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Date:

Rectangular Duct Construction

- Tabular Details of
  - Transverse Joints
  - Longitudinal Seams
  - Reinforcements
- TDC/TDF Tables
- Mid Panel Tie Rods

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Reinf. Class		T-22 Companion Angles		T-24 Flanged		T-24a Flanged		T-25b Flanged		Slip-On Flange
	E1*	H × T	WT LF	T (Nom.)	WT LF	H × T (Nom.)	WT LF	H × T (Nom.)	WT LF	
B	1.0	Use E		Use D		Use D		Use D		Consult manufacturers for ratings established by performance documented to functional criteria in Chapter 11. *See* text S1.18 on page 2.4.
C	1.9	Use E		Use D		Use D		Use D		
D	2.7	Use E		26 ga	0.5	1 × 22 ga	0.4	26 ga	0.5	
E	6.5	C 1 × ⅛	1.7	24 ga	0.6	Use F		24 ga	0.6	
F	12.8	H 1 × ⅛	1.7	22 ga	0.7	1½ × 20 ga	0.6	22 ga	0.7	
G	15.8	1¼ × ⅛	2.1	22 ga (R) 20 G	1.0	1½ × 18 ga	0.8	22 ga (R) 20 ga	1.0	
H	26.4	C 1½ × ⅛ (+) H 1½ × ⅛	2.6	18 ga	1.1	SEE TIE ROD TEXT		18 ga	1.1	
I	69	1½ × ¼	3.7	20 ga (R)	1.0			20 ga (R)	1.0	
J	80	1½ × ¼ (+) 2 × ⅛	4.7	18 ga (R)	1.1			18 ga (R)	1.1	
K	103	2 × 3/16	5	18 ga (R)	1.1			18 ga (R)	1.1	
L	207	H 2 × ¼	6.5	18 ga (R)	1.1			18 ga (R)	1.1	

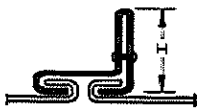
Table 2–32 Transverse Joint Reinforcement

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T-1 – DRIVE SLIP
T-3 – REINFORCED

- 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



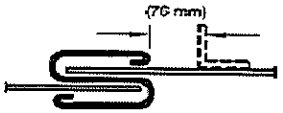
STANDING DRIVE SLIP
T-2

- 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

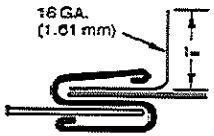


PLAIN "S" SLIP
T-5

- 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 ft maximum intervals
- 2 in. wg maximum pressure



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

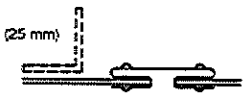


REINFORCED "S" SLIP
T-7

- 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

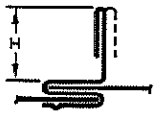
FIGURE 2-1 RECTANGULAR DUCT/TRANSVERSE JOINTS

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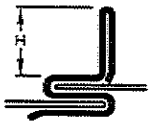


T–8 DOUBLE "S" SLIP
(T–8a REINFORCED)

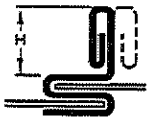
- 24 ga for 30 inch width or less
- 22 ga over 30 inch width
- Fasten to each section of the duct within 2 in. from corners and at 6 in. maximum intervals
- ⅝ in. minimum tabs to close corners



STANDING S
T–10

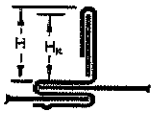


STANDING S (ALT.)
T–11



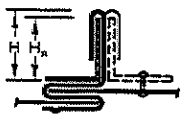
STANDING S (ALT.)
T–12

- When using S on all four sides, fasten slip to duct within 2 in. of the corner and at 12 in. maximum intervals
- 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 S
(BAR REINFORCED)
T–13

- Fasten as per Joint T-10
- Standing portion as per T-10 or T-11 to hold Flat Bar
- Fasten bar stock to the connector within 2 in. of the corner and at 12 in. maximum intervals
- 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

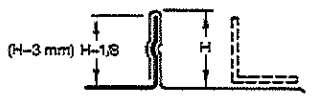


STANDING S
(ANGLE REINFORCED)
T–14

- Fasten as per Joint T-10
- Fasten angle to the connector or duct wall within 2 in. of the corner and at 12 in. maximum intervals
- 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

FIGURE 2–1 RECTANGULAR DUCT/TRANSVERSE JOINTS (CONTINUED)

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STANDING SEAM
T–15

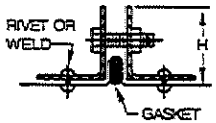
ANGLE REINFORCED
STANDING SEAM
T–16

- Button punch or otherwise fasten within 2 in. of each corner and at 6 in. maximum intervals
- Seal and fold corners
- Stagger joints on adjacent sides if using standing seam on all four sides
- Hammer longitudinal seam at ends of standing seam



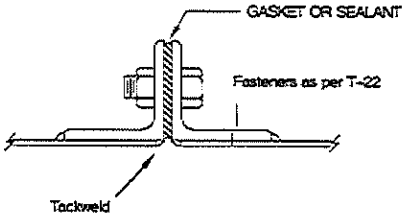
T–21 WELDED FLANGE
(T–21a REINFORCED W.F.)

- Use ½ in. minimum flange and end weld
- Flanges larger than ⅝ in. must be spot welded, bolted, riveted or screwed to prevent separation (2 in. from ends and at 8 in. maximum intervals)
- On 24, 22 or 20 ga. brace or weld ¼ in. ø 4 in. rod in corners or provide hangers at every joint



COMPANION ANGLES
(CAULK OR GASKET)
T–22

- ⅝ in. minimum flange on duct
- Angles must have welded corners
- Angles must be tack welded, bolted or screwed to the duct wall at 2 in. maximum from the ends and at 12 in. maximum intervals
- Bolt Schedule:
  - ⅝ minimum diameter at 6 in. maximum spacing at 4 in. wg or lower
  - ? in. angle requires 4 in. maximum spacing at 4 in. wg
  - 4 in. maximum spacing at higher pressures



COMPANION ANGLES
T–22 ALT.

- Hold duct back ⅛ in. from vertical face of the angle and tack weld to the flange along the edge of the duct
- Fasten angle to duct as per T-22
- For additional tightness place sealant between the angle and duct or seal the weld
- If the faces of the angles are flush, thick consistency sealant may be used in lieu of gasket
- Use gasket suitable for the specific service and fit it uniformly to avoid protruding into the duct

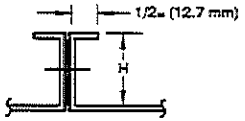
FIGURE 2–1 RECTANGULAR DUCT/TRANSVERSE JOINTS (CONTINUED)

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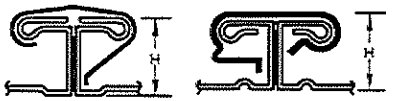
FLANGED
(WITH GASKET)
T-24

- Close corners with minimum 16 ga corner pieces and ? in. diameter bolts
- Gasket to be located to form an effective seal
- Lock flanges together with 6 in. long clips located within 6 in. of each corner
- Clips spaced at 15 in. maximum for 3 in. wg pressure class or lower
- Clips spaced at 12 in. maximum for 4, 6 and 10 in. wg
- *See* Figure 2-16



FLANGED
(WITH GASKET)
T-24A

- Bolt, rivet 1 in. maximum from ends and at 6 in. maximum intervals
- Limited to 2 in. wg pressure class
- *See* Figure 2-16
- Gasket to be located to form an effective seal



FLANGED
(WITH GASKET)
T-25a

FLANGED
(WITH GASKET)
T-25b

- 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

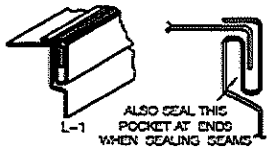


SLIP-ON
FLANGE

- Consult manufacturers for ratings established by performance documented to functional criteria in Chapter 11.

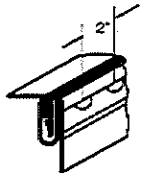
FIGURE 2-1 RECTANGULAR DUCT/TRANSVERSE JOINTS (CONTINUED)

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PITTSBURGH LOCK

- Pocket depth from ¼ in. to ⅝ in.
- Use on straight duct and fittings
- To ± 10 in. wg



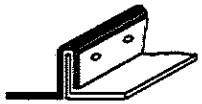
L-2
BUTTON PUNCH SNAP LOCK

- ⅝ in. pocket depth for 20, 22 & 24 ga
- ½ in. pocket depth for 24 & 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. 1-6 ALSO

L-4 STANDING SEAM

- To ± 10 in. wg
- 1 in. seam up to duct width of 42 in.
- 1 ½ 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



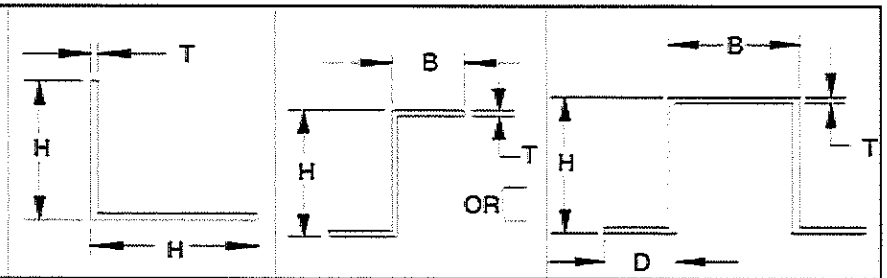
FLANGED
(WITH GASKET)
T-25a

FLANGED
(WITH GASKET)
T-25b

- 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

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Reinf. Class		Angle		Channel or Zee		Hat Section	
	EI*	H × T (MIN)	WT LF	H × T (MIN)	WT LF	H × T (MIN)	WT LF
A	0.43	Use C		Use B		Use F	
B	1.0	Use C		⅞ × ½ × 20 ga	0.24	Use F	
C	1.9	C1 × 16 ga C¾ × ⅛	0.40 0.57	¾ × ½ × 18 ga 1 × ¾ × 20 ga	0.31	Use F	
D	2.7	H¾ × ⅛ C1 × ⅛	0.57 0.80	1 × ¾ × 18 ga	0.45	Use F	
E	6.5	C1 ¼ × 12 ga H1 × ⅛	0.90	2 × 1 ⅛ × 20 ga	0.60	Use F	
F	12.8	H1 ¼ × ⅛	1.02	1 ½ × ¾ × 18 ga	0.54	1 ½ × ¾ × ⅝ × 18 ga 1 ½ × 1 ½ × ¾ × 20 ga	0.90 0.83
G	15.8	1 ½ × ⅛	1.23	1 ½ × ¾ × 16 ga	0.66	1 ½ × ¾ × ⅝ × 18 ga	0.80
H	26.4	1 ½ × 3/16 2 × ⅛	1.78 1.65	1 ½ × ¾ × ⅛	1.31	1 ½ × 1 ½ × ¾ × 18 ga 2 × 1 × ¾ × 20 ga	1.08 0.90
I	69	C2 × 3/16 2 ½ × ⅛	2.44 2.10	2 × 1 ⅛ × 12 ga 3 × 1 ⅛ × 16 ga	1.60 1.05	2 × 1 × ¾ × 16 ga	1.44
J	80	H2 × 3/16 C2 × ¼ 2 ½ × ⅛ (+)	2.44 3.20 2.10	2 × 1 ⅛ × ⅛	1.85	2 × 1 × ¾ × 12 ga 2 ½ × 2 × ¾ × 18 ga	2.45 1.55
K	105	2 ½ × 3/16	3.10	3 × 1 ⅛ × 12 ga	2.00	2 ½ × 2 × ¾ × 16 ga 3 × 1 ½ × ¾ × 16 ga	1.88 2.00
L	207	H2 ½ × ¼	4.10	3 × 1 ⅛ × ⅛	2.29	2 ½ × 2 × ¾ × ⅛ 3 × 1 ½ × ¾ × 12 ga	3.70 3.40

Table 2–29 Intermediate Reinforcement

See para 2.1.4. Nominal EI is number listed times 10^5 before adjustment for bending moment capacity. C and H denote cold formed and hot rolled ratings; when neither is listed, either may be used. *See* tie rod options elsewhere.

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FRAMING CHANNEL (STRUT) MAY BE USED AS DUCT REINFORCEMENT AS FOLLOWS:

Channel (Strut)			Reinforcement Class Per Table 2-29
H	W	GA	
15/16 in.	1 5/8 in.	14	A, B, C
15/16 in.	1 5/8 in.	14	D
7/8 in.	1 5/8 in.	12	D, E
1 3/8 in.	1 5/8 in.	12	F, G
2 7/8 in.	1 5/8 in.	12	H, I, J
3 1/4 in.	1 5/8 in.	12	K, L

Table 2–30

NOTE: Framing channels having the same physical dimensions as those listed above, but fabricated from thicker steel may be used at the reinforcement class assigned to the lighter version.

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½ in. wg Static Pos. or Neg. Duct Dimension	No Reinforcement Required	Reinforcement Code for Duct Gage Number — Reinforcement Spacing Options							
		10 ft	8 ft	6 ft	5 ft	4 ft	3 ft	2½ ft	2 ft
①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩
10 in. and under	26 ga.	Not Required							
11 – 12 in.	26 ga.								
13 – 14 in.	26 ga.								
15 – 16 in.	26 ga.								
17 – 18 in.	26 ga.								
19 – 20 in.	24 ga.	B-26	B-26	B-26	B-26	B-26	B-26	A-26	A-26
21 – 22 in.	22 ga.	B-26	B-26	B-26	B-26	B-26	B-26	B-26	A-26
23 – 24 in.	22 ga.	C-26	C-26	C-26	B-26	B-26	B-26	B-26	B-26
25 – 26 in.	20 ga.	C-26	C-26	C-26	C-26	B-26	B-26	B-26	B-26
27 – 28 in.	18 ga.	C-24	C-26	C-26	C-26	C-26	B-26	B-26	B-26
29 – 30 in.	18 ga.	C-24	C-26	C-26	C-26	C-26	B-26	B-26	B-26
31 – 36 in.	18 ga.	D-22	D-24	C-26	C-26	C-26	C-26	C-26	B-26
37 – 42 in.	16 ga.	E-20	E-24	D-24	D-26	C-26	C-26	C-26	C-26
43 – 48 in.	16 ga.	E-20	E-22	E-24	E-26	D-26	D-26	C-26	C-26
49 – 54 in.	Not Designed	F-18	F-20	F-22	E-26	E-26	E-26	D-26	C-26
55 – 60 in.		G-18	F-20	F-22	E-24	E-24	E-26	E-26	D-26
61 – 72 in.		H-16	H-18	F-20	F-22	F-24	E-24	E-24	E-24
73 – 84 in.			I-16G	H-18G	H-22G	G-24	F-24	F-24	F-24
85 – 96 in.			I-16G	I-18G	H-20G	H-22G	G-22	F-22	F-22
97 – 108 in.				I-16G	I-18G	I-18G	H-18G	H-18G	G-18
109 – 120 in.					I-16G	I-16G	I-18G	H-18G	H-18G

Table 2–1 Rectangular Duct Reinforcement

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1 in. wg Static Pos. or Neg. / Duct Dimension	No Reinforcement Required	Reinforcement Code for Duct Gage Number							
		Reinforcement Spacing Options							
		10 ft	8 ft	6 ft	5 ft	4 ft	3 ft	2½ ft	2 ft
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
10 in. and under	26 ga.	Not Required							
11 – 12 in.	26 ga.								
13 – 14 in.	26 ga.								
15 – 16 in.	26 ga.								
17 – 18 in.	24 ga.		B-26	B-26	B-26	B-26	B-26	B-26	B-26
19 – 20 in.	24 ga.		C-26	C-26	C-26	C-26	B-26	B-26	B-26
21 – 22 in.	22 ga.	C-24	C-24	C-26	C-26	C-26	B-26	B-26	B-26
23 – 24 in.	22 ga.	C-24	C-24	C-26	C-26	C-26	C-26	B-26	B-26
25 – 26 in.	20 ga.	D-22	D-24	C-26	C-26	C-26	C-26	C-26	B-26
27 – 28 in.	18 ga.	D-22	D-24	D-26	C-26	C-26	C-26	C-26	C-26
29 – 30 in.	18 ga.	E-22	D-24	D-26	D-26	C-26	C-26	C-26	C-26
31 – 36 in.	18 ga.	E-20	E-22	E-24	D-24	D-26	C-26	C-26	C-26
37 – 42 in.	16 ga.	F-18	F-20	E-22	E-24	E-26	D-26	D-26	C-26
43 – 48 in.	16 ga.	G-18	G-18	F-20	F-22	E-24	E-26	E-26	D-26
49 – 54 in.	Not Designed	H-18	H-18	G-20	F-22	F-24	E-24	E-24	E-24
55 – 60 in.		I-16	H-18	G-20	G-22	F-24	F-24	E-24	E-24
61 – 72 in.			I-16G	H-18G	H-18G	H-22G	F-24	F-24	F-24
73 – 84 in.				I-18G	I-18G	I-20G	H-22G	H-22G	G-22
85 – 96 in.				J-16H	I-18H	I-18H	I-20G	H-20G	H-22G
97 – 108 in.					J-16H	I-18H	I-18G	I-18G	I-18G
109 – 120 in.						J-16H	I-18H	I-18H	I-18G

Table 2–2 Rectangular Duct Reinforcement

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2 in. wg Static Pos. or Neg. / Duct Dimension	No Reinforcement Required	Reinforcement Code for Duct Gage Number							
		Reinforcement Spacing Options							
		10 ft	8 ft	6 ft	5 ft	4 ft	3 ft	2½ ft	2 ft
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
10 in. and under	26 ga.	Not Required							
11 – 12 in.	26 ga.								
13 – 14 in.	24 ga.		B-26	B-26	B-26	B-26	B-26	B-26	B-26
15 – 16 in.	24 ga.		C-26	C-26	C-26	C-26	C-26	B-26	B-26
17 – 18 in.	22 ga.		C-26	C-26	C-26	C-26	C-26	C-26	B-26
19 – 20 in.	20 ga.	C-22	C-24	C-26	C-26	C-26	C-26	C-26	C-26
21 – 22 in.	18 ga.	D-22	D-24	D-26	D-26	C-26	C-26	C-26	C-26
23 – 24 in.	18 ga.	E-22	E-24	D-26	D-26	D-26	C-26	C-26	C-26
25 – 26 in.	18 ga.	E-22	E-22	E-24	D-26	D-26	C-26	C-26	C-26
27 – 28 in.	18 ga.	F-20	E-20	E-22	E-24	D-26	D-26	C-26	C-26
29 – 30 in.	18 ga.	F-20	F-20	E-22	E-24	E-26	D-26	D-26	C-26
31 – 36 in.	16 ga.	G-18	G-20	F-22	F-24	E-24	E-26	D-26	D-26
37 – 42 in.	Not Designed	H-16	H-18	G-20	G-22	F-24	E-24	E-26	E-26
43 – 48 in.			I-18	H-20	H-22	G-22	F-24	F-24	E-24
49 – 54 in.			I-16G	I-18G	H-20G	H-20G	G-24	F-24	F-24
55 – 60 in.				I-18G	I-20G	H-20G	G-22	G-24	F-24
61 – 72 in.				J-16H	J-18H	I-20G	H-22G	H-22G	H-24
73 – 84 in.					J-16H	I-20G	I-20G	I-22G	I-22G
85 – 96 in.						J-18H	I-18H	I-20H	I-22H
97 – 108 in.						K-16I	K-18H	J-18H	I-18H
109 – 120 in.							K-16I	K-18I	J-18I

Table 2–3 Rectangular Duct Reinforcement

Reviewed for Code Compliance
Inspections Division
Approved with Conditions
Date:

3 in. wg Static Pos. or Neg. / Duct Dimension	No Reinforcement Required	Reinforcement Code for Duct Gage Number							
		Reinforcement Spacing Options							
		10 ft	8 ft	6 ft	5 ft	4 ft	3 ft	2½ ft	2 ft
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
10 in. and under	24 ga.	Not Required		B-26	B-26	B-26	B-26	B-26	B-26
11 – 12 in.	24 ga.			B-26	B-26	B-26	B-26	B-26	B-26
13 – 14 in.	22 ga.			C-24	C-24	C-26	C-26	B-26	B-26
15 – 16 in.	22 ga.			C-24	C-24	C-26	C-26	C-26	C-26
17 – 18 in.	20 ga.		D-24	D-24	C-24	C-26	C-26	C-26	C-26
19 – 20 in.	18 ga.		D-22	D-22	D-24	D-24	C-26	C-26	C-26
21 – 22 in.	18 ga.		E-22	E-22	D-24	D-24	D-26	C-26	C-26
23 – 24 in.	18 ga.		E-20	E-22	E-24	E-24	D-26	D-26	C-26
25 – 26 in.	18 ga.		F-20	E-22	E-24	E-24	D-26	D-26	C-26
27 – 28 in.	18 ga.		F-20	F-20	F-22	E-24	E-26	D-26	D-26
29 – 30 in.	18 ga.		G-20	F-20	F-22	E-24	E-26	E-26	D-26
31 – 36 in.	16 ga.	H-18G	H-18G	H-18G	G-20	F-22	F-24	E-26	E-26
37 – 42 in.	Not Designed		I-16G	H-18G	H-20G	G-22	F-24	F-24	E-26
43 – 48 in.			J-16H	I-18G	I-18G	H-20	G-22	G-24	F-24
49 – 54 in.				J-16H	I-18G	I-18G	H-22G	G-24	G-24
55 – 60 in.				J-16H	I-18G	I-18G	H-20G	H-22G	G-24
61 – 72 in.					J-16I	J-18H	I-20G	I-22G	I-24G
73 – 84 in.					L-16I	K-16H	J-18H	I-20H	I-22G
85 – 96 in.						L-16I	K-18I	J-18I	I-20H
97 – 108 in.							L-16I	L-18I	K-18I
109 – 120 in.							L-16I	L-18I	K-18I

Table 2–4 Rectangular Duct Reinforcement

RESURGAM, MAINE, CITY OF PORTLAND
Reviewed for Code Compliance
Inspections Division
Approved with Conditions
Date:

4 in. wg Static Pos. or Neg. / Duct Dimension	No Reinforcement Required	Reinforcement Code for Duct Gage Number — Reinforcement Spacing Options							
		10 ft	8 ft	6 ft	5 ft	4 ft	3 ft	2½ ft	2 ft
①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩
8 in. and under	24 ga.	Not Required		B-26	B-26	B-26	B-26	B-26	B-26
9 – 10 in.	22 ga.			B-24	B-26	B-26	B-26	B-26	B-26
11 – 12 in.	22 ga.		B-24	C-24	C-26	C-26	C-26	B-26	B-26
13 – 14 in.	20 ga.		C-22	C-22	C-24	C-26	C-26	C-26	C-26
15 – 16 in.	20 ga.		D-22	D-22	C-24	C-26	C-26	C-26	C-26
17 – 18 in.	18 ga.		D-22	D-22	D-24	D-26	C-26	C-26	C-26
19 – 20 in.	18 ga.		E-20	E-22	E-24	D-24	D-26	C-26	C-26
21 – 22 in.	18 ga.		E-20	E-20	E-24	E-24	D-26	D-26	C-26
23 – 24 in.	18 ga.		F-20	F-20	E-22	E-24	E-26	D-26	D-26
25 – 26 in.	16 ga.	G-18	G-18	F-20	F-22	E-24	E-26	E-26	D-26
27 – 28 in.	16 ga.	H-18G	G-18	G-20	F-22	F-24	E-26	E-26	D-26
29 – 30 in.	16 ga.	H-18G	H-18G	G-18	G-22	F-24	E-26	E-26	E-26
31 – 36 in.	Not Designed	J-16H	I-16G	H-18G	H-20	G-22	F-24	F-26	E-26
37 – 42 in.			J-16H	I-16G	I-18G	H-20G	G-22	G-24	F-26
43 – 48 in.				J-16H	I-18G	I-18G	H-22G	H-24G	G-24
49 – 54 in.				J-16H	I-18H	I-18G	I-20G	H-22G	H-24G
55 – 60 in.					J-16I	I-18H	I-20G	I-22G	H-24G
61 – 72 in.						K-16H	J-18H	I-20H	I-22G
73 – 84 in.							K-16I	J-18I	I-20H
85 – 96 in.							L-16I	K-18I	J-20I
97 – 108 in.							L-16I	L-18I	L-18I
109 – 120 in.							L-16I	L-18J	L-18J

Table 2–5 Rectangular Duct Reinforcement

RESURGAM. MAINE. CITY OF PORTLAND
Reviewed for Code Compliance
Inspections Division
Approved with Conditions
Date:

6 in. wg Static Pos. or Neg. / Duct Dimension	No Reinforcement Required	Reinforcement Code for Duct Gage Number — Reinforcement Spacing Options							
		10 ft	8 ft	6 ft	5 ft	4 ft	3 ft	2½ ft	2 ft
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
8 in. and under	24 ga.	Not Required			C-26	C-26	B-26	B-26	B-26
9 – 10 in.	24 ga.			B-24	C-24	C-24	B-26	B-26	B-26
11 – 12 in.	20 ga.		C-22	C-22	C-24	C-24	C-26	C-26	C-26
13 – 14 in.	20 ga.		C-22	D-20	D-22	C-24	C-26	C-26	C-26
15 – 16 in.	18 ga.		D-20	D-20	D-22	D-24	D-26	C-26	C-26
17 – 18 in.	18 ga.		E-20	E-20	E-22	E-24	D-26	D-26	C-26
19 – 20 in.	16 ga.	F-18	F-20	F-20	E-22	E-24	D-24	D-26	D-26
21 – 22 in.	16 ga.	F-18	F-18	F-20	F-22	F-24	E-24	E-26	D-26
23 – 24 in.	16 ga.	G-18	G-18	G-20	F-22	F-22	E-24	E-26	E-26
25 – 26 in.	Not Designed	H-16G	H-16G	G-18	G-20	F-22	F-24	E-24	E-24
27 – 28 in.			H-16G	H-18G	H-20G	G-22	F-24	F-24	E-24
29 – 30 in.			I-16G	H-18G	H-18G	G-22	F-24	F-24	E-24
31 – 36 in.				I-16H	I-18H	H-20G	H-22G	G-24	F-24
37 – 42 in.				J-16H	I-16H	I-18G	H-20G	H-22G	G-22
43 – 48 in.					J-16H	I-18H	I-20H	I-22G	I-22G
49 – 54 in.						J-16H	I-18H	I-20G	I-22G
55 – 60 in.						J-16H	J-18H	I-20H	I-22G
61 – 72 in.							K-16I	J-18I	J-20H
73 – 84 in.							L-16J	L-18J	K-18I
85 – 96 in.							It-16	It-16	L-18J
97 – 108 in.							Jt-16	Jt-16	L-18J
109 – 120 in.							Kt-16	Kt-16	Kt-18

Table 2–6 Rectangular Duct Reinforcement

RESURGAM. MAINE CITY OF PORTLAND
Reviewed for Code Compliance
Inspections Division
Approved with Conditions
Date:

10 in. wg Static Pos. or Neg. / Duct Dimension	No Reinforcement Required	Reinforcement Code for Duct Gage Number — Reinforcement Spacing Options							
		10 ft	8 ft	6 ft	5 ft	4 ft	3 ft	2½ ft	2 ft
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
8 in. and under	22 ga.	Not Required		C-20	C-24	C-26	C-26	C-26	C-26
9 – 10 in.	20 ga.			C-20	C-22	C-24	C-26	C-26	C-26
11 – 12 in.	18 ga.		C-20	D-20	D-22	D-24	C-26	C-26	C-26
13 – 14 in.	18 ga.		D-20	E-20	E-20	D-22	D-24	D-26	C-26
15 – 16 in.	16 ga.	E-18	E-18	E-18	E-20	E-20	E-24	D-24	D-26
17 – 18 in.	16 ga.	F-18	F-18	F-18	F-20	F-20	E-24	E-24	D-26
19 – 20 in.		G-16	G-18	G-18	G-18	F-20	F-22	E-24	E-24
21 – 22 in.		H-16G	H-18G	H-18G	G-18	G-20	F-22	F-24	E-24
23 – 24 in.		I-16G	I-18G	H-18G	H-18G	H-20G	G-22	F-24	F-24
25 – 26 in.			J-16G	I-16G	H-18G	H-20G	G-22	F-24	F-24
27 – 28 in.				I-16G	I-18G	H-18G	H-22G	G-24	F-24
29 – 30 in.				J-16G	I-18G	I-18G	H-22G	H-24G	G-24
31 – 36 in.					J-16H	I-18H	I-20G	H-22G	H-24G
37 – 42 in.					J-16I	J-18I	I-18G	I-20H	I-22G
43 – 48 in.						J-16I	J-18I	I-18H	I-22H
49 – 54 in.		Not Designed				L-16I	K-18I	J-18H	I-20H
55 – 60 in.							L-16I	K-18I	J-20I
61 – 72 in.							L-16I	L-18I	L-18I
73 – 84 in.								L-16J	L-18J
85 – 96 in.									Lt-16
97 – 108 in.									Lt-16
109 – 120 in.									Lt-16

Table 2–7 Rectangular Duct Reinforcement

Reviewed for Code Compliance
Inspections Division
Approved with Conditions
Date:

2 in. wg Static Pos. or Neg. / Duct Dimension	4 ft Joints			4 ft Joints w/2 ft Reinf. Spacing				
				Joints/Reinf.			Int. Reinf.	
	Min ga	Joint Reinf.	Alt. Joint Reinf.	Min ga	Joint Reinf.	Alt. Joint Reinf.	Tie Rod	Alt. Reinf.
10 in. dn	26	N/R	N/A	Use 4 ft Joints				
11, 12 in.	26	N/R	N/A					
13, 14 in.	26	N/R	N/A					
15, 16 in.	26	N/R	N/A					
17, 18 in.	26	N/R	N/A					
19, 20 in.	26	N/R	N/A					
21, 22 in.	26	N/R	N/A					
23, 24 in.	26	N/R	N/A					
25, 26 in.	26	N/R	N/A					
27, 28 in.	26	N/R	N/A					
29, 30 in.	24	N/R	N/A	26	N/R	N/A	MPT	C
31-36 in.	24	N/R	N/A	26	N/R	N/A	MPT	D
37-42 in.	22	N/R	N/A	24	N/R	N/A	MPT	E
43-48 in.	22	JTR	(2) C	24	N/R	N/A	MPT	E
	20	N/R	—					
49-54 in.	20	JTR	(2) E	22	N/R	N/A	MPT	F
55-60 in.	20	JTR	(2) E	22	N/R	N/A	MPT	F
61-72 in.	20	JTR	(2) H	20	JTR	(2) E	MPT	H
				18	N/R	N/A		
73-84 in.	20	JTR	(2) H	20	JTR	(2) H	2 MPT	I
85-96 in.	18	JTR	(2) H	20	JTR	(2) H	2 MPT	I
97-108 in.	16	JTR	(2) I	18	JTR	(2) H		I
109-120 in.	Not Designed			18	JTR	(2) H		J

Table 2-10 4 ft Coil/Sheet Stock/T25a/T25b (TDC/TDF) Duct Reinforcement

N/R – Not Required
N/A – Not Applicable

JTR – Joint Tie Rod
MPT – Mid Panel Tie Rod (s)

Reviewed for Code Compliance
Inspections Division
Approved with Conditions
Date:

2 in. wg Static Pos. or Neg. Duct Dimension	4 ft Joints			4 ft Joints w/2 ft Reinf. Spacing				
				Joints/Reinf.			Int. Reinf.	
	Min ga	Joint Reinf.	Alt. Joint Reinf.	Min ga	Joint Reinf.	Alt. Joint Reinf.	Tie Rod	Alt. Reinf.
10 in. dn	26	N/R	N/A	Use 4 ft Joints				
11, 12 in.	26	N/R	N/A					
13, 14 in.	26	N/R	N/A					
15, 16 in.	26	N/R	N/A					
17, 18 in.	26	N/R	N/A					
19, 20 in.	26	N/R	N/A					
21, 22 in.	26	N/R	N/A					
23, 24 in.	26	N/R	N/A					
25, 26 in.	26	N/R	N/A					
27, 28 in.	26	N/R	N/A					
29, 30 in.	24	N/R	N/A	26	N/R	N/A	MPT	C
31-36 in.	24	N/R	N/A	26	N/R	N/A	MPT	D
37-42 in.	22	N/R	N/A	24	N/R	N/A	MPT	E
43-48 in.	22	JTR	(2) C	24	N/R	N/A	MPT	E
	20	N/R	—					
49-54 in.	20	JTR	(2) E	22	N/R	N/A	MPT	F
55-60 in.	20	JTR	(2) E	22	N/R	N/A	MPT	F
61-72 in.	20	JTR	(2) H	20	JTR	(2) E	MPT	H
				18	N/R	N/A		
73-84 in.	20	JTR	(2) H	20	JTR	(2) H	2 MPT	I
85-96 in.	18	JTR	(2) H	20	JTR	(2) H	2 MPT	I
97-108 in.	16	JTR	(2) I	18	JTR	(2) H		I
109-120 in.	Not Designed			18	JTR	(2) H		J

Table 2–10 4 ft Coil/Sheet Stock/T25a/T25b (TDC/TDF) Duct Reinforcement

N/R – Not Required
N/A – Not Applicable

JTR – Joint Tie Rod
MPT – Mid Panel Tie Rod (s)

RESURGAM, MAINE CITY OF PORTLAND
Reviewed for Code Compliance
Inspections Division
Approved with Conditions
Date:

4 in. wg Static Pos. or Neg. / Duct Dimension	5 ft Joints			5 ft Joints w/2 ½ ft Reinf. Spacing				
				Joints/Reinf.			Int. Reinf.	
	Min ga	Joint Reinf.	Alt. Joint Reinf.	Min ga	Joint Reinf.	Alt. Joint Reinf.	Tie Rod	Alt. Reinf.
8 in. dn	26	N/R	N/R	Use 5 ft Joints				
9, 10 in.	26	N/R	N/R					
11, 12 in.	26	N/R	N/R					
13, 14 in.	24	N/R	N/R	26	N/R	N/R	MPT	C
15, 16 in.	24	N/R	N/R	26	N/R	N/R	MPT	C
17, 18 in.	24	N/R	N/R	26	N/R	N/R	MPT	C
19, 20 in.	24	N/R	N/R	26	N/R	N/R	MPT	C
21, 22 in.	24	N/R	N/R	26	N/R	N/R	MPT	D
23, 24 in.	22	N/R	N/R	26	N/R	N/R	MPT	D
25, 26 in.	22	N/R	N/R	24	N/R	N/R	MPT	E
27, 28 in.	22	N/R	N/R	24	N/R	N/R	MPT	E
29, 30 in.	20	N/R	N/R	24	N/R	N/R	MPT	E
31-36 in.	20	JTR	(2) E	22	N/R	N/R	MPT	F
37-42 in.	18	JTR	(2) H	22	JTR	(2) C	MPT	G
				20	N/R	N/R		
43-48 in.	18	JTR	(2) H	20	JTR	(2) E	MPT	H
				18	N/R	N/R		
49-54 in.	18	JTR	(2) H	20	JTR	(2) E	MPT	H
				18	N/R	N/R		
55-60 in.	16	JTR	(2) H	20	JTR	(2) I	MPT	I
61-72 in.	Not Designed			20	JTR	(2) I	(2) MPT	I
73-84 in.				18	JTR	(2) I	(2) MPT	J
85-96 in.				18	JTR	(2) I	(2) MPT	K
97-108 in.				18	JTR	(2) K		L
109-120 in.				18	JTR	(2) K		L

Table 2-19 5 ft Coil/Sheet Stock/T25a/T25b (TDC/TDF) Duct Reinforcement

N/R – Not Required **JTR – Joint Tie Rod**

N/A – Not Applicable **MPT – Mid Panel Tie Rod (s)**

Reviewed for Code Compliance
Inspections Division
Approved with Conditions
Date:

4 in. wg Static Pos. or Neg. / Duct Dimension	6 ft Joints			6 ft Joints w/3 ft Reinf. Spacing				
				Joints/Reinf.			Int. Reinf.	
	Min ga	Joint Reinf.	Alt. Joint Reinf.	Min ga	Joint Reinf.	Alt. Joint Reinf.	Tie Rod	Alt. Reinf.
8 in. dn	26	N/R	N/A	Use 6 ft Joints				
9, 10 in.	24	N/R	N/A	26	N/R	N/A	N/A	B
11, 12 in.	24	N/R	N/A	26	N/R	N/A	N/A	C
13, 14 in.	22	N/R	N/A	26	N/R	N/A	N/A	C
15, 16 in.	22	N/R	N/A	26	N/R	N/A	N/A	C
17, 18 in.	22	N/R	N/A	26	N/R	N/A	N/A	C
19, 20 in.	22	N/R	N/A	26	N/R	N/A	N/A	D
21, 22 in.	20	N/R	N/A	26	N/R	N/A	N/A	D
23, 24 in.	20	N/R	N/A	24	N/R	N/A	N/A	E
25, 26 in.	20	N/R	N/A	24	N/R	N/A	N/A	E
27, 28 in.	20	N/R	N/A	24	N/R	N/A	N/A	E
29, 30 in.	18	N/R	N/A	24	N/R	N/A	N/A	E
31-36 in.	18	N/R	N/A	22	N/R	N/A	MPT	F
37-42 in.	16	JTR	(2) H	22	JTR	(2) C	N/A	G
				20	N/R	N/A		
43-48 in.	16	JTR	(2) H	22	JTR	(2) E	N/A	H
				18	N/R	N/A		
49-54 in.	16	JTR	(2) H	20	JTR	(2) H	MPT	I
55-60 in.	Not Designed			20	JTR	(2) H	2 MPT	I
61-72 in.				18	JTR	(2) H	2 MPT	J
73-84 in.				16	JTR	(2) I	2 MPT	K
85-96 in.				16	JTR	(2) K	N/A	L
97-108 in.				16	JTR	(2) K		L
109-120 in.				16	JTR	(2) K		L

Table 2-26 6 ft Coil/Sheet Stock/T25a/T25b (TDC/TDF) Duct Reinforcement

N/R – Not Required

N/A – Not Applicable

JTR – Joint Tie Rod

MPT – Mid Panel Tie Rod (s)

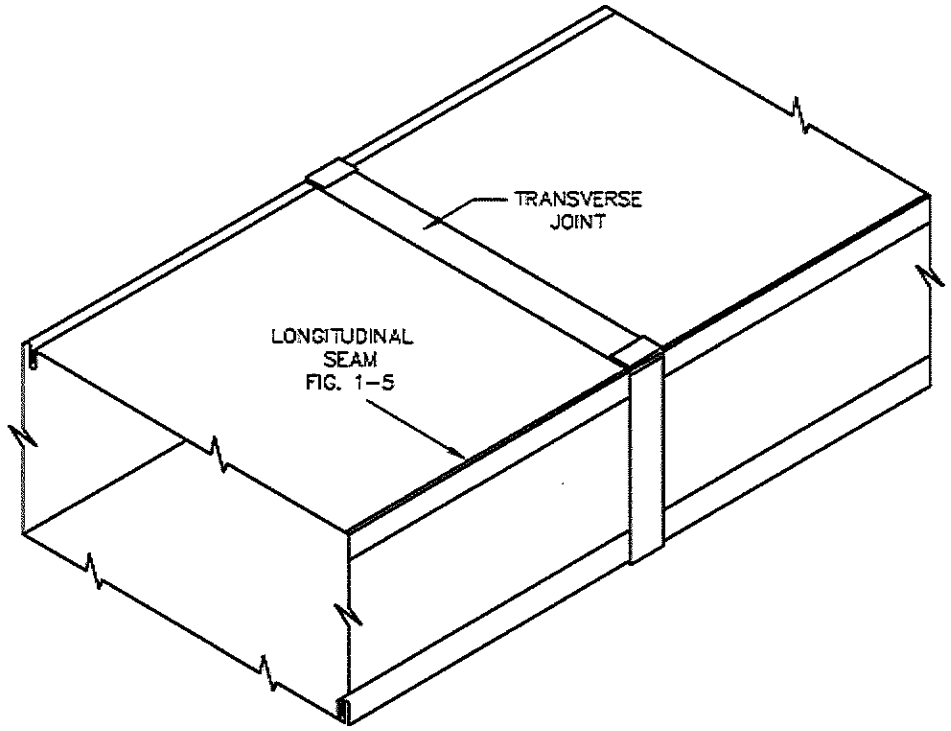
RESURGAM. MAINE. CITY OF PORTLAND
Reviewed for Code Compliance
Inspections Division
Approved with Conditions
Date:

	RS	16 ga	18 ga	20 ga	22 ga	24 ga	26 ga
±½ in. wg	3 ft				To 96(1)	To 84(1)	To 60(1)
	2 ½ ft				To 96(1)	To 84(1)	To 60(1)
	2 ft				To 96(1)	To 84(1)	To 60(1)
±1 in. wg	3 ft		To 96(1)*	To 84(1)* 85-96(2)	To 72(1)* 73-84(2)	To 60(1) 61-72(2)	To 48(1)
	2 ½ in.		To 96(1)*	To 84(1)* 85-96(2)	To 72(1)* 73-84(2)	To 60(1) 61-72(2)	To 48(1)
	2 ft		To 96(1)*	To 84(1)* 85-96(2)	To 72(1) 73-96(2)	To 72(1)	To 48(1)
±2 in. wg	3 ft		To 84(1)* To 96(2)	To 60(1)* 61-84(2)	To 48(1)* 49-72(2)	To 42(1) 43-54(2)	To 36(1)
	2 ½ ft		To 84(1)* 85-96(2)	To 72(1)* 73-96(2)	To 60(1)* 61-84(2)	To 54(1) 55-60(2)	To 42(1)
	2 ft		To 96(1)*	To 72(1)* 73-96(2)	To 60(1) 61-96(2)	To 60(1) 61-72(2)	To 42(1)
±3 in. wg	3 ft		To 72(1)* 73-84(2)	To 54(1)* 55-72(2)	To 48(1) 49-54(2)	To 42(1)	To 30(1)
	2 ½ ft		To 72(1)* To 96(2)	To 60(1)* 61-84(2)	To 54(1)* 55-72(2)	To 42(1) 43-54(2)	To 36(1)
	2 ft		To 84(1)* 85-96(2)	To 72(1)* 73-96(2)	To 60(1)* 61-84(2)	To 54(1) 55-72(2)	To 42(1)
±4 in. wg	3 ft	To 84(2)	To 60(1)* 61-72(2)	To 54(1)* 55-60(2)	To 48(1)	To 36(1)	To 30(1)
	2 ½ ft		To 72(1)* 73-96(2)	To 60(1)* 61-72(2)	To 48(1) 49-60(2)	To 48(1)	To 36(1)
	2 ft		To 84(1)* 85-96(2)	To 60(1)* 61-96(2)	To 60(1) 61-72(2)	To 48(1) 49-60(2)	To 42(1)
±6 in. wg	3 ft	To 72(2)	To 54(1)* 55-60(2)	To 42(1)	To 36(1)	N/A	N/A
	2 ½ in.	To 96(2)	To 72(1)*	To 54(1) 55-60(2)	To 48(1)	To 36(1)	N/A
	2 ft		To 72(1)* 73-96(2)	To 60(1)* 61-72(2)	To 48(1) 49-60(2)	To 36(1)	N/A

Table 2–41 Midpanel Tie Rod (MPT) Schedule (RS)

RESURGAM. CITY OF PORTLAND, MAINE
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Inspections Division
Approved with Conditions
Date:

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

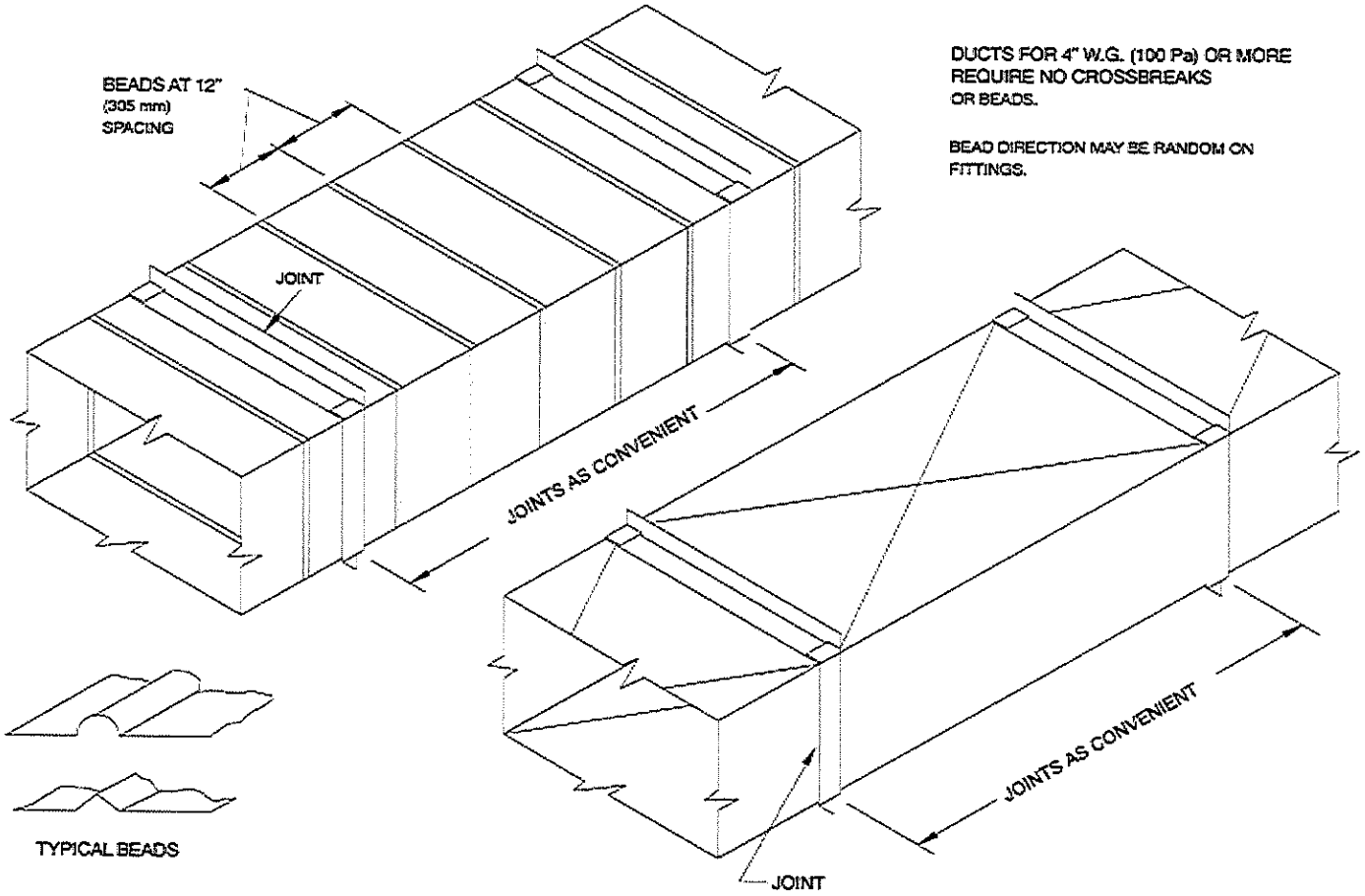


DOUBLE "S" SLIP
T-8

FIGURE 2-8 UNREINFORCED DUCT

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Date:

DUCT SIZES 19" (483 mm) WIDE AND LARGER WHICH HAVE MORE THAN 10 SQUARE FEET (0.93 SQUARE METER) OF UNBRACED PANEL SHALL BE BEADED OR CROSS BROKEN UNLESS DUCTS WILL HAVE INSULATION COVERING OR ACOUSTICAL LINER. THIS REQUIREMENT IS APPLICABLE TO 20 GAGE (1.00 mm) OR LESS THICKNESS AND 3" W.G. (750 Pa) OR LESS. IT IS UNNECESSARY TO BREAK OR BEAD ALL SIDES UNLESS EACH DUCT DIMENSION REQUIRES IT.



NOTICE: NEITHER BEADS NOR CROSSBREAKS AFFECT REINFORCEMENT SPACING SCHEDULE.

FIGURE 2-9 CROSSBROKEN AND BEADED DUCT

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Date:

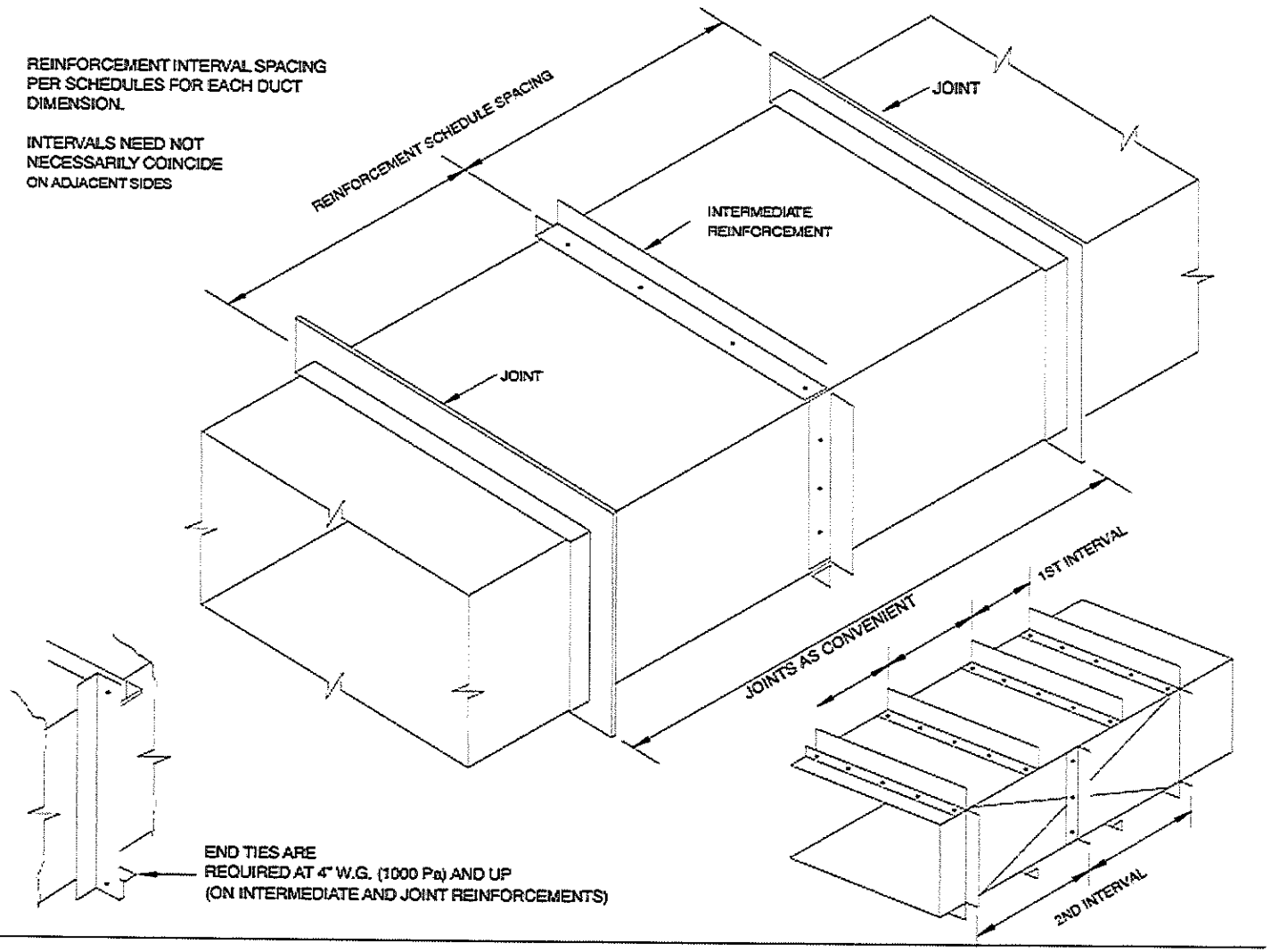
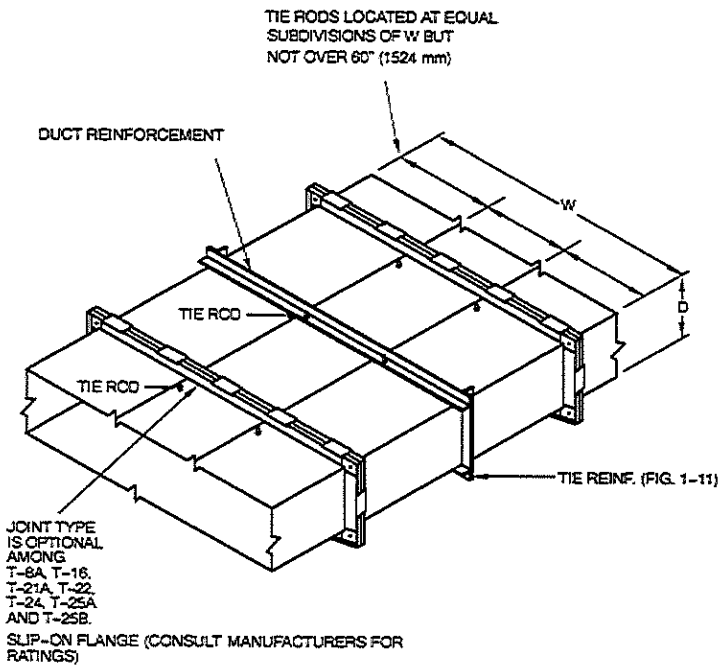


FIGURE 2-11 DUCT REINFORCED ON ALL SIDES

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Duct Pressure Class

	½ in.	1 in.	2 in.	3 in.	4 in.	6 in.	10 in.
Panel Ga	18	18	18	18	18	18	16
Reinf. Size	It	It	It	It	Jt	Kt	Lt
Reinf. Spacing (ft)	2½ ft	2½ ft	2½ ft	2½ ft	2½ ft	2	2
Max. Tie Rod Spacing (ft)	5	5	5	5	5	5	4

Table 2–49 Large (Over 120 in.) Duct Construction

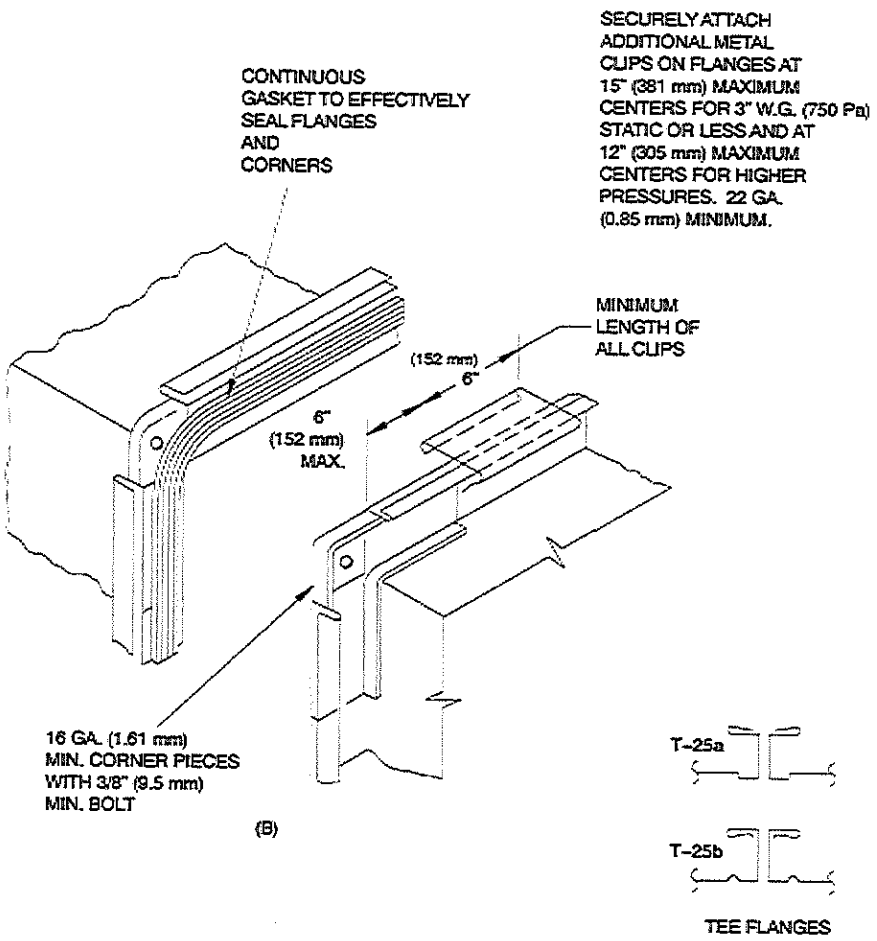
a. See tie rod text.

b. See Reinforcement Attachment in Figure 2-12.

c. See Figure 3-7 for large duct supports. Duct over 100 in. width may require other internal supports for shape retention.

FIGURE 2–13 DUCT OVER 120 IN. (3048 MM) WIDE

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Date:



SCREWS MAY BE USED IN LIEU OF METAL CLIPS. INSTALL 1" MAX. FROM END OF CORNER PIECE AND AT 6" MAX. INTERVALS.

EQUIVALENT FIXATION OF JOINTS MAY BE USED. CONTINUOUS CLEATS MAY BE USED.

FIGURE 2-17 CORNER CLOSURES – FLANGES