

**Addendum #2**  
**Criminal Justice Complex Mechanical Renovations – Phase III**  
**Parish Project No. 11-JAIL-34 Phase III**

December 23, 2016

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**General Items:**

1. Pertaining to the Specifications:
  - a. Section 15200 Subpart 2.09 “Low Velocity Ductwork”
    - i. Add new Specification Section subpart “J.” to read as follows:  
“ Exterior (Outdoor) ductwork shall be double wall construction as manufactured by Thermaduct L.L.C. or approved equal. The panel shall be manufactured with 3.5” of 3.5 pcf CFC-free Kingspan Kooltherm (or equal) closed cell rigid thermoset resin thermally bonded on both sides to a factory applied .001" (25 micron) aluminum foil facing reinforced with a fiberglass scrim. An added UV stable, 39 mil high impact resistant titanium infused vinyl is factory bonded to the outer surfaces to provide a zero permeability water tight barrier. The temperature rating shall provide a continuous rating of 185F maximum interior and 165F exterior.
    - ii. Refer to attached Specification titled “Outdoor ductwork” for additional information and requirements. .
2. Clarification- Contractor is responsible under the Scope of the work to provide and modify the sprinkler and fire alarm systems in the areas associated with the mechanical rooms to provide a complete operational Fire Marshal approved systems. This work will includes all fees, Fire Marshal submittals, inspections, associated with the smoke detectors for the six air units and sprinkler system modifications required due to the ductwork blocking existing heads, needing head (new required) relocation, or needing additional coverage due to the modifications. Existing smoke detectors may be reutilized in the new replacement units and rooms if allowed by the Fire Marshal’s office. This clarification is in addition to work already indicated in the Construction Documents.

**END OF ADDENDUM #2**

## **Addendum #2 Attachment**

### **OUTDOOR DUCTWORK**

#### **PART 1 – GENERAL**

##### **1.1 SUMMARY**

**A. Section includes:**

1. Thermaduct, ducts and fittings by Thermaduct, LLC.

**B. This section does not include:**

1. Air passages rated over a continuous internal static pressure of 6" w.g. positive, 6" negative, or with test pressure rating over: 10" w.g. startup and 10" w.g. negative (as documented on product labeling).

##### **1.2 SUBMITTALS**

**A. Product data:** For each type of product indicated.

**B. Shop drawings:** Fabrication, assembly, and installation, including plans, elevations, sections, components, and attachments to other work including.

1. Duct layout indicating sizes and pressure classes.
2. Elevation of top of ducts.
3. Dimensions of main duct runs from building grid lines.
4. Fittings.
5. Penetrations through fire-rated and other partitions.

**C. Coordination Drawings:** Plans, drawn to scale, showing coordination general construction, building components, and other building services.

##### **1.3 QUALITY ASSURANCE**

**A. Installer Qualifications:**

1. Ductwork can be installed by competent trained field mechanics who demonstrate competence in the HVAC industry for this type of ductwork..

##### **1.4 SPECIFICATION COMPLIANCE**

**A. SMACNA leakage, Class 1 or less.**

**B. Ductwork shall incorporate a closed cell fortified inner compliant to UL (C-UL) 181 Standard for Safety Listed, Class 1 system, with included testing and passing the following:**

1. Test for Surface Burning Characteristics
2. Flame Penetration Test
3. Burning Test
4. Mold Growth and Humidity Test
5. Low Temperature Test and High Temperature Test

6. Puncture Test
7. Static Load Test
8. Impact Test
9. Pressure Test and Collapse (negative pressure) Test
10. High Temperature and Humidity for 90 days
11. Cone Calorimeter
12. ASTM E2257 Standard Test Method for Room Fire Test of Wall and Ceiling Materials and Assemblies
13. ASTM E 84 tested, Tunnel Test, Does not exceed 25 flame spread, 50 smoke developed.
14. DW144, Class B
15. NRTL product approval, (Subpart S of 29 CFR Part 1910, OSHA)
16. ASTM C 423 noise reduction
17. ASTM E 96/E 96M Procedure A for permeability
18. ASTM C 1071 for erosion
19. ASTM C 518: 2004, Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus
20. UL 723, Test for Surface Burning Characteristics of Building Materials
21. NFPA Compliance:
  - a. NFPA 90A, "Installation of Air Conditioning and Ventilating Systems"
  - b. NFPA 90B, "Installation of Warm Air Heating and Air Conditioning Systems"
  - c. NFPA 255, "Standard Method of Test of Surface Burning Characteristics of Building Materials"

B. Ductwork outer shell shall be a UV stable, 39 mil high impact resistant titanium infused vinyl with included testing as following;

1. UL-94 Flammability V-0
2. ASTM D-638 Tensile Strength of 6250 psi
3. ASTM D-790 Flexible Strength of 11,000 psi
4. ASTM D-4226 Drop Impact Resistance
5. ASTM D-4216 Cell Classification

## 1.5 PRODUCT DELIVERY AND STORAGE

- A. Prevent objectionable aesthetic damage to the outer surface of duct segments during transport and storage.
- B. Store duct segments under cover and protect from excessive moisture prior to installation.

## PART 2 – PRODUCTS

### 2.1 OUTDOOR RECTANGULAR DUCT AND FITTINGS

#### A. Product:

1. Thermaduct or approved equal.
- B. The panel shall be manufactured of CFC-free closed cell rigid thermoset resin thermally bonded on both sides to a factory applied .001" (25 micron) aluminum foil facing reinforced with a fiberglass scrim. An added UV stable, 39 mil high impact resistant titanium infused vinyl is factory bonded to the outer surfaces to provide a zero permeability water tight barrier.
- C. The thermal conductivity shall be no greater than 0.13BTU • in/Hr •ft<sup>2</sup>•°F (.018W/m•°C), the thermal conductivity shall be no greater than 0.13BTU • in/Hr •ft<sup>2</sup>•°F (.018W/m•°C)
- D. The density of the close cell foam shall not be less than 3.5 pcf (56 Kg/m<sup>3</sup>) with a minimum compressive strength of 28 psi (.2 MPa).
- E. The standard panel is (31 mm) thickness panel with R-8.1 (1.5 RSI) shall be utilized unless indicated otherwise on the print.
  1. Maximum Temperature: Continuous rating of 185 degrees F (70 deg C) inside ducts or ambient temperature surrounding ducts.
  2. Maximum Thermal Conductivity: 0.13 Btu x in./h x sq. ft. x deg F at 75 deg F mean temperature.
  3. Permeability: 0.00 perms maximum when tested according to ASTM E 96/E 96M, Procedure A.
  4. Antimicrobial Agent: Additive for antimicrobial shall not used, but product must pass UL bacteria growth testing.
  5. Noise-Reduction Coefficient: 0.05 minimum when tested according to ASTM C 423, Mounting A.
  6. Required Markings: All interior duct liner shall bear UL label and other markings required by UL 181 on each full sheet of duct panel; UL ratings for internal closure materials.
  7. All insulation materials shall be closed cell with a closed cell content of >90%.
  8. R-value this project: 3.5 Double wall (100 mm) Thick Panel 24 R

#### F. Closure Materials:

1. V-Groove Adhesive: Silicone (interior only).
2. UV stable 39 mil high impact resistant titanium infused vinyl (exterior).
  - a. Factory manufactured seamless corners for zero perms.
  - b. Cohesive bonded over-lap at corner seam covers for zero perms.
  - c. Water resistant titanium infused welded vinyl seams.

d. Mold and mildew resistant.

3. Polymeric Sealing System:

- a. Structural Membrane: Aluminum scrim with woven glass fiber with UV stable vinyl clad applied
- b. Minimum Seam Cover Width: 2 7/8" inches (75 mm)
- c. Sealant: Low VOC.
- d. Color: White (colors, matched by architect optional).
- e. Water resistant.
- f. Mold and mildew resistant.

4. Duct Connectors.

- a. Factory manufactured cohesive bonded strips (low pressure only).
- b. Factory manufactured all aluminum grip flange (use in coastal areas only-within 50 miles of coast)
  - 1. Grip flange
  - 2. F-flange
  - 3. H-flange
  - 4. U-flange
- c. Factory manufactured galvanized 4-bolt flange.

G. Outdoor Cladding

- 1. Thermaduct outdoor Installations: Duct segments shall incorporate UV stable 39 mil high impact resistant titanium infused vinyl which is introduced during the manufacturing process.

H. Flange coverings

- 1. Flanges are field sealed airtight before flange covers are installed.  
Flange covering consists of the following:
  - a. Foam tape insulation with molded 39 mil covers.
  - b. Air gap (heating only application) with molded 39 mil covers.

I. Weight

- 1. Ductwork shall provide low weight stresses on the building framing and support members. Assembled system shall have a weight of 0.86 lbs. per square foot to maximum weight of 2.7 lbs. per square foot (depending on R-value). Hangers and tie-downs are to be detailed on the manufacturer's installing contractors detail drawings prior to installation but not exceeding 13' for duct girth <84" and 8' for duct girth >85" between hangers and designed to carry the weight and wind

load of the ductwork.

## PART 3 – EXECUTION

### 3.1 Shop Fabrication

#### A. Certification:

1. Ducts shall be detailed and fully factory manufactured.

#### B. Fabrication:

1. Fabricated joints, seams, transitions, reinforcement, elbows, branch connections, access doors and panels, and damage repairs according to manufacturer's written and detailed instructions.
2. Fabricated 90-degree mitered elbows to include turning vanes.
3. Fabricated duct segments in accordance with manufacturer's written details.
4. Duct Fittings shall include 6 inches of connecting material, as measured, from last bend line to the end of the duct. Connections on machine manufactured duct may be 4 inches.
5. Fabricated duct segments utilizing v-groove method of fabrication. Factory welded or cohesively bonded seams will apply to fully manufactured ductwork and fittings. Internal seams will be supplied with an unbroken layer of low VOC silicone or bonding (for paint shop applications). Each duct segment will be factory supplied with either aluminum grip pro-file or pre-insulated duct connectors in accordance with manufacturer's detailed submittal guide. Applied duct reinforcement to protect against side deformation from both positive and negative pressure per manufacturer's design guide based on specified ductwork size and system pressure.
6. Designed and fabricated duct segments and fittings will be in accordance with "SMACNA Duct Construction Standards" latest edition.
7. Both positive and negative ductwork and fittings shall be constructed to incorporate a UL Listed as a Class 1 air duct to Standard for Safety UL 181 liner with an exterior clad for permanent protection against water intrusion.
8. Duct shall be constructed to exceed requirements for wind loads.

### 3.2 DUCT INSTALLATION

A. Duct segments shall be installed by competent HVAC installers.

B. Install ducts and fittings to comply with manufacturer's installation instructions as follows:

1. Install ducts with fewest possible joints.
2. Unless otherwise indicated, install ducts vertically and horizontally, and parallel and perpendicular to building lines.
3. Install ducts close to walls, overhead construction, columns, and other structural and permanent enclosure elements of building.
4. Protect duct interiors from the moisture, construction debris and dust, and other foreign materials. Comply with SMACNA's "Duct Cleanliness for New Construction Guidelines."
5. Use prescribed duct support spacing as described in this specification and manufacturer's recommendations.

C. Air Leakage: Duct air leakage rates to be in compliance with "SMACNA HVAC Duct Construction Standards" latest version per applicable leakage class based on pressure.

### 3.3 HANGER AND SUPPORT INSTALLATION

- A. Contractor to ensure that the ductwork system is properly and adequately supported to meet the wind loads at the site.
  1. Ensure that the chosen method is compatible with the specific ductwork system requirements per the Manufacturer's installation detail drawings. Pre-installation should be provided prior to work commencement by installing contractor for approval. .
  2. Install upper attachments to structures. Select and size upper attachments with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.
- B. Supports on straight runs of ductwork shall be positioned at centers not exceeding 13 feet (3.96 m) for duct sections when fabricated in 13 foot (3.96 m) lengths with duct girth less than 84". Larger duct sizes and short segments with duct girth greater than 84" are to be supported at 8 foot centers or less, in accordance with the Manufacturer's installation details provided prior to work commencement.
- C. Ductwork shall be supported at changes of direction, at branch duct connections, tee fittings, parallel under turning vanes and all duct accessories such as dampers, etc.
- D. The load of such accessories to the ductwork shall be neutralized by the accessory support.

### 3.4 FIELD QUALITY CONTROL

- A. Inspection: Arrange for manufacturer's representative to inspect completed installation and provide written report that installation complies with manufacturer's written instructions.
  1. Remove and replace duct system where inspection indicates that it does

not comply with specified requirements.

- B. Perform additional testing and inspecting, at the Contractor's expense, to determine compliance of replaced or additional work with specified requirements.

### 3.5 DUCT SCHEDULE

#### A. Outdoor Ducts and Fittings:

- 1. ThermaDuct or approved equal Rectangular Ducts and Fittings:
  - a. Minimum Panel Thickness: 3.5" with R-24 insulation
  - b. Cladding: minimum 0.038 inch