CROMWELL

1300 East 6th Street | Little Rock, AR 72202
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Submittal Review Form

Job Title: Anduril

Job No: 2023-047

Submittal No: 233100.1 HVAC Ducts and Casings

By: JDG

Date: 02-07-2024

Reviewing is only for conformance with the design concepts of the Project and compliance with the information given in the contract documents. The Contractor is responsible for dimensions to confirmed or correlated at the site; for information that pertains solely to the fabrication process, or the means, methods, techniques, sequences, and procedures of construction; and for the coordination of the work of all other trades.

Item No.	Description	No Exception Taken	Make Corrections Noted	Revise and Resubmit	Not Accepted	Comments
1	Ductwork					
-	Connections	X				
-	Duct Sox	X				
-	Flex duct	X				
-	Spiral Duct	X				

Quality People. Building Solutions.

Comfort Systems USA (Arkansas), Inc.
P.O. Box 16620
Little Rock, AR 72231
Phone 501-834-3320
Fax 501-834-5416

Date: 1/11/2024
Return Request: 1/22/2024
Project: Anduril Industries – Bldgs. 301, 400, 600
Supplier: Ivey Mechanical
Manufacturer: Various
Submittal: HVAC Ducts & Casings
Submittal Number: 23 31 00-01
Drawing # and Installation: Mechanical Drawings

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Division 23

Ivey Submission #10

Buildings 301,400, and 600

Specification Section 23 31 00- HVAC Ducts and Casings

Submitted Date: 1/10/2024

Owner:

Anduril Industries

488 East McHenry Rd.

McHenry, MS 39561

Mechanical Engineer:

Cromwell Architects Engineers, Inc.

1300 East 6th Street

Little Rock, AR 72202

Ivey Mechanical Company
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P.O. Box 610
Kosciusko, MS
662.289.3646
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RECTANGULAR GALVANIZED DUCTWORK

IMC FABRICATION

IMC FABRICATION

SHOP STANDARDS FOR DUCT CONSTRUCTION

(GALVANIZED RECTANGULAR DUCT)

2" W.G. AND BELOW POS. OR NEG.

DUCT DIMENSION	METAL GAUGE	MAX LENGTH	JOINT CONNECTION	LONGITUDINAL SPACING AND REINFORCING
0-20	24	59"	Slip and Drive T-11 & T-1	Transverse Connections @ 59" Not Required
21-30	24	56-1/4"	TDC T-25a	Transverse Connections @ 56-1/4" Not Required
31-47	22	56-1/4"	TDC T-25a	Transverse Connections @ 56-1/4" Not Required
48-54	22	56-1/4"	TDC T-25a	Transverse Connections @ 56-1/4" 3/4"x1-1/2"x16ga "Z" Bar @ Max 27"
55-60	20	56-1/4"	TDC T-25a	Transverse Connections @ 56-1/4" Not Required
61-84	20	56-1/4"	TDC T-25a	Transverse Connections @ 56-1/4" 3/4"x2"x16ga "Z" Bar @ Max 27"
85-119	18	56-1/4"	TDC T-25a	Transverse Connections @ 56-1/4" 3"x1 1/8"x16ga "Z" Bar @ Max 27"
120 & UP	18	60"	J-Flange	Transverse Connections @ 60" 3"x1 1/8"x16ga "Z" Bar @ max 27"

NOTE: Ductwork is compatible with SMACNA - HVAC Duct Construction Standards 2005.

IMC FABRICATION

SHOP STANDARDS FOR DUCT CONSTRUCTION

(GALVANIZED RECTANGULAR DUCT)

4" W.G.
POS. OR NEG.

DUCT DIMENSION	METAL GAUGE	MAX LENGTH	JOINT CONNECTION	LONGITUDINAL SPACING AND REINFORCING
0-16	24	59"	Slip and Drive T-11 & T-1	Transverse Connections @ 59" Not Required
17-22	24	56-1/4"	TDC T-25a	Transverse Connections @ 56-1/4" Not Required
23-29	22	56-1/4"	TDC T-25a	Transverse Connections @ 56-1/4" Not Required
30-36	20	56-1/4"	TDC T-25a	Transverse Connections @ 56-1/4" Not Required
37-48	20	56-1/4"	TDC T-25a	Transverse Connections @ 56-1/4" 3/4"x1-1/2"x16ga "Z" Bar @ Max 27"
49-54	20	56-1/4"	TDC T-25a	Transverse Connections @ 56-1/4" 3/4"x2"x16ga "Z" Bar @ Max 27"
55-60	18	56-1/4"	TDC T-25a	Transverse Connections @ 56-1/4" 3/4"x2"x16ga "Z" Bar @ Max 27"
61-84	18	56-1/4"	TDC T-25a	Transverse Connections @ 56-1/4" 3"x1 1/8"x16ga "Z" Bar @ Max 27"
85-119	18	56-1/4"	TDC T-25a	Transverse Connections @ 56-1/4" 2 1/2"x2"x3/4"18ga "HAT" Section @ Max 27"
120 & UP	18	60"	J-Flange	Transverse Connections @ 60" With Joint Tie Rod (JTR) and 2 1/2"x2"x3/4"18ga "HAT" Section @ max 27"

NOTE: Ductwork is compatible with SMACNA - HVAC Duct Construction Standards 2005.

IMC FABRICATION

SHOP STANDARDS FOR DUCT CONSTRUCTION

(GALVANIZED RECTANGULAR DUCT)

6" W.G.
POS. OR NEG.

DUCT DIMENSION	METAL GAUGE	MAX LENGTH	JOINT CONNECTION	LONGITUDINAL SPACING AND REINFORCING
0-13	24	56-1/4"	TDC T-25a	Transverse Connections @ 56-1/4" Not Required
14-29	22	56-1/4"	TDC T-25a	Transverse Connections @ 56-1/4" Not Required
30-40	20	56-1/4"	TDC T-25a	Transverse Connections @ 56-1/4" 3/4"x1-1/2"x16ga "Z" Bar @ Max 27"
41-48	20	56-1/4"	TDC T-25a	Transverse Connections @ 56-1/4" 3/4"x1-1/2"x16ga "Z" Bar @ Max 27"
49-54	20	56-1/4"	TDC T-25a	Transverse Connections @ 56-1/4" 3/4"x2"x16ga "Z" Bar @ Max 27"
55-60	18	56-1/4"	TDC T-25a	Transverse Connections @ 56-1/4" 3/4"x2"x16ga "Z" Bar @ Max 27"
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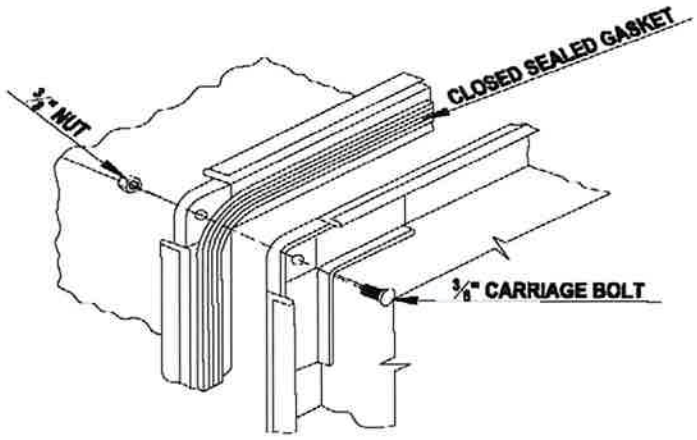
120 & UP	18	60"	J-Flange	Transverse Connections @ 60" With Joint Tie Rod (JTR) and 2 1/2"x2"x3/4"16ga "HAT" Section @ max 27"

NOTE: Ductwork is compatible with SMACNA - HVAC Duct Construction Standards 2005.

T.D.C.

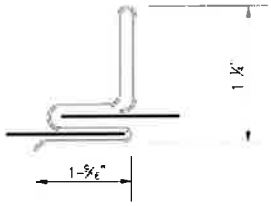


T-25a (T.D.C. CONNECTION)

Note- See pressure spec. for use of T.D.C.

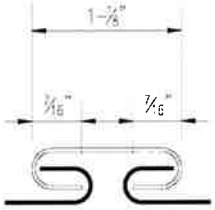
*Reference- SMACNA – HVAC Duct Construction Standards, 3rd Edition 2005, page 2.121. (FIG. 2-17)

TRANSVERSE CONNECTIONS



T-11 (STANDING SLIP LOCK)

T-6 (FLAT SLIP LOCK)



T-1 (FLAT DRIVE)

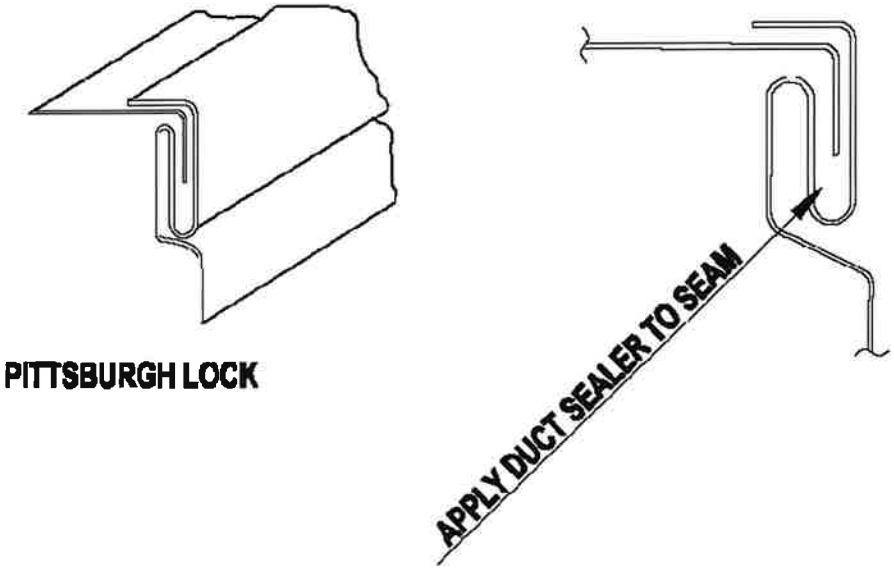
Note- See pressure spec. for use of connections.

*Reference- SMACNA – HVAC Duct Construction Standards, 3rd Edition 2005, page 2.6 & 2.7. (FIG. 2-1)

IMC FABRICATION

LONGITUDINAL SEAMS

PITTSBURGH LOCK

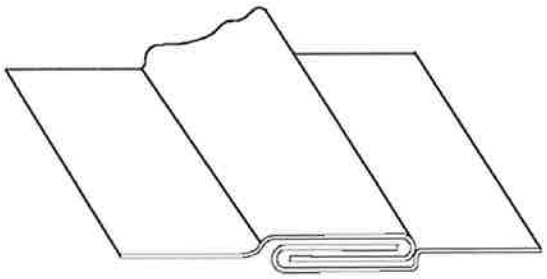


PITTSBURGH LOCK

Note-We use a small pittsburgh on 22 gauge and lighter, and a large pittsburgh on 20 gauge and heavier.

*Reference- SMACNA – HVAC Duct Construction Standards, 3rd Edition 2005, page 2.10. (FIG. 2-2)

HAMMER LOCK



HAMMER LOCK SEAM

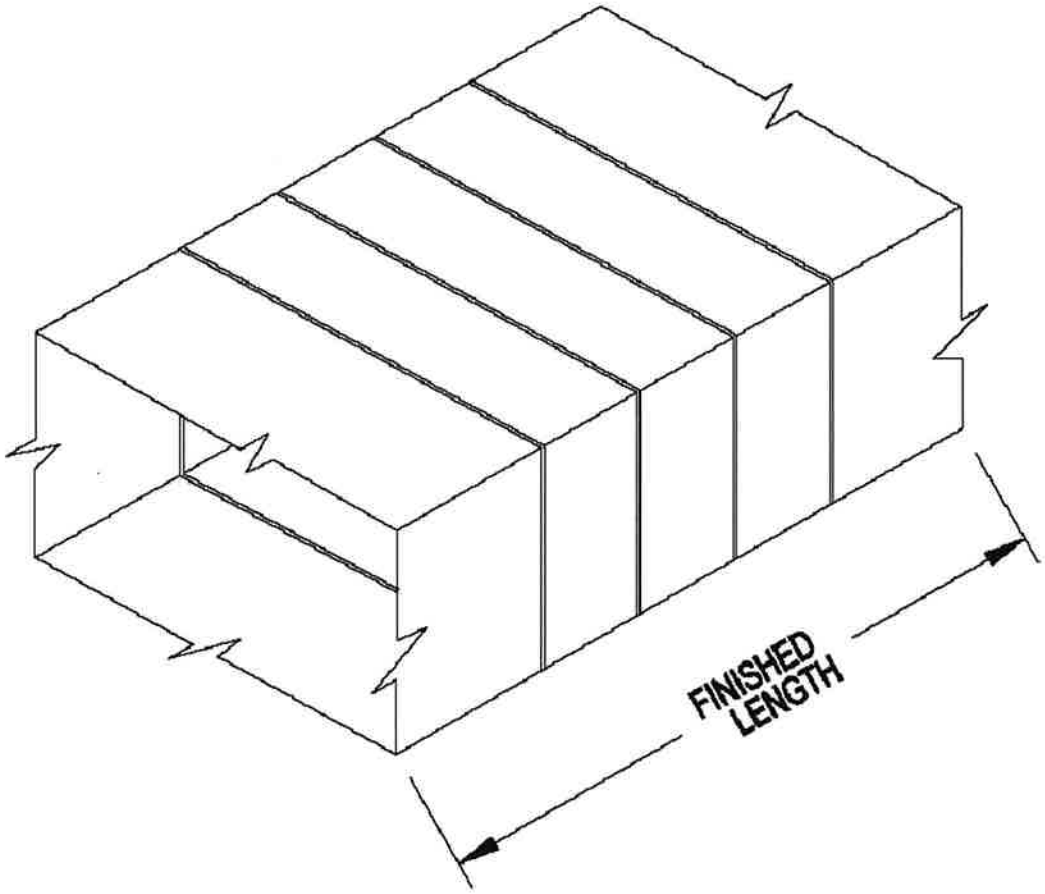
Note- We use the hammer lock seam on square to rounds and round reducers.

*Reference- SMACNA – HVAC Duct Construction Standards, 3rd Edition 2005, page 2.10. (FIG. 2-2)

IMC FABRICATION

STANDARD DUCT LENGTH

STANDARD DUCT

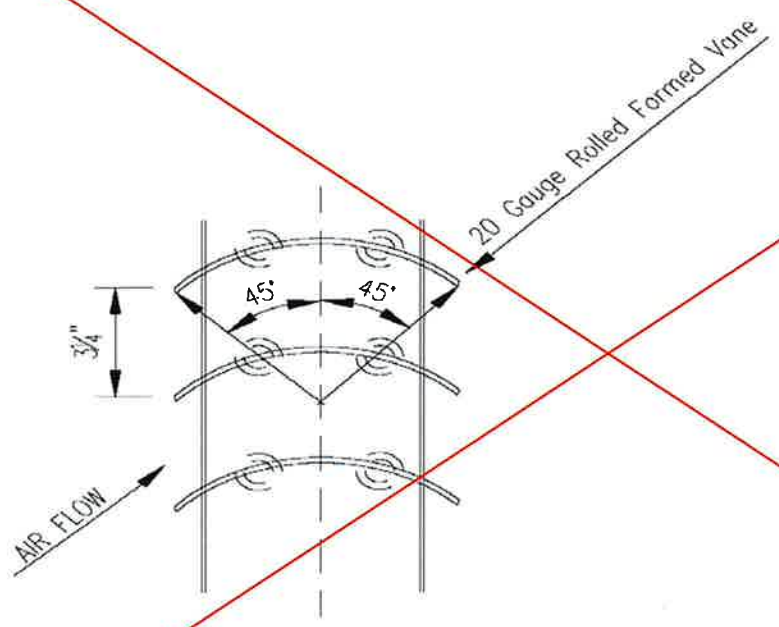


Note: We use three types of connections on standard duct.

1. Slip and Drive will finish 59”
2. T.D.C. will finish at 56 ¼”
3. Raw to Raw or J-Flange to J- Flange, will finish 60”

LOW PRESSURE TURNING VANES

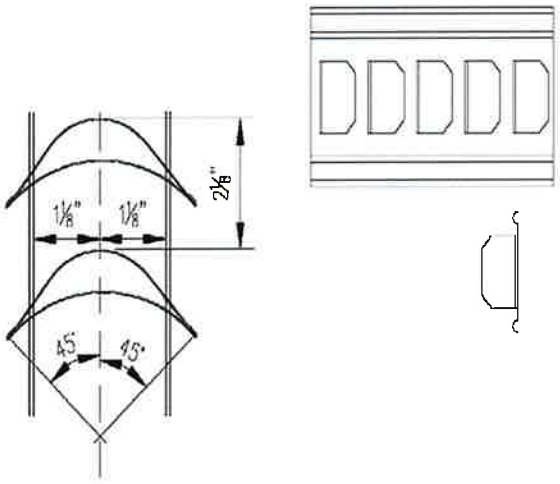
6" SINGLE VANE



Note- We use type 2 vane runner.

*Reference- SMACNA – HVAC Duct Construction Standards, 3rd Edition 2005, page 4.5. (FIG. 4-3)

2" SMALL HARPER VANE AND RAIL



Note- We use type 1 vane runner.

*Reference- SMACNA – HVAC Duct Construction Standards, 3rd Edition 2005, page 4.5. (FIG. 4-3)

IMC
FABRICATION

DuctMate Products

1. T.D.C. Corners
2. Cleats
3. J-Flange and J-Flange Corners
4. Gasket

WDCI™ C Corner

Basic Use

A corner used to complete a TDC® flange connection.

Description

Each corner is manufactured by Ductmate for manual insertion into TDC® ductwork. Precision stamped out of 14 gauge galvanized steel.

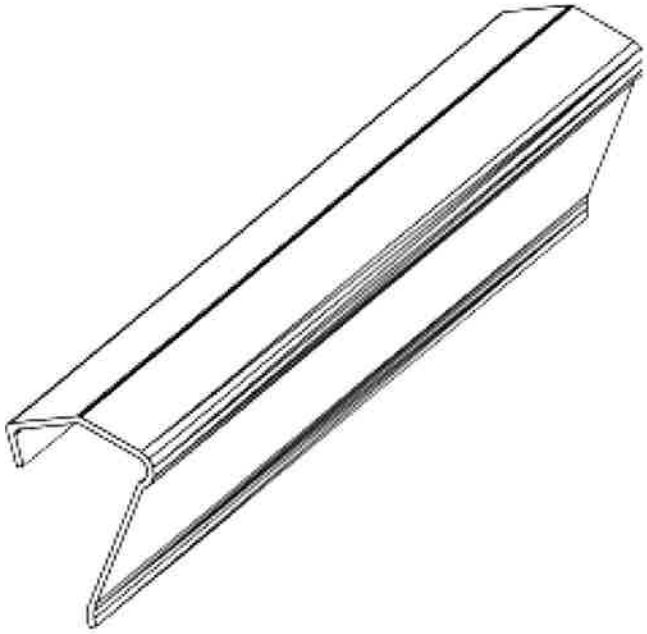
Special Characteristics

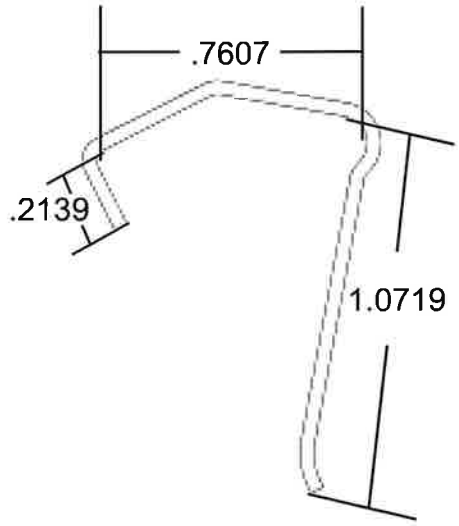
- Union made
- 250 corners per box
- Corner also available in aluminum, aluminized, and 304 stainless steel

Material Safety Data Sheets

Stainless Steel Products
Ductmate Galvanized Steel Products
Aluminum Products

VERSA-CLEAT





All measurements are inside dimensions
Manufactured from 22 Gauge

DESCRIPTION

Snap-On Cleat

BASIC USE

Can be used in conjunction with a variety of TDC connections along with Ductmate 45.

AVAILABLE SIZES

Part No.	Description	Quantity	Linear Feet	Weight
DV6CGA	6" Snap-On TDC Cleat	250 Pcs. / Box	125' / Box	29 lbs./ Box
DV10CGA	10' Snap-On TDC Cleat	10 Lengths	100' / Bundle	23 lbs./ Bundle

AVAILABLE MATERIALS

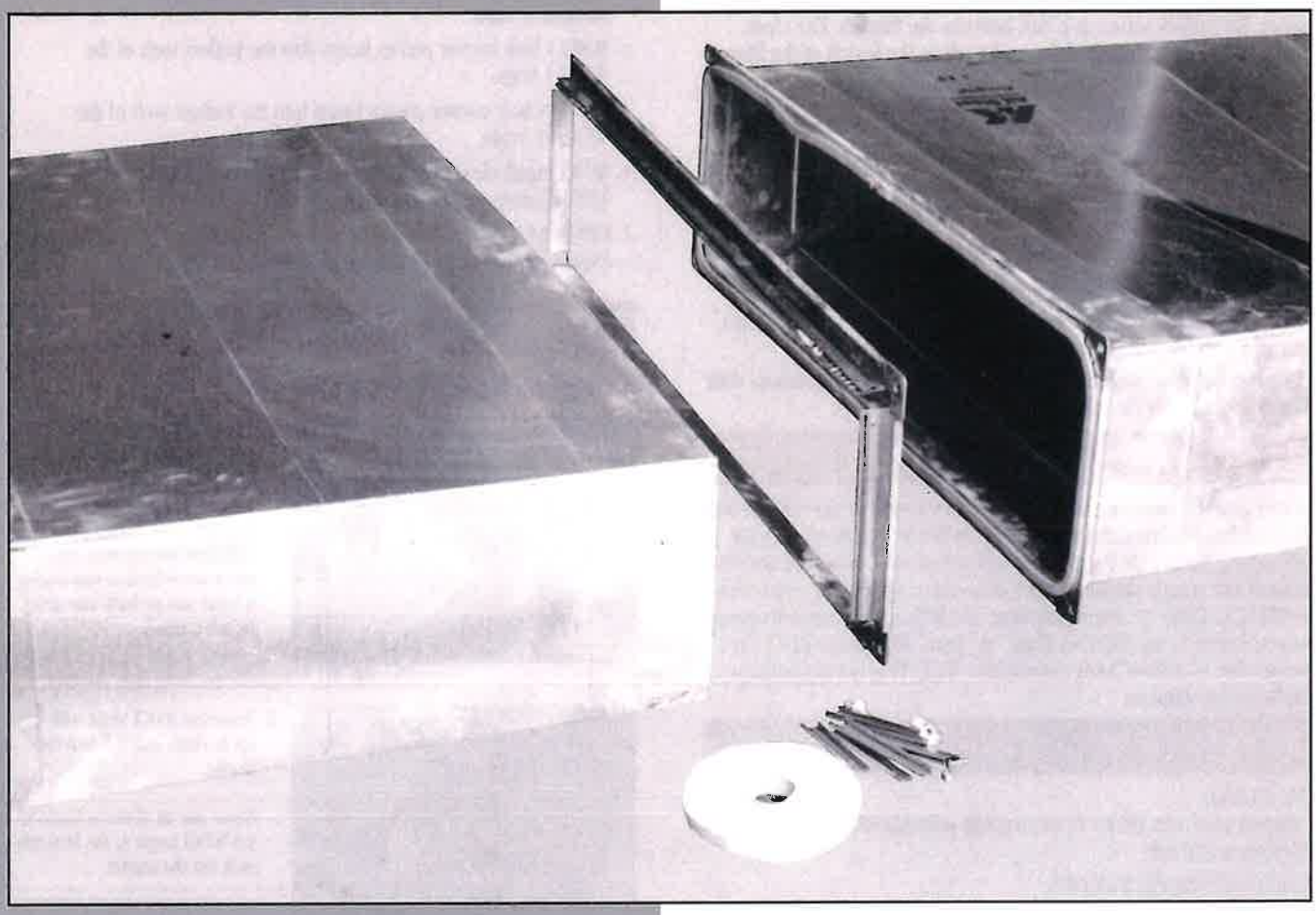
Galvanized
Galvanneal
PVC Coated
316 Stainless
Aluminized

MANUFACTURED BY:

DUCTMATE Industries, Inc.

D U C T M A T E

WDCI J & H



Rectangular Duct Connection System

Strong and Virtually Leak-Free

- Simple to install
- No additional sealing required
- Available in specialty metals
- Consistent connections

DUCTMATE® Industries, Inc.

WDCI J and H

Rectangular Duct Connection System

DESCRIPTION

WDCI J and H connection systems consist of roll-formed flanges, corner pieces, gasket, bolts, nuts and cleat. The flanges attach to the duct wall and have an integral mastic which allows the flange to seal itself to the duct. Corner pieces are used to add rigidity to the flange; hold the ductwork together and provide a sealing surface for the gasket. The gasket serves as a seal between the flanges. The cleat insures even compression of the gasket along the length of the flange.

BASIC USE

WDCI J and H connection systems are used to connect rectangular ducts when a rigid, leak-free connection is required.

SPECIAL CHARACTERISTICS

Sealing materials meet NFPA 90A & 90B Class 1 requirements.

WDCI J connections systems is not recommended for application with duct gauges heavier than 16 GA, or lighter than 26 GA.

WDCI H connection system is not recommend for applications with duct gauges heavier than 20 GA or lighter than 26 GA.

TECHNICAL INFORMATION

WDCI J and H connection systems have been tested in accordance with SMACNA procedures with test results certified by Pittsburgh Testing Laboratory, Pittsburgh PA. No external sealant was employed and the certified test results reveal: WDCI J connection system is comparable to the SMACNA Class "J" transverse joint and WDCI H connection system is comparable to the SMACNA Class "H" joint. Aluminum WDCI J is comparable to a SMACNA H connections. WDCI H is not available in aluminum or stainless.

CLEAT

PVC CLEAT:
Polyvinyl chloride (PVC) is an organic polymer derived from petroleum and salt.

PERFORMANCE PROPERTIES:

Relative high ignition resistance	flash ignition 391°C/735°F self ignition 454°C/850°F
Low fuel contribution	
Lack of flaming drips	
High external heat necessary to maintain combustion	
UL723 (ASTM E-84) Test Data:	Flame Spread: 10 Fuel Contribution: 0 Smoke Density: 10
Service Temp:	+32°F to +150°F

METAL CLEAT:
WDCI Metal Cleat is roll-formed from 22 GA galvanized steel for application around perimeter of transverse joint.

PACKAGING INFORMATION

WDCI connection systems consists of the following components:

a. WDCI J flange is roll-formed from 20 GA galvanized steel, with an integral sealant.

b. WDCI H flange is roll-formed from 22 GA galvanized steel, with and integral sealant.

c. WDCI J bold corner pieces insert into the hollow web of the WDCI J Angle.

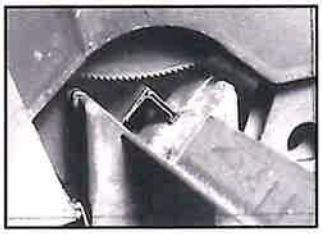
d. WDCI H bold corner pieces insert into the hollow web of the WDCI H Angle.

e. WDCI metal cleat is roll-formed from 22 GA galvanized steel (PVC Cleat is available upon request).

f. 440 Butyl Gasket is extruded butyl for used between mating flanges (Neoprene gasket is available upon request).

INSTALLATION INSTRUCTIONS

Cutting WDCI Angle

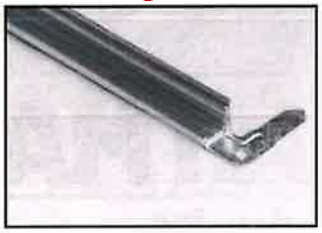


1. Always cut WDCI angle 1⅝" shorter than duct dimensions. Slam the blade through the Angle as quickly as possible. Saw must have sufficient horsepower. Always use a metal friction saw blade. A band saw or hack saw can be substituted.

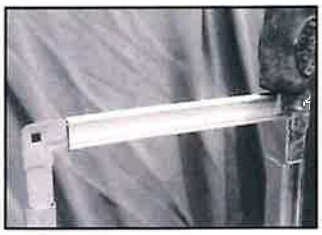
2. Never cut WDCI angle with legs up as chips may fall into the mastic.

   Never use abrasive blade to cut WDCI angle as the heat can melt out the mastic

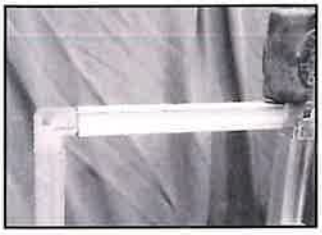
Assembling WDCI Frame



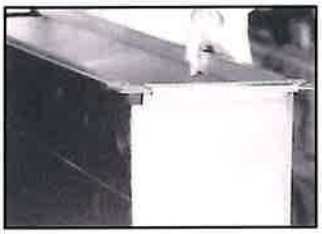
3. Insert a WDCI corner piece into each end of the two shortest frame angle pieces.



4. Slide two longer angle pieces onto corner pieces already inserted into shorter pieces, then add the second short piece to complete the frame.



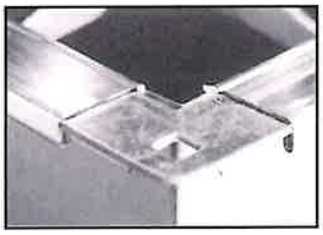
5. Now complete the frame by seating the corner pieces into the WDCI angle.



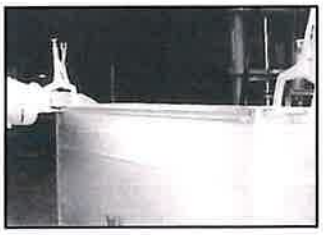
6. Start, completed WDCI frame at corner of duct.

Seating WDCI Frame

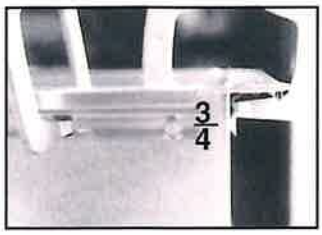
7. Use a mallet to seat the frame onto the duct. *Establish metal to metal contact along the length of the angle.*



8. The duct must be seated all the way into the WDCI angle in order to penetrate the integral mastic sealant and avoid leakage.



9. Work in one direction around duct when seating the frame. Fasten in sequence as you go. Do not fasten angle at corners first, it can cause seating problems.



10. It is essential that the frame angle is fastened to the duct within ¾" of the end of the angle at each corner.

    When the table below requires a second screw at each corner it must be placed within 2"-3" of the end of the WDCI angle.

WDCI angle may be fastened to the duct with self drilling screws or spotwelds.

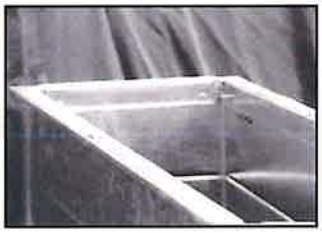
Spot welding is recommended, especially on ductwork where static pressure is above 3" and the leakage is specified to be less than 1%.

Due to their superior strength, spotwelds may be substituted for screws in the table below. Table also shows minimum fastening requirements. Job conditions (handling, etc.) may require additional fastening.

Fasten at intervals as in table below:

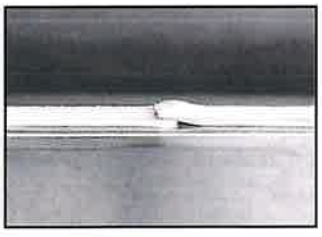
Duct Wall Size	0-4" W.G.	6" W.G.
0-24"	1 screw each corner	1 screw each corner
25"-48"	1 screw each corner	2 screws each corner
49" and over	1 screw each corner plus 1 screw each 24"	2 screws each corner plus 1 screw each 24"

Applying Ductmate 440 Gasket Tape

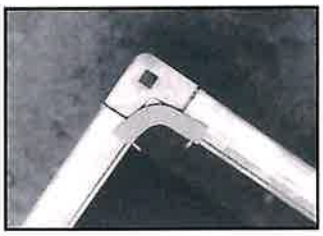


11. Start approximately in the middle of one side, place a single strip of gasket tape completely around the inside edge of the angle frame. At the corners, the gasket must cover the exposed edge of the duct section and the gap between the duct wall and the WDCI corners.

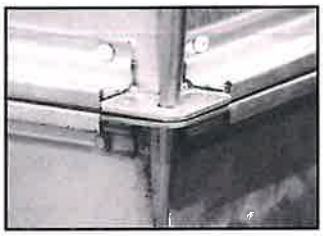
12. Position 440 Gasket in an arc so that is covers the three points in the duct corner. Gasket must cover all three points. Some gasket will protrude into the airstream. Press firmly into contact with the raw edge of the duct corner and WDCI corner assembly. In steps 11, 12, 13, and 14 Ductmate 440 is the preferred gasket. Ductmate Neoprene Gasket may be used where a section must be disassembled.



13. Apply 440 gasket completely around WDCI frame to the beginning point. Where the gasket meets overlay about ⅜".



14. On the mating WDCI frame apply 440 gasket only to the corners as in photo (approximately 3" per corner). The same 3 point application requirements apply as in photo 12.



15. Carefully align mating frames before they touch. Ductmate 440 adheres on contact. A drift pin can be used to correct any misalignment.

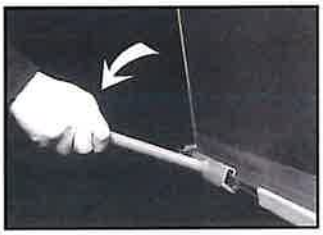
Completing WDCI Connection

16. Insert ⅜" x 1" nut and bolt for WDCI J Connection System.

    Insert a ¼" x 1" nut and bolt for WDCI H Connection Systems.

    It is not necessary to over torque the nuts and bolts.

Cleat Installation



With DM440 Gasket
For all low, medium and high pressure applications, use 6" cleat 24" O.C.

With Neoprene Gasket
For ½" - 2" WG/SP use 6" cleat, 24" O.C.

For 3" - 4" WG/SP use 6" cleat, 18" O.C.

For 6" - 10" WG/SP use 6" cleat, 12" O.C.

17. WDCI cleat can be snapped-on with the Cleater I Tool or with the Cleater II where space is restricted.

    Insert cleat in tool, hook onto mated frames near corner, apply pressure to handle so the Cleater tool compresses frames and cleat snaps on. Work toward center of duct using the schedule at left.

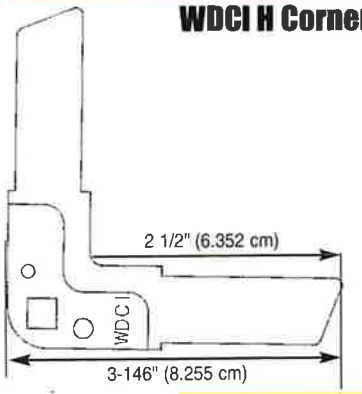
    For weather-proof duct connections, install full-length, one-piece cleat to top duct flange joint to prevent water from collecting on gasket.

    If corner cannot be bolted due to inaccessibility, cleat can be driven onto the mating flanges to complete the WDCI connection.

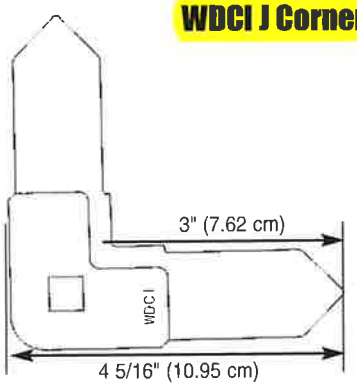
CLEATER I & II
Ideal tool to attache cleat to WDCI flange joint where space is not a consideration. Use Cleater II in conjunction with ⅝" deep-wall socket, extensions and wrench (not included) to attach cleat in hard to reach places.

DUCTMATE WDCI COMPONENTS

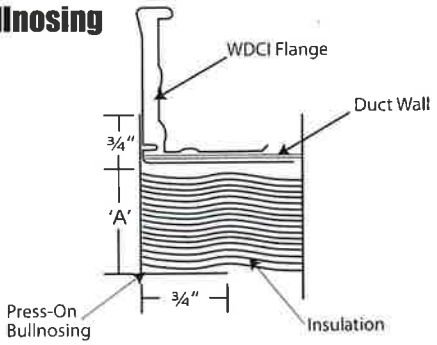
WDCI H Corner Piece



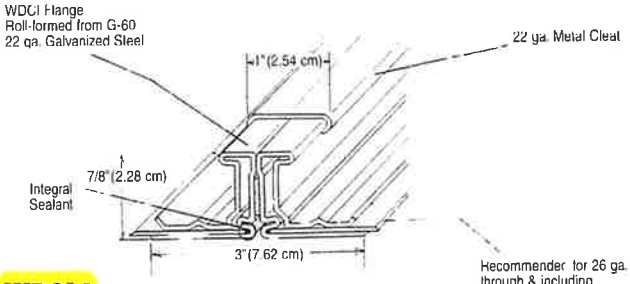
WDCI J Corner Piece



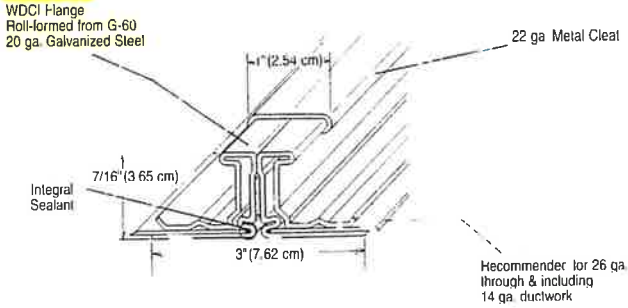
Press-On Bullnosing



WDCI H

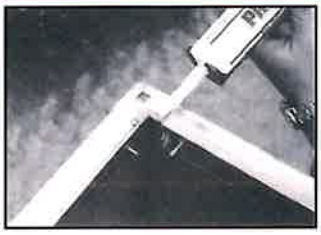


WDCI J

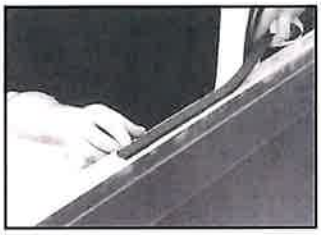


ADDITIONAL INSTRUCTION FOR APPLICATION REQUIRING NEOPRENE GASKET

When using Neoprene gasket with WDCI J & H connection system, sealant is required in the corners. Unlike the Butyl gasket the Neoprene gasket alone is unable to properly seal the corners. It is necessary to apply a small amount of duct sealant (preferably sealant from a tube) in all eight corners to form a flawless connection. Ideally the sealant should be allowed to cure before the gasketing is applied. However, if reasonable care is taken, the gasket may be applied before the sealant is cured. When applying the gasket, care must still be taken at the corners. As with the 440 Butyl gasket, the three points at the corners should be covered. The joint is then completed in the standard manner. This sealing technique is especially useful when making connections at fire dampers where the Neoprene must be used.

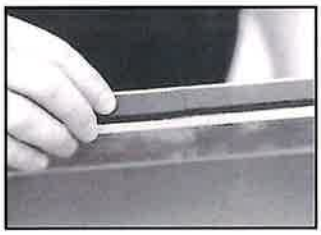


1. Apply a liberal amount of PROseal sealant in each of the eight corners. The sealant must cover the three points in the duct corner.



2. Start applying Ductmate Neoprene gasket about halfway between corners. Position gasket in center of WDCI angle as in photo.

3. Position Neoprene gasket in an arc so that it covers the three points in the duct corner. Gasket must cover all three points.



4. Apply Neoprene gasket completely around WDCI frame to the beginning point. Butt the two ends of the gasket up against each other. Do not overlap the two ends.

Frequently a contractor installing a high velocity duct system will employ a duct joint which either he or his work force have no experience. In such a case, it is strongly recommended that the contractor promptly test the initial 100 to 300 feet of duct before installing any more duct. This test will quickly reveal whether or not the workmen can make this joint ait-tight in an economical manner.

Reprinted from SMACNA High Pressure Manual

LIMITED PRODUCT WARRANTY

Ductmate warrants that WDCI J and H Connection Systems, when properly installed and maintained, will be free from defects in material and workmanship, and will comply with all written specifications made by Ductmate at the time of sale. Ductmate's warranty shall run for a period of one year from the date of manufacture.

Warranty Limitation

The warranty stated above is in lieu of all other warranties, express or implied, including but not limited to the implied warranties of MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. Although Ductmate may have suggested the product, or provided written or oral advice to the Purchaser, it is the Purchaser's responsibility to test and determine the suitability of WDCI J and H Connection Systems, for the intended use and purpose, and Purchaser and/or its customer assumes all risk and liability whatsoever regarding such suitability.

Limitation of Liability

In the event of a breach of the above warranty, Ductmate's sole obligation, and Purchaser's sole and exclusive remedy, shall be, at Ductmate's option, repair or replacement of any defective products, or refund of an applicable portion of the purchase price. Ductmate shall have no liability for costs of removal or reinstallation of the product. The Purchaser agrees that no other remedy, including but not limited to loss of profits, loss sales, injury to person or property, or any other special, incidental or consequential damages, shall be available to the Purchaser for any claim arising out of this Agreement, regardless of whether such claim is made in contract or in tort, including strict liability in tort. In no event will Ductmate be obligated to pay damages to the Purchaser in any amount exceeding the purchase price that the Purchaser paid to Ductmate for the allegedly defective product.

DUCTMATE Industries, Inc.

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210 Fifth Street
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1-800-245-3188 • www.ductmate.com

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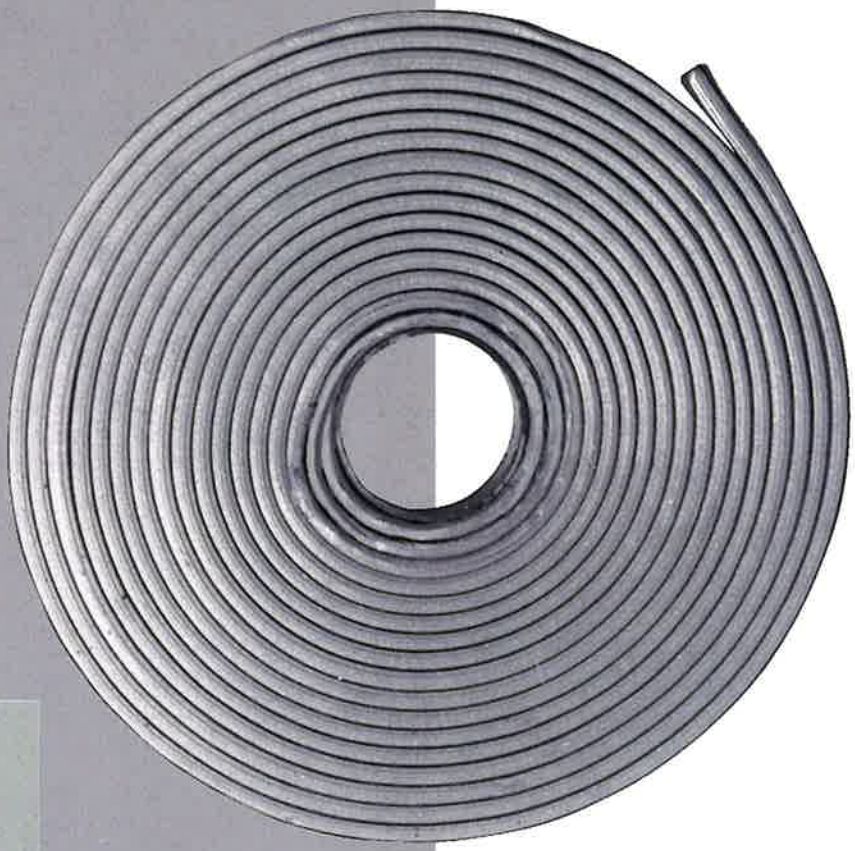
SMACNA SPIDA

D U C T M A T E

Sticky Tape



Industrial Grade Sealing Tape

Ideal for Rectangular Connections

- Wide range of application temperatures
- Works under extreme conditions
- Non-hardening
- Strong adhesion to most dry metal surfaces

DUCTMATE® Industries, Inc.

Sticky Tape

Industrial Grade Sealing Tape

DESCRIPTION

This product is an industrial grade tape developed for the metal ducting industry for use as a sealant, moisture and dust barrier. It is non-hardening and has excellent adhesion to most dry metal surfaces.

BASIC USE

To be used for TDC and TDF connections, where a low cost gasket is preferred.

PACKAGING INFORMATION

This product is made from butyl and proprietary copolymers. The plasticizers are of the Polyisobutylene and Polybutene type and permit no oxidation or migration. The fillers are inert and are primarily used as extenders and process aids and, to a lesser extent, as reinforcing pigments. The remaining materials are antioxidants and organic processing aids.

3/16"x5/8"x25' per roll. Other sizes available upon request

Mineral Spirits will readily facilitate the cleaning of tools and equipment.

LIMITED PRODUCT WARRANTY

Ductmate warrants that Sticky Tape, when properly installed and maintained, will be free from defects in material and workmanship, and will comply with all written specifications made by Ductmate at the time of sale. Ductmate's warranty shall run for a period of one year from the date of manufacture.

Warranty Limitation
The warranty stated above is in lieu of all other warranties, express or implied, including but not limited to the implied warranties of MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. Although Ductmate may have suggested the product, or provided written or oral advice to the Purchaser, it is the Purchaser's responsibility to test and determine the suitability of Sticky Tape, or the intended use and purpose, and Purchaser and/or its customer assumes all risk and liability whatsoever regarding such suitability.

Limitation of Liability
In the event of a breach of the above warranty, Ductmate's sole obligation, and Purchaser's sole and exclusive remedy, shall be, at Ductmate's option, repair or replacement of any defective products, or refund of an applicable portion of the purchase price. Ductmate shall have no liability for costs of removal or reinstallation of the product. The Purchaser agrees that no other remedy, including but not limited to loss of profits, loss sales, injury to person or property, or any other special, incidental or consequential damages, shall be available to the Purchaser for any claim arising out of this Agreement, regardless of whether such claim is made in contract or in tort, including strict liability in tort. In no event will Ductmate be obligated to pay damages to the Purchaser in any amount exceeding the purchase price that the Purchaser paid to Ductmate for the allegedly defective product.

TECHNICAL INFORMATION

% SOLIDS:	99.6 ± 0.2%
COLOR:	Off White
SPECIFIC GRAVITY:	1.75 ± 0.05 (ASTM C771)
DENSITY:	14.6 lbs/gal (ASTM C771-03)
SHELF & SERVICE LIFE:	20 years minimum
HARDNESS:	77°F 10 mm - 11.5 mm (ASTM D217)
PLASTICIZER MIGRATION:	No bleed/contact stain
STAINING:	No bleed/contact stain
FLEXIBILITY:	Passes, no cracking or loss of adhesion (ASTM C765)
WATER RESISTANCE:	Vacuum .75% max Static 0%
ELONGATION:	≥ 400% (DM1200)
ELONGATION AFTER AGING:	≥ 200% (DM1200a)
PEEL ADHESION:	≥ 1.6 PLI on Galvanized Steel (ASTM C 794-mod.)
AGING CHARACTERISTICS:	(Weather-O-Meter, 1,000 hrs.) 10% reduction in most physicals QUV Cabinet 10% reduction in most physicals
SLUMP RESISTANCE:	≤ 1" (DM1100) (300°F, 24 hrs.)
COMPRESSIBILITY:	≤ 33 lbF - peak force (ASTM C907-mod.) (75°F, 50%H)
TACK STRENGTH:	< 1" (ASTM D3121) (Ambient)
SERVICE TEMPERATURE:	-40°F to +190°F -40°C to + 88°C
APPLICATION TEMPERATURE:	Above 40°F
MANUFACTURING TOLERANCES:	Tape Width ± 1/16 Inch Tape Height ± 1/32 Inch
SPECIFICATION COMPLIANCE:	
U.S.D.A. ACCEPTABILITY:	Product chemically acceptable to the U.S. Department of Agriculture for use in meat and poultry processing areas under Federal inspection.
F.D.A. REQUIREMENTS:	Meets Requirement 21CFR175.105

DUCTMATE Industries, Inc.

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SMACNA SPIDA

DUCTMATE® Industries, Inc.

MATERIAL SAFETY DATA SHEET
PARR 7208

Revision Date: August 8, 2014

SECTION 1: COMPANY AND PRODUCT IDENTIFICATION

COMPANY INFORMATION:
Ductmate Industries Inc
210 Fifth Street
Charleroi, PA 15022
Phone: 1-800-245-3188

Transport Emergency Phone Number (CHEMTREC): 1-800-424-9300

PRODUCT NUMBER:	PARR 7208
PRODUCT DESCRIPTION:	Commodity Gasket Tape

SECTION 2: COMPOSITION/INFORMATION ON INGREDIENTS

Based on data available to Edge Adhesives, none of the components in this product are considered hazardous according to OSHA Hazard Communication Standard (29 CFR 1910. 1200). The composition of this compound is proprietary information. In the event of a medical emergency, detailed information will be provided to a nurse or physician.

SECTION 3: HAZARD(S) IDENTIFICATION

EMERGENCY OVERVIEW:

HMIS RATING: HEALTH – 0 FLAMMABILITY – 1 REACTIVITY – 0

See SECTION 8: EXPOSURE CONTROLS/PERSONAL PROTECTION for personal protective equipment recommendations.

POTENTIAL HEALTH EFFECTS BY ROUTE OF ENTRY:

EYE: No irritation hazard in normal industrial use.

SKIN: No irritation hazard in normal industrial use.

INHALATION: No irritation hazard in normal industrial use. Inhalation of dusts produced during cutting, grinding or sanding of this product may cause irritation of the respiratory tract. Prolonged exposure may lead to inflammation and ulceration.

INGESTION: Ingestion is not an anticipated route of exposure.

LONG-TERM (CHRONIC) HEALTH EFFECTS
TARGET ORGAN(S): No organs known to be damaged from exposure to this product.

REGULATED CARCINOGEN STATUS:
Unless noted below, this product does not contain regulated levels of NTP, IARC, ACGIH, or OSHA listed carcinogens.
EXISTING HEALTH CONDITIONS AFFECTED BY EXPOSURE: No medical conditions affected by exposure.

SECTION 4: FIRST AID MEASURES

IF IN EYES: This product is an inert solid. Remove the substance from the eye(s), and immediately flush eye(s) with plenty of water while retracting eyelids often. If inflammation or blurred vision develops, seek medical attention and provide the medical care professional with this MSDS.

IF ON SKIN: Wash with soap and water.

IF VAPORS INHALED: Not an anticipated route of exposure. This product is an inert solid. If dusts are produced by cutting or sanding this product, please consider improving work site ventilation.

IF SWALLOWED: No hazard in normal industrial use. Do not induce vomiting. Seek medical attention if symptoms develop. Provide medical care provider with this MSDS.

SECTION 5: FIRE FIGHTING MEASURES

FLASH POINT:	Not applicable
AUTOIGNITION TEMPERATURE:	Not established
LOWER EXPLOSIVE LIMIT (% in air):	Not established
UPPER EXPLOSIVE LIMIT (% in air):	Not established
EXTINGUISHING MEDIA:	Use water spray, foam, dry chemical or carbon dioxide.
UNUSUAL FIRE AND EXPLOSION HAZARDS:	Material will burn in a fire.
SPECIAL FIRE FIGHTING INSTRUCTIONS:	Persons exposed to products of combustion should wear self-contained breathing apparatus and full protective equipment.
HAZARDOUS COMBUSTION PRODUCTS:	Carbon dioxide, Carbon monoxide, Bromine containing gases

SECTION 6: ACCIDENTAL RELEASE MEASURES

SPECIAL PROTECTION:	No adverse health effects expected from the clean-up of spilled material. Follow personal protective equipment recommendations found in Section 8 of this MSDS.

Transport Emergency Phone Number (CHEMTREC): 1-800-424-9300

SECTION 7: HANDLING AND STORAGE

Handling: No special handling instructions due to toxicity.
Storage: Store in a cool, dry place.

Consult the Technical Data Sheet for specific storage instructions.

SECTION 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

EYE PROTECTION: Wear goggles when handling this product.

SKIN PROTECTION: Protect skin accordingly if working in environments with elevated temperatures.

GLOVES: Not normally required. Use nitrile gloves if conditions warrant.

RESPIRATORY PROTECTION: Not normally required.

VENTILATION: Use local exhaust ventilation to minimize exposure.

HYGIENIC PRACTICES: Wash hands before eating, smoking, or using the restroom.

EXPOSURE LIMITS: None applicable for this product when used for normal industrial applications. Avoid excessive and unnecessary exposure whenever possible. If deemed useful and essential for treatment, specific exposure limits of raw materials used during the manufacturing process will be provided to a nurse or physician.

SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL STATE:	Solid
COLOR:	Light Tan
ODOR:	Neutral
ODOR THRESHOLD:	Not established
SPECIFIC GRAVITY:	1.6 – 1.7
SOLIDS (% by weight):	100%
pH:	Not established
BOILING POINT (deg. C):	Not established
FREEZING/MELTING POINT (deg. C):	Not established
VAPOR PRESSURE (mm Hg):	Not established
VAPOR DENSITY:	Not established
EVAPORATION RATE:	Not established
OCTANOL/WATER COEFFICIENT:	Not established

SECTION 10: STABILITY AND REACTIVITY

STABILITY:	Stable under normal conditions
CHEMICAL INCOMPATIBILITY:	Not established
HAZARDOUS POLYMERIZATION:	Will not occur
HAZARDOUS DECOMPOSITION PRODUCTS:	Carbon monoxide, carbon dioxide, Bromine containing gases

SECTION 11: TOXICOLOGICAL INFORMATION

CHEMICAL NAME	LD50/LC50
Calcium carbonate	Oral LD50 Rat = 6450 mg/kg

TOXICOLOGY SUMMARY: No additional health information available.

SECTION 12: ECOLOGICAL INFORMATION

OVERVIEW: No ecological information available.

SECTION 13: DISPOSAL CONSIDERATIONS

To the best of our knowledge, this product does not meet the definition of hazardous waste under the U.S. EPA Hazardous Waste Regulations 40 CFR 261. Dispose of in accordance with federal, state, and local law. Consult your state, local or provincial authorities and your local waste vendor for more restrictive requirements.

SECTION 14: TRANSPORTATION INFORMATION

Consult Bill of Lading for transportation information.

SECTION 15: REGULATORY INFORMATION

INVENTORY STATUS:

U.S. EPA TSCA: This product is in compliance with the Toxic Substances Control Act's Inventory requirements.

If you need more information about the inventory status of this product, call 651-236-5858.

This product may contain chemical substances that are regulated for export by various government agencies (such as the Environmental Protection Agency, the Bureau of Industry and Security, or the Drug Enforcement Administration, among others).

FEDERAL REPORTING:
EPA SARA Title III Section 313

Unless listed below, this product does not contain toxic chemical(s) subject to the reporting requirements of section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA) and 40 CFR part 72. EPA has advised that when a percentage range is listed the midpoint may be used to fulfill reporting obligations.

Chemical Name	CAS#	%
None Applicable		
None Applicable		
None Applicable		

CANADIAN WHMIS STATUS: To the best of our knowledge, this material is classified as a NON-CONTROLLED PRODUCT.

SECTION 16: ADDITIONAL INFORMATION

This Material Safety Data Sheet is prepared to comply with the United States Occupational Safety and Health Administration (OSHA) Hazard Communication Standard (29 CFR 1910.1200).

Prepared by: Ductmate Industries Inc
Phone: 1-800-245-3188

The information and recommendations set forth herein are believed to be accurate. Because some of the information is derived from information provided to Edge Adhesives from its suppliers, and because Edge Adhesives has no control over the conditions of handling and use, Edge Adhesives makes no warranty, expressed or implied, regarding the accuracy of the data or the results to be obtained from the use thereof. The information is supplied solely for your information and consideration, and Edge Adhesives assumes no responsibility for use or reliance thereon. It is the responsibility of the user of Edge Adhesives products to comply with all applicable federal, state and local laws and regulations.

IMC
FABRICATION

HARDCAST Products

1. VG-181 Duct Sealer

HARDCAST
DUCT SEALANTS & INSULATION ADHESIVES

Contributes to LEED® Credit Requirements

Versa-Grip™ 181

Premium Indoor/Outdoor Water Based Duct Sealant

PART NUMBERS

304141	1 Case w/ (25) 11 oz. Cartridges (White)
305056	1 Case w/ (25) 11 oz. Cartridges (Gray)
304138	1 Case w/ (4) 1-Gallon Pails (White)
305057	1 Case w/ (4) 1-Gallon Pails (Gray)
304139	1 - 2-Gallon Pail (White)
305058	1 - 2-Gallon Pail (Gray)

TECHNICAL DATA

Color	White & Gray
Consistency	Heavy textured
Base	Synthetic latex
Solvent	Water
Weight per Gallon	11.6 lbs.
Solids Content	73.4%
Viscosity	Thixotropic
Coverage (UL 181 A-M)	Apply 18 mil, scrim, addt. 18 mil. Approximately 130 lin. ft. per 11-fluid-oz tube, ⅛" bead (40 m per 325 L tube, 3.2 mm bead)
Coverage (UL 181 B-M)	Approximately 214 to 320 lin. ft. per gal. at 20 to 30 mil wet film thickness at 3" width
Shore A Hardness	>20
Flexibility	Passes ¼ inch mandrel bend
Time to Test	48 hours*
Service Temperature	-20°F to 200°F (-28.8°C to 93.3°C)
Mildew Resistance	Mold & Mildew resistant
VOC	Exempt: 0 g/l Non-Exempt: 38 g/l (less water)
Surface Burning	Flame Spread - 0, Smoke Developed - 0 (When tested in accordance with ASTM E84, UL 723)
Pressure Classes	SMACNA ½ , 1, 2, 3, 4, 6 and 10 inches w.g.
Seal Class	Meets Seal Class A
Packaging	11 oz. cart.; 1 & 2 gal. pails
Freeze/Thaw Stability	Passed 5 Cycles

*May vary according to temperature and humidity

PRECAUTIONS

Surface must be clean and free of moisture, contamination and foreign matter. Do not allow this product to freeze. Apply when temperatures will not fall below freezing for at least 36-48 hours, depending on temperature and humidity. Do not apply this product where temperatures will exceed 200°F. Keep out of the reach of children. Review MSDS for complete safety information prior to use. DO NOT use where acidic or alkaline chemicals are present (ie., lab fume hood, vents, etc.)

For Industrial Professional Use Only.

UL LISTED

Underwriters Laboratories Inc.®
LISTED
17NF
UL 181A-M
FOR USE WITH U.L. LISTED RIGID FIBERGLASS AIR DUCTS OR CONNECTORS.
UL 181B-M
FOR USE WITH U.L. LISTED FLEXIBLE AIR DUCTS OR CONNECTORS

Versa-Grip 181 is a premium grade, versatile, all purpose duct sealant for use on all types of metal duct, fiberglass duct board, duct fabric, and flex duct. Versa-Grip incorporates a built-in fiber reinforcement for exceptional strength, with UV inhibitors for outdoor use. UL 181A-M listed / UL 181B-M listed.

APPLICATION

Temperature	35°F to 110°F (1.7°C to 44°C)
Method	Brush, putty knife, caulk gun
Preparation	Surface must be dry, dirt, oil, and grease free.
Rate (UL 181 A-M)	Apply 18 mil, scrim and 18 mil over scrim.
Rate (UL 181 B-M)	Approx. 214 to 320 lin. ft. per gal. at 20 to 30 mil wet film thickness at 3" width.
Clean Up Wet	Soap and water
Clean Up Dry	UN-TACK™ or Solvent (Use safe handling practices.)
Painting	Only latex or epoxy paints
Ductboard	Scrim required for UL 181A-M

STORAGE

Temperature	35°F to 110°F (1.7°C to 44°C) DO NOT FREEZE
Shelf Life	One year (unopened)
Flammability	Non-flammable

SPECIFICATION/STANDARDS COMPLIANCE

Property	Method	Results
Freeze Thaw & Heat Cycling	ASTM C-731	Pass
Slump Test	ASTM D-2202	Pass
VOC Limitation	SCAQMD Rule 1168	Pass
Extractant Testing	NSF	Pass
Compounds for use in Construction of Federally Inspected Meat & Poultry Plants	FSIS	Pass
Acceptable Indoor Air Concentrations	Michigan Department of Quality Criteria (Part 201/213)	Pass
	US EPA	Pass
	NSF/AWSI Standard 61	Pass
	USDA	Pass
	FDA	Pass
	City of Los Angeles Approval RR#8427	Pass

USDA, EPA & FDA APPROVED

CARLISLE HVAC PRODUCTS

USA: 900 Hensley Lane, Wylie, TX 75098 • (877) 495-4822
Canada: 2100 Remembrance Road, Lachine, QC H8S 1X3 • (800) 544-5535
www.carlislehvac.com

Section 1 - PRODUCT AND COMPANY IDENTIFICATION

Material Name
VG 181 Gray

Synonyms
Sealant

Chemical Family
Water based mastic

Product Use
Duct sealant

Restrictions on Use
For industrial use only.

Manufacturer Information

Carlisle HVAC Products
900 Hensley Lane
Wylie, TX 75098
www.carlislehvac.com

Medical Emergency:
CHEMTREC (USA): (800) 424-9300

MSDS Assistance – 972-442-6545
Technical Assistance – 888-229-2199
Customer Service – 888-229-0199Service – 888-229-0199

Section 2 - HAZARDS IDENTIFICATION

Classification in accordance with paragraph (d) of 29 CFR 1910.1200.
Reproductive Toxicity - Category 1B
Specific Target Organ Toxicity - Single Exposure - Category 1 (body, central nervous system, systemic toxicity, eyes)
Specific Target Organ Toxicity - Repeated Exposure - Category 1 (eyes,central nervous system)

GHS Label Elements

Symbol(s)

Signal Word
Danger

Hazard Statement(s)
May damage fertility or the unborn child
Causes damage to organs
Causes damage to organs through prolonged or repeated exposure

Precautionary Statement(s)

Prevention
Obtain special instructions before use
Do not handle until all safety precautions have been read and understood
Wear protective gloves/protective clothing/eye protection/face protection
Do not breathe dust/fume/gas/mist/vapours/spray
Wash thoroughly after handling
Do not eat, drink or smoke when using this product

Response
If exposed: Call a POISON CENTER or doctor/physician
Get medical advice/attention if you feel unwell
Specific treatment (see label)

Storage
Store locked up

Disposal
Dispose of contents/container in accordance with local/regional/national/international regulations

Other Hazards
No additional information available.

Section 3 - COMPOSITION / INFORMATION ON INGREDIENTS

CAS	Component Name	Percent
Trade Secret	De-foaming agent	0.1-1
Trade Secret	Nonylphenol polyethylene glycol ether	0.1-1
Mixture	Polymer, ethyl acrylate and methacrylic acid	0.1-1
Mixture	Acrylic polymer	0.1-1
Mixture	Polycarboxylate salt	0.1-1
107-21-1	Ethylene glycol	0.1-1
Mixture	Fuller's earth	0.1-1
1317-65-3	Limestone	15-40

67-56-1	Methanol	1-5
Mixture	4,4-Dimethyloxazolidine	0.1-1
7664-41-7	Ammonia	0.1-1
Trade Secret	Aluminium trihydroxide	10-30
Trade Secret	Polyester fibers	0.1-1

Section 4 - FIRST AID MEASURES

Description of Necessary Measures
If exposed or concerned: Call a POISON CENTER or doctor/physician.

Inhalation
Remove person to fresh air and keep comfortable for breathing. Get medical attention, if needed.

Skin
Wash exposed skin with soap and water. Remove contaminated clothing and wash it before reuse. If skin irritation occurs, get medical advice/attention.

Eyes
Flush eyes with plenty of water for 15 minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists, get medical advice/attention.

Ingestion
Do NOT induce vomiting. If swallowed, get medical attention.

Indication of any immediate medical attention and special treatment needed
Treat symptomatically and supportively.

Most Important Symptoms/Effects

Acute
Causes damage to central nervous system, body, eyes, systemic toxicity.

Delayed
May damage fertility or the unborn child. Causes damage to organs through prolonged or repeated exposure: eyes, central nervous system.

Note to Physicians
Contains. ethylene glycol, methanol

Section 5 - FIRE FIGHTING MEASURES

Extinguishing Media

Suitable Extinguishing Media
Use dry chemical, carbon dioxide, alcohol-resistant foam or water spray.

Unsuitable Extinguishing Media
None reported.

Special Hazards Arising from the Chemical
Slight fire hazard. Sealed containers may rupture or explode if exposed to heat.

Hazardous Combustion Products
Oxides of carbon, oxides of nitrogen, hydrocarbons

Advice for firefighters
Wear full protective fire fighting gear including self contained breathing apparatus (SCBA) for protection against possible exposure. Do not inhale any material or combustion by-products.

Fire Fighting Measures
Remove product from area of fire. Stay upwind and keep out of low areas.

Section 6 - ACCIDENTAL RELEASE MEASURES

Personal Precautions, Protective Equipment and Emergency Procedures
Wear personal protective clothing and equipment, see Section 8.

Methods and Materials for Containment and Cleaning Up
Absorb with earth, sand or other non-combustible material and transfer to container. Dike for later disposal. Dispose in accordance with all applicable regulations.

Environmental Precautions
Avoid release to the environment.

Section 7 - HANDLING AND STORAGE

Precautions for Safe Handling
This product contains crystalline silica, which is a known carcinogen: Do not grind or sand. Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Wear protective gloves/protective clothing/eye protection/face protection. Do not breathe dust/fume/gas/mist/vapors/spray. Avoid contact with eyes, skin and clothing. Wash thoroughly after handling. Do not eat, drink or smoke when using this product. Wash contaminated clothing before reuse. KEEP OUT OF REACH OF CHILDREN.

Conditions for Safe Storage, Including any Incompatibilities
Store locked up
Store in a well-ventilated place. Store above 0 C. Store below 45 C. When not in use, keep containers tightly closed. Do not cut, puncture, or weld on or near this container. Keep away from incompatible materials.

Incompatible Materials
Strong acids, strong oxidizing agents

Section 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION

Component Exposure Limits

Ethylene glycol	107-21-1	
ACGIH:	100 mg/m3 Ceiling aerosol only	
Europe:	20 ppm TWA; 52 mg/m3 TWA	40 ppm STEL; 104 mg/m3 STEL
	Possibility of significant uptake through the skin	
Mexico:	100 mg/m3 Ceiling aerosol	
Silica, crystalline	14808-60-7	
ACGIH:	0.025 mg/m3 TWA respirable fraction	
NIOSH:	0.05 mg/m3 TWA respirable dust	50 mg/m3 IDLH respirable dust
OSHA (US):	((30)/(%SiO2 + 2) mg/m3 TWA) total dust; ((250)/(%SiO2 + 5) mppcf TWA) respirable fraction; ((10)/(%SiO2 + 2) mg/m3 TWA) respirable fraction	
Mexico:	0.1 mg/m3 TWA LMPE-PPT respirable fraction	
Limestone	1317-65-3	
NIOSH:	10 mg/m3 TWA total dust; 5 mg/m3 TWA respirable dust	
OSHA (US):	15 mg/m3 TWA total dust; 5 mg/m3 TWA respirable fraction	
Mexico:	10 mg/m3 TWA LMPE-PPT	20 mg/m3 STEL [LMPE-CT]
Methanol	67-56-1	
ACGIH:	200 ppm TWA	250 ppm STEL
	Skin - potential significant contribution to overall exposure by the cutaneous route	
NIOSH:	200 ppm TWA; 260 mg/m3 TWA	250 ppm STEL; 325 mg/m3 STEL
	Potential for dermal absorption	
	6000 ppm IDLH	
Europe:	200 ppm TWA; 260 mg/m3 TWA	

	Possibility of significant uptake through the skin	
OSHA (US):	200 ppm TWA; 260 mg/m3 TWA	
Mexico:	200 ppm TWA LMPE-PPT; 260 mg/m3 TWA LMPE-PPT	
	250 ppm STEL [LMPE-CT]; 310 mg/m3 STEL [LMPE-CT]	
	Skin - potential for cutaneous absorption	
Ammonia	7664-41-7	
ACGIH:	25 ppm TWA	35 ppm STEL
NIOSH:	25 ppm TWA; 18 mg/m3 TWA	35 ppm STEL; 27 mg/m3 STEL
	300 ppm IDLH	
Europe:	20 ppm TWA; 14 mg/m3 TWA	50 ppm STEL; 36 mg/m3 STEL
OSHA (US):	50 ppm TWA; 35 mg/m3 TWA	
Mexico:	25 ppm TWA LMPE-PPT; 18 mg/m3 TWA LMPE-PPT	
	35 ppm STEL [LMPE-CT]; 27 mg/m3 STEL [LMPE-CT]	

Biological limit value
There are no biological limit values for any of this product's components.

Engineering Controls
Provide adequate ventilation. Ensure compliance with applicable exposure limits.

Individual Protection Measures, such as Personal Protective Equipment

Eye/face protection
Wear splash resistant safety goggles with a faceshield. Provide an emergency eye wash fountain and quick drench shower in the immediate work area.

Skin Protection
Wear appropriate work clothing.

Respiratory Protection
A NIOSH approved air-purifying respirator with an appropriate cartridge or canister may be appropriate under certain circumstances where airborne concentrations are expected to exceed exposure limits.

Glove Recommendations
Wear protective gloves. Recommended material: Hycron(R), neoprene, nitrile.

Section 9 - PHYSICAL AND CHEMICAL PROPERTIES

Appearance	thick gray paste	**Physical State**	solid
Odor	Slight,ammonia	**Color**	gray
Odor Threshold	Not available	**pH**	8 - 9
Melting Point	Not available	**Boiling Point**	212 °F
Freezing point	Not available	**Evaporation Rate**	24 - 28 % volatile
Boiling Point Range	Not available	**Flammability (solid, gas)**	Not available
Autoignition	Not available	**Flash Point**	Not available
Lower Explosive Limit	Not available	**Decomposition**	Not available
Upper Explosive Limit	Not available	**Vapor Pressure**	17 mmHg (@ 20 °C)
Vapor Density (air=1)	<1	**Specific Gravity (water=1)**	Not available
Water Solubility	soluble	**Partition coefficient: n-octanol/water**	Not available
Viscosity	thixotropic (@ 77 °F)	**Solubility (Other)**	Not available
Density	1.39 (relative)	**VOC**	38 g/L (SCAQMD calculation method)

Other Information
No additional information available.

Section 10 - STABILITY AND REACTIVITY

Reactivity
No reactivity hazard is expected.

Chemical Stability
Stable under normal conditions of use.

Possibility of Hazardous Reactions
Hazardous polymerization will not occur.

Conditions to Avoid
Avoid heat, flames, sparks and other sources of ignition. Avoid contact with incompatible materials.

Incompatible Materials
strong acids, strong oxidizing agents

Hazardous decomposition products
Oxides of carbon, oxides of nitrogen, hydrocarbons

Section 11 - TOXICOLOGICAL INFORMATION

Information on Likely Routes of Exposure

Inhalation
May cause adverse effects on the central nervous system.

Skin Contact
May cause mild skin irritation.

Eye Contact
May cause mild eye irritation.

Ingestion
Methanol can produce blindness with onset of symptoms being delayed for 18-24 hours.

Acute and Chronic Toxicity

Component Analysis - LD50/LC50
The components of this material have been reviewed in various sources and the following selected endpoints are published:
Ethylene-vinyl acetate copolymer (Trade Secret)
Oral LD50 Rat >2000 mg/kg

Epoxidized soybean oil (Trade Secret)
Oral LD50 Rat >5000 mg/kg
Dermal LD50 Rabbit >20 mL/kg

De-foaming agent (Trade Secret)
Oral LD50 >2000 mg/kg

Nonylphenol polyethylene glycol ether (Trade Secret)
Oral LD50 Rat 2780 mg/kg
Chlorinated paraffins (Trade Secret)
Oral LD50 Rat >4000 mg/kg

Polymer, ethyl acrylate and methacrylic acid (Mixture)
Oral LD50 Rat >5000 mg/kg
Dermal LD50 Rabbit >5000 mg/kg

Acrylic polymer (Mixture)
Oral LD50 Rat >5000 mg/kg
Dermal LD50 Rabbit >5000 mg/kg

Polycarboxylate salt (Mixture)
Oral LD50 Rat >5000 mg/kg
Dermal LD50 Rabbit >2000 mg/kg

Ethylene glycol (107-21-1)
Oral LD50 Rat 4700 mg/kg
Dermal LD50 Rat 10600 mg/kg
Inhalation LC50 Rat >200 mg/m3 vapor 4 hr

Silica, crystalline (14808-60-7)
Oral LD50 Rat 500 mg/kg

Limestone (1317-65-3)
Oral LD50 Rat 6450 mg/kg

Methanol (67-56-1)
Oral LD50 Rat 6200 mg/kg
Inhalation LC50 Rat 22500 ppm 8 h

4,4-Dimethyloxazolidine (Mixture)
Oral LD50 Rat 1037 mg/kg
Dermal LD50 Rabbit >2000 mg/kg
Inhalation LC50 Rat 1.1 mg/L 4 hr

Ammonia (7664-41-7)
Oral LD50 Rat 350 mg/kg
Inhalation LC50 Rat 2000 ppm 4 hr

Aluminium trihydroxide (Trade Secret)
Oral LD50 Rat >5000 mg/kg

Immediate Effects
Causes damage to central nervous system, body, eyes, systemic toxicity.

Delayed Effects
May damage fertility or the unborn child. Causes damage to organs through prolonged or repeated exposure: eyes, central nervous system.

Irritation/Corrosivity Data
May cause mild skin irritation. May cause mild eye irritation.

Respiratory Sensitization
No data available.

Dermal Sensitization
No data available.

Component Carcinogenicity

Chlorinated paraffins	Trade Secret

IARC:	Monograph 48 [1990] (Group 2B (possibly carcinogenic to humans))
DFG:	Category 3B (could be carcinogenic for man)
OSHA:	Present
Ethylene glycol	107-21-1
ACGIH:	A4 - Not Classifiable as a Human Carcinogen
Silica, crystalline	14808-60-7
ACGIH:	A2 - Suspected Human Carcinogen
IARC:	Monograph 100C [2012]; Monograph 68 [1997] (Group 1 (carcinogenic to humans))
NTP:	Known Human Carcinogen (respirable size)
DFG:	Category 1 (causes cancer in man, alveola fraction)
OSHA:	Present (respirable size)

Germ Cell Mutagenicity
No data available.

Reproductive Toxicity
May damage fertility or the unborn child.

Specific Target Organ Toxicity - Single Exposure
central nervous system, body, systemic toxicity, eyes

Specific Target Organ Toxicity - Repeated Exposure
central nervous system, eyes

Aspiration hazard
No data available.

Medical Conditions Aggravated by Exposure
No data available.

Additional Data
No additional information available.

Section 12 - ECOLOGICAL INFORMATION

Ecotoxicity
Avoid release to the environment.

Component Analysis - Aquatic Toxicity

Ethylene-vinyl acetate copolymer	Trade Secret
Fish:	LC50 96 hr Cyprinus carpio >1000 mg/kg
Epoxidized soybean oil	Trade Secret
Fish:	LC50 48 hr Fish 900 mg/L
Algae:	EC50 72 h Desmodesmus subspicatus 8 mg/L IUCLID
Invertebrate:	EC50 24 hr Daphnia >100 mg/L
Chlorinated paraffins	Trade Secret
Fish:	LC50 96 h Lepomis macrochirus >300 mg/L [static]; LC50 96 h Oncorhynchus mykiss >0.0109 mg/L [flow-through]; LC50 96 h Oncorhynchus mykiss 94.5 - 271 mg/L [static]; LC50 96 h Lepomis macrochirus >0.1 mg/L [flow-through]; LC50 96 h Pimephales promelas >100 mg/L [static]
Invertebrate:	EC50 48 hr Daphnia magna 0.0059 mg/L
Polymer, ethyl acrylate and methacrylic acid	Mixture
Fish:	LC50 96 hr Pimephales promelas >1000 mg/L
Invertebrate:	EC50 48 hr Daphnia magna >1000 mg/L
Ethylene glycol	107-21-1
Fish:	LC50 96 h Oncorhynchus mykiss 41000 mg/L; LC50 96 h Oncorhynchus mykiss 14 - 18 mL/L [static]; LC50 96 h Lepomis macrochirus 27540 mg/L [static]; LC50 96 h Oncorhynchus mykiss 40761 mg/L [static]; LC50 96 h Pimephales promelas 40000 - 60000 mg/L [static]; LC50 96 h Poecilia reticulata 16000 mg/L [static]
Algae:	EC50 96 h Pseudokirchneriella subcapitata 6500 - 13000 mg/L IUCLID

Invertebrate:	EC50 48 h Daphnia magna 46300 mg/L IUCLID
Methanol	67-56-1
Fish:	LC50 96 h Pimephales promelas 28200 mg/L [flow-through]; LC50 96 h Pimephales promelas >100 mg/L [static]; LC50 96 h Oncorhynchus mykiss 19500 - 20700 mg/L [flow-through]; LC50 96 h Oncorhynchus mykiss 18 - 20 mL/L [static]; LC50 96 h Lepomis macrochirus 13500 - 17600 mg/L [flow-through]
Ammonia	7664-41-7
Fish:	LC50 96 h Cyprinus carpio 0.44 mg/L; LC50 96 h Lepomis macrochirus 0.26 - 4.6 mg/L; LC50 96 h Lepomis macrochirus 1.17 mg/L [flow-through]; LC50 96 h Pimephales promelas 0.73 - 2.35 mg/L; LC50 96 h Pimephales promelas 5.9 mg/L [static]; LC50 96 h Poecilia reticulata >1.5 mg/L; LC50 96 h Poecilia reticulata 1.19 mg/L [static]
Invertebrate:	LC50 48 h Daphnia magna 25.4 mg/L IUCLID

Persistence and Degradability
No information available for the product.

Bioaccumulative Potential
No information available for the product.

Mobility
No information available for the product.

Other Toxicity
No additional information available.

Section 13 - DISPOSAL CONSIDERATIONS

Disposal Methods
Dispose of contents/container in accordance with local/regional/national/international regulations.

Section 14 - TRANSPORT INFORMATION

US DOT Information:
UN/NA #: Not regulated

IATA Information:
UN#: Not regulated

TDG Information:
UN#: Not regulated

Section 15 - REGULATORY INFORMATION

U.S. Federal Regulations
This material contains one or more of the following chemicals required to be identified under SARA Section 302 (40 CFR 355 Appendix A), SARA Section 313 (40 CFR 372.65), CERCLA (40 CFR 302.4), TSCA 12(b), and/or require an OSHA process safety plan.

Ethylene glycol	107-21-1
SARA 313:	1 % de minimis concentration
CERCLA:	5000 lb final RQ; 2270 kg final RQ
Methanol	67-56-1
SARA 313:	1 % de minimis concentration
CERCLA:	5000 lb final RQ; 2270 kg final RQ
Ammonia	7664-41-7
SARA 302:	500 lb TPQ
SARA 313:	1 % de minimis concentration (includes anhydrous Ammonia and aqueous Ammonia from water dissociable Ammonium salts and other sources, 10% of total aqueous Ammonia is reportable under this listing)
CERCLA:	100 lb final RQ; 45.4 kg final RQ
OSHA (safety):	10000 lb TQ anhydrous); 15000 lb TQ solution, >44% Ammonia by weight)
SARA 304:	100 lb EPCRA RQ

SARA Section 311/312 (40 CFR 370 Subparts B and C)
Acute Health: Yes **Chronic Health:** Yes **Fire:** No **Pressure:** No **Reactivity:** No

U.S. State Regulations

The following components appear on one or more of the following state hazardous substances lists:

Component	CAS	CA	MA	MN	NJ	PA
Chlorinated paraffins	Trade Secret	No	Yes	No	No	No
Ethylene glycol	107-21-1	Yes	Yes	Yes	Yes	Yes
Silica, crystalline	14808-60-7	No	Yes	Yes	Yes	Yes
Limestone	1317-65-3	No	Yes	Yes	Yes	Yes
Methanol	67-56-1	Yes	Yes	Yes	Yes	Yes
Ammonia	7664-41-7	Yes	Yes	Yes	Yes	Yes

The following statement(s) are provided under the California Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65):

WARNING! This product contains a chemical known to the state of California to cause cancer

WARNING! This product contains a chemical known to the state of California to cause reproductive/developmental effects

Silica, crystalline	14808-60-7
Carc:	carcinogen , initial date 10/1/88 (airborne particles of respirable size)
Methanol	67-56-1
Repro/Dev. Tox	Developmental toxicity , initial date 3/16/12

Canadian WHMIS Ingredient Disclosure List (IDL)

Components of this material have been checked against the Canadian WHMIS Ingredients Disclosure List. The List is composed of chemicals which must be identified on MSDSs if they are included in products which meet WHMIS criteria specified in the Controlled Products Regulations and are present above the threshold limits listed on the IDL

Ethylene glycol	107-21-1
	1 %
Silica, crystalline	14808-60-7
	1 %
Methanol	67-56-1
	1 %
Ammonia	7664-41-7
	1 %

Component Analysis - Inventory

Ethylene-vinyl acetate copolymer (Trade Secret)

US	CA	EU	AU	PH	JP - ENCS	JP - ISHL	KR - KECI/KECL	KR - TCCA	CN	NZ	MX
Yes	DSL	ELN	Yes	Yes	Yes	No	Yes	No	Yes	Yes	Yes

Epoxidized soybean oil (Trade Secret)

US	CA	EU	AU	PH	JP - ENCS	JP - ISHL	KR - KECI/KECL	KR - TCCA	CN	NZ	MX
Yes	DSL	EIN	Yes	Yes	No	No	Yes	No	Yes	Yes	Yes

Nonylphenol polyethylene glycol ether (Trade Secret)

US	CA	EU	AU	PH	JP - ENCS	JP - ISHL	KR - KECI/KECL	KR - TCCA	CN	NZ	MX
Yes	DSL	No	Yes	Yes	Yes	No	Yes	No	Yes	Yes	No

Chlorinated paraffins (Trade Secret)

US	CA	EU	AU	PH	JP - ENCS	JP - ISHL	KR - KECI/KECL	KR - TCCA	CN	NZ	MX
Yes	DSL	EIN	Yes	Yes	Yes	No	Yes	No	Yes	Yes	Yes

Polymer, ethyl acrylate and methacrylic acid (Mixture)

US	CA	EU	AU	PH	JP - ENCS	JP - ISHL	KR - KECI/KECL	KR - TCCA	CN	NZ	MX
Yes	DSL	No	Yes	Yes	Yes	No	Yes	No	Yes	Yes	Yes

Ethylene glycol (107-21-1)

US	CA	EU	AU	PH	JP - ENCS	JP - ISHL	KR - KECI/KECL	KR - TCCA	CN	NZ	MX
Yes	DSL	EIN	Yes	Yes	Yes	No	Yes	No	Yes	Yes	Yes

Fuller's earth (Mixture)

US	CA	EU	AU	PH	JP - ENCS	JP - ISHL	KR - KECI/KECL	KR - TCCA	CN	NZ	MX
Yes	DSL	No	Yes	Yes	No	No	Yes	No	Yes	Yes	Yes

Silica, crystalline (14808-60-7)

US	CA	EU	AU	PH	JP - ENCS	JP - ISHL	KR - KECI/KECL	KR - TCCA	CN	NZ	MX
Yes	DSL	EIN	Yes	Yes	Yes	No	Yes	No	Yes	Yes	Yes

Limestone (1317-65-3)

US	CA	EU	AU	PH	JP - ENCS	JP - ISHL	KR - KECI/KECL	KR - TCCA	CN	NZ	MX
Yes	NSL	EIN	Yes	Yes	Yes	No	Yes	No	Yes	Yes	Yes

Methanol (67-56-1)

US	CA	EU	AU	PH	JP - ENCS	JP - ISHL	KR - KECI/KECL	KR - TCCA	CN	NZ	MX
Yes	DSL	EIN	Yes	Yes	Yes	No	Yes	No	Yes	Yes	Yes

4,4-Dimethyloxazolidine (Mixture)

US	CA	EU	AU	PH	JP - ENCS	JP - ISHL	KR - KECI/KECL	KR - TCCA	CN	NZ	MX
Yes	DSL	EIN	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes

Ammonia (7664-41-7)

US	CA	EU	AU	PH	JP - ENCS	JP - ISHL	KR - KECI/KECL	KR - TCCA	CN	NZ	MX
Yes	DSL	EIN	Yes	Yes	Yes	No	Yes	No	Yes	Yes	Yes

Aluminium trihydroxide (Trade Secret)

US	CA	EU	AU	PH	JP - ENCS	JP - ISHL	KR - KECI/KECL	KR - TCCA	CN	NZ	MX
Yes	DSL	EIN	Yes	Yes	Yes	No	Yes	No	Yes	Yes	Yes

Section 16 - OTHER INFORMATION

HMIS Rating

Health: 1* Fire: 1 Reactivity: 0
Hazard Scale: 0 = Minimal 1 = Slight 2 = Moderate 3 = Serious 4 = Severe * = Chronic hazard

NFPA Ratings

Health: 1 Fire: 1 Reactivity: 0
Hazard Scale: 0 = Minimal 1 = Slight 2 = Moderate 3 = Serious 4 = Severe

Summary of Changes

New SDS: May 15, 2015

Key / Legend

ACGIH - American Conference of Governmental Industrial Hygienists; ADR - European Road Transport; AU - Australia; BOD - Biochemical Oxygen Demand; C - Celsius; CA - Canada; CAS - Chemical Abstracts Service; CERCLA - Comprehensive Environmental Response, Compensation, and Liability Act; CLP - Classification, Labelling, and Packaging; CN - China; CPR - Controlled Products Regulations; DFG - Deutsche Forschungsgemeinschaft; DOT - Department of Transportation; DSD - Dangerous Substance Directive; DSL - Domestic Substances List; EEC - European Economic Community; EINECS - European Inventory of Existing Commercial Chemical Substances; EPA - Environmental Protection Agency; EU - European Union; F - Fahrenheit; IARC - International Agency for Research on Cancer; IATA - International Air Transport Association; ICAO - International Civil Aviation Organization; IDL - Ingredient Disclosure List; IDLH - Immediately Dangerous to Life and Health; IMDG - International Maritime Dangerous Goods; JP - Japan; Kow - Octanol/water partition coefficient; KR - Korea; LEL - Lower Explosive Limit; LLV - Level Limit Value; LOLI - List Of LIsts™ - ChemADVISOR's Regulatory Database; MAK - Maximum Concentration Value in the Workplace; MEL - Maximum Exposure Limits; NFPA - National Fire Protection Agency; NIOSH - National Institute for Occupational Safety and Health; NJTSR - New Jersey Trade Secret Registry; NTP - National Toxicology Program; NZ - New Zealand; OSHA - Occupational Safety and Health Administration; PH - Philippines; RCRA - Resource Conservation and Recovery Act; REACH- Registration, Evaluation, Authorisation, and restriction of Chemicals; RID - European Rail Transport; SARA - Superfund Amendments and Reauthorization Act; STEL - Short-term Exposure Limit; TDG - Transportation of Dangerous Goods; TSCA - Toxic Substances Control Act; TWA - Time Weighted Average; UEL - Upper Explosive Limit; US - United States.

Other Information

Disclaimer:
The information contained herein is based upon data and information available to us, and reflects our best professional judgment. This product may be formulated in part with components purchased from other companies. In many instances, especially when proprietary or trade secret materials are used, CCWI Company must rely upon the hazard evaluation of such components submitted by that product's manufacturer or importer. No warranty of merchantability, fitness for any use, or any other warranty is expressed or implied regarding the accuracy of such data or information. The results to be obtained from the use thereof, or that any such use does not infringe any patent, since the information contained herein may be applied under conditions of use beyond our control and with which we may be unfamiliar, we do not assume responsibility for the results of such application. This information is furnished upon the condition that the person receiving it shall make his own determination of the suitability of the material for his particular use.

IMC
FABRICATION

DURO DYNE Products

1. Flex Connectors

SUBMITTAL RECORD
JOB _____
LOCATION _____
SUBMITTED TO _____
SUBMITTAL PREPARED BY _____
APPROVED BY _____
DATE _____

DURO DYNE®

Submittal Form DDFDC Flexible Duct Connector

DESCRIPTION

All air duct installations for heating, cooling or ventilation are attached to mechanical equipment containing a fan or blower. Vibrations, noises and rattles resulting from operation of the fan or blower are transmitted into the metal ducts which carry the noises throughout the system.

In order to isolate the vibration and noises to the source, an air - tight flexible joint, consisting of a fabric which is attached to sheet metal on both side, must be inserted between the equipment and the ductwork. This vibration isolator is called a "Flexible Duct Connector".

RELATED NFPA 90A & 90B STANDARDS

2-3.2.2 Vibration isolation connectors in duct systems shall be made of an approved flame-retardant fabric or shall consist of sleeve joints with packing of approved material, each having a maximum flame spread index of 25 and a maximum smoke developed index of 50. Exception: Approved flame-retardant fabric having a maximum length of 10 in. (25.4 cm) in the direction of airflow-**NFPA No. 90A 1999**

2-1.1.1 Exception No. 3: Vibration isolation connectors in duct systems shall be made of approved flame-retardant fabric or shall consist of sleeve joints with packing of approved noncombustible material. The fabric shall not exceed 10 in. (254 mm) in length in direction of airflow-**NFPA No. 90B 1999**

FABRIC COMPARISONS	Excelon[5] ☐	Neoprene ☐	Durolon ☐	Insulflex* ☐	Thermafab® ☐	Teflon ☐	Glasseal ☐
UL Classified File #	R4462	R4462	R4462	n/a	R4462	n/a	R4462
Continuous Temp. Range	-40°F. to 180°F.	-40°F. to 200°F.	-40°F. to 250°F.	-40°F. to 180°F.	-65°F. to 500°F.	-150°F. to 500°F.	-40°F. - 180°F.
Color	Black	Black	White	Black	Grey	Grey Outside/ Beige Inside	Grey & Black
Weight Per Square Yard	22	30	26	28 (composite weight)	17	16.5	16
Abrasion Resistance[1]	15,000 cycles	600 cycles	500 cycles	500 cycles	125 cycles	1,000 cycles	1,400 cycles
Leakage Resistance[2]	350	595	250	125	400	650	120
Tear Strength[3]	100/100	12/12	12/12	8/11	50/40	50/30	8/9
Tensile Strength[4]	240/220	500/450	225/300	70/70	200/150	400/300	90/90
Base Fabric	Woven Nylon/ Polyester Blend	Woven Fiberglass	Woven Fiberglass	Polyester	Woven Fiberglass	Fiberglass/ Satin Weave	Woven Fiberglass
Coating	Vinyl	Neoprene	Hypalon	Vinyl	Silicon Rubber	Teflon	Vinyl
Features	High Tear Strength High Abrasion Resistance	General Purpose	Excellent Ozone and Weathering Resistance Best Overall Acid Resistance Recommended for rooftop applications Unaffected by mildew	Low Smoke Emission Insulated 3-4-3 Configuration	Very Low Smoke Emission High Temperature Resistant	High Temperature Resistant High Corrosion Resistance Excellent Chemical Resistance	Resistant to Acids & Chemical Fumes Resistant to Grease & Alkalies Unaffected By Mildew
Codes							
Metal-Fab 3x3x3 Grip Loc	MBX333 (#10159)	MFN333 (#10003)	MFD333 (#10002)	IDC343 (#10173) *Gauge: 28 +Guard Loc	MFT333 (#10005)	MCT333 (#10278)	MGL333 (#10004)
Super Metal-Fab 3x6x3 Grip Loc	MB6X363 (#10160)	MF6N363 (#10012)	MF6D363 (#10011)	Not Available	MF6T363 (#10013)	Not Available	MF6G363 (#10016)
TDC/TDF 4x4x4 Grip Loc	MBX444 (#10210) MSPX444 (#10264) MBX464 (#10214)	MFN444 (#10211) MFN464 (#10246)	MFD444 (#10237) MFD464 (#10245)	Not Available	Not Available	MCT444 (#10279)	Not Available

All Metal-Fab, Super Metal-Fab and TDC/TDF Flexible Duct Connectors are manufactured with 24 gauge galvanized steel.
Other materials are available upon request.
Stainless Steel configurations utilize 304 or 316 grade material.

Notes:

1. Abrasion resistance as per Federal Test Standard 191 Method #5306 using CS 17 wheel with 250 Gram load.
2. Leakage resistance as per Federal Test Standard 191 Method #5512. Results in P.S.I.
(To convert inches of water multiply P.S.I. x 27.176.).
3. Tear strength in tongue pounds as per Federal Test Standard 191 Method #5134.1 (warp/fill).
4. Tensile strength in grab pounds as per Federal Test Standard 191 Method #5100 (warp/fill).
5. Standard Excelon is not LA city approved. Use Excelon-LA when LA city approval is necessary.
(See Specification Form Excelon-LA - 203)

All Duro Dyne Flexible Duct Connector Products are suitable for pressures of -10 to +15 wg. Duro Dyne's standard 'single fold' metal to fabric grip has been tested by an independent testing laboratory to withstand a negative pressure of -10"WC and a positive pressure of +17.25" WC with no tearing or visible separation.

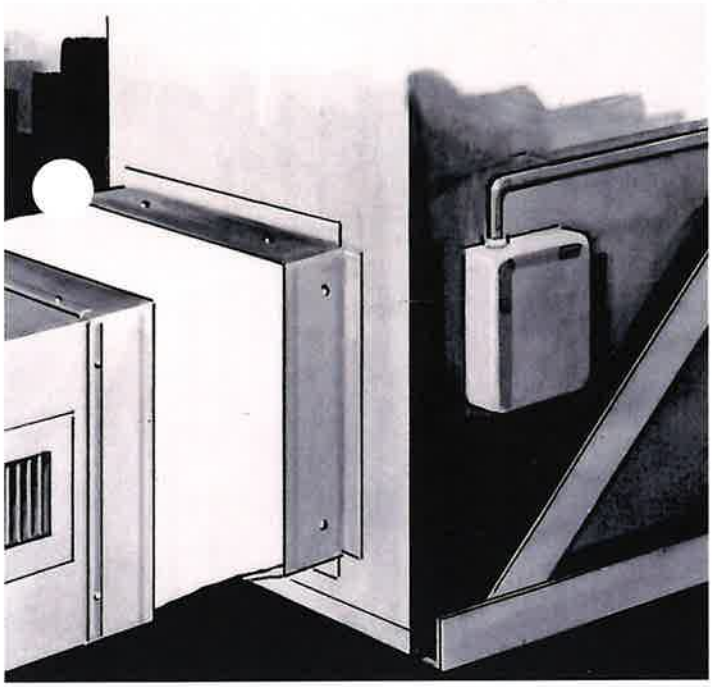
SUGGESTED SPECIFICATION

Vibration Isolating Flexible Duct Connector For Heating, Cooling & Exhaust Supplies & Returns.

At the inlet and discharge of all air handling equipment(unless otherwise noted) furnish and install vibration isolators. Vibration isolators shall be a coated woven fabric named _____ and shall be "Underwriters Laboratories Classified".

Vibration isolators shall have a tear strength of not less then _____, and a continuous temperature range of _____ .Vibration isolators shall be preassembled metal to exposed fabric to metal. Fabric and metal shall be joined by means of a double lock seam.

Vibration isolators shall be code_____ (called Flexible Duct Connectors) as manufactured by Duro Dyne Corporation, Bay Shore, N.Y.



DURO DYNE®

Specifications

All Listed Duro Dyne Flexible Duct Connector Fabrics are designed to meet the following specifications:

1. MIL-C-20696B Para. 4.4.3. (Oil Resistance).
2. MIL-C-20696B Para. 4.4.4. (Hydro Carbon Resistance).
3. NFPA 90A Installation of Air Conditioning and Ventilating Systems Para. 4.3.2.2 2012 Edition.
4. NFPA 90B Warm air heating and air conditioning systems. Para. 4.1.1.1.3.1 2012 Edition. *(*See note 1 below)*
5. NFPA701 Tests for Flame Propagation of Fabrics and film.
6. California State Fire Marshal Approved.
7. Los Angeles City Approved. *(*See note 2 below)*
8. Denver City Approved.

All Duro Dyne Flexible Duct Connectors utilize galvanized steel meeting ASTM-A-525 G 60 or better.

Duro Dyne Flexible Duct Connectors are also available with 300 series stainless steel or 3003 aluminum upon request.

Note 1 - Standard Excelon does not currently meet NFPA 90B 2012 but does meet all previous editions. Use Excelon-LA if NFPA 90B 2012 approval is necessary.

****Note 2*** - Standard Excelon is not LA city approved. Use Excelon-LA when LA city approval is necessary. (See Submittal Form for Excelon-LA)

CHEMICAL RESISTANCE

(X = Extremely Resistant)
(NR = Not Recommended)
(O = No Data Available)

Chemical	Excelon	Neoprene	Durolon	Insulflex	Thermafab	Teflon	Glasseal
Acetic Acid	NR	X	X	NR	NR	X	NR
Aluminum Chloride	X	X	X	X	X	X	X
Aluminum Sulfate	X	X	X	X	X	X	X
Ammonia (Anhyd)	X	X	X	X	X	X	X
Ammonium Hydroxide	X	X	X	X	X	X	X
Ammonium Sulfate	X	X	X	X	X	X	X
Barium Sulfide	X	X	X	X	O	X	X
Black Sulfate Liquor	X	X	X	X	NR	X	X
Boric Acid	X	X	X	X	X	X	X
Butyl Alcohol	NR	X	X	NR	NR	X	NR
Cadmium Plating Solution	X	NR	NR	NR	O	O	X
Calcium Chloride	X	X	X	X	X	X	X
Calcium Hypochlorite	X	NR	X	X	O	X	X
Chlorine Water	X	NR	NR	X	NR	O	X
Chromic Acid	X	NR	X	X	O	X	X
Chromium Plating Solution	X	O	O	NR	O	O	X
Citric Acid	X	X	X	X	X	X	X
Copper Chloride	X	X	X	X	O	X	X
Copper Sulfate	X	X	X	X	O	X	X
Cottonseed Oil	X	X	X	X	X	O	X
Diacetone Alcohol	NR	X	X	NR	O	O	NR
Disodium Phosphate	X	NR	NR	X	O	O	X
Ethyl Alcohol	NR	X	X	NR	NR	X	NR
Ethylene Glycol	NR	X	X	NR	X	X	NR
Ferric Chloride	X	X	X	X	X	X	X
Ferric Sulfate	X	X	X	X	X	X	X
Fluroboric Acid	X	X	X	NR	O	O	X
Formaldehyde (40%)	X	X	X	X	O	X	X
Formic Acid	X	X	X	X	O	X	X
Glucose	X	X	X	X	X	X	X
Glycerine	NR	X	X	NR	X	X	NR
Heptane	NR	X	X	NR	O	X	NR
Hexane	NR	X	X	NR	O	X	NR
Hydrobromic Acid (40%)	NR	X	X	NR	O	X	NR
Hydrochloric Acid (conc)	NR	X	X	NR	NR	X	NR

Chemical	Excelon	Neoprene	Durolon	Insulflex	Thermafab	Teflon	Glasseal
Hydrofluoric Acid (100%)	NR	X	X	NR	NR	X	NR
Hydrogen Peroxide	X	NR	X	X	X	X	X
Hydrogen Sulfide	X	X	X	X	O	X	X
Lactic Acid	NR	X	X	NR	O	X	NR
Linseed Oil	NR	X	X	NR	X	O	NR
Magnesium Chloride	NR	X	X	NR	NR	X	NR
Maleic Acid	X	NR	X	X	X	O	X
Methyl Alcohol	NR	X	X	NR	NR	X	NR
Methyl Cellosolve	NR	X	X	NR	NR	O	NR
Mineral Oil	X	X	X	X	NR	X	X
Naptha	NR	NR	NR	NR	X	X	NR
Nickel Chloride	X	X	X	X	O	X	X
Nickel Sulfate	X	X	X	X	X	X	X
Nitric Acid (40%)	X	NR	X	X	NR	X	X
Oleic Acid	X	NR	NR	X	NR	X	X
Oleum	NR	NR	X	NR	O	X	NR
Oxalic Acid	X	X	X	X	X	X	X
Phosphoric Acid (85%)	NR	X	X	NR	X	X	NR
Pickling Solution	X	NR	X	X	O	O	X
Potassium Chloride	X	X	X	X	O	O	X
Potassium Cyanide	X	X	X	X	O	X	X
Potassium Dichromate	X	X	X	X	O	X	X
Potassium Hydroxide (40%)	X	X	X	NR	X	X	X
Potassium Sulfate	X	X	X	X	O	X	X
Propyl Alcohol	NR	X	X	NR	NR	O	NR
Sodium Chloride	X	X	X	X	X	X	X
Sodium Hydroxide (40%)	NR	X	X	NR	X	X	NR
Sodium Hypochlorite	NR	NR	X	NR	NR	X	NR
Steam	NR	X	NR	NR	O	X	NR
Sulfur Dioxide (Liquid)	NR	X	X	NR	X	X	NR
Sulfuric Acid (50%)	X	NR	X	NR	NR	X	X
Sulfuric Acid (over 50%)	NR	NR	X	NR	NR	X	NR
Tannic Acid	X	X	X	X	O	X	X
Vinegar	X	X	X	X	X	X	X

Duro Dyne East Division, Bay Shore, NY 631-249-9000 Fax: 631-249-8346
Duro Dyne Midwest Division, Fairfield, OH 513-870-6000 Fax: 513-870-6005
Duro Dyne West Division, Fontana, CA 562-926-1774 Fax: 562-926-5778
Duro Dyne Canada, Lachine, Quebec, Canada 514-422-9760 Fax: 514-636-0328
www.durodyne.com E-mail: durodyne@durodyne.com

DURO DYNE®

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IVEY MECHANICAL

Division 23

Ivey Submission #11

Buildings 301,400, and 600

Specification Section 23 31 00, 23 37 00

Drawing Schedules B300,B400,B600-M-601

- Dixon 4 in Quick Connect Clamps
- Ductsox Fabric Duct
- Eastern Sheet Metal Spiral Duct & Fittings
- Flexmaster Conical Taps with Damper and In-Line Dampers
- Flexmaster Type 1 Insulated Flex Duct, Type 5 Insulated Flex Duct, and Stainless Steel Flex Clamps
- Price Grilles, Registers & Diffusers
- Ruskin Backdraft Dampers
- Ruskin Barometric Dampers
- Ruskin Manual Volume Dampers
- Ruskin Motorized Control Dampers
- Ruskin Stationary Blade Louvers and Combination Louvers w/Motorized Dampers

Submitted Date: 1/10/2024

Owner:

Anduril Industries

488 East McHenry Rd.

McHenry, MS 39561

Mechanical Engineer:

Cromwell Architects Engineers, Inc.

1300 East 6th Street

Little Rock, AR 72202

Ivey Mechanical Company
514 North Wells Street
P.O. Box 610
Kosciusko, MS
662.289.3646
Fax: 662.289.3713

January 10, 2024

SUBMITTAL DATA

Project Name: Anduril Industries – Air Distribution

Contractor: Ivey Mechanical Co.

Submitted By:
Trent Dismuke
Airflo Sales, Inc.
103 First Choice Dr.
Madison, MS 39110
Phone: 601-898-1017
Fax: 601-898-1018

Items Submitted: Dixon 4" Quick Connect Clamps (Mobile Casting Unit Connections)

23 31 00
23 37 00

Approved By:

Date of Approval:

Dixon 4 in. Aluminum Quick Connect Clamps

SKU: DXDBCG400

Manufacturer: Dixon

Size: 4 in.

Weight: 4.90 LBS

January 10, 2024

SUBMITTAL DATA

Project Name: Anduril Industries – Air Distribution

Contractor: Ivey Mechanical Co.

Submitted By:
Trent Dismuke
Airflo Sales, Inc.
103 First Choice Dr.
Madison, MS 39110
Phone: 601-898-1017
Fax: 601-898-1018

Items Submitted: Ductsox Fabric Duct

Approved By:

Date of Approval:

DUCTSOX®
Redefining Air Dispersion

DuctSox Corporation
4343 Chavenelle Road
Dubuque, Iowa 52002
866-382-8769
www.ductsox.com

Submittal

Project Name: Anduril Industries - McHenry, MS

Date Created: January 10, 2024

This document includes details on proposed products supplied by DuctSox Corporation

Project Information	
Proposal ID #	1933356
Date	January 10, 2024
Project Name:	Anduril Industries - McHenry, MS
Address	
City/St/Zip	
Phone	
Contact	
MEP Firm	
Mechanical Contractor	
Prepared By	

Note: This submittal is based on equipment and options listed on the attachment(s) and represents our interpretation of your requirements. It is the representative's responsibility to review this submittal and verify that it meets the job specifications.

Project Summary		
Qty	**Primary Tag(s)**	**Model Description**
1	A	Round - Round

DuctSox Corporation
4343 Chavenelle Road
Dubuque, Iowa 52002
866-382-8769
www.ductsox.com

Submittal

Project Name: **Anduril Industries - McHenry, MS**

Round Submittal Data

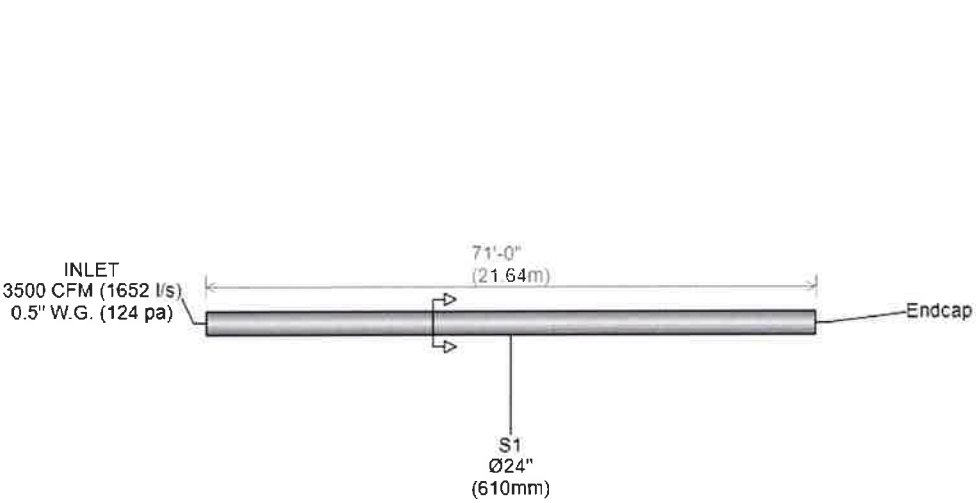
Table of Contents

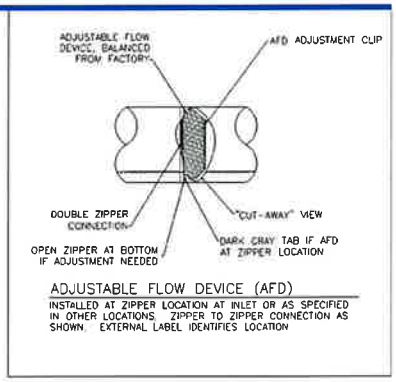
DuctSox Corporation
4343 Chavenelle Road
Dubuque, Iowa 52002
866-382-8769
www.ductsox.com

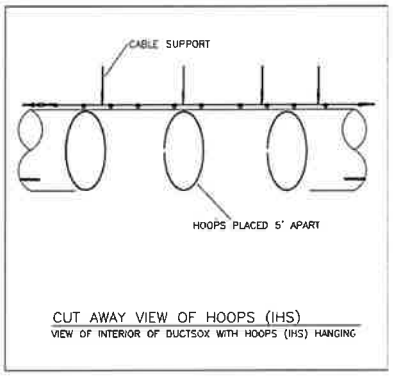
Submittal

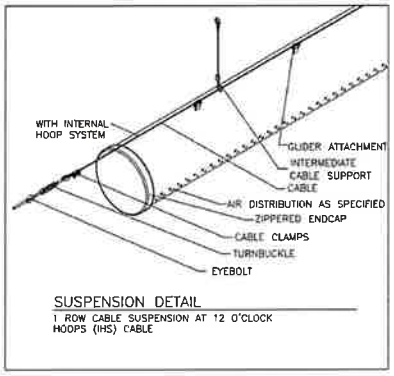
Project Name: **Anduril Industries - McHenry, MS**

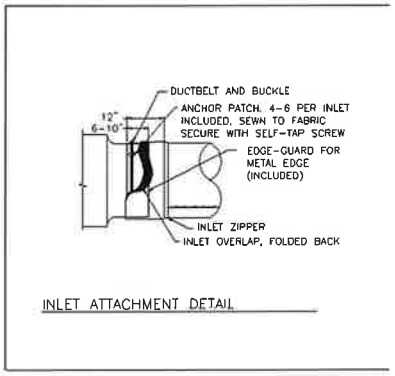
System Drawings: A











***This drawing is not to scale.**

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www.ductsox.com

Submittal

Project Name: **Anduril Industries - McHenry, MS**

Segment Details: **A**

Sox Details						
ID	Label	Section Length	Center Line Length	Diameter	Fabric	Fabric Color
S1		71 ft. 0 in. (21.64 m)	71 ft. 0 in. (21.64 m)	24 in. (610 mm)	Verona	To Be Determined

Hanging Details						
ID	Label	Hardware (Y/N)	Suspension	Hardware Type	Support Type	Support Length
S1		Yes	IHS	Cable	Galvanized	5 ft (1.52 m)

Fittings Details				
ID	Label	Fitting	Diameter	Length
A1	AFD 1	AFD	24 in. (610 mm)	-

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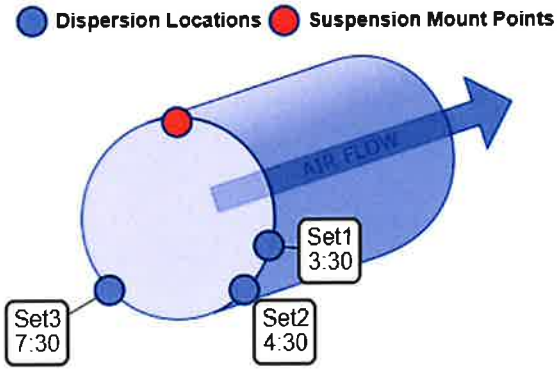
Submittal

Project Name: Anduril Industries - McHenry, MS

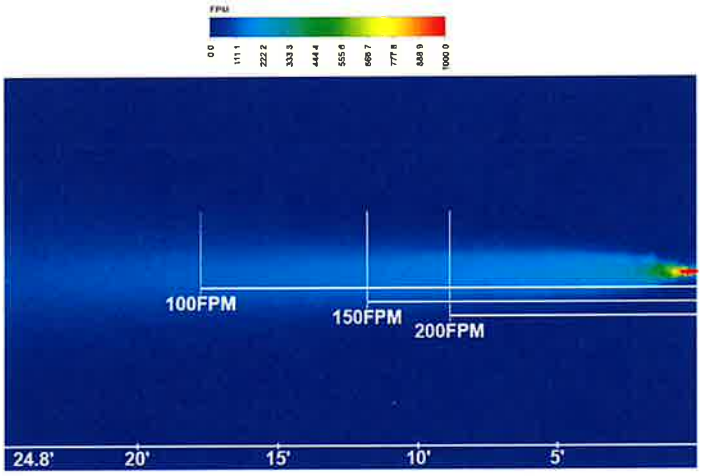
Airflow Design & CFD Analysis: A

Section ID:		S1	
Section Label:			
Section Dispersion Airflow:		3500 CFM (1,652 l/s)	
Airflow through Fabric:		983 CFM (464 l/s)	
Airflow through Dispersion Method:		2517 CFM (475 l/s)	
Location	**Percentage**	**Type**	**Size**
03:30	40%	Orifice	1.5
04:30	30%	Orifice	1.25
07:30	30%	Orifice	1.25



*Note: Reference dispersion Size for CFD performance analysis below. If size is same, only one performance image will be displayed.

Type	Orifice
Size	1.5
Location	03:30
Imperial	
50 FPM:	35.51 ft
100 FPM:	17.76 ft
150 FPM:	11.84 ft
200 FPM:	8.88 ft
250 FPM:	7.10 ft
Metric	
0.254 m/s	10.82 m
0.508 m/s:	5.41 m
0.762 m/s:	3.61 m
1.016 m/s:	2.71 m
1.270 m/s:	2.16 m



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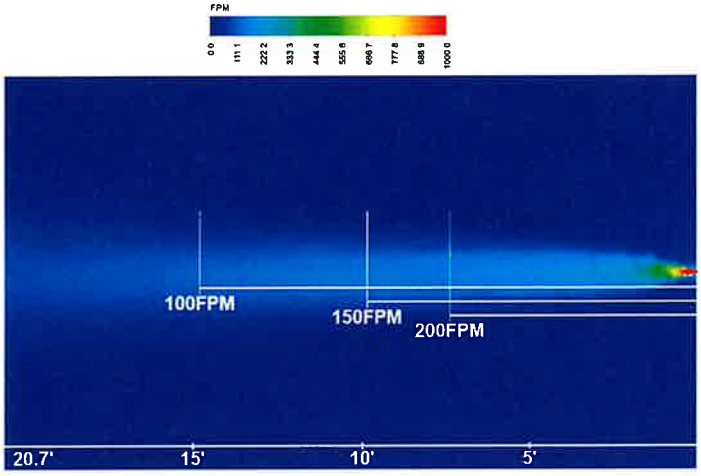
Submittal

Project Name: **Anduril Industries - McHenry, MS**

Type	Orifice
Size	1.25
Location	04:30, 07:30
Imperial	
50 FPM:	29.59 ft
100 FPM:	14.80 ft
150 FPM:	9.86 ft
200 FPM:	7.40 ft
250 FPM:	5.92 ft
Metric	
0.254 m/s	9.02 m
0.508 m/s:	4.51 m
0.762 m/s:	3.01 m
1.016 m/s:	2.26 m
1.270 m/s:	1.80 m



Verona Fabric Sheet

Qty: 1 Tag(s): A

VERONA™ Fabric Specification Sheet

Air Porous

FABRIC

Verona™ is an all purpose, woven, air permeable, commercial grade fabric that offers best-in-class performance and features.

FEATURES & BENEFITS

- Commonly used alternative to exposed double wall duct
- Guaranteed not to condensate
- Air is able to pass through the fabric with the airflow rate controlled by the fabric weave and the internal static pressure
- Desired airflow can be delivered exclusively through the porous fabric or combined with various venting options
- Machine washable

FABRIC SPECIFICATIONS

Weave:	Fire Retardant Polyester Filament/Filament Twill
Weight:	6.8 oz/yd² (231g/m²)
Porosity:	2 CFM/ft² at 0.5in w.g. (10.2L/2/m² @ 125Pa)
Codes:	Classified by Underwriters Laboratories in accordance with the requirements of: • NFPA 90A • UL 2518 • UL-C (Canada) • AS/NZS 1530.3-1999 (Australia / New Zealand)

CLASSIFIED UL File R18856

COLOR

SHAPE

SUSPENSION WARRANTY

SkeleCore FTS	SkeleCore Pull-Tight	IHS (Hoops)	Hangers	1, 2 or 3 Row	Surface Mount
✓	✓	✓	✓	✓	✓
15 yrs Pro-rated 11-20yrs		**10 yrs**		**10 yrs** Pro-rated 8-10yrs	

See full warranty sheet for application and airflow requirements

AIR DISPERSION

Air Porous	Linear Vents	Orifices	Grommets	Adjustable Nozzles	Fixed Nozzles
✓	✓	✓	✓	✓	✓

IHS Cable Cut Sheet

Qty: 1 Tag(s): A

IHS | Internal Hoop System
Cable System

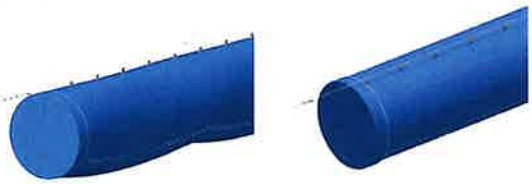
Easy installation with Cable. Longer life expectancy with less fabric sagging and wrinkling compared to multiple row and horizontal suspension systems. Ideal for variable air volume (VAV) applications.

- Light weight
- Economical
- Requires anchor attachments on either end for tensioning

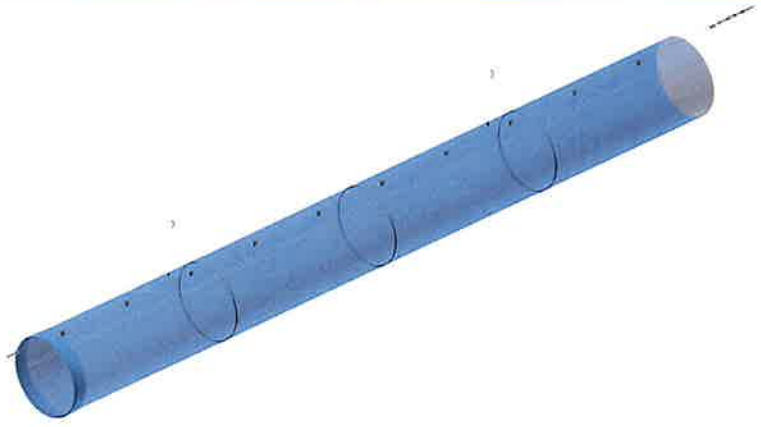
IHS Hoops | 5% Deflation

- 8" - 60" diameters (203mm - 1524mm)
- Fabric attached to 1 Row Cable at 12 o'clock every 12" (305mm)
- No noise at start-up with minimal fabric motion

Deflated | **Inflated**



Internal Framework



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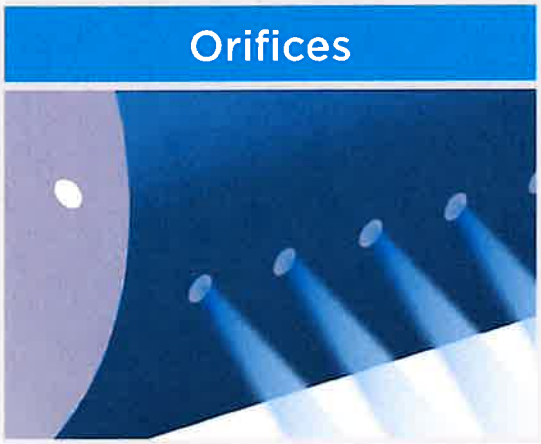
Submittal

Project Name: **Anduril Industries - McHenry, MS**

Orifices Cut Sheet

Qty: 1 **Tag(s): A**

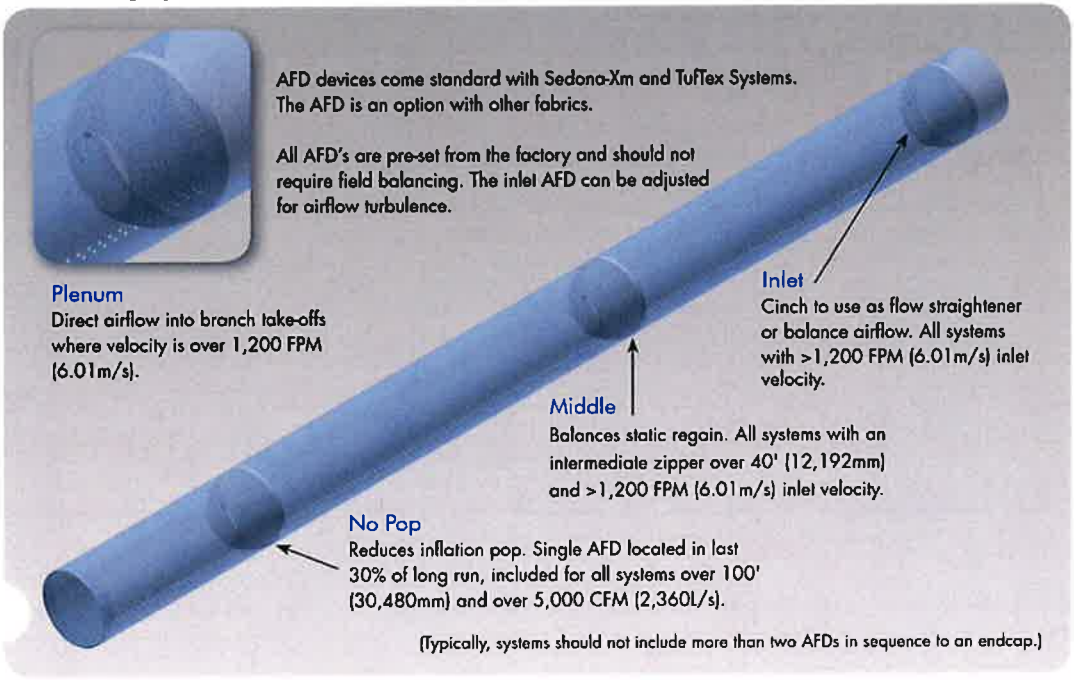


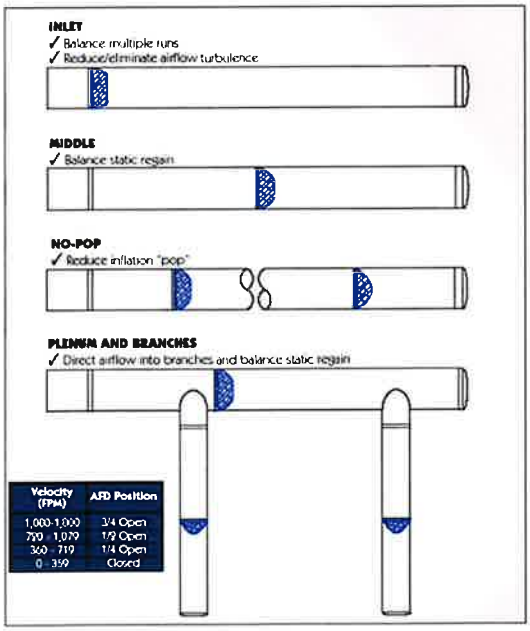
- Orifices are the standard dispersion option for non-porous fabrics
- Provides airflow throw by orifice size and pressure up to 150ft (45.7m)
- Available from .5" - 5" diameter (12.7mm - 127mm)

AFD Cut Sheet

Qty: 1 Tag(s): A

The AFD is a polyester mesh cone with a factory set or field adjustable hemmed drawstring aperture for air balancing all models of DuctSox fabric air dispersion models.





Designed for retrofits as well as new systems, the AFD is easily installed or replaced for laundering in minutes by zipping or unzipping its collar between duct lengths. Besides airflow regulation, the AFD also serves as a flow straightener.

The AFD, which is available in 6 to 72-inch diameters and custom order large sizes, is made of a polyester weave with large scrim openings that don't abnormally attract HVAC system particles. For systems with mediocre or low filtration designs, the AFD can be unzipped and easily laundered. AFD cannot be used at the same connection as a DuctSox Final Filter (FF).

The AFD will be preset from the factory to the recommended setting per location, and should not require any field balancing unless otherwise noted.

Warranty

Qty: 1 Tag(s): A

[1]Warranty Period (in years)						
Suspension / Fabric	SkeleCore FTS	SkeleCore Pull-Tight	IHS (Hoops)	Hangers 3x1 or 4x2	1 Row | 2 Row | 3 Row	[2]Surface Mount
Sedona-Xm, TufTex	20 (Pro-rated 11-20)	15 (Pro-rated 11-15)	10			
Verona, DuraTex	15 (Pro-rated 11-15)	10			10 (Pro-rated 8-10)	
Opti-X*	15 (Pro-rated 11-15)	10				
	*5 yrs in high wash down applications					
Stat-X	10 (Pro-rated 6-10)	5	5 (Pro-rated 2.5-5)			
Rx, LabSox, Microbe-X	10 (Pro-rated 6-10)	5	1			
PolyTex, ChemSox	N/A		1			
DataSox	N/A			5		

C-Series Diffuser	D-Series Diffuser	F-Series Diffuser	V-Series Diffuser
5	1	1	1

Oval*	UnderFloor
5 *1 Year for Food Processing	5 (Pro-rated 2.5-5)

[1]Application Requirements: Airflow and static pressure per original DuctSox design in accordance with published requirements. Warranty is based on inlet velocities up to 1,600 fpm (8.12 m/s). For SkeleCore FTS, a 10 year warranty is available for inlet velocities up to 2,000 fpm (10.16 m/s). Some exceptions may apply. [2]Surface Mount represents Half-Round and Quarter-Round systems. The amount of coverage in a prorated warranty is determined using the following logic: A 20 years warranty (pro-rated years 11-20) is covered 100% for years 1 to 10. From years 11 to 20, the remaining years will be covered on a scale from 50% at 10 years and one day, reducing to 0% at the end of year 20.

DESIGN & PERFORMANCE WARRANTY

DuctSox Systems that are designed within our performance criteria, based on DuctSox submittal documents, are covered by a 1 year Design & Performance Warranty. We want to ensure the product performs consistently through the entire heating and cooling cycle for the first year of operation. To ensure a DuctSox System is designed correctly, our Inside Sales and Engineering group are available to provide design assistance.

A copy of our design manual can be requested at: www.ductsox.com/design/design-manual-request

PRODUCT WARRANTY

Our Product Warranty is for replacement or repair credit based on the amount of the warranty period remaining. The warranty is not available in the form of a cash payment, only as credit towards repair or replacement. The DuctSox Warranty covers materials, fabrication, and performance of the fabric portion of the DuctSox System only. Warranty coverage begins at the time of shipment.

Both the Design & Performance Warranty and the Product Warranty exclude damage to the fabric from improper installation, poor maintenance, abuse, abrasion, caustic chemicals, exposure to high temperature (over 180 degrees Fahrenheit, 82 degrees Celsius), fabric discoloration and shrinkage, or any unauthorized modifications to the DuctSox System. It also does not cover labor, equipment rental, or freight charges incurred as a result of executing the warranty. The DuctSox Product Warranty is non-transferable.

Sound Data

Qty: 1 Tag(s): A

Test Method

The samples were tested in accordance with the ASHRAE 70-2006 Standard "Method of Testing for Rating the Performance of Air Outlets and Inlets", which incorporates ADC 1062: GRD-84 Test Code for Grilles, Registers and Diffusers. Acoustical data was obtained employing a Bruel & Kjaer Pulse Digital Frequency Analyzer. The reference sound source used for this test was a calibrated Bruel & Kjaer Type 4204, which conforms to the above standard. Noise Criteria ratings were determined by subtracting a room absorption of 10dB from the Sound Power Level data. The octave band sound power levels were plotted on graph of Noise Criteria Curves which is in the ADC Test Code. These curves are reprinted with permission from the ASHRAE Handbook and Product Directory, 1976. Each sample was installed in the reverberation room and supplied with measured volumes of air. The static pressure was measured upstream of the sample section.

Test Equipment

Equipment	Calibration Date	Due Date	S/N	Model	Asset
Pulse Analyzer	03/19/2012	03/19/2013	2519258	7539	E446
Reference Sound Source	07/19/2012	07/19/2015	2036621	4204	A230
Microphone/Pre-DF	05/03/2012	05/03/2013	2381159	4942	E449

Description of Test Specimen

A 15' diffuser section with the specified air outlets was evaluated.

Summary of Results

Noise Criteria (NC)					
		Inlet Static Pressure			
	Quantity / Linear Vent Size	0.25" wg	0.50" wg	0.75" wg	1.00" wg
2" Orifices	Quantity:8	20	32	37	40
	Quantity:16	20	32	37	40
3" Orifices	Quantity:4	18	29	36	39
	Quantity:7	18	29	36	39
2" Adjustable Nozzles	Quantity:9	32	42	46	52
	Quantity:19	35	44	49	53
1" Fixed Nozzles	Quantity:44	21	32	37	40
	Quantity:87	22	33	38	41
Linear Vents	Vent Size: 10	23	33	37	41
	Vent Size: 20	23	33	38	41
	Vent Size: 30	23	33	38	41
	Vent Size: 40	23	33	38	41
	Vent Size: 60	23	33	39	43

Laundry Instructions

Qty: 1 Tag(s): A

There are three different areas to consider for maintaining your DuctSox products.

Performance

DuctSox products have been refined to reduce or eliminate required maintenance. Over years of use, extensive dirt build up will have little, if any, effect on the air dispersion performance of our products.

Aesthetics

Keeping the exterior of your DuctSox looking clean may be very important to you. If this is the case, your maintenance schedule should be no different than with metal duct. Although, keeping your DuctSox looking clean can be much easier and less expensive than keeping your metal duct clean. There are a few things that may help reduce the exterior dusting of a DuctSox, including selecting a porous fabric or cycling the system once daily. The most common options for cleaning your DuctSox include vacuuming and/or using compressed air, or it can be easily removed and laundered.

Hygienic

Over its lifetime, the interior of a duct system will collect dust and/or other micro-organisms that have been known to contribute to sick building syndrome. DuctSox has a distinct advantage over metal – you can completely launder your fabric duct system. This allows you to clean both the inside and outside of your HVAC system helping to eliminate the contributors of sick building syndrome.

Overall, the laundry requirements for each space varies based on the quality of the filters in the air handling unit, the amount of dirt entrainment entering the space (on people's shoes and/or clothing), and other location related issues (e.g. near farmland). Based on our experience, average commercial space with relatively high traffic and 50% efficient filters may choose to launder their DuctSox after five to seven years. If your fabric is white, a more frequent schedule may be necessary.

Laundering Instructions

Remove the DuctSox fabric from your system, being sure to unzip all sections and taking care to record where each section was installed. Turn soiled side out before cleaning (not needed for PolyTex and ChemSox).

Fabric(s)	Laundry Instructions
Sedona-XM, Verona UnderFloor	Soak in cold water for 30 minutes. Machine wash cold (85°F) on a gentle cycle. Use mild detergent, no bleach. Rinse thoroughly (repeat cycle if water/DuctSox is still soiled). Line dry or no-heat tumble dry.
TufTex, DuraTex Opti-X, Stat-X, Rx	Machine wash warm (105°F). Use mild detergent, no bleach. Rinse thoroughly (repeat cycle if water/DuctSox is still soiled). Line dry or no-heat tumble dry.
Microbe-X	Machine wash hot (120°F). Use mild detergent. Rinse thoroughly (repeat cycle if water/DuctSox is still soiled) and tumble dry.
PolyTex, ChemSox	Spray with water to remove dust and dirt particles. Wash with soapy water and rinse clean, if needed.

If the system becomes dirty/soiled during installation, please coordinate a proper cleaning prior to completion. Exterior surface dirt can, most frequently, be blown off using a combination of a brush and compressed air.

Code Compliance

Qty: 1 Tag(s): A

Underwriters Laboratories (UL) 2518 is the most comprehensive compliance requirement assembled for the fabric duct industry. It ensures that our products meet a higher level of safety, quality, and performance. Additional information is available at www.ductsox.com

CLASSIFIED UL File R18856

Continued Compliance Testing

AC167 includes criterion and evaluations contained within UL181, including (Weight and Air Permeability test are outside of UL181):

Surface Burning Characteristics	25/50 flame spread / smoke generated per UL273.
Mold Growth & Humidity	Fabric sample is tested in a closed test chamber, subjected to an atmosphere saturated with water vapor, at room temperature, and under dark conditions for 60 days.
Erosion	General measure of durability of product, as tested products are subjected to 2.5x highest design air velocity, or 5,000 feet per minute. Passing samples show a decrease in loss of macroscopic particles throughout the 4 hour test.
Temperature	High Temperature: Product is tested in an oven where internal temperature of the product is maintained at not less than 265°F and the exterior is maintained at not less than 125°F for 60 days.
	Low Temperature: Product is placed in an environment saturated with water vapor and at a room temperature for 48 hrs. Product is then placed in a chamber maintained at 0°F. After 24 hrs of exposure, product is visually examined for indications of deterioration.
Pressure	Product Sample is tested to 2.5x highest design static pressure (3.01" wg), which results in pressure testing at 7.525" wg static pressure.

Continued Compliance

In addition to having the product pass the required evaluation criteria, compliance to UL2518 also includes unannounced quarterly inspections at each of our production facilities. For UL2518, inspections include review of inventory certification, and pulling random fabric samples to confirm compliance.

Air Dispersion System

ICC's reference to Air Dispersion Systems in the latest IMC:

603.17 Air dispersion systems. Air dispersion systems shall:

1. Be installed entirely in exposed locations.
2. Be utilized in systems under positive pressure.
3. Not pass through or penetrate fire-resistant-rated construction.
4. Be listed and labeled in compliance with UL2518.

January 10, 2024

SUBMITTAL DATA

Project Name: Anduril Industries – Air Distribution

Contractor: Ivey Mechanical Co.

Submitted By: Trent Dismuke
Airflo Sales, Inc.
103 First Choice Dr.
Madison, MS 39110
Phone: 601-898-1017
Fax: 601-898-1018

Items Submitted: Eastern Sheet Metal Spiral Duct & Fittings

Approved By:

Date of Approval:

Eastern Sheet Metal

9/1/2023

ESM Representative:	Airflo Sales
Project Name:	Anduril Buildings 301, 400, & 600
Contractor:	Ivey Mechanical
System Types:	ESM Dual Wall Spiral

	Pressure		Include		Material		Connectors	Size
☐	1995 2" Pos	☐	Access Doors	☐	Galvanized	☒	Couplings	<12"
☐	1995 10" Pos	☐	Bellmouths	☒	Paint Grip	☐	ESM Tight	
☒	2005 10" Pos	☐	Dampers	☐	304 Stainless Steel	☒	ESM Flanges	>12"
☐	1995 2" Neg	☐	VAV Reducers	☐	316 Stainless Steel	☐	Vanstone Rings	
☐	1995 4" Neg			☐	Aluminum	☐	Welded Rings	
☐	1995 10" Neg		**Dual Wall**	☐	Poly Coated	☐	Spiralmate	
☐	2005 2" Neg	☒	1" Dual Wall	☐	Hot Rolled			
☐	2005 4" Neg	☐	1" Quietzone Liner		**Access Type**		**Tees/Saddles**	
☐	2005 6" Neg	☐	1.0# Density	☐	Section	☐	Tees	
☐	2005 10" Neg	☒	1.5# Density	☐	Mani-folded	☐	Saddles	
☐	Underground	☐	Mylar	☐	Loose			
☐	Other Pos	☐	Mat Faced	☐	Rectangular		**Tap Type**	
		☐	EFREE	☐	Sandwich	☐	Pressed	Max 12"
☐	Other Neg					☐	Straight	
					Grille Taps	☒	Conical	
	Pipe		**Inner Fitting**	☒	Factory Installed	☐	Combination	
☒	Std. Spiral	☒	Perforated	☐	Shipped Loose	☐	Straight Lateral	
☐	Smooth Only	☐	Solid	☒	Flange In	☐	Conical Lateral	
☐	Ribbed		**Inner Pipe**	☐	Flange Out			
☐	Long Seam	☐	Perforated	☐	Hole Only		**Saddles**	
	Fittings	☒	Solid			☐	Factory Installed	
☒	Tack/Seal	☐	Ribbed		**Spiral Pipe Length**	☐	Shipped Loose	
☐	Continuously Welded	☐	Smooth	☐	5'			
				☐	8'			
				☐	10'			
				☒	12' (Standard)			

Comments:

Eastern Sheet Metal
9959 Blue Ash Rd.
Cincinnati, OH 45242
Ph. 513-793-3440 / Fax 513-793-5990
www.easternsheetmetal.com

Eastern Sheet Metal

Double Wall ROUND

DUAL WALL ROUND SPIRAL DUCT AND FITTINGS CONSTRUCTION STANDARDS

Outer Shell Positive Pressure

Gauge selection for galvanized (ASTM A653), paint grip steel and types 304 and 316 stainless steel. Fittings are spot welded or gorelocked through 40" diameter. All larger fittings are continuously welded except for PCS fittings. All fittings can be provided as continuously welded if required. All galvanized spiral pipe 6" and larger is corrugated. All spiral pipe from other materials will be smooth.

DUCT DIAMETER	2005 SMACNA 10" WG SPIRAL PIPE	2005 SMACNA 10" WG FITTINGS	1995 SMACNA 2" WG SPIRAL PIPE	1995 SMACNA 2" WG FITTINGS	1995 SMACNA 10" WG SPIRAL PIPE	1995 SMACNA 10" WG FITTINGS
3"-6"	26	26	26	26	26	26
7"-8"	26	26	26	26	26	26
9"-10"	26	26	26	26	26	26
11"-12"	26	26	26	26	26	24
13"-14"	26	26	26	26	26	24
15"-16"	26	26	24	24	24	22
17"-18"	26	26	24	24	24	22
19"-24"	26	24	24	24	24	22
25"-26"	24	22	24	24	24	22
27"-36"	24	22	24	22	22	20
37"-42"	24	22	22	20	22	20
43"-48"	22	20	22	20	20	20
49"-50"	22	20	22	20	20	20
51"-60"	22	20	20	18	18	18
61"-66"	22	18	18	16	18	16
67"-84"	20	18	18	16	18	16

DUCT DIAMETER	1985 SMACNA 2" WG SPIRAL PIPE	1985 SMACNA 2" WG FITTINGS	1985 SMACNA 10" WG SPIRAL PIPE	1985 SMACNA 10" WG FITTINGS	ALUMINUM 2" WG SPIRAL PIPE	ALUMINUM 2" WG FITTINGS
3"-8"	26	26	26	24	0.025"	0.032"
9"-14"	26	26	26	24	0.025"	0.032"
15"-26"	24	24	24	22	0.032"	0.040"
27"-36"	24	22	22	20	0.040"	0.050"
37"-50"	22	20	20	20	0.040"	0.063"
51"-60"	20	18	18	18	0.063"	0.071"
61"-84"	18	16	18	16	0.063"	0.090"

Inner Shell

Gauge selection for inner shell. Standard material for the inner shell of spiral pipe is Spirorib perforated steel (ASTM A653), with 3/32" holes on 3/16" staggered centers for a free area of 23%. Standard material for the inner shell of fittings is solid steel. Fittings are also available with a perforated liner and spiral pipe with a solid liner.

DUCT DIAMETER	SPIRORIB PIPE	SPIRORIB FITTINGS	SPIRAL PIPE
3"-26"	26	22	26
27"-60"	26	22	22
61"-84"	24	22	22

Standard insulation is 1" thick, 1 pound per cubic foot density, with a thermal conductivity (ASTM C 518) @ 75° F mean temperature of 0.26 (BTU-in./hr.ft.2°F)

Surface burning characteristics (ASTM E 84, UL 723)
25 flame spread
50 smoke developed.

Sound absorption coefficients. (ASTM C 423, Type A)

Frequency, Hz						
125	250	500	1000	2000	4000	NRC
0.17	0.24	0.62	0.79	0.88	0.96	0.65

Eastern Sheet Metal

Double Wall Round
INSTALLATION

<12"

DUAL WALL SLIP FIT

The inner and outer collars of Eastern Sheet Metal fittings are sized to slip into, and should be used with, Eastern Sheet Metal spiral duct. The inner collar projects beyond the outer collar. This permits the inner collar to be started into the inner liner of the spiral duct in a manner similar to the single wall technique. A tight fit is necessary to minimize friction loss and to promote proper sealing. Care should be taken during the handling and installationto avoid dents and distortions that can case improper fit or difficult installation.

1. Bring the bottom of the inner fitting collar into the inner spiral duct at a slight angle.
2. Work the rest of the inner collar into the spiral duct.
3. When the inner collar is fully inserted, start the outer collar in the same manner.
4. Carefully work the rest of the collar into the spiral duct until approximately one inch of the collar remains exposed between the end of the spiral duct and the stop bead of the fitting collar. Do not. use a screwdriver or knife to help make the connection. Apply pressure with the heal of your hand or with your fist to help slip the fitting into the duct.
5. Apply duct sealer to this exposed area. Skip this step if installing Eastern Tight fittings.
6. Push the fitting into the spiral duct until the stop bead meets the edge of the spiral duct.
7. Fasten the fitting into the spiral duct with screws per the chart at right. The screws should be evenly spaced around the perimeter of the connection, approximately 1/2" back from the stop bead. Placement of the screws should be opposite of each other as demonstrated in the diagram.

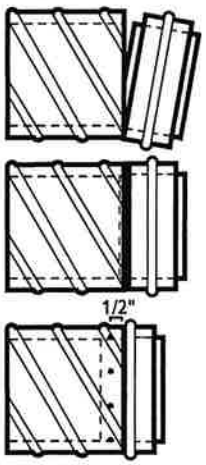
>12

DUAL WALL EASTERN FLANGE

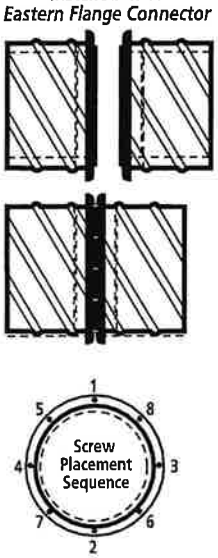
Eastern Flanges come factory-mounted on fittings and spiral duct. Eastern Flanges ar standard for all duct over 61" in diameter, but are available on smaller sizes. Dual wall Eastern Flanges attach to both the outer wall and the inner wall of the duct, eliminating the need to make an inner connection.

1. Place closed cell neoprene gasket on the face of one of the mating outer flanges.
2. Push the flanges together keeping the edges of the flanges aligned.
3. Clamp the flanges to help hold them in place.
4. Screw the flanges together with self-tapping screws per the chart at right. The screws should be evenly spaced around the perimeter of the connection. Placement of the screws should be opposite of each other as demonstrated in the diagram.

Installation of Slip Joint Connector



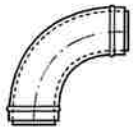
Installation of Eastern Flange Connector



DUCT PERIMETER ROUND EQUIV.	#OF SCREWS SLIP FIT	#OF SCREWS EASTERN FLANGE
4"-9"	3	NA
10"	3	4
11"-16"	3	6
17"-21"	4	8
22"-26"	5	10
27"-30"	6	12
32"-36"	7	14
38"-42"	8	16
44"-46"	9	18
48"-52"	10	20
54"-56"	11	22
58"-60"	12	24
62"-66"	NA	26
68"-72"	NA	28
74"-76"	NA	30
78"-84"	NA	32

Eastern Sheet Metal

Double Wall
ROUND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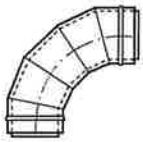
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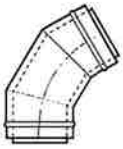
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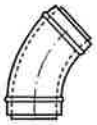
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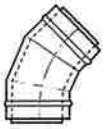
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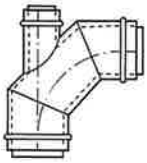
E22/E30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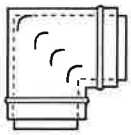
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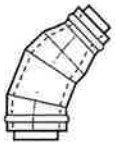
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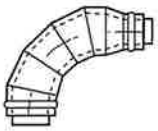
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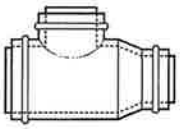
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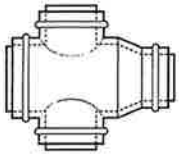
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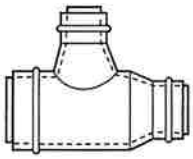
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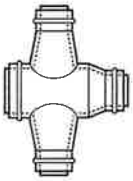
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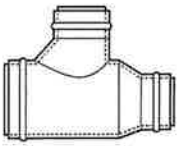
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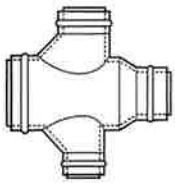
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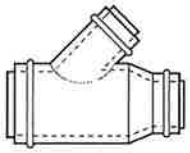
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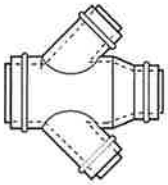
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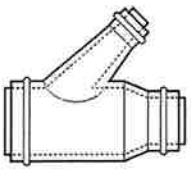
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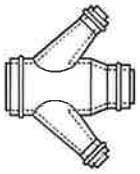
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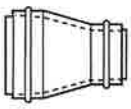
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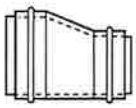
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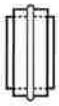
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FCP


IS


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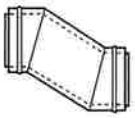
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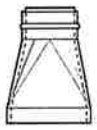
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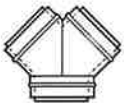
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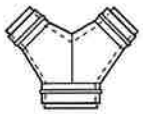
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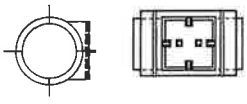
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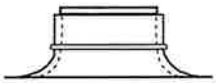
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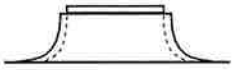
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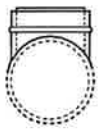
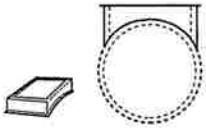
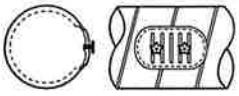

ST/FT


STC/FTC


SL/FL


SCB/FCB


SRR/FRR


FA

Eastern Sheet Metal

9/1/2023

ESM Representative:	Airflo Sales
Project Name:	Anduril Buildings 301, 400, & 600
Contractor:	Ivey Mechanical
System Types:	ESM Low Pressure Single Wall Spiral

	Pressure		**Include**		**Material**		**Connectors**	**Size**
☐	1995 2" Pos	☐	Access Doors	☒	Galvanized	☒	Couplings	<12"
☐	1995 10" Pos	☐	Bellmouths	☐	Paint Grip	☐	ESM Tight	
☒	2005 10" Pos	☐	Dampers	☐	304 Stainless Steel	☒	ESM Flanges	>12"
☐	1995 2" Neg	☐	VAV Reducers	☐	316 Stainless Steel	☐	Vanstone Rings	
☐	1995 4" Neg			☐	Aluminum	☐	Welded Rings	
☐	1995 10" Neg		**Dual Wall**	☐	Poly Coated	☐	Spiralmate	
☐	2005 2" Neg	☐	1" Dual Wall	☐	Hot Rolled			
☐	2005 4" Neg	☐	1" Quietzone Liner		**Access Type**		**Tees/Saddles**	
☐	2005 6" Neg	☐	1.0# Density	☐	Section	☐	Tees	
☐	2005 10" Neg	☐	1.5# Density	☐	Mani-folded	☐	Saddles	
☐	Underground	☐	Mylar	☐	Loose			
☐	Other Pos	☐	Mat Faced	☐	Rectangular		**Tap Type**	
		☐	EFREE	☐	Sandwich	☐	Pressed	Max 12"
☐	Other Neg					☐	Straight	
					Grille Taps	☒	Conical	
	Pipe		**Inner Fitting**	☐	Factory Installed	☐	Combination	
☒	Std. Spiral	☐	Perforated	☐	Shipped Loose	☐	Straight Lateral	
☐	Smooth Only	☐	Solid	☐	Flange In	☐	Conical Lateral	
☐	Ribbed		**Inner Pipe**	☐	Flange Out			
☐	Long Seam	☐	Perforated	☐	Hole Only		**Saddles**	
	Fittings	☐	Solid			☐	Factory Installed	
☒	Tack/Seal	☐	Ribbed		**Spiral Pipe Length**	☐	Shipped Loose	
☐	Continuously Welded	☐	Smooth	☐	5'			
				☐	8'			
				☐	10'			
				☒	12' (Standard)			

Comments:

Eastern Sheet Metal
3959 Blue Ash Rd.
Cincinnati, OH 45242
Ph. 513-793-3440 / Fax 513-793-5990
www.easternsheetmetal.com

Eastern Sheet Metal

Single Wall ROUND

SINGLE WALL ROUND DUCT AND FITTINGS CONSTRUCTION STANDARDS

Negative Pressure

Gauge selection for galvanized steel (ASTM A 653), paint grip steel, type 304 and 316 stainless steel, and Eastern Poly Coated Steel (PCS).*
Fittings are spot welded and/or gorelocked through 40" diameter. All larger fittings are continuously welded except for PCS fittings. All fittings can be provided as continuously welded if required. All galvanized spiral pipe 6" and larger is corrugated. All spiral pipe from other materials will be smooth.

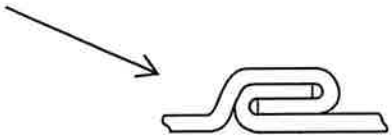
MAX. DUCT DIAM.	2005 SMACNA 2" WG				2005 SMACNA 4" WG				2005 SMACNA 6" WG			
	SPIRAL PIPE	REIN. & SPACNG	FITTINGS	REIN & SPACNG	SPIRAL PIPE	REIN. & SPACNG	FITTINGS	REIN. & SPACNG	SPIRAL PIPE	REIN. & SPACNG	FITTINGS	REIN. & SPACNG
6"	26		26		26		26		26		26	
8"	26		26		26		26		26		26	
10"	26		26		26		26		26		24	
12"	26		26		26		24		24		24	
14"	26		24		24		22		24		22	
16"	26		24		24		22		26	A 12	22	A 12
18"	26	A 12	24	A 12	26	A 12	24	A 12	26	A 12	22	A 12
20"	26	A 12	24	A 12	26	A 12	24	A 12	26	A 12	22	A 12
22"	26	A 12	24	A 12	26	A 12	24	A 12	24	A 12	22	A 12
24"	26	A 12	24	A 12	26	A 12	24	A 12	24	A 12	22	A 12
30"	26	A 12	24	A 12	24	A 12	22	A 12	24	A 12	20	A 12
36"	26	A 12	24	A 12	24	A 12	22	A 12	22	B 12	20	B 12
42"	26	A 12	22	A 12	22	B 12	20	B 12	22	B 12	18	B 12
48"	24	A 12	22	A 12	22	B 12	20	B 12	20	B 12	18	B 12
54"	24	B 12	22	B 12	22	B 12	18	B 12	20	C 12	18	C 12
60"	24	B 12	22	B 12	22	C 12	18	C 12	20	C 12	18	C 12
66"	24	B 12	20	B 12	20	C 12	18	C 12	18	E 12	16	E 12
72"	22	B 12	20	B 12	20	D 12	18	D 12	18	E 12	16	E 12
78"	22	C 12	20	C 12	20	E 12	18	E 12	18	E 12	16	E 12
84"	22	C 12	20	C 12	20	E 12	18	E 12	18	F 12	16	F 12
90"	22	D 12	18	D 12	18	E 12	16	E 12	18	G 12	16	G 12
96"	22	E 12	18	E 12	18	E 12	16	E 12	18	G 12	16	G 12

MAX. DUCT DIAM.	2005 SMACNA 10" WG				1985 SMACNA 2" WG				RIDCS CLASS 1 2" WG			
	SPIRAL PIPE	REIN. & SPACNG	FITTINGS	REIN. & SPACNG	SPIRAL PIPE	REIN. & SPACNG	FITTINGS	REIN. & SPACNG	SPIRAL PIPE	REIN. & SPACNG	FITTINGS	REIN. & SPACNG
6"	26		26		26		24		22		22	
8"	26		24		26		24		22		22	
10"	26		24		26		24		22		22	
12"	24		22		26		24		22		22	
14"	24	A 12	22	A 12	26		24		22		22	
16"	24	A 12	22	A 12	24		22		22		22	
18"	24	A 12	22	A 12	24		22		20		20	F1 20
20"	24	A 12	22	A 12	24		22		20		20	F1 20
22"	24	A 12	20	A 12	24		22		18		20	F1 20
24"	22	A 12	20	A 12	24		20		18		20	F1 20
30"	22	A 12	18	A 12	22		20		16		18	F1 20
36"	20	B 12	18	B 12	22		20		16		16	F1 12
42"	20	B 12	18	B 12	20		18		20	F1 12	16	F1 12
48"	18	C 12	16	C 12	20		18		20	F1 12	14	F1 12
54"	18	D 12	16	D 12	18		16		20	F1 12	14	F1 12
60"	18	E 12	16	E 12	18		16		18	F1 12	12	F1 12
66"	18	E 12	16	E 10	16		14		18	F1 12	12	F1 12
72"	18	F 12	16	F 10	16		14		18	F1 12	12	F1 12
78"	16	G 12	16	G 6	16		14		18	F1 12	10	F1 12
84"	16	G 12	16	G 6	16		14		18	F1 12	10	F1 12
90"	16	G 12	16	G 6	NA		NA		18	F1 12	10	F1 12
96"	16	G 12	16	G 6	NA		NA		18	F1 12	10	F1 12

A,B,C,D,E,F,G = Angle ring reinforcements per SMACNAS 2005 HVAC DCS Table 3-2
F1 = F1 reinforcement per SMACNA RIDCS, Chapter 12
* Refer to note on the bottom of page 2.

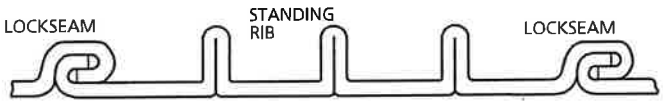
Eastern Sheet Metal

Single Wall Round CONSTRUCTION



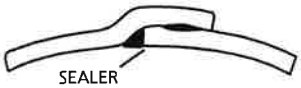
SPIRAL PIPE LOCK SEAM (RL—1)

	Available Gauges
GALVANIZED	28-14
STAINLESS STEEL	26-18
ALUMINUM	22-14
PAINT GRIP	26-16
POLY VINYL COATED	26-18
PERFORATED	22



SPIRORIB (TRIPLE RIB REINFORCED) SPIRAL PIPE (RL—1)

	Available Gauges
GALVANIZED	28-24
PAINT GRIP	28-24
PERFORATED	26-24

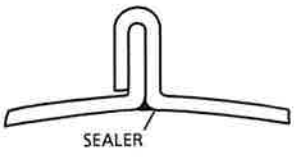


LAP SEAM
spot weld
seam weld
stitch weld
button punch
rivet

	Available Gauges
GALVANIZED	26-18
STAINLESS STEEL	26-18
ALUMINUM	22-18
PAINT GRIP	26-18
POLY VINYL COATED	26-18

BUTT-WELDED SEAM

	Available Gauges
GALVANIZED	20-10
STAINLESS STEEL	22-10
ALUMINUM	16-1/4"
PAINT GRIP	20-16
HOT ROLLED	16-1/4"



GORELOCKED SEAM

	Available Gauges
GALVANIZED	26-18
STAINLESS STEEL	26-22
ALUMINUM	24-16
PAINT GRIP	26-18
POLY VINYL COATED	26-18

Eastern Sheet Metal

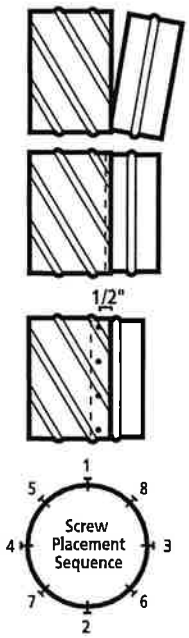
Single Wall Round
INSTALLATION

SINGLE WALL SLIP JOINT

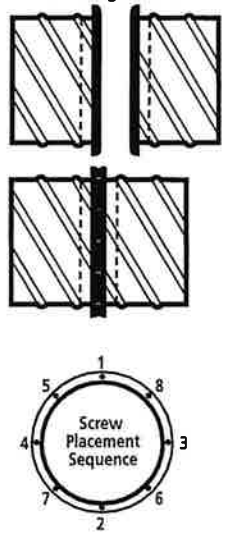
Eastern Sheet Metal fittings are sized to slip into, and should be used with, Eastern Sheet Metal spiral duct. A tight fit is necessary to minimize friction loss and to promote proper sealing. Care should be taken during handling and installation to avoid dents and distortions that can cause improper fit or difficult installation.

1. Bring the bottom of the fitting collar into the spiral duct at a slight angle.
2. Carefully work the rest of the collar into the spiral duct until approximately one inch of the collar remains exposed between the end of the spiral duct and the stop bead of the fitting collar. Do not use a screwdriver or knife to help make the connection. Apply pressure with the heal of your hand or with your fist to help slip the fitting into the duct.
3. Apply duct sealer to this exposed area. Skip this step if installing Eastern Tight fittings.
4. Push the fitting into the spiral duct until the stop bead meets the edge of the spiral duct.
5. Fasten the fitting into the spiral duct with screws per the chart at right. The screws should be evenly spaced around the perimeter of the connection, approximately 1/2" back from the stop bead. Placement of the screws should be opposite of each other as demonstrated in the diagram.

Installation of Slip Joint Connector



Installation of Eastern Flange Connector



EASTERN FLANGE

Eastern Flanges come factory-mounted on fittings and spiral duct. Eastern Flanges ar standard for all duct over 61" in diameter, but are available on smaller sizes.

1. Place closed cell neoprene gasket on the face of one of the mating flanges.
2. Push the flanges together keeping the edges of the flanges aligned.
3. Clamp the flanges to help hold them in place.
4. Screw the flanges together with self-tapping screws per the chart at right. The screws should be evenly spaced around the perimeter of the connection. Placement of the screws should be opposite of each other as demonstrated in the diagram.

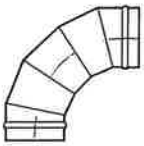
Protected by the following U.S. Patents: 7,287,407; D518,885; D517,679; D516,698; D516,697.

DUCT PERIMETER ROUND EQUIV.	#OF SCREWS	
	SLIP FIT	EASTERN FLANGE
4"-9"	3	NA
10"	3	4
11"-16"	3	6
17"-21"	4	8
22"-26"	5	10
27"-30"	6	12
32"-36"	7	14
38"-42"	8	16
44"-46"	9	18
48"-52"	10	20
54"-56"	11	22
58"-60"	12	24
62"-66"	NA	26
68"-72"	NA	28
74"-76"	NA	30
78"-84"	NA	32

Eastern Sheet Metal

Single Wall
ROUND


PE90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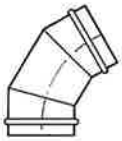
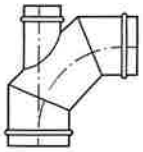

E60


PE45

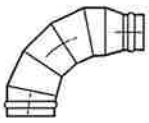

E45


E22/E30


E90L


E290/EV290


E45R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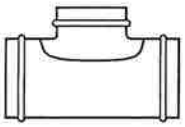
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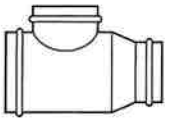
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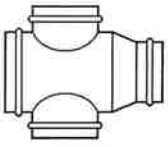
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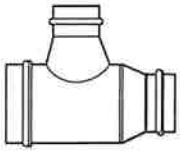
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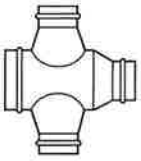
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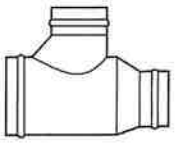
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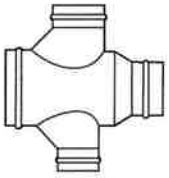
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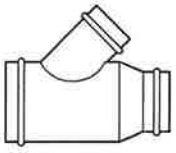
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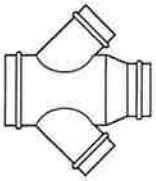
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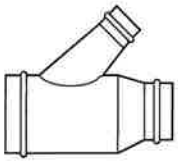
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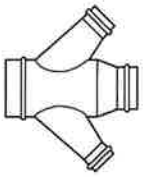
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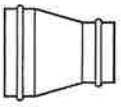
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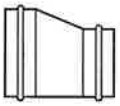
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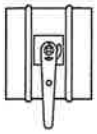
PRD

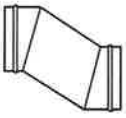

D


PCP


FCP


PEC


EC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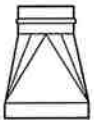
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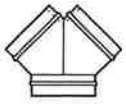
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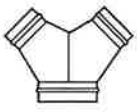
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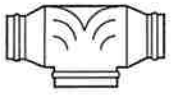
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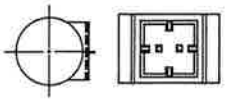
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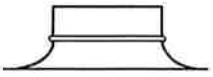
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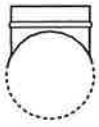
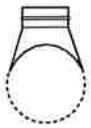

ST/FT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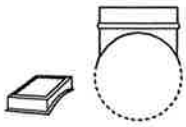
SL/FL


SCB/FCB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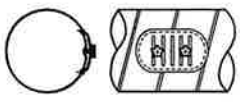
FA

Adranos Elmore County Coded Plumbing Fixtures and Equipment

Total EQ MH

Plumbing Fixtures/Equipment

	Code	MH	$$$
Bldg 400	3 7600	136	4,352
Bldg 600	3 7600	90	2,880

Adranos Elmore County Coded Plumbing Fixtures and Equipment

Total EQ MH

Plumbing Fixtures/Equipment

	Code	MH	$$$
Bldg 400	3 7600	136	4,352
Bldg 600	3 7600	90	2,880

January 10, 2024

SUBMITTAL DATA

Project Name: Anduril Industries – Air Distribution

Contractor: Ivey Mechanical Co.

Submitted By:
Trent Dismuke
Airflo Sales, Inc.
103 First Choice Dr.
Madison, MS 39110
Phone: 601-898-1017
Fax: 601-898-1018

Items Submitted: Flexmaster Conical Taps w/Dampers
Flexmaster In-Line Dampers (4" Installed @ Mobile Casting Unit)

Approved By:

Date of Approval:

SUBMITTAL DATA

Flexmaster U.S.A.® Conical Bellmouth SOG

SHEET METAL FITTINGS

The Flexmaster U.S.A.® Conical Bellmouth with stick on gasket (CB-SOG) is manufactured from 26 gauge, or heavier, G-90 galvanized steel to meet SMACNA and UMC Standards for commercial construction.

The CB-SOG is manufactured with a 1" formed on flange and Stick on Gasket to provide air-tight installation.

The CB-SOG should be installed using SMACNA installation standards.

Order Size	Diameter	Cone Diameter	Hole Cut Diameter	Length w/ Damper	Length w/o Damper	Extractor	
						90°	45°
4"	3 ⅞"	5 ⅞"	5 ¾"	10"	6"	2"	2"
5"	4 ⅞"	6 ⅞"	6 ¾"	10"	6"	2 ½"	2"
6"	5 ⅞"	7 ⅞"	7 ¾"	10"	6"	3	2 ½"
7"	6 ⅞"	8 ⅞"	8 ¾"	10"	6"	3 ½"	3"
8"	7 ⅞"	9 ⅞"	9 ¾"	10"	6"	4	3 ½"
9"	8 ⅞"	10 ⅞"	10 ¾"	10"	6"	4 ½"	4"
10"	9 ⅞"	11 ⅞"	11 ¾"	10"	6"	5	4 ½"
12"	11 ⅞"	13 ⅞"	13 ¾"	10"	6"	6	5"
14"	13 ⅞"	15 ⅞"	15 ¾"	10"	6"	7	6"
15"	14 ⅞"	16 ⅞"	16 ¾"	10"	6"	7	6"
16"	15 ⅞"	17 ⅞"	17 ¾"	10"	6"	8	7"
18"	17 ⅞"	19 ⅞"	19 ¾"	10"	6"	9	8"
20"	19 ⅞"	21 ⅞"	21 ¾"	10"	6"	10	9"

(+/-) 1/8" Tolerance on all Sizes

Optional Features

Gauge Options: standard 26 ga

- ☐ 24 ga
- ☐ 22 ga
- ☐ 20 ga

Material Options:

- ☐ Aluminum
- ☐ Stainless steel

Construction Options:

- ☐ Extractor:
  __45° or __90°
- ☐ Insulation Guard
- ☐ All seams sealed

Damper Options:

- ☒ BO3, Build-Out (2"), 3/8" square shaft, U-bolt, nylon bushings, locking quadrant, handle
- ☐ BO4, Build-Out (2"), 3/8" square shaft, U-bolt, nylon bushings, Rossi Everlock locking quadrant, handle

BO3
- 2" Build out
- Locking Quadrant
- 3/8" Aluminum Square Shaft
- Nylon Bushing

BO4
- 2" Rossi (Ever-lock) Build out
- Locking Quadrant
- 3/8" Aluminum Square Shaft
- Nylon Bushing

Flexmaster U.S.A.®
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Fax + 1.713.939.8441
www.FlexmasterUSA.com
www.Masterduct.com

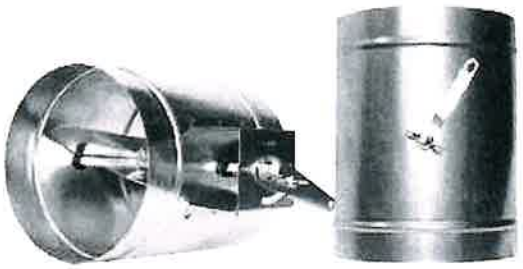
FLEXMASTER U.S.A.®
A MASTERDUCT COMPANY

SUBMITTAL DATA

Mobile Casting Unit Dampers

Flexmaster U.S.A.® Connecting Sleeve

SHEET METAL FITTINGS



The Flexmaster U.S.A.® Connecting Sleeve (SL) is manufactured from 26 gauge, or heavier, galvanized steel to meet SMACNA and UMC Standards for commercial construction.

The SL should be installed using SMACNA installation standards.

Order Size	Diameter	Hole Cut Diameter	Length w/ and w/o Damper
4"	3 ⅜"	5 ¾"	7 ½"
5"	4 ⅜"	6 ¾"	7 ½"
6"	5 ⅜"	7 ¾"	7 ½"
7"	6 ⅜"	8 ¾"	7 ½"
8"	7 ⅜"	9 ¾"	7 ½"
9"	8 ⅜"	10 ¾"	7 ½"
10"	9 ⅜"	11 ¾"	7 ½"
12"	11 ⅜"	13 ¾"	7 ½"
14"	13 ⅜"	15 ¾"	7 ½"
15"	14 ⅜"	16 ¾"	7 ½"
16"	15 ⅜"	17 ¾"	7 ½"
18"	17 ⅜"	19 ¾"	7 ½"
20"	19 ⅜"	21 ¾"	7 ½"

(+/-) 1/8" Tolerance on all Sizes

Optional Features

Gauge Options: standard 26 ga

- ☐ 24 ga
- ☐ 22 ga
- ☐ 20 ga

Material Options:

- ☐ Aluminum
- ☐ Stainless steel

Damper Options:

- ☒ BO3, Build-Out (2"), 3/8" square shaft, U-bolt, nylon bushings, locking quadrant, handle
- ☐ BO4, Build-Out (2"), 3/8" square shaft, U-bolt, nylon bushings, Rossi Everlock locking quadrant, handle

BO3
- 2" Build out
- Locking Quadrant
- 3/8" Aluminum Square Shaft
- Nylon Bushing

BO4
- 2" Rossi (Ever-lock) Build out
- Locking Quadrant
- 3/8" Aluminum Square Shaft
- Nylon Bushing

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FLEXMASTER U.S.A.®
A MASTERDUCT COMPANY

January 10, 2024

SUBMITTAL DATA

Project Name: Anduril Industries – Air Distribution

Contractor: Ivey Mechanical Co.

Submitted By:
Trent Dismuke
Airflo Sales, Inc.
103 First Choice Dr.
Madison, MS 39110
Phone: 601-898-1017
Fax: 601-898-1018

Items Submitted: Flexmaster Type 1 Insulated Flex Duct (GRD Hook-Ups)
Flexmaster Type 5 Insulated Flex Duct (Mobile Casting Unit Hook-Ups)
Flexmaster Stainless Steel Flex Clamps

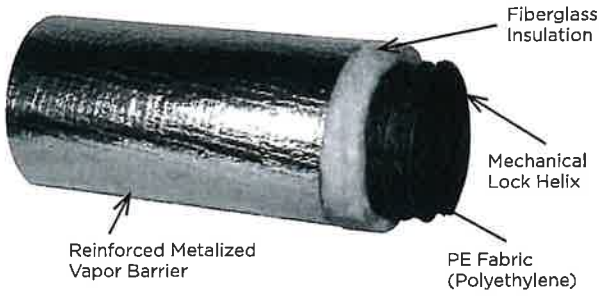
Approved By:

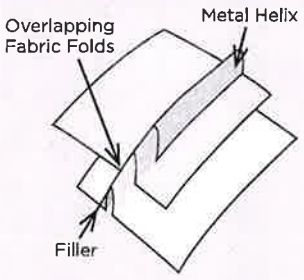
Date of Approval:

SUBMITTAL DATA GRD Hook-Ups

Flexmaster U.S.A.® 1M

Acoustical Flexible Duct Insulated





Metal Helix

Technical Data	
Standard Lengths (ft)	25 ft
Inside Diameter (in)	3", 4", 5", 6", 7", 8", 9", 10", 12", 14", 15", 16", 18", 20"
Air Friction Loss	See Friction Loss Chart for details
Vapor Barrier Permeance	(.05) perm A.S.T.M. E96, Procedure A
Test Standard	UL181
Tested By	Intertek/ETL
Certifications Met	Class 1 Air Duct, NFPA 90A and 90B, BOCA, SBBC, HUD/FHA, MIN Property Std.
Internal Working Pressure (w.g.)	10" w.g. positive 5" w.g. negative thru 16" dia. 1" w.g. negative, 18" & 20" dia.
Rated Velocity	5500 F.P.M.
Min Burst Pressure	2 1/2 times working pressure
Operating Temperature Range	-20° to +250°F
Flame/Smoke	25/50
Insulation Thermal Conductance	[redacted]R6, [redacted]

Like the UL Mark, the ETL Listed Mark shows that our product has been independently tested by a Nationally Recognized Testing Laboratory (NRTL). It shows that it has met the requirements of widely accepted product safety standards and that we have agreed to periodic follow-up inspections to verify continued compliance.

Construction Features

The Flexmaster U.S.A.® Type 1M is manufactured to meet the highest quality standards in strength, permeability and fire resistance required in a flexible duct. Tested to UL standard 181, this Class 1 Air Duct is fabricated with an acoustically transparent PE inner film which allows mid-range sound energy to penetrate the duct wall.

Duct Fabric

A Polyethylene fabric, mechanically locked to the duct helix without the use of adhesives.

Duct Helix

Made from corrosive resistant galvanized steel, the duct helix is mechanically formed to attach the duct fabric without the use of adhesives.

Vapor Barrier

Fire retardant, reinforced aluminum material. Excellent strength at low temperatures. Will not age harden.

Insulation

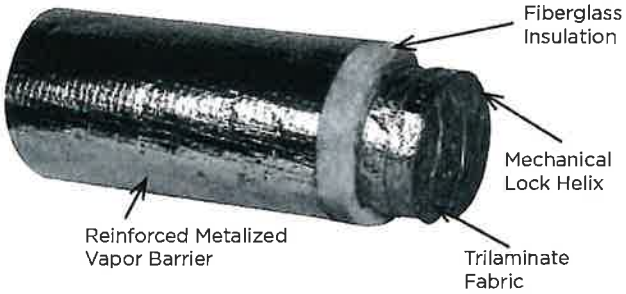
Formaldehyde-free fiberglass insulation by Johns Manville.

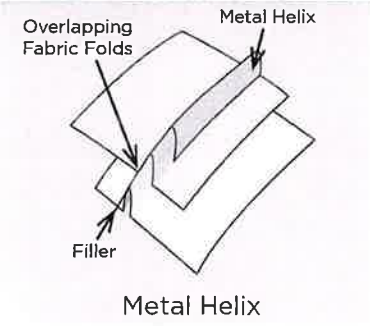
SUBMITTAL DATA

Mobile Casting Unit Hook-Ups

Flexmaster U.S.A.® 5M

Medium Pressure Flexible Duct Insulated





Metal Helix

Technical Data	
Standard Lengths (ft)	25 ft
Inside Diameter (in)	3", 4", 5", 6", 7", 8", 9", 10", 12", 14", 15", 16", 18", 20"
Air Friction Loss	See Friction Loss Chart for details
Vapor Barrier Permeance	(.05) perm A.S.T.M. E96, Procedure A
Test Standard	UL181
Tested By	Intertek/ETL
Certifications Met	Class 1 Air Duct, NFPA 90A and 90B, BOCA, SBBC, HUD/FHA, MIN Property Std.
Internal Working Pressure (w.g.)	15" w.g. positive 10" w.g. negative thru 12" dia. 5" w.g. negative 14" & 16" dia. 1" w.g. negative, 18" & 20" dia.
Rated Velocity	5500 F.P.M.
Min Burst Pressure	2 1/2 times working pressure
Operating Temperature Range	-20° to +250°F
Flame/Smoke	25/50
Insulation Thermal Conductance	[redacted] R6, [redacted]

Like the UL Mark, the ETL Listed Mark shows that our product has been independently tested by a Nationally Recognized Testing Laboratory (NRTL). It shows that it has met the requirements of widely accepted product safety standards and that we have agreed to periodic follow-up inspections to verify continued compliance.

Construction Features

The Flexmaster U.S.A.® Type 5M is manufactured to meet the highest quality standards in strength, permeability and fire resistance required in a flexible duct. Tested to UL standard 181, this Class 1 Air Duct is fabricated for application in a low to medium pressure HVAC air distribution system.

Duct Fabric

A Trilaminate of Aluminum Foil, Fiberglass and Aluminized Polyester, mechanically locked to the duct helix without the use of adhesives.

Duct Helix

Made from corrosive resistant galvanized steel, the duct helix is mechanically formed to attach the duct fabric without the use of adhesives.

Vapor Barrier

Fire retardant, reinforced aluminum material. Excellent strength at low temperatures. Will not age harden.

Insulation

Formaldehyde-free fiberglass insulation by Johns Manville.

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