Submittal For Double Wall Spiral With Non-Gasketed Fittings

Project Name:_____

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HRANEC CORP.

SUBMITTAL
Double Wall Spiral

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SPECIAL NOTES:

● **SUBMITAL =** INCLUDES ALL AVAILABLE MATIERIALS, CONNECTIONS AND PRESSURE CLASSES REFFERANCE OUR FABRICATION FORM FOR PROJECT SPECIFIC DUCTWORK INFORMATION. LISTED AS PAGE 1

● **FABRICATION =** ALL DUCTWORK IS FABRICATED PER SMACNA STANDARDS AND / PROJECT SPECIFICATIONS

● **MATERIALS FOR PAINTING =** RECOMMENDED MATERIAL FOR PAINTED SPIRAL DUCT = PAINT GRIP, HOWEVER GALVANIZED G90 CAN EASILY BE PAINTED WITH EXTRA PREP WORK.

● **PREP BEFORE PAINTING =** WE RECOMMENDED WIPING DOWN MINIMAL EXCESS LUBRICANT TWICE BEFORE PAINTING WITH DRY RAGS. IN ADDITION, WIPE DOWN WITH NO RINSE PREPAINT CLEANER #13158 (SHERWIN WILLIAMS) BEFORE APPLYING TWO COATS METAL PRIMER.

●**PAINT AND PRIMER** = ALL PRIMER AND PAINT SHOULD BE LABELED TO ADHERE TO METAL PAINTING APPLICATIONS. FOLLOW PAINT MANUFACTURERS APPLICATION PROCEDURES, TEMERATURE, HUMIDITY, SURFACE PREP WORK, ETC.

●**CAUTION =** IF A STEEL CABLE HANGING SYSTEM IS USED TO SUSPEND DUCT WORK, DO NOT APPLY PAINT, LUBRICANTS, OR OTHER COATINGS TO THE HANGING SYSTEM. FOLLOW HANING SYSTEM MANUFACTURERS INSTRUCTIONS

●**TESTING** = OUR SPIRAL DUCTWORK HAS BEEN EXTENSIVELY AIR TESTED FOR LOW, MEDIUM, & HIGH PRESSURES.

●**SEAMS =** LONGITUDINAL SEAMS ARE ALL STITCH WELDED ON FITTINGS.

●**GAUGES** = METAL GAUGES ARE PRESSURE CLASS DRIVEN FROM LATEST SMACNA STANDARDS

●**SEALANT** = PROPER SEALING OF ALL COMPONENTS ESSPECIALLY CONNECTIONS. IS REQUIRED TO AVOID DARK AIR STREAKS AFTER INSTALLATION.

●**MATERIAL =** GALVANIZED, PAINT GRIP, SS304, SS316, PVC 4X4, ALUMINUM

● **INNER MATERIAL =** STANDARD INNER MATERIAL IS PERFORATED GALVANIZED ON SPIRAL PIPE AND SOLID GALVANIZED ON FITTING, SOLID SS304, SS316, AND ALUMINUM ARE ALSO AVAILABLE

●**WATER PROOF =** SPIRAL SEAM DUCT WORK IS NOT CONSTRUCTED TO BE WATER PROOF

PRESSURE CLASSES

POSITIVE PRESSURE

2005 SMACNA +10WG -6WG

Diameter	Fittings	Spiral
3-9	28	28
9-14	28	28
15-18	26	26
19-24	24	26
25-42	22	24
43-60	20	22
61-66	18	22
67-96	18	20

ALUMINUM
2005 SMACNA +4WG -6WG

Dia.	Fittings	Spiral
3-8	**0.032**	**0.025**
9-14	**0.032**	**0.025**
15-26	**0.040**	**0.032**
27-36	**0.050**	**0.040**
37-50	**0.063**	**0.050**
51-60	**0.071**	**0.063**

GALV, PG, SS, PVC ("Steel")

HRANEC PIPE		HRANEC FITTINGS	
Size	Gauge	Size	Gauge
4"-18"	26	5"-20"	24
20-28	24	22-36	22
30-38	22	38-50	20
40-48	20	52-60	18
50-58	18	62-70	16
60-70	16		

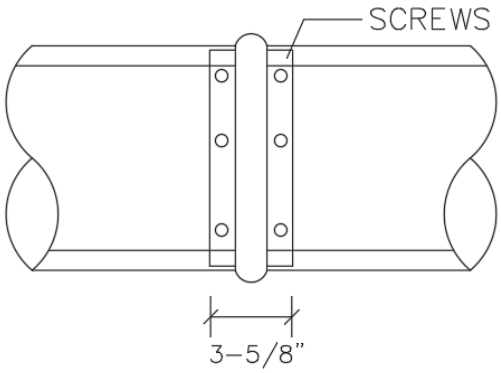
ALUM

HRANEC PIPE		HRANEC FITTINGS	
SIZE	GAUGE	SIZE	GAUGE
4"- 40"	**.040**	**4" – 40"**	**.040**
42" - 70"	**.050**	**42" – 70"**	**.050**

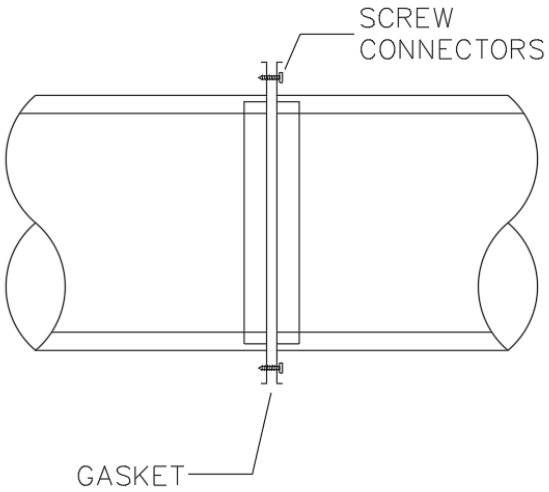
- **ALL GAUGE AND DIAMETER PIPE WILL BE SPIRAL SEAM**
- **ALL STEEL FITTINGS 24 GAUGE TO 20 GAUGE TO HAVE GORELOCK TRANSVERSE SEAM**
- **ALL STEEL FITTINGS 24 GAUGE TO 20 GAUGE TO HAVE STITCH WELD LONGITUDINAL SEAM**
- **ALL STEEL FITTINGS 18 GAUGE TO 16 GAUGE TO HAVE TACK WELDED AND SEALED TRANSVERSE SEAM**
- **ALL STEEL FITTINGS 18 GAUGE TO 16 GAUGE TO HAVE TACK WELDED AND SEALED LONGITUDINAL SEAM**
- **ALL ALUMINUM FITTINGS 50" AND SMALLER TO HAVE GORELOCK TRANSVERSE SEAM**
- **ALL ALUMINUM FITTINGS 50" AND SMALLER TO HAVE BUTTON LOCK LONGITUDINAL SEAM**
- **ALL ALUMINUM FITTINGS 52" AND LARGER TO HAVE BUTTON LOCK TRANSVERSE SEAM**
- **ALL ALUMINUM FITTINGS 50" AND SMALLER TO HAVE TACK WELDED AND SEALED LONGITUDINAL SEAM**

CONNECTIONS AVAILABLE FOR ROUND DUCT AND FITTINGS

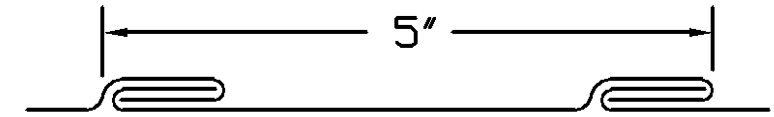
1. **SLIP FIT = RECOMMENDED INSTALLATION = FITTINGS WILL SLIP INTO TO SPIRAL PIPE. FITTINGS WILL HAVE A 1 INCH EXTENSION ON THE INNER WALL THAT SHOULD BE INSERTED FIRST. THE OUTER WALL WILL BE INSERTED AFTER THE INNER WALL. CAULKING SHOULD BE USED TO SEAL THE CONNECTION. SCREWS MUST BE USED TO SECURE THE CONNECTION. SCREWS SHOULD BE PLACED EVERY 10 INCHES AROUND THE DIAMETER.**



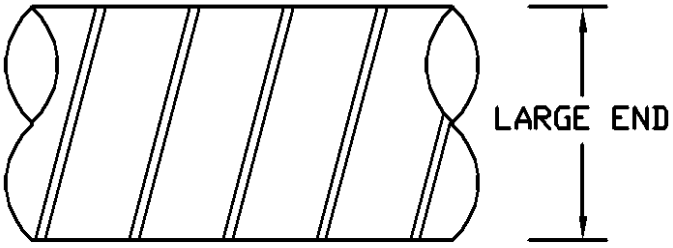
2. **DOUBLE – WALL FLANGE = RECOMMENDED INSTALLATION = FLANGED CONNECTION TO BE GASKETED OR CAULKED AND SCREWED EVERY 10" AROUND THE DIAMETER**



SPIRAL DUCT



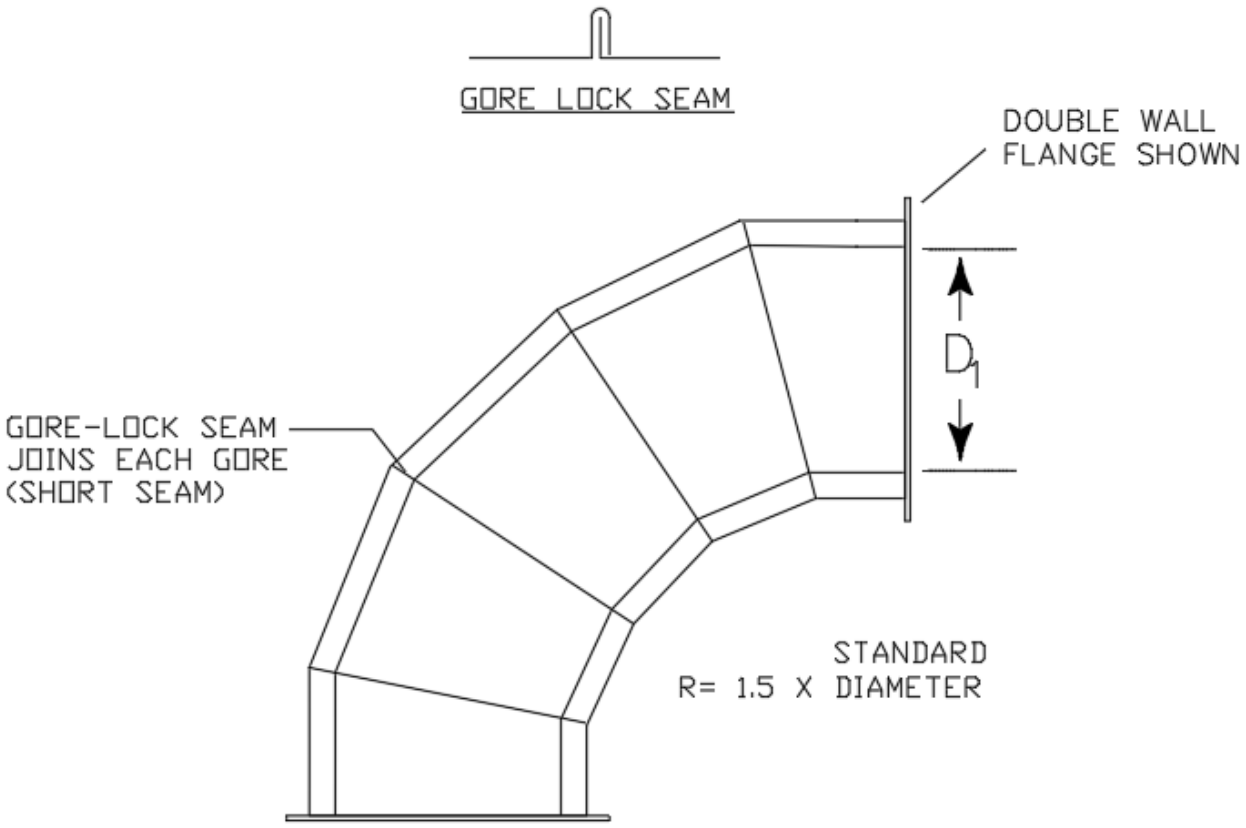
LATERAL SECTION OF 4-PLY PRESSURE PROOF SPIRAL SEAM



NOTES:

A. AVAILABLE IN EVEN SIZES 4"Ø THROUGH 70" Ø
B. AVAILABLE IN ODD SIZES 5"Ø, 7", & 9"Ø
C. LENGTHS - 6" THROUGH 240" (STANDARD 120")

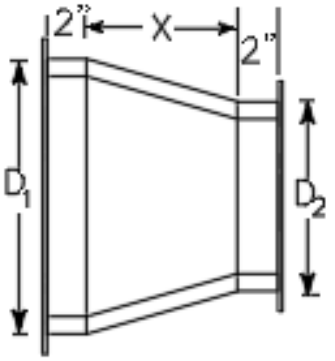
GORE-LOCK ELBOW



- **AVAILABLE IN 5° THROUGH 120°**
- **SHORT RADIUS ELBOWS ARE CONSIDERED 1 X DIAMETER AND IS CENTERLINE**
- **OTHER RADIUS ELBOWS ARE AVAILABLE**

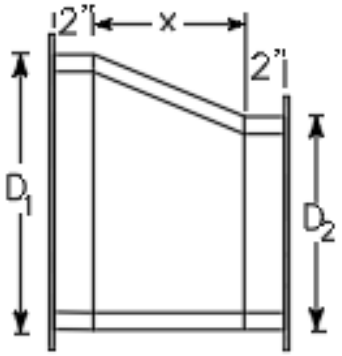
REDUCERS

CONCENTRIC REDUCER



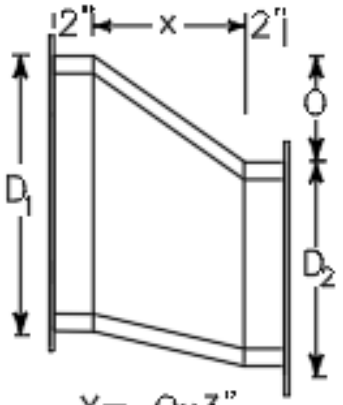
X= $D_1 - D_2 / 2 \times 3$
4" Minimum

ECCENTRIC REDUCER



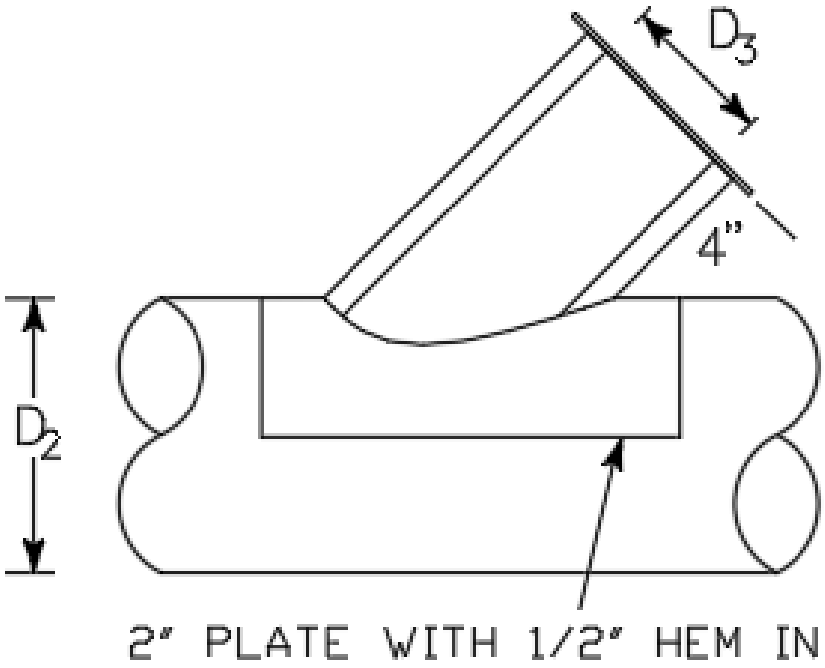
X= $D_1 - D_2 (3)$
4" Minimum

OFFSETTING REDUCER

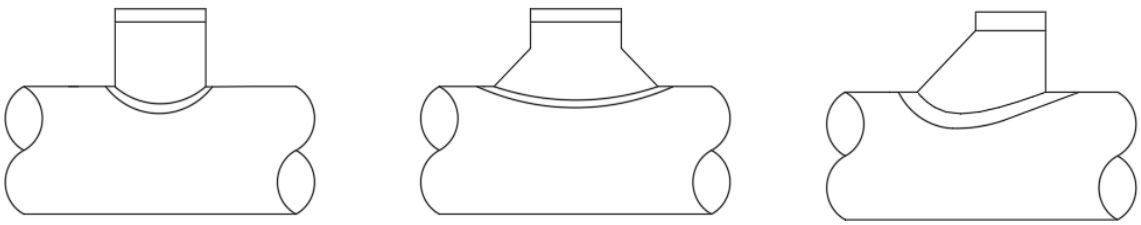


X= Ox3"
4" Minimum

ROUND END SADDLE TAPS

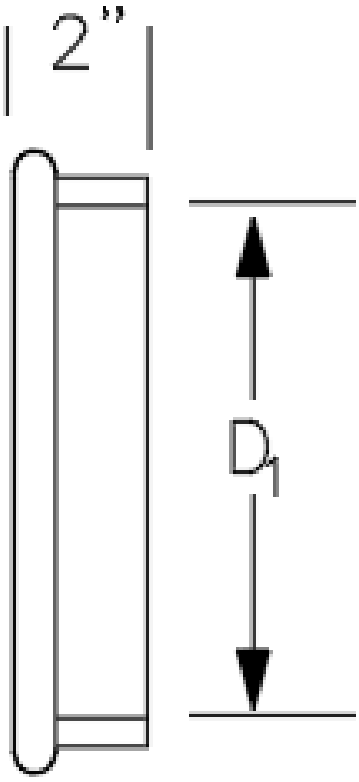


- **STANDARD 45 DEGREE&90 DEGREE ANGLES. ALTERNATE ANGLES AVAILABLE.**
- **90 DEGREE CONICAL AVAILABLE.**
- **HIGH EFFICIENCY SHOE STYLE AVAILABLE**

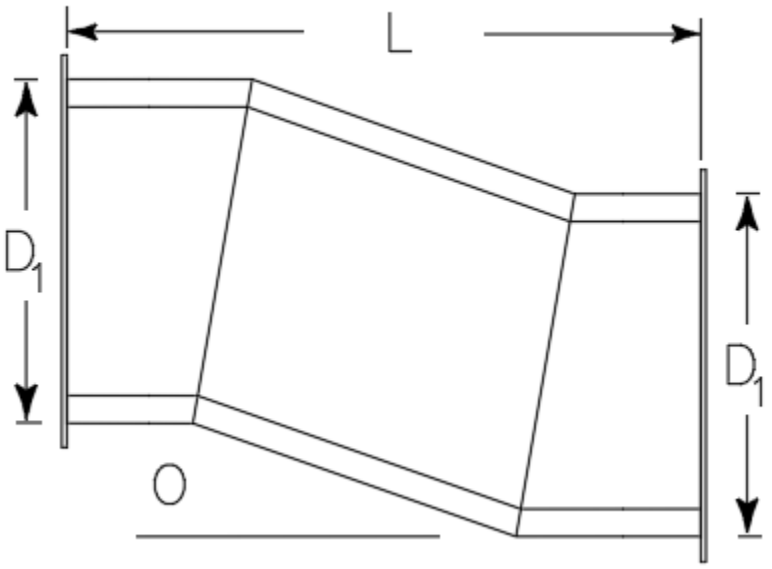


90 DEGREE SADDLE | CONICAL SADDLE | SHOE STYLE SADDLE

END CAPS

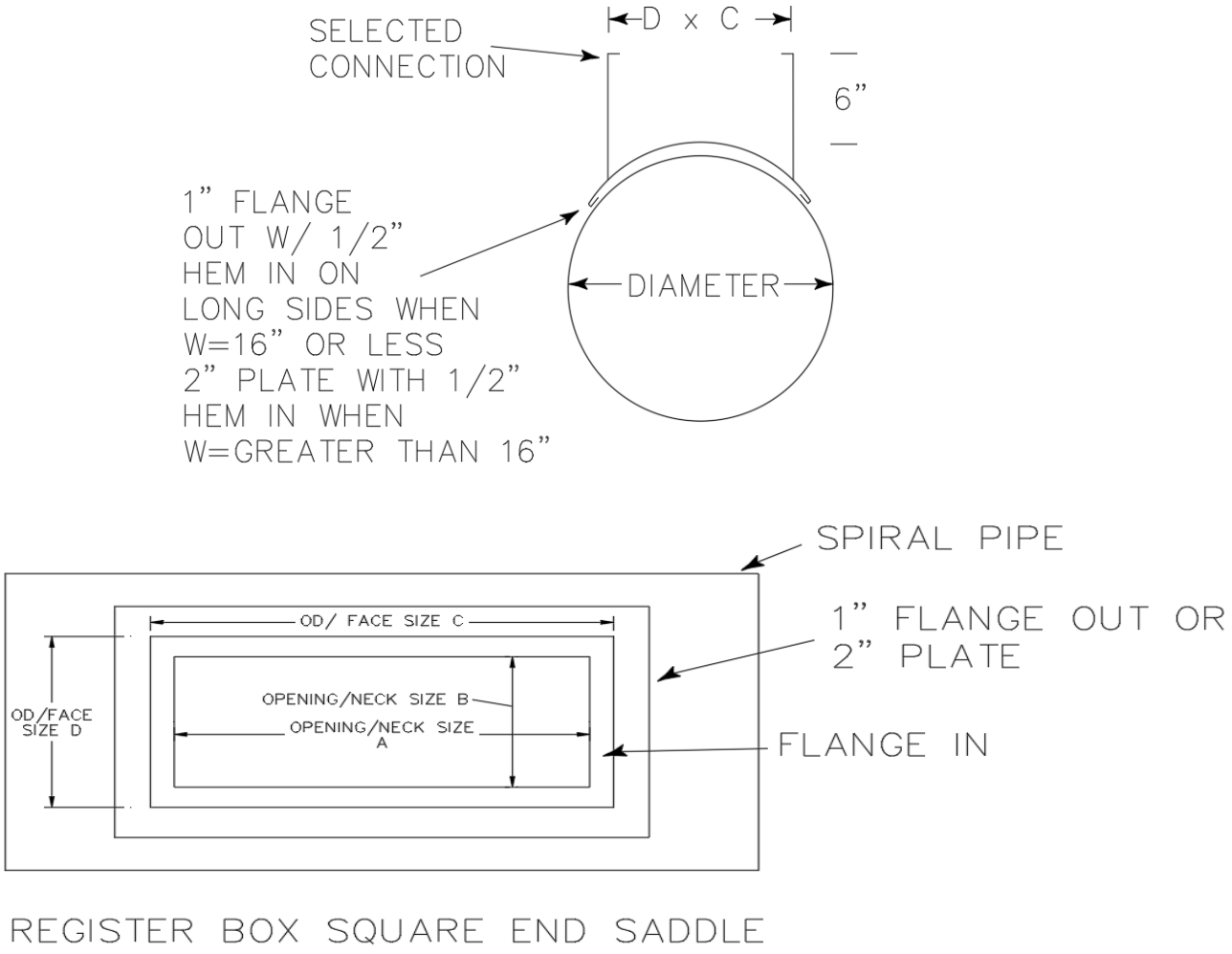


OFFSETS



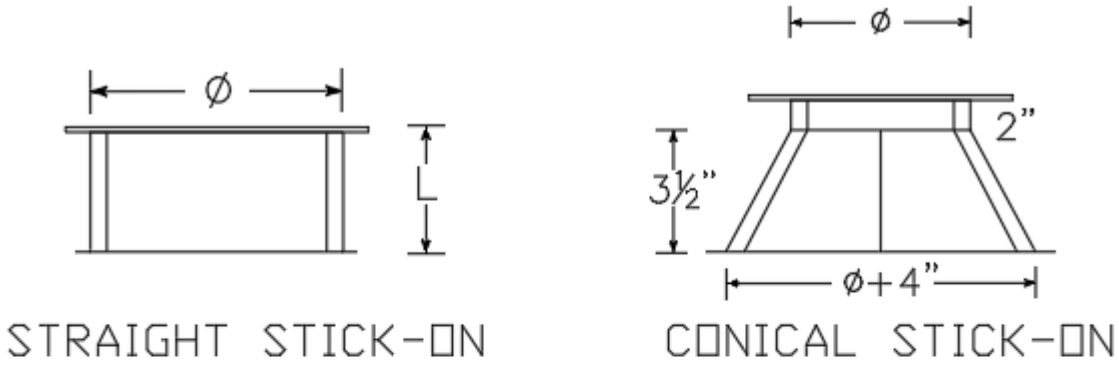
- **LENGTH TWO OR THREE TIMES THE OFFSET**

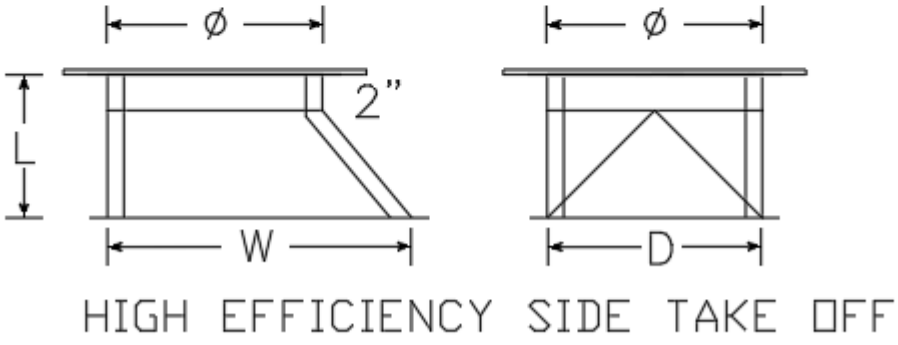
RECTANGULAR END SADDLE TAPS



- **SPOT WELDED SEAMS USED ON BOXES**
- **STANDARD RECTANGULAR CONNECTION IS FLANGE IN**
- **ALTERNATE CONNECTIONS AVAILABLE: SLIP AND DRIVE, TDC, OR PREMANUFACTURED FLANGE FOR RECTANGULAR END**

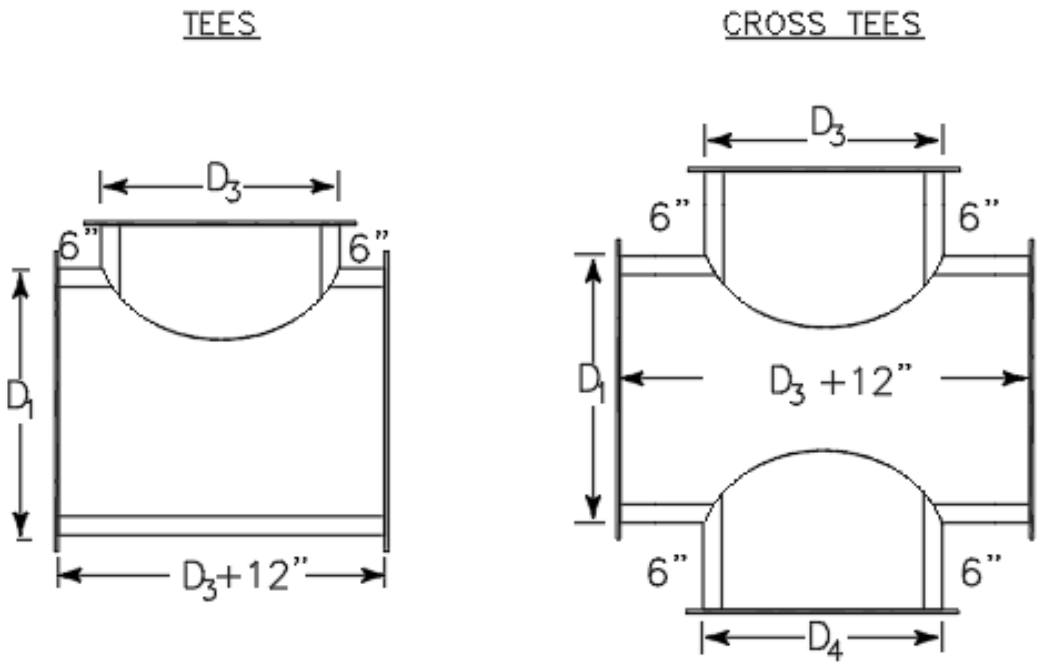
ROUND TAPS OFF FLAT SURFACES





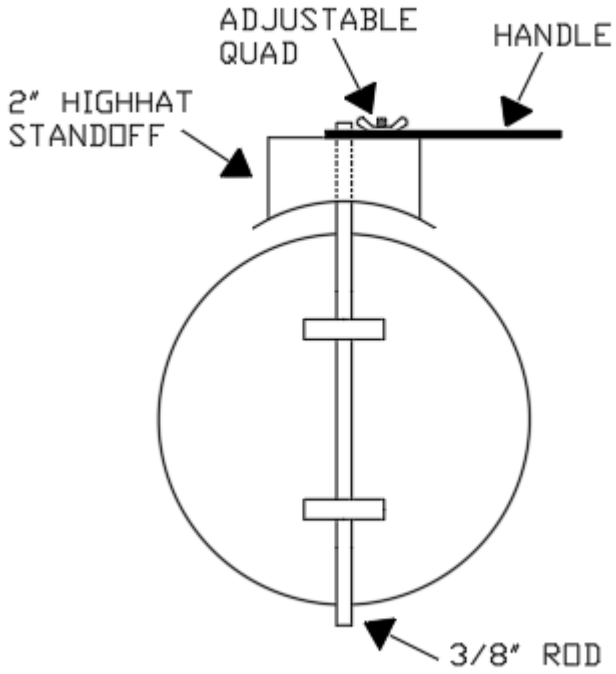
- **ALL TAPS HAVE 3/4” FLANGE OUT WITH 1/8” THICK GASKET.**
- **45 DEGREE LATERAL TAPS AVAILABLE**
- **INSTALLED DAMPERS AVAILABLE (SEE DAMPER SHEET FOR DETAILS)**

TEES AND CROSSES



- **SEALED, TACK WELDED SEAMS, STITCH WELDED LONGITUDINAL SEAMS**
- **CONICAL, SHOE STYLE, 45 DEGREE LATERAL TEES AND CROSSES AVAILABLE**
- **REDUCING TEES AND LATERALS ALSO AVAILABLE**

ROUND DAMPERS



DAMPER W/ 3/8" HARDWARE

- **DAMPER AVAILABLE IN SLEEVES, LOOSE, OR INSTALLED IN SPIRAL PIPE AND FITTINGS**

Atmosphere™ Duct Liner *with ECOSE® Technology*

Submittal Date _____

KNAUF INSULATION

DESCRIPTION

Knauf Insulation Atmosphere Duct Liner is a flexible, mat-faced insulation bonded with ECOSE Technology. It is faced with a tightly bonded mat to give the airstream a smooth, tough surface, resisting damage during installation and operation. The encapsulant edge coating eliminates airstream flaring.

ECOSE® TECHNOLOGY

ECOSE Technology is a revolutionary binder chemistry that enhances the sustainability of our products. The "binder" is the bond that holds our glass mineral wool product together and gives the product its shape and brown color. ECOSE Technology is a plant-based, sustainable chemistry that replaces the phenol/formaldehyde (PF) binder traditionally used in glass mineral wool products. Products using ECOSE Technology are formaldehyde-free and have reduced global warming potential when compared to our products of the past.

APPLICATION

Specifically designed as an interior insulation material for sheet metal ducts used in heating, ventilating and air conditioning. Provides an optimum combination of efficient sound absorption, low thermal conductivity and minimal airstream surface friction.

PRODUCT FEATURES

- Low thermal conductivity
- Fire-resistant, non-corrosive, durable and resilient
- Tough, tightly bonded mat facing
- Excellent sound absorption
- Energy conservation
- Better temperature control
- Lowers operating costs
- Greatly reduces noise from fans and mechanical equipment as well as cross-talk and air movement
- Withstands damage from normal handling and shop abuse
- If necessary, can be cleaned in accordance with NAIMA's "Cleaning Fibrous Glass Insulated Air Duct Systems Recommended Practices"
- Low emitting for indoor air quality consideration
- Airstream surface mat facing is treated with an EPA-registered antimicrobial agent to aid in the prevention of fungal and bacterial growth

SUSTAINABILITY

Knauf Insulation's products used for thermal insulating purposes recover the energy that it took to make them in just hours or days, depending on the application. Once installed, the product continues to save energy and reduce carbon generation as long as it is in place.

Glass mineral wool insulation with ECOSE Technology contains three key ingredients:

- Recycled glass content, verified every six months by UL Environment
- Sand, one of the world's most abundant resources
- Our green chemistry initiative ECOSE Technology, which is validated to be formaldehyde-free

SPECIFICATION COMPLIANCE

In U.S.

- ASTM C1071; Type I
- ASTM G21 and G22
- NFPA 90A and 90B
- ASHRAE 62

In Canada

- CAN/ULC S102
- CAN/CGSB-51.11-92

INDOOR AIR QUALITY

- UL Environment
  - GREENGUARD certified
  - GREENGUARD Gold certified
  - Validated to be formaldehyde-free
- Does not contain polybrominated diphenyl ethers (PBDE) such as Penta-BDE, Octa-BDE, or Deca-BDE
- EUCEB

APPLICATION & SPECIFICATION GUIDELINES

Storage

- Inside storage is recommended.

Fabrication and Application

- Fabricate in compliance with the latest edition of "NAIMA's Fibrous Glass Duct Liner Standard."
- Liner shall be folded and compressed in the corners of rectangular duct sections or shall be cut and fit to assure lapped, compressed joints. Longitudinal joints in duct liner should not occur except at the corner of ducts. Longitudinal joints in liner shall be coated with adhesive. All damaged areas of the air stream surface shall be repaired with an adhesive which conforms to ASTM C916.
- Liner should be adhered to the duct with 90% minimum area coverage of an adhesive which conforms to ASTM C916.
- Mechanical fasteners should not compress the insulation more than ⅛" (3 mm), and shall be installed perpendicular to the duct surface. All fasteners should comply with the guidelines of NAIMA's "Fibrous Glass Duct Liner Standard and the Mechanical Fastener's Standard MF-1-1975."
- Metal nosings shall be securely installed over transversely oriented liner edges facing the airstream at fan discharge, at access doors and at any interval of lined duct preceded by unlined duct. In addition, where velocities exceed 4,000 ft./min. (20.3 m/sec.), metal nosing shall be used on upstream edges of liner at every transverse joint (See illustration)

Limitations

- Knauf Insulation Atmosphere Duct Liner with ECOSE Technology should not be used in systems operating at velocities exceeding 6,000 ft./min. (30.5 m/sec.) or at temperatures above 250° F (121° C).

MAINTAINED DUCT SYSTEMS ARE KEY

The best way to ensure that an HVAC system, whether bare metal or internally insulated, will continue to provide efficient, quiet air delivery, occupant comfort, and cost-effectiveness is by following a regular system operation and maintenance schedule. This, along with a high-efficiency filtration system, assures protection of both HVAC system components and building occupants. Maintenance procedures include inspection, detection, and remediation of proable sources of airborne contaminants and moisture.

CERTIFICATIONS

- UL Environment
  - GREENGUARD
  - GREENGUARD Gold
  - Formaldehyde-free
  - UL/ULC Classified
- Declare Red List Free
- EUCEB
- USGBC LEED

GLASS MINERAL WOOL AND MOLD

Glass mineral wool insulation will not sustain mold growth. However, mold can grow on almost any material when it becomes wet and contaminated. Carefully inspect any insulation that has been exposed to water. If it shows any sign of mold, it must be discarded. If the material is wet but shows no evidence of mold, it should be dried rapidly and thoroughly. If it shows signs of facing degradation from wetting, it should be replaced. Air handling insulation used in the air stream must be discarded if exposed to water.

NOTES

The chemical and physical properties of Knauf Insulation Atmosphere™ Duct Liner with ECOSE® Technology represent typical average values determined in accordance with accepted test methods. The data is subject to normal manufacturing and testing variations. The data is supplied as a technical service and is subject to change without notice. References to numerical flame spread ratings are not intended to reflect hazards presented by these or any other materials under actual fire conditions.

When condensation is permitted to occur between nested Atmosphere Duct Liner and galvanized steel panels, discoloration of the metal may occur.

Check with your Knauf Insulation Territory Manager to ensure information is current.

with ECOSE

Atmosphere™ Duct Liner *with ECOSE® Technology*

Submittal Sheet

KNAUF INSULATION

Technical Data

Property (Unit)	Test	Performance
Corrosiveness	ASTM C665	Does not accelerate corrosion of steel
Corrosion	ASTM C1617	Pass
Maximum Service Temperature	ASTM C411	250° F (121° C)
Air Velocity	ASTM C1071	Max. 6,000 ft./min. (30.5 m/sec.) Tested to 15,000 ft./min. (76.2 m/sec.)
Water Vapor Sorption (by weight)	ASTM C1104	Less than 3%
Mold Growth	ASTM C1338, UL 2824, ASTM G21, ASTM G22	Pass
Surface Burning Characteristics (flame spread/smoke developed)	ASTM E84, UL 723, CAN/ULC S102	25/50

Thermal Conductance "C"* and Resistance "R"† (ASTM C177)

Mean Temperature 75° F (24° C)

Product		Conductance "C"	Resistance "R"†
1.5 PCF (24 kg/m³)	1" (25 mm)	0.24 (1.42)	R-4.2 (0.74)
	1.5" (38 mm)	0.17 (0.97)	R-6.0 (1.06)
	2" (51 mm)	0.13 (0.74)	R-8.0 (1.41)
2.0 PCF (32 kg/m³)	0.5" (13 mm)	0.48 (2.73)	R-2.1 (0.37)
	1" (25 mm)	0.24 (1.36)	R-4.2 (0.74)
	1.5" (38 mm)	0.16 (0.91)	R-6.3 (1.11)

"C Units" $\frac{BTU}{ft^2 \cdot hr \cdot °F}\left(\frac{W}{m^2 \cdot °C}\right)$ "R Units" $\frac{ft^2 \cdot hr \cdot °F}{BTU}\left(\frac{m^2 \cdot °C}{W}\right)$

*The lower the value, the better the performance. †The higher the value, the better the performance.

Atmosphere™ Duct Liner *with ECOSE® Technology*

Submittal Sheet

KNAUF INSULATION

Forms Available

Density	Thickness**	Width	Length
1.5 PCF	1"	34"–36"* (864 mm–915 mm) 46"–48" (1168 mm–1219 mm) 56"–72" (1422 mm–1829 mm)	50' (15.24 m)
			100' (30.48 m)
			140' (42.67 m)
			200' (60.96 m)
	1.5"		50' (15.24 m)
			90' (27.43 m)
	2"		50' (15.24 m)
			100' (30.48 m)
2.0 PCF	0.5"		100' (30.48 m)
	1"		50' (15.24 m)
			100' (30.48 m)

*Widths of 34"–36" not available with edge coating.
**Non-standard widths for all 0.5", 1", 1.5", and 2" products from 34"–36", 46"–48" and 56"–72" are available in 25" (6.35 mm) increments of minimum order quantity.

Sound Absorption Coefficients | ASTM C423, Type A Mounting

Type		Octave Band Center Frequency (cycles/sec.)						
		125	250	500	1000	2000	4000	NRC
1.5 PCF (24 kg/m³)	1" (25 mm)	0.18	0.28	0.73	0.85	0.91	0.90	0.70
	1.5" (38 mm)	0.23	0.50	0.87	0.92	0.93	0.93	0.80
	2" (51 mm)	0.37	0.76	1.02	1.00	0.98	0.92	0.95
2.0 PCF (32 kg/m³)	0.5" (13 mm)	0.10	0.17	0.43	0.59	0.73	0.75	0.50
	1" (25 mm)	0.25	0.35	0.69	0.89	0.96	1.01	0.70
	1.5" (38 mm)	0.27	0.55	0.87	0.99	1.00	0.98	0.85

Coefficients determined per ASTM E795 Type A Mounting.
NOTE: ASHRAE Handbook for HVAC Applications – Sound and Vibration Control contains insertion loss values for lined sheet metal ducts.

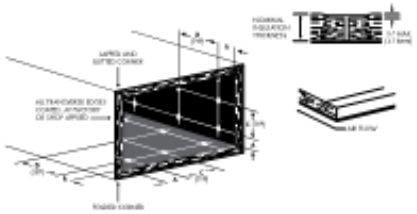
Atmosphere™ Duct Liner *with ECOSE® Technology*

Submittal Sheet

KNAUF INSULATION

Mechanical Fastener Location

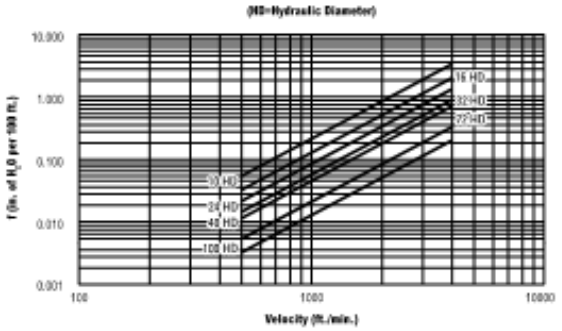
Velocity per ft./min. (m/sec.)	0-2500 (0-12.7)	2501-5000 (12.7-25.4)
A. From corners of duct	4" (102 mm)	4" (102 mm)
B. From transverse end of duct liner	3" (76 mm)	3" (76 mm)
C. Across width of duct, on centers (min. 1/side)	12" (305 mm)	12" (305 mm)
D. Across length of duct, on centers (min. 1/side)	18" (457 mm)	18" (457 mm)



Liner Interior Width

No. Pins	Inches	(mm)
0	≤ 8	≤ 203
2	9-16	229-406
3	17-28	432-711
4	29-40	737-1016
5	41-52	1041-1321
6	53-64	1346-1626
7	65-76	1651-1930
8	77-88	1956-2235
9	89-100	2261-2540

Friction Loss | Inches of water per 100'



Ft./min. Velocity	Hydraulic Diameter 10"	16"	24"	32"	40"	72"	100"
500	0.054	0.030	0.018	0.012	0.009	0.005	0.003
600	0.077	0.042	0.025	0.018	0.013	0.007	0.004
700	0.104	0.057	0.034	0.024	0.018	0.009	0.006
800	0.134	0.074	0.044	0.031	0.023	0.011	0.008
900	0.169	0.093	0.056	0.039	0.029	0.014	0.010
1000	0.207	0.114	0.068	0.048	0.036	0.018	0.012
2000	0.806	0.443	0.266	0.186	0.141	0.069	0.046
3000	1.797	0.988	0.594	0.415	0.315	0.153	0.103
4000	3.179	1.748	1.050	0.734	0.557	0.271	0.181
5000	4.952	2.724	1.636	1.143	0.867	0.422	0.283