



Quality People. Building Solutions.

Comfort Systems USA (Arkansas), Inc.

P.O. Box 16620

LittleRock, AR 72231

Phone 501-834-3320

Fax 501-834-5416

Date: 6/22/2026

Return Request: 6/29/2026

Project: Hot Springs National Park – Rehabilitate Bathhouses – Libbey Bathhouse

Supplier: Custom Metals

Manufacturer: Varies

Submittal: Ductwork (Re-Submittal #1)

Submittal Number: 233100.001

Spec Section: 233100

Drawing # and Installation Location: M1.1 and M1.2

ARCHITECT

Quinn Evans Architects

219-1/2 N. Main Street

Ann Arbor, Michigan 48104

(734)663-5888

GENERAL CONTRACTOR

Tepa, LLC

2345 Grand Blvd, Suite 700

Kansas City, Missouri 64108

(816)708-1110

ENGINEER

IMEG Corp.

1600 Baltimore Street, Suite 300

Kansas City, Missouri 64108

(816)842-8437

MECHANICAL SUBCONTRACTOR

Comfort Systems USA (Arkansas), Inc.

9924 Landers Road

North Little Rock, Arkansas 72117

(501)834-3320

Comments:

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CSUSA PROJECT NO.

25-7065

joe@comfortar.com

9924 Landers Road
No. LittleRock, AR 72117



Job: **Libbey Bathhouse Renovation**

Spec: **23 31 00 Ductwork**

Item: **Rectangle Ducts**

Submitted by:

Joe Minton Jr.

Vice President HVAC

(501) 607-0043

- DWM Rectangular Duct & Fittings are available in the following materials

- Galvanized G60 & G90
- Phosphatized (Paint-Grip)
- 304L Stainless Steel
- 316L Stainless Steel
- Polyvinyl Coated
- Aluminum

- Special materials are available. Please contact representative for more information.

- DWM products are manufactured in accordance with applicable SMACNA, ASHRAE & ASTM A 653 standards.

HVAC DUCT CONSTRUCTION STANDARDS METAL AND FLEXIBLE

THIRD EDITION – 2005



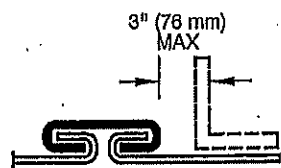
SHEET METAL AND AIR CONDITIONING CONTRACTORS'
NATIONAL ASSOCIATION, INC.
4201 Lafayette Center Drive
Chantilly, VA 20151-1209
www.smacna.org

Project: _____ Job No: _____

Location: _____ Date: _____

Mechanical Contractor: _____

RECTANGULAR DUCT CONSTRUCTION



T-1 - DRIVE SLIP
T-3 - REINFORCED

***All Rectangular Ducts
6" and Smaller**

- Gage no less than two gages less than duct gage
- 24 ga minimum
- Qualification as reinforcement per Table 2-48
- T-3 - Slip Gage as per T-1
 - Any length at 2 in. wg
 - 36 in. maximum length at 3 in. wg
 - 30 in. maximum length at 4 in. wg
 - Not allowed above 4 in. wg

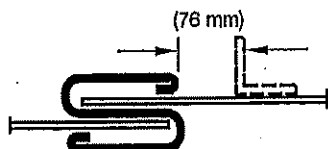


STANDING DRIVE SLIP
T-2

- ~~• Fasten standing portions within 2 in. of each end and elsewhere at 8 in. spacing or less~~
- ~~• Any length at 2 in. wg~~
- ~~• 36 in. maximum length at 3 in. wg~~
- ~~• 30 in. maximum length at 4 in. wg~~
- ~~• Not allowed above 4 in. wg~~



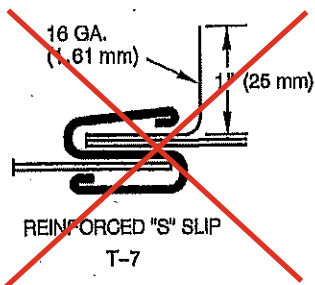
PLAIN "S" SLIP
T-5



T-6 HEMMED "S" SLIP
(T-6a REINFORCED)

***All Rectangular Ducts
6" and Smaller**

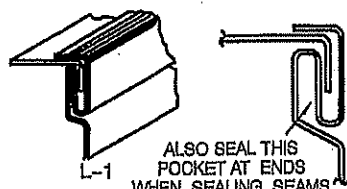
- Not less than two gages less than duct gage
- 24 ga minimum
- When used on all 4 sides, fasten within 2 in. of the corners and at 12 in. maximum intervals
- 2 in. wg maximum pressure



REINFORCED "S" SLIP
T-7

- ~~• Use slips conforming to T-6~~
- ~~• Use 16 ga angle of 1 in. height into slip pocket~~
- ~~• Fasten with screws at ends~~
- ~~• Angle used only for A, B, or C rigidity class~~
- ~~• 2 in. wg maximum pressure~~

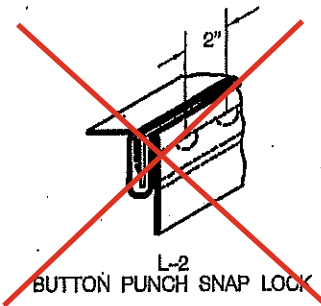
FIGURE 2-1 RECTANGULAR DUCT/TRANSVERSE JOINTS



PITTSBURGH LOCK

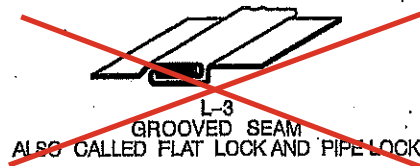
***All Rectangular Ducts**

- Pocket depth from 1/4 in. to 5/8 in.
- Use on straight duct and fittings
- To ± 10 in. wg



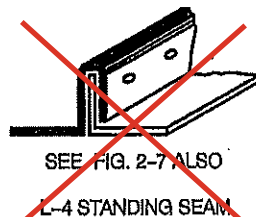
L-2
BUTTON PUNCH SNAP LOCK

- ~~5/8 in. pocket depth for 20, 22, and 24 ga.~~
- ~~1/4 in. pocket depth for 24 and 26 ga.~~
- ~~To ± 4 in. wg~~
- ~~Screws must be added at the ends of all duct of 4 in. wg and at the ends of 3 in. wg when the duct is over 48 in. width~~



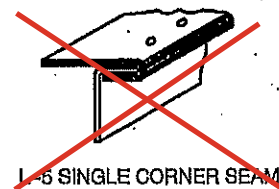
L-3
GROOVED SEAM
ALSO CALLED FLAT LOCK AND PIPE LOCK

- ~~To ± 10 in. wg~~



SEE FIG. 2-7 ALSO
L-4 STANDING SEAM

- ~~To ± 10 in. wg~~
- ~~1 in. seam up to duct width of 42 in.~~
- ~~1 1/2 in. seam for larger ducts~~
- ~~May be used on duct interiors~~
- ~~Fasten at 2 in. maximum from ends and at 8 in. maximum intervals~~



L-5 SINGLE CORNER SEAM

- ~~To ± 10 in. wg~~
- ~~Fasten as per L-4~~



FLANGED
(WITH GASKET)
T-25a



FLANGED
(WITH GASKET)
T-25b

***All Rectangular Ducts Larger than 6"**

- Assemble per Figure 2-17.
- Ratings may be adjusted with EI-rated bar stock or members from Tables 2-29 and 2-30
- Supplemental members may be attached to the duct wall on both sides of the joint
- Single members may be used if they are fastened through both mating flanges
- Gasket to be located to form an effective seal

FIGURE 2-2 RECTANGULAR DUCT/LONGITUDINAL SEAMS

SEE TABLES 2-47 AND 2-48.
 DUCTS WITH FLAT SLIP CONNECTORS
 AND NO REINFORCEMENT
 SEE OTHER FIGURES AND TEXT
 FOR COMPLETE REQUIREMENTS
 AND LIMITATIONS

JOINT OPTIONS



DRIVE SLIP
T-1



PLAIN "S" SLIP
T-5



HEMMED "S" SLIP
T-6



DOUBLE "S" SLIP
T-8

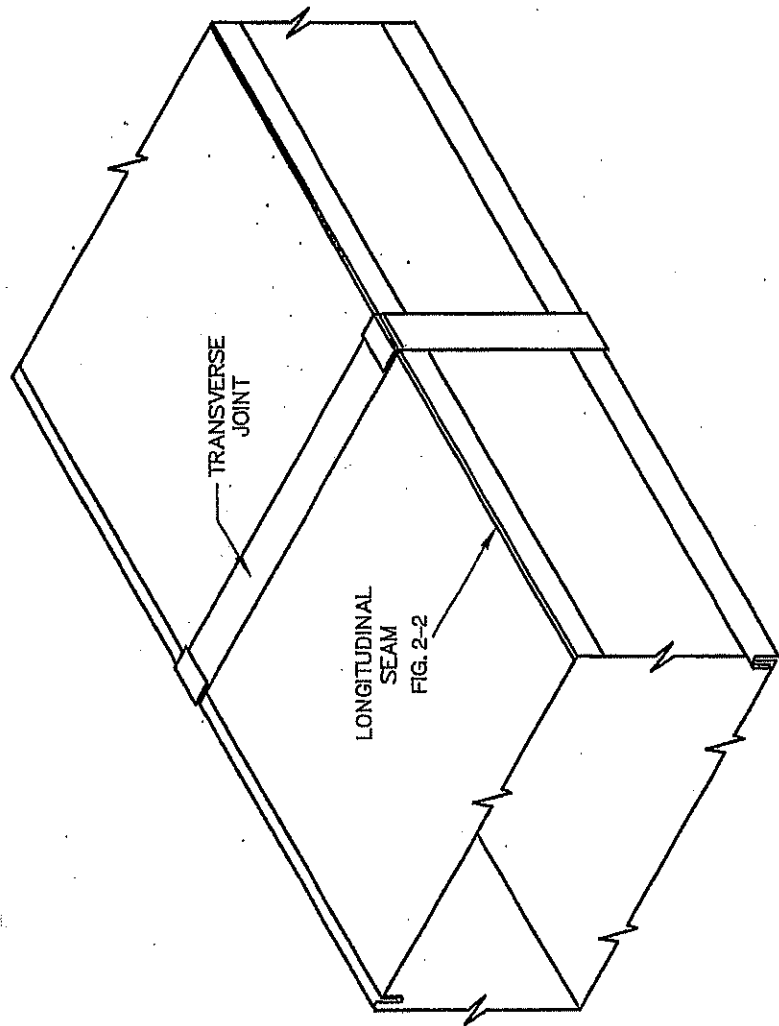


FIGURE 2-8 UNREINFORCED DUCT

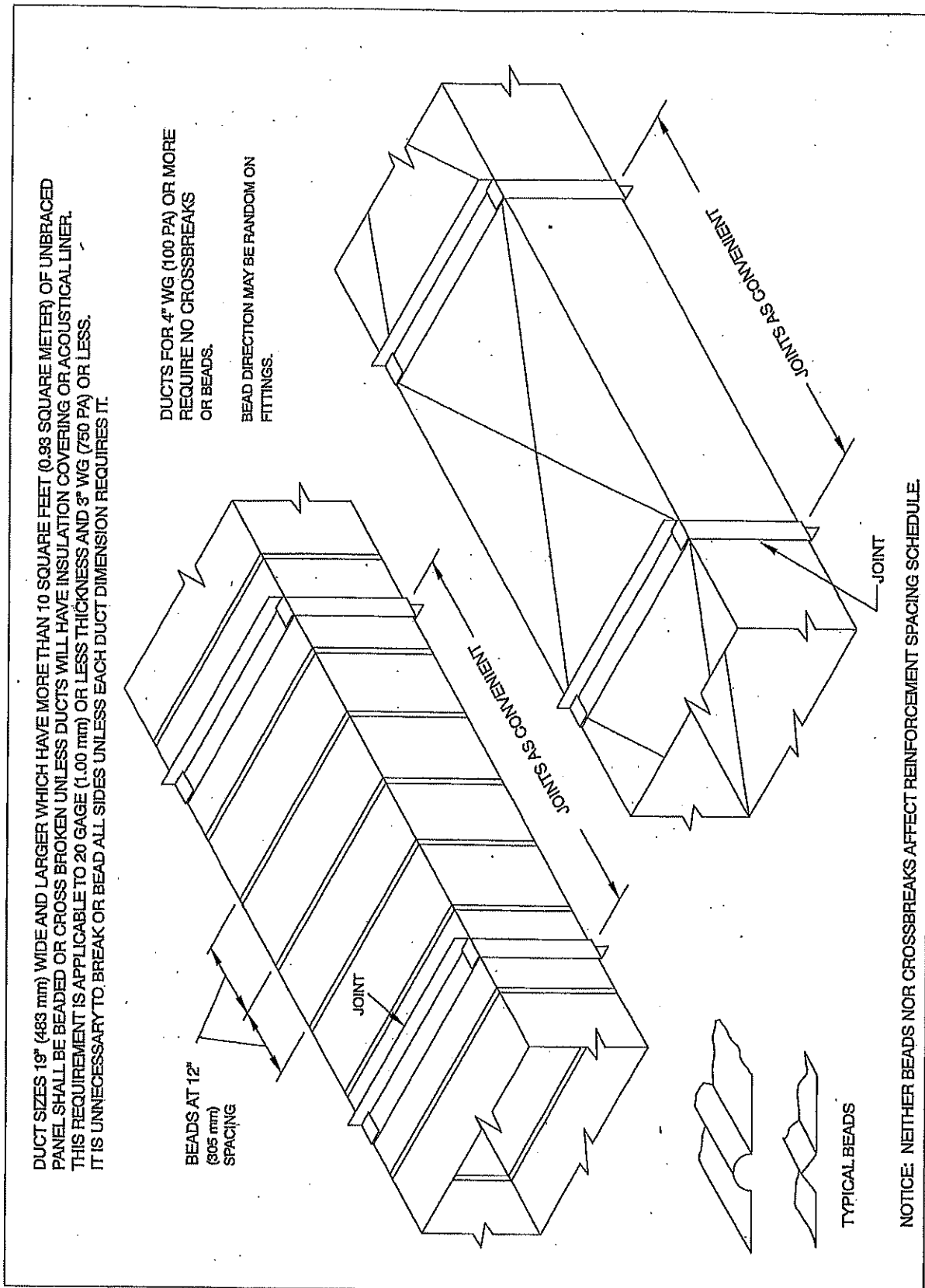


FIGURE 2-9 CROSSBROKEN AND BEADED DUCT

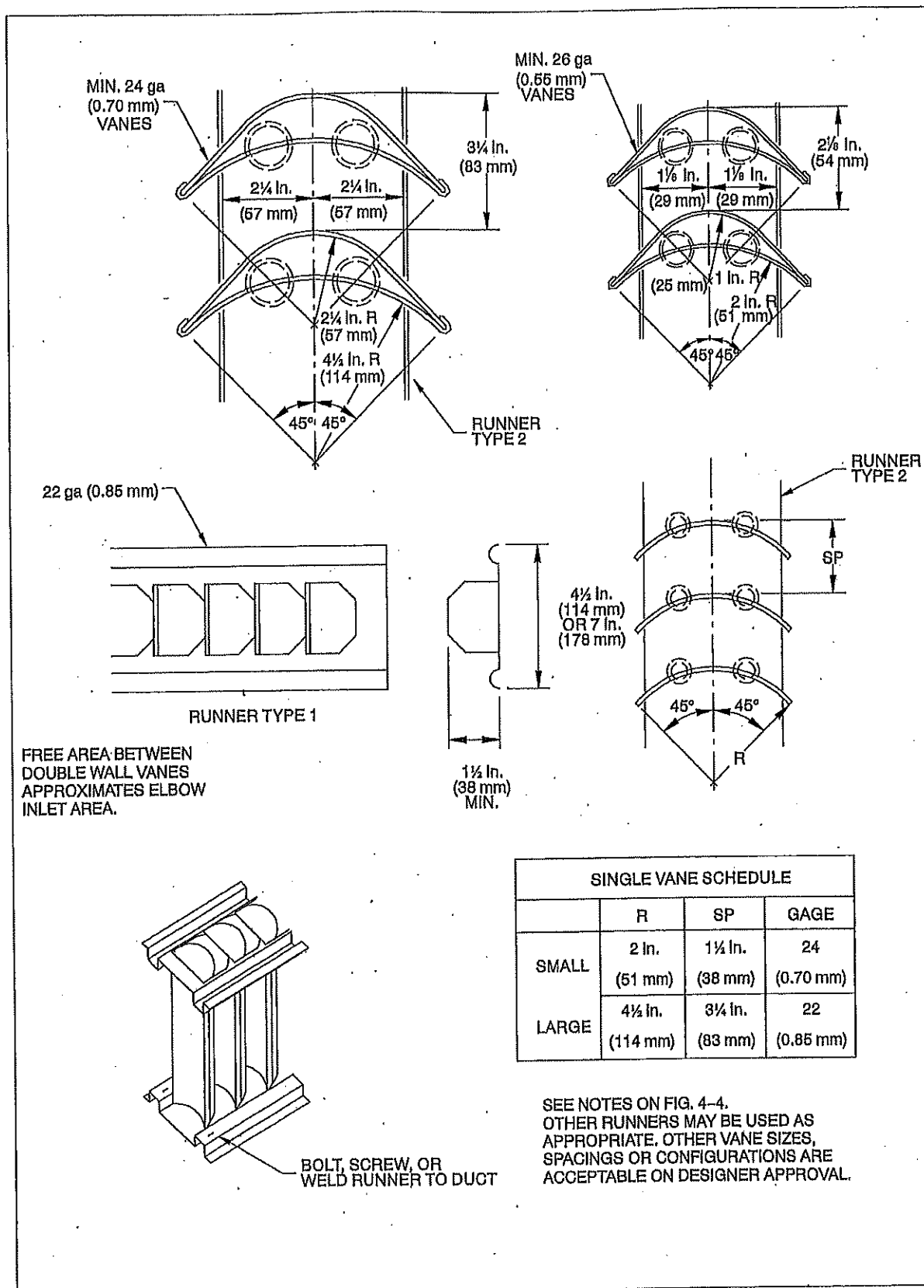
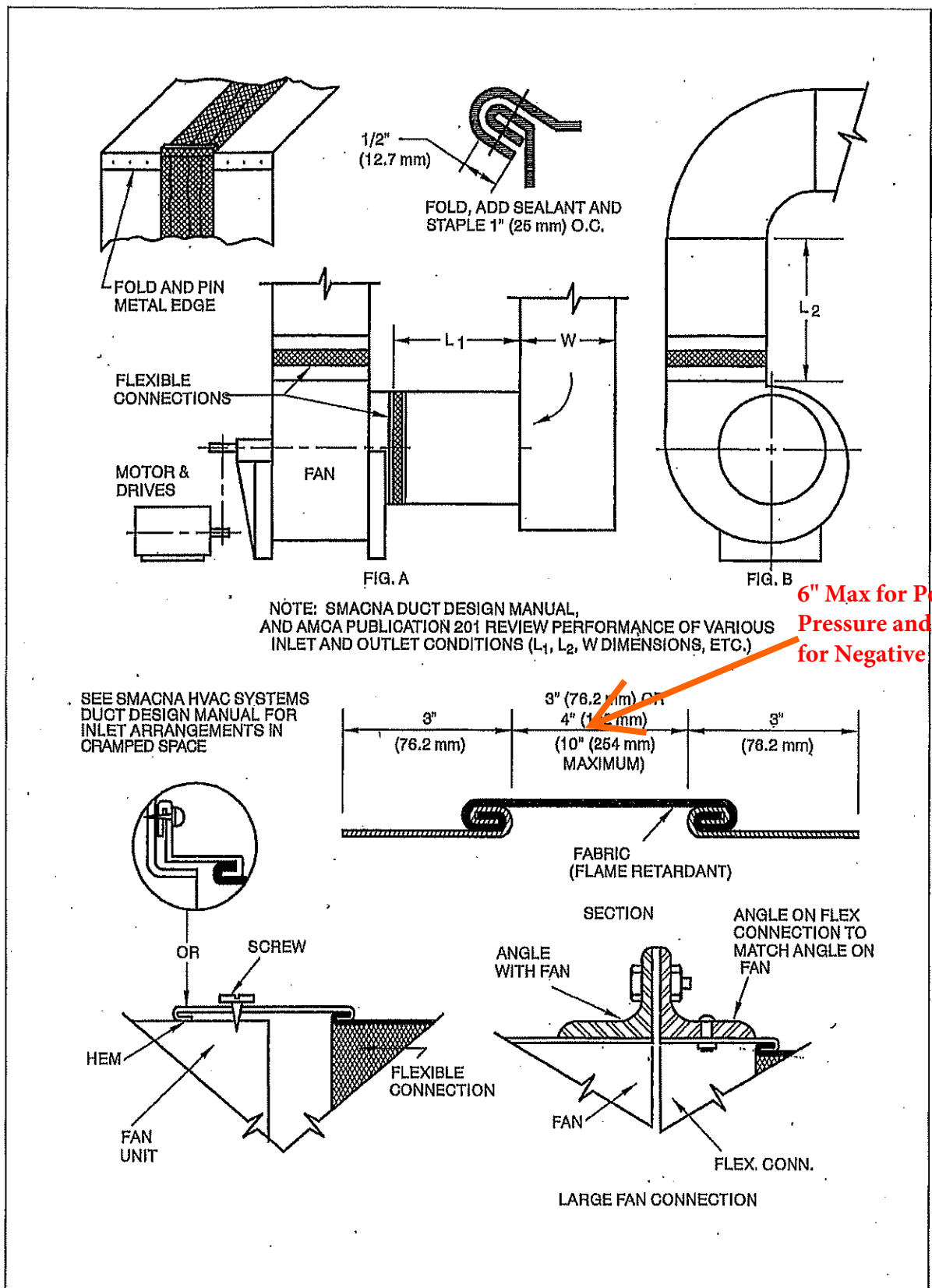


FIGURE 4-3 VANES AND VANE RUNNERS



6" Max for Positive Pressure and 2" Max for Negative Pressure

FIGURE 7-8 FLEXIBLE CONNECTIONS AT FAN

SUBMITTAL RECORD

JOB _____

LOCATION _____

SUBMITTED TO _____

SUBMITTAL PREPARED BY _____

APPROVED BY _____

DATE _____



Submittal Form

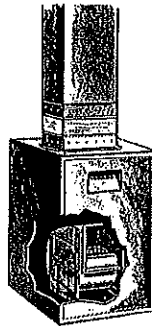
DDFDC

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 sides, 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 [®]	Neoprene	Durolon	Insulflex [®]	Thermafab [®]	Envirofab	Teflon	Glascon
UL Classified File #	R4462	R4462	R4462	n/a	R4462	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.	-40°F. to 200°F.	-150°F. to 500°F.	-40°F. - 180°F.
Color	Black or Spec Chk Orange	Black	White	Black	Grey	Black/White	Grey Outside/ Beige Inside	Grey & Black
Weight Per Square Yard	22	30	26	28 (composite weight)	17	18	16.5	16
Abrasion Resistance ¹	15,000 cycles	600 cycles	500 cycles	500 cycles	125 cycles	15,000 cycles	1,000 cycles	1,400 cycles
Leakage Resistance ²	350	595	250	125	400	350	650	120
Tear Strength ³	100/100	12/12	12/12	8/11	50/40	60/80	50/30	8/9
Tensile Strength ⁴	240/220	500/450	225/300	70/70	200/150	200/190	400/300	90/90
Base Fabric	Woven Nylon/ Polyester Blend	Woven Fiberglass	Woven Fiberglass	Polyester	Woven Fiberglass	Polyester	Fiberglass/ Satin Weave	Woven Fiberglass
Coating	Vinyl	Neoprene	Hypalon	Vinyl	Silicon Rubber	Proprietary Vinyl Blend	Teflon	Vinyl
Features	High Tear Strength High Abrasion Resistance	General Purpose	Excellent Ozone and Weathering Resistance Best Overall Acid Resistance	Low Smoke Emission Insulated 3-4-3 Configuration	Very Low Smoke Emission High Temperature Resistant	"Green" 10% Recycled Content UV Reflective Puncture 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) MSPX333 (#10263)	MFN333 (#10003)	MFD333 (#10002)	IDC343 (#10173) *Gauge: 28 †Round Loc	MFT333 (#10005)	MEV333 (#10301)	MCT333 (#10278)	MGL333 (#10004)
Super Metal-Fab 3x6x3 Grip Loc	MB6X363 (#10160) MSP6X363 (#10265)	MF6N363 (#10012)	MF6D363 (#10011)	Not Available	MF6T363 (#10013)	Not Available	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	MEV444 (#10300)	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/roll).
4. Tensile strength in grn pounds as per Federal Test Standard 191 Method #5100 (warp/roll).
5. Standard Excelon is not LA city approved. Use Excelon-LA when LA city approval is necessary. (See Specification Form Excelon-LA - 203)



GRIP LOC

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.

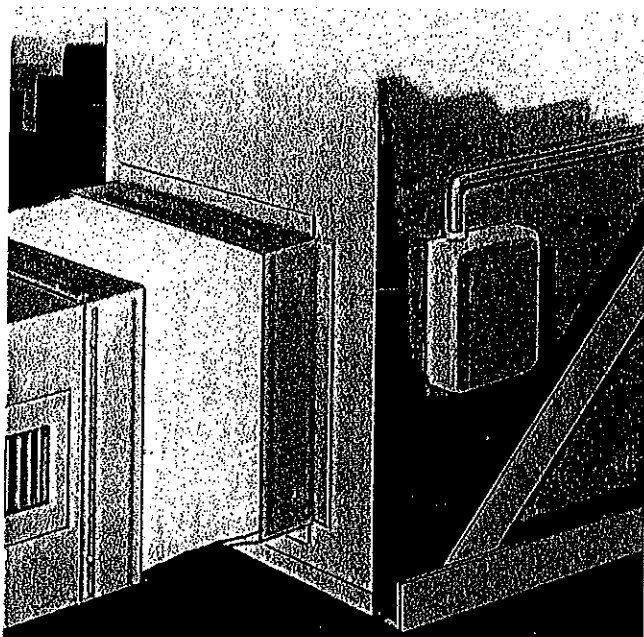
At the inlet and discharge of all air handling equipment(unless otherwise noted) furnish and install vibration isolators. Vibration isolators shall be a coated woven fabric named _____ and shall be "Underwriters Laboratories Classified".

Vibration isolators shall have a tear strength of not less than _____, 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	Durulon	Insulflex	Thermafab	Envirofab	Teflon	Glassteel	Chemical	Excelon	Neoprene	Durulon	Insulflex	Thermafab	Envirofab	Teflon	Glassteel
Acetic Acid	NR	X	X	NR	NR	NR	X	NR	Hydrofluoric Acid (100%)	NR	X	X	NR	NR	NR	X	NR
Aluminum Chloride	X	X	X	X	X	X	X	X	Hydrogen Peroxide	X	NR	X	X	X	X	X	X
Aluminum Sulfate	X	X	X	X	X	X	X	X	Hydrogen Sulfide	X	X	X	O	X	X	X	X
Ammonia (Anhyd)	X	X	X	X	X	X	X	X	Lactic Acid	NR	X	X	NR	O	NR	X	NR
Ammonium Hydroxide	X	X	X	X	X	X	X	X	Linseed Oil	NR	X	X	NR	X	NR	O	NR
Ammonium Sulfate	X	X	X	X	X	X	X	X	Magnesium Chloride	NR	X	X	NR	NR	NR	X	NR
Barium Sulfide	X	X	X	X	O	X	X	X	Maleic Acid	X	NR	X	X	X	X	O	X
Black Sulfate Liquor	X	X	X	X	NR	X	X	X	Methyl Alcohol	NR	X	X	NR	NR	NR	X	NR
Boric Acid	X	X	X	X	X	X	X	X	Methyl Cellosolve	NR	X	X	NR	NR	NR	O	NR
Butyl Alcohol	NR	X	X	NR	NR	NR	X	NR	Mineral Oil	X	X	X	X	NR	X	X	X
Cadmium Plating Solution	X	NR	NR	NR	O	X	O	X	Naphtha	NR	NR	NR	NR	X	NR	X	NR
Calcium Chloride	X	X	X	X	X	X	X	X	Nickel Chloride	X	X	X	X	O	X	X	X
Calcium Hypochlorite	X	NR	X	X	O	X	X	X	Nickel Sulfate	X	X	X	X	X	X	X	X
Chlorine Water	X	NR	NR	X	NR	X	O	X	Nitric Acid (40%)	X	NR	X	X	NR	X	X	X
Chromic Acid	X	NR	X	X	O	X	X	X	Oleic Acid	X	NR	NR	X	NR	X	X	X
Chromium Plating Solution	X	O	O	NR	O	X	O	X	Oleum	NR	NR	X	NR	O	NR	X	NR
Citric Acid	X	X	X	X	X	X	X	X	Oxalic Acid	X	X	X	X	X	X	X	X
Copper Chloride	X	X	X	X	O	X	X	X	Phosphoric Acid (85%)	NR	X	X	NR	X	NR	X	NR
Copper Sulfate	X	X	X	X	O	X	X	X	Pickling Solution	X	NR	X	X	O	X	O	X
Cottonseed Oil	X	X	X	X	X	X	O	X	Potassium Chloride	X	X	X	X	O	X	O	X
Diacetone Alcohol	NR	X	X	NR	O	NR	O	NR	Potassium Cyanide	X	X	X	X	O	X	X	X
Disodium Phosphate	X	NR	NR	X	O	X	O	X	Potassium Dichromate	X	X	X	X	O	X	X	X
Ethyl Alcohol	NR	X	X	NR	NR	NR	X	NR	Potassium Hydroxide (40%)	X	X	X	NR	X	X	X	X
Ethylene Glycol	NR	X	X	NR	X	NR	X	NR	Potassium Sulfate	X	X	X	X	O	X	X	X
Ferric Chloride	X	X	X	X	X	X	X	X	Propyl Alcohol	NR	X	X	NR	NR	NR	O	NR
Ferric Sulfate	X	X	X	X	X	X	X	X	Sodium Chloride	X	X	X	X	X	X	X	X
Fluoroboric Acid	X	X	X	NR	O	X	O	X	Sodium Hydroxide (40%)	NR	X	X	NR	X	NR	X	NR
Formaldehyde (40%)	X	X	X	X	O	X	X	X	Sodium Hypochlorite	NR	NR	X	NR	NR	NR	X	NR
Formic Acid	X	X	X	X	O	X	X	X	Steam	NR	X	NR	NR	O	NR	X	NR
Glucose	X	X	X	X	X	X	X	X	Sulfur Dioxide (Liquid)	NR	X	X	NR	X	NR	X	NR
Glycerine	NR	X	X	NR	X	NR	X	NR	Sulfuric Acid (50%)	X	NR	X	NR	NR	X	X	X
Heptane	NR	X	X	NR	O	NR	X	NR	Sulfuric Acid (over 50%)	NR	NR	X	NR	NR	NR	X	NR
Hexane	NR	X	X	NR	O	NR	X	NR	Tannic Acid	X	X	X	X	O	X	X	X
Hydrobromic Acid (40%)	NR	X	X	NR	O	NR	X	NR	Vinegar	X	X	X	X	X	X	X	X
Hydrochloric Acid (conc)	NR	X	X	NR	NR	NR	X	NR									

Duro Dyne East Division, Bay Shore, NY
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**DURO
DYNE[®]**

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Printed in USA 7/14
BO010403



Job: Libbey Bathhouse Renovation

Spec: 23 31 00 Ductwork

Item: Spiral Ducts

Submitted by:

Joe Minton Jr.

Vice President HVAC

(501) 607-0043



SUBMITTAL

PRODUCT	Spiral Pipe and Fittings
SPECIFICATION	233100
MANUFACTURER	Dixie Metal Products
JOB NAME	Libby Bathhouse Renovation
LOCATION	Hot Springs, AR
ENGINEER	IMEG Consultants Corp
CONTRACTOR	Custom Sheet Metal
DATE	8/25/2025
SUBMITTED BY	Courtney Michael

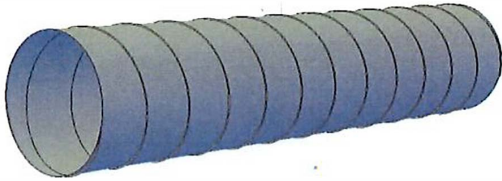
5440 Northshore Drive - North Little Rock, Arkansas 72118 - Tel: 501.374.5420 Fax: 501.370.9298



963 South Bellevue
 Memphis, TN 38106
 (901) 774-2220
 (901) 774-2174 Fax

SINGLE WALL ROUND GALVANIZED MANUFACTURING STANDARDS

Project:	Libbey Bathhouse
Location:	Hot Springs, AR



10" Positive WG
(SMACNA 2005 Standard)

DIAMETER	Spiral Seam Pipe		Fitting Construction
3" - 18"	26		24
19" - 24"	26		24
25" - 42"	24		22
43" - 60"	22		20
61" - 66"	22		18
67" - 96"	20		18

SPIRAL SEAM

Construction Standards:

- Standard lengths of spiral pipe are 10' for spiral seam and 5' for longitudinal welded seam construction
- Class 1 air duct materials, or UL 181
- Galvanized Steel pipe will be lock-forming quality and have a zinc-coating of **G-90** or greater in accordance with ASTM A653 (formerly ASTM A525/A527)
- Spiral Seam construction will be RL-1 to 4" W.G Negative. Longitudinal seam will be RL-4 to 4" W.G. Negative in accordance with SMACNA
- Fabrication in accordance with SMACNA HVAC Duct Construction Standards - Metal & Flexible (2005) except as indicated and Spiral Pipe Manufacturers Association (SPIDA) standards.

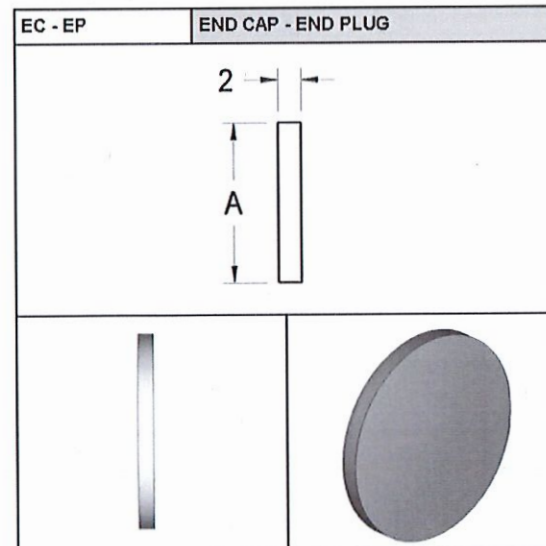
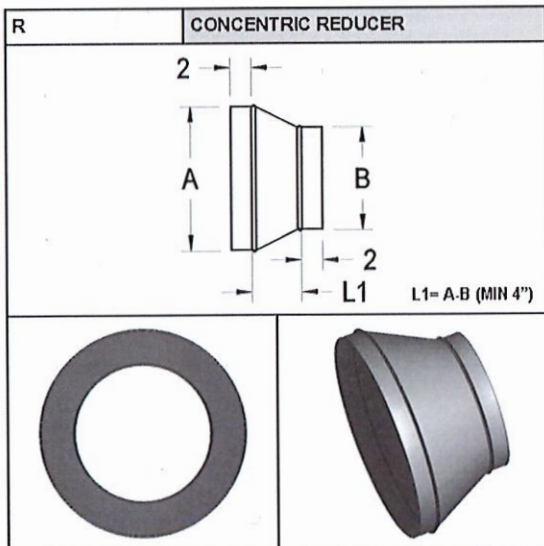
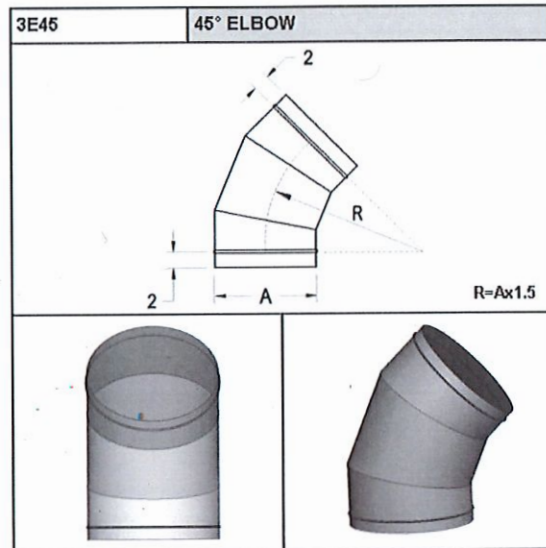
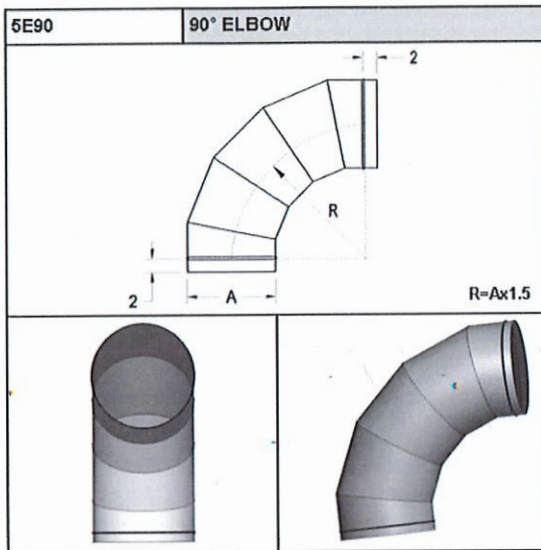
Submittal By:	Dale Turner
Submittal Date:	8/28/2025



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 Memphis, TN 38106
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 (901) 774-2174 Fax

SINGLE WALL ROUND FITTINGS

Project:	Libbey Bathhouse
Location:	Hot Springs, AR
Construction:	Tack Welded Seam or Gore Locked Standing Seam and Sealed with high pressure duct sealant



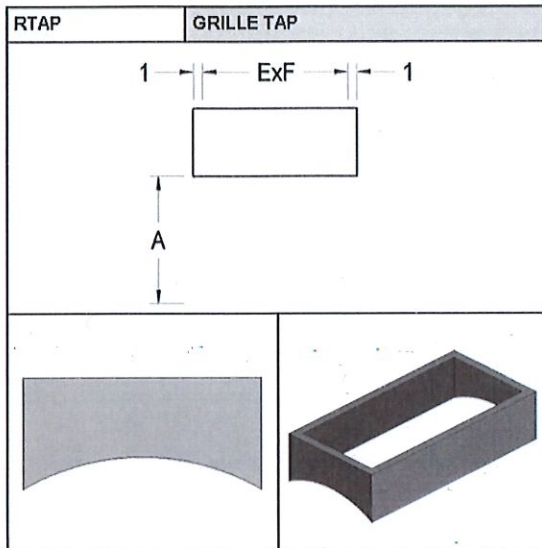
Submitted By:	Dale Turner
Submittal Date:	8/28/2025



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Memphis, TN 38106
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(901) 774-2174 Fax

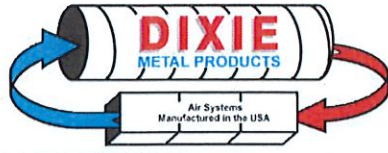
SINGLE WALL ROUND FITTINGS

Project:	Libbey Bathhouse
Location:	Hot Springs, AR
Construction:	Tack Welded Seam or Gore Locked Standing Seam and Sealed with high pressure duct sealant



The 4" tall grille tap shown here will be factory installed on spiral pipe sections.

Submitted By:	Dale Turner
Submittal Date:	8/28/2025



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DIXIFLANGE ROUND FLANGE CONNECTION

** SINGLEWALL **

Project:	Libbey Bathhouse
Location:	Hot Springs, AR
Sizes:	All round single wall sizes
Construction:	16ga Construction – Flanges will be provided on single wall (SW) round pipe and fittings as listed above. Flange will be manufactured and installed in our facility per the attached below profile to the inside of the duct wall. Flange will be tack welded to pipe and then continuously sealed with high pressure duct sealant between the outside pipe wall and the flange. For field installation, duct and fitting transverse joints will be mated with a gasket between flanges and then screwed on 6" centers with sheet metal screws.



Submitted By:	Dale Turner
Submittal Date:	8/28/2025