

WEST NAVARRE INTERMEDIATE SCHOOL
5 CLASSROOM ADDITION

SECTION 15085 - PLUMBING PIPING INSULATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. DRAWINGS AND GENERAL PROVISIONS OF THE CONTRACT, INCLUDING GENERAL AND SUPPLEMENTARY CONDITIONS AND DIVISION 01 SPECIFICATION SECTIONS, APPLY TO THIS SECTION.

1.2 SUMMARY

- A. SECTION INCLUDES INSULATING THE FOLLOWING PLUMBING PIPING SERVICES:
 - 1. DOMESTIC COLD-WATER PIPING.
 - 2. DOMESTIC HOT-WATER PIPING.
 - 3. DOMESTIC RECIRCULATING HOT-WATER PIPING.
 - 4. SUPPLIES AND DRAINS FOR HANDICAP-ACCESSIBLE LAVATORIES AND SINKS.

1.3 ACTION SUBMITTALS

- A. PRODUCT DATA: FOR EACH TYPE OF PRODUCT INDICATED. INCLUDE THERMAL CONDUCTIVITY, WATER-VAPOR PERMEANCE THICKNESS, AND JACKETS (BOTH FACTORY- AND FIELD-APPLIED, IF ANY).

1.4 QUALITY ASSURANCE

- A. SURFACE-BURNING CHARACTERISTICS: FOR INSULATION AND RELATED MATERIALS, AS DETERMINED BY TESTING IDENTICAL PRODUCTS ACCORDING TO ASTM E 84 BY A TESTING AGENCY ACCEPTABLE TO AUTHORITIES HAVING JURISDICTION. FACTORY LABEL INSULATION AND JACKET MATERIALS AND ADHESIVE, MASTIC, TAPES, AND CEMENT MATERIAL CONTAINERS, WITH APPROPRIATE MARKINGS OF APPLICABLE TESTING AGENCY.
 - 1. INSULATION INSTALLED INDOORS: FLAME-SPREAD INDEX OF 25 OR LESS, AND SMOKE-DEVELOPED INDEX OF 50 OR LESS.
 - 2. INSULATION INSTALLED OUTDOORS: FLAME-SPREAD INDEX OF 75 OR LESS, AND SMOKE-DEVELOPED INDEX OF 150 OR LESS.
- B. COMPLY WITH THE FOLLOWING APPLICABLE STANDARDS AND OTHER REQUIREMENTS SPECIFIED FOR MISCELLANEOUS COMPONENTS:
 - 1. SUPPLY AND DRAIN PROTECTIVE SHIELDING GUARDS: ICC A117.1.

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1.5 COORDINATION

- A. COORDINATE SIZES AND LOCATIONS OF SUPPORTS, HANGERS, AND INSULATION SHIELDS SPECIFIED IN SECTION 15061 "HANGERS AND SUPPORTS FOR PLUMBING PIPING AND EQUIPMENT."
- B. COORDINATE CLEARANCE REQUIREMENTS WITH PIPING INSTALLER FOR PIPING INSULATION APPLICATION. BEFORE PREPARING PIPING SHOP DRAWINGS, ESTABLISH AND MAINTAIN CLEARANCE REQUIREMENTS FOR INSTALLATION OF INSULATION AND FIELD-APPLIED JACKETS AND FINISHES AND FOR SPACE REQUIRED FOR MAINTENANCE.

1.6 SCHEDULING

- A. SCHEDULE INSULATION APPLICATION AFTER PRESSURE TESTING SYSTEMS AND, WHERE REQUIRED, AFTER INSTALLING AND TESTING HEAT TRACING. INSULATION APPLICATION MAY BEGIN ON SEGMENTS THAT HAVE SATISFACTORY TEST RESULTS.
- B. COMPLETE INSTALLATION AND CONCEALMENT OF PLASTIC MATERIALS AS RAPIDLY AS POSSIBLE IN EACH AREA OF CONSTRUCTION.

PART 2 - PRODUCTS

2.1 INSULATION MATERIALS

- A. PRODUCTS SHALL NOT CONTAIN ASBESTOS, LEAD, MERCURY, OR MERCURY COMPOUNDS.
- B. PRODUCTS THAT COME IN CONTACT WITH STAINLESS STEEL SHALL HAVE A LEACHABLE CHLORIDE CONTENT OF LESS THAN 50 PPM WHEN TESTED ACCORDING TO ASTM C 871.
- C. INSULATION MATERIALS FOR USE ON AUSTENITIC STAINLESS STEEL SHALL BE QUALIFIED AS ACCEPTABLE ACCORDING TO ASTM C 795.
- D. FOAM INSULATION MATERIALS SHALL NOT USE CFC OR HCFC BLOWING AGENTS IN THE MANUFACTURING PROCESS.
- E. FLEXIBLE ELASTOMERIC INSULATION: CLOSED-CELL, SPONGE- OR EXPANDED-RUBBER MATERIALS. COMPLY WITH ASTM C 534, TYPE I FOR TUBULAR MATERIALS.
 - 1. PRODUCTS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE ONE OF THE FOLLOWING:
 - A. AEROFLEX USA, INC.; AEROCCEL.
 - B. ARMACELL LLC; AP ARMAFLEX.
 - C. K-FLEX USA; INSUL-LOCK, INSUL-TUBE, AND K-FLEX LS.
- F. MINERAL-FIBER, PREFORMED PIPE INSULATION:
 - 1. PRODUCTS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE ONE OF THE FOLLOWING:

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- A. FIBREX INSULATIONS INC.; COREPLUS 1200.
 - B. JOHNS MANVILLE; MICRO-LOK.
 - C. KNAUF INSULATION; 1000-DEGREE PIPE INSULATION.
 - D. MANSON INSULATION INC.; ALLEY-K.
 - E. OWENS CORNING; FIBERGLAS PIPE INSULATION.
 - 2. TYPE I, 850 DEG F MATERIALS: MINERAL OR GLASS FIBERS BONDED WITH A THERMOSETTING RESIN. COMPLY WITH ASTM C 547, TYPE I, GRADE A, WITH FACTORY-APPLIED ASJ-SSL. FACTORY-APPLIED JACKET REQUIREMENTS ARE SPECIFIED IN "FACTORY-APPLIED JACKETS" ARTICLE.
- 2.2 INSULATING CEMENTS
- A. MINERAL-FIBER, HYDRAULIC-SETTING INSULATING AND FINISHING CEMENT: COMPLY WITH ASTM C 449.
 - 1. PRODUCTS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, AVAILABLE PRODUCTS THAT MAY BE INCORPORATED INTO THE WORK INCLUDE, BUT ARE NOT LIMITED TO, THE FOLLOWING:
 - A. RAMCO INSULATION, INC.; RAMCOTE 1200 AND QUIK-COTE.
- 2.3 ADHESIVES
- A. MATERIALS SHALL BE COMPATIBLE WITH INSULATION MATERIALS, JACKETS, AND SUBSTRATES AND FOR BONDING INSULATION TO ITSELF AND TO SURFACES TO BE INSULATED, UNLESS OTHERWISE INDICATED.
 - B. FLEXIBLE ELASTOMERIC AND POLYOLEFIN ADHESIVE: COMPLY WITH MIL-A-24179A, TYPE II, CLASS I.
 - 1. PRODUCTS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE ONE OF THE FOLLOWING:
 - A. AEROFLEX USA, INC.; AEROSEAL.
 - B. ARMACELL LLC; ARMAFLEX 520 ADHESIVE.
 - C. FOSTER BRAND, SPECIALTY CONSTRUCTION BRANDS, INC., A BUSINESS OF H. B. FULLER COMPANY; 85-75.
 - D. K-FLEX USA; R-373 CONTACT ADHESIVE.
 - C. MINERAL-FIBER ADHESIVE: COMPLY WITH MIL-A-3316C, CLASS 2, GRADE A.
 - 1. PRODUCTS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE ONE OF THE FOLLOWING:
 - A. CHILDERS BRAND, SPECIALTY CONSTRUCTION BRANDS, INC., A BUSINESS OF H. B. FULLER COMPANY; CP-127.
 - B. EAGLE BRIDGES - MARATHON INDUSTRIES; 225.
 - C. FOSTER BRAND, SPECIALTY CONSTRUCTION BRANDS, INC., A BUSINESS OF H. B. FULLER COMPANY; 85-60/85-70.
 - D. MON-ECO INDUSTRIES, INC.; 22-25.

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- D. ASJ ADHESIVE, AND FSK JACKET ADHESIVE: COMPLY WITH MIL-A-3316C, CLASS 2, GRADE A FOR BONDING INSULATION JACKET LAP SEAMS AND JOINTS.
1. PRODUCTS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE ONE OF THE FOLLOWING:
- A. CHILDERS BRAND, SPECIALTY CONSTRUCTION BRANDS, INC., A BUSINESS OF H. B. FULLER COMPANY; CP-82.
 - B. EAGLE BRIDGES - MARATHON INDUSTRIES; 225.
 - C. FOSTER BRAND, SPECIALTY CONSTRUCTION BRANDS, INC., A BUSINESS OF H. B. FULLER COMPANY; 85-20.
 - D. MON-ECO INDUSTRIES, INC.; 22-25.
- E. PVC JACKET ADHESIVE: COMPATIBLE WITH PVC JACKET.
1. PRODUCTS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE ONE OF THE FOLLOWING:
- A. DOW CORNING CORPORATION; 739, DOW SILICONE.
 - B. JOHNS MANVILLE; ZESTON PERMA-WELD, CEEL-TITE SOLVENT WELDING ADHESIVE.
 - C. P.I.C. PLASTICS, INC.; WELDING ADHESIVE.
 - D. SPEEDLINE CORPORATION; POLYCO VP ADHESIVE.
- 2.4 MASTICS
- A. MATERIALS SHALL BE COMPATIBLE WITH INSULATION MATERIALS, JACKETS, AND SUBSTRATES; COMPLY WITH MIL-PRF-19565C, TYPE II.
- B. VAPOR-BARRIER MASTIC: WATER BASED; SUITABLE FOR INDOOR USE ON BELOW-AMBIENT SERVICES.
1. PRODUCTS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE ONE OF THE FOLLOWING:
- A. FOSTER BRAND, SPECIALTY CONSTRUCTION BRANDS, INC., A BUSINESS OF H. B. FULLER COMPANY; 30-80/30-90.
 - B. VIMASCO CORPORATION; 749.
2. WATER-VAPOR PERMEANCE: ASTM E 96/E 96M, PROCEDURE B, 0.013 PERM AT 43-MIL DRY FILM THICKNESS.
3. SERVICE TEMPERATURE RANGE: MINUS 20 TO PLUS 180 DEG F.
4. SOLIDS CONTENT: ASTM D 1644, 58 PERCENT BY VOLUME AND 70 PERCENT BY WEIGHT.
5. COLOR: WHITE.
- C. BREATHER MASTIC: WATER BASED; SUITABLE FOR INDOOR AND OUTDOOR USE ON ABOVE-AMBIENT SERVICES.
1. PRODUCTS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE ONE OF THE FOLLOWING:
- A. CHILDERS BRAND, SPECIALTY CONSTRUCTION BRANDS, INC., A BUSINESS OF H. B. FULLER COMPANY; CP-10.

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- B. EAGLE BRIDGES - MARATHON INDUSTRIES; 550.
 - C. FOSTER BRAND, SPECIALTY CONSTRUCTION BRANDS, INC., A BUSINESS OF H. B. FULLER COMPANY; 46-50.
 - D. MON-ECO INDUSTRIES, INC.; 55-50.
 - E. VIMASCO CORPORATION; WC-1/WC-5.
- 2. WATER-VAPOR PERMEANCE: ASTM F 1249, 1.8 PERMS AT 0.0625-INCH DRY FILM THICKNESS.
 - 3. SERVICE TEMPERATURE RANGE: MINUS 20 TO PLUS 180 DEG F.
 - 4. SOLIDS CONTENT: 60 PERCENT BY VOLUME AND 66 PERCENT BY WEIGHT.
 - 5. COLOR: WHITE.

2.5 SEALANTS

A. JOINT SEALANTS:

- 1. JOINT SEALANTS FOR CELLULAR-GLASS AND PHENOLIC PRODUCTS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE ONE OF THE FOLLOWING:
 - A. CHILDERS BRAND, SPECIALTY CONSTRUCTION BRANDS, INC., A BUSINESS OF H. B. FULLER COMPANY; CP-76.
 - B. EAGLE BRIDGES - MARATHON INDUSTRIES; 405.
 - C. FOSTER BRAND, SPECIALTY CONSTRUCTION BRANDS, INC., A BUSINESS OF H. B. FULLER COMPANY; 30-45.
 - D. MON-ECO INDUSTRIES, INC.; 44-05.
 - E. PITTSBURGH CORNING CORPORATION; PITTSEAL 444.
- 2. MATERIALS SHALL BE COMPATIBLE WITH INSULATION MATERIALS, JACKETS, AND SUBSTRATES.
- 3. PERMANENTLY FLEXIBLE, ELASTOMERIC SEALANT.
- 4. SERVICE TEMPERATURE RANGE: MINUS 100 TO PLUS 300 DEG F.
- 5. COLOR: WHITE OR GRAY.

B. PVC JACKET FLASHING SEALANTS:

- 1. PRODUCTS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE ONE OF THE FOLLOWING:
 - A. CHILDERS BRAND, SPECIALTY CONSTRUCTION BRANDS, INC., A BUSINESS OF H. B. FULLER COMPANY; CP-76.
- 2. MATERIALS SHALL BE COMPATIBLE WITH INSULATION MATERIALS, JACKETS, AND SUBSTRATES.
- 3. FIRE- AND WATER-RESISTANT, FLEXIBLE, ELASTOMERIC SEALANT.
- 4. SERVICE TEMPERATURE RANGE: MINUS 40 TO PLUS 250 DEG F.
- 5. COLOR: WHITE.

2.6 FACTORY-APPLIED JACKETS

- A. INSULATION SYSTEM SCHEDULES INDICATE FACTORY-APPLIED JACKETS ON VARIOUS APPLICATIONS. WHEN FACTORY-APPLIED JACKETS ARE INDICATED, COMPLY WITH THE FOLLOWING:

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1. ASJ: WHITE, KRAFT-PAPER, FIBERGLASS-REINFORCED SCRIM WITH ALUMINUM-FOIL BACKING; COMPLYING WITH ASTM C 1136, TYPE I.
2. ASJ-SSL: ASJ WITH SELF-SEALING, PRESSURE-SENSITIVE, ACRYLIC-BASED ADHESIVE COVERED BY A REMOVABLE PROTECTIVE STRIP; COMPLYING WITH ASTM C 1136, TYPE I.

2.7 FIELD-APPLIED JACKETS

- A. FIELD-APPLIED JACKETS SHALL COMPLY WITH ASTM C 921, TYPE I, UNLESS OTHERWISE INDICATED.
- B. PVC JACKET: HIGH-IMPACT-RESISTANT, UV-RESISTANT PVC COMPLYING WITH ASTM D 1784, CLASS 16354-C; THICKNESS AS SCHEDULED; ROLL STOCK READY FOR SHOP OR FIELD CUTTING AND FORMING. THICKNESS IS INDICATED IN FIELD-APPLIED JACKET SCHEDULES.
 1. PRODUCTS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE ONE OF THE FOLLOWING:
 - A. JOHNS MANVILLE; ZESTON.
 - B. P.I.C. PLASTICS, INC.; FG SERIES.
 - C. PROTO CORPORATION; LOSMOKE.
 - D. SPEEDLINE CORPORATION; SMOKESAFE.
 2. ADHESIVE: AS RECOMMENDED BY JACKET MATERIAL MANUFACTURER.
 3. COLOR: WHITE.
 4. FACTORY-FABRICATED FITTING COVERS TO MATCH JACKET IF AVAILABLE; OTHERWISE, FIELD FABRICATE.
 - A. SHAPES: 45- AND 90-DEGREE, SHORT- AND LONG-RADIUS ELBOWS, TEES, VALVES, FLANGES, UNIONS, REDUCERS, END CAPS, SOIL-PIPE HUBS, TRAPS, MECHANICAL JOINTS, AND P-TRAP AND SUPPLY COVERS FOR LAVATORIES.

2.8 TAPES

- A. ASJ TAPE: WHITE VAPOR-RETARDER TAPE MATCHING FACTORY-APPLIED JACKET WITH ACRYLIC ADHESIVE, COMPLYING WITH ASTM C 1136.
 1. PRODUCTS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE ONE OF THE FOLLOWING:
 - A. ABI, IDEAL TAPE DIVISION; 428 AWF ASJ.
 - B. AVERY DENNISON CORPORATION, SPECIALTY TAPES DIVISION; FASSON 0836.
 - C. COMPAC CORPORATION; 104 AND 105.
 - D. VENTURE TAPE; 1540 CW PLUS, 1542 CW PLUS, AND 1542 CW PLUS/SQ.
 2. WIDTH: 3 INCHES.
 3. THICKNESS: 11.5 MILS.
 4. ADHESION: 90 OUNCES FORCE/INCH IN WIDTH.
 5. ELONGATION: 2 PERCENT.
 6. TENSILE STRENGTH: 40 LBF/INCH IN WIDTH.
 7. ASJ TAPE DISKS AND SQUARES: PRECUT DISKS OR SQUARES OF ASJ TAPE.

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- B. PVC TAPE: WHITE VAPOR-RETARDER TAPE MATCHING FIELD-APPLIED PVC JACKET WITH ACRYLIC ADHESIVE; SUITABLE FOR INDOOR AND OUTDOOR APPLICATIONS.
1. PRODUCTS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE ONE OF THE FOLLOWING:
 - A. ABI, IDEAL TAPE DIVISION; 370 WHITE PVC TAPE.
 - B. COMPAC CORPORATION; 130.
 - C. VENTURE TAPE; 1506 CW NS.
 2. WIDTH: 2 INCHES.
 3. THICKNESS: 6 MILS.
 4. ADHESION: 64 OUNCES FORCE/INCH IN WIDTH.
 5. ELONGATION: 500 PERCENT.
 6. TENSILE STRENGTH: 18 LBF/INCH IN WIDTH.

2.9 SECUREMENTS

- A. BANDS:
1. PRODUCTS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE ONE OF THE FOLLOWING:
 - A. ITW INSULATION SYSTEMS; GERRARD STRAPPING AND SEALS.
 - B. RPR PRODUCTS, INC.; INSUL-MATE STRAPPING AND SEALS.
 2. STAINLESS STEEL: ASTM A 167 OR ASTM A 240/A 240M, TYPE 304 OR TYPE 316; 0.015 INCH THICK, 1/2 INCH WIDE WITH WING SEAL.
 3. ALUMINUM: ASTM B 209, ALLOY 3003, 3005, 3105, OR 5005; TEMPER H-14, 0.020 INCH THICK, 1/2 INCH WIDE WITH WING SEAL.
- B. STAPLES: OUTWARD-CLINCHING INSULATION STAPLES, NOMINAL 3/4-INCH- WIDE, STAINLESS STEEL OR MONEL.
- C. WIRE: 0.062-INCH SOFT-ANNEALED, STAINLESS STEEL.

2.10 PROTECTIVE SHIELDING GUARDS

- A. PROTECTIVE SHIELDING PIPE COVERS:
1. MANUFACTURERS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE PRODUCTS BY ONE OF THE FOLLOWING:
 - A. ENGINEERED BRASS COMPANY.
 - B. INSUL-TECT PRODUCTS CO.; A SUBSIDIARY OF MVG MOLDED PRODUCTS.
 - C. MCGUIRE MANUFACTURING.
 - D. PLUMBEREX.
 - E. TRUEBRO; A BRAND OF IPS CORPORATION.
 - F. ZURN INDUSTRIES, LLC; TUBULAR BRASS PLUMBING PRODUCTS OPERATION.

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2. DESCRIPTION: MANUFACTURED PLASTIC WRAPS FOR COVERING PLUMBING FIXTURE HOT-WATER SUPPLY AND TRAP AND DRAIN PIPING. COMPLY WITH AMERICANS WITH DISABILITIES ACT (ADA) REQUIREMENTS.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. EXAMINE SUBSTRATES AND CONDITIONS FOR COMPLIANCE WITH REQUIREMENTS FOR INSTALLATION TOLERANCES AND OTHER CONDITIONS AFFECTING PERFORMANCE OF INSULATION APPLICATION.
 1. VERIFY THAT SYSTEMS TO BE INSULATED HAVE BEEN TESTED AND ARE FREE OF DEFECTS.
 2. VERIFY THAT SURFACES TO BE INSULATED ARE CLEAN AND DRY.
- B. PROCEED WITH INSTALLATION ONLY AFTER UNSATISFACTORY CONDITIONS HAVE BEEN CORRECTED.

3.2 PREPARATION

- A. SURFACE PREPARATION: CLEAN AND DRY SURFACES TO RECEIVE INSULATION. REMOVE MATERIALS THAT WILL ADVERSELY AFFECT INSULATION APPLICATION.
- B. COORDINATE INSULATION INSTALLATION WITH THE TRADE INSTALLING HEAT TRACING. COMPLY WITH REQUIREMENTS FOR HEAT TRACING THAT APPLY TO INSULATION.
- C. MIX INSULATING CEMENTS WITH CLEAN POTABLE WATER; IF INSULATING CEMENTS ARE TO BE IN CONTACT WITH STAINLESS-STEEL SURFACES, USE DEMINERALIZED WATER.

3.3 GENERAL INSTALLATION REQUIREMENTS

- A. INSTALL INSULATION MATERIALS, ACCESSORIES, AND FINISHES WITH SMOOTH, STRAIGHT, AND EVEN SURFACES; FREE OF VOIDS THROUGHOUT THE LENGTH OF PIPING INCLUDING FITTINGS, VALVES, AND SPECIALTIES.
- B. INSTALL INSULATION MATERIALS, FORMS, VAPOR BARRIERS OR RETARDERS, JACKETS, AND THICKNESSES REQUIRED FOR EACH ITEM OF PIPE SYSTEM AS SPECIFIED IN INSULATION SYSTEM SCHEDULES.
- C. INSTALL ACCESSORIES COMPATIBLE WITH INSULATION MATERIALS AND SUITABLE FOR THE SERVICE. INSTALL ACCESSORIES THAT DO NOT CORRODE, SOFTEN, OR OTHERWISE ATTACK INSULATION OR JACKET IN EITHER WET OR DRY STATE.
- D. INSTALL INSULATION WITH LONGITUDINAL SEAMS AT TOP AND BOTTOM OF HORIZONTAL RUNS.
- E. INSTALL MULTIPLE LAYERS OF INSULATION WITH LONGITUDINAL AND END SEAMS STAGGERED.

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- F. DO NOT WELD BRACKETS, CLIPS, OR OTHER ATTACHMENT DEVICES TO PIPING, FITTINGS, AND SPECIALTIES.
- G. KEEP INSULATION MATERIALS DRY DURING APPLICATION AND FINISHING.
- H. INSTALL INSULATION WITH TIGHT LONGITUDINAL SEAMS AND END JOINTS. BOND SEAMS AND JOINTS WITH ADHESIVE RECOMMENDED BY INSULATION MATERIAL MANUFACTURER.
- I. INSTALL INSULATION WITH LEAST NUMBER OF JOINTS PRACTICAL.
- J. WHERE VAPOR BARRIER IS INDICATED, SEAL JOINTS, SEAMS, AND PENETRATIONS IN INSULATION AT HANGERS, SUPPORTS, ANCHORS, AND OTHER PROJECTIONS WITH VAPOR-BARRIER MASTIC.
 - 1. INSTALL INSULATION CONTINUOUSLY THROUGH HANGERS AND AROUND ANCHOR ATTACHMENTS.
 - 2. FOR INSULATION APPLICATION WHERE VAPOR BARRIERS ARE INDICATED, EXTEND INSULATION ON ANCHOR LEGS FROM POINT OF ATTACHMENT TO SUPPORTED ITEM TO POINT OF ATTACHMENT TO STRUCTURE. TAPER AND SEAL ENDS AT ATTACHMENT TO STRUCTURE WITH VAPOR-BARRIER MASTIC.
 - 3. INSTALL INSERT MATERIALS AND INSTALL INSULATION TO TIGHTLY JOIN THE INSERT. SEAL INSULATION TO INSULATION INSERTS WITH ADHESIVE OR SEALING COMPOUND RECOMMENDED BY INSULATION MATERIAL MANUFACTURER.
 - 4. COVER INSERTS WITH JACKET MATERIAL MATCHING ADJACENT PIPE INSULATION. INSTALL SHIELDS OVER JACKET, ARRANGED TO PROTECT JACKET FROM TEAR OR PUNCTURE BY HANGER, SUPPORT, AND SHIELD.
- K. APPLY ADHESIVES, MASTICS, AND SEALANTS AT MANUFACTURER'S RECOMMENDED COVERAGE RATE AND WET AND DRY FILM THICKNESSES.
- L. INSTALL INSULATION WITH FACTORY-APPLIED JACKETS AS FOLLOWS:
 - 1. DRAW JACKET TIGHT AND SMOOTH.
 - 2. COVER CIRCUMFERENTIAL JOINTS WITH 3-INCH- WIDE STRIPS, OF SAME MATERIAL AS INSULATION JACKET. SECURE STRIPS WITH ADHESIVE AND OUTWARD CLINCHING STAPLES ALONG BOTH EDGES OF STRIP, SPACED 4 INCHES O.C.
 - 3. OVERLAP JACKET LONGITUDINAL SEAMS AT LEAST 1-1/2 INCHES. INSTALL INSULATION WITH LONGITUDINAL SEAMS AT BOTTOM OF PIPE. CLEAN AND DRY SURFACE TO RECEIVE SELF-SEALING LAP. STAPLE LAPS WITH OUTWARD CLINCHING STAPLES ALONG EDGE AT 2 INCHES O.C.
 - A. FOR BELOW-AMBIENT SERVICES, APPLY VAPOR-BARRIER MASTIC OVER STAPLES.
 - 4. COVER JOINTS AND SEAMS WITH TAPE, ACCORDING TO INSULATION MATERIAL MANUFACTURER'S WRITTEN INSTRUCTIONS, TO MAINTAIN VAPOR SEAL.
 - 5. WHERE VAPOR BARRIERS ARE INDICATED, APPLY VAPOR-BARRIER MASTIC ON SEAMS AND JOINTS AND AT ENDS ADJACENT TO PIPE FLANGES AND FITTINGS.
- M. CUT INSULATION IN A MANNER TO AVOID COMPRESSING INSULATION MORE THAN 75 PERCENT OF ITS NOMINAL THICKNESS.

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- N. FINISH INSTALLATION WITH SYSTEMS AT OPERATING CONDITIONS. REPAIR JOINT SEPARATIONS AND CRACKING DUE TO THERMAL MOVEMENT.
- O. REPAIR DAMAGED INSULATION FACINGS BY APPLYING SAME FACING MATERIAL OVER DAMAGED AREAS. EXTEND PATCHES AT LEAST 4 INCHES BEYOND DAMAGED AREAS. ADHERE, STAPLE, AND SEAL PATCHES SIMILAR TO BUTT JOINTS.
- P. FOR ABOVE-AMBIENT SERVICES, DO NOT INSTALL INSULATION TO THE FOLLOWING:
 - 1. VIBRATION-CONTROL DEVICES.
 - 2. TESTING AGENCY LABELS AND STAMPS.
 - 3. NAMEPLATES AND DATA PLATES.
 - 4. CLEANOUTS.

3.4 PENETRATIONS

- A. INSULATION INSTALLATION AT INTERIOR WALL AND PARTITION PENETRATIONS (THAT ARE NOT FIRE RATED): INSTALL INSULATION CONTINUOUSLY THROUGH WALLS AND PARTITIONS.
- B. INSULATION INSTALLATION AT FIRE-RATED WALL AND PARTITION PENETRATIONS: INSTALL INSULATION CONTINUOUSLY THROUGH PENETRATIONS OF FIRE-RATED WALLS AND PARTITIONS.

3.5 GENERAL PIPE INSULATION INSTALLATION

- A. REQUIREMENTS IN THIS ARTICLE GENERALLY APPLY TO ALL INSULATION MATERIALS EXCEPT WHERE MORE SPECIFIC REQUIREMENTS ARE SPECIFIED IN VARIOUS PIPE INSULATION MATERIAL INSTALLATION ARTICLES.
- B. INSULATION INSTALLATION ON FITTINGS, VALVES, STRAINERS, FLANGES, AND UNIONS:
 - 1. INSTALL INSULATION OVER FITTINGS, VALVES, STRAINERS, FLANGES, UNIONS, AND OTHER SPECIALTIES WITH CONTINUOUS THERMAL AND VAPOR-RETARDER INTEGRITY UNLESS OTHERWISE INDICATED.
 - 2. INSULATE PIPE ELBOWS USING PREFORMED FITTING INSULATION OR MITERED FITTINGS MADE FROM SAME MATERIAL AND DENSITY AS ADJACENT PIPE INSULATION. EACH PIECE SHALL BE BUTTED TIGHTLY AGAINST ADJOINING PIECE AND BONDED WITH ADHESIVE. FILL JOINTS, SEAMS, VOIDS, AND IRREGULAR SURFACES WITH INSULATING CEMENT FINISHED TO A SMOOTH, HARD, AND UNIFORM CONTOUR THAT IS UNIFORM WITH ADJOINING PIPE INSULATION.
 - 3. INSULATE TEE FITTINGS WITH PREFORMED FITTING INSULATION OR SECTIONAL PIPE INSULATION OF SAME MATERIAL AND THICKNESS AS USED FOR ADJACENT PIPE. CUT SECTIONAL PIPE INSULATION TO FIT. BUTT EACH SECTION CLOSELY TO THE NEXT AND HOLD IN PLACE WITH TIE WIRE. BOND PIECES WITH ADHESIVE.
 - 4. INSULATE VALVES USING PREFORMED FITTING INSULATION OR SECTIONAL PIPE INSULATION OF SAME MATERIAL, DENSITY, AND THICKNESS AS USED FOR ADJACENT PIPE. OVERLAP ADJOINING PIPE INSULATION BY NOT LESS THAN TWO TIMES THE THICKNESS OF PIPE INSULATION, OR ONE PIPE DIAMETER, WHICHEVER IS THICKER. FOR VALVES, INSULATE UP TO AND INCLUDING THE BONNETS,

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- VALVE STUFFING-BOX STUDS, BOLTS, AND NUTS. FILL JOINTS, SEAMS, AND IRREGULAR SURFACES WITH INSULATING CEMENT.
5. INSULATE STRAINERS USING PREFORMED FITTING INSULATION OR SECTIONAL PIPE INSULATION OF SAME MATERIAL, DENSITY, AND THICKNESS AS USED FOR ADJACENT PIPE. OVERLAP ADJOINING PIPE INSULATION BY NOT LESS THAN TWO TIMES THE THICKNESS OF PIPE INSULATION, OR ONE PIPE DIAMETER, WHICHEVER IS THICKER. FILL JOINTS, SEAMS, AND IRREGULAR SURFACES WITH INSULATING CEMENT. INSULATE STRAINERS SO STRAINER BASKET FLANGE OR PLUG CAN BE EASILY REMOVED AND REPLACED WITHOUT DAMAGING THE INSULATION AND JACKET. PROVIDE A REMOVABLE REUSABLE INSULATION COVER. FOR BELOW-AMBIENT SERVICES, PROVIDE A DESIGN THAT MAINTAINS VAPOR BARRIER.
 6. INSULATE FLANGES AND UNIONS USING A SECTION OF OVERSIZED PREFORMED PIPE INSULATION. OVERLAP ADJOINING PIPE INSULATION BY NOT LESS THAN TWO TIMES THE THICKNESS OF PIPE INSULATION, OR ONE PIPE DIAMETER, WHICHEVER IS THICKER.
 7. COVER SEGMENTED INSULATED SURFACES WITH A LAYER OF FINISHING CEMENT AND COAT WITH A MASTIC. INSTALL VAPOR-BARRIER MASTIC FOR BELOW-AMBIENT SERVICES AND A BREATHER MASTIC FOR ABOVE-AMBIENT SERVICES. REINFORCE THE MASTIC WITH FABRIC-REINFORCING MESH. TROWEL THE MASTIC TO A SMOOTH AND WELL-SHAPED CONTOUR.
 8. FOR SERVICES NOT SPECIFIED TO RECEIVE A FIELD-APPLIED JACKET EXCEPT FOR FLEXIBLE ELASTOMERIC AND POLYOLEFIN, INSTALL FITTED PVC COVER OVER ELBOWS, TEES, STRAINERS, VALVES, FLANGES, AND UNIONS. TERMINATE ENDS WITH PVC END CAPS. TAPE PVC COVERS TO ADJOINING INSULATION FACING USING PVC TAPE.
 9. STENCIL OR LABEL THE OUTSIDE INSULATION JACKET OF EACH UNION WITH THE WORD "UNION." MATCH SIZE AND COLOR OF PIPE LABELS.
- C. INSULATE INSTRUMENT CONNECTIONS FOR THERMOMETERS, PRESSURE GAGES, PRESSURE TEMPERATURE TAPS, TEST CONNECTIONS, FLOW METERS, SENSORS, SWITCHES, AND TRANSMITTERS ON INSULATED PIPES. SHAPE INSULATION AT THESE CONNECTIONS BY TAPERING IT TO AND AROUND THE CONNECTION WITH INSULATING CEMENT AND FINISH WITH FINISHING CEMENT, MASTIC, AND FLASHING SEALANT.
- 3.6 INSTALLATION OF FLEXIBLE ELASTOMERIC INSULATION
- A. SEAL LONGITUDINAL SEAMS AND END JOINTS WITH MANUFACTURER'S RECOMMENDED ADHESIVE TO ELIMINATE OPENINGS IN INSULATION THAT ALLOW PASSAGE OF AIR TO SURFACE BEING INSULATED.
- B. INSULATION INSTALLATION ON PIPE FLANGES:
1. INSTALL PIPE INSULATION TO OUTER DIAMETER OF PIPE FLANGE.
 2. MAKE WIDTH OF INSULATION SECTION SAME AS OVERALL WIDTH OF FLANGE AND BOLTS, PLUS TWICE THE THICKNESS OF PIPE INSULATION.
 3. FILL VOIDS BETWEEN INNER CIRCUMFERENCE OF FLANGE INSULATION AND OUTER CIRCUMFERENCE OF ADJACENT STRAIGHT PIPE SEGMENTS WITH CUT SECTIONS OF SHEET INSULATION OF SAME THICKNESS AS PIPE INSULATION.
 4. SECURE INSULATION TO FLANGES AND SEAL SEAMS WITH MANUFACTURER'S RECOMMENDED ADHESIVE TO ELIMINATE OPENINGS IN INSULATION THAT ALLOW PASSAGE OF AIR TO SURFACE BEING INSULATED.
- C. INSULATION INSTALLATION ON PIPE FITTINGS AND ELBOWS:

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1. INSTALL MITERED SECTIONS OF PIPE INSULATION.
2. SECURE INSULATION MATERIALS AND SEAL SEAMS WITH MANUFACTURER'S RECOMMENDED ADHESIVE TO ELIMINATE OPENINGS IN INSULATION THAT ALLOW PASSAGE OF AIR TO SURFACE BEING INSULATED.

D. INSULATION INSTALLATION ON VALVES AND PIPE SPECIALTIES:

1. INSTALL PREFORMED VALVE COVERS MANUFACTURED OF SAME MATERIAL AS PIPE INSULATION WHEN AVAILABLE.
2. WHEN PREFORMED VALVE COVERS ARE NOT AVAILABLE, INSTALL CUT SECTIONS OF PIPE AND SHEET INSULATION TO VALVE BODY. ARRANGE INSULATION TO PERMIT ACCESS TO PACKING AND TO ALLOW VALVE OPERATION WITHOUT DISTURBING INSULATION.
3. INSTALL INSULATION TO FLANGES AS SPECIFIED FOR FLANGE INSULATION APPLICATION.
4. SECURE INSULATION TO VALVES AND SPECIALTIES AND SEAL SEAMS WITH MANUFACTURER'S RECOMMENDED ADHESIVE TO ELIMINATE OPENINGS IN INSULATION THAT ALLOW PASSAGE OF AIR TO SURFACE BEING INSULATED.

3.7 INSTALLATION OF MINERAL-FIBER INSULATION

A. INSULATION INSTALLATION ON STRAIGHT PIPES AND TUBES:

1. SECURE EACH LAYER OF PREFORMED PIPE INSULATION TO PIPE WITH WIRE OR BANDS AND TIGHTEN BANDS WITHOUT DEFORMING INSULATION MATERIALS.
2. WHERE VAPOR BARRIERS ARE INDICATED, SEAL LONGITUDINAL SEAMS, END JOINTS, AND PROTRUSIONS WITH VAPOR-BARRIER MASTIC AND JOINT SEALANT.
3. FOR INSULATION WITH FACTORY-APPLIED JACKETS ON ABOVE-AMBIENT SURFACES, SECURE LAPS WITH OUTWARD CLINCHED STAPLES AT 6 INCHES O.C.
4. FOR INSULATION WITH FACTORY-APPLIED JACKETS ON BELOW-AMBIENT SURFACES, DO NOT STAPLE LONGITUDINAL TABS. INSTEAD, SECURE TABS WITH ADDITIONAL ADHESIVE AS RECOMMENDED BY INSULATION MATERIAL MANUFACTURER AND SEAL WITH VAPOR-BARRIER MASTIC AND FLASHING SEALANT.

B. INSULATION INSTALLATION ON PIPE FLANGES:

1. INSTALL PREFORMED PIPE INSULATION TO OUTER DIAMETER OF PIPE FLANGE.
2. MAKE WIDTH OF INSULATION SECTION SAME AS OVERALL WIDTH OF FLANGE AND BOLTS, PLUS TWICE THE THICKNESS OF PIPE INSULATION.
3. FILL VOIDS BETWEEN INNER CIRCUMFERENCE OF FLANGE INSULATION AND OUTER CIRCUMFERENCE OF ADJACENT STRAIGHT PIPE SEGMENTS WITH MINERAL-FIBER BLANKET INSULATION.
4. INSTALL JACKET MATERIAL WITH MANUFACTURER'S RECOMMENDED ADHESIVE, OVERLAP SEAMS AT LEAST 1 INCH, AND SEAL JOINTS WITH FLASHING SEALANT.

C. INSULATION INSTALLATION ON PIPE FITTINGS AND ELBOWS:

1. INSTALL PREFORMED SECTIONS OF SAME MATERIAL AS STRAIGHT SEGMENTS OF PIPE INSULATION WHEN AVAILABLE.
2. WHEN PREFORMED INSULATION ELBOWS AND FITTINGS ARE NOT AVAILABLE, INSTALL MITERED SECTIONS OF PIPE INSULATION, TO A THICKNESS EQUAL TO ADJOINING PIPE INSULATION. SECURE INSULATION MATERIALS WITH WIRE OR BANDS.

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D. INSULATION INSTALLATION ON VALVES AND PIPE SPECIALTIES:

1. INSTALL PREFORMED SECTIONS OF SAME MATERIAL AS STRAIGHT SEGMENTS OF PIPE INSULATION WHEN AVAILABLE.
2. WHEN PREFORMED SECTIONS ARE NOT AVAILABLE, INSTALL MITERED SECTIONS OF PIPE INSULATION TO VALVE BODY.
3. ARRANGE INSULATION TO PERMIT ACCESS TO PACKING AND TO ALLOW VALVE OPERATION WITHOUT DISTURBING INSULATION.
4. INSTALL INSULATION TO FLANGES AS SPECIFIED FOR FLANGE INSULATION APPLICATION.

3.8 FIELD-APPLIED JACKET INSTALLATION

A. WHERE PVC JACKETS ARE INDICATED, INSTALL WITH 1-INCH OVERLAP AT LONGITUDINAL SEAMS AND END JOINTS. SEAL WITH MANUFACTURER'S RECOMMENDED ADHESIVE.

1. APPLY TWO CONTINUOUS BEADS OF ADHESIVE TO SEAMS AND JOINTS, ONE BEAD UNDER LAP AND THE FINISH BEAD ALONG SEAM AND JOINT EDGE.

3.9 PIPING INSULATION SCHEDULE, GENERAL

A. ACCEPTABLE PREFORMED PIPE AND TUBULAR INSULATION MATERIALS AND THICKNESSES ARE IDENTIFIED FOR EACH PIPING SYSTEM AND PIPE SIZE RANGE. IF MORE THAN ONE MATERIAL IS LISTED FOR A PIPING SYSTEM, SELECTION FROM MATERIALS LISTED IS CONTRACTOR'S OPTION.

B. ITEMS NOT INSULATED: UNLESS OTHERWISE INDICATED, DO NOT INSTALL INSULATION ON THE FOLLOWING:

1. DRAINAGE PIPING LOCATED IN CRAWL SPACES.
2. UNDERGROUND PIPING.
3. BELOW GRADE PIPING.
4. CHROME-PLATED PIPES AND FITTINGS UNLESS THERE IS A POTENTIAL FOR PERSONNEL INJURY.

3.10 INDOOR PIPING INSULATION SCHEDULE

A. DOMESTIC COLD WATER:

1. NPS 1 AND SMALLER: INSULATION SHALL BE THE FOLLOWING:
 - A. MINERAL-FIBER, PREFORMED PIPE INSULATION, TYPE I: 1/2 INCH THICK.
2. NPS 1-1/4 AND LARGER: INSULATION SHALL BE THE FOLLOWING:
 - A. MINERAL-FIBER, PREFORMED PIPE INSULATION, TYPE I: 1 INCH THICK.

B. DOMESTIC HOT AND RECIRCULATED HOT WATER:

1. NPS 1-1/4 AND SMALLER: INSULATION SHALL BE THE FOLLOWING:

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- A. MINERAL-FIBER, PREFORMED PIPE INSULATION, TYPE I: 1/2 INCH THICK.
- 2. NPS 1-1/2 AND LARGER: INSULATION SHALL BE THE FOLLOWING:
 - A. MINERAL-FIBER, PREFORMED PIPE INSULATION, TYPE I: 1 INCH THICK.
- C. EXPOSED SANITARY DRAINS, DOMESTIC WATER, DOMESTIC HOT WATER, AND STOPS FOR PLUMBING FIXTURES FOR PEOPLE WITH DISABILITIES:
 - 1. ALL PIPE SIZES: INSULATION SHALL BE THE FOLLOWING:
 - A. FLEXIBLE ELASTOMERIC: 1/2 INCH THICK.
- 3.11 INDOOR, FIELD-APPLIED JACKET SCHEDULE
 - A. INSTALL JACKET OVER INSULATION MATERIAL. FOR INSULATION WITH FACTORY-APPLIED JACKET, INSTALL THE FIELD-APPLIED JACKET OVER THE FACTORY-APPLIED JACKET.
 - B. PIPING, CONCEALED:
 - 1. NONE.
 - C. PIPING, BELOW 6'-8" ABOVE FINISHED FLOOR:
 - 1. PVC: 30 MILS THICK.
 - D. PIPING, 6'-8" OR MORE ABOVE FINISHED FLOOR:
 - 1. NONE.

END OF SECTION 15085