANDARD: ASME A112.31.
- SIZE: SAME AS CONNECTED BRANCH.
- HOUSING: STAINLESS STEEL.
- CLOSURE: STAINLESS STEEL WITH SEAL.
- D. CAST-IRON WALL CLEANOUTS:
- MANUFACTURERS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE PRODUCTS BY ONE OF THE FOLLOWING:
- JOSAM COMPANY; JOSAM DIV.
 - SMITH, JAY R. MFG. CO.; DIVISION OF SMITH INDUSTRIES, INC.
 - TYLER PIPE, WADE DIV.
 - ZURN PLUMBING PRODUCTS GROUP; SPECIFICATION DRAINAGE OPERATION. STANDARD: ASME A112.36.2M, INCLUDE WALL ACCESS.
- SIZE: SAME AS CONNECTED DRAINAGE PIPING.
- HUB-AND-SPOUT, CAST-IRON SOIL PIPE T-BRANCH AS REQUIRED TO MATCH CONNECTED PIPING.
- CLOSURE: COUNTERSUNK OR RAISED-HOOD, BRASS PLUG.
- TYPE: ADJUSTABLE HOUSING THREADED, ADJUSTABLE HOUSING.
- STANDARD: ASME A112.31.
- SIZE: SAME AS CONNECTED BRANCH.
- HOUSING: STAINLESS STEEL.
- CLOSURE: STAINLESS STEEL WITH SEAL.
- E. FLOOR CLEANOUTS FOR PIPING BELOW FLOORS, INSTALL CLEANOUT DECK PLATES WITH TOP FLUSH WITH FINISHED FLOOR.
- F. FOR CLEANOUTS LOCATED IN CONCEALED PIPING, INSTALL CLEANOUT WALL ACCESS COVERS, OF TYPES INDICATED WITH FRAME AND COVER FLUSH WITH FINISHED WALL.
- G. INSTALL FLOOR DRAINS AT LOW POINTS OF SURFACE AREAS TO BE DRAINED. SET GRATES OF DRAINS FLUSH WITH FINISHED FLOOR, UNLESS OTHERWISE INDICATED.
- H. INSTALL FLASHING ASSEMBLIES ON SANITARY STACK VENTS AND VENT STACKS THAT EXTEND THROUGH ROOF.
- I. ASSEMBLE OPEN DRAIN FITTINGS AND INSTALL WITH TOP OF HUB 2 INCHES (51 MM) ABOVE FINISHED FLOOR.
- J. INSTALL TRAP-SEAL TRAPS ON FLOOR DRAINS AND OTHER WASTE OUTLETS, IF INDICATED.
- K. INSTALL FLOOR-DRAIN, TRAP-SEAL PRIMER FITTINGS ON INLET TO FLOOR DRAINS THAT REQUIRE TRAP-SEAL PRIMER CONNECTION.
- L. EXCEPTION: FITTING MAY BE OMITTED IF TRAP HAS TRAP-SEAL PRIMER CONNECTION.
- M. SIZE: SAME AS FLOOR DRAIN INLET.
- N. INSTALL CARBON-STEEL PIPE HANGERS FOR HORIZONTAL PIPING IN CORROSIVE ENVIRONMENTS.
- O. INSTALL STAINLESS-STEEL PIPE HANGERS FOR HORIZONTAL PIPING IN CORROSIVE ENVIRONMENTS.
- P. INSTALL CARBON-STEEL PIPE SUPPORT CLAMPS FOR VERTICAL PIPING IN CORROSIVE ENVIRONMENTS.
- Q. INSTALL INDIVIDUAL, STRAIGHT, HORIZONTAL PIPING RIGS:
- 1.00 FEET (30 M) AND LESS: MSS TYPE 1, ADJUSTABLE, STEEL GLEEVES HANGERS.
 - LONGER THAN 100 FEET (30 M): MSS TYPE 43, ADJUSTABLE ROLLER HANGERS.
 - LONGER THAN 100 FEET (30 M) IF INDICATED: MSS TYPE 49, SPRING CONNECTION ROLLS.
 - MULTIPLE, STRAIGHT, HORIZONTAL PIPING RUNS 100 FEET (30 M) OR LONGER: MSS TYPE 44, PIPE ROLLS.
 - SUPPORT PIPING ROLLS ON TRAFFICE.
- U. BASE OF VERTICAL PIPING: MSS TYPE 52, SPRING HANGERS.
- V. FITTING HORIZONTAL PIPING AND TUBING WITHIN 12 INCHES (300 MM) OF EACH SUPPORT, VALVE, AND COUPLING.
- W. DURRING INSTALLATION, NOTIFY AUTHORITIES HAVING JURISDICTION AT LEAST 24 HOURS BEFORE INSPECTION MUST BE MADE. PREPARE TESTS SPECIFIED BELOW IN PRESENCE OF AUTHORITIES HAVING JURISDICTION.
- X. DURING INSTALLATION, NOTIFY AUTHORITIES HAVING JURISDICTION AT LEAST 24 HOURS BEFORE INSPECTION MUST BE MADE. PREPARE TESTS SPECIFIED BELOW IN PRESENCE OF AUTHORITIES HAVING JURISDICTION.
- ROUGH-IN-INSPECTION: ARRANGE FOR INSPECTION OF PIPING BEFORE CONCRETE OR CLOSING-IN AFTER ROUGHING-IN AND BEFORE SETTING FIXTURES.
- FINAL INSPECTION: ARRANGE FOR FINAL INSPECTION BY AUTHORITIES HAVING JURISDICTION TO OBSERVE TESTS SPECIFIED BELOW AND TO ENSURE COMPLIANCE WITH REQUIREMENTS.
- REINSPECTION: IF AUTHORITIES HAVING JURISDICTION FIND THAT PIPING WILL NOT PASS TEST OR INSPECTIONS, MAKE REQUIRED CORRECTIONS AND ARRANGE FOR REINSPECTION.
- PREPARE INSPECTION REPORTS AND HAVE THEM SIGNED BY AUTHORITIES HAVING JURISDICTION.
- Y. PIPING TESTS AND INSPECTIONS:
- FILL DOMESTIC WATER PIPING. CHECK COMPONENTS TO DETERMINE THAT THEY ARE NOT AIR BOUND AND THAT PIPING IS FULL OF WATER.
 - TEST FOR LEAKS AND DEFECTS IN NEW PIPING AND PARTS OF EXISTING PIPING THAT HAVE BEEN ALTERED, EXTENDED, OR REPAIRED. IF TESTING IS PERFORMED IN SEGMENTS, SUBMIT A SEPARATE REPORT FOR EACH TEST, COMPLETE WITH DIAGRAM OF PORTION OF PIPING TESTED.
 - LEAK: NEW, ALTERED, EXTENDED, OR REPLACED DOMESTIC WATER PIPING UNCOVERED AND UNCONCEALED UNTIL IT HAS BEEN TESTED AND APPROVED. EXPOSE WORK THAT WAS COVERED OR CONCEALED BEFORE IT WAS TESTED.
 - CAP AND SUBJECT PIPING TO STATIC WATER PRESSURE OF 50 PSIG (345 KPA) ABOVE OPERATING PRESSURE, WITHOUT EXCEEDING PRESSURE RATING OF PIPING SYSTEM MATERIALS. ISOLATE TEST SOURCE AND ALLOW TO STAND FOR FOUR HOURS. LEAKS AND LOSS IN TEST PRESSURE CONSTITUTE DEFECTS THAT MUST BE REPAIRED.
 - REPAIR LEAKS AND DEFECTS WITH NEW MATERIALS AND RETEST PIPING OR PORTION THEREOF UNTIL SATISFACTORY RESULTS ARE OBTAINED.
 - PREPARE REPORTS FOR TESTS AND FOR CORRECTIVE ACTION REQUIRED.
- Z. DOMESTIC WATER PIPING WILL BE CONSIDERED DEFECTIVE IF IT DOES NOT PASS TESTS AND INSPECTIONS.
- AA. PREPARE TEST AND INSPECTION REPORTS.
- AB. CLEAN AND DISINFECT POTABLE AND NON-POTABLE DOMESTIC WATER PIPING AS FOLLOWS: AC. PURGE NEW PIPING AND PARTS OF EXISTING PIPING THAT HAVE BEEN ALTERED, EXTENDED, OR REPAIRED BEFORE USING.
- AD. USE PURGING AND DISINFECTING PROCEDURES PRESCRIBED BY AUTHORITIES HAVING JURISDICTION; IF METHODS ARE NOT PRESCRIBED, USE PROCEDURES DESCRIBED IN EITHER AWWA C651 OR AWWA C652 OR FOLLOW PROCEDURES DESCRIBED BELOW:
- FLUSH PIPING SYSTEM WITH CLEAN, POTABLE WATER UNTIL DIRTY WATER DOES NOT APPEAR AT OUTLETS.
 - FLUSH SYSTEM WITH CLEAN, POTABLE WATER UNTIL NO CHLORINE IS IN WATER COMING FROM SYSTEM AFTER THE STANDING TIME.
 - SUBMIT WATER SAMPLES IN STERILE BOTTLES TO AUTHORITIES HAVING JURISDICTION. REPEAT PROCEDURES IF BIOLOGICAL EXAMINATION SHOWS CONTAMINATION.
- AE. UNDER-BUILDING-SLAB, DOMESTIC WATER PIPING, NPS 2 (DN 50) AND SMALLER, SHALL BE THE FOLLOWING:
- SOFT COPPER TUBE, ASTM B 88, TYPE L (ASTM B 88M, TYPE B); WROUGHT-COPPER SOLDER-JOINT FITTINGS, AND BRAZED JOINTS.
- AF. ABOVEGROUND DOMESTIC WATER PIPING, NPS 2 (DN 50) AND SMALLER, SHALL BE THE FOLLOWING:
- HARD COPPER TUBE, ASTM B 88, TYPE L (ASTM B 88M, TYPE B); WROUGHT-COPPER SOLDER-JOINT FITTINGS, AND SOLDERED JOINTS.
 - COPPER PRESS FITTINGS: AT THE CONTRACTOR'S OPTION ON THE DOMESTIC HOT AND COLD WATER PIPING, COILING COIL, CONDENSATE DRAIN IN COPPER LINES 1/2" DIAMETER UP THROUGH 2-1/2" DIAMETER MECHANICAL PRESS (PRO-PRESS) JOINTS AND FITTINGS INCLUDING THE SMART CONNECTION FEATURE OPTION TO ENSURE THAT UNPRESSURED FITTING WILL EASILY BE DETECTED DURING PRESSURE TESTING AS MANUFACTURER BY VEGA, NIBCO AND APOLLO PRESS WILL BE ACCEPTABLE PROVIDED THE FITTING MANUFACTURER'S RECOMMENDED CHIPPING TOOL, WITH PROPERLY SIZED REPLACEMENT JAWS ARE UTILIZED RIGID TOOL COMPANY. INSTALLATION WILL BE IN ACCORDANCE WITH MANUFACTURER'S APPROVED PUBLISHED GUIDELINES.
- AG. ABOVEGROUND DOMESTIC WATER PIPING, NPS 2-1/2 TO NPS 4 (DN 65 TO DN 100), SHALL BE OF THE FOLLOWING:
- HARD COPPER TUBE, ASTM B 88, TYPE L (ASTM B 88M, TYPE B); CAST-COPPER SOLDER-JOINT FITTINGS, AND SOLDERED JOINTS.
 - GALVANIZED-STEEL PIPE: GROOVED-JOINT, GALVANIZED-STEEL-PIPE APPURTENANCES, AND GROOVED JOINTS.
- AH. DRAWINGS INDICATE VALVE TYPES TO BE USED. WHERE SPECIFIC VALVE TYPES ARE NOT INDICATED, THE FOLLOWING REQUIREMENTS APPLY:
- SHUTOFF DUTY: USE BALL VALVES FOR PIPING NPS 2 (DN 50) AND SMALLER. USE GATE VALVES WITH FLANGED ENDS FOR PIPING NPS 2-1/2 (DN 65) AND LARGER.
 - THROTTLING DUTY: USE BALL VALVES FOR PIPING NPS 2 (DN 50) AND SMALLER. USE BALL VALVES WITH FLANGED ENDS FOR PIPING NPS 2-1/2 (DN 65) AND LARGER.
 - HOT-WATER CIRCULATION VALVE: CALIBRATED BALANCING VALVES.
 - DRAIN DUTY: HOSE-END DRAIN VALVES.
- AI. USE CHECK VALVES TO MAINTAIN CORRECT DIRECTION OF DOMESTIC WATER FLOW TO AND FROM EQUIPMENT.
- AJ. IRON GROOVED-END VALVES MAY BE USED WITH GROOVED-END PIPING.

- AF. ABOVEGROUND, SOIL AND WASTE PIPING 6" AND SMALLER SHALL BE ANY OF THE FOLLOWING:
- SERVICE CLASS, CAST-IRON SOIL PIPE AND FITTINGS; GASKETS; AND GASKETED JOINTS.
 - HUBLESS, CAST-IRON SOIL PIPE AND FITTINGS HEAVY-DUTY HUBLESS-PIPING COUPLINGS; AND COUPLED JOINTS.
- AG. ABOVEGROUND, SOIL AND WASTE PIPING 8" AND LARGER SHALL BE ANY OF THE FOLLOWING:
- SERVICE WEIGHT (SV) HUB AND SPOUT CAST IRON SOIL PIPE FITTINGS
- AH. ABOVEGROUND, VENT PIPING 6" AND SMALLER SHALL BE ANY OF THE FOLLOWING:
- HUBLESS, CAST-IRON SOIL PIPE AND FITTINGS; CSPR HUBLESS-PIPING COUPLINGS; AND COUPLED JOINTS.
- AI. ABOVEGROUND, VENT PIPING 8" AND LARGER SHALL BE ANY OF THE FOLLOWING:
- SERVICE CLASS, CAST-IRON SOIL PIPE AND FITTINGS; GASKETS; AND GASKETED JOINTS.
 - SOLID WALL PVC PIPE, PVC SOCKET FITTINGS, AND SOLVENT-CEMENTED JOINTS
- CLEANOUTS**
- A. EXPOSED METAL CLEANOUTS:
- MANUFACTURERS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE PRODUCTS BY ONE OF THE FOLLOWING:
- JOSAM COMPANY; JOSAM DIV.
 - MFAB, INC.
 - SMITH, JAY R. MFG. CO.; DIVISION OF SMITH INDUSTRIES, INC.
 - ZURN PLUMBING PRODUCTS GROUP; SPECIFICATION DRAINAGE OPERATION. STANDARD: ASME A112.31, CAST-IRON SOIL PIPE FOR CLEANOUT TEST TEST.
- SIZE: SAME AS CONNECTED DRAINAGE PIPING.
- BODY MATERIAL: HUB-AND-SPOUT, CAST-IRON SOIL PIPE T-BRANCH AS REQUIRED TO MATCH CONNECTED PIPING.
- CLOSURE: COUNTERSUNK PLUG.
- CLOSURE PLUG SIZE: SAME AS OR NOT MORE THAN ONE SIZE SMALLER THAN CLEANOUT SIZE.
- CLOSURE: STAINLESS-STEEL PLUG WITH SEAL.
- B. METAL FLOOR CLEANOUTS:
- MANUFACTURERS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE PRODUCTS BY ONE OF THE FOLLOWING:
- JOSAM COMPANY; JOSAM DIV.
 - SMITH, JAY R. MFG. CO.; DIVISION OF SMITH INDUSTRIES, INC.
 - TYLER PIPE, WADE DIV.
 - ZURN PLUMBING PRODUCTS GROUP; SPECIFICATION DRAINAGE OPERATION. STANDARD: ASME A112.36.2M FOR THREADED, ADJUSTABLE HOUSING CLEANOUT. SIZE: SAME AS CONNECTED BRANCH.
- TYPE: ADJUSTABLE HOUSING THREADED, ADJUSTABLE HOUSING.
- STANDARD: ASME A112.31.
- SIZE: SAME AS CONNECTED BRANCH.
- HOUSING: STAINLESS STEEL.
- CLOSURE: STAINLESS STEEL WITH SEAL.
- C. CAST-IRON WALL CLEANOUTS:
- MANUFACTURERS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE PRODUCTS BY ONE OF THE FOLLOWING:
- JOSAM COMPANY; JOSAM DIV.
 - SMITH, JAY R. MFG. CO.; DIVISION OF SMITH INDUSTRIES, INC.
 - TYLER PIPE, WADE DIV.
 - ZURN PLUMBING PRODUCTS GROUP; SPECIFICATION DRAINAGE OPERATION. STANDARD: ASME A112.36.2M, INCLUDE WALL ACCESS.
- SIZE: SAME AS CONNECTED DRAINAGE PIPING.
- HUB-AND-SPOUT, CAST-IRON SOIL PIPE T-BRANCH AS REQUIRED TO MATCH CONNECTED PIPING.
- CLOSURE: COUNTERSUNK OR RAISED-HOOD, BRASS PLUG.
- TYPE: ADJUSTABLE HOUSING THREADED, ADJUSTABLE HOUSING.
- STANDARD: ASME A112.31.
- SIZE: SAME AS CONNECTED BRANCH.
- HOUSING: STAINLESS STEEL.
- CLOSURE: STAINLESS STEEL WITH SEAL.
- D. INSTALL CLEANOUTS IN ABOVEGROUND PIPING AND BUILDING DRAIN PIPING ACCORDING TO THE FOLLOWING, UNLESS OTHERWISE INDICATED:
- SIZE SAME AS DRAINAGE PIPING (10" NPS 4 (DN 100), USE NPS 4 (DN 100) FOR LARGER DRAINAGE PIPING UNLESS LARGER CLEANOUT IS INDICATED.
 - LOCATE AT EACH CHANGE IN DIRECTION OF PIPING GREATER THAN 45 DEGREES.
 - LOCATE AT MINIMUM INTERVALS OF 50 FEET (15 M) FOR PIPING NPS 4 (DN 100) AND SMALLER AND 100 FEET (30 M) FOR LARGER PIPING.
 - LOCATE AT BASE OF EACH VERTICAL SOIL AND WASTE STACK.
- E. FLOOR CLEANOUTS FOR PIPING BELOW FLOORS, INSTALL CLEANOUT DECK PLATES WITH TOP FLUSH WITH FINISHED FLOOR.
- F. FOR CLEANOUTS LOCATED IN CONCEALED PIPING, INSTALL CLEANOUT WALL ACCESS COVERS, OF TYPES INDICATED WITH FRAME AND COVER FLUSH WITH FINISHED WALL.
- G. INSTALL FLOOR DRAINS AT LOW POINTS OF SURFACE AREAS TO BE DRAINED. SET GRATES OF DRAINS FLUSH WITH FINISHED FLOOR, UNLESS OTHERWISE INDICATED.
- H. INSTALL FLASHING ASSEMBLIES ON SANITARY STACK VENTS AND VENT STACKS THAT EXTEND THROUGH ROOF.
- I. ASSEMBLE OPEN DRAIN FITTINGS AND INSTALL WITH TOP OF HUB 2 INCHES (51 MM) ABOVE FINISHED FLOOR.
- J. INSTALL TRAP-SEAL TRAPS ON FLOOR DRAINS AND OTHER WASTE OUTLETS, IF INDICATED.
- K. INSTALL FLOOR-DRAIN, TRAP-SEAL PRIMER FITTINGS ON INLET TO FLOOR DRAINS THAT REQUIRE TRAP-SEAL PRIMER CONNECTION.
- L. EXCEPTION: FITTING MAY BE OMITTED IF TRAP HAS TRAP-SEAL PRIMER CONNECTION.
- M. SIZE: SAME AS FLOOR DRAIN INLET.
- N. INSTALL CARBON-STEEL PIPE HANGERS FOR HORIZONTAL PIPING IN CORROSIVE ENVIRONMENTS.
- O. INSTALL STAINLESS-STEEL PIPE HANGERS FOR HORIZONTAL PIPING IN CORROSIVE ENVIRONMENTS.
- P. INSTALL CARBON-STEEL PIPE SUPPORT CLAMPS FOR VERTICAL PIPING IN CORROSIVE ENVIRONMENTS.
- Q. INSTALL INDIVIDUAL, STRAIGHT, HORIZONTAL PIPING RIGS:
- 1.00 FEET (30 M) AND LESS: MSS TYPE 1, ADJUSTABLE, STEEL GLEEVES HANGERS.
 - LONGER THAN 100 FEET (30 M): MSS TYPE 43, ADJUSTABLE ROLLER HANGERS.
 - LONGER THAN 100 FEET (30 M) IF INDICATED: MSS TYPE 49, SPRING CONNECTION ROLLS.
 - MULTIPLE, STRAIGHT, HORIZONTAL PIPING RUNS 100 FEET (30 M) OR LONGER: MSS TYPE 44, PIPE ROLLS.
 - SUPPORT PIPING ROLLS ON TRAFFICE.
- U. BASE OF VERTICAL PIPING: MSS TYPE 52, SPRING HANGERS.
- V. FITTING HORIZONTAL PIPING AND TUBING WITHIN 12 INCHES (300 MM) OF EACH SUPPORT, VALVE, AND COUPLING.
- W. DURRING INSTALLATION, NOTIFY AUTHORITIES HAVING JURISDICTION AT LEAST 24 HOURS BEFORE INSPECTION MUST BE MADE. PREPARE TESTS SPECIFIED BELOW IN PRESENCE OF AUTHORITIES HAVING JURISDICTION.
- ROUGH-IN-INSPECTION: ARRANGE FOR INSPECTION OF PIPING BEFORE CONCRETE OR CLOSING-IN AFTER ROUGHING-IN AND BEFORE SETTING FIXTURES.
- FINAL INSPECTION: ARRANGE FOR FINAL INSPECTION BY AUTHORITIES HAVING JURISDICTION TO OBSERVE TESTS SPECIFIED BELOW AND TO ENSURE COMPLIANCE WITH REQUIREMENTS.
- REINSPECTION: IF AUTHORITIES HAVING JURISDICTION FIND THAT PIPING WILL NOT PASS TEST OR INSPECTIONS, MAKE REQUIRED CORRECTIONS AND ARRANGE FOR REINSPECTION.
- PREPARE INSPECTION REPORTS AND HAVE THEM SIGNED BY AUTHORITIES HAVING JURISDICTION.
- Y. PIPING TESTS AND INSPECTIONS:
- FILL DOMESTIC WATER PIPING. CHECK COMPONENTS TO DETERMINE THAT THEY ARE NOT AIR BOUND AND THAT PIPING IS FULL OF WATER.
 - TEST FOR LEAKS AND DEFECTS IN NEW PIPING AND PARTS OF EXISTING PIPING THAT HAVE BEEN ALTERED, EXTENDED, OR REPAIRED. IF TESTING IS PERFORMED IN SEGMENTS, SUBMIT A SEPARATE REPORT FOR EACH TEST, COMPLETE WITH DIAGRAM OF PORTION OF PIPING TESTED.
 - LEAK: NEW, ALTERED, EXTENDED, OR REPLACED DOMESTIC WATER PIPING UNCOVERED AND UNCONCEALED UNTIL IT HAS BEEN TESTED AND APPROVED. EXPOSE WORK THAT WAS COVERED OR CONCEALED BEFORE IT WAS TESTED.
 - CAP AND SUBJECT PIPING TO STATIC WATER PRESSURE OF 50 PSIG (345 KPA) ABOVE OPERATING PRESSURE, WITHOUT EXCEEDING PRESSURE RATING OF PIPING SYSTEM MATERIALS. ISOLATE TEST SOURCE AND ALLOW TO STAND FOR FOUR HOURS. LEAKS AND LOSS IN TEST PRESSURE CONSTITUTE DEFECTS THAT MUST BE REPAIRED.
 - REPAIR LEAKS AND DEFECTS WITH NEW MATERIALS AND RETEST PIPING OR PORTION THEREOF UNTIL SATISFACTORY RESULTS ARE OBTAINED.
 - PREPARE REPORTS FOR TESTS AND FOR CORRECTIVE ACTION REQUIRED.
- Z. DOMESTIC WATER PIPING WILL BE CONSIDERED DEFECTIVE IF IT DOES NOT PASS TESTS AND INSPECTIONS.
- AA. PREPARE TEST AND INSPECTION REPORTS.
- AB. CLEAN AND DISINFECT POTABLE AND NON-POTABLE DOMESTIC WATER PIPING AS FOLLOWS: AC. PURGE NEW PIPING AND PARTS OF EXISTING PIPING THAT HAVE BEEN ALTERED, EXTENDED, OR REPAIRED BEFORE USING.
- AD. USE PURGING AND DISINFECTING PROCEDURES PRESCRIBED BY AUTHORITIES HAVING JURISDICTION; IF METHODS ARE NOT PRESCRIBED, USE PROCEDURES DESCRIBED IN EITHER AWWA C651 OR AWWA C652 OR FOLLOW PROCEDURES DESCRIBED BELOW:
- FLUSH PIPING SYSTEM WITH CLEAN, POTABLE WATER UNTIL DIRTY WATER DOES NOT APPEAR AT OUTLETS.
 - FLUSH SYSTEM WITH CLEAN, POTABLE WATER UNTIL NO CHLORINE IS IN WATER COMING FROM SYSTEM AFTER THE STANDING TIME.
 - SUBMIT WATER SAMPLES IN STERILE BOTTLES TO AUTHORITIES HAVING JURISDICTION. REPEAT PROCEDURES IF BIOLOGICAL EXAMINATION SHOWS CONTAMINATION.
- AE. UNDER-BUILDING-SLAB, DOMESTIC WATER PIPING, NPS 2 (DN 50) AND SMALLER, SHALL BE THE FOLLOWING:
- SOFT COPPER TUBE, ASTM B 88, TYPE L (ASTM B 88M, TYPE B); WROUGHT-COPPER SOLDER-JOINT FITTINGS, AND BRAZED JOINTS.
- AF. ABOVEGROUND DOMESTIC WATER PIPING, NPS 2 (DN 50) AND SMALLER, SHALL BE THE FOLLOWING:
- HARD COPPER TUBE, ASTM B 88, TYPE L (ASTM B 88M, TYPE B); WROUGHT-COPPER SOLDER-JOINT FITTINGS, AND SOLDERED JOINTS.
 - COPPER PRESS FITTINGS: AT THE CONTRACTOR'S OPTION ON THE DOMESTIC HOT AND COLD WATER PIPING, COILING COIL, CONDENSATE DRAIN IN COPPER LINES 1/2" DIAMETER UP THROUGH 2-1/2" DIAMETER MECHANICAL PRESS (PRO-PRESS) JOINTS AND FITTINGS INCLUDING THE SMART CONNECTION FEATURE OPTION TO ENSURE THAT UNPRESSURED FITTING WILL EASILY BE DETECTED DURING PRESSURE TESTING AS MANUFACTURER BY VEGA, NIBCO AND APOLLO PRESS WILL BE ACCEPTABLE PROVIDED THE FITTING MANUFACTURER'S RECOMMENDED CHIPPING TOOL, WITH PROPERLY SIZED REPLACEMENT JAWS ARE UTILIZED RIGID TOOL COMPANY. INSTALLATION WILL BE IN ACCORDANCE WITH MANUFACTURER'S APPROVED PUBLISHED GUIDELINES.
- AG. ABOVEGROUND DOMESTIC WATER PIPING, NPS 2-1/2 TO NPS 4 (DN 65 TO DN 100), SHALL BE OF THE FOLLOWING:
- HARD COPPER TUBE, ASTM B 88, TYPE L (ASTM B 88M, TYPE B); CAST-COPPER SOLDER-JOINT FITTINGS, AND SOLDERED JOINTS.
 - GALVANIZED-STEEL PIPE: GROOVED-JOINT, GALVANIZED-STEEL-PIPE APPURTENANCES, AND GROOVED JOINTS.
- AH. DRAWINGS INDICATE VALVE TYPES TO BE USED. WHERE SPECIFIC VALVE TYPES ARE NOT INDICATED, THE FOLLOWING REQUIREMENTS APPLY:
- SHUTOFF DUTY: USE BALL VALVES FOR PIPING NPS 2 (DN 50) AND SMALLER. USE GATE VALVES WITH FLANGED ENDS FOR PIPING NPS 2-1/2 (DN 65) AND LARGER.
 - THROTTLING DUTY: USE BALL VALVES FOR PIPING NPS 2 (DN 50) AND SMALLER. USE BALL VALVES WITH FLANGED ENDS FOR PIPING NPS 2-1/2 (DN 65) AND LARGER.
 - HOT-WATER CIRCULATION VALVE: CALIBRATED BALANCING VALVES.
 - DRAIN DUTY: HOSE-END DRAIN VALVES.
- AI. USE CHECK VALVES TO MAINTAIN CORRECT DIRECTION OF DOMESTIC WATER FLOW TO AND FROM EQUIPMENT.
- AJ. IRON GROOVED-END VALVES MAY BE USED WITH GROOVED-END PIPING.

PLUMBING PIPING INSULATION

- A. INSULATION MATERIALS
- PRODUCTS SHALL NOT CONTAIN ASBESTOS, LEAD, MERCURY, OR MERCURY COMPOUNDS.
- PRODUCTS THAT COME IN CONTACT WITH STAINLESS STEEL SHALL HAVE A LEACHABLE CHLORIDE CONTENT OF LESS THAN 50 PPMM WEIGHTED ACCORDING TO ASTM A 871.
- B. FOAM INSULATION MATERIALS SHALL NOT USE CFC OR HCFC BLOWING AGENTS IN THE MANUFACTURING PROCESS.
- C. MINERAL-FIBER, PREFORMED PIPE INSULATION:
- PRODUCTS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE THE FOLLOWING [PROVIDE ONE OF THE FOLLOWING]:
- CERTAIN TEED, CO.
 - JONAS MANVILLE, MORO-KO.
 - MINERAL-FIBER INSULATION: TYPE I FOR INDOOR APPLICATIONS, USE MASTICS THAT HAVE A VOC CONTENT OF 50 G/L OR LESS WHEN CALCULATED ACCORDING TO 40 CFR 59, SUBPART D (EPA METHOD 24).
- D. MINERAL-FIBER INSULATING CEMENT: COMPLY WITH ASTM C 195.
- PRODUCTS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE THE FOLLOWING:
- RAMCO INSULATION, INC.; SUPER-SITK.
- E. MINERAL-FIBER, HYDRAULIC-SETTING INSULATING AND FINISHING CEMENT: COMPLY WITH ASTM C 449.
- PRODUCTS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE THE FOLLOWING:
- RAMCO INSULATION, INC.; RAMCOITE 1200 AND QUIK-COTE.
- F. ADHESIVES
- MINERAL-FIBER SHALL BE COMPATIBLE WITH INSULATION MATERIALS, JACKETS, AND SUBSTRATES AND FOR BONDING INSULATION TO ITSELF AND TO SURFACES TO BE INSULATED, UNLESS OTHERWISE INDICATED.
- MINERAL-FIBER ADHESIVE: COMPLY WITH MIL-A-3316C, CLASS 2, GRADE A.
- PRODUCTS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE ONE OF THE FOLLOWING:
- CHILDERS BRAND, SPECIALTY CONSTRUCTION BRANDS, INC., A BUSINESS OF H. B. FULLER COMPANY; CP-30.
 - EAGLE BRIDGES - MARATHON INDUSTRIES; 225.
 - FOSTER BRAND, SPECIALTY CONSTRUCTION BRANDS, INC., A BUSINESS OF H. B. FULLER COMPANY; 30-35.
 - MON-ECO INDUSTRIES, INC.; 22-25.
- FOR INDOOR APPLICATIONS, USE ADHESIVE THAT HAS A VOC CONTENT OF 80 G/L OR LESS WHEN CALCULATED ACCORDING TO 40 CFR 59, SUBPART D (EPA METHOD 24).
- G. ASU ADHESIVE, AND FSK JACKET ADHESIVE, COMPLY WITH MIL-A-3316C, CLASS 2, GRADE A FOR BONDING INSULATION TO METAL SEAMS AND JOINTS.
- PRODUCTS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE ONE OF THE FOLLOWING:
- CHILDERS BRAND, SPECIALTY CONSTRUCTION BRANDS, INC., A BUSINESS OF H. B. FULLER COMPANY; CP-30.
 - EAGLE BRIDGES - MARATHON INDUSTRIES; 225.
 - FOSTER BRAND, SPECIALTY CONSTRUCTION BRANDS, INC., A BUSINESS OF H. B. FULLER COMPANY; 30-35.
 - MON-ECO INDUSTRIES, INC.; 22-25.
- FOR INDOOR APPLICATIONS, USE ADHESIVE THAT HAS A VOC CONTENT OF 50 G/L OR LESS WHEN CALCULATED ACCORDING TO 40 CFR 59, SUBPART D (EPA METHOD 24).
- H. MASTICS: MATERIALS SHALL BE COMPATIBLE WITH INSULATION MATERIALS, JACKETS, AND SUBSTRATES. COMPLY WITH MIL-PRC 12956, TYPE II FOR INDOOR APPLICATIONS, USE MASTICS THAT HAVE A VOC CONTENT OF 50 G/L OR LESS WHEN CALCULATED ACCORDING TO 40 CFR 59, SUBPART D (EPA METHOD 24).
- I. VAPOR-BARRIER MASTIC: SOLVENT BASED; SUITABLE FOR INDOOR USE ON BELOW-AMBIENT SERVICES.
- PRODUCTS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE ONE OF THE FOLLOWING:
- CHILDERS BRAND, SPECIALTY CONSTRUCTION BRANDS, INC., A BUSINESS OF H. B. FULLER COMPANY; CP-30.
 - FOSTER BRAND, SPECIALTY CONSTRUCTION BRANDS, INC., A BUSINESS OF H. B. FULLER COMPANY

ELECTRICAL SPECIFICATIONS

ELECTRICAL CONDUCTORS

- A. MANUFACTURERS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE PRODUCTS BY ONE OF THE FOLLOWING:
ALCAN PRODUCTS CORPORATION; ALCAN CABLE DIVISION.
AMERICAN INSULATED WIRE CORP.; A LEVITON COMPANY.
GENERAL CABLE CORPORATION.
SINATOR WIRE CABLE COMPANY.
SOUTHWIRE COMPANY.
CONDUCTOR TYPES: COMPLY WITH NEMA WC 70.
CONDUCTOR INSULATION: COMPLY WITH NEMA WC 70 FOR ARMORED CABLE, TYPE AC, METAL-CLAD CABLE, AND COPPER.
TRIPRODUCTOR CABLE: COMPLY WITH NEMA WC 70 FOR ARMORED CABLE, TYPE AC, METAL-CLAD CABLE, TYPE MC, TYPE SD, AND TYPE USE WITH GROUND WIRE.
- B. CONDUCTOR MATERIAL APPLICATIONS:
COPPER: SOLID FOR NO. 10 AND SMALLER; STRANDED FOR NO. 8 AWG AND LARGER.
CONDUCTOR INSULATION AND MULTICONDUCTOR CABLE APPLICATIONS AND WIRING METHODS
- C. CONDUCTOR INSULATION AND MULTICONDUCTOR CABLE APPLICATIONS AND WIRING METHODS
1. SERVICE ENTRANCE: TYPE THIN-THIN, SINGLE CONDUCTORS IN RACEWAY, TYPE SE OR USE MULTICONDUCTOR CABLE.
2. EXPOSED FEEDERS: TYPE THIN-THIN, SINGLE CONDUCTORS IN RACEWAY.
3. FEEDERS CONCEALED IN CEILINGS, WALLS, PARTITIONS, AND CRAWLSPACES: TYPE THIN-THIN, SINGLE CONDUCTORS IN RACEWAY.
4. FEEDERS CONCEALED IN CONCRETE, BELOW SLABS-ON-GRADE, AND UNDERGROUND:
TYPE THIN-THIN, SINGLE CONDUCTORS IN RACEWAY.
5. FEEDERS INSTALLED BELOW RAISED FLOORING: TYPE THIN-THIN, SINGLE CONDUCTORS IN RACEWAY.
6. EXPOSED BRANCH CIRCUITS INCLUDING IN CRAWLSPACES: TYPE THIN-THIN, SINGLE CONDUCTORS IN RACEWAY, METAL-CLAD CABLE, TYPE MC.
7. BRANCH CIRCUITS CONCEALED IN CEILINGS, WALLS, AND PARTITIONS: TYPE THIN-THIN, SINGLE CONDUCTORS IN RACEWAY, ARMORED CABLE, TYPE AC, METAL-CLAD CABLE, TYPE MC.
8. BRANCH CIRCUITS CONCEALED IN CONCRETE, BELOW SLABS-ON-GRADE, AND UNDERGROUND:
TYPE THIN-THIN, SINGLE CONDUCTORS IN RACEWAY.
9. BRANCH CIRCUITS INSTALLED BELOW RAISED FLOORING: TYPE THIN-THIN, SINGLE CONDUCTORS IN RACEWAY OR ARMORED CABLE, TYPE MC, METAL-CLAD CABLE, TYPE MC.
10. BRANCH CIRCUITS INSTALLED IN PATIENT CARE AREAS: TYPE HSF-WRAP OR AC-HF WITH ASSEMBLY CERTIFIED AS AN EQUIPMENT GROUNDING CONDUCTOR AND A GREEN INSULATED EQUIPMENT GROUNDING CONDUCTOR TO ALL RECEPTABLES, METALLIC BOXES CONTAINING RECEPTABLES, AND ALL METALLIC EQUIPMENT CASINGS.

GROUNDING

- A. INSULATED CONDUCTORS: COPPER WIRE OR CABLE INSULATED FOR 600 V UNLESS OTHERWISE REQUIRED BY APPLICABLE CODE OR AUTHORITIES HAVING JURISDICTION.
- B. BARE COPPER CONDUCTORS:
- SOLID CONDUCTORS: ASTM B 3.
 - STRANDED CONDUCTORS: ASTM B 8.
 - BONDING CABLE: 28 INCH, 14 STRANDED OF NO. 17 AWG CONDUCTOR, 1/4 INCH (6 MM) IN DIAMETER.
 - BONDING CONDUIT: NO. 4 OR NO. 6 AWG, STRANDED CONDUCTOR.
 - BONDING LEMPS: COPPER TAPE, BRAIDED CONDUCTING CAPABILITY TO THE DEGREE DEFINED BY FERROUS; 1-5/8 INCHES (41 MM) AND 1/16 INCH (1.6 MM) THICK.
- C. GROUNDING BUS: PREDRILLED RECTANGULAR BARS OF ANNEALED COPPER, 1/4 BY 4 INCHES (6 BY 100 MM) IN CROSS SECTION, WITH 9/32-INCH (7.14-MM) HOLES SPACED 1-1/8 INCHES (28 MM) APART. STAND-OFF INSULATORS FOR MOUNTING SHALL COMPLY WITH UL 891 FOR USE IN SWITCHBOARDS, 600 V, LEXAN, IMPULSE TESTED AT 5000 V.
- D. CONNECTORS LISTED AND LABELED BY AN NRTL ACCEPTABLE TO AUTHORITIES HAVING JURISDICTION FOR APPLICATION AND FOR SPECIFIC TYPES, SIZES, AND COMBINATIONS OF CONDUCTORS AND OTHER ITEMS CONNECTED.
- E. BOLTED CONNECTORS FOR CONDUCTORS AND PIPES: COPPER OR COPPER ALLOY, PRESSURE TUBE WITH AT LEAST TWO BOLTS.
WELDED CONNECTORS: CLAMP TYPE, SIZED FOR PIPE.
- F. WELDED CONNECTORS: EXOTHERMIC-WELDING KITS OF TYPES RECOMMENDED BY KIT MANUFACTURER FOR MATERIALS BEING JOINED AND INSTALLATION CONDITIONS.
- G. BUS-BAR CONNECTORS: MECHANICAL TYPE, CAST SILICON BRONZE, SOLDERLESS COMPRESSION-TYPE WIRE TERMINALS, AND LONG-BARREL, TWO-BOLT CONNECTION TO GROUND BUS BAR.
- H. CONDUCTORS: INSTALL SOLID CONDUCTOR FOR NO. 8 AWG AND SMALLER, AND STRANDED CONDUCTORS FOR NO. 6 AWG AND LARGER (UNLESS OTHERWISE INDICATED).
- I. ISOLATED GROUNDING CONDUCTORS: GREEN-COLORED INSULATION WITH CONTINUOUS YELLOW STRIPE, ON FEEDERS WITH ISOLATED GROUNDING IDENTIFY GROUNDING CONDUCTOR WHERE VISIBLE TO NORMAL INSPECTION, WITH ALTERNATING BANDS OF GREEN AND YELLOW TAPE, WITH AT LEAST THREE BANDS OF GREEN AND TWO BANDS OF YELLOW.
- J. CONDUCTOR TERMINATIONS AND CONNECTIONS:
PIPE AND EQUIPMENT GROUNDING CONDUCTOR TERMINATIONS: BOLTED CONNECTORS.
UNDERGROUND CONNECTIONS: WELDED CONNECTIONS EXCEPT AT TEST WELLS AND AS OTHERWISE INDICATED. CONNECTIONS TO GROUND RODS AT TEST WELLS: BOLTED CONNECTIONS. CONNECTIONS TO STRUCTURAL STEEL: WELDED CONNECTORS.
- K. EQUIPMENT GROUNDING:
INSTALL INSULATED EQUIPMENT GROUNDING CONDUCTORS TO COMPLY WITH THE NEC AND AS INDICATED ON THE DRAWINGS.

ELECTRICAL HANGERS AND SUPPORTS

- A. COMPLY WITH NECA 1 AND NECA 101 FOR APPLICATION OF HANGERS AND SUPPORTS FOR ELECTRICAL EQUIPMENT AND SYSTEMS EXCEPT IF REQUIREMENTS IN THIS SECTION ARE STRICTER. MAXIMUM SUPPORT SPACING AND MINIMUM HANGER ROD SIZE FOR RACEWAY: SPACE SUPPORTS FOR EMT, IMC, AND RMC AS SCHEDULED IN NECA 1, WHERE ITS TABLE 1 LISTS MAXIMUM SPACINGS LESS THAN STATED IN NECA 70. MINIMUM ROD SIZE SHALL BE 1/4 INCH (6 MM) IN DIAMETER. MULTIPLE RACEWAYS OR CABLES: INSTALL TRAPEZOID-TYPE SUPPORTS FABRICATED WITH STEEL SLOTTED OR OTHER SUPPORT SYSTEM, SIZED 50% CAPACITY CAN BE INCREASED BY AT LEAST 25 PERCENT IN FUTURE WITHOUT EXCEEDING SPECIFIED DESIGN LOAD LIMITS. SECURE RACEWAYS AND CABLES TO THESE SUPPORTS WITH TWO-BOLT CONDUIT CLAMPS, SPRING-STEEL CLAMPS DESIGNED FOR SUPPORTING SINGLE CONDUCTORS WITHOUT BOLTS MAY BE USED FOR 1-1/2-INCH (38-MM) AND SMALLER RACEWAYS SERVING BRANCH CIRCUITS AND COMMUNICATION SYSTEMS ABOVE SUSPENDED CEILINGS AND FOR FASTENING RACEWAYS TO TRAPEZOID SUPPORTS.
- B. SUPPORT INSTALLATION: COMPLY WITH NECA 1 AND NECA 101 FOR INSTALLATION REQUIREMENTS EXCEPT AS SPECIFIED IN THIS ARTICLE.
- C. RACEWAY SUPPORT METHODS: IN ADDITION TO METHODS DESCRIBED IN NECA 1, EMT, IMC, AND RMC MAY BE SUPPORTED BY OPENINGS THROUGH STRUCTURE MEMBERS, AS PERMITTED IN NECA 70.
- D. STRENGTH OF SUPPORT ASSEMBLIES: WHERE NOT INDICATED, SELECT SIZES OF COMPONENTS SO STRENGTH WILL BE ADEQUATE TO CARRY PRESENT AND FUTURE STATIC LOADS WITH SPECIFIED LOADING LIMITS. MINIMUM STATIC DESIGN LOAD USED FOR STRENGTH DETERMINATION SHALL BE WEIGHT OF SUPPORTED COMPONENTS PLUS 200 LB (90 KG).
- E. MOUNTING AND ANCHORAGE OF SURFACE-MOUNTED EQUIPMENT AND COMPONENTS: ANCHOR AND FASTEN ELECTRICAL ITEMS AND THEIR SUPPORTS TO BUILDING STRUCTURAL ELEMENTS BY THE FOLLOWING METHODS UNLESS OTHERWISE INDICATED BY CODE:
- TO WOOD: FASTEN WITH LAG SCREWS OR THROUGH BOLTS.
 - TO NEW CONCRETE: BOLT TO CONCRETE INSERTS.
 - TO MASONRY: APPROVED TOGGLE-TYPE BOLTS ON HOLLOW MASONRY UNITS AND EXPANSION ANCHOR FASTENERS ON SOLID MASONRY.
 - TO EXISTING CONCRETE: EXPANSION ANCHOR FASTENERS.
 - INSTEAD OF EXPANSION ANCHORS, POWER-ACTUATED TRENCH THREADED STUDS PROVIDED WITH LOCK WASHERS AND NUTS MAY BE USED IN EXISTING STANDARD-WEIGHT CONCRETE 4 INCHES (100 MM) THICK OR GREATER. DO NOT USE FOR ANCHORAGE TO LIGHTWEIGHT-AGGREGATE CONCRETE OR FOR SLABS LESS THAN 4 INCHES (100 MM) THICK.
 - TO STEEL: WELDED THREADED STUDS COMPLYING WITH AWS D1.1/D1.1M, WITH LOCK WASHERS AND NUTS OR BEAM CLAMPS (MSS TYPE 19, 21, 23, 25, OR 27) COMPLYING WITH MSS SP-63AL SCREWS.
 - TO LIGHT STEEL: SHEET METAL SCREWS.
 - DRILL HOLES FOR EXPANSION ANCHORS IN CONCRETE AT LOCATIONS AND TO DEPTHS THAT AVOID REINFORCING BARS.

ELECTRICAL CONDUIT

- A. METAL CONDUIT AND TUBING MANUFACTURERS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE PRODUCTS BY ONE OF THE FOLLOWING:
ATC CABLE SYSTEMS, INC.
ALFLEX INC.
2. ALLEX TUBE & CONDUIT; A TYCO INTERNATIONAL LTD. CO.
4. ANAVET ELECTRICAL, INC.; ANACONDA METAL HOSE.
ELECTRI-FLEX CO.
6. MAVERICK TUBE CORPORATION.
7. O-Z/GEENEY; A UNIT OF GENERAL SIGNAL.
8. WHEATLAND TUBE COMPANY.
B. RIGID STEEL CONDUIT: ANSI C80.1.
ALUMINUM RIGID CONDUIT: ANSI C80.5.
D. IMC: ANSI C80.6.
E. PVC-COATED STEEL CONDUIT: PVC-COATED RIGID STEEL CONDUIT.
COMPLY WITH NEMA WC 70.
F. IMC: ANSI C80.6.
G. COATING THICKNESS: 0.040 INCH (1 MM), MINIMUM.
H. EMT: ANSI C80.3.
I. IMC: ANSI C80.3.
J. LFMC: FLEXIBLE STEEL CONDUIT WITH PVC JACKET.
K. FITTINGS FOR CONDUIT INCLUDING ALL TYPES AND FLEXIBLE AND LIQUDTIGHT), EMT, AND CABLE: NEMA FB 1, LISTED FOR TYPE AND SIZE RACEWAY WITH WHICH USED, AND FOR APPLICATION AND ENVIRONMENT IN WHICH INSTALLED.
1. FITTINGS FOR EMT: STEEL SET-SCREW OR COMPRESSION TYPE; DIE-CAST IS NOT ACCEPTABLE.
2. COATING FOR FITTINGS FOR PVC-COATED CONDUIT: MINIMUM THICKNESS, 0.040 INCH (1 MM), WITH OVERLAPPING SLEEVES PROTECTING THREADED JOINTS.
L. JOINT COMPOUNDS AND GASKETS: GALVANIZED STEEL WITH SHAP-ON CABLE CONNECTOR ASSEMBLIES, AND COMPOUNDED FOR USE TO LUBRICATE AND PROTECT THREADED RACEWAY JOINTS FROM CORROSION AND ENHANCE THEIR CONDUCTIVITY.
M. METAL PANEL ACCESS, PULL, AND JUNCTION BOXES: NEMA FB 1, GALVANIZED, CAST IRON WITH GASKETED COVER.
N. ENCLOSEURE: VENTILATED, NEMA 250, TYPE 3R, CORE AND COIL SHALL BE ENCAPSULATED WITHIN RESIN COMPOUND, SEALING OUT MOISTURE AND AIR.
O. TRANSFORMER ENCLOSURE FINISH: COMPLY WITH NEMA 250 FINISH COLOR: GRAY.
P. TAPS FOR TRANSFORMERS SMALLER THAN 7.5 KVA: ONE 5 PERCENT TAP ABOVE NORMAL FULL CAPACITY.
Q. TAPS FOR TRANSFORMERS 7.5 TO 24 KVA: ONE 5 PERCENT TAP ABOVE AND ONE 5 PERCENT TAP BELOW NORMAL FULL CAPACITY.
R. TAPS FOR TRANSFORMERS 25 KVA AND LARGER: TWO 2.5 PERCENT TAPS ABOVE AND TWO 2.5 PERCENT TAPS BELOW NORMAL FULL CAPACITY.
S. INSULATION CLASS: 220 DEG C, UL-COMPONENT-RECOGNIZED INSULATION SYSTEM WITH A MAXIMUM OF 115 DEG C RISE ABOVE 40 DEG C AMBIENT TEMPERATURE.
T. ENERGY EFFICIENCY FOR TRANSFORMERS RATED 15 KVA AND LARGER: COMPLYING WITH DOE-2016 10 CFR PART 431.
U. SHEET METAL OUTLET AND DEVICE BOXES: NEMA FB 1, FERROUS ALLOY, TYPE FD, WITH GASKETED COVER.
V. METAL PANEL ACCESS, PULL, AND JUNCTION BOXES: NEMA FB 1, GALVANIZED, CAST IRON WITH GASKETED COVER.
W. HINGED-COVER ENCLOSURES: NEMA 250, TYPE 1, WITH CONTINUOUS-HINGE COVER WITH FLUSH LATCH, UNLESS OTHERWISE INDICATED.
1. METAL ENCLOSURES: STEEL, FINISHED INSIDE AND OUT WITH MANUFACTURER'S STANDARD ENAMEL.
A. IN STANDARD PARTITIONS, WHERE 1/2" AND 3/4" CONDUITS ARE EMPLOYED: 4" SQUARE BY 2-1/8" DEEP BOXES WITH 1-1/8" GANG OR 2-GANG PLASTER COVERS SHALL BE USED, NO. 4SD-SPL.
B. IN THIN PARTITIONS MEASURING 3-1/2" OR LESS: 4" SQUARE BY 1-1/2" DEEP BOXES WITH 1-1/8" GANG OR 2-GANG PLASTER COVERS SHALL BE USED, NO. 4SD-SPL.
C. IN STANDARD PARTITIONS, WHERE COVERS OF A SIZE GREATER THAN 3/4" ARE EMPLOYED: 4" SQUARE BY 2-1/8" DEEP BOXES WITH 1-1/8" GANG OR 2-GANG PLASTER COVERS SHALL BE USED, NO. 4SD-SPL.
D. WHEREBY NO TWO (2) OUTLET BOXES ARE INSTALLED CLOSER THAN 24" ON CENTER, AND SECURELY ATTACHED TO THE PARTITION STUDS, WITH AT LEAST ONE (1) PARTITION STUD SEPARATING THE OUTLET BOXES. IT IS NOT ACCEPTABLE TO SECURE OUTLET BOXES ONLY TO JEWEL PARTITION.
X. CABINETS:
1. NEMA 250, TYPE 1, GALVANIZED-STEEL BOX WITH REMOVABLE INTERIOR PANEL AND REMOVABLE FRONT, FINISHED INSIDE AND OUT WITH MANUFACTURER'S STANDARD ENAMEL.
2. HINGED DOOR IN FRONT COVER WITH FLUSH LATCH AND CONCEALED HINGE.
3. KEY LATCH TO MATCH PANELBOARDS.
4. METAL BARRIERS TO PREVENT CONTACT OF DIFFERENT SYSTEMS AND VOLTAGE.
5. ACCESSORY FEET WHERE REQUIRED FOR FREESTANDING EQUIPMENT.
Y. RACEWAY APPLICATION OUTDOORS: APPLY RACEWAY PRODUCTS AS SPECIFIED BELOW, UNLESS OTHERWISE INDICATED:
1. EXPOSED CONDUIT: RIGID STEEL CONDUIT, EMT, IMC, UNDERGROUND CONDUIT.
2. UNDERGROUND CONDUIT: RVC, TYPE EPC-40-PVC, DIRECT BURIED.
3. CONNECTION TO VIBRATING EQUIPMENT (INCLUDING TRANSFORMERS AND HYDRAULIC, PNEUMATIC, ELECTRIC SOLENOID, OR MOTOR-DRIVEN EQUIPMENT): LFMC.
4. BOXES AND ENCLOSURES: NEMA 250, TYPE 3R, EXCEPT NEMA 250, TYPE 3R, CONCEALED IN CEILINGS AND INTERIOR WALLS AND PARTITIONS: EMT.
5. CONNECTION TO VIBRATING EQUIPMENT (INCLUDING TRANSFORMERS AND HYDRAULIC, PNEUMATIC, ELECTRIC SOLENOID, OR MOTOR-DRIVEN EQUIPMENT): FMG, EXCEPT USE LFMC IN DAMP OR WET LOCATIONS.
6. DAMP OR WET LOCATIONS: RIGID STEEL CONDUIT.
7. RACEWAYS FOR OPTICAL FIBER OR COMMUNICATIONS CABLE IN SPACES USED FOR ENVIRONMENTAL AIR: PLENUM-TYPE, OPTICAL FIBER/COMMUNICATIONS CABLE RACEWAY, EMT.
8. RACEWAYS FOR OPTICAL FIBER OR COMMUNICATIONS CABLE RISERS IN VERTICAL SHAFTS: RISER-TYPE, OPTICAL FIBER/COMMUNICATIONS CABLE RACEWAY, EMT.
9. RACEWAYS FOR CONCEALED GENERAL PURPOSE DISTRIBUTION OF OPTICAL FIBER OR COMMUNICATIONS CABLE: GENERAL-PURPOSE, OPTICAL FIBER/COMMUNICATIONS CABLE RACEWAY, RISER-TYPE, OPTICAL FIBER/COMMUNICATIONS CABLE RACEWAY, EMT.
10. BOXES AND ENCLOSURES: NEMA 250, TYPE 1, EXCEPT USE NEMA 250, TYPE 4K, STAINLESS STEEL IN DAMP OR WET LOCATIONS.
X. MINIMUM RACEWAY SIZE: 1/2-INCH (16-MM) TRADE SIZE.
Y. RACEWAY FITTINGS: COMPATIBLE WITH RACEWAYS AND SUITABLE FOR USE WITH 4K, RIGID AND INTERMEDIATE STEEL CONDUIT. USE THREADED RIGID STEEL CONDUIT FITTINGS, UNLESS OTHERWISE INDICATED.
1. PVC ENCASED THREADED RIGID STEEL CONDUITS: USE ONLY FITTINGS LISTED FOR USE WITH THAT MATERIAL. PATCH AND SEAL ALL JOINTS, NICKS, AND SCRAPS IN PVC COATING AFTER INSTALLING CONDUITS AND FITTINGS. USE SEALANT RECOMMENDED BY FITTING MANUFACTURER.
2. INSTALLATION:
COMPLY WITH NECA 1 FOR INSTALLATION REQUIREMENTS APPLICABLE TO PRODUCTS SPECIFIED EXCEPT WHERE REQUIREMENTS ON DRAWINGS OR IN THIS ARTICLE ARE STRICTER.
AA. KEEP RACEWAYS AT LEAST 6 INCHES (150 MM) AWAY FROM PARALLEL RUNS OF FLUES AND STEAM PIPING.
AB. COMPLETE RACEWAY INSTALLATION BEFORE STARTING CONDUITOR INSTALLATION.
AC. SUPPORT RACEWAYS AS SPECIFIED IN "HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS."
AD. ARRANGE STUB-UPS SO CURVED PORTIONS OF BENDS ARE NOT VISIBLE ABOVE THE FINISHED FLOOR.
AE. INSTALL NO MORE THAN THE EQUIVALENT OF THREE 90-DEGREE BENDS IN ANY CONDUIT RUN EXCEPT FOR COMMUNICATIONS CONDUITS, FOR WHICH FEWER BENDS ARE ALLOWED.
AF. CONCEAL CONDUIT AND EMT WITH FINISHED WALLS, CEILINGS, AND FLOORS, UNLESS OTHERWISE INDICATED.
AG. RACEWAYS EMBEDDED IN SLABS:
1. RUN CONDUIT LARGER THAN 1-INCH (27-MM) TRADE SIZE, PARALLEL OR AT RIGHT ANGLES TO MAIN REINFORCEMENT, WHERE AT RIGHT ANGLES TO REINFORCEMENT, PLACE CONDUIT CLOSE TO SLAB SUPPORT.
2. ARRANGE RACEWAYS TO CROSS BUILDING EXPANSION JOINTS AT RIGHT ANGLES WITH EXPANSION FITTINGS.
3. CHANGE FROM EMT TO RIGID, TYPE EPC-40-PVC, RIGID STEEL CONDUIT, OR IMC BEFORE RISING ABOVE THE FLOOR.
AH. THREADED CONDUIT JOINTS, EXPOSED TO WET, DAMP, CORROSIVE, OR OUTDOOR CONDITIONS, APPLICABLE TO THREADED CONDUIT JOINTS, FITTINGS BEFORE MAKING UP JOINTS. FOLLOW COMPOUND MANUFACTURER'S WRITTEN INSTRUCTIONS.
AI. RACEWAY TERMINATIONS AT LOCATIONS SUBJECT TO MOISTURE OR VIBRATION: USE INSULATING BUSHINGS TO PROTECT CONDUCTORS, INCLUDING CONDUCTORS SMALLER THAN NO. 4 AWG.
AJ. INSTALL PULL WIRES IN EMPTY RACEWAYS. USE POLYPROPYLENE OR MONOPOLYMER PLASTIC LINE WITH NOT LESS THAN 200-LB (90-KG) TENSILE STRENGTH. LEAVE AT LEAST 12 INCHES (300 MM) OF SLACK AT EACH END OF PULL WIRE.
AK. RACEWAYS FOR OPTICAL FIBER AND COMMUNICATIONS CABLE: INSTALL RACEWAYS, METALLIC AND NONMETALLIC, RIGID AND FLEXIBLE, AS FOLLOWS:
1. 3/4-INCH (19-MM) TRADE SIZE AND SMALLER: INSTALL RACEWAYS IN MAXIMUM LENGTHS OF 50 FEET (15 M).
2. 1-INCH (25-MM) TRADE SIZE AND LARGER: INSTALL RACEWAYS IN MAXIMUM LENGTHS OF 75 FEET (23 M).
3. INSTALL WITH A MAXIMUM OF TWO 90-DEGREE BENDS OR EQUIVALENT FOR EACH LENGTH OF RACEWAY UNLESS DRAWINGS SHOW STRICTER REQUIREMENTS. SEPARATE LENGTHS WITH PULL OR JUNCTION BOXES OR TERMINATIONS AT DISTRIBUTION FRAMES OR CABINETS WHERE NECESSARY TO COMPLY WITH THESE REQUIREMENTS.
AL. INSTALL RACEWAY SEALING FITTINGS AT SUITABLE, APPROVED, AND ACCESSIBLE LOCATIONS AND FILL THEM WITH LISTED SEALING COMPOUND. FOR CONCEALED RACEWAYS, INSTALL EACH FITTING IN A FLUSH STEEL BOX WITH A BLANK COVER PLATE HAVING A FINISH SIMILAR TO THAT OF ADJACENT PLATES OR SURFACES. INSTALL RACEWAY SEALING FITTINGS AT THE FOLLOWING POINTS:
1. WHERE CONDUITS PASS FROM WARM TO COLD LOCATIONS, SUCH AS BOUNDARIES OF REFRIGERATED SPACES.
2. WHERE OTHERWISE REQUIRED BY NFPA 70.

- AP. FLEXIBLE CONDUIT CONNECTIONS: USE MAXIMUM OF 48 INCHES (1219 MM) OF FLEXIBLE CONDUIT FOR RECESSED AND SEMIRECESSED LIGHTING FIXTURES, EQUIPMENT SUBJECT TO VIBRATION, NOISE TRANSMISSION, OR MOVEMENT, AND FOR TRANSFORMERS AND MOTORS:
1. USE LFMC IN DAMP OR WET LOCATIONS.
AQ. RECESSED BOXES IN MASONRY WALLS: SAW-CUT OPENING FOR BOX IN CENTER OF CELL OF BRICK OR BLOCK. INSTALL BOX FLUSH WITH SURFACE OF WALL.
AR. SET METAL FLOOR BOXES LEVEL AND FLUSH WITH FINISHED FLOOR SURFACE.
AS. FIRESTOPPING TO ELECTRICAL PENETRATIONS OF FIRE-RATED FLOOR AND WALL ASSEMBLIES TO RESTORE ORIGINAL FIRE-RESISTANCE RATING OF ASSEMBLY. FINISHED SLEEVES FOR FLOOR PENETRATIONS EXTENDING 2" ABOVE FLOOR EXCEPT IN FINISHED AREAS WHERE COORDINATED WITH ARCHITECT.

TRANSFORMERS

- A. SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE PRODUCTS BY ONE OF THE FOLLOWING:
ACME ELECTRIC CORPORATION; POWER DISTRIBUTION PRODUCTS DIVISION.
EATON ELECTRICAL INC.; OUTLER-HAMMER PRODUCTS.
GENERAL ELECTRIC COMPANY.
SEMENS ENERGY & AUTOMATION, INC.
SOLA-HEWLETT.
SQUARE D; SCHNEIDER ELECTRIC.
B. GENERAL TRANSFORMER REQUIREMENTS:
DESCRIPTION: FACTORY-ASSEMBLED AND -TESTED, AIR-COOLED UNITS FOR 60-HZ SERVICE. (GRAN-ORIENTED, NON-ANISOTROPIC SILICON STEEL).
CONTINUOUS WINDINGS WITHOUT SPIICES EXCEPT FOR TAPS.
INTERNAL COIL CONNECTIONS: BRAZED OR PRESSURE TIE.
COIL MATERIAL: COPPER.
C. COMPLY WITH NEMA ST 20, AND LIST AND LABEL AS COMPLYING WITH UL 1561, ONE LED PER PHASE.
D. ENCLOSURE: VENTILATED, NEMA 250, TYPE 3R, CORE AND COIL SHALL BE ENCAPSULATED WITHIN RESIN COMPOUND, SEALING OUT MOISTURE AND AIR.
E. ENCLOSURE: VENTILATED, NEMA 250, TYPE 3R, CORE AND COIL SHALL BE ENCAPSULATED WITHIN RESIN COMPOUND, SEALING OUT MOISTURE AND AIR.
F. TRANSFORMER ENCLOSURE FINISH: COMPLY WITH NEMA 250 FINISH COLOR: GRAY.
G. TAPS FOR TRANSFORMERS SMALLER THAN 7.5 KVA: ONE 5 PERCENT TAP ABOVE NORMAL FULL CAPACITY.
H. TAPS FOR TRANSFORMERS 7.5 TO 24 KVA: ONE 5 PERCENT TAP ABOVE AND ONE 5 PERCENT TAP BELOW NORMAL FULL CAPACITY.
I. TAPS FOR TRANSFORMERS 25 KVA AND LARGER: TWO 2.5 PERCENT TAPS ABOVE AND TWO 2.5 PERCENT TAPS BELOW NORMAL FULL CAPACITY.
J. INSULATION CLASS: 220 DEG C, UL-COMPONENT-RECOGNIZED INSULATION SYSTEM WITH A MAXIMUM OF 115 DEG C RISE ABOVE 40 DEG C AMBIENT TEMPERATURE.
K. ENERGY EFFICIENCY FOR TRANSFORMERS RATED 15 KVA AND LARGER: COMPLYING WITH DOE-2016 10 CFR PART 431.
L. K-FACTOR RATING: TRANSFORMERS INDICATED TO BE K-FACTOR RATED SHALL COMPLY WITH UL 1561 SURFACE METAL RATING FOR NONINDUSTRIAL LOAD CURRENT-HANDLING CAPABILITY TO THE DEGREE DEFINED BY DESIGNATED K-FACTOR. UNIT SHALL NOT OVERHEAT WHEN RATED FULL-LOAD CURRENT WITH HARMONIC DISTORTION CORRESPONDING TO DESIGNATED K-FACTOR. INDICATE VALUE OF K-FACTOR ON TRANSFORMER NAMEPLATE.
M. ELECTROSTATIC SHIELDING: EACH WINDING SHALL HAVE AN INDEPENDENT, SINGLE-FILL-WIDTH COPPER ELECTROSTATIC SHIELD ARRANGED TO MINIMIZE INTERWINDING CAPACITANCE. ARRANGE COIL LEADS AND TERMINAL STRIPS TO MINIMIZE CAPACITIVE COUPLING BETWEEN INPUT AND OUTPUT TERMINALS. INCLUDE SPECIAL TERMINAL FOR GROUNDING THE SHIELD. SHIELD EFFECTIVENESS: CAPACITANCE BETWEEN PRIMARY AND SECONDARY WINDINGS: NOT TO EXCEED 33 PICOFARADS OVER A FREQUENCY RANGE OF 4000 KHZ AND AVERAGE RATED LIFE OF 20,000 HOURS UNLESS OTHERWISE INDICATED. MINIMUM OF MINUS 65 DBA AT 1.5 TO 10 KHZ, MINIMUM OF MINUS 120 DBA AT 0.8 TO 10 KHZ, MINIMUM OF MINUS 65 DBA AT 1.5 TO 10 KHZ, MINIMUM OF MINUS 120 DBA AT 0.8 TO 10 KHZ.
N. FUNGUS PROOFING: PERMANENT FUNGICIDAL TREATMENT FOR COIL AND CORE.
O. LUG RATING: ALL LUG CONNECTIONS SHALL BE RATED FOR CONNECTION OF 75 DEG C INSULATION CONDUCTORS.

PANELBOARDS

- A. ENCLOSURES: FLUSH- AND SURFACE-MOUNTED CABINETS, RATED FOR ENVIRONMENTAL CONDITIONS AT INSTALLED LOCATION, INDOOR DRY AND CLEAN LOCATIONS: NEMA 250, TYPE 1, OUTDOOR LOCATIONS: NEMA 250, TYPE 3R. WET OR DAMP INDOOR LOCATIONS: NEMA 250, TYPE 4X STAINLESS STEEL.
B. FRONT: SECURED TO BOX WITH CONCEALED TRIM CLAMPS. FOR SURFACE-MOUNTED FRONTS, MATCH BOX DESIGN FOR OVERCURRENTS; FOR FLUSH-MOUNTED FRONTS, OVERLAP BOX.
C. HINGED FRONT COVER: ENTIRE FRONT TRIM HINGED TO BOX AND WITH STANDARD DOOR WITHIN 1/8" FROM COVER.
D. FINISHES:
HANDLS AND TRIM: GALVANIZED STEEL, FACTORY FINISHED IMMEDIATELY AFTER CLEANING AND PRETREATING WITH MANUFACTURER'S STANDARD TWO-COAT, BAKED-ON FINISH CONSISTING OF PRIME COAT AND THERMOSETTING TOPCOAT.
E. BACK BOXES: GALVANIZED STEEL.
F. FUNGUS PROOFING: PERMANENT FUNGICIDAL TREATMENT FOR OVERCURRENT PROTECTIVE DEVICES AND OTHER COMPONENTS.
G. DIRECTORY CARD: INSIDE PANELBOARD DOOR, MOUNTED IN TRANSPARENT CARD HOLDER.
H. INCOMING MAINS LOCATION: TOP AND BOTTOM.
I. PHASE, NEUTRAL AND GROUND BUSSES:
MATERIAL: TIN-PLATED ALUMINUM OR HARD-BRASS COPPER, 98 PERCENT CONDUCTIVITY.
CONFIGURATION: 5-200 AND 15-200 FOR FEEDER AND BRANCH-CIRCUIT EQUIPMENT GROUNDING CONDUITS; BONDED TO BOX.
J. CONDUCTOR CONNECTORS: SUITABLE FOR USE WITH CONDUCTOR MATERIAL AND SIZES.
MATERIAL: TIN-PLATED ALUMINUM OR HARD-BRASS COPPER, 98 PERCENT CONDUCTIVITY.
MAIN AND NEUTRAL LUGS: COMPRESSION TYPE, FEED-THROUGH LUGS. COMPRESSION TYPE, SUITABLE FOR USE WITH CONDUCTOR MATERIAL. LOCATE AT POSITIVE END OF BUS FROM INCOMING LUGS OR MAIN DEVICE. RATED FOR CONNECTION OF 75 DEG C INSULATED CONDUCTORS.
K. PANELBOARD SHORT-CIRCUIT CURRENT RATING: FULLY RATED TO INTERRUPT SYMMETRICAL SHORT-CIRCUIT CURRENT AVAILABLE AT TERMINALS.
L. LIGHTING AND APPLIANCE BRANCH-CIRCUIT PANELBOARDS:
MANUFACTURERS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE PRODUCTS BY ONE OF THE FOLLOWING:
EATON ELECTRICAL INC.; OUTLER-HAMMER BUSINESS UNIT.
GENERAL ELECTRIC COMPANY; GE CONSUMER & INDUSTRIAL.
SEMENS ENERGY & AUTOMATION, INC.
SOLA-HEWLETT.
PANELBOARDS: NEMA FB 1, LIGHTING AND APPLIANCE BRANCH-CIRCUIT TYPE.
MATERIAL: GALVANIZED STEEL.
MANS: CIRCUIT BREAKER OR LUGS ONLY.
OVERCURRENT PROTECTIVE DEVICES: BOLT-ON CIRCUIT BREAKERS, REPLACEABLE WITHOUT DISTURBING ADJACENT UNITS.
DOORS: CONCEALED HINGES, SECURED WITH FLUSH LATCH WITH TUMBLER LOCK; KEYS ALIKE.

LIGHTING FIXTURES

- A. GENERAL REQUIREMENTS FOR LIGHTING FIXTURES AND COMPONENTS:
1. RECESSED FIXTURES: COMPLY WITH NEMA LE 4 FOR CEILING COMPATIBILITY FOR RECESSED FIXTURES.
2. INCANDESCENT FIXTURES: COMPLY WITH UL 1598. WHERE LER IS SPECIFIED, TEST ACCORDING TO NEMA LE 5A.
3. FLUORESCENT FIXTURES: COMPLY WITH UL 1598. WHERE LER IS SPECIFIED, TEST ACCORDING TO NEMA LE 5A AND NEMA LE 5A AS APPLICABLE.
4. LED FIXTURES:
4.1. LISTED AND LABELED AS DEFINED IN NFPA 70, BY A QUALIFIED TESTING AGENCY, AND MARKED FOR INTENDED LOCATION AND APPLICATION.
4.2. EACH LUMINAIRE SHALL BE BINED WITHIN A THREE-STEP MACADAM ELLIPSE TO ENSURE COLOR CONSISTENCY AMONG LUMINAIRES.
METAL PARTS: FREE OF BURRS AND SHARP CORNERS AND EDGES. SHEET METAL COMPONENTS: STEEL UNLESS OTHERWISE INDICATED. FORM AND SURFACE TO PREVENT WARPING AND SAGGING. DOORS, FRAMES, AND OTHER INTERNAL ACCESS: SMOOTH OPERATING, FREE OF LIGHT LEAKAGE UNDER OPERATING CONDITIONS, AND DESIGNED TO PERMIT RELAXING WITHOUT USE OF TOOLS. DESIGNED TO PREVENT DOORS, FRAMES, LENSES, DIFFUSERS, AND OTHER COMPONENTS FROM FALLING ACCIDENTALLY DURING RELAXING AND WHEN SECURED IN OPERATING POSITION.
B. DIFFUSERS AND GLOBES:
1. ACRYLIC LIGHTING DIFFUSERS: 100 PERCENT VIRGIN ACRYLIC PLASTIC. HIGH RESISTANCE TO YELLOWING AND OTHER CHANGES DUE TO AGING, EXPOSURE TO HEAT, AND UV RADIATION.
2. LENS THICKNESS: AT LEAST 0.125 INCH (3.175 MM) MINIMUM UNLESS OTHERWISE INDICATED.
3. UV STABILIZED.
4. GLASS: ANNEALED CRYSTAL GLASS UNLESS OTHERWISE INDICATED.
C. FACTORY-APPLIED LABELS: COMPLY WITH UL 1598. INCLUDE RECOMMENDED LAMPS AND BALLASTS. LABELS SHALL BE LOCATED WHERE THEY WILL BE READILY VISIBLE TO SERVICE PERSONNEL, BUT NOT SEEN FROM NORMAL VIEWING ANGLES WHEN LAMPS ARE IN PLACE. LABEL SHALL INCLUDE THE FOLLOWING INFORMATION:
1. "USE ONLY" AND INCLUDE SPECIFIC LAMP TYPE.
2. LAMP DIAMETER CODE (T-4, T-5, T-8, T-12, ETC.), TUBE CONFIGURATION (CWN, QUAD, TRIPLE, ETC.), BASE TYPE, AND NORMAL WATTAGE FOR FLUORESCENT AND COMPACT FLUORESCENT LUMINAIRES.
3. LAMP TYPE, WATTAGE, BUBB TYPE (ED17, B056, ETC) AND COATING (CLEAR OR COATED) FOR HD LUMINAIRES.
4. START TYPE (PREHEAT, RAPID START, INSTANT START, ETC.) FOR FLUORESCENT AND COMPACT FLUORESCENT LUMINAIRES.
5. ANSI BALLAST TYPE (M89, M57, ETC) FOR HD LUMINAIRES.
6. OCT AND CRI FOR ALL LUMINAIRES.
D. ELECTROMAGNETIC-INTERFERENCE FILTERS: FACTORY INSTALLED TO SUPPRESS CONDUCTED ELECTROMAGNETIC-INTERFERENCE AS REQUIRED BY MIL-STD-461E. FABRICATE LIGHTING FIXTURES WITH ONE FILTER ON EACH BALLAST INDICATED TO REQUIRE A FILTER.

BALLASTS

- A. BALLASTS FOR LINEAR FLUORESCENT LAMPS, GENERAL REQUIREMENTS FOR ELECTRONIC BALLASTS:
1. COMPLY WITH UL 935 AND WITH ANSI C82.11.
2. DESIGN FOR TYPE AND QUANTITY OF LAMPS SERVED.
3. BALLASTS SHALL BE DESIGNED FOR FULL LIGHT OUTPUT UNLESS ANOTHER BF, DIMMER, OR B-LEVEL CONTROL IS INDICATED.
4. SOUND RATING: CLASS 1.
5. TOTAL HARMONIC DISTORTION RATING: LESS THAN 10 PERCENT.
6. TRANSIENT VOLTAGE PROTECTION: IEEE C62.41.1 AND IEEE C62.41.2, CATEGORY A OR B.
7. OPERATING FREQUENCY: 42 KHZ OR HIGHER.
8. LAMP CURRENT GREST FACTOR: 1.7 OR LESS.
9. BF: 0.95 OR HIGHER.
10. POWER FACTOR: 0.95 OR HIGHER.
11. PARALLEL LAMP CIRCUITS: MULTIPLE LAMP BALLASTS SHALL COMPLY WITH ANSI C82.11 AND SHALL BE CONNECTED TO MAINTAIN FULL LIGHT OUTPUT ON SURVIVING LAMPS IF ONE OR MORE LAMPS FAIL.
B. LUMINAIRES CONTROLLED BY OCCUPANCY SENSORS SHALL HAVE PROGRAMMED-START BALLASTS.
C. ELECTRONIC PROGRAMMED-START BALLASTS FOR 18 AND 15 AND T5HO LAMPS: COMPLY WITH ANSI C82.11 AND THE FOLLOWING:
1. LAMP END-OF-LIFE DETECTION AND SHUTDOWN CIRCUIT FOR 15 DIAMETER LAMPS.
2. AUTOMATIC LAMP STARTING AFTER LAMP REPLACEMENT.
D. ELECTROMAGNETIC BALLASTS: COMPLY WITH ANSI C82.1; ENERGY SAVING, HIGH-POWER FACTORS, CLASS P, AND HAVING AUTOMATIC-RESET THERMAL PROTECTION.
E. BALLAST MANUFACTURER CERTIFICATION: INDICATED BY LABEL.
F. SINGLE BALLASTS FOR MULTIPLE LIGHTING FIXTURES: FACTORY WIRED WITH BALLAST ARRANGEMENTS AND BUNDLED EXTENSION WIRING TO SUIT FINAL INSTALLATION CONDITIONS WITHOUT MODIFICATION OR REMWIRING IN THE FIELD.
G. BALLASTS FOR COMPACT FLUORESCENT LAMPS:
DESCRIPTION: ELECTRONIC-PROGRAMMED RAPID-START TYPE, COMPLYING WITH UL 935 AND WITH ANSI C 82.11, DESIGNED FOR TYPE AND QUANTITY OF LAMPS INDICATED. BALLAST SHALL BE DESIGNED FOR FULL LIGHT OUTPUT UNLESS OTHERWISE INDICATED. BALLAST SHALL BE DESIGNED FOR FULL LIGHT OUTPUT UNLESS OTHERWISE INDICATED.
1. SOUND RATING: CLASS 1.
2. AUTOMATIC LAMP STARTING AFTER LAMP REPLACEMENT.
3. SOUND RATING: CLASS 1.
4. TOTAL HARMONIC DISTORTION RATING: LESS THAN 20 PERCENT.
5. TRANSIENT VOLTAGE PROTECTION: IEEE C62.41.1 AND IEEE C62.41.2, CATEGORY A OR B.
6. OPERATING FREQUENCY: 20 KHZ OR HIGHER.
7. LAMP CURRENT GREST FACTOR: 1.7 OR LESS.
8. BF: 0.95 OR HIGHER UNLESS OTHERWISE INDICATED.
9. POWER FACTOR: 0.95 OR HIGHER.
10. INTERFERENCE: COMPLY WITH 47 CFR 18, CH. 1, SUBPART C, FOR LIMITATIONS ON ELECTROMAGNETIC AND RADIO-FREQUENCY INTERFERENCE FOR NONCONSUMER EQUIPMENT.

FLUORESCENT LAMPS

- A. T8 RAPID-START LAMPS, RATED 32 W MAXIMUM, NOMINAL LENGTH OF 48 INCHES (1220 MM), 2900 INITIAL LUMENS (MINIMUM), CRI 85 (MINIMUM), COLOR TEMPERATURE 3000 K, AND AVERAGE RATED LIFE 20,000 HOURS UNLESS OTHERWISE INDICATED.
B. T8 RAPID-START LAMPS, RATED 17 W MAXIMUM, NOMINAL LENGTH OF 24 INCHES (610 MM), 1300 INITIAL LUMENS (MINIMUM), CRI 85 (MINIMUM), COLOR TEMPERATURE 3000 K, AND AVERAGE RATED LIFE OF 20,000 HOURS UNLESS OTHERWISE INDICATED.
C. T5 RAPID-START LAMPS, RATED 28 W MAXIMUM, NOMINAL LENGTH OF 45.2 INCHES (1150 MM), 2900 INITIAL LUMENS (MINIMUM), CRI 85 (MINIMUM), COLOR TEMPERATURE 3000 K, AND AVERAGE RATED LIFE OF 20,000 HOURS UNLESS OTHERWISE INDICATED.
D. T5HO RAPID-START, HIGH-OUTPUT LAMPS, RATED 54 W MAXIMUM, NOMINAL LENGTH OF 45.2 INCHES (1150 MM), 5000 INITIAL LUMENS (MINIMUM), CRI 85 (MINIMUM), COLOR TEMPERATURE 4100 K, AND AVERAGE RATED LIFE OF 20,000 HOURS UNLESS OTHERWISE INDICATED.
E. COMPACT FLUORESCENT LAMPS: 4-PIN, CRI 80 (MINIMUM), COLOR TEMPERATURE 3000 K, AVERAGE RATED LIFE OF 10,000 HOURS AT THREE HOURS OPERATION PER START, AND SUITABLE FOR USE WITH DIMMING BALLASTS UNLESS OTHERWISE INDICATED:
1. 13 W T4, DOUBLE OR TRIPLE TUBE, RATED 900 INITIAL LUMENS (MINIMUM).
2. 18 W T4, DOUBLE OR TRIPLE TUBE, RATED 1200 INITIAL LUMENS (MINIMUM).
3. 26 W T4, DOUBLE OR TRIPLE TUBE, RATED 1800 INITIAL LUMENS (MINIMUM).
4. 32 W T4, TRIPLE TUBE, RATED 2400 INITIAL LUMENS (MINIMUM).
5. 42 W T4, TRIPLE TUBE, RATED 3200 INITIAL LUMENS (MINIMUM).
6. 57 W T4, TRIPLE TUBE, RATED 4300 INITIAL LUMENS (MINIMUM).
7. 70 W T4, TRIPLE TUBE, RATED 5200 INITIAL LUMENS (MINIMUM).

LED LAMPS

- A. MINIMUM LUMENS PER SCHEDULED FIXTURE.
B. MINIMUM ALLOWABLE EFFICACY OF 85 LM/W.
C. MATCH BOX DESIGN FOR OVERCURRENTS; FOR FLUSH-MOUNTED FRONTS, OVERLAP BOX.
D. RATED LAMP LIFE OF 50,000 HOURS TO L70.
E. DIMMABLE FROM 100 PERCENT TO 1 PERCENT OF MAXIMUM LIGHT OUTPUT.
F. INTERNAL DIMMING AVAILABLE AT TERMINALS.
G. USER-REPLACEABLE LAMPS:
1. BULL SHAPE COMPLYING WITH ANSI C78.79.
2. LAMP BASE COMPLYING WITH ANSI C81.61 OR IEC 60061-1.

WIRING DEVICES

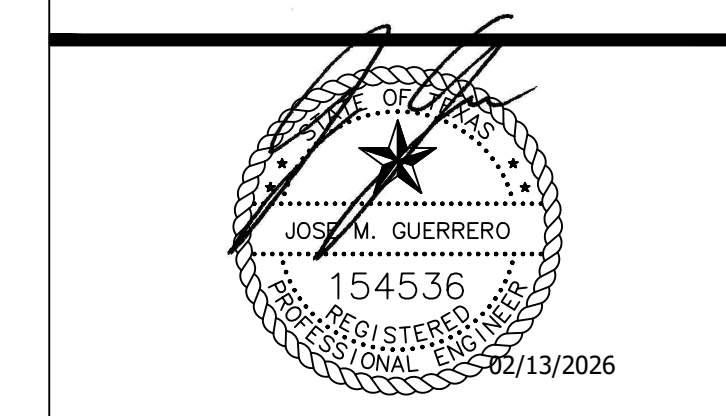
- A. MANUFACTURERS:
1. COOPER WIRING DEVICES.
2. HUBBELL INCORPORATED; WIRING DEVICE-KELLUMS
3. LEVITON MFG. COMPANY INC.
4. PASS & SEYMOUR/LEGAND; WIRING DEVICES & ACCESSORIES
B. ALL WIRING DEVICES TO BE WHITE OR COLOR AS SELECTED BY ARCHITECT.
C. STRAIGHT LACE RECEPTABLES:
CONVENIENCE RECEPTABLES, 125 V, 20 A: COMPLY WITH NEMA WD 1, NEMA WD 6 CONFIGURATION 5-200 AND 15-200 FOR FEEDER AND BRANCH-CIRCUIT EQUIPMENT REQUIREMENTS, PROVIDE ONE OF THE FOLLOWING:
1. LEVITON; 16341-W (SINGLE), 16362-W (DUPLEX).
2. ANY EQUAL BY ABOVE LISTED MANUFACTURERS.
D. ISOLATED-ROUND, DUPLEX CONVENIENCE RECEPTABLES, 125 V, 20 A: COMPLY WITH NEMA WD 1, NEMA WD 6 CONFIGURATION 5-200 AND 15-200 FOR FEEDER AND BRANCH-CIRCUIT EQUIPMENT REQUIREMENTS, PROVIDE ONE OF THE FOLLOWING:
1. LEVITON; 16362-10W.
2. ANY EQUAL BY ABOVE LISTED MANUFACTURERS.
DESCRIPTION: STRAIGHT LACE, EQUIPMENT GROUNDING CONTACTS SHALL BE CONNECTED ONLY TO THE GREEN GROUNDING SCREW TERMINAL OF THE DEVICE AND WITH INHERENT ELECTRICAL ISOLATION FROM MOUNTING STRAP ISOLATION SHALL BE INTEGRAL TO RECEPTACLE CONSTRUCTION AND NOT DEPENDENT ON REMOVABLE PARTS.
E. GPO RECEPTABLES:
GENERAL DESCRIPTION: STRAIGHT LACE, FEED-THROUGH TYPE. COMPLY WITH NEMA WD 1, NEMA WD 6, UL 498, AND UL 943, CLASS A, AND INCLUDE INDICATOR LIGHT THAT IS LIGHTED WHEN DEVICE IS TRIPPED AND INDICATOR LIGHT THAT IS LIGHTED WHEN DEVICE IS TRIPPED AND INDICATOR LIGHT THAT IS LIGHTED WHEN DEVICE IS TRIPPED. SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE ONE OF THE FOLLOWING:
1. LEVITON; 7899-W.
2. ANY EQUAL BY ABOVE LISTED MANUFACTURERS.
F. SNAP SWITCHES, COMPLY WITH NEMA WD 1 AND UL 20. SWITCHES, 120/277 V, 20 A: PRODUCTS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE ONE OF THE FOLLOWING:
1. LEVITON; 5621-2W (SINGLE POLE), 5622-2 (TWO POLE), 5623-2 (THREE WAY)
2. ANY EQUAL BY ABOVE LISTED MANUFACTURERS.
G. WALL-BOX DIMMERS, DIMMER SWITCHES: MODULAR, FULL-WAVE, SOLID-STATE UNITS WITH INTEGRAL, QUIET ON-OFF SWITCHES, WITH ADJUSTIBLE FREQUENCY AND EM/RFI SUPPRESSION FILTERS. CONTROL: CONTINUOUSLY ADJUSTABLE SLIDER, WITH SINGLE-POLE OR THREE-WAY SWITCHING. COMPLY WITH UL 1472.
1. INCANDESCENT LAMP DIMMERS: 120 V, CONTROL SHALL FOLLOW SQUARE-LAW DIMMING CURVE. ON-OFF SWITCH POSITIONS SHALL BYPASS DIMMER MODULE. 2000 W, DIMMERS SHALL REQUIRE NO DERATING WHEN GANGED WITH OTHER DEVICES.
2. FLUORESCENT LAMP DIMMER SWITCHES: MODULAR, COMPATIBLE WITH DIMMER BALLASTS; TRIM POTENTIOMETER ADJUSTABLE. DIMMER SWITCHES: DIMMER-BALLAST COMBINATION CAPABLE OF CONSISTENT DIMMING WITH LOW END NOT GREATER THAN 20 PERCENT OF FULL BRIGHTNESS.
3. ACCEPTABLE MANUFACTURERS: LUTRON, LEVITON.
H. VACANCY/OCCUPANCY SENSORS, WALL-SWITCH SENSORS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE ONE OF THE FOLLOWING:
1. LUTRON; MS-B102. (PROGRAMMED FOR VACANCY OR OCCUPANCY OPERATION AS SHOWN)
2. ANY EQUAL BY NOVATAS, WATTSTOPPER, LEVITON OR SENSOR SWITCH.
DESCRIPTION: DUAL TECHNOLOGY TYPE 1

ISSUED FOR CLIENT APPROVAL	DATE
ISSUED FOR BIDDING	
ISSUED FOR PERMIT	02/13/2026
ISSUED FOR CONSTRUCTION	

REVISIONS

MARK	DESCRIPTION	DATE
	90% REVIEW SET	2026/02/06
	ISSUED FOR PERMIT	2026/02/13

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DRAWING TITLE
MECHANICAL SCHEDULES

SHEET NO.

M3.01

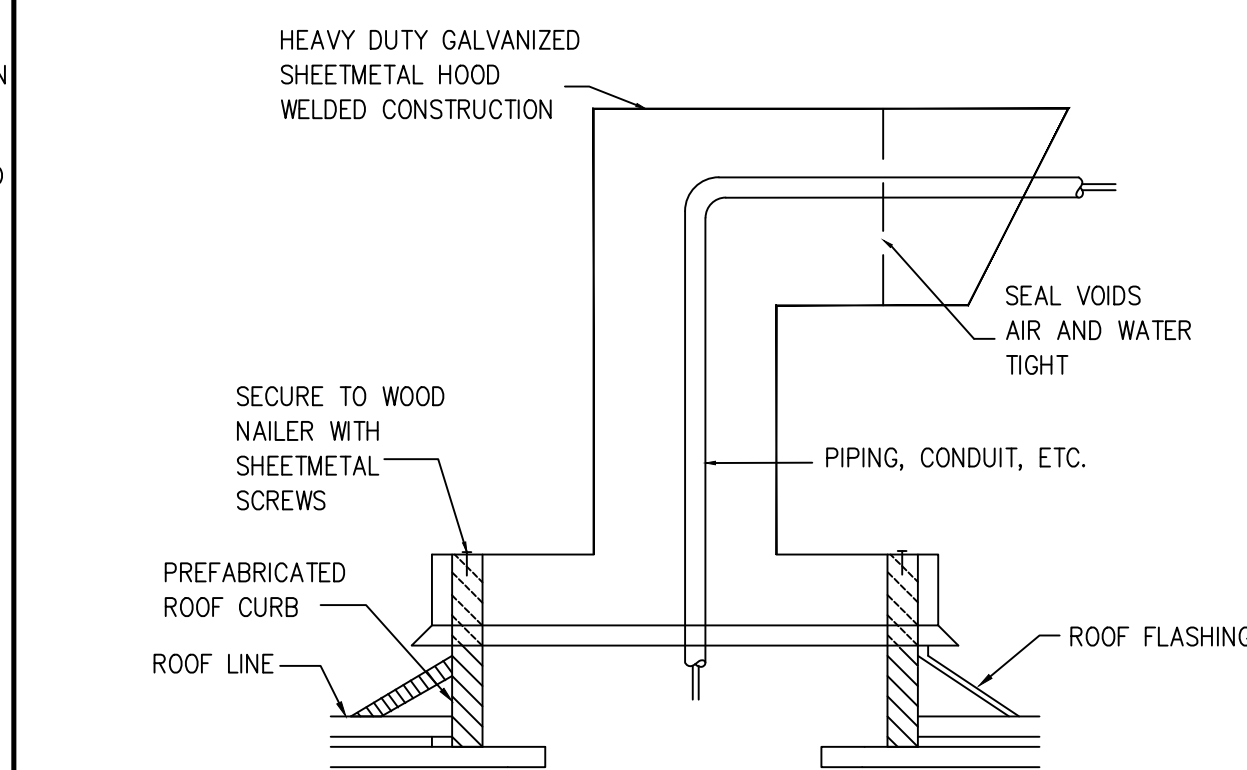
SCALE: N.T.S.

EIBIE Mechanical
CONSULTING ENGINEERS Electrical Plumbing

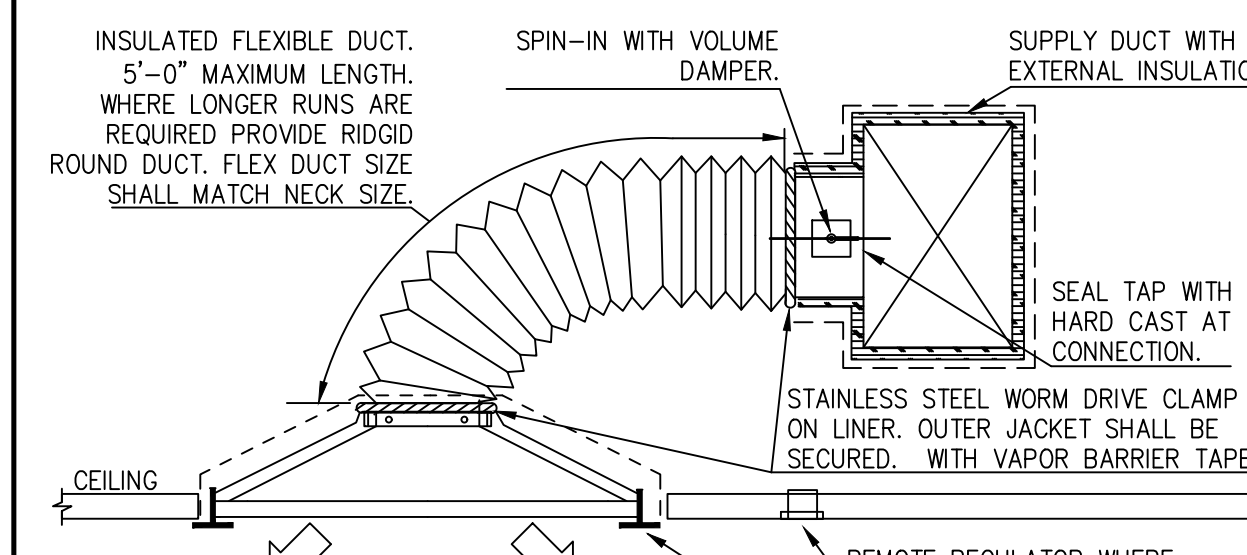
12603 Southwest Frwy, Ste 170, Stafford, TX 77477
Tel: (713) 840-0177 / Firm Reg. No: 5638

PM	MECH	ELEC	PLBG	CHCK
JG	THV	JG	BM	JG

NOTE: ROOF CURB TO BE PROVIDED BY MECHANICAL CONTRACTOR AND ALL FLASHING AND ROOFING TO BE PERFORMED BY CERTIFIED ROOFING CONTRACTOR.

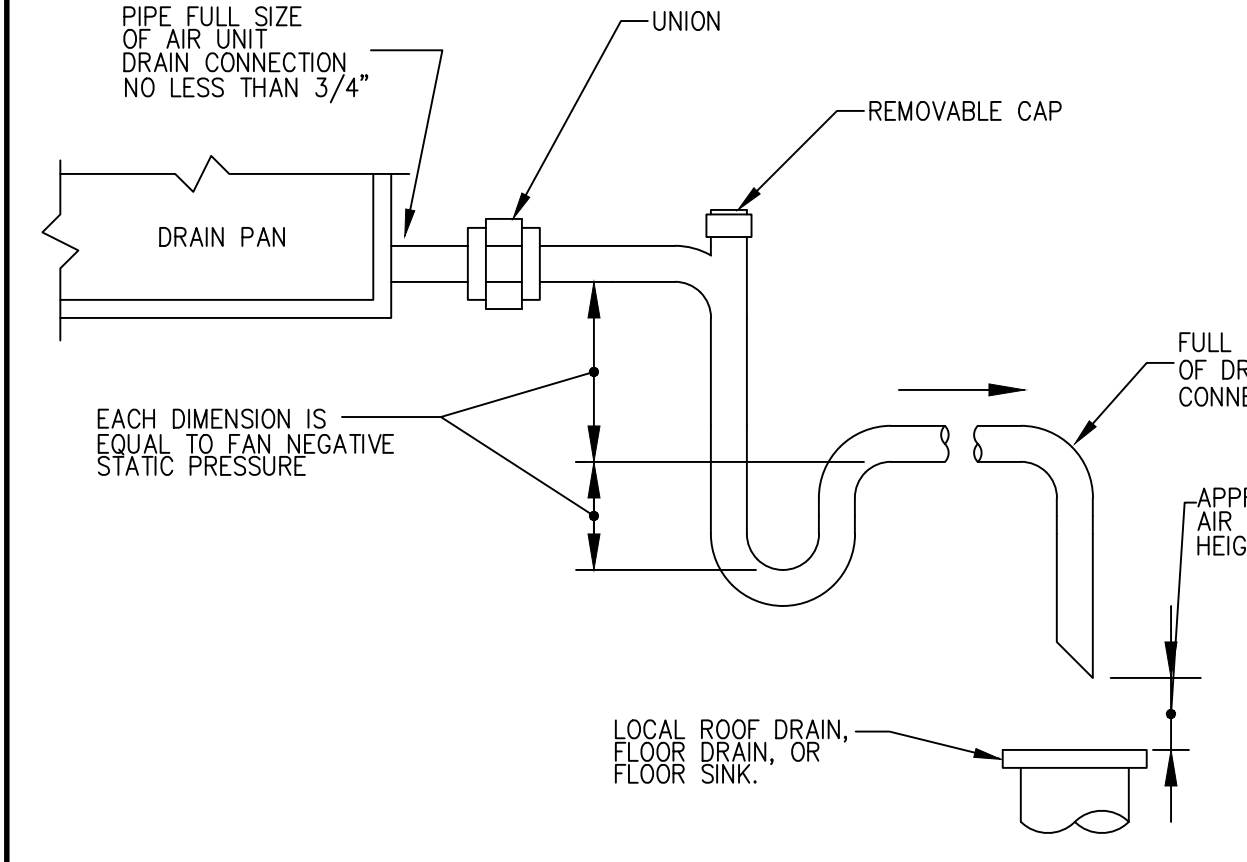


ROOF PIPING PENETRATION 01
SCALE: NONE



- NOTES:
- CEILING DIFFUSER SHALL BE INSTALLED SUCH THAT THE FACE OF DIFFUSER IS FLUSH WITH CEILING. REFER TO AIR DEVICE SCHEDULE FOR EXACT DEVICE.
 - SUPPORT FLEXIBLE DUCT FROM STRUCTURE. FLEXIBLE DUCT SHALL NOT KINK, SAG OR REST ON LIGHT FIXTURE, CEILING SUPPORT "TEES" OR CEILING TILE.
 - PROVIDE SQUARE TO ROUND TAP AT BRANCH DUCT WHERE FLEXIBLE DUCT SIZE EXCEEDS DIMENSION OF RECTANGULAR DUCT.
 - FOR UNCONDITIONED CEILING PLENUMS, INSULATE BACK OF CEILING DIFFUSER WITH 1" DUCT WRAP AND SEAL WITH VAPOR BARRIER TAPE.
 - METALLIC FLEXIBLE DUCT SHALL BE USED WHERE FLEXIBLE DUCT CONNECTIONS ARE SHOWN ON THE DRAWING TO ALL AIR DEVICES INSTALLED IN INACCESSIBLE LOCATIONS SUCH AS ABOVE GYPSUM BOARD OR PLASTER CEILINGS. (REFER TO ARCH. DRAWINGS FOR CEILING TYPE.)
 - CEILING "TEE" OR DRYWALL TRIM PIECE BY OTHERS.

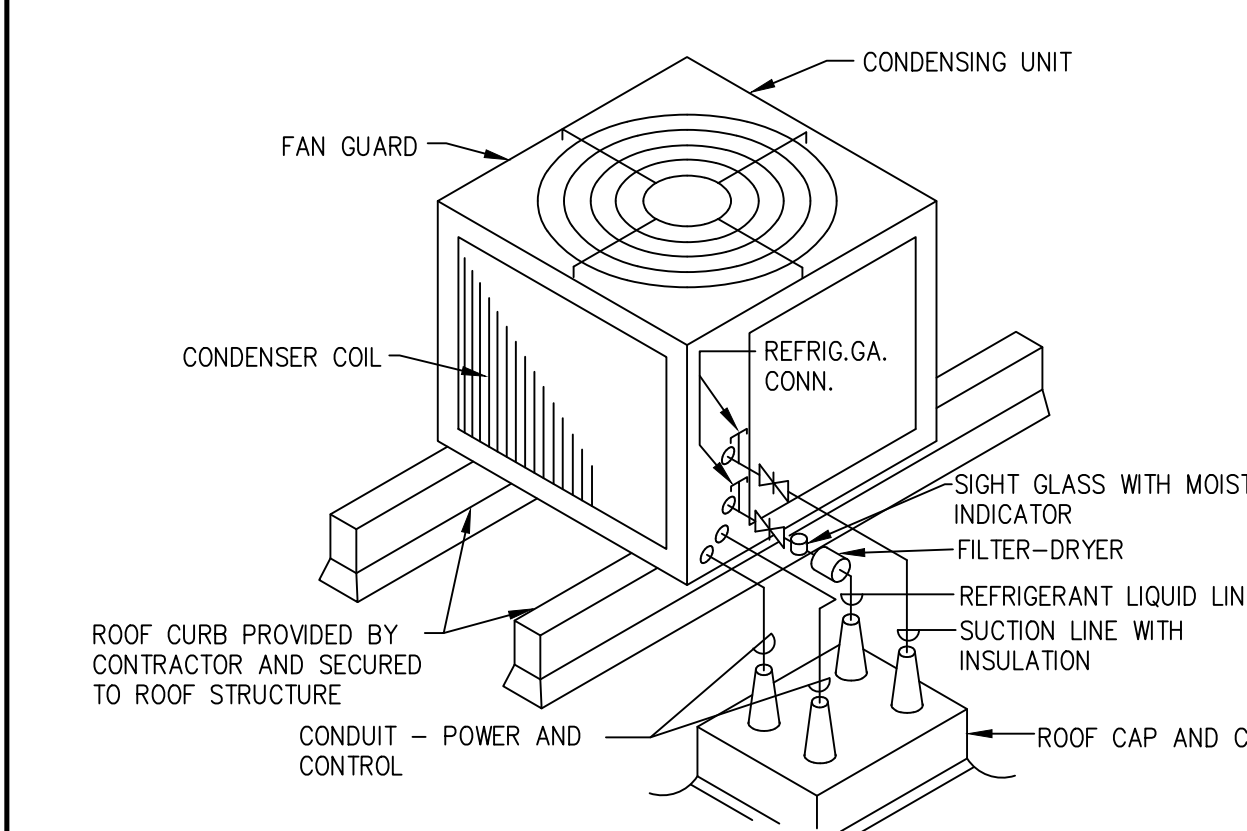
CEILING DIFFUSER 03
SCALE: NONE



- NOTE:
- LOCATE TRAPS SA AS TO BE ACCESSIBLE FOR CLEANING.
 - TO DETERMINE OFFSET, SUBTRACT SCHEDULED E.S.P. FROM T.S.P. THEN ADD 1".
 - ROUTE TO NEAREST SANITARY DRAIN.

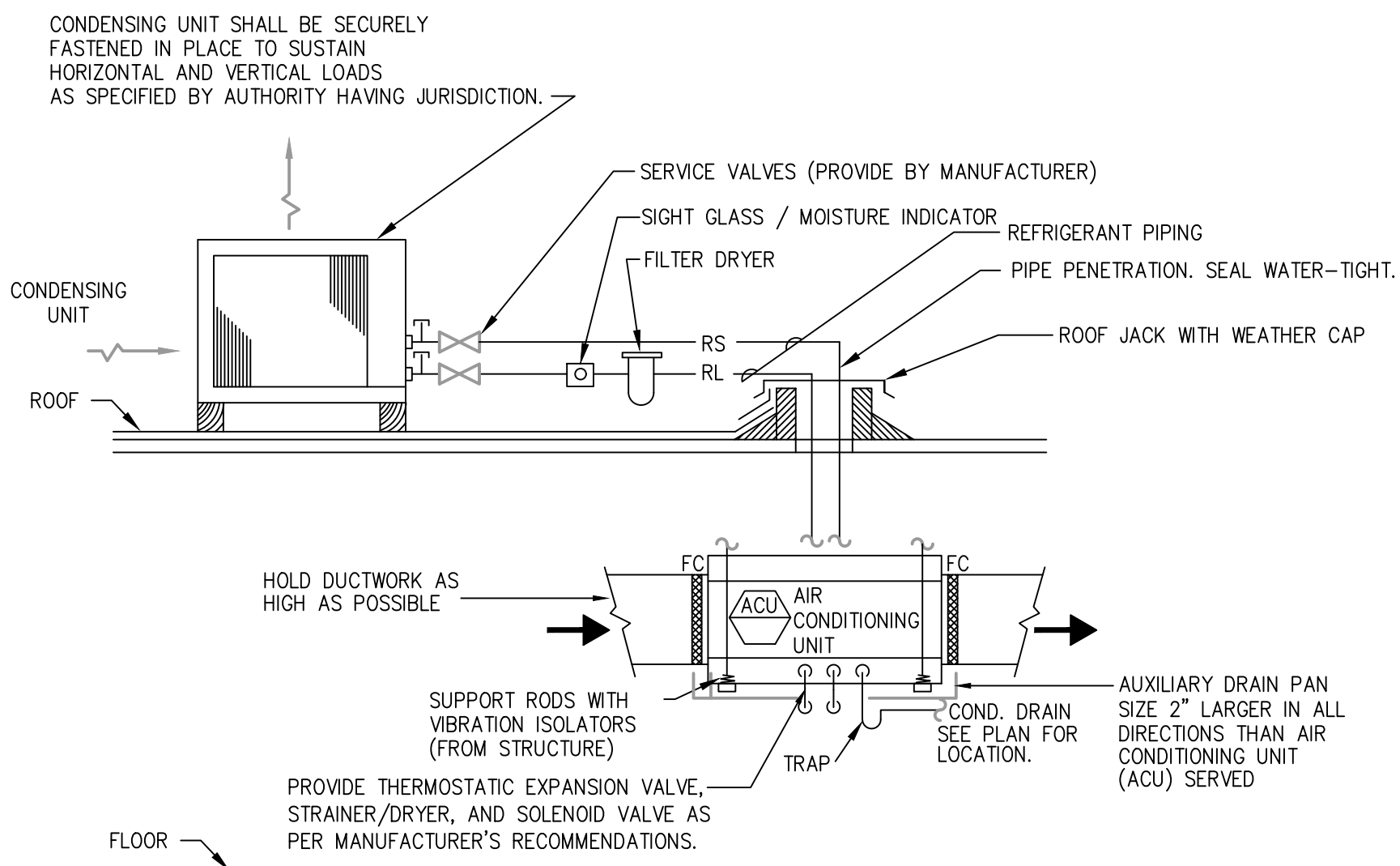
CONDENSATE DRAIN 02
SCALE: NONE

NOTE: ROOF CURB TO BE PROVIDED BY MECHANICAL CONTRACTOR AND ALL FLASHING AND ROOFING TO BE PERFORMED BY CERTIFIED ROOFING CONTRACTOR. UNIT TO BE SECURED TO CURB USING INTEGRAL ATTACHMENT POINTS ON BOTTOM OF UNIT.

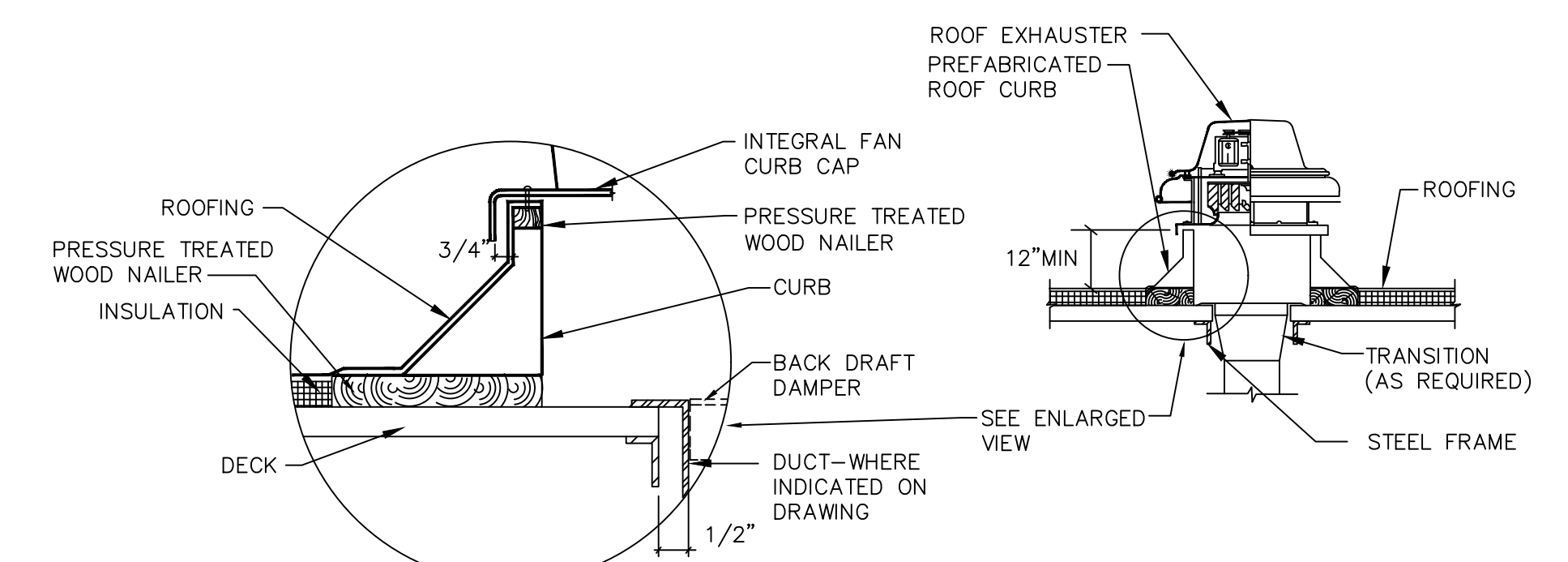


ROOFTOP CONDENSING UNIT 04
SCALE: NONE

- NOTES:
- AIR CONDITIONING UNIT TO BE INSTALLED AS HIGH AS POSSIBLE COORDINATE ACU LOCATION WITH STRUCTURAL AND ARCHITECTURAL ELEMENTS TO MAINTAIN REQUIRED ACCESS TO MOTORS, FILTERS, VALVES, AND ACCESS TO PANEL ON UNIT. CONTRACTOR SHALL BE RESPONSIBLE FOR KEEPING WORKING CLEARANCES FREE OF PIPING, CONDUIT, DUCTS, AND OTHER OBSTRUCTIONS.
 - PROVIDE FLEXIBLE CONNECTION AT FAN COIL UNIT DISCHARGE & RETURN AIR PLENUM. REFRIGERANT LINES SIZED AS PER MANUFACTURER RECOMMENDATIONS. COORDINATE PIPE ROUTING WITH FILTER REMOVAL ACCESS. PITCH LINES IN DIRECTION OF REFRIGERANT FLOW TO FACILITATE OIL RETURN TO COMPRESSOR.
 - REFRIGERANT LINES SHALL BE TYPE "L" HARD DRAWN "ACR" TUBING THAT HAS BEEN CLEANED AND CAPPED FOR REFRIGERATION SERVICE. FITTINGS SHALL BE WROUGHT COPPER AND SHALL BE INSTALLED WITH SILVER SOLDER JOINTS.
 - SUCTION LINE INSULATION SHALL BE EQUAL TO ARMSTRONG "ARMAFLEX", 1" THICK. FINISH WITH 0.16" THICK ALUMINUM JACKET HAVING STRAPS AT 12" ON CENTER. INSTALL INSULATION AND METAL JACKET PER MANUFACTURER'S RECOMMENDATIONS.
 - PROVIDE CONDUCTIVITY SWITCH IN AUXILIARY DRAIN PAN TO DE-ENERGIZE FAN COIL UNIT WHEN WATER IS DETECTED IN AUXILIARY DRAIN PAN.
 - PRIOR TO EQUIPMENT INSTALLATION FINAL LOCATIONS SHALL BE APPROVED BY THE OWNER OR PROJECT ARCHITECT.



A/C SYSTEM W/ HORZ. AIR HANDLING + ROOF MOUNTED CONDENSING UNIT. TYPICAL. 05
SCALE: NONE

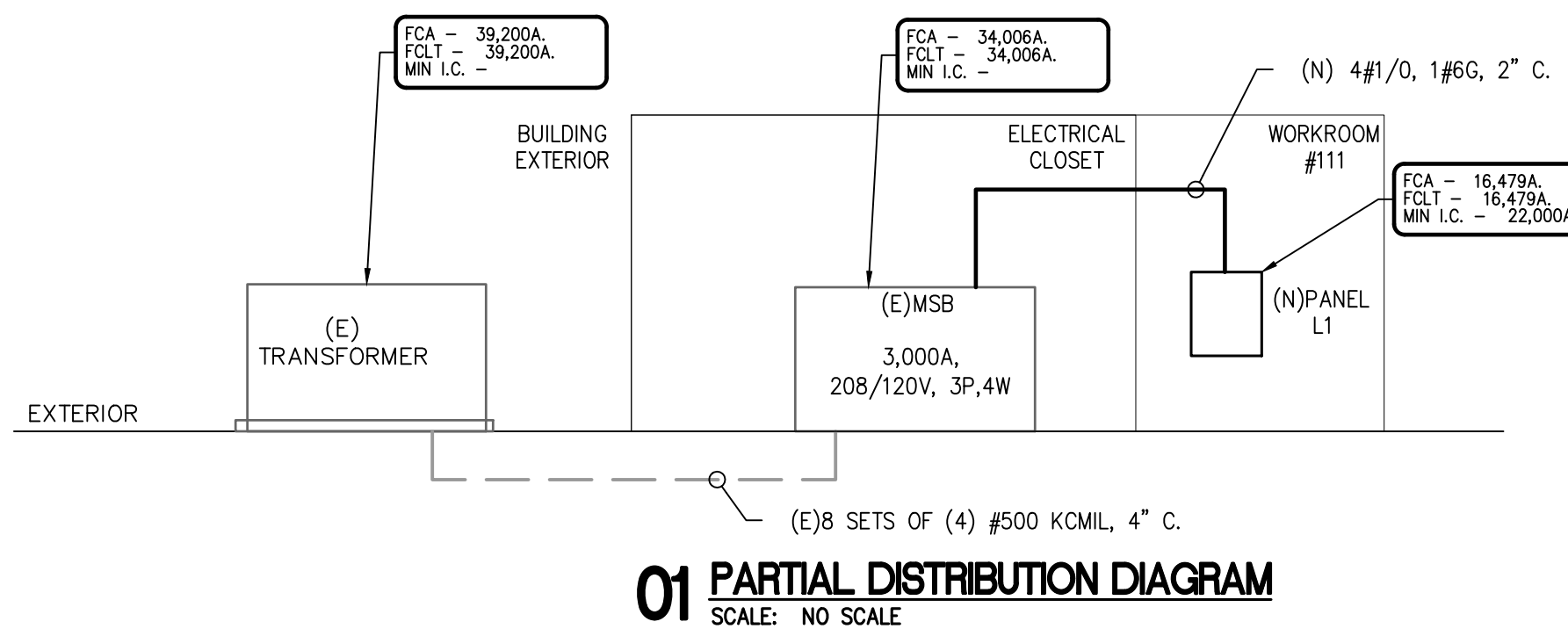


- NOTES:
- WHERE NO DUCT IS INDICATED, BACKDRAFT DAMPER SHALL BE FULL SIZE OF OPENING IN ROOF DECK.
 - ROOF MOUNTED EXHAUST FANS SHALL NOT BE MOUNTED ON A SLOPE OF GREATER THAN 6:12. SEE GENERAL NOTES.

ROOF MOUNTED EXHAUST FAN 06
SCALE: NONE

ELECTRICAL LOAD ANALYSIS					
PROJECT NAME: WOODFOREST NATIONAL -- CONROE					
PROJECT NUMBER: 26024.00					
SERVICE VOLTAGE: 120/208V, 3 PHASE, 4 WIRE, WYE					
SERVICE RATING: 150 AMPS					
GROSS AREA: 3,924 SQUARE FEET					
LOAD DESCRIPTION	CODE	CONNECTED	DEMAND	DESIGN	REMARKS
		LOAD (kVA)	FACTORS (%)	LOAD (kVA)	
LIGHTS (1.3 VA/FT2):	5.1	1.9	125%	6.4	NEC 220.42, 43, 44, 45
SIGN LIGHTS:		0.0	125%	0.0	NEC 220.14.F
SITE LIGHTS:		0.0	125%	0.0	NEC 220.42, 43, 44, 45
RECEPTACLES:	3.9	4.7	10kVA+50%	4.7	NEC 220.14.H, I, J, K, 220.47
EQUIPMENT:		7.6	100%	7.6	NEC 220.14.A
WATER HEATERS:		0.0	100%	0.0	NEC 220.14.A
HVAC:		18.8	100%	18.8	NEC 220.14.C, 220.50
ELECTRIC HEAT:		8.0	100%	8.0	NEC 220.51
LARGEST MOTOR:		0.0	125%	0.0	NEC 430.22
TOTAL DESIGN LOAD:					46 kVA
208V, 3 PHASE:					126 AMPS

NOTE: ALL LOADS AND DEMAND FACTORS ARE IN ACCORDANCE WITH APPLICABLE SECTIONS OF NEC ARTICLE 220



ELECTRICAL DISTRIBUTION DIAGRAM NOTES:

- CONDUCTOR SIZES SHOWN ARE FOR COPPER CONDUCTORS WITH THWN INSULATION IN EMT (4" C. OR LESS) OR RIGID CONDUIT (> 4" C.). PROVIDE GROUNDING CONDUCTORS FOR ALL CONDUIT. GROUNDING CONDUCTORS ARE NEEDED FOR ALL PVC CONDUIT.
- SHORT CIRCUIT CURRENT VALUES ARE GIVEN IN RMS SYMMETRICAL AMPERES. PREFIX 'FCA' INDICATES MAXIMUM AVAILABLE FAULT CURRENT. PREFIX 'FCLT' INDICATES APPARENT LET-THRU CURRENT FROM UPSTREAM CURRENT LIMITING DEVICE.
- ELECTRICAL SYSTEM SHALL BE FULLY RATED. SERIES RATED EQUIPMENT IS NOT ACCEPTABLE.
- PROVIDE FULL LENGTH, FULL SIZE INSULATED GROUND AND NEUTRAL BUS IN ALL PANELBOARDS.
- REFER TO ELECTRICAL UTILITY SPECIFICATIONS FOR ALL WORK AT SERVICE POINT OF ATTACHMENT.
- CONTRACTOR TO VERIFY FAULT CURRENT AVAILABLE AT UTILITY TRANSFORMER SECONDARY WITH ELECTRICAL UTILITY FOR THE FINAL SELECTION OF EQUIPMENT AIC RATINGS.
- SPARES AND SPACES ARE INDICATED ON PANELBOARD SCHEDULES.
- FLEXIBLE METAL CONDUIT SHALL NOT BE USED IN WET LOCATIONS OR WET AREAS.
- ALL FEEDER AND BRANCH CIRCUIT WIRING METHODS SHALL INCLUDE AN EQUIPMENT-GROUNDING CONDUCTOR PER NEC.
- ALL CONDUIT BELOW GRADE OR IN CONCRETE SLABS SHALL BE PVC. MAXIMUM CONDUIT SIZE FOR CONDUIT IN CONCRETE SLABS IS 3/4".
- A PERMANENTLY AFFIXED LABEL SHALL BE APPLIED WITH THE AVAILABLE FAULT CURRENT AT THE TIME OF INSTALLATION AND CALCULATION. THE LABEL SHALL BE 2 X 3 IN SIZE AND SHALL BE BLUE LETTERING ON A CONTRASTING BACKGROUND. THIS LABEL SHALL ALSO INCLUDE THE DATE OF THE CALCULATION. COH ELECTRICAL CODE 504.1.1.

PROJECT NAME: WOODFOREST NATIONAL BANK -- CONROE												
PROJECT NUMBER: 26024.00												
PANEL: MSB												
VOLTAGE: 120/208V, 3PH, 4W												
BUS: 3000 AMP												
MAINS: M.L.O.												
ACCESSORIES:												
EXISTING PANEL												
CODES: 0=LIGHTS 1=RECEP 2=EQUIP 3=A/C 4=HTG 5=125% LGST MTR 6=KITCHEN 7=PREVIOUSLY CALCULATED												
CODE	LOAD	CIRCUIT DESCRIPTION	BKR	CKT	PH	CKT	BKR	CIRCUIT DESCRIPTION	LOAD	CODE		
2	5000	SPD	*	80/3	1	A	2	PANEL L1	14160	2		
2	5000	---	*	---	3	B	4	---	14160	2		
2	5000	---	*	---	5	C	6	---	14160	2		
		SPARE	**	200/3	7	A	8	200/3 SPARE	**	**		
		---	**	---	9	B	10	---	**	**		
		---	**	---	11	C	12	---	**	**		
		SPACE	***	---	13	A	14	150/3 PANEL L1	12838	7		
		---	***	---	15	B	16	---	14826	7		
		---	***	---	17	C	18	---	14670	7		
		SPARE	**	400/3	19	A	20	400/3 SPARE	**	**		
		---	**	---	21	B	22	---	**	**		
		---	**	---	23	C	24	---	**	**		
2	39600	BDP	*	600/3	25	A	26	SPACE	51680	2		
2	39600	---	*	---	27	B	28	---	51680	2		
2	39600	---	*	---	29	C	30	---	51680	2		
2	50880	DP2A	*	800/3	31	A	32	800/3 DP3A	51680	2		
2	50880	---	*	---	33	B	34	---	51680	2		
2	50880	---	*	---	35	C	36	---	51680	2		
2	49850	DP3B	*	800/3	37	A	38	---	51680	2		
2	49850	---	*	---	39	B	40	---	51680	2		
2	49850	---	*	---	41	C	42	---	51680	2		
		LIGHTS						PHASE	CONN.KVA	LOAD FACTORS	DES. KVA	DES. AMP
	0	0	21170	0	0	A		A	224.0	LIGHTS @ 125%	211.2	1758
	0	0	21170	0	0	B		B	225.2	EQUIP. @ 100%	211.2	1758
	0	0	21170	0	0	C		C	225.8	L.G. MOTOR @ 25%	211.2	1758
	0	0	633510	0	0	TOTAL		TOTAL	675.0	RECEPS @ 10kVA+50%	633.5	1758
SUB-FEED PANELS:												
								PANEL NAME	S.F. KVA	LOAD FACTORS	DES. KVA	DES. AMP
								PANEL L1	41.5	SUB FEED @ 100%	41.5	115
GRAND TOTAL									675.0		1874	

- * EXISTING CIRCUIT BREAKER - ESTIMATED LOAD
- ** EXISTING SPARE CIRCUIT BREAKER
- *** EXISTING BREAKER SPACE
- **** REPLACE EXISTING BREAKER AS SHOWN

PROJECT NAME: WOODFOREST NATIONAL BANK -- CONROE												
PROJECT NUMBER: 26024.00												
PANEL: L1												
VOLTAGE: 120/208V, 3PH, 4W												
BUS: 225 AMP												
MAINS: 150A. M.C.B.												
ACCESSORIES: INSULATED GROUND												
NEW PANEL												
CODES: 0=LIGHTS 1=RECEP 2=EQUIP 3=A/C 4=HTG 5=125% LGST MTR 6=KITCHEN 7=PREVIOUSLY CALCULATED												
CODE	LOAD	CIRCUIT DESCRIPTION	BKR	CKT	PH	CKT	BKR	CIRCUIT DESCRIPTION	LOAD	CODE		
0	950	LIGHTING		20/1	1	A	2	20/1 CONFERENCE GP	1260	1		
0	950	LIGHTING		20/1	3	B	4	20/1 G.P. RECEP	1260	1		
6	800	REF		20/1	5	C	6	20/1 G.P. RECEP	1080	1		
2	1200	PC		20/1	7	A	8	20/1 SPARE				
2	1200	PC		20/1	9	B	10	20/1 SPARE				
2	900	PC		20/1	11	C	12	20/1 SPARE				
1	540	RR/STORAGE GFCCI		20/1	13	A	14	20/1 SPARE	200	2		
2	800	DATA DEDICATED		20/1	15	B	16	20/1 SF-1,2,3/EF-1	180	1		
2	800	DATA DEDICATED		20/1	17	C	18	20/1 ROOF GFI	676	7		
2	720	PLOTTER		20/1	19	A	20	15/2 AHU-1	676	7		
2	400	WORKROOM APPLIANCE		20/1	21	B	22	--	676	7		
1	360	WORKROOM GP		20/1	23	C	24	15/2 AHU-2	676	7		
6	600	COFFEE MAKER		20/1	25	A	26	--	676	7		
3	2446	CU-1		30/2	27	B	28	15/2 AHU-3	676	7		
3	2446	---		---	29	C	30	--	676	7		
3	2879	CU-2		35/2	31	A	32	15/2 AHU-4	42	7		
3	2879	---		---	33	B	34	--	42	7		
3	2446	CU-3		30/2	35	C	36	30/2 IWH-1	2005	4		
3	2446	---		---	37	A	38	--	2005	4		
3	1648	CU-4		20/2	39	B	40	30/2 IWH-1	2005	4		
3	1648	---		---	41	C	42	--	2005	4		
		LIGHTS						PHASE	CONN.KVA	LOAD FACTORS	DES. KVA	DES. AMP
	950	1800	2520	5325	2005	A		A	14.2	LIGHTS @ 125%	12.8	107
	950	1260	2600	6873	2005	B		B	15.2	EQUIP. @ 100%	14.0	117
	0	1620	2500	6540	4010	C		C	16.2	L.G. MOTOR @ 25%	14.7	122
	1900	4680	7620	18638	8020	TOTAL		TOTAL	45.6	RECEPS @ 10kVA+50%	41.5	115

LABEL	MANUFACTURER + SPECIFICATION	MOUNTING	LAMP (NO./TYPE)	VOLTS	REMARKS
A24	MATCH 2ND FLOOR FIXTURE REFER TO REMARKS	RECESSED	LED (40 WATT MAX.)	120	CENTER BASKET LED 2'X4' LIGHT FIXTURE. 0-10V. DIMMABLE. PROVIDE WITH 90-MINUTE BATTERY PACK WHERE NOTED ON PLANS.
B22	MATCH 2ND FLOOR FIXTURE REFER TO REMARKS	RECESSED	LED (30 WATT MAX.)	120	FLAT LENS LED 2'X2' LIGHT FIXTURE. 0-10V. DIMMABLE. PROVIDE WITH 90-MINUTE BATTERY PACK WHERE NOTED ON PLANS.
C	MATCH 2ND FLOOR FIXTURE REFER TO REMARKS	RECESSED	LED (20 WATT MAX.)	120	RECESSED LED ROUND DOWNLIGHT. 0-10V. DIMMABLE. PROVIDE WITH 90-MINUTE BATTERY PACK WHERE NOTED ON PLANS.
L	TBD	SURFACE	LED (7W./FT MAX.)	120	RECESSED LED ROUND DOWNLIGHT. 0-10V. DIMMABLE. PROVIDE WITH 90-MINUTE BATTERY PACK WHERE NOTED ON PLANS.
S1	TBD	SUSPENDED	LED (20 WATT MAX.)	120	4' LED STRIP LIGHT, 0-10V. DIMMING. PROVIDE WITH 90-MINUTE BATTERY PACK WHERE NOTED ON PLANS.
S2	TBD	SUSPENDED	LED (26 WATT MAX.)	120	6' LED STRIP LIGHT, 0-10V. DIMMING.
UC	TBD	SURFACE	LED (7W./FT MAX.)	120	UNDER CABINET LED LIGHT.
X	MATCH BUILDING STANDARD EXIT SIGN REFER TO REMARKS	SURFACE	LED (<5W.)	120	PROVIDE WITH 90-MINUTE BATTERY BACK. MATCH DIRECTIONAL ARROWS AS NOTED ON PLANS.

THIS FIXTURE SCHEDULE IS INTENDED TO PROVIDE GENERAL LIGHTING FIXTURE QUALITY AND PERFORMANCE REQUIREMENTS ONLY. CONTRACTOR SHALL BE RESPONSIBLE TO OBTAIN THE EXACT MODEL/CATALOG NUMBER OF THE LIGHTING FIXTURES LISTED ABOVE. ANY DIFFERENCES BETWEEN THIS LIGHTING FIXTURE SCHEDULE AND ARCHITECTURAL DRAWINGS OR MANUFACTURERS PRODUCT LISTINGS SHALL BE IMMEDIATELY BROUGHT TO THE ATTENTION OF THE ENGINEER.

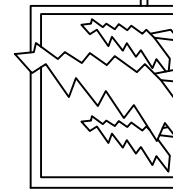


ARCHITECTURE PLANNING INTERIOR DESIGN

15810 PARK TEN PLACE, SUITE 300
HOUSTON, TEXAS 77084
713-465-4650
www.sligroup.com

WOODFOREST NATIONAL BANK

400 W. DAVIS
CONROE, TX 77301



E/B/E Project Number : 25026

ISSUED FOR CLIENT APPROVAL	DATE	
ISSUED FOR BIDDING		
ISSUED FOR PERMIT	02/13/2026	
ISSUED FOR CONSTRUCTION		
REVISIONS		
MARK	DESCRIPTION	DATE
	90% REVIEW SET	2026/02/06
	ISSUED FOR PERMIT	2026/02/13

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DRAWING TITLE
ELECTRICAL SCHEDULES

SHEET NO.

E4.01

SCALE: N.T.S.

EIBIE Mechanical Electrical Plumbing
CONSULTING ENGINEERS

12603 Southwest Frwy, Ste 170, Stafford, TX 77477
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PM	MECH	ELEC	PLBG	CHCK
JG	THV	JG	BM	JG

