

HVAC DUCT CONSTRUCTION STANDARDS METAL AND FLEXIBLE

THIRD EDITION – 2005



**SHEET METAL AND AIR CONDITIONING CONTRACTORS'
NATIONAL ASSOCIATION, INC.**

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3 in. wg Static Pos. or Neg.	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

4 in. wg Static Pos. or Neg.	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

2 in. wg Static Pos. or Neg.	5 ft Joints			5 ft Joints w/2 ½ 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.
Duct Dimension								
10 in. and under	26	N/R	N/R	Use 5 ft Joints				
11 – 12 in.	26	N/R	N/R					
13 – 14 in.	26	N/R	N/R					
15 – 16 in.	26	N/R	N/R					
17 – 18 in.	26	N/R	N/R					
19 – 20 in.	26	N/R	N/R					
21 – 22 in.	26	N/R	N/R					
23 – 24 in.	26	N/R	N/R					
25 – 26 in.	26	N/R	N/R					
27 – 28 in.	24	N/R	N/R	26	N/R	N/R	MPT	C
29 – 30 in.	24	N/R	N/R	26	N/R	N/R	MPT	D
31 – 36 in.	22	N/R	N/R	26	N/R	N/R	MPT	D
37 – 42 in.	22	JTR	(2) C	24	N/R	N/R	MPT	E
	20	N/R	N/A					
43 – 48 in.	20	JTR	(2) E	22	N/R	N/R	MPT	F
	18	N/R	N/A					
49 – 54 in.	20	JTR	(2) E	22	N/R	N/R	MPT	F
	18	N/R	N/A					
55 – 60 in.	20	JTR	(2) H	22	JTR	(2) C	MPT	G
61 – 72 in.	18	JTR	(2) H	20	JTR	(2) E	MPT	H
73 – 84 in.	16	JTR	(2) H	20	JTR	(2) I	(2) MPT	I
85 – 96 in.	Not Designed			20	JTR	(2) I	(2) MPT	I
97 – 108 in.				18	JTR	(2) I	X	J
109 – 120 in.				18	JTR	(2) I	X	K

Table 2–17 5 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) (X) - Indicates 2 external reinforcements of class (X) to be used in lieu of Joint Tie Rods

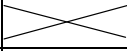
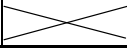
4 in. wg Static Pos. or Neg.	5 ft Joints			5 ft Joints w/2 ½ ft Reinf. Spacing				
	Min ga	Joint Reinf.	Alt. Joint Reinf.	Joints/Reinf.			Int. Reinf.	
				Min ga	Joint Reinf.	Alt. Joint Reinf.	Tie Rod	Alt. Reinf.
Duct Dimension								
8 in. and under	26	N/R	N/R	Use 5 ft Joints				
9 – 10 in.	26	N/R	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	MPT	G
43 – 48 in.	18	JTR	(2) H	20	JTR	(2) E	MPT	H
				18	N/R	N/R	MPT	H
49 – 54 in.	18	JTR	(2) H	20	JTR	(2) E	MPT	H
				18	N/R	N/R	MPT	H
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

N/A - Not Applicable

JTR - Joint Tie Rod

MPT - Mid Panel Tie Rod(s)

(2) (X) - Indicates 2 external reinforcements of class (X) to be used in lieu of Joint Tie Rods

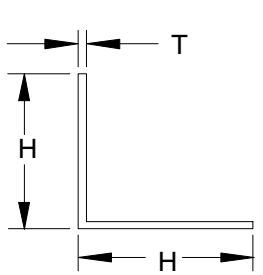
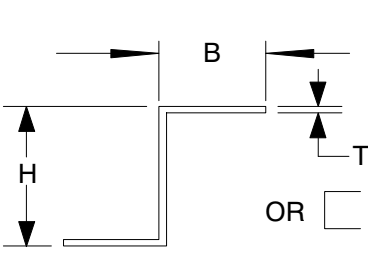
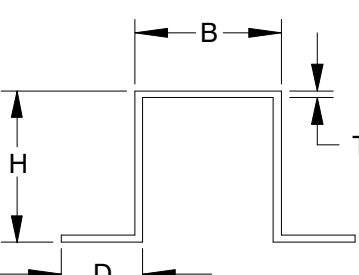
							
Reinf. Class		Angle		Channel or Zee		Hat Section	
	E1*	H x T (MIN)	WT LF	H x B x T (MIN)	WT LF	H x B x D x T (MIN)	WT LF
A	0.43	Use C		Use B		Use F	
B	1.0	Use C		$\frac{3}{4} \times \frac{1}{2} \times 20$ ga	0.24	Use F	
C	1.9	C 1×16 ga C $\frac{3}{4} \times \frac{1}{8}$	0.40 0.57	$\frac{3}{4} \times \frac{1}{2} \times 18$ ga $1 \times \frac{3}{4} \times 20$ ga	0.31	Use F	
D	2.7	H $\frac{3}{4} \times \frac{1}{8}$ C $1 \times \frac{1}{8}$	0.57 0.80	$1 \times \frac{3}{4} \times 18$ ga	0.45	Use F	
E	6.5	C $1 \frac{1}{4} \times 12$ ga H $1 \times \frac{1}{8}$	0.90	$2 \times 1 \frac{1}{8} \times 20$ ga	0.60	Use F	
F	12.8	H $1 \frac{1}{4} \times \frac{1}{8}$	1.02	$1 \frac{1}{2} \times \frac{3}{4} \times 18$ ga	0.54	$1 \frac{1}{2} \times \frac{3}{4} \times \frac{5}{8} \times 18$ ga $1 \frac{1}{2} \times 1 \frac{1}{2} \times \frac{3}{4} \times 20$ ga	0.90 0.83
G	15.8	$1 \frac{1}{2} \times \frac{1}{8}$	1.23	$1 \frac{1}{2} \times \frac{3}{4} \times 16$ ga	0.66	$1 \frac{1}{2} \times \frac{3}{4} \times \frac{5}{8} \times 18$ ga	0.80
H	26.4	$1 \frac{1}{2} \times \frac{3}{16}$ $2 \times \frac{1}{8}$	1.78 1.65	$1 \frac{1}{2} \times \frac{3}{4} \times \frac{1}{8}$	1.31	$1 \frac{1}{2} \times 1 \frac{1}{2} \times \frac{3}{4} \times 18$ ga $2 \times 1 \times \frac{3}{4} \times 20$ ga	1.08 0.90
I	69	C $2 \times \frac{3}{16}$ $2 \frac{1}{2} \times \frac{1}{8}$	2.44 2.10	$2 \times 1 \frac{1}{8} \times 12$ ga $3 \times 1 \frac{1}{8} \times 16$ ga	1.60 1.05	$2 \times 1 \times \frac{3}{4} \times 16$ ga	1.44
J	80	H $2 \times \frac{3}{16}$ C $2 \times \frac{1}{4}$ $2 \frac{1}{2} \times \frac{1}{8}$ (+)	2.44 3.20 2.10	$2 \times 1 \frac{1}{8} \times \frac{1}{8}$	1.85	$2 \times 1 \times \frac{3}{4} \times 12$ ga $2 \frac{1}{2} \times 2 \times \frac{3}{4} \times 18$ ga	2.45 1.53
K	103	$2 \frac{1}{2} \times \frac{3}{16}$	3.10	$3 \times 1 \frac{1}{8} \times 12$ ga	2.00	$2 \frac{1}{2} \times 2 \times \frac{3}{4} \times 16$ ga $3 \times 1 \frac{1}{2} \times \frac{3}{4} \times 16$ ga	1.88 2.00
L	207	H $2 \frac{1}{2} \times \frac{1}{4}$	4.10	$3 \times 1 \frac{1}{8} \times \frac{1}{8}$	2.29	$2 \frac{1}{2} \times 2 \times \frac{3}{4} \times \frac{1}{8}$ $3 \times 1 \frac{1}{2} \times \frac{3}{4} \times 12$ ga	3.70 3.40

Table 2-29 Intermediate Reinforcement

See Section 2.1.4. *Effective 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.

NOTES:

- a. (+) indicates positive pressure use only.
- b. Hat Section Dimension "B" may be equal to 2 times Dimension "H" with the same reinforcement class rating.

Reinf. Class		T-2 Standing Drive Slip		T-10 Standing S		T-11 Standing S		T-12 Standing S		T-14 Standing S																							
	EI*	H × T	WT LF	H × T	WT LF	H × T	WT LF	H × T	WT LF	H × T + HR	WT LF																						
A	0.43	Use B		Use B		½ × 26 ga	0.5	Use B		Use D																							
B	1.0	1 ⅝ × 26 ga	0.4	1 × 26 ga	0.6	½ × 22 ga 1 × 26 ga	0.6	1 × 26 ga	0.7	Use D																							
C	1.9	1 ⅝ × 22 ga	0.6	1 × 22 ga	0.8	1 × 22 ga	0.8	1 × 24 ga	0.8	Use D																							
D	2.7	1 ⅝ × 18 ga	0.8	1 ⅝ × 20 ga 1 × 22 ga (+)	0.9	1 × 20 ga 1 × 22 ga (+)	0.9	1 ½ × 22 ga	1.0	1 ⅝ × 24 ga 1 ½ × ⅝ Bar	1.4																						
E	6.5	NOT GIVEN		1 ⅝ × 18 ga	1.0	1 × 18 ga (+)	1.0	1 × 18 ga 1 ½ × 20 ga	1.2	Use F																							
F	12.8			Use G		NOT GIVEN		Use G		1 ⅝ × 22 ga 1 ½ × ⅝ Bar	1.5																						
G	15.8			1 ⅝ × 18 ga	1.3			1 ½ × 18 ga	1.3	1 ⅝ × 20 ga 1 ½ × ⅝ Bar	1.7																						
H	26.4			NOT GIVEN				NOT GIVEN		NOT GIVEN		1 ⅝ × 18 ga 1 ½ × ⅝ Bar	2.0																				
I	69											NOT GIVEN		NOT GIVEN		NOT GIVEN		2 ⅝ × 20 ga 2 × 2 × ⅝ Angle	2.9														
J	80																	NOT GIVEN		NOT GIVEN		NOT GIVEN		2 ⅝ × 20 ga 2 × 2 × ⅜ Angle	3.7								
K	103																							NOT GIVEN		NOT GIVEN		NOT GIVEN		NOT GIVEN			
L	207																															NOT GIVEN	

Table 2-31 Transverse Joint Reinforcement

See Section 2.1.4. *Effective EI is number listed times 10⁵ before adjustment for bending moment capacity. T-2 and T-10 through T-14 are restricted to 30 in. length at 4 in. wg, to 36 in. length at 3 in. wg and are not recommended for service above 4 in. wg. (+) indicates positive pressure use only.

Reinf. Class	T-22 Companion Angles		T-24 Flanged		T-24a Flanged		T-25a Flanged		T-25b Flanged		Slip-On Flange	
	EI*	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 × 1/8	1.7	24 ga	0.6	Use F		24 ga	0.6			
F	12.8	H 1 × 1/8	1.7	22 ga	0.7	1/2 × 20 ga	0.6	22 ga	0.7			
G	15.8	1/4 × 1/8	2.1	22 ga (R) 20 G	1.0	1/2 × 18 ga	0.8	22 ga (R) 20 ga	1.0			
H	26.4	C 1/2 × 1/8 (+) H 1/2 × 1/8	2.6	18 ga	1.1	SEE TIE ROD TEXT		18 ga	1.1			
I	69	1/2 × 1/4	3.7	20 ga (R)	1.0				20 ga (R)	1.0		
J	80	1/2 × 1/4 (+) 2 × 1/8	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 × 1/4	6.5	18 ga (R)	1.1				18 ga (R)	1.1		

Table 2-32 Transverse Joint Reinforcement

See Section 2.1.4. *Effective EI is number listed times 10⁵ before adjustment for bending moment capacity. For T-22, see tie rod downsize options in Tables 2-1 to 2-7; one rod for two angles. (R) means Tie Rodded. Accepted Pressure Mode for T-24a is (+) or (-) 2 in. wg maximum. See Figures 2-5 and 2-6 and tie rod text. (+) indicates positive pressure use only.

Compression Stress Allowed (PSI)											
				9000	8000	7000	6000	5200	4700	4200	3700
				130	140	150	160	170	180	190	200
Dia.	Type	r_g	$L/r_g=$								
½ in.	EMT	0.235	LEN.	30 in.	32 in.	34 in.	36 in.	40 in.	42 in.	44 in.	46 in.
			LBS.	792	704	616	528	458	414	370	325
¾ in.	EMT	0.309	LEN.	40 in.	42 in.	46 in.	48 in.	52 in.	54 in.	58 in.	62 in.
			LBS.	1206	1072	938	804	697	630	563	496
1 in.	EMT	0.371	LEN.	48 in.	52 in.	54 in.	58 in.	62 in.	66 in.	70 in.	74 in.
			LBS.	1782	1584	1386	1188	1030	930	831	732
1¼ in.	EMT	0.511	LEN.	66 in.	72 in.	76 in.	82 in.	86 in.	92 in.	96 in.	102 in.
			LBS.	2655	2360	2065	1770	1534	1386	1239	1091
1½ in.	EMT	0.592	LEN.	76 in.	82 in.	88 in.	94 in.	100 in.	106 in.	112 in.	118 in.
			LBS.	3078	2736	2394	2052	1778	1607	1436	1265
2 in.	EMT	0.754	LEN.		106 in.	112 in.	120 in.	128 in.	136 in.	142 in.	150 in.
			LBS.		3480	3045	2610	2262	2044	1827	1609

Table 2-38 Internal EMT Conduit Size (-) Pressure

NOTES:

The table gives maximum length and maximum load; *see* Table 2-34 for assumed loads. Blank spaces are not economical.

EMT Conduit Data				
Dia.	EMT Conduit			Weight
	O.D. in.	t in.	A in ²	lbs/ft
½ in.	0.71	0.042	0.088	0.29
¾ in.	0.92	0.049	0.134	0.45
1 in.	1.16	0.057	0.198	0.65
1¼ in.	1.51	0.065	0.295	0.96
1½ in.	1.74	0.065	0.342	1.11
2 in.	2.2	0.065	0.435	1.41

	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)*	To 72(1)*	To 60(1)	To 48(1)
	2 ½ 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. wg	3 ft		To 84(1)*	To 60(1)*	To 48(1)*	To 42(1)	To 36(1)
	2 ½ ft		To 84(1)*	To 72(1)*	To 60(1)*	To 54(1)	To 42(1)
	2 ft		To 96(1)*	To 72(1)*	To 60(1)	To 60(1)	To 42(1)
±3 in. wg	3 ft		To 72(1)*	To 54(1)*	To 48(1)	To 42(1)	To 30(1)
	2 ½ 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. wg	3 ft	To 84(2)	To 60(1)*	To 54(1)*	To 48(1)	To 36(1)	To 30(1)
	2 ½ 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. wg	3 ft	To 72(2)	To 54(1)*	To 42(1)	To 36(1)	N/A	N/A
	2 ½ in.	To 96(2)	To 72(1)*	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 Midpanel Tie Rod (MPT) Schedule (RS)

NOTES:

- Table cells give duct width limit range in inches for use of one (1) and two (2) tie rods at midpanel (MPT) as a substitute for Table 2-29 intermediate reinforcements that would be centrally located between two otherwise qualified transverse joints. Joint spacings greater than six feet are not available for this alternative.
- N/A refers to a ga not available to RS condition. RS is the Reinforcement Spacing.
- For some conditions and joint types, the MPT option is contingent on use of tie rods at joints (JTR).
- In some cases use of the MPT option would require that the gage be increased above those in Tables 2-1 to 2-6. An asterisk in Table 2-41 denotes a one tie rod thickness option when less thickness requires two rods.



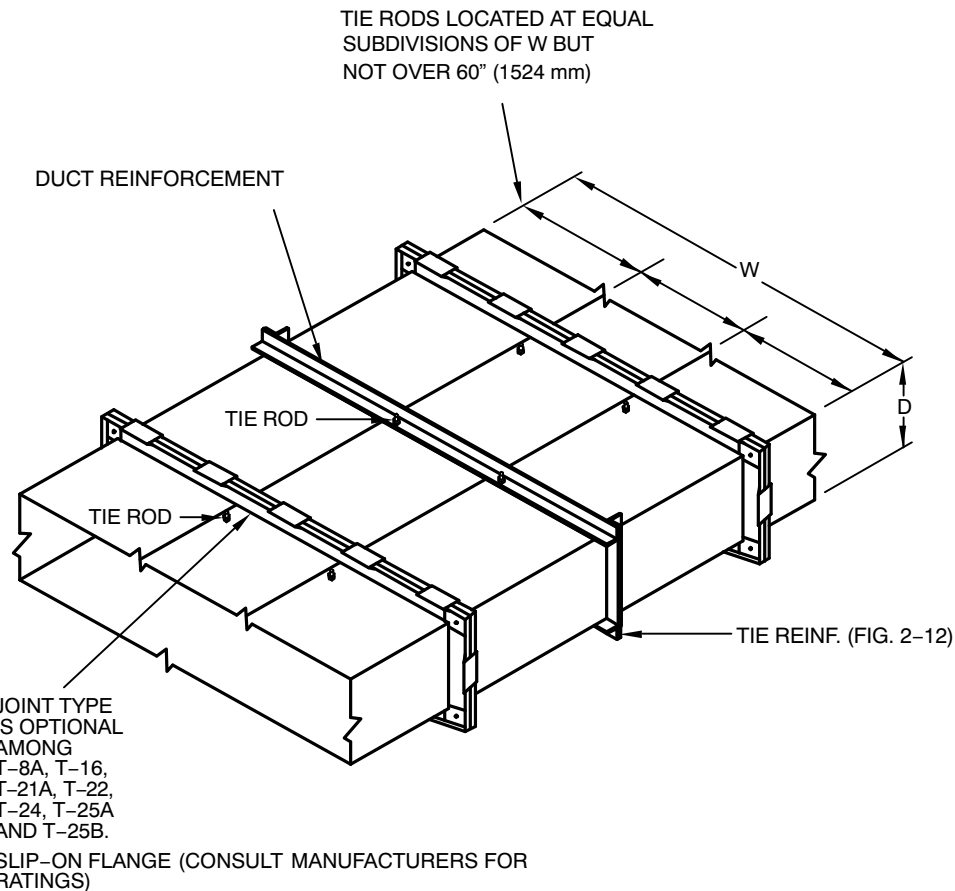
Static Pressure Class, in. wg									Static Pressure Class, in. wg									
W	RS	½"	1"	2"	3"	4"	6"	10"	W	RS	½"	1"	2"	3"	4"	6"	10"	
37"	36	25	49	99	148	198	296	494	72"	36	47	94	187	281	374	562	936	
	30	21	41	82	124	165	247	412		30	39	78	156	234	312	468	780	
	28	19	38	77	115	154	231	384		28	36	73	146	218	291	437	728	
	24	17	33	66	99	132	198	329		24	31	62	125	187	250	374	624	
	22	15	30	60	91	121	181	302		22	29	57	114	172	229	343	572	
	20	14	27	55	82	110	165	274		20	26	52	104	156	208	312	520	
42"	36	27	55	109	164	218	328	546	78"	36	51	101	203	304	406	608	1014	
	30	23	46	91	136	182	273	455		30	43	85	169	254	338	507	845	
	28	21	43	85	127	170	255	425		28	39	79	158	237	315	473	789	
	24	18	36	73	109	146	218	364		24	34	68	135	203	270	406	676	
	22	17	33	67	100	134	200	334		22	31	62	124	186	248	372	620	
	20	15	30	61	91	121	182	303		20	28	56	113	169	225	538	563	
48"	36	31	62	125	187	250	374	624	84"	36	55	109	218	328	437	655	1092	
	30	26	52	104	156	208	312	520		30	46	91	182	273	364	546	910	
	28	24	49	97	146	194	291	485		28	42	85	170	255	340	510	849	
	24	21	42	84	125	166	250	416		24	36	73	146	218	291	437	728	
	22	19	38	76	114	153	229	381		22	33	67	133	200	267	400	667	
	20	17	35	70	104	139	208	347		20	30	61	121	182	243	364	607	
54"	36	35	70	140	211	281	421	702	90"	36	59	117	234	351	468	702	1170	
	30	29	59	117	176	234	351	585		30	49	98	195	293	395	585	975	
	28	27	55	109	164	218	328	546		28	46	91	182	273	364	546	910	
	24	23	47	94	140	187	281	468		24	39	78	156	234	312	468	780	
	22	22	43	86	129	172	257	429		22	36	72	143	215	286	429	715	
	20	20	39	78	117	156	234	390		20	33	65	130	195	260	390	650	
60"	36	39	78	156	234	312	468	780	96"	36	62	125	250	374	499	749	1248	
	30	33	65	130	195	220	390	650		30	52	104	208	312	416	624	1040	
	28	31	61	121	182	243	364	607		28	49	97	194	291	388	582	971	
	24	26	52	108	156	216	312	520		24	42	83	166	250	333	494	832	
	22	24	48	95	143	191	286	477		22	38	76	153	305	458	458	763	
	20	22	43	87	130	173	260	433		20	35	69	139	208	277	416	693	
66"	36	43	86	171	257	343	514	858										
	30	36	72	143	215	286	429	715										
	28	33	68	133	200	267	400	667										
	24	29	57	114	171	229	343	572										
	22	26	52	104	157	210	315	524										
	20	24	48	95	143	191	286	477										

Table 2-46 Midpanel Tie Rod (MPT) Design Load in Pounds

NOTES:

- a. This table applies for tie rods at midpanel. It is based on 5.2 PSF/IN. WG on an area of duct width (W) times reinforcement spacing (RS). For sizes between W intervals use the load at the larger W or calculate it. Pressure is (+) or (-). 10 in. wg data is for independent custom design use only.





Duct Pressure Class

wg (Pa)	½ in. (125 Pa)	1 in. (250 Pa)	2 in. (500 Pa)	3 in. (750 Pa)	4 in. (1000 Pa)	6 in. (1500 Pa)	10 in. (2500 Pa)
Panel Ga (mm)	18 (1.31 mm)	18 (1.31 mm)	18 (1.31 mm)	18 (1.31 mm)	18 (1.31 mm)	18 (1.31 mm)	16 (1.61 mm)
Reinf. Size	It	It	It	It	Jt	Kt	Lt
Reinf. Spacing ft (m)	2 ½ (0.75 m)	2 ½ (0.75 m)	2 ½ (0.75 m)	2 ½ (0.75 m)	2 ½ (0.75 m)	2 (0.60 m)	2 (0.60 m)
Max. Tie Rod Spacing ft (m)	5 (1.50 m)	5 (1.50 m)	5 (1.50 m)	5 (1.50 m)	5 (1.50 m)	5 (1.50 m)	4 (1.20 m)

Table 2-49 Duct Over 120 in. (3000 mm) Duct Construction

- a. See tie rod text.
- b. See Reinforcement Attachment in Figure 2-12.
- c. See Figure 5-7 for large duct supports. Duct over 100 in. (2540 mm) width may require other internal supports for shape retention.

FIGURE 2-13 DUCT OVER 120 IN. (3000 MM) WIDE

**RECTANGULAR ALUMINUM DUCT
ADAPTED FROM 3 IN. WG (750 PA) OR LOWER**

Galv. Steel ga (mm) nominal	28 (0.48)	26 (0.55)	24 (0.70)	22 (0.78)	20 (1.00)	18 (1.31)	16 (1.61)
Min. Alum. equivalent* (mm)	0.023 (0.58)	0.027 (0.69)	0.034 (0.86)	0.043 (1.09)	0.052 (1.32)	0.067 (1.70)	0.083 (2.11)
Commercial size (mm)	0.025 (0.60)	0.032 (0.80)	0.04 (1.00)	0.05 (1.27)	0.063 (1.60)	0.071 (1.80)	0.09 (2.29)
Lbs wt/Sf. Alum.	Consult Appendix page A.5 for Weights						

Table 2-50 Thickness Adjustments

*Alloy 3003-H-14.

Galv. Rigidity Class	A	B	C	D	E	F	G	H	I	J	K	L
Alum. dim. per Galv. Class	C	E	E	F	H	I	I	K	**	**	**	**

Table 2-51 Dimension Adjustments

**Calculate an effective $I_x = 3 \times$ that used for steel.

Steel Angle Size In. (mm)	Cod	Equivalent Alum.*** Angle Size, In.	Steel Bar	Alum. Bar***
1 × 1 × 16 ga (25 × 25 × 1.61)	C	1¼ × 1¼ × ⅛ (31.8 × 31.8 × 3.2)	1 × ⅛ (25 × 3.2)	1½ × ⅛ or 1¼ × ⅜ (38.1 × 38.1 or 31.8 × 4.8)
1 × 1 × ⅛ (25 × 25 × 3.2)	D	1½ × 1½ × ⅛ (38.1 × 38.1 × 3.2)	1½ × ⅛ (38.1 × 3.2)	1½ × ⅛ or 1¼ × ⅜ (38.1 × 38.1 or 31.8 × 4.8)
1¼ × 1¼ × ⅛ (31.8 × 31.8 × 3.2)	E	1¾ × 1¾ × ⅛ (44.5 × 44.5 × 3.2)		
1½ × 1½ × ⅛ (31.8 × 31.8 × 3.2)	F	2½ × 2½ × ⅛ (63.5 × 63.5 × 3.2)		
1½ × 1½ × ⅜ (31.8 × 31.8 × 4.8)	G	2 × 2 × ¼ (51 × 51 × 6.4)		
2 × 2 × ⅛ (51 × 51 × 3.2)	H	2½ × 2½ × ⅜ (63.5 × 63.5 × 4.8)		
2 × 2 × ⅜ (51 × 51 × 4.8)	I	2½ × 2½ × ⅜ or 3 × 3 × ¼ (63.5 × 63.5 × 7.9 or 76.2 × 76.2 × 6.4)		
2 × 2 × ¼ (51 × 51 × 6.4)	J	2½ × 2½ × ⅜ or 3 × 3 × ¼ (63.5 × 63.5 × 7.9 or 76.2 × 76.2 × 6.4)		
2½ × 2½ × ⅜ (63.5 × 63.5 × 4.8)	K	3 × 3 × ⅜ or 3½ × 3½ × ¼ (76.2 × 76.2 × 9.5 or 88.9 × 88.9 × 6.4)		

Table 2-52 Reinforcements

***Allow 6061-T Strength normally.

Any aluminum shape substitute must have a moment of inertia three times that of steel and have 30,000 psi minimum yield strength.

