

Rectangular Duct Construction

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


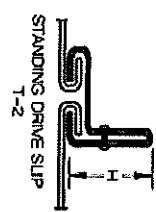
Reinf. Class	Companion Angles	T-22		T-24 Flanged		T-24a Flanged		T-25b Flanged		Slip-On Flange
		RIVET OR WELD GASKET	H	WT LF	T (Nom.)	WT LF	H x T (Nom.)	WT LF	H x T (Nom.)	
B	1.0	Use E		Use D		Use D		Use D		 <p>Consult manufacturers for ratings established by performance documented to functional criteria in Chapter 11. See text S1.18 on page 2.4.</p>
C	1.9	Use E		Use D		Use D		Use D		
D	2.7	Use E		26 ga	0.5	1 x 22 ga	0.4	26 ga	0.5	
E	6.5	C 1 x 1/8	1.7	24 ga	0.6	Use F		24 ga	0.6	
F	12.8	H 1 x 1/8	1.7	22 ga	0.7	1/2 x 20 ga	0.6	22 ga	0.7	
G	15.8	1/4 x 1/8	2.1	22 ga (R) 20 G	1.0	1/2 x 18 ga	0.8	22 ga (R) 20 ga	1.0	
H	26.4	C 1 1/2 x 1/8 (+) H 1 1/2 x 1/8	2.6	18 ga	1.1			18 ga	1.1	
I	69	1 1/2 x 1/4	3.7	20 ga (R)	1.0			20 ga (R)	1.0	
J	80	1 1/2 x 1/4 (+) 2 x 1/8	4.7	18 ga (R)	1.1			18 ga (R)	1.1	
K	103	2 x 3/16	5	18 ga (R)	1.1			18 ga (R)	1.1	
L	207	H 2 x 1/4	6.5	18 ga (R)	1.1			18 ga (R)	1.1	

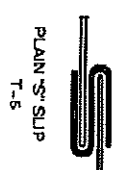
Table 2-32 Transverse Joint Reinforcement



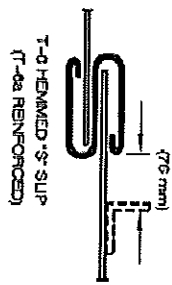
- Gage no less than two gages less than duct gage
- 24 ga minimum
- Qualification as reinforcement per Table 2-48
- T-3 - Slip Gage as per T-1
 - Any length at 2 in. wg
 - 36 in. maximum length at 3 in. wg
 - 30 in. maximum length at 4 in. wg
 - Not allowed above 4 in. wg



- 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



- 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



- 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

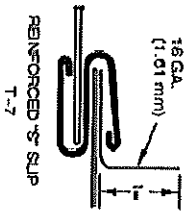


FIGURE 2-1 RECTANGULAR DUCT/TRANSVERSE JOINTS

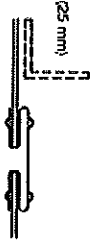


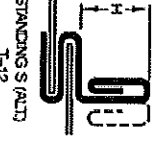
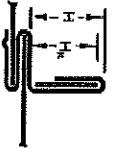
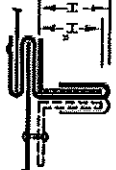
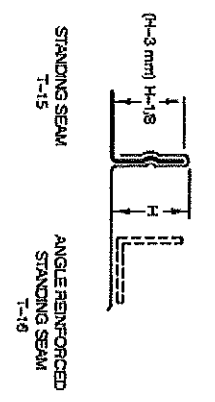
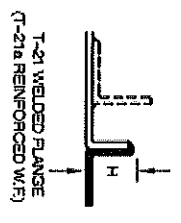
 <p>T-8 DOUBLE "S" SLIP (T-8a REINFORCED)</p> <ul style="list-style-type: none"> ▪ 24 ga for 30 inch width or less ▪ 22 ga over 30 inch width ▪ Fasten to each section of the duct within 2 in. from corners and at 6 in. maximum intervals ▪ 3/4 in. minimum tabs to close corners
 <p>STANDING S T-10</p>  <p>STANDING S (ALT) T-11</p>  <p>STANDING S (ALT) T-12</p> <ul style="list-style-type: none"> ▪ 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
 <p>STANDING S (BAR REINFORCED) T-13</p> <ul style="list-style-type: none"> ▪ 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
 <p>STANDING S (ANGLE REINFORCED) T-14</p> <ul style="list-style-type: none"> ▪ 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

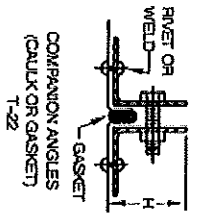
FIGURE 2-1 RECTANGULAR DUCT/TRANSVERSE JOINTS (CONTINUED)



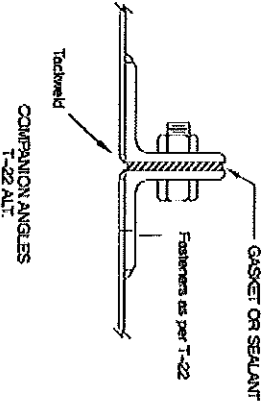
- Button punch or otherwise fasten within 2 in. of each corner and at 6 in. maximum intervals
- Seal and fold corners
- Sagger joints on adjacent sides if using standing seam on all four sides
- Hammer longitudinal seam at ends of standing seam



- Use ½ in. minimum flange and end weld
- Flanges larger than ¾ 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. x 4 in. rod in corners or provide hangers at every joint



- ¾ in. minimum flange on duct
- Angles must have welded corners
- Angles must be back welded, bolted or screwed to the duct wall at 2 in. maximum from the ends and at 12 in. maximum intervals
- Bolt Schedule:
 - ¾ minimum diameter at 6 in. maximum spacing at 4 in. wg or lower
 - ½ in. angle requires 4 in. maximum spacing at 4 in. wg
 - 4 in. maximum spacing at higher pressures



- Hold duct back ½ in. from vertical face of the angle and back 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)

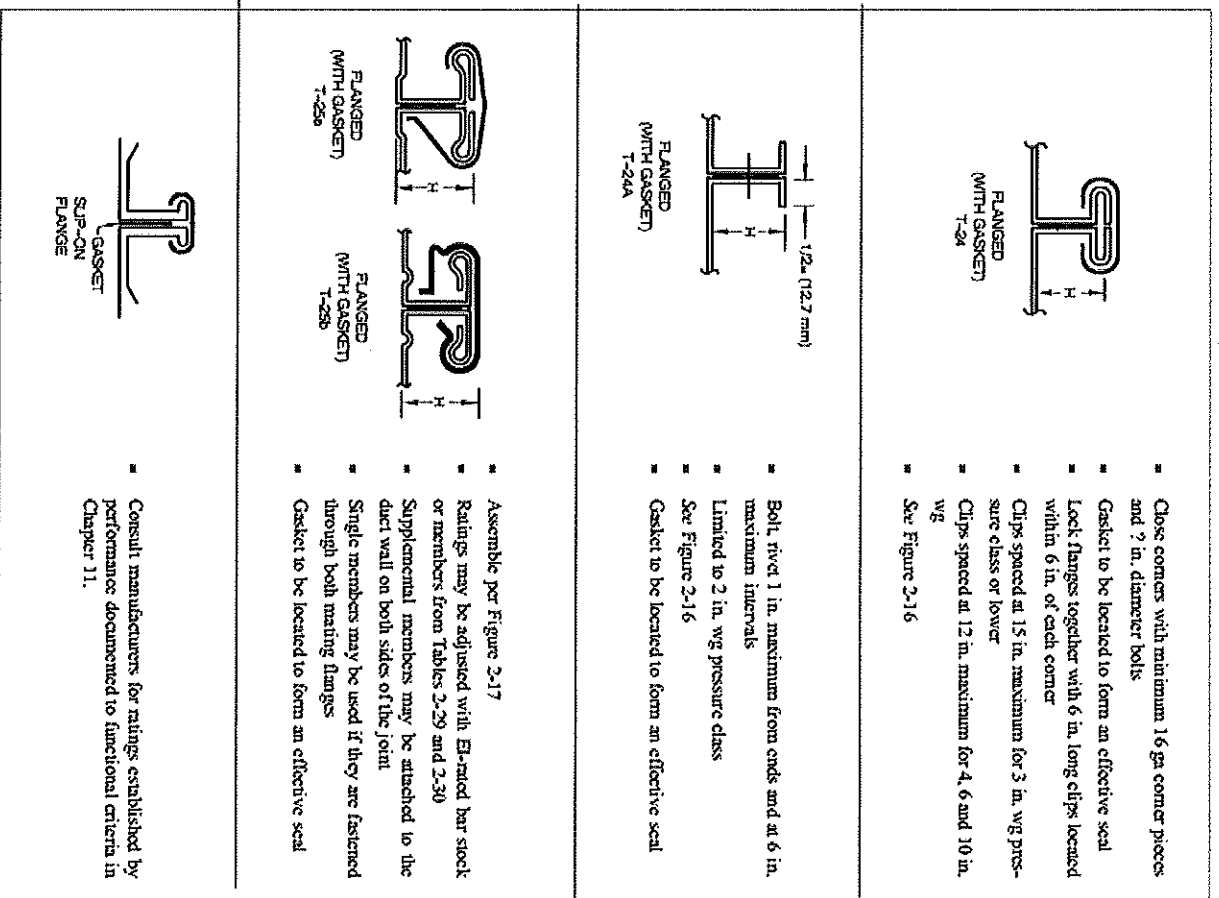
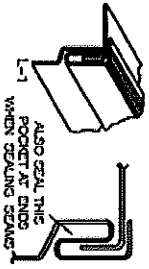
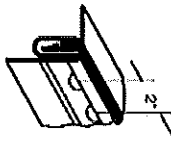


FIGURE 2-1 RECTANGULAR DUCT/TRANSVERSE JOINTS (CONTINUED)



PITTSBURGH LOOK

- Pocket depth from 1/4 in. to 3/8 in.
- Use on straight duct and fittings
- To ± 10 in. wg



BUTTON PUNCH SWAP LOOK

- 3/8 in. pocket depth for 20, 22 & 24 ga
- 1/2 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



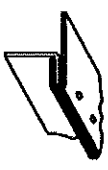
GROOVED SEAM
ALSO CALLED FLAT LOCK AND PIPE LOCK

- To ± 10 in. wg



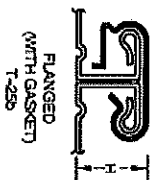
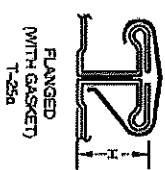
SEE FIG. 1-6 ALSO
L-4 STRANDING SEAM

- 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



- Assemble per Figure 2-17
- Ratings may be adjusted with E-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

Reinf Class	Angle	Channel or Zee		Hat Section	
		H × T (MIN)	WT LF	H × T (MIN)	WT LF
A	0.43	Use C		Use F	
B	1.0	Use C		Use F	
C	1.9	C1 × 16 ga C9/4 × 1/6	3/4 × 1/2 × 18 ga 1 × 3/4 × 20 ga	Use F	
D	2.7	H3/4 × 1/6 C1 × 1/6	1 × 3/4 × 18 ga	Use F	
E	6.5	C1 1/4 × 12 ga H1 × 1/6	2 × 1 1/6 × 20 ga	Use F	
F	12.8	H1 1/4 × 1/6	1 1/2 × 3/4 × 18 ga	1 1/2 × 3/4 × 5/8 × 18 ga 1 1/2 × 1 1/2 × 3/4 × 20 ga	0.90 0.83
G	15.8	1 1/2 × 1/6	1 1/2 × 3/4 × 16 ga	1 1/2 × 3/4 × 5/8 × 18 ga	0.80
H	26.4	1 1/2 × 3/8 2 × 1/6	1 1/2 × 3/4 × 1/6	1 1/2 × 1 1/2 × 3/4 × 18 ga 2 × 1 × 3/4 × 20 ga	1.08 0.90
I	69	C2 × 3/8 2 1/2 × 1/6	2 × 1 1/2 × 12 ga 3 × 1 1/2 × 16 ga	2 × 1 × 3/4 × 16 ga	1.44
J	80	H2 × 3/8 C2 × 1/4 2 1/2 × 1/6 (+)	2 × 1 1/2 × 1/6	2 × 1 × 3/4 × 12 ga 2 1/2 × 2 × 3/4 × 18 ga	2.45 1.53
K	105	2 1/2 × 3/8	3 × 1 1/2 × 12 ga	2 1/2 × 2 × 3/4 × 16 ga 3 × 1 1/2 × 3/4 × 16 ga	1.88 2.00
L	207	H2 1/2 × 1/6	3 × 1 1/2 × 1/6	2 1/2 × 2 × 3/4 × 1/6 3 × 1 1/2 × 3/4 × 12 ga	3.70 3.40

Table 2-29 Intermediate Reinforcement

See para 2.1.4. Nominal EI is number listed times 10⁵ 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 the rod options elsewhere.

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

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

½ in. wg Static Pos. or Neg.	Duct Dimension	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	10 in. and under	26 ga.	③	④	⑤	⑥	⑦	⑧	⑨	⑩																																																																																																																																																																																																				
																					11 - 12 in.	26 ga.	B-26	B-26	B-26	B-26	B-26	B-26	B-26	B-26	A-26	A-26																																																																																																																																																																														
																																										13 - 14 in.	26 ga.	B-26	B-26	B-26	B-26	B-26	B-26	B-26	B-26	B-26	B-26																																																																																																																																																									
																																																																15 - 16 in.	26 ga.	B-26	B-26	B-26	B-26	B-26	B-26	B-26	B-26	B-26	B-26																																																																																																																																			
																																																																																							17 - 18 in.	26 ga.	B-26	B-26	B-26	B-26	B-26	B-26	B-26	B-26	B-26	B-26																																																																																																												
																																																																																																														19 - 20 in.	24 ga.	B-26	B-26	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	B-26	B-26	B-26																																																														
																																																																																																																																																												23 - 24 in.	22 ga.	C-26	C-26	C-26	B-26	B-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	B-26	B-26																
																																																																																																																																																																																																										27 - 28 in.	18 ga.	C-24	C-26	C-26
29 - 30 in.	18 ga.	C-24	C-26	C-26	C-26	C-26	B-26	B-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	C-26	C-26	C-26																																																																																																																																																																														
																																										37 - 42 in.	16 ga.	E-20	E-24	D-24	D-26	C-26	C-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	C-26	C-26																																																																																																																																			
																																																																																							49 - 54 in.		F-18	F-20	E-22	E-26	E-26	E-26	E-26	E-26	D-26	C-26																																																																																																												
																																																																																																														55 - 60 in.		G-18	F-20	F-22	E-24	E-24	E-24	E-26	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	E-24	E-24																																																														
																																																																																																																																																												73 - 84 in.		I-16G	H-18G	H-22G	G-24	F-24	F-24	F-24	F-24	F-24	F-24																																							
																																																																																																																																																																																			85 - 96 in.		I-16G	I-18G	H-20G	H-22G	G-22	G-22	F-22	F-22	F-22	F-22																
																																																																																																																																																																																																										97 - 108 in.		I-16G	I-18G	I-18G
109 - 120 in.		I-16G	I-16G	I-16G	I-16G	I-18G	I-18G	I-18G	I-18G	H-18G	H-18G																																																																																																																																																																																																			

Table 2-1 Rectangular Duct Reinforcement

1 in. w/g Static Pos. or Neg.	Reinforcement Required	Reinforcement Code for Duct Gage Number									
		Reinforcement Spacing Options									
Duct Dimension	No	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	B-26	
19 – 20 in.	24 ga.		C-26	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	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	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	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	C-26	
29 – 30 in.	18 ga.	E-22	D-24	D-26	D-26	C-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	C-26	
37 – 42 in.	16 ga.	F-18	F-20	E-22	E-24	E-26	D-26	D-26	C-26	C-26	
43 – 48 in.	16 ga.	G-18	G-18	F-20	F-22	E-24	E-26	E-26	E-26	D-26	
49 – 54 in.		H-18	H-18	G-20	F-22	F-24	E-24	E-24	E-24	E-24	
55 – 60 in.		I-16	H-18	G-20	G-22	F-24	F-24	F-24	E-24	E-24	
61 – 72 in.											
73 – 84 in.											
85 – 96 in.											
97 – 108 in.											
109 – 120 in.											

Table 2-2 Rectangular Duct Reinforcement

2 in. w/g Static Pos. or Neg.	Reinforcement Required	Reinforcement Code for Duct Gage Number									
		Reinforcement Spacing Options									
Duct Dimension	No	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	B-26	
15 - 16 in.	24 ga.		C-26	C-26	C-26	C-26	C-26	C-26	C-26	B-26	
17 - 18 in.	22 ga.		C-26	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	C-26	
21 - 22 in.	18 ga.	D-22	D-24	D-26	D-26	C-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	C-26	
25 - 26 in.	18 ga.	E-22	E-22	E-24	D-26	D-26	C-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	C-26	
29 - 30 in.	18 ga.	F-20	F-20	E-22	E-24	E-26	D-26	D-26	C-26	C-26	
31 - 36 in.	16 ga.	G-18	G-20	F-22	F-24	E-24	E-26	D-26	D-26	D-26	
37 - 42 in.		H-16	H-18	G-20	G-22	F-24	E-24	E-26	E-26	E-26	
43 - 48 in.		I-18	H-20	H-22	G-22	F-24	F-24	F-24	F-24	E-24	
49 - 54 in.		J-16G	I-18G	H-20G	H-20G	G-24	F-24	F-24	F-24	F-24	
55 - 60 in.			I-18G	H-20G	H-20G	G-22	G-24	G-24	F-24	F-24	
61 - 72 in.			I-18G	I-20G	H-20G	G-22	G-24	H-22G	H-22G	H-24	
73 - 84 in.			J-16H	J-18H	I-20G	H-20G	H-22G	H-22G	H-22G	H-24	
85 - 96 in.				J-16H	I-20G	I-20G	I-20G	I-22G	I-22G	I-22G	
97 - 108 in.					J-18H	I-18H	I-18H	I-20H	I-22H	I-22H	
109 - 120 in.					K-16I	K-18H	J-18H	J-18H	I-18H	I-18H	
					K-16I	K-18I	K-18I	K-18I	J-18I	J-18I	

Not Designed

Table 2-3 Rectangular Duct Reinforcement

3 in. wvg 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 10 in. and under	② 24 ga.	③ Not Required	④ Not Required	⑤ B-26	⑥ B-26	⑦ B-26	⑧ B-26	⑨ B-26	⑩ B-26		
11 - 12 in.	24 ga.			B-26	B-26	B-26	B-26	B-26	B-26		
13 - 14 in.	22 ga.			B-26	B-26	B-26	B-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.			C-24	C-24	C-26	C-26	C-26	C-26		
19 - 20 in.	18 ga.			D-24	D-24	D-24	C-26	C-26	C-26		
21 - 22 in.	18 ga.			D-22	D-24	D-24	C-26	C-26	C-26		
23 - 24 in.	18 ga.			E-22	D-24	D-24	D-26	C-26	C-26		
25 - 26 in.	18 ga.			E-20	E-24	E-24	D-26	D-26	C-26		
27 - 28 in.	18 ga.			F-20	E-24	E-24	D-26	D-26	C-26		
29 - 30 in.	18 ga.			F-20	F-22	E-24	E-26	E-26	D-26		
31 - 36 in.	16 ga.			G-20	F-22	E-24	E-26	E-26	D-26		
37 - 42 in.		H-18G	H-18G	H-18G	G-20	F-22	F-24	E-26	E-26		
43 - 48 in.			L-16G	H-18G	H-20G	G-22	F-24	F-24	E-26		
49 - 54 in.			J-16H	L-18G	H-18G	H-20	G-22	G-24	F-24		
55 - 60 in.				J-16H	I-18G	I-18G	H-22G	G-24	G-24		
61 - 72 in.				J-16H	I-18G	I-18G	H-20G	H-22G	G-24		
73 - 84 in.					J-16I	J-18H	L-20G	I-22G	I-24G		
85 - 96 in.					L-16I	K-16H	J-18H	I-20H	I-22G		
97 - 108 in.						L-16I	K-18I	J-18I	I-20H		
109 - 120 in.							L-16I	L-18I	K-18I		
							L-16I	L-18I	K-18I		

Table 2-4 Rectangular Duct Reinforcement

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

Table 2-5 Rectangular Duct Reinforcement

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 8 in. and under	② 24 ga.	③	④	⑤	⑥	⑦	⑧	⑨	⑩		
										Not Required	
① 9 - 10 in.	② 24 ga.	③	④	⑤	⑥	⑦	⑧	⑨	⑩		
											C-26
① 11 - 12 in.	② 20 ga.	③	④	⑤	⑥	⑦	⑧	⑨	⑩		
											C-22
① 13 - 14 in.	② 20 ga.	③	④	⑤	⑥	⑦	⑧	⑨	⑩		
											C-22
① 15 - 16 in.	② 18 ga.	③	④	⑤	⑥	⑦	⑧	⑨	⑩		
											D-20
① 17 - 18 in.	② 18 ga.	③	④	⑤	⑥	⑦	⑧	⑨	⑩		
											E-20
① 19 - 20 in.	② 16 ga.	③	④	⑤	⑥	⑦	⑧	⑨	⑩		
											F-18
① 21 - 22 in.	② 16 ga.	③	④	⑤	⑥	⑦	⑧	⑨	⑩		
											F-18
① 23 - 24 in.	② 16 ga.	③	④	⑤	⑥	⑦	⑧	⑨	⑩		
											G-18
① 25 - 26 in.	② 16 ga.	③	④	⑤	⑥	⑦	⑧	⑨	⑩		
											H-16G
① 27 - 28 in.	② 16 ga.	③	④	⑤	⑥	⑦	⑧	⑨	⑩		
											H-16G
① 29 - 30 in.	② 16 ga.	③	④	⑤	⑥	⑦	⑧	⑨	⑩		
											I-16G
① 31 - 36 in.	② 16 ga.	③	④	⑤	⑥	⑦	⑧	⑨	⑩		
											I-16H
① 37 - 42 in.	② 16 ga.	③	④	⑤	⑥	⑦	⑧	⑨	⑩		
											J-16H
① 43 - 48 in.	② 16 ga.	③	④	⑤	⑥	⑦	⑧	⑨	⑩		
											J-16H
① 49 - 54 in.	② 16 ga.	③	④	⑤	⑥	⑦	⑧	⑨	⑩		
											J-16H
① 55 - 60 in.	② 16 ga.	③	④	⑤	⑥	⑦	⑧	⑨	⑩		
											J-16H
① 61 - 72 in.	② 16 ga.	③	④	⑤	⑥	⑦	⑧	⑨	⑩		
											J-16H
① 73 - 84 in.	② 16 ga.	③	④	⑤	⑥	⑦	⑧	⑨	⑩		
											J-16H
① 85 - 96 in.	② 16 ga.	③	④	⑤	⑥	⑦	⑧	⑨	⑩		
											J-16H
① 97 - 108 in.	② 16 ga.	③	④	⑤	⑥	⑦	⑧	⑨	⑩		
											J-16H
① 109 - 120 in.	② 16 ga.	③	④	⑤	⑥	⑦	⑧	⑨	⑩		
											J-16H

Table 2-6 Rectangular Duct Reinforcement

10 in. w/g 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	Not Required	Not Required	③	④	⑤	⑥	⑦	⑧	⑨	⑩
				C-20	C-24	C-26	C-26	C-26	C-26	C-26	C-26
8 in. and under	22 ga.	Not Required	Not Required	C-20	C-24	C-26	C-26	C-26	C-26	C-26	C-26
				C-20	C-22	C-24	C-26	C-26	C-26	C-26	
9 – 10 in.	20 ga.	Not Required	Not Required	C-20	D-22	D-24	C-26	C-26	C-26	C-26	
				D-20	D-20	D-22	D-24	D-24	D-26	C-26	
11 – 12 in.	18 ga.	Not Required	Not Required	D-20	E-20	E-20	D-22	D-24	D-24	D-26	
				D-20	E-20	E-20	D-22	D-24	D-24	D-26	
13 – 14 in.	18 ga.	Not Required	Not Required	D-20	E-20	E-20	D-22	D-24	D-24	D-26	
				D-20	E-20	E-20	D-22	D-24	D-24	D-26	
15 – 16 in.	16 ga.	Not Required	Not Required	E-18	E-18	E-20	E-20	E-24	E-24	D-26	
				E-18	E-18	E-20	E-20	E-24	E-24	D-26	
17 – 18 in.	16 ga.	Not Required	Not Required	F-18	F-20	F-20	F-20	E-24	E-24	D-26	
				F-18	F-20	F-20	F-20	E-24	E-24	D-26	
19 – 20 in.	16 ga.	Not Required	Not Required	G-16	G-18	G-18	F-20	F-22	E-24	E-24	
				G-16	G-18	G-18	F-20	F-22	E-24	E-24	
21 – 22 in.	18 ga.	Not Required	Not Required	H-16G	H-18G	G-18	G-20	F-22	F-24	E-24	
				H-16G	H-18G	G-18	G-20	F-22	F-24	E-24	
23 – 24 in.	18 ga.	Not Required	Not Required	I-16G	H-18G	H-18G	H-20G	G-22	F-24	F-24	
				I-16G	H-18G	H-20G	G-22	F-24	F-24		
25 – 26 in.	16 ga.	Not Required	Not Required	J-16G	H-18G	H-20G	G-22	F-24	F-24	F-24	
				J-16G	H-18G	H-20G	G-22	F-24	F-24		
27 – 28 in.	16 ga.	Not Required	Not Required	I-16G	I-18G	H-18G	H-22G	G-24	F-24	F-24	
				I-16G	I-18G	H-18G	H-22G	G-24	F-24		
29 – 30 in.	18 ga.	Not Required	Not Required	J-16G	I-18G	H-22G	H-24G	G-24	F-24	F-24	
				J-16G	I-18G	H-22G	H-24G	G-24	F-24		
31 – 36 in.	18 ga.	Not Required	Not Designed	J-16H	I-18H	I-20G	H-22G	H-24G	H-24G	H-24G	
				J-16H	I-18H	I-20G	H-22G	H-24G	H-24G		
37 – 42 in.	16 ga.	Not Required	Not Designed	J-16I	J-18I	I-18G	I-20H	I-22G	I-22G	I-22G	
				J-16I	J-18I	I-18G	I-20H	I-22G	I-22G		
43 – 48 in.	16 ga.	Not Required	Not Designed	J-16I	J-18I	I-18H	I-18H	I-22H	I-22H	I-22H	
				J-16I	J-18I	I-18H	I-18H	I-22H	I-22H		
49 – 54 in.	18 ga.	Not Required	Not Designed	L-16I	K-18I	J-18H	I-20H	I-20H	I-20H	I-20H	
				L-16I	K-18I	J-18H	I-20H	I-20H	I-20H		
61 – 72 in.	18 ga.	Not Required	Not Designed	L-16I	L-18I	L-18I	L-18I	L-18I	L-18I	L-18I	
				L-16I	L-18I	L-18I	L-18I	L-18I	L-18I		
73 – 84 in.	16 ga.	Not Required	Not Designed	L-16J	L-18J	L-18J	L-18J	L-18J	L-18J	L-18J	
				L-16J	L-18J	L-18J	L-18J	L-18J	L-18J		
85 – 96 in.	16 ga.	Not Required	Not Designed	Lt-16	Lt-16	Lt-16	Lt-16	Lt-16	Lt-16	Lt-16	
				Lt-16	Lt-16	Lt-16	Lt-16	Lt-16	Lt-16		
97 – 108 in.	18 ga.	Not Required	Not Designed	Lt-16	Lt-16	Lt-16	Lt-16	Lt-16	Lt-16	Lt-16	
				Lt-16	Lt-16	Lt-16	Lt-16	Lt-16	Lt-16		
109 – 120 in.	16 ga.	Not Required	Not Designed	Lt-16	Lt-16	Lt-16	Lt-16	Lt-16	Lt-16	Lt-16	
				Lt-16	Lt-16	Lt-16	Lt-16	Lt-16	Lt-16		

Table 2-7 Rectangular Duct Reinforcement

2 in. w/g Static Pos. or Neg. Duct Dimension	4 ft Joints			4 ft Joints w/2 ft Reinf. Spacing					
	Min ga	Joint Reinf.	Alt. Joint Reinf.	Joints/Reinf.			Int. 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	
	20	JTR	(2) E	22	N/R	N/A	MPT	F	
55-60 in.	20	JTR	(2) H	20	JTR	(2) E	MPT	H	
	20	JTR	(2) H	18	N/R	N/A			
61-72 in.	20	JTR	(2) H	20	JTR	(2) H	2 MPT	I	
	20	JTR	(2) H	20	JTR	(2) H	2 MPT	I	
73-84 in.	18	JTR	(2) H	18	JTR	(2) H	2 MPT	I	
	16	JTR	(2) I	18	JTR	(2) H	2 MPT	I	
85-96 in.	16	JTR	(2) I	18	JTR	(2) H	2 MPT	I	
97-108 in.	16	JTR	(2) I	18	JTR	(2) H	2 MPT	I	
109-120 in.	Not Designed			18	JTR	(2) H	2 MPT	I	

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)

2 in. wg Static Pos. or Neg. Duct Dimension	4 ft Joints			4 ft Joints w/2 ft Reinf. Spacing					
	Min ga	Joint Reinf.	Alt. Joint Reinf.	Joints/Reinf.			Int. 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	X	I	
109-120 in.	Not Designed			18	JTR	(2)H	X	J	

Table 2-10 4 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)

4 in. wg Static Pos. or Neg. Duct Dimension	5 ft Joints			5 ft Joints w/2 ½ ft Reinf. Spacing									
	Min ga	Joint Reinf.	Alt. Joint Reinf.	Joints/Reinf.			Int. Reinf.	Alt. Reinf.					
8 in. dia	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.	Not Designed			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)

4 in. wg Static Pos. or Neg. Duct Dimension	6 ft Joints			6 ft Joints w/3 ft Reinf. Spacing				
	Min ga	Joint Reinf.	Alt. Joint Reinf.	Joints/Reinf.		Alt. Joint Reinf.	Int 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.	Not Designed			16	JTR	(2)K	N/A	L
97-108 in.				16	JTR	(2)K		L
109-120 in.				16	JTR	(2)K		L

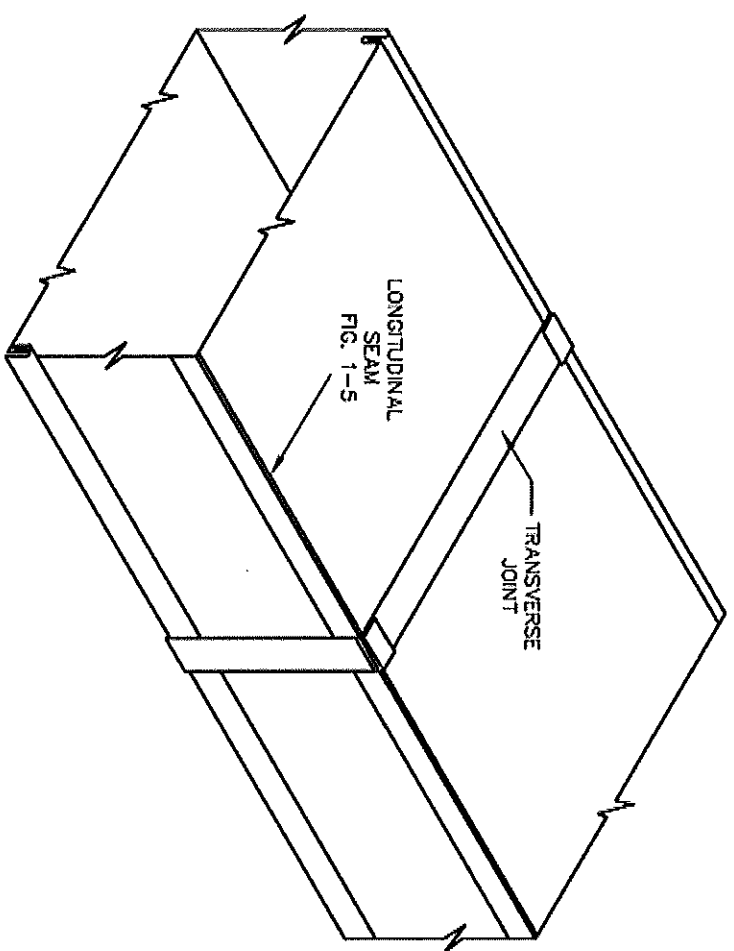
Table 2-26 6 ft Coil/Sheet Stock/T25a/T25b (TDC/TDF) Duct Reinforcement

N/R – Not Required JTR – Joint Tie Rod
 N/A – Not Applicable MPT – Mid Panel Tie Rod (s)

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

Table 2-41 Middpanel Tie Rod (MPRT) Schedule (RS)

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

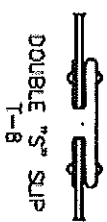
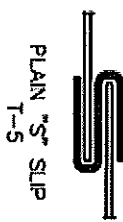
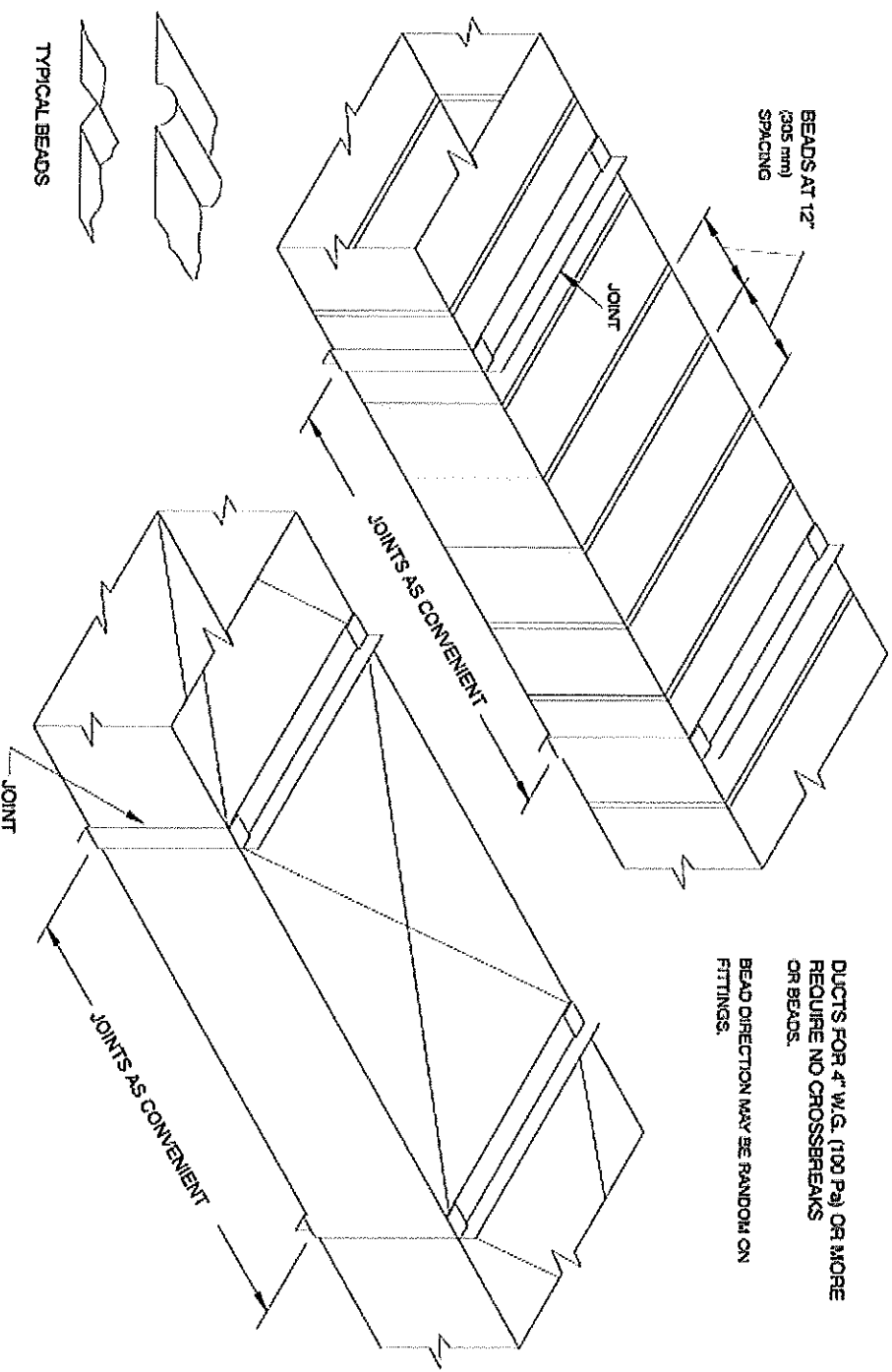


FIGURE 2-8 UNREINFORCED DUCT

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.



DUCTS FOR 4" W.G. (100 Pa) OR MORE REQUIRE NO CROSSBREAKS OR BEADS.

BEAD DIRECTION MAY BE RANDOM ON FITTINGS.

TYPICAL BEADS

NOTICE: NEITHER BEADS NOR CROSSBREAKS AFFECT REINFORCEMENT SPACING SCHEDULE.

FIGURE 2-9 CROSSBROKEN AND BEADED DUCT

REINFORCEMENT INTERVAL SPACING
PER SCHEDULES FOR EACH DUCT
DIMENSION.
INTERVALS NEED NOT
NECESSARILY COINCIDE
ON ADJACENT SIDES

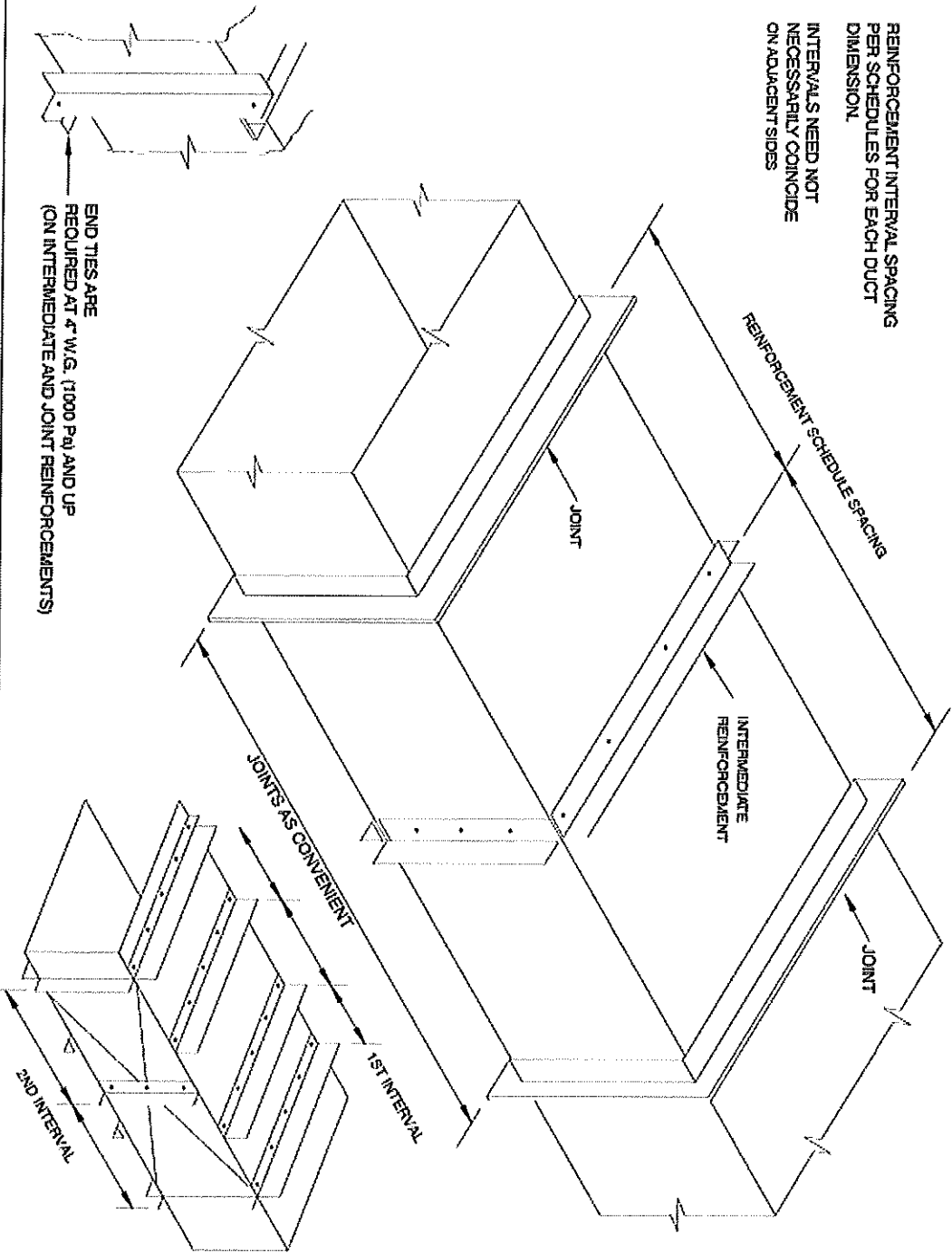
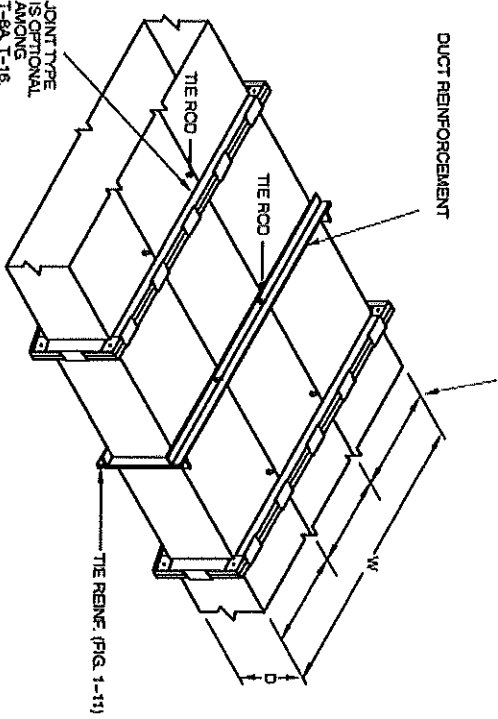


FIGURE 2-11 DUCT REINFORCED ON ALL SIDES

THE RODS LOCATED AT EQUAL
SUBDIVISIONS OF W BUT
NOT OVER 90° (1524 mm)



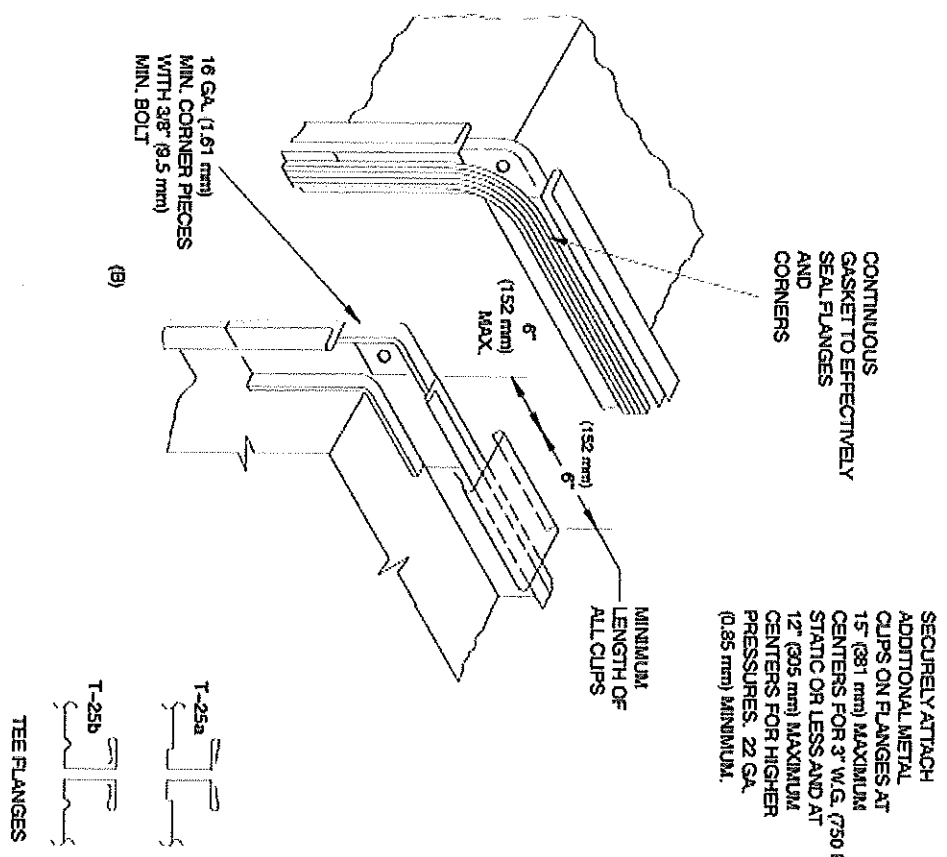
Duct Pressure Class

	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	It	K1	Lt
Reinf. Spacing (ft)	2 ½ ft	2 ½ ft	3 ½ ft	2 ½ ft	2 ½ 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



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