This master should be used by designers working on Port of Portland construction projects and by designers working for PDX tenants (“Tenants”). Usage notes highlight a few specific editing choices, however the entire section should be evaluated and edited to fit specific project needs.

SECTION 220719 - PLUMBING INSULATION

1. GENERAL
	* + 1. DESCRIPTION
				1. This section describes insulation for piping and equipment.
			2. RELATED WORK SPECIFIED ELSEWHERE
				1. Section 099100, Painting
				2. Section 220529, Hangers and Supports for Plumbing Piping and Equipment
			3. REFERENCES
				1. IBC: International Building Code

IBC Chapter 13: Energy Efficiency

* + - * 1. UL: Underwriters Laboratories

UL 723: Standard for Test for Surface Burning Characteristics of Building Materials

* + - 1. SUBMITTALS
				1. Product Data: For each type of insulation including density, conductivity, thickness, jacket, vapor barrier, flame spread, and smoke developed indexes.
				2. Shop Drawings: Detail the installation of insulation for the following:

Removable covers for pump casings, accesses, etc.

Expansion joints.

Acoustical insulation including construction and installation of stainless steel jacket.

* + - 1. QUALITY ASSURANCE
				1. Regulatory Requirements:

Flame and Smoke Ratings: Installed composite flame spread not to exceed 25 and smoke developed not to exceed 50 as tested by UL 723.

Energy Codes: IBC Chapter 13 shall govern where requirements for thickness exceeds thickness specified.

* + - * 1. Protection: Protect against dirt, water, chemical or mechanical damage before, during, and after installation. Repair or replace damaged insulation at no additional cost to the Port.
				2. Source Quality Control:

Service: Use insulation specifically manufactured for service specified.

Labeling: Insulation labeled or stamped with brand name and number.

Insulation and accessories shall not provide any nutritional or bodily use to fungi, bacteria, insects, rats, mice, or other vermin: not react corrosively with equipment, piping, or ductwork; and be asbestos free.

1. PRODUCTS
	* + 1. GENERAL
				1. All insulation shall be of one manufacturer.
			2. PIPE INSULATION
				1. Fiberglass: Split sectional or snap-on type with 3.5 pcf density 0.23 per inch maximum thermal conductivity (K-factor) at 75ºF mean temperature, 500ºF minimum service rating and white, vapor barrier jacket with pressure sensitive closure system. Owens Corning Fiberglas Pipe Insulation SSL II or equal.
				2. Calcium Silicate: Sectional with 14 pcf nominal density, 0.42 per inch maximum K-factor at 200ºF mean temperature and 1200ºF minimum service rating. Pabco or equal.
				3. Elastomeric: Expanded closed cell, 0.27 per inch maximum K-factor at 75ºF mean temperature and 220ºF maximum service rating with fitting covers. Armstrong Armaflex II or equal.
				4. Acoustical: 2-inch thick 8 pcf density mineral wool.
			3. ACCESSORIES
				1. Adhesives:

Fiberglass: Johns Manville Zeston, Z-Glu, or equal.

Calcium Silicate: Benjamin Foster 30-36 or equal.

Elastomeric: Armstrong 520 or equal.

* + - * 1. Weld Pins: Duro-Dyne, with NC-1 nylon stop clips, or equal.
				2. Cements:

Insulating: Ryder or equal.

Heat Transfer: Johns Manville Zeston Z-20 or equal.

* + - * 1. Wire Mesh: 1-inch mesh with 20-gauge annealed steel wire.
				2. Pipe Fitting Covers: One-piece PVC insulated pipe fitting covers. Johns Manville Zeston, Ceel-Co, or equal.
				3. Grooved Coupling Insulation: One-piece PVC insulated fitting cover. Johns Manville Zeston, Ceel-Co, or equal.
				4. Insulation Protection Saddles: 12-inch long, 16-gauge steel. All piping with insulation shall be Anvil Fig. 167, galvanized, or equal.
				5. Mastic:

Vapor Barrier: Design Polymerics 3040, or equal.

Outdoor Mastic: Design Polymerics 3040, or equal.

* + - * 1. Metal Pipe Jacket: 0.016-inch thick aluminum jacket with form-fitting covers, aluminum snap straps and sealant.
				2. Cloth Facing: Presized fiberglass cloth.
				3. Tapes: Pressure sensitive, weather resistant and for temperatures up to 150ºF. Zeston Z-tape or equal.

Add cross reference below, as applicable.

* + - * 1. Paint: Ultraviolet resistant latex paint with special adherence capabilities to the PVC fitting covers, elastomeric, aluminum facing, Kraft paper, tapes, and adhesives.
1. EXECUTION
	* + 1. GENERAL
				1. Applicators: Applicators shall be employed by a firm that specializes in insulation work.
				2. Preparation: Surfaces of piping and equipment shall be clean, free of oil or dirt, and dry before insulation is applied.
				3. Stamps: Do not cover ASME stamps, UL labels, or similar stamps and labels.
				4. Any insulation that becomes damaged, water soaked, or stained shall be replaced at no additional cost to the Port.
			2. PIPE AND EQUIPMENT INSULATION APPLIED LOCATIONS
				1. Insulate the following piping systems with glass fiber insulation, all purpose jacket in thickness listed.
				2. Insulate piping in calcium silicate where indicated. Use same thickness as listed above for glass fiber insulation.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Description | Domestic Cold Water | Domestic Hot and Tempered Water | Non-Potable Water | Liquid Grease | Vacuum Waste |
| Pipe Size < 1-1/2" | 1/2  | 1 | 1/2  | - | - |
| Pipe Size ≥ 1-1/2" | 1 | 1-1/2  | 1 | - | - |
| Heat Traced | 1 | 1 | 1 | 1 | 1 |
| Pipe exposed to weather, heat trace with metal jacket over insulation | 1 | 1 | 1 | 1 | 1 |

The following piping is not insulated (except for where heat traced): domestic cold water exposed supplies, priming lines, vacuum waste, vents and waste.

Interior stormwater and overflow drains, 1/2-inch thick on vertical and horizontal runs to main stack. Main stack not insulated

Trap priming lines and traps in unheated space, 1-inch over heat tape

For air separators, heat exchangers, and storage tanks, 3 1/2-inch thick, Contractor may use elastomeric insulation or block fiberglass at the same thickness.

At hangers and horizontal pipe supports, use calcium silicate hard packs.

* + - * 1. Insulation shall include all fittings, unions, flanges, mechanical couplings, valve bodies, valve bonnets, and piping through sleeves (except valve bonnets). Unions and flanges need not be insulated on the following systems:

Domestic hot water, inside building.

* + - * 1. Insulate valves and irregular fittings with section of pipe insulation and insulating cement, securely fastened, and finished with 6 oz. canvas and Foster 30-36 or equal, lagging adhesive. The Contractor shall have the option on all flanges, valves, and strainers not requiring a vapor barrier to insulate with removable replaceable pads fabricated of 1-inch layer of Pittsburgh Corning Temp Mat, or equal, sandwiched between inner and outer layer of 8-ounce glass cloth, held together with stainless staples with sufficient stainless lacing hooks to hold pad firmly to flange or valve with minimum 3-inch overlap onto adjacent pipe insulation using 18-gauge stainless steel lacing wire.
				2. Expansion Joints and Flexible Connectors: Pipe insulation or block of same material and thickness as adjacent piping.
			1. PIPING INSTALLATION
				1. General:

Joints: Coat both sides of complete joining area with applicable adhesive.

Longitudinal Joints: Make joints on top or back of pipe to minimize visibility. Except for foam plastic, seal with closure system or 3-inch-wide tape.

Butt Joints: Butt tightly together and, except for foam plastic, seal with 3-inch-wide tape or butt straps.

Multiple Layered Insulation: Joints shall be staggered.

Access: Strainer and other items requiring service or maintenance with easily removable and replaceable section of insulation to provide access.

Voids: Fill all voids, chipped corners, and other openings with insulating cement or material compatible with insulating material. In insulation with vapor barrier, coat with vapor barrier mastic.

Heat Tracing: Where piping is shown or specified to be heat traced, bed heat tape into heat transfer cement with insulation over heat tape and cement. FG or FP not allowed.

Seal joints, seams, and fittings of metal watertight jackets at exterior locations.

* + - * 1. Fiberglass Insulation: Exterior insulation encased in metal jacket.
				2. Calcium Silicate Insulation:

On systems with vapor barrier, coat complete with vapor barrier mastic.

Cover with cloth facing secured with applicable adhesive.

Exterior insulation encased in metal jacket.

* + - * 1. Elastomeric Insulation:

Slit full length and snap around pipe.

Make cuts perpendicular to insulating surface leaving no cut section exposed.

Do not stretch insulation to cover joints or fittings.

Seal joints with adhesive. Sealing joints with tape will not be allowed.

* + - * 1. Fittings: Install insulation on all fittings.

On Elastomeric and Acoustical Insulation: Fittings covered with covers made up of mitered sections of insulation or with formed pipe fitting covers.

In Other Insulation: Fittings covered with insulation to the same level of the adjoining insulation or fill with insulating cement. Finish with pipe fitting covers or cloth facing and tape.

* + - * 1. Unions, Flanges, Mechanical Joints, Valves, Etc:

General:

As specified for fittings.

Minimum thickness same as specified for piping.

Unions: Build up insulation at least 1/2 inch beyond adjoining insulation.

Flanges: With square corners. Where flanges are not insulated, terminate adjacent insulation so flange bolts can be removed.

Flanged Valves: Insulation with square corners.

* + - * 1. Vapor Barrier Insulation:

Piping which requires vapor barrier protection shall have a continuous vapor barrier, which shall not be pierced or broken, except inside of walls. The following piping systems require vapor barrier protection:

Domestic cold water.

Non-potable cold water.

Insulation for pipe requiring vapor barrier protection 3/4 inch or smaller, insulation continuous through pipe hanger.

For pipe 1 -inch and larger, 18-inch section of calcium silicate, same thickness as pipe insulation, with continuous vapor barrier jacket, at each hanger.

For all piping, protect vapor barrier with pipe shield specified in Section 220529.

* + - * 1. Non-Vapor Barriered Insulation:

Piping not requiring a vapor barrier shall be supported as specified above except at piping requiring roller hangers. Provide saddle as specified in Section 220529.

On piping 3/4-inch and smaller, insulation may pass through hanger. Provide shield or rigid insulation at hanger.

* + - 1. EQUIPMENT INSTALLATION
				1. General: Install true and smooth. Insulation over curved surfaces shall conform to curves of surface.

Access: Access, etc., that requires service, inspection, or maintenance shall be provided with covers or sections that are easily removable and replaceable. Reinforce openings in adjacent insulation with metal beading. In vapor barriered insulation, coat joints with vapor barrier mastic.

Voids, Depressions, and Cavities: All voids, chipped corners, and other openings shall be filled with insulating cement or material compatible with insulating material.

Vapor Barriered Insulation: Where insulation is specified to have a vapor barrier, the barrier shall not be pierced or broken.

Coat tears, etc., with vapor barrier mastic and patch with insulation facing or tape.

Staples shall be brush coated with vapor barrier coating.

Cover all raw edges coated with vapor barrier mastic, and seal cover to equipment surface.

Non-Vapor Barriered Insulation:

Patch tears, etc. with insulation facing or tape.

Cover all raw edges and bevel neatly to the equipment surface.

Multi-layered Insulation: Joints shall be staggered.

* + - * 1. Expansion Joints: Covered with larger size pipe insulation to allow full movement and be removable.
			1. FIELD QUALITY CONTROL
				1. Field Test: Test and approve all systems prior to installation of insulation.
				2. Existing Insulation:

Repair existing insulation damaged during construction.

Make neat connections where new and existing insulation meet.

Where existing piping or equipment is removed, cover existing surfaces neatly to match existing.

END OF SECTION 220719