

## SECTION 230713- ALUMAGUARD® ENGINEER SPECIFICATION DIVISION 23 HEATING, COOLING, AIR CONDITIONING AND VENTILATION

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

#### 1.2 SUMMARY

- A. This Section includes jacketing for exterior and interior insulated duct work, refrigeration piping, chilled water piping, tanks, vessels, and equipment, including the following:

- 1. Jacket materials

- B. Related Sections include the following:

- 1. Section 220719-Plumbing Pipe Insulation
  - 2. Section 230716-HVAC Equipment Insulation
  - 3. Section 230719- HVAC Piping Insulation

#### 1.3 SUBMITTALS

- A. Product Data: For each type of product indicated, identify thickness, and jackets (both factory and field applied, if any).
- B. Shop Drawings: Show details for the following:
  - 1. Application of field-applied jackets.
- C. Installer Certificates: Signed by Contractor certifying that installers comply with the manufacturer's installation requirements.
- D. Field quality-control inspection reports.

#### 1.4 QUALITY ASSURANCE

- A. Installer Qualifications: Skilled mechanics who have successfully completed an apprenticeship program or another craft training program certified by the Department of Labor, Bureau of Apprenticeship and Training. Submit test report submittals where fire-performance characteristics are important requirements. Include test date and test methods.

#### 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Packaging: Jacketing material containers shall be marked by manufacturer with appropriate ASTM standard designation, type and grade, and maximum use temperature.

#### 1.6 COORDINATION

- A. Coordinate size and location of supports, hangers, and insulation shields specified in Section "Hangers and Supports."

**THIS SPECIFICATION IS WRITTEN TO ASSIST IN THE SPECIFICATION PROCESS; POLYGUARD RESERVES ALL RIGHTS TO THIS DOCUMENT. CHANGES, DELETIONS, OR ADDITIONS MUST BE DONE SO WITH POLYGUARD'S KNOWLEDGE AND CONSULTATION. THE ORIGINAL DOCUMENT IS AVAILABLE IN WORD FORMAT FOR YOUR USE, YOU MAY REQUEST IT BY EMAILING [POLYGUARD@POLYGUARDPRODUCTS.COM](mailto:POLYGUARD@POLYGUARDPRODUCTS.COM). THE ORIGINAL DOCUMENT IS ON FILE FOR FUTURE COMPARISON, VERSION # OF THIS DOCUMENT IS: AGMECHSPEC 12.8.08.0**

- B. Coordinate clearance requirements with piping Installer for piping insulation application duct Installer for duct insulation application, and equipment Installer for equipment insulation application. Before preparing piping and ductwork Shop Drawings, establish and maintain clearance requirements for installation of insulation and field-applied jackets and finishes and for space required for maintenance.

#### 1.7 SCHEDULING

- A. Schedule jacketing application after pressure testing systems and, where required, after installing and testing heat tracing. Jacketing application may begin on segments that have satisfactory test results.

#### 1.8 WARRANTY

- A. The contractor shall provide the owner with the manufacturer's written and signed ten-year warranty. The warranty must be signed by a duly authorized officer of the manufacturer (Polyguard Products, Incorporated). The contractor must also include a separate project information form, completed by the contractor, to authenticate the warranty.
- B. General Warranty: Special warranty specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.
- C. Manufacturer's Warranty Period: Ten years from date of Substantial Completion.

### **PART 2 - PRODUCTS**

#### 2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  1. Polyguard Products, Inc., Ennis, TX; Alumaguard<sup>®</sup>, or Alumaguard<sup>®</sup> All Weather and/or Alumaguard<sup>®</sup> Lite.

#### 2.2 PRODUCTS

- A. Alumaguard, Alumaguard All Weather and Alumaguard Lite are laminated jacketing systems. These waterproofing/vapor barrier membranes are composed of either a rubberized bitumen compound; heat applied to a multi-ply embossed UV-resistant aluminum foil/polymer laminate, or polyester/foil multiple layer laminate with acrylic adhesive, or a combination of both. The specific description of these membranes is given below.
  1. Alumaguard is a composite membrane consisting of a multi-ply embossed UV-resistant aluminum foil/polymer laminate to which is applied a layer of rubberized asphalt specially formulated for use on insulated duct and piping applications. Also available with a white Alumaguard<sup>®</sup> Cool Wrap coating. See physical properties in Table 1.
  2. Alumaguard Lite is a multi-ply (5 layers) aluminum foil/polymer composite film coated with an aggressive, low temperature acrylic pressure sensitive adhesive. Product is available in smooth and stucco-embossed aluminum or white Alumaguard Cool Wrap and can be installed as a complete system or in combination with Alumaguard as the material used on the bottom of the duct to eliminate the need for pinning. See Tables 2 for physical properties.
  3. Alumaguard All Weather is a hybrid product combining the multi-ply embossed UV-resistant aluminum foil/polymer laminate and rubberized asphalt used in the Alumaguard product with a special metalized film coated with the same aggressive low-temperature acrylic adhesive used in Alumaguard Lite. Also available with a white Alumaguard Cool Wrap coating. See Table 3 for physical properties.

4. All three Alumaguard membranes are available with a special bright white Alumaguard Cool Wrap™ coating. The Alumaguard Cool Wrap coating has high reflectivity and solar emittance and meets California Title 24, Cool Roof Rating Council and Energy Star requirements for cool roofs.
- B. The jacketing system is installed over outdoor insulation on exterior ductwork, refrigeration piping, chilled water piping, tanks, vessels, and equipment.
    - C. The membranes are 'peel and stick', some are self-healing if punctured, UV stable, and will expand and contract with the mechanical system. All Alumaguard products are supplied in rolls for ease of application. All products are laminated to a disposable release sheet and require only a "peel 'n stick" application procedure.
    - D. Choice of Alumaguard® product will be made by the engineer: Alumaguard, Alumaguard All-Weather or Alumaguard Lite. Installation on all products is similar in nature but vary slightly depending on the adhesive system. Alumaguard is installed in combination with Alumaguard Lite (AG Lite on the bottom of the duct). Alumaguard All-Weather and Alumaguard Lite can be installed on the entire duct. These products have excellent emissivity and sound attenuation properties.
    - E. The products do not promote mold growth.

**Table 1- Alumaguard Physical Properties**

<b>Alumaguard® Technical Properties and Testing</b>		
<b>Membrane Property</b>	<b>Test Method</b>	<b>Results</b>
Product Thickness	Micrometer	55-60 mils
Product Weight	Scale	0.3 lbs/sf
Water Vapor Transmission (grains/hr-ft <sup>2</sup> )	ASTM E96-00	0.00
Permeance (US Perms)	ASTM E96-00	0.00
Peel Adhesion (to primed steel)	ASTM D1000	>12 lbs/in
Elongation at Break	ASTM D882	182%
Low Temperature Pliability	ASTM D146	No Cracks@-15°F
Tensile Strength (Film only)(MD)	ASTM D882	43 lbs/in
(XD)		51 lbs/in
Puncture Resistance (Film Only)	ASTM D774	150 PSI
Mold Resistance	ASTM C1338	Pass
Upper Temperature Limit	LAB	160°F
Emissivity	ASTM C1371	.030
<b>Alumaguard® Cool Wrap Properties and Test Results</b>	<b>Solar Reflectance</b>	<b>Thermal Emittance</b>
Cool Roof Rating Council(CRRC) Initial	0.86	0.82
Cool Roof Rating Council(CRRC) 3 Year	Pending	Pending
Energy Star 3 Year	0.84	0.78
California Title 24	Exceeds 0.75	Exceeds 0.75

**Table 2- Alumaguard Lite Physical Properties**

Membrane Property	Test Method	Results
Total Product Thickness(w/o liner)	Micrometer	7 mils(Silver) 7 mils(Cool Duct) 5 mils(White)
Water Vapor Transmission(grains/hr-ft <sup>2</sup> )	ASTM E96-00	.00
Permeance(US Perms)	ASTM E96-00	.00
Peel Adhesion(to primed steel)	PSTC-101	62.4oz/in
Breaking Strength	PSTC-131	80.9 lbs/in width
Tensile Strength(Film only)	ASTM D882(Method B)	5000 PSI
Puncture Resistance	ASTM D-1000	48.7 Lbs
Mold and Mildew Resistance	ASTM C-1338	Pass
Upper Temperature Limit	LAB	150°F
Peel Adhesion(overlap bond)after24 hrs, Lbs/1"	ASTM D1000	5.5
Peel Adhesion(overlap bond)@-15°F, Lbs/in	ASTM D1000	1.24
Tear Strength-die C, Lbs/in	ASTM D1000	900
Flame/Smoke	ASTM E-84	Meets 25/50
Emissivity	ASTM C1371	.030
<b>Alumaguard® Cool Wrap™ Properties &amp; Test Results</b>	<b>Solar Reflectance</b>	<b>Thermal Emittance</b>
Cool Roof Rating Council(CRRC)Initial	0.86	0.82
Cool Roof Rating Council(CRRC)3 Year	Pending	Pending
Energy Star 3 Year	0.84	0.78
California Title 24	Exceeds 0.75	Exceeds 0.75

**Table 3- Alumaguard All-Weather Physical Properties**

Alumaguard® All-Weather Technical Properties and Testing		
Membrane Property	Test Method	Results
Product Thickness (w/o liner)	Micrometer	35-38 mils
Product Weight	Scale	0.2 lbs/sf
Water Vapor Transmission (grains/hr-ft <sup>2</sup> )	ASTM E96-00	.00
Permeance (US Perms)	ASTM E96-00	.00
Peel Adhesion (to primed steel)	ASTM D1000	>16 lbs/in
Elongation at Break	PSTC 131	164%
Tensile Strength	PSTC 131	50 lb/in
Puncture Resistance (Film Only)	ASTM D774	150 PSI
Mold Resistance	ASTM C1338	Pass
Upper Temperature Limit	LAB	150°F
Emissivity	ASTM C1371	.030
<b>Alumaguard® Cool Wrap™ Properties and Test Results</b>	<b>Solar Reflectance</b>	<b>Thermal Emittance</b>
Cool Roof Rating Council(CRRC) Initial	0.86	0.82
Cool Roof Rating Council(CRRC) 3 Year	Pending	Pending
Energy Star 3 Year	0.84	0.78
California Title 24	Exceeds 0.75	Exceeds 0.75

## **PART 3 - EXECUTION**

### **3.1 EXAMINATION**

- A. Examine substrates and conditions for compliance with requirements for installation and other conditions affecting performance of insulation application.
  - 1. Verify that systems and equipment to be insulated have been tested and are free of defects.
  - 2. Verify that surfaces to be insulated are clean and dry.
  - 3. Proceed with installation only after unsatisfactory conditions have been corrected.

### **3.2 GENERAL INSTALLATION**

- A. The contractor shall verify and obtain the latest installation instructions from the manufacturer prior to any work being done. This specification is not an installation instruction document. Before installing or specifying Alumaguard, obtain a full set of installation instructions from Polyguard Products (1-214-515-5000) for instructions. The manufacturer also has them available on the website at:

<http://www.polyguardproducts.com/products/Mechanical/datasheets/index.htm>

### **3.3 ALUMAGUARD INSTALLATION NOTES**

- A. Ducts must be sealed in accordance with SMACNA HVAC Duct Construction Standards Metal and Flexible - Second Edition (1995) Seal Class A (or latest version of SMACNA) prior to insulation of Alumaguard. Leaking ducts can cause Alumaguard to balloon as it totally seals the insulation system.
- B. All Alumaguard products will be installed on ductwork insulation which is pitched to shed water and prevent water ponding on top of the duct.
- C. Fiberglass, Urethane, Styrofoam, Cellular Glass or Phenolic Foam Insulation must have a factory applied facing. The manufacturer recommends extruded polystyrene insulation with foil facing on all sides for the best adhesion results. Contractor is responsible for testing adhesion to any substrate; there are products that have manufacturing release agents (Densglas gold) which will not allow adhesion.
- D. Substrate surface must be clean, dry, and free of oil films.
- E. On ductwork to be weather protected by Alumaguard, Alumaguard Lite is recommended for use on the bottom of the duct in lieu of pinning.
- F. On ductwork to be weather protected by either Alumaguard All-Weather or Alumaguard Lite, no pinning of either membrane is required on the underside of the duct.
- G. Hot and cold air ducts should be installed in the following manner to maintain proper vapor barrier and physical integrity; the board insulation should be mechanically installed on properly sealed duct according to the engineer's specification using insulation fasteners (mini-cup weld pins or perf. based pins and washers). The washers should be covered with a 4" square piece of smooth foil tape prior to jacketing the ductwork to prevent the puncture of the outer membrane by the fasteners. Insulation on the top of the ductwork should be installed in such a manner as to allow for 'water shed' from the top of the duct to prevent water from 'ponding'.
- H. Polyguard recommends Alumaguard be installed according to one of the following procedures:
  - 1. Contractors have the following options for installing Alumaguard products, they vary by Alumaguard selected product and duct size:
    - a. One Piece Installation
    - b. Two Piece Installation
    - c. Three Piece Installation
    - d. Four Piece Installation
- I. When installing Alumaguard in temperatures below 50° F, Polyguard's Alumaguard All Weather or Alumaguard Lite must be used.

- J. Alumaguard and Alumaguard All Weather must be protected from damaging chemicals. Rubberized bitumen, will be 'solvated' when exposed to petroleum or coal tar based compounds. If the installer is unsure of the materials he will be subjecting the product to, contact the manufacturer immediately for more information.
- K. The properties of Alumaguard facilitate installation on cold piping systems without the need for slip joints, eliminating a potential vapor breach. Alumaguard will expand and contract with the piping system without rupture; wrinkling may occur.
- L. Piping systems jacketed with Alumaguard should be installed with a "stretch out" for each piece cut to allow a 6" lap over the circumferential lap. A 4" wide butt lap or overlap over the joint and rolled with a roller. Longitudinal laps should be installed at a water shed position.
- M. It is not recommended that Alumaguard or Alumaguard All-Weather be pre-applied to fabricated insulation unless metal banding is used over the Alumaguard; Alumaguard Lite can be used pre-applied to insulation. Alumaguard is not a mechanical fastening system and cannot be relied on to hold the insulation on the pipe.
- N. Note: Care should be taken when using Alumaguard on hot systems to insure that the surface temperatures after insulation does not exceed the manufacturer's upper temperature use limitations. It is important to note that heat transfer through single layer joint seams could result in the softening or melting of the rubberized asphalt compound.
- O. The manufacturer does not recommend the cigarette wrap procedure of Alumaguard on refrigeration piping systems (use the butt lap method).
- P. 90's, tees, valves, and 45's can be laid out using standard sheet metal 'two piece' methods, modified to allow for overlap seals. This can be accomplished by adding 1-1/2"-2" to the throat of the bottom half of the fitting and adding 1-1/2" to the heel of the top half of the fitting. The
  - Q. bottom piece is installed first, and then the top piece lapped over the bottom piece to permit water shedding over the lap. Tees, valves and other fittings can be fabricated just like you would use standard layout procedures, adding 1-1/2" to 2" for the required laps. Fittings can also be 'gored', over sizing each gore piece to allow for a lap onto the preceding piece. The two piece method makes a better looking fitting, however, as with metal work, larger fittings must be gored due to material constraints and ease of application. Installers can also use standard metal fitting covers with the Alumaguard products. Care must be used to insure that the fittings are vapor sealed.

### 3.4 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified independent inspecting agency to perform field inspections and prepare inspection reports.
- B. Perform the field tests and inspections and prepare test reports:
  - 1. Inspect the jackets on the exterior ductwork, piping, and equipment.
- C. All jacketing applications will be considered defective Work if sample inspection reveals noncompliance with requirements. Remove defective Work.
- D. Install new insulation and jackets to replace insulation and jackets removed for inspection. Repeat inspection procedures after new materials are installed.
- E. Obtain written confirmation from jacket manufacturer that completed installation meets manufacturer's installation requirements.

**END OF SECTION 230713**