**

*Abstract: This document is an engineering specification template for the Q Duct Pre-Insulated Outdoor Duct System. There are product specifications that are* ***(Optional)*** *and they are shown in red. Please make sure to remove unrequired product specifications from this document when finalizing your specification.*

THE Q DUCT® SPECIFICATION

1. GENERAL
	1. SECTION INCLUDES
		1. Pre-Insulated Outdoor HVAC ductwork system.
	2. RELATED SECTIONS
		1. Section 23 05 00- Common Work Results for HVAC
	3. REFERENCES
		1. ASTM International (ASTM)
			1. ASTM C518- Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.
			2. ASTM E84- Standard Test Method for the Surface Burning Characteristics of Building Materials.
		2. American Society of Heating, Refrigeration, and Air-Conditioning Engineers (ASHRAE)
			1. ASHRAE Design Fundamentals Handbook.
			2. ASHRAE 90.1- Energy Standard for Buildings Except for Low-Rise Residential Buildings.
		3. National Fire Protection Agency (NFPA)
			1. NFPA 90A- Standard for the Installation of Air-Conditioning and Ventilating Systems.
			2. NFPA 90B- Standard for the Installation of Warm Air Heating and Air-Conditioning Systems.
		4. Sheet Metal and Air Conditioning Contractors National Association (SMACNA)
			1. SMACNA HVAC Air Duct Leakage Test Manual.
			2. SMACNA Phenolic Duct Construction Standards.
			3. SMACNA HVAC Duct System Design Manual.
		5. Underwriters Laboratories (UL)
			1. UL 181- Standards for Factory Made Air Ducts and Air Connectors.
			2. UL 723- Standard Test Method for Surface Burning Characteristics of Building Materials.
	4. SUBMITTALS
		1. Submit under provisions of Section 01 30 00 – Administrative Requirements
		2. Product Documentation: Manufacturer’s documentation on each product to be used, including:
			1. Technical Data Sheets.
			2. Material Safety Data Sheets.
			3. Installation and Maintenance Manual.
		3. Shop Drawings & Production Submittal: CAD drawings and production release documentation to including the following.
			1. Plan & Elevation views: Scaled and annotated with duct sizes, lengths, and elevations dimensions.
			2. Isometric Views: 3D layout drawing of system with item numbering for part identification.
			3. Item Shop Drawing: Shop drawings for each duct item, displaying plan, elevation and isometric views. Detailed duct information including dimensions, connector type, seam type, duct specification, and accessories.
			4. Item summary: line item list indicating part numbers, duct types, specifications, and duct size.
	5. QUALITY ASSURANCE
		1. Single Source Responsibility: Contractor to source primary materials from a single manufacturer.
		2. Installer Qualifications: Contractor to receive webinar installation training or onsite installation training as provided by manufacturer.
	6. PRE-INSTALLATION MEETINGS
		1. Convene with the manufacturer’s authorized technical representative, general contractor, and related trades minimum of 2 weeks prior to starting execution of this section to discuss timeline, project conditions, and manufacturer’s installation procedures.
	7. DELIVERY, STORAGE, AND HANDLING
		1. Deliver and store products in manufacturer’s original packaging until ready for installation.
		2. Follow manufacturers procedures for proper storage and handling upon delivery.
		3. Duct Products shall be shipped with open ends covered to protect interior from dust, debris, & moisture.
	8. PROJECT CONDITIONS
		1. Ensure environmental conditions (temperature, humidity, ventilation) during installation are within limits recommended by the manufacturer.
		2. Do not install products under environmental conditions outside of manufacturer’s recommendations.
	9. SEQUENCING
		1. Ensure that products of this section are supplied to trades in time to prevent interruption of construction process.
		2. Verify production lead times with product manufacturer prior to scheduling installation of this section.
2. PRODUCTS
	1. MANUFACTURERS
		1. Basis of Design
			1. Q Duct by AQC Industries; 2920 Centre Pointe Dr, Roseville, MN 55113; Tel: (651)-209-0050; Email: team@aqcind.com; Web: [www.aqcind.com](http://www.aqcind.com)
	2. PRE-INSULATED OUTDOOR HVAC DUCTWORK SYSTEM
		1. Pre-Insulated Outdoor HVAC Ductwork system:
			1. Q Duct System by AQC Industries
				1. Q Duct System for HVAC supply, return, and exhaust air ductwork as shown on layout drawings.
				2. System shall include pre-insulated panels, coupling systems, sealants, cladding and accessories to meet the following performance criteria.
			2. Materials
				1. Ductwork

Pre-Insulated Duct Panels: UL 181 listed rigid thermoset phenolic duct panel

Minimum internal facing: 2.3 mil (60 micron) embossed aluminum

Minimum external facing: 7.9 mil (200 micron) embossed aluminum

Nominal Density: 4.05 lbs/ft^3 (60 kg/m^3)

Closed Cell Content: Minimum 90%

Compressive Strength: Minimum 29 psi (200 kPa) at 10% compression

Cladding: UL 181 listed multi-layered aluminum laminate cladding

Minimum cladding thickness 19.7 (500 micron) mil

Tape: UL 181 listed foil mastic sealant tape

* + - * 1. Metal Accessories

Corrosion Resistant Construction

Turning vanes, reinforcement, support mounts, and connector material to be fabricated from corrosion resistant galvanized steel.

***Non-Ferrous Construction***

***Turning vanes, reinforcement, support mounts, and connector material to be fabricated from non-ferrous aluminum alloy.***

* + - 1. Air Leakage
				1. Duct shall exceed a SMACNA Air Leakage Class 1

Standard Pressure Design

Design Pressure @ 1” WG = 1 cfm/100 sqft

Design Pressure @ 2” WG= 1.6 cfm/100 sqft

Design Pressure @ 3” WG= 2.1 cfm/100 sqft

Design Pressure @ 4” WG= 2.5 cfm/100 sqft

***High Pressure Design***

***Design Pressure @ 5” WG= 2.9 cfm/100 sqft***

***Design Pressure @ 6” WG= 3.2 cfm/100 sqft***

***Design Pressure @ 7” WG= 3.6 cfm/100 sqft***

* + - 1. Air Velocity
				1. Maximum 6890 fpm (35 m/s)
			2. Design Pressure Reinforcement Specification
				1. Duct shall be reinforced to meet the 4” WG Pressure Class

Maximum Positive 4” WG (1000 Pa)

Maximum Negative 4” WG (1000 Pa)

* + - * 1. ***Duct shall be reinforced to meet the 7” WG Pressure Class***

***Maximum Positive 7” w.g. (1750 Pa)***

***Maximum Negative 7” w.g. (1750 Pa)***

* + - 1. Duct Connections
				1. Duct connections must exceed SMACNA Leakage Class 1

Interlocking connection permitted.

* + - * 1. Connections that cannot meet or exceed SMACNA Leakage Class 1 are not permitted.

TDC/TDF connection not permitted.

4-Bolt Flange connection not permitted

* + - 1. Duct R-Value, Insulation Panel Layers, Nominal Wall Thickness
				1. R-12: Double Panel, 2.50” wall thickness: ***+ additional R-8.6 Sloped Roof Insulation***
				2. ***R-18: Triple Panel, 3.75” wall thickness: + additional R-8.6 Sloped Roof Insulation***
				3. ***R-24: Quad Panel, 5.00” wall thickness: + additional R-8.6 Sloped Roof Insulation***
			2. Field Paintable
				1. Duct system shall be capable of applying field paint by others
				2. Color selected by Architect
			3. Warranty
				1. Manufacturer shall provide a 10-year limited warranty for the Pre-Insulated Outdoor HVAC Ductwork system.
			4. Mounting System
				1. Horizontal Ductwork Support Universal Mounting Rails

Factory supplied & attached external support rails on all ducts longer than 24” & depth greater than 24”.

* + - * 1. Vertical Ductwork Support Universal Mounting Rails

Factory supplied & attached external support rails on all straight ducts with vertical rise greater than 6’.

* + - * 1. ***Support Mounting Rails for all Ducts and Fittings***

***Factory supplied & attached external support rails on all straight duct regardless of size or reinforcement specification.***

* + - 1. **Sloped Roof Water Shed**
				1. **Roof Slope: Minimum roof slope of ½” per 1’**
				2. **Roof Insulation: Minimum R-8.6 at 1.5” insulation thickness.**
				3. **Roof Cladding: UL 181 listed multi-layered 19.5 mil aluminum laminate cladding**
	1. FABRICATION
		1. Ductwork to be factory fabricated with pre-insulated and jacketed exterior, adhesives, sealants, connectors, reinforcements, supports and accessories in accordance with Manufacturer’s specifications and the SMACNA Phenolic Duct Construction Standards.
			1. 90-degree rectangular elbows shall include turning vanes per SMACNA Phenolic Duct Construction Standards.
			2. Duct reinforcement shall meet or exceed SMACNA Phenolic Duct Construction Standards.
1. EXECUTION
	1. EXAMINATION
		1. Do not begin installation until roof substrates have been properly prepared.
		2. If substrate preparation is the responsibility of another installer, notify the Architect of unsatisfactory preparation before proceeding.
	2. PREPARATION
		1. Ensure interior & exterior surfaces of product are clean of dirt, debris and moisture prior to installation.
		2. Ensure work site is clear of obstructions to allow for safe handling of material during installation process.
	3. INSTALLATION
		1. Install in accordance with manufacturer’s instruction manual.
		2. Installing contractor is responsible for properly supporting duct system in accordance with manufacturer’s instructions. Support and install materials are to be checked for compatibility with duct system.
		3. Join and seal sections in accordance with manufacturer’s specifications.
		4. Refer to manufacturer’s instructions for field modifications of duct system.
		5. Ensure products are properly protected until completion of project.
		6. Touch-up, repair or replace damaged products before substantial completion of installation.
	4. FIELD QUALITY CONTROL
		1. Commissioning: Testing and verification of operational performance at intended pressure and temperature ranges. Commission test pressure is not to exceed design pressure.
		2. Air Leakage Testing: Test in accordance with SMACNA HVAC Air Duct Leakage Test Manual on at least 10% of the total installed duct area, after all duct has been secured to the duct supports. Ensure duct system exceeds SMACNA Air leakage Class 1.