

SECTION 15082

JACKETING TAPES FOR DUCT INSULATION

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**** NOTE TO SPECIFIER **** 3M; Insulation Jacketing Tapes.

This section is based on the products of 3M Insulation Jacketing Tapes, which is located at:

3M Center Building 225-3S-06

St. Paul, MN 55144-1000

Toll Free Tel: 800-362-3550

Fax: 877-369-2923

Email: _____

Web: www.3m.com

[\[Click Here\]](#) for additional information.

3M™ VentureClad™ Jacketing Systems provide mechanical duct and pipe insulation protection while being cost effective. The self-adhering jacketing can be applied quickly and easily in a wide range of temperatures without any special tools. 3M™ VentureClad™ Jacketing Systems provide long-term reliability. They are an absolute vapor barrier, including the overlap seams, and provide a clean, professional finish while helping to prevent corrosion under insulation.

PART 1 GENERAL

1.1 SECTION INCLUDES

**** NOTE TO SPECIFIER **** Delete items below not required for project.

- A. Joint Tapes for HVAC.
 - 1. Fiberglass ductboards, sheet metal duct joints, and FSK systems. (1525CW)
 - 2. Fiberglass ductboards, sheet metal duct joints, and mineral wool insulation. (1520CW)
 - 3. Fiberglass ductboards, sheet metal duct joints, and mineral wool insulation. (3520CW)
 - 4. Closure and vapor seal system on ASJ faced ductboards and pipe systems. (1540CW)
 - 5. Fiberglass ductboards, flexible ducts, rigid metal and flexible duct connections. (1581A)
 - 6. Flexible ducts and flexible duct connections. (1599B)
 - 7. Line sets and foam piping insulation. (1507)
- B. Insulation Jacketing Tapes:
 - 1. 3M Venture Tape (1521CW).

1.2 RELATED SECTIONS

**** NOTE TO SPECIFIER **** Delete any sections below not relevant to this project; add others as required.

- A. Section 15080 - Mechanical Insulation.
- B. Section 15081 - Jacketing Tapes for Plumbing Piping Insulation.
- C. Section 15083 - Jacketing Tapes for HVAC Equipment Insulation.

- D. Section 15084 - Jacketing Tapes for HVAC Piping Insulation.
- E. Section 15100 - Building Services Piping.
- F. Section 15140 - Water Piping.
- G. Section 15210 - Process Air and Gas Piping.
- H. Section 15220 - Process Water and Waste Piping.
- I. Section 15810 - Ducts.

1.3 REFERENCES

**** NOTE TO SPECIFIER **** Delete references from the list below that are not actually required by the text of the edited section.

- A. ASTM International (ASTM):
 - 1. ASTM C1136-12 Standard Specification for Flexible, Low Permeance Vapor Retarders for Thermal Insulation
 - 2. ASTM C1338 - Standard Test Method for Determining Fungi Resistance of Insulation Materials and Facings.
 - 3. ASTM D3330 - Standard Test Method for Peel Adhesion of Pressure-Sensitive Tape.
 - 4. ASTM D3652 - Standard Test Method for Thickness of Pressure-Sensitive Tapes.
 - 5. ASTM D3759 - Standard Test Method for Breaking Strength and Elongation of Pressure-Sensitive Tape.
 - 6. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
 - 7. ASTM E96 - Standard Test Methods for Water Vapor Transmission of Materials.
- B. British Standards (BS):
 - 1. BS 476, Summary Class "0"
 - 2. BS 476-6 - Fire tests on building materials and structures. Method of test for fire propagation for products.
 - 3. BS 476-7 - Fire tests on building materials and structures. Method of test to determine the classification of the surface spread of flame of products.
- C. German Institute for Standardization (DIN):
 - 1. DIN 4102 - Fire behavior of building materials and elements.
- D. International Convention for the Safety of Life at Sea (SOLAS):
 - 1. SOLAS – Regulation II-2/3.
 - 2. SOLAS – Regulation II-2/5.
 - 3. SOLAS – Regulation II-2/6.
- E. International Maritime Organization (IMO):
 - 1. IMO Resolution MSC 61 (67) Annex 1 Part 2 and Annex 2
 - 2. IMO Resolution MSC 61 (67) Annex 1 Part 5 and Annex 2
 - 3. IMO Resolution A653(16)
- F. Underwriters Laboratories (UL):
 - 1. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials.
 - 2. UL 181A - Standard for Closure Systems for Use With Rigid Air Ducts, January 8, 2013

- 3. UL 181B -Standard for Closure Systems for Use With Flexible Air Ducts and Air Connectors, January 8, 2013
- G. Underwriters Laboratories Canada (ULC):
 - 1. ULC S102 - Standard Method of Test for Surface Burning Characteristics of building Materials and Assemblies.
- H. United States Coast Guard (USCG):

1.4 SUBMITTALS

- A. Submit under provisions of Section 01300.
- B. Product Data:
 - 1. Manufacturer's data sheets on each product to be used.
 - 2. Preparation instructions and recommendations.
 - 3. Storage and handling requirements and recommendations.
 - 4. Typical installation methods.

**** NOTE TO SPECIFIER ** Delete if not applicable to product type.**

- C. Verification Samples: Two representative units of each type, size, pattern and color.
- D. Shop Drawings: Include details of materials, construction and finish. Include relationship with adjacent construction.

1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with a minimum five years documented experience.

**** NOTE TO SPECIFIER ** 3M provides a training program for installers.**

- B. Installer Qualifications: Company specializing in performing Work of this section with minimum two years documented experience with projects of similar scope and complexity.
- C. Source Limitations: Provide each type of product from a single manufacturing source to ensure uniformity.

**** NOTE TO SPECIFIER ** Include mock-up if the project size or quality warrant the expense. The following is one example of how a mock-up on might be specified. When deciding on the extent of the mock-up, consider all the major different types of work on the project.**

- D. Mockups: Before starting taping, construct mockups for each type of tape listed below. Mockups will be used to demonstrate quality of application and finishes. Build mockups in the location indicated or as directed by Architect, Engineer, A/E, Contractor, installer, and Owner. Use materials indicated for the completed Work.

- 1. Construct mockup following manufacturer's installation guidelines.

**** NOTES TO SPECIFIER ** If retaining "Mockups" edit the following subparagraphs for the types of ductwork in the project.**

- 2. HVAC Fiberglass Ductboard Mockups:
 - a. One 10 foot (3 meter) section of HVAC fiberglass ductboard including one joint between two sections.
 - b. One 90 degree HVAC fiberglass ductboard elbow.
 - c. One damper access door.
 - d. One automatic motor operated damper.

- e. One sensor tap.
- f. Four support hangers including hanger shield and insert.
- 3. HVAC Sheet Metal Ductwork Mockups:
 - a. One joint between sections of HVAC sheet metal ductwork.
 - b. One joint at 90 degree elbow in HVAC sheet metal ductwork.
 - c. One damper access door.
 - d. One automatic motor operated damper.
 - e. One sensor tap.
 - f. Four support hangers including hanger shield and insert.
- 4. HVAC Flexible Ductwork Mockups:
 - a. One joint between sections of HVAC flexible ductwork.
 - b. One connection between sections of HVAC flexible ductwork and fiberglass ductwork.
 - c. One connection between sections of HVAC flexible ductwork and sheet metal ductwork.
 - d. One connection between HVAC flexible ductwork and damper access door sheet metal section of ductwork.
 - e. One connection between HVAC flexible ductwork and automatic motor operated damper sheet metal section of ductwork.
 - f. One sensor tap.
- 5. Fabricate each mockup to allow observation of application details of tapes.
- 6. Notify Architect seven days in advance of dates and times when mockups will be constructed.
- 7. Obtain Architect's approval of mockups before starting taping application.
- 8. Submit one copy of report to Architect describing tests, results, and any modifications made to correct deficiencies or to improve performance.
- 9. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.

**** NOTES TO SPECIFIER ** Retain the subparagraph above or below for the types of mockups in the project.**

- 10. Mockup may remain part of the overall work and remain in place if approved by the Architect and manufacturer's technical field representative.

**** NOTES TO SPECIFIER ** Retain subparagraph above if mockup may be applied to the work. Otherwise, delete and retain the following 2 subparagraphs if the mockup may NOT be part to the work.**

- 11. Mockup shall not be a part of the finished work, but shall remain at the Project site protected during the work with weather-resistant membrane, and removed when directed, or upon completion of the work.

**** NOTES TO SPECIFIER ** Retain subparagraph below if mockups are not only for establishing appearance factors.**

- 12. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless specifically approved in writing by Architect of such deviations.

1.6 PRE-INSTALLATION CONFERENCE

- A. Convene a conference approximately two weeks before scheduled commencement of the Work. Attendees shall include Architect, Contractor and trades involved. Agenda shall include schedule, responsibilities, critical path items and approvals.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Store and handle in strict compliance with manufacturer's written instructions and recommendations; a clean, dry place with a temperature range of 40 to 80 degrees F (4 to 26 degrees C) and 40 to 50 percent relative humidity.
- B. Protect from damage due to weather, excessive temperature, and construction operations.

1.8 PROJECT CONDITIONS

- A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's recommended limits.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturer: 3M Insulation Jacketing Tapes, which is located at: 3M Center Building 225-3S-06; St. Paul, MN 55144-1000; ASD Toll Free Tel: 800-362-3550; Fax: 877-369-2923; Email: _____; Web: www.3m.com.

**** NOTES TO SPECIFIER ** Delete one of the following two paragraphs; coordinate with requirements of Division 1 section on product options and substitutions.**

- B. Substitutions: Not permitted.
- C. Requests for substitutions will be considered in accordance with provisions of Section 01600.

2.2 PERFORMANCE CRITERIA

- A. Surface-Burning Characteristics: For insulation jacketing and related materials when identical products are tested in accordance with ASTM E84 by a testing agency acceptable to authorities having jurisdiction. Factory label insulation jacketing, tapes, sealants, primers, adhesion promoters, cleaning solvents, and other accessories with appropriate markings of applicable testing agency.
 - 1. Refer to specific products for exact flame-spread indexes and smoke-developed indexes.

2.3 HVAC DUCTWORK TAPE

**** NOTES TO SPECIFIER ** The product below is ideal for fabricating fiberglass ductboards, sheet metal duct joints, blankets, and for taping FSK systems. It is applicable for indoor or outdoor use and for low and high temperature applications. Tape is malleable for use around corners and irregular surfaces. A general purpose foil tape for a variety of applications. Delete if not required.**

- A. Basis of Design: 3M Venture Tape Aluminum Foil Tape 1520CW as manufactured and supplied by 3M. A high strength dead soft aluminum foil tape coated with a cold weather acrylic pressure sensitive adhesive.
 - 1. Certifications:
 - a. Flame and Smoke Rating Classification per UL723: UL File No. R10984.
 - 1) Flame: 10.
 - 2) Smoke: 10.
 - b. Flame and Smoke Rating Classification per CAN/ULC S102:
 - 1) Flame: 10.
 - 2) Smoke: 10.
 - c. U.S. Coast Guard Approved: 164.112/1121/WCL MED0287.

- d. SOLAS – Regulation II-2/3.40.5.
 - e. SOLAS – Regulation II-2/5.3.2.4.
 - f. SOLAS – Regulation II-2/6.2.
2. Bonds and seals down to minus 10 degrees F (minus 23 degrees C).
 3. Excels in demanding temperature and humidity applications.
 4. Conforms well to curved and irregular surfaces.
 5. Specifically designed for cold weather conditions.
 6. Hand tearable.
 7. Adhesive: Acrylic.
 8. Color: Natural aluminum
 9. Liner: Release liner.
 10. Total Tape Thickness per ASTM D3652: 3.2 mil (0.08 mm).
 11. Backing Thickness per ASTM D3652: 1.8 mil (0.05 mm).
 12. Backing: Aluminum foil.
 13. Peel Adhesion per ASTM D3330: 51 oz per in (5.6 N per cm).
 14. Tensile Strength per ASTM D3759: 21 lb per in (36.8 N per cm).
 15. Elongation per ASTM D3759: 9 percent.
 16. Service Temperature: Minus 40 to 260 degrees F (minus 40 to 127 degrees C).
 17. Roll Widths: 2, 3, and 4 inches (51, 76, and 100 mm).
 18. Roll Lengths: 50 yards (45.7 m).

**** NOTES TO SPECIFIER **** The product below is ideal for fabricating fiberglass ductboards, sheet metal duct joints and for taping FSK systems. It is applicable for indoor or outdoor use and for low and high temperature applications. Tape is malleable for use around corners and irregular surfaces.

- B. Basis of Design: 3M Venture Tape Aluminum Foil Tape 3520CW as manufactured and supplied by 3M: High strength, malleable, aluminum foil tape, coated with a cold-weather acrylic adhesive.
1. Fire, Flame, and Smoke Resistance per UL 723:
 - a. Flame: 5.
 - b. Smoke: 10.
 2. Water Vapor Transmission Rate per ASTM E96: 0.00 perm.
 3. Thickness: 3.7 mils (0.09 mm), without release paper.
 4. Peel Adhesion: 50 oz per inch (13.9 N per 25 mm).
 5. Shear Strength: Greater than 24 hrs at 2.2 psi (15.2 kPa).
 6. Tensile Strength: 23 lbs per inch (102 N per 25 mm).
 7. Elongation: 8.5 percent.
 8. Service Temperature: Minus 40 to 250 degrees F (minus 40 to 121 degrees C).
 9. Application Temperature: Minus 10 degrees F (minus 23 degrees C).
 10. Surface Finish: Smooth.
 11. Color: Aluminum.
 12. Roll Widths: 2, 3, and 4 inches (51, 76, and 100 mm).
 13. Roll Lengths: 50 yards (45.7 m).

**** NOTES TO SPECIFIER **** The product below is ideal for sealing applications for fiberglass ductboards, FSK-faced duct wrap and sheet metal duct joints and mineral wool thermal insulation. Also used as a vapor seal for reinforced aluminum faced fiberglass or mineral wool thermal insulation. Applicable for indoor or outdoor use and for low and high temperature applications. Delete if not required.

- C. Basis of Design: 3M Venture Tape FSK Facing Tape 1525CW as manufactured and supplied by 3M. A foil/scrim/kraft (FSK) lamination coated with a cold weather solvent acrylic pressure sensitive adhesive tape.
1. Certifications:
 - a. Flame and Smoke Rating Classification per UL723: UL File No. R10984.

- 1) Flame: 10.
- 2) Smoke: 10.
- b. Flame and Smoke Rating Classification per CAN/ULC S102:
 - 1) Flame: 10.
 - 2) Smoke: 10.
- c. Facing meets ASTM C1136, type II and IV.
2. Bonds and seals at temperatures down to minus 10 degrees F (minus 23 degrees C).
3. Cold weather adhesive performs well over a wide temperature range.
4. Excellent performance in demanding heat and humidity conditions.
5. Conforms well to irregular surfaces.
6. Adhesive: Acrylic.
7. Color: Natural aluminum.
8. Liner: Release liner.
9. Total Tape Thickness per ASTM D3652: 5.5 mil (0.14 mm).
10. Backing Thickness per ASTM D3652: 4 mil (0.1 mm).
11. Backing: FSK.
12. Peel Adhesion per ASTM D3330: 66 oz per in (7.2 N per cm).
13. Tensile Strength per ASTM D3759: 39 lb per in (68.3 N per cm).
14. Elongation per ASTM D3759: 2 percent.
15. Service Temperature: Minus 40 to 240 degrees F (minus 40 to 116 degrees C).

**** NOTES TO SPECIFIER ** Disks and squares are also available. Contact 3M for sizes.**

16. Roll Widths: 3 inches, 4 inches, 5 inches (76 mm, 101 mm, 127 mm).
17. Roll Lengths: 50 yards (45.7 m).

**** NOTES TO SPECIFIER ** The product below is ideal for exterior or interior use and applicable as a closure and vapor seal system on ASJ faced ductboards and pipe systems. White exposed surface and fiber reinforced aluminum is on concealed side. It is applicable for indoor or outdoor use and for low and high temperature applications. Delete if not required.**

- D. Basis of Design: 1540CW ASJ (All Service Jacket) Facing 3M Venture Tape as manufactured and supplied by 3M. A white kraft/scrim/foil laminate coated with cold weather acrylic pressure sensitive adhesive, UL 723 Classified. Complies as a vapor retarder per ASTM C1136, for Type I, II, III and IV.
1. Fire, Flame, and Smoke Resistance per UL 723:
 - a. Flame: 15.
 - b. Smoke: 10.
 2. Water Vapor Transmission Rate per ASTM E96: 0.02 perms
 3. Thickness: 7.5 mils (0.19 mm), without release paper.
 4. Peel Adhesion: Exceeds the strength of the backing.
 5. Shear Strength: Greater than 24 hrs at 2.2 psi (15.2 kPa).
 6. Tensile Strength: 40 lbs per inch (178 N per 25 mm).
 7. Elongation: 2 percent.
 8. Service Temperature: Minus 40 to 240 degrees F (minus 40 to 116 degrees C).
 9. Application Temperature: Minus 10 degrees F. (minus 23 degrees C).
 10. Surface Finish: Smooth with reinforcing fibers visible on concealed foil face.
 11. Color: White.

**** NOTES TO SPECIFIER ** Disks and squares are also available. Contact 3M for sizes.**

12. Roll Widths: 2, 3, 4, and 5 inches (50, 76, 101, and 127 mm).
13. Roll Lengths: 50 yards (45.7 m).

**** NOTES TO SPECIFIER ** The product below is ideal for interior use for sealing fiberglass ductboards, flexible ducts, rigid metal and flexible duct connections. Meets the requirements for closure systems used**

with factory-made rigid air ducts and connectors, and used with factory-made flexible air ducts and connectors in compliance with UL 181 - Standard for Factory-Made Air Ducts and Air Connectors.

- A. Basis of Design: 1581A Aluminum Foil 3M Venture Tape as manufactured and supplied by 3M. Heavy-duty, high strength, malleable, aluminum foil tape, coated with pressure sensitive acrylic adhesive.
1. Fire, Flame, and Smoke Resistance:
 - a. Complies with UL 181A-P.
 - b. Complies with UL 181B-FX.
 2. Water Vapor Transmission Rate; ASTM E96: 0.00 perm.
 3. Thickness: 4.0 mils (0.10 mm), without release paper.
 4. Peel Adhesion: 60 oz per inch (16.7 N per 25 mm).
 5. Shear Strength: Greater than 24 hrs at 2.2 psi (15.2 kPa).
 6. Tensile Strength: 27 lbs per inch (122 N per 25 mm).
 7. Elongation: 10 percent.
 8. Service Temperature: Minus 40 to 300 degrees F (minus 40 149 degrees C).
 9. Application Temperature: minus 10 degrees F (minus 23 degrees C).
 10. Surface Finish: Smooth.
 11. Color: Aluminum.
 12. Roll Widths: 2-1/2 and 3 inches (63.5 and 76 mm).
 13. Roll Lengths: 60 yards (55 m).

**** NOTES TO SPECIFIER **** The product below is ideal for exterior or interior use with flexible ducts and flexible duct connections to meet the requirements for closure systems used with factory-made flexible air ducts and connectors in compliance with UL 181 - Standard for Factory-Made Air Ducts and Air Connectors. Can also be used to secure flex duct to rigid ducts, flex duct to duct wrap facings and metal-to-metal connections. Appropriate for sub-zero and high temperature applications. Delete if not required.

- B. Basis of Design: 1599B Polypropylene Duct 3M Venture Tape as manufactured and supplied by 3M. A tape coated with pressure sensitive acrylic adhesive.
1. Fire, Flame, and Smoke Resistance:
 - a. Complies with UL 181B-FX.
 2. Fire, Flame, and Smoke Resistance per UL 723:
 - a. Flame: 0.
 - b. Smoke: 0.
 3. Thickness: 3.0 mils (0.08 mm), without release paper.
 4. Peel Adhesion: 30 oz per inch (8.3 N per 25 mm).
 5. Shear Strength: Greater than 24 hrs at 2.2 psi (15.2 kPa).
 6. Tensile Strength: 32 lbs per inch (142 N per 25 mm).
 7. Elongation: 213 percent.
 8. Service Temperature: minus 40 to 185 degrees F (minus 40 to 85 degrees C).
 9. Application Temperature: Minus 10 degrees F (minus 23 degrees C).
 10. Surface Finish: Smooth.
 11. Color: Aluminum with red print.
 12. Roll Widths: 2-1/2 inches, 3 inches (63.5 mm, 76 mm).
 13. Roll Lengths: 120 yards (110 m).

**** NOTES TO SPECIFIER **** The product below is ideal for exterior or interior use with line sets and foam piping insulation. Appropriate for sub-zero or tropical temperature applications, and in direct sunlight.

- C. Basis of Design: 1507 Line Set 3M Venture Tape as manufactured and supplied by 3M. Bi-axially oriented polypropylene (BOPP) coated with a cold weather acrylic pressure sensitive adhesive.

1. Fire, Flame, and Smoke Resistance per UL 723:
 - a. Flame: 0
 - b. Smoke: 10
2. Water Vapor Transmission Rate; ASTM E96: 0.05 perm.
3. Thickness: 3.0 mils (0.10 mm), without release paper.
4. Peel Adhesion: 30 oz per inch (8.3 N per 25 mm).
5. Shear Strength: Greater than 24 hrs at 2.2 psi (15.2 kPa).
6. Tensile Strength: 20 lbs per inches (90 N per 25 mm).
7. Elongation: 130 percent.
8. Service Temperature: Minus 40 to 185 degrees F (minus 40 to 85 degrees C).
9. Application Temperature: Minus 10 degrees F (minus 23 degrees C).
10. Surface Finish: Smooth.
11. Color: White.
12. Roll Widths: 2 and 3 inches (50 and 76 mm).
13. Roll Lengths: 60 yards (55 m).

2.4 INSULATION JACKETING TAPES

**** NOTE TO SPECIFIER **** The product below is ideal for fibrous and sheet metal ducts. Also used as a vapor seal for reinforced fiberglass and mineral wool insulation, and seam and joint sealing on sheet metal and fibrous ductwork. Delete if not required.

- A. Basis of Design: 3M Venture Tape Aluminum Foil Tape 1521CW as manufactured and supplied by 3M. A high strength dead soft aluminum foil coated with a cold weather acrylic pressure sensitive adhesive.
 1. Certifications:
 - a. Flame and Smoke Rating Classification per UL723: UL File No. R10984.
 - 1) Flame: 10.
 - 2) Smoke: 10.
 - b. U.S. Coast Guard Approved: CGA No. 164.112/63/0
 2. Excels in demanding temperature and humidity applications.
 3. Conforms well to curved and irregular surfaces.
 4. Specifically designed for cold weather conditions.
 5. Hand tearable and easy to install.
 6. Adhesive: Acrylic.
 7. Color: Natural aluminum
 8. Liner: Release liner.
 9. Total Tape Thickness per ASTM D3652: 2.8 mil (0.07 mm).
 10. Backing Thickness per ASTM D3652: 1.4 mil (0.04 mm).
 11. Backing: Aluminum foil.
 12. Peel Adhesion per ASTM D3330: 46 oz per in (5 N per cm).
 13. Tensile Strength per ASTM D3759: 15 lb per in (26.3 N per cm).
 14. Elongation per ASTM D3759: 4 percent.
 15. Service Temperature: Minus 40 to 250 degrees F (minus 40 to 121 degrees C).

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with installer present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance.
 1. Verify that items scheduled to receive jacketing have been tested and are free of defects that prevent adhesion and proper installation of jacketing.

2. Verify that surfaces to receive jacketing are clean and dry, free of dust, dirt, contaminants, oils, grease, etc.
- B. If substrate preparation is the responsibility of another installer, notify Architect in writing of unsatisfactory preparation before proceeding.

3.2 PREPARATION

- A. Clean surfaces thoroughly prior to installation.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.3 INSTALLATION

- A. Install in accordance with manufacturer's instructions, approved submittals and in proper relationship with adjacent construction.
- B. Install tapes compatible with ductboards, sheet metal, flexible ducts, or insulation materials and suitable for the service. Install tapes that do not corrode, soften, or otherwise attack with ductboards, sheet metal, flexible ducts, or insulation in either wet or dry state.
- C. For ductwork with factory-applied jacket, install the shop-applied or field-applied tapes over the factory-applied jacket.
- D. Tape ductwork seams, joints and connections with specified or manufacturers' recommended tapes. If more than one tape material is specified, selection from materials specified is Contractor's option.
- E. Install tapes with smooth, straight, and even surfaces; free of voids, bubbles, and open edges throughout the length of ductwork including fittings, valves, and specialties.
- F. Keep tape materials dry during application and finishing.
- G. Install tapes with least number of joints practical, and with tight overlapping seams and end joints.
 1. Install tape continuously around hanger and anchor attachments.
- H. Repair damaged tape by applying same tape material over damaged areas. Extend patches at least 4 inches (100 mm) beyond damaged areas.
- I. Do not install tape to the following:
 1. Vibration-control devices.
 2. Testing agency labels and stamps.
 3. Nameplates and data plates.
 4. Cleanouts.

3.4 FIELD QUALITY CONTROL

Note to Editor: Inspections in this article are destructive. Retain if workmanship quality is an important requirement. Architect should be prepared to reject all work if defective work is discovered in sample inspection.

- A. Perform inspection prior to pressurizing the ductwork.

- B. Inspect ductwork taped joints and connections randomly selected by Architect, by removing field-applied jacket and insulation in layers in reverse order of their installation.
 - 1. Tape failures include, but not limited to, non-adhesion, fish-mouths, tears, cracks or splits in the tape, improper tape used for the duct material, improper tape used for environmental condition, improper tape installed as specified.

3.5 CLEANING AND PROTECTION

- A. Clean products in accordance with the manufacturers recommendations.
- B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION