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PLAINTIFF'S EXHIBIT

SH-2637

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1. GENERAL

1.1 SCOPE

This Procurement Specification identifies acceptable types of hot service insulation materials, final coverings and insulation accessories. The insulation system selected shall be one that has compatible components and is satisfactory for the intended service and environment.

1.2 REFERENCES

- .1 Field Specification, Hot Service Insulation, 5 FS-1.

2. INSULATION MATERIALS

2.1 GENERAL

- .1 Where reference is made to a particular material, it shall serve only as a precise identification of the type and quality of the material required and alternate materials will be considered.
- .2 The materials listed below cover a broad range of physical and thermal properties and may not be suitable for all applications of hot service insulation.
- .3 Where several types of insulation are considered acceptable, the preferred insulation material shall be specified for the basic bid and alternate bids requested on the other materials.

2.2 INSULATION MATERIALS

- .1 Calcium Silicate block and pipe insulation
 - .1 Shall be in accordance with ASTM C533
 - .2 Shall meet the corrosion and chloride requirements of ASTM C795 for use over austenitic stainless steel.
 - .3 Shall be continuously marked throughout the insulation to identify it as being asbestos free.

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.2 Expanded perlite block and pipe insulation.

.1 Shall be in accordance with ASTM C610.

.2 Shall meet the corrosion and chloride requirements of ASTM C795 for use over austenitic stainless steel.

.3 Shall be continuously marked throughout the insulation to distinguish it from previous asbestos containing insulation.

.4 Manufacturer shall be approved by Shell for each use.

.3 Mineral wool blanket insulation (metal mesh covered) (not approved for piping)

.1 Shall be in accordance with ASTM C592 Class II (1200°F) amended as follows

.1 Minimum density shall be 10 lb/ft³, nominal.

.2 For insulation which is hung from support rings, one side shall be faced with 3/8" expanded metal (2.5 lbs/sq yd), the other side faced with wire mesh.

.3 For material supported by pins, both sides shall be faced with stainless steel or monel mesh.

.2 Basic insulation material shall meet the corrosion and chloride requirements of ASTM C795 for use over austenitic stainless steel.

.4 Glass wool preformed pipe insulation

.1 Shall be in accordance with ASTM C547

.2 Vendor shall furnish density data on material. Density ranges shall be approved by Shell.

.3 Restricted to maximum use temperature of 350°F

.4 Factory applied jacket, if required, will be supplied with self-sealing lap.

.5 Cellular glass block and pipe insulation

.1 Shall be in accordance with ASTM C552

.2 Plain cellular glass shall not be used above 400°F

.3 Laminated cellular glass shall not be used above 650°F



- .4 Gypsum cement shall be used for fabricating cellular glass components
- .5 Bore coating shall be Hydrocal B-11 or equal
- .6 Pipe covering shall be fabricated in accordance with manufacturer's recommended practice
- .6 Mineral wool preformed pipe insulation
 - .1 Shall be Eagle Picher Epitherm 1200 or equal
 - .2 Shall be used only on heat traced lines
- .7 Molded Fiber Fittings
 - .1 Fiberglas fittings shall be restricted to 350°F and shall be Hamfab 450 or equal.
 - .2 Mineral wool fillings may be used to 1200°F and shall be Hamfab or equal.

2.3 CEMENTS

- .1 Insulating cement shall be an asbestos free mineral fiber cement in accordance with ASTM C195.
- .2 Finishing cement shall be an asbestos free hydraulic setting cement in accordance with ASTM C449.

2.4 FILLER MATERIAL

- .1 Filler material to be spun mineral wool loose fibers for hand packing, Eagle Picher Superglas H-2 or equal.
- .2 Cushioning blanket material to be a lightweight mineral wool blanket, Owens Corning TIW type I or equal.

2.5 SEALANTS AND FLASHING COMPOUNDS

- .1 Flashing compound exposed to temperatures up to 250°F shall be a butyl rubber - Foster 95-44 or equal.
- .2 Where exposed to temperatures between 250°F and 400°F, a silicone rubber, such as Dow Corning 999 Silicone Rubber or equal, shall be used.
- .3 Flashing compound for temperatures between 400°F and 700°F shall be Childers CP-79 or equal.

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2.6 WEATHERPROOFING COMPOUND

- .1 Shall be Polyvinyl acetate, EVA or vinyl acrylic water base emulsion.
- .2 Shall be aluminum gray when used on piping and equipment and white when used on tankage.

2.7 ALUMINUM SHEATHING

- .1 Shall be fabricated from type 3003 or type 5005 alloy and shall have an H14 temper.
- .2 Shall be furnished with a factory applied moisture barrier which is continuously heat sealed to the aluminum. The moisture barrier shall be either a polykraft barrier consisting of one layer of 40 lb virgin kraft paper laminated with a one mil polyethylene film or a 3 mil high density polyethylene film.
- .3 Shall be a minimum of 0.016" thick and with finishes and corrugations as detailed in Field Specification, Hot Service Insulation 5 FS-1.
- .4 Where specified for severe atmospheric conditions, the aluminum sheeting shall be coated on the outside with a light gray epoxy coating or with a 3 mil gray colored acrylic film heat sealed to the aluminum.

2.8 ALUMINUM ELL COVERS

- .1 Shall be deep drawn from type 5005 aluminum alloy with a minimum 0.016" thickness of the thinnest point.
- .2 Shall be supplied with a factory applied colored epoxy moisture barrier inside.
- .3 Where specified for severe atmospheric conditions, a light gray epoxy external coating shall also be supplied.
- .4 Shall be provided on lines 1/2" and larger.
- [.5 Molded fiberglass covers, Permacover or equal, may be used in lieu of aluminum ell covers.

2.9 STAINLESS STEEL SHEATHING

- .1 Shall be 0.010" thick type 304 smooth stainless steel.
- .2 Shall be supplied with factory applied moisture barrier as specified for aluminum sheathing.



2.10 FABRIC WEATHER BARRIER

- .1 Shall be a fiberglass fabric coated on both sides with Hypalon laminated to .0015 inch Tedlar film. Alpha Associates HU-AL TGH 1000 or equal.

2.11 GALVANIZED SHEATHING

- .1 Shall be 0.015" thick hot dipped galvanized sheathing.
- .2 Used for mechanical protection over fabric weather barrier.

2.12 INSULATION ACCESSORIES

- .1 Reinforcing wire mesh shall be 1" hex by 0.032" three twist Monel or 18-8 stainless steel wire.
- .2 Tie wire, lacing wire and lacing hair pins shall be 16 gage type 304 soft annealed stainless steel wire.
- .3 Sheet metal screws shall be #8 x 1/2" stainless steel self-tapping screws, Pan head "A".
- .4 Breather springs for non-load carrying applications may be Techalloy standard springs or equal. Breather springs for load carry applications shall be a design in which the spring is in compression and the travel is limited.
- .5 Banding shall be type 304 stainless steel, soft annealed temper with heavy duty wing type seals. Bands shall be 0.020" thick and either 1/2" or 3/4" wide as defined in Field Specification, Hot Service Insulation, 5 FS-1.
- .6 Reinforcing membrane shall be a leno weave or knitted fabric and may be glass, Dynel, Nylon or Polyester. The fabric shall weigh at least 2 oz per sq yard, shall be 10 mesh or less to the inch and be a minimum of 400 denier.
- .7 Snap rivets for fastening aluminum final covering shall be 3/16" diameter domed-head aluminum rivets with aluminum mandrels Cherry Type "T" or equal.
- .8 Insulating tape shall be Ametex Nor Fab 400 Series, or equal, 2" wide by 1/8" thick.
- .9 Pressure sensitive tape shall be a 2 mil Tedlar film laminated to polyester fabric Alpha Associates #6209 TW or equal.

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.10 Aluminum tape for heat tracing.

.1 For temperatures up to 350°F use 3M type #425 or equal.

.2 For temperatures between 350°F and 600°F use 3M type #363 or equal.

.3 See 15 PS-9 for widths and application.

[.11 Reinforced fiberglass tape shall be 3/4" wide Pittsburg Corning Tape #25 or equal.