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DIVISION 07 - THERMAL AND MOISTURE PROTECTION

SECTION 07130

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06/04

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SECTION 07130

SHEET WATERPROOFING  
06/04

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NOTE: Delete, revise, or add to the text in this section to cover project requirements. Notes are for designer information and will not appear in the final project specification.  
  
This section covers membrane waterproofing of walls and floors below grade and floors at and above grade.  
  
Drawings must indicate wall and floor construction details, plumbing and heating line penetrations through the membrane, conditions at building expansion joints, and the type of protective course required. (Insulation board, asphalt board).  
  
Drawings must indicate the type of subslab to receive membrane waterproofing. A minimum working pad must consist of at least 2 inches 50 millimeter of Class 3, Type N, concrete.  
\*\*\*\*\*

PART 1 GENERAL

1.1 REFERENCES

\*\*\*\*\*  
NOTE: The following references should not be manually edited except to add new references. References not used in the text will automatically be deleted from this section of the project specification.  
\*\*\*\*\*

The publications listed below form a part of this section to the extent referenced:

ASTM INTERNATIONAL (ASTM)

- ASTM C 514 (2001) Standard Specification for Nails for the Application of Gypsum Board
- ASTM C 726 (2000a) Standard Specification for Mineral Fiber Roof Insulation Board
- ASTM D 1327 (1997a) Bitumen-Saturated Woven Burlap Fabrics Used in Roofing and Waterproofing

ASTM D 140	(2001) Standard Practice for Sampling Bituminous Materials
ASTM D 1668	(1997a) Standard Specification for Glass Fabrics (Woven and Treated) for Roofing and Waterproofing
ASTM D 173	(2003) Standard Specification for Bitumen-Saturated Cotton Fabrics Used in Roofing and Waterproofing
ASTM D 2178	(1997a) Standard Specification for Asphalt Glass Felt Used in Roofing and Waterproofing
ASTM D 226	(1997a) Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing
ASTM D 227	(1997a) Standard Specification for Coal-Tar-Saturated Organic Felt Used in Roofing and Waterproofing
ASTM D 2643	(1998) Prefabricated Asphalt Canal Ditch, or Pond Liner (Exposed Type)
ASTM D 2822	(1991; R 1997e1) Standard Specification for Asphalt Roof Cement
ASTM D 41	(1994; R 2000e1) Standard Specification for Asphalt Primer Used in Roofing, Dampproofing, and Waterproofing
ASTM D 43	(2000) Standard Specification for Coal Tar Primer Used in Roofing, Dampproofing, and Waterproofing
ASTM D 449	(2003) Standard Specification for Asphalt Used in Dampproofing and Waterproofing
ASTM D 450	(1996; R 2000e1) Standard Specification for Coal-Tar Pitch used in Roofing, Dampproofing, and Waterproofing

1.2 SUBMITTALS

\*\*\*\*\*  
**NOTE: Review submittal description (SD) definitions in Section 01330 SUBMITTAL PROCEDURES and edit the following list to reflect only the submittals required for the project. Submittals should be kept to the minimum required for adequate quality control. Include a columnar list of appropriate products and tests beneath each submittal description.**  
 \*\*\*\*\*

The following shall be submitted in accordance with Section 01330 SUBMITTAL

PROCEDURES in sufficient detail to show full compliance with the specification:

SD-03 Product Data

Manufacturer's catalog data shall be submitted for the following items:

Asphalt Primer  
Asphalt  
Coal-Tar Pitch  
Primer  
Asphalt-Saturated Organic Felt  
Asphalt-Impregnated Glass Fiber Felts  
Coal-Tar-Saturated Organic Felt  
Bitumen-Saturated Burlap Fabric  
Bitumen-Saturated Woven-Cotton Fabric  
Glass Fabric  
Bituminous Cement  
Protection Course  
Nails  
Wood Nailers

SD-06 Test Reports

Test reports for the following items shall be in accordance with the paragraph entitled, "Bitumen Sampling and Testing," of this section.

Asphalt  
Coal-Tar Pitch

SD-07 Certificates

Certificates shall be submitted for the following items showing conformance with referenced standards contained in this section.

Asphalt Primer  
Asphalt  
Coal-Tar Pitch  
Primer  
Asphalt-Saturated Organic Felt  
Asphalt-Impregnated Glass Fiber Felts  
Coal-Tar-Saturated Organic Felt  
Bitumen-Saturated Burlap Fabric  
Bitumen-Saturated Woven-Cotton Fabric  
Glass Fabric  
Bituminous Cement  
Protection Course  
Nails  
Wood Nailers

1.3 QUALIFICATIONS FOR WATERPROOFING WORK

Supervisory personnel assigned to this project shall have a minimum of [5] [\_\_\_\_\_] years of experience in membrane waterproofing.

#### 1.4 BITUMEN SAMPLING AND TESTING

Bitumen shall be sampled and tested in accordance with ASTM D 140 and as follows:

[Asphalt for waterproofing shall meet or exceed the property requirements listed in ASTM D 449, Table I, and shall be sampled and tested for the softening point, flash point, penetration, ductility, loss on heating, bitumen soluble in carbon disulfide, bitumen soluble in carbon tetrachloride, ash, and coarse particles.]

[Coal-Tar Pitch for waterproofing shall meet or exceed the property requirements listed in ASTM D 450, Table I, and shall be sampled and tested for water, specific gravity, softening point, flash point, distillation, ductility, bitumen soluble in carbon disulfide, and ash.]

#### 1.5 DELIVERY, HANDLING, AND STORAGE

Materials shall be delivered to the site in the manufacturer's unbroken, labeled packages. Felt rolls shall be labeled to indicate grade, weight, and the type of saturant. Only approved materials shall be brought to or stored at the site.

Materials shall be stored in an approved manner and shall be protected from contact with soil and from the weather. Felt and fabric rolls shall be stacked on end and stored in an area maintained at not less than 50 degrees F 10 degrees C for at least 24 hours before use.

#### 1.6 PROTECTION OF PROPERTY

Flame-heated equipment shall be located and used so it will not endanger the structure, other materials on the site, or adjacent property. Fire extinguishers of an appropriate type and capacity shall be provided and maintained.

Before starting work, paving and the face of building walls adjacent to kettles shall be protected for the duration of the work. Heating kettles shall be placed no closer than 30 feet 9.1 meter to any structure.

Damaged work or materials shall be cleaned and restored to the original condition or replaced with new materials at no additional cost to the Government.

#### 1.7 WEATHER RESTRICTIONS

##### 1.7.1 Inclement Weather

Membrane waterproofing shall not be installed in wet weather.

Surfaces shall be thoroughly dry before installation of materials.

##### 1.7.2 Cold Weather Limitations

Membrane waterproofing shall not be installed when ambient temperatures are less than 50 degrees F 10 degrees C unless positive and approved methods are provided to protect the work during and after installation.

PART 2 PRODUCTS

2.1 MATERIALS

\*\*\*\*\*  
NOTE: Select the type of waterproofing bitumen.  
Asphalt must be selected for membrane waterproofing  
of floor slabs.  
\*\*\*\*\*

2.1.1 Asphalt Primer

Asphalt primer shall conform to ASTM D 41.

2.1.2 Asphalt

Asphalt shall conform to ASTM D 449.

Type I shall be used for membrane waterproofing vertical surfaces below grade and Type III shall be used above grade.

Type II shall be used for membrane waterproofing concrete slabs.

2.1.3 Coal-Tar Pitch

Coal-tar pitch shall conform to ASTM D 450, Type II.

2.1.4 Primer

Creosote primer for use with coal-tar pitch shall conform to ASTM D 43.

Asphalt primer shall conform to ASTM D 41.

\*\*\*\*\*  
NOTE: Select the type of felt or fabric based on  
bitumen selected, cost, and durability. Organic  
felts are least expensive. Non-asbestos felts,  
cotton, burlap, and glass fabrics are more expensive  
in ascending order. Glass fabric is the most  
suitable for fabric strength and durability where  
rough masonry walls must be waterproofed, for walls  
in saturated soils, or where building settlement or  
vibration is a possibility.  
\*\*\*\*\*

2.1.5 Asphalt-Saturated Organic Felt

Felt shall conform to ASTM D 226 and shall be Type I.

2.1.6 Asphalt-Impregnated Glass Fiber Felts

Felt shall conform to ASTM D 2178 and shall be Type IV.

2.1.7 Coal-Tar-Saturated Organic Felt

Felt shall conform to ASTM D 227.

2.1.8 Bitumen-Saturated Burlap Fabric

Fabric shall conform to ASTM D 1327 and shall be saturated with the specified bitumen.

2.1.9 Bitumen-Saturated Woven-Cotton Fabric

Fabric shall conform to ASTM D 173 and shall be saturated with the specified bitumen.

2.1.10 Glass Fabric

Fabric shall be bituminized glass fabric treated with either asphalt or coal-tar pitch and shall conform to ASTM D 1668.

2.1.11 Bituminous Cement

Cement shall conform to ASTM D 2822, Type I or Type II, and shall be compatible with the bitumen and primer.

2.1.12 Protection Course

[Protection course shall be 3/4-inch 19 millimeter thick asphalt-saturated, asphalt-impregnated, or asphalt-coated vegetable or mineral fiberboard not less than 12 pounds per cubic foot 192 kilogram per cubic meter, nominal density. Board shall conform to ASTM C 726 for mineral fiberboard.]

[Protection course shall be 1/8-inch 3.2 millimeter thick asphalt-saturated mineral fiberboard conforming to ASTM D 2643.]

[Material shall be not less than 7/16-inch 11 millimeter thick and shall have an asphalt surfacing on one side weighing not less than 4 ounces per square foot 1220 gram per cubic meter Bituminous surfacing shall be covered with an asphalt-saturated kraft paper.]

2.1.13 Nails

Nails shall be galvanized hardened-steel concrete nails conforming to ASTM C 514, and galvanized roofing nails, Type II, Style 20. Nails shall be driven through tin caps unless the nail has an integral flat cap not less than 1 inch 25 millimeter in diameter.

2.1.14 Wood Nailers

\*\*\*\*\*  
**NOTE: Delete the paragraph heading and the following paragraph if nailers are not required by the waterproofing materials manufacturer and the design conditions.**  
\*\*\*\*\*

Flush or surface-mounted nailing strips for securing membrane shall be as specified in Section 06100 ROUGH CARPENTRY.

PART 3 EXECUTION

3.1 CONDITION OF SURFACES

Surfaces shall be clean, dry, frost-free, smooth, and free from deleterious

substances and projections. Holes, honeycomb, cracks, and cavities shall be filled and finished flush with cement mortar. Mortar joints shall be neatly struck. Top surfaces of projecting masonry or concrete ledges below grade shall be finished to a steep bevel.

Surfaces to receive membrane waterproofing shall be carefully inspected and the application of materials on surfaces in unsatisfactory condition shall be withheld until such conditions are corrected.

### 3.2 HEATING OF BITUMEN

Solid bitumen shall be broken up on a clean surface free from dirt and debris.

Bitumen shall be carefully heated and frequently stirred in kettles designed to prevent direct contact of the flame with surfaces in contact with the bitumen. Flue effluent from the combustion system shall never exceed 475 degrees F 246 degrees C. A flue outlet thermometer shall be installed at the Contractor's expense. Thermometer shall be kept in calibration and working order. Kettle temperature shall not be permitted to exceed 375 degrees F 191 degrees C.

Bitumen shall be heated to flow freely, but the pitch shall not be heated above 350 degrees F 177 degrees C nor the asphalt above 400 degrees F 204 degrees C.

Cutting back, adulterating, or fluxing bitumen will not be permitted.

### 3.3 INSTALLATION

#### 3.3.1 General

Membrane waterproofing shall be applied in accordance with the manufacturer's printed instructions, except as modified herein.

One coat of primer shall be applied to surfaces at a minimum rate of 1 gallon for each 100 square feet 1100 milliliter per 300 square meter and allowed to dry. Required number of plies shall then be installed.

Each ply shall be completely embedded, without buckles or wrinkles, in a solid mop coat of hot bitumen as follows:

One coat over the primed surface

One coat between each ply

One coat over the final ply

Not less than 30 pounds 2 kilogram of bitumen shall be used per 100 square feet 160 square meter for each coat.

Each ply shall be laid separately and completed prior to installing the next ply.

Membrane shall be installed using the shingle method. Strips of felt shall be installed at the starting point and shall be of the widths required to provide the specified number of plies at every point.

### 3.3.2 Vertical Surfaces

\*\*\*\*\*  
**NOTE: Drawings must indicate all vertical surface areas to receive waterproofing, the number of plies, the location and design of wood nailers, and the type of protection course.**  
\*\*\*\*\*

Membrane waterproofing shall be applied to all vertical surfaces below grade, as indicated, from the top of the footing to within 4 inches 100 millimeter of the finish grade.

Membrane shall be extended to include exterior wing walls, intersecting walls, area walls, and wall projections as required to provide a continuous below-grade membrane.

Each ply shall have minimum 10-inch 250 millimeter end laps, with joints staggered a minimum of 24 inches 600 millimeter.

[Membrane, where indicated, shall be a 2-ply system with each ply overlapping the previous ply by one-half.]

[Membrane, where indicated, shall be a 3-ply system with each ply overlapping the previous ply by two-thirds.]

[Membrane, where indicated, shall be a 4-ply system, with each ply overlapping the previous ply by three-quarters.]

[Membrane, where indicated, shall be a 5-ply system with each ply overlapping the previous ply by four-fifths.]

[Membrane shall be terminated as indicated.]

### 3.3.3 Horizontal Surfaces

\*\*\*\*\*  
**NOTE: Drawings must indicate areas to receive membrane waterproofing, number of plies, drains and pipe lines through the membrane, and the protection course for the finish surface.**  
\*\*\*\*\*

Each sheet shall lap the adjoining sheet a minimum of 2 inches 50 millimeter. End laps shall be 10-inches 250 millimeter wide. Adjacent end laps shall be staggered a minimum of 24 inches 600 millimeter.

Membrane waterproofing shall be continuous and shall be carried up abutting vertical surfaces as indicated.

[Membrane, where indicated, shall be a 2-ply system with each ply overlapping the previous ply by one-half.]

[Membrane, where indicated, shall be a 3-ply system with each ply overlapping the previous ply by two-thirds.]

[Membrane, where indicated, shall be a 4-ply system with each ply overlapping the previous ply by three-quarters.]

[Membrane, where indicated, shall be a 5-ply system with each ply overlapping the previous ply by four-fifths.]

#### 3.4 REINFORCEMENT

Reinforcing membrane strips of the specified felts or fabrics shall be installed over membrane waterproofing on building-construction joints, corners, angles, projections, or changes in plane; in walls or floors; and penetrations of waterproofed surfaces by pipes, conduit, and other building services. First strip shall be at least 12-inches 300 millimeter wide and shall be covered by a second strip at least 18-inches 450 millimeter wide. Both strips shall be laid in and embedded in bitumen as recommended by the manufacturer of the membrane waterproofing. Reinforcing strips between the floor and the wall shall extend at least 6 inches 150 millimeter on the floor and 6 inches 150 millimeter up the wall, except as otherwise indicated. Strips at vertical corners shall extend at least 5 inches 125 millimeter on each side of the corner.

#### 3.5 KEYED FOOTINGS

Where keyed footings are indicated, waterproofing membrane plies shall be extended at least 6 inches 150 millimeter past the footing on each side of the wall. Plies shall be protected until wall and floor slabs have been poured.

#### 3.6 PENETRATIONS THROUGH MEMBRANE WATERPROOFING

Metal-flashing flange of floor drains, pipe sleeves and pipes, conduit, and similar penetrations through the membrane shall be cemented to the waterproofing membrane, embedded in bituminous cement over the waterproofing membrane, then covered and flashed with two plies of asphalt-saturated fabric set in hot bitumen.

Steam lines and other hot lines shall be insulated from the membrane.

#### 3.7 REPAIR OF DEFECTIVE AREAS

Completed membrane shall be examined for defective or damaged areas and repaired before installing the protection course and backfilling or slab topping. Damaged or defective areas shall be cut out in a square or rectangular shape extending out at least 3 inches 75 millimeter on all sides of the damaged area. The same number of plies as originally specified shall be installed in the cutout area. Over the cutout area, three additional plies of felt shall be installed and hot mopped into place; the first ply shall overlap the cut out area at least 3 inches 75 millimeter on all sides, and each succeeding ply shall overlap the preceding ply by 3 inches 75 millimeter on all sides.

#### 3.8 PROTECTION COURSE

Membrane on vertical surfaces shall be protected with one layer of the specified protection board. Protection board shall be pressed into the final mopping of hot bitumen with board edges butted tightly and with joints staggered in adjacent rows.

Protection boards shall be carefully and neatly fitted around pipes and projections and shall cover the entire surface of the waterproofing. Membranes that are not covered with insulating fiberboards shall be given temporary protection to prevent injury by subsequent building operations.

Protection course shall be installed as soon as any portion of the waterproofing has been completed. Backfilling, as specified under Section 02311, "Excavating, Backfilling, and Compacting for Structures," shall immediately follow installation of protection course.

-- End of Section --