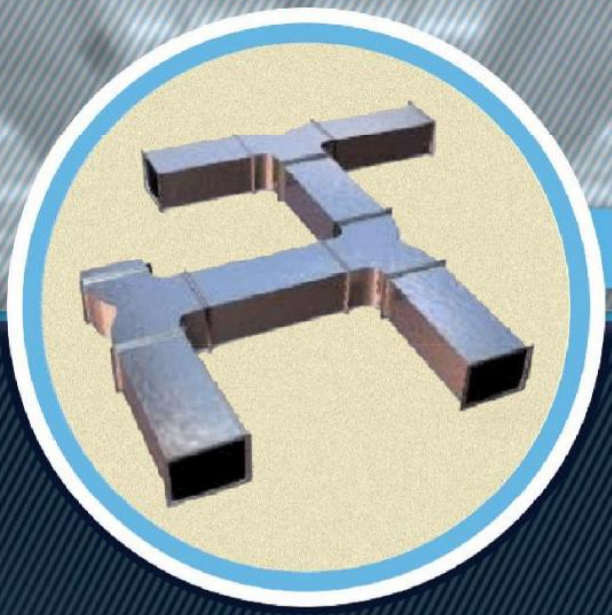
ALANDALOSIA

FOR AIR OUTLET



CATALOGUE

DUCT WORK

Air Outlet Andalosia

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INTRODUCTION

Most air conditioning and heating systems require some form of duct work to channel or direct the air to places where the conditioned air is needed. There are many types of ductwork available and often times the ductwork can make a big difference in your utility bills. For that reason, it is important that the ductwork is designed and installed correctly. A poor installation job will result in poor performance, bad air flow, leaky duct systems, and higher than usual utility bills. Another important factor in the installation process is to make sure the duct work is sized properly. Over sizing systems cost more and does not maintain the desired air flow and undersized duct work causes the system to strain mechanically and can be noisy.

Several conditions must be considered in an effective design. A primary issue is the tradeoff between the initial cost of the duct system and the energy cost of the air distribution system; larger ducts require a larger initial investment, but result in lower fan energy costs over the life of the system. Other issues include space available, noise level, capacity for expansion, appearance etc. It is important that the air conditioning ductwork system be designed for the air conditioning load. Each room or space of the facility should be evaluated and a determination of how much air flow will be required to ensure that each room remains at a desirable and comfortable temperature.

Generally at the time of designing an air conditioning duct system, the required airflow rates are known from load calculations. The location of fans and air outlets are fixed initially. The duct layout is then made taking into account the space available and ease of construction. In principle, required amount of air can be conveyed through the air conditioning ducts by a

number of combinations. However, for a given system, only one set results in the optimum design. Hence, it is essential to identify the relevant design parameters and then optimize the design.

Duct

A duct system is a network of round or rectangular tubes—generally constructed of sheet metal, fiberglass board, or a flexible plasticand- wire composite—located within the walls, floors, and ceilings. Usually, you can see only the outlet, which is a register covered with grillwork.

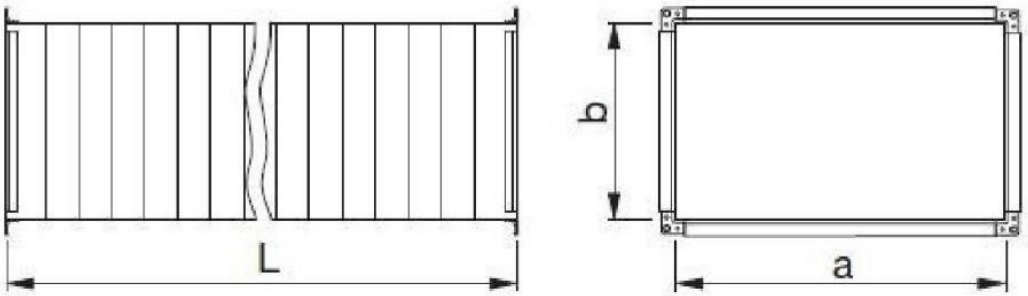
The purpose of a duct system is to transmit air from the central air source to the air diffusers located in the building control zones. Figure below shows a central heating furnace connected to supply and return air ductwork. The furnace is connected to the air plenum at the starting point. Furnace fan/s draw air in through grilles called returns and force air through the plenum and into the conditioned space through supply registers.

Description

Straight duct, stiffened with transverse trapezoid corrugations, which reduces the risk of noise generation. Larger dimensions have stiffening profiles and/or internal rods. Installa on height of these profiles is 23 mm.

Ducts are normally supplied with a strong joining, but can also be supplied as a flexible piece, where the joining profile on one end is not fixed. Also available with an end cover fixed by joining profiles.

Dimensions

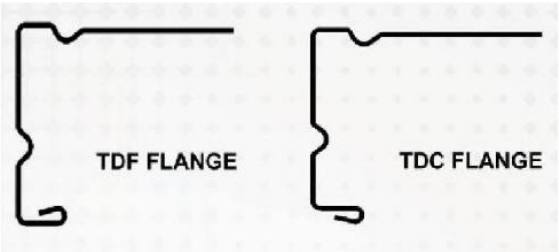


Air Outlet Andalosia

FULLY AUTOMATED DUCTING MACHINE

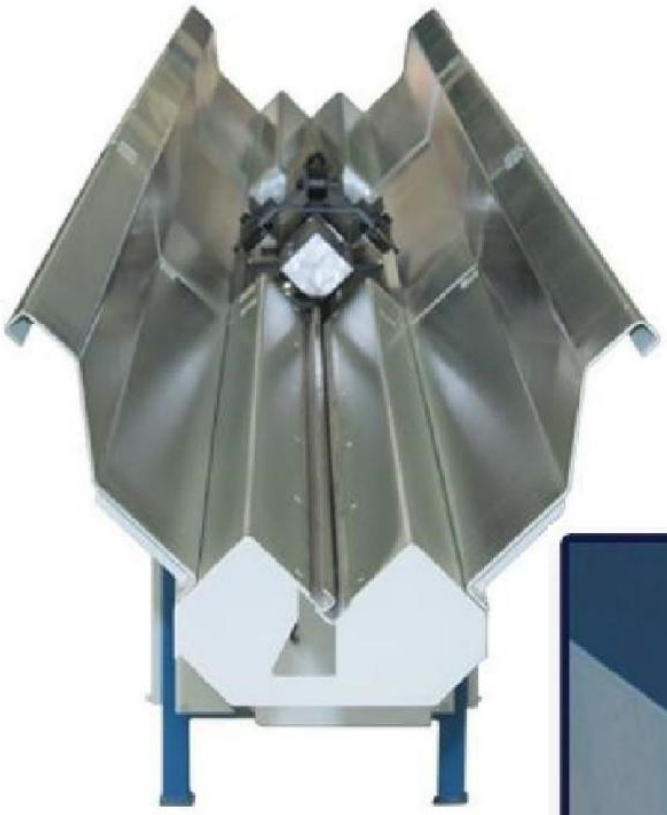
This is a totally automatic machine which allows you to produce the self flanged ducts. Our machine is designed, to produce duct by bending and cutting the rolled sheet in the desired dimensions. In order to carry out the same production we need to have separate machines and more personnel. Thanks to this machine that we can make a quick, precise and cost-effective production within a less room and personnel. Our machine prevents sheet waste and recover your loss nearly up to %20.

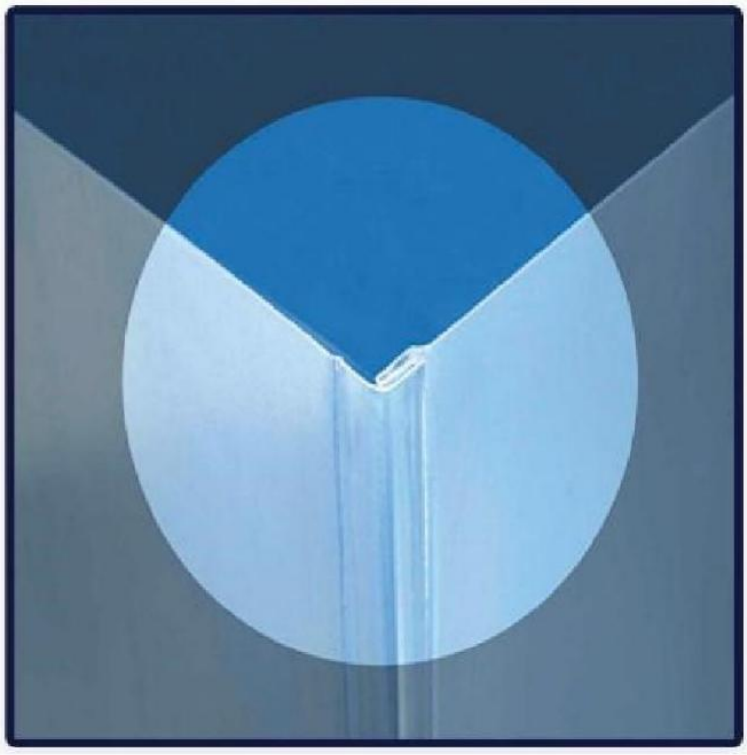
Sheet Thickness	0,5 mm(27 ga)-1,20 mm(19 ga) Galvenized / Aluminium 0,5-0,8 mm Stainless steel
Sheet width	1500 mm 60 inch
Sheet width allowence	+/-0,5 mm 0,019 inch
Diagonal allowence	+/- 0,8 mm 0,031 inch
Speed	Up to 11 mt/ min 36 ft/min
Hydraulic driven	
Power	32 KW
Notching type	TDF or TDC
Max duct size rectangular	200*1150 mm 8 inch x 45 inch (single segment)
Max duct size L form	1300*2000 51 inch x 78 inch (double segment)
Dimensions	15 mt * 7 mt 49,2 ft x 22,9 ft (width *Length)



Seam Closer Machine

This machine is designed to seam the rectangular ducts, square ducts . The machine can make both rectangular and square form clamps. The clamps are formed in three stages. Firstly it is roll formed to both sheets at the front bending. Secondly conjunction of the sheets is obtained and lastly the clamp is made. Besides silent operation of the machine, it is easy to use and economical with its output and energy-saving features. Among the similar machines with its clamp (seaming) type it is tighter and has less air leakage. It has got special roller lifts, which are highly resistant to friction and break downs.



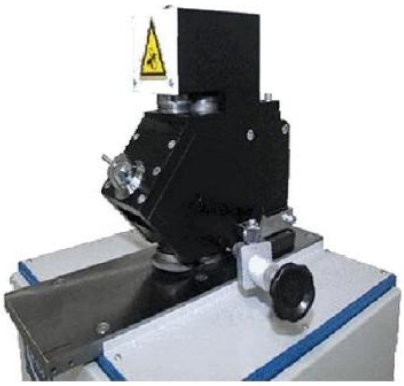


Vertical Seam Closer Machine

THICKNESS	0,5 mm (27 ga.)-1,2 mm (19 ga.)
DUCT LENGHT	900 mm 35 inch / 1200 mm 47inch 1500 mm 60 inch / 1800 mm 70 inch
DUCT FLANGE SIZE	SUITABLE FOR ALL FLANGES
POWER	4 KW
HYDRAULIC OIL CAPACITY	80 Lt
WEIGHT	1000 kg 2204 lbs
DIMENSIONS	1100 mm x 900mm x 2800mm 3,6 ft x 2,9 ft x 9,1 ft

Flanging Machine

This machine working for composing male site in Pittsburgh and Snap lock. Design is not depend on geometry. We can prepare edges for Pittsburgh or Snap lock male. Its operation is very simple and ergonomic. Machine speed can be adjustable between 0-9 mt/min.



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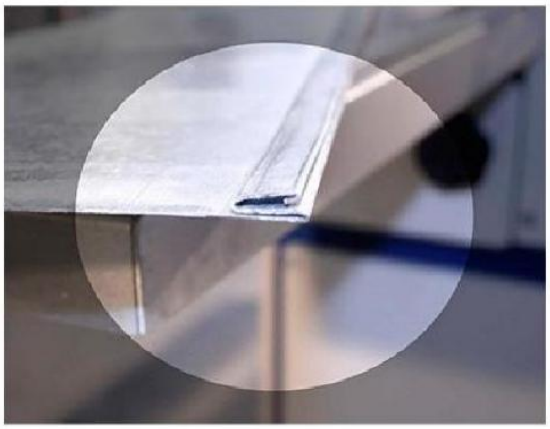
Lock Former Machine

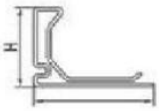
Machine can work with up to 1, 0 mm sheet thickness. Two roller sets are standard in the machine. One side can be Pittsburgh and the other side can be Snaplock. Roller sets are made of high quality steel in order to extend the life time. Working height can be adjustable in order to increase the safety. It works very quite. Pre bending can be adjustable in order to increase the safety. Pre bending can be done by using the adjustable roller set.

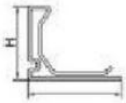


TDC Flange Machine

TDC Flange Machine offers to produce flanges in high quality. Prevents the air leakage inside the flange by using a silicone mastic.

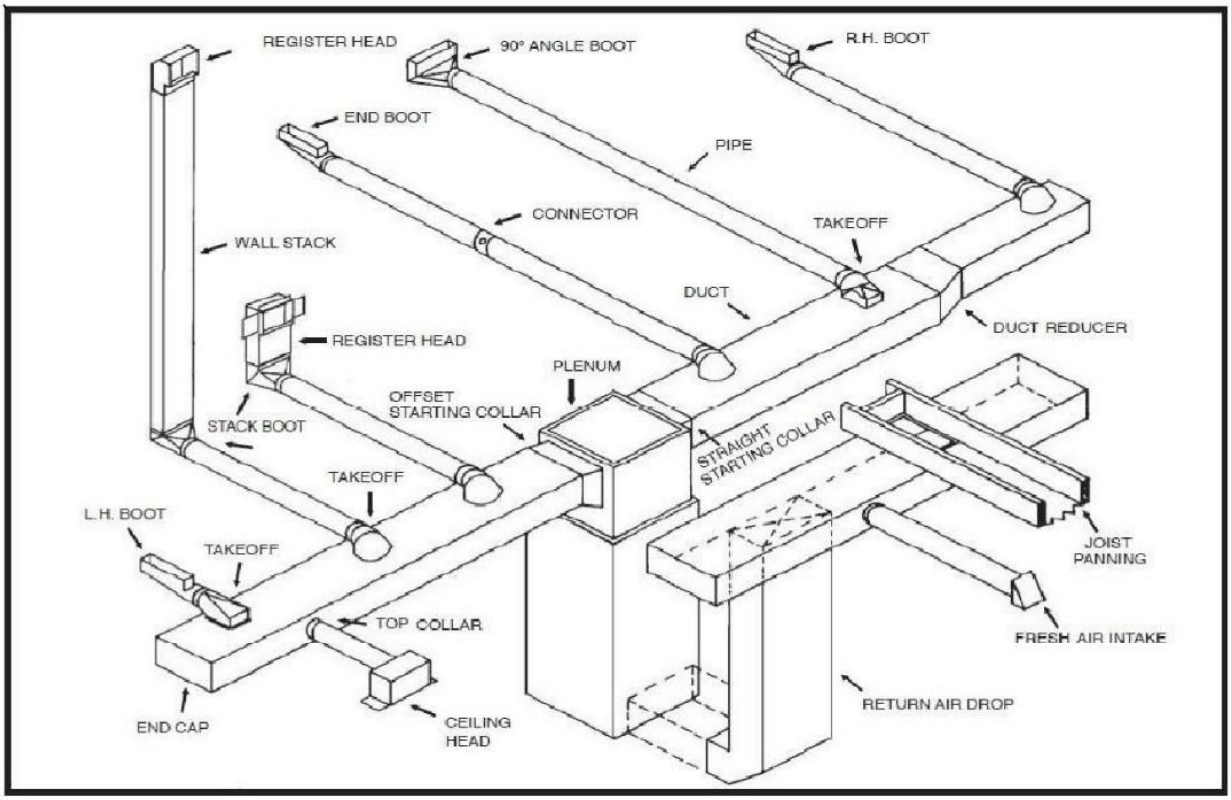
Rectangular Joint Flange Profile comes in three sizes, different sheet steel thicknesses, with and without sealant.

Model	Flanş Tipi	Kalınlık(mm)	Üretim Hızı
T-20		0.6 mm	14 mt/min

Model	Flanş Tipi	Kalınlık(mm)	Üretim Hızı
T-25		0.7 mm	14 mt/min

Model	Flanş Tipi	Kalınlık(mm)	Üretim Hızı
T-30		0.7 mm	14 mt/min

DUCT COMPONENTS



The Plenum The plenum is the main part of the supply and return duct system that goes directly from the air handler or furnace to the Main Trunk. The plenum is the central collecting chamber of the conditioned fresh air leaving the furnace.

The Main Trunk The Main Trunk(s) are the part of the duct system that all the air from the system is going to travel in before we "take off" the main plenum to the "diffusers" or grilles.

Take Off A "take off "is that part of the system where we take the air off the trunk to supply air to the living area of the house. Then from the "take off" we will go directly to the Grilles, diffuser or registers.

Bend

Elbows - A variety of elbows are available for rectangular duct system. Elbow types range from mitred to long radius. Long radius elbows are most efficient. An elbow with a centerline radius (r/D or r/W) of 1.5 is very efficient and should be used in cases where duct air velocity is 2,500 fpm or higher. A standard radius elbow (r/D of 1.0) is more economical and only slightly less efficient; it is generally preferred. Short radius elbows are those with an inside throat radius less than the turning width of the duct, but in no case may this throat radius be less than 3 inches. To improve the efficiency of short radius elbows splitter vanes should be provided as follows:

•A single splitter vane should be provided in short radius elbows with a turning width of 12 inches or less.

•Two splitter vanes should be provided in short radius elbows with a turning width of 12 to 24 inches.

•Three splitter vanes should be provided in short radius elbows with a turning width of over 24 inches.

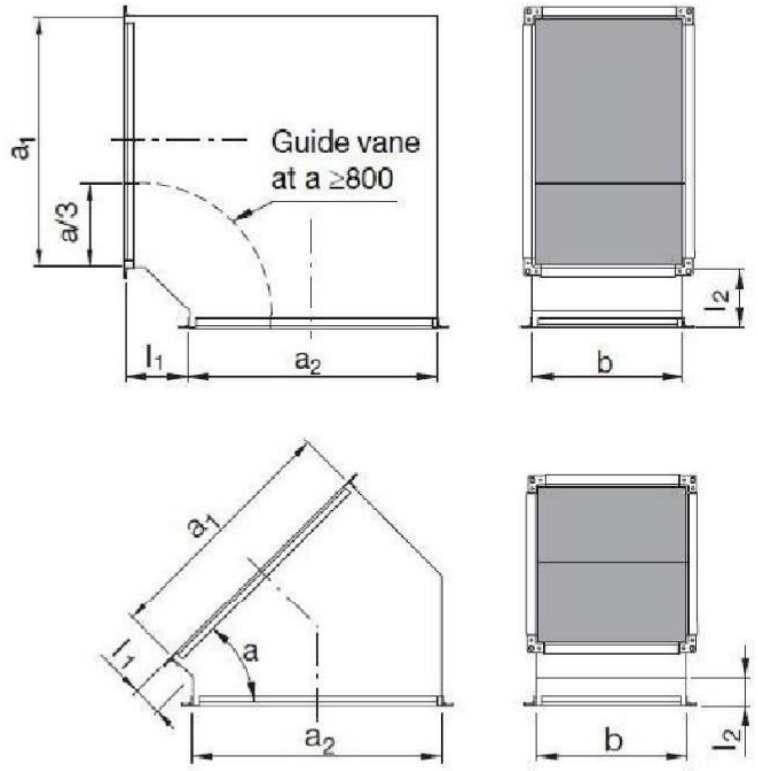
Description

Bend with rounded outer corner, stiffened with trapezoid corrugations. Other leg lengths and angles can also be ordered. Standard design l1 = l2 = 125 mm.

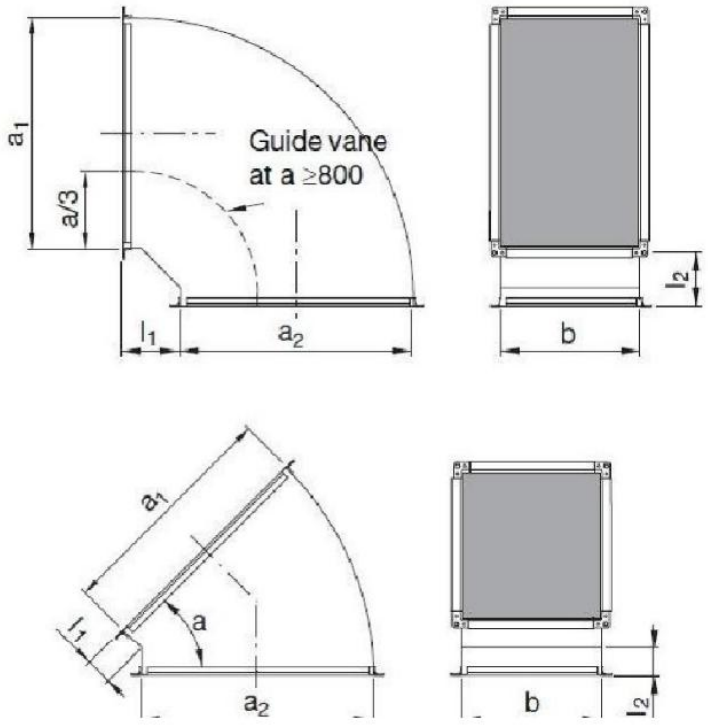
Description

Bend with sharp outer corner, stiffened with trapezoid corrugation.
Standard design l1 = l2 = 125 mm.

Dimensions



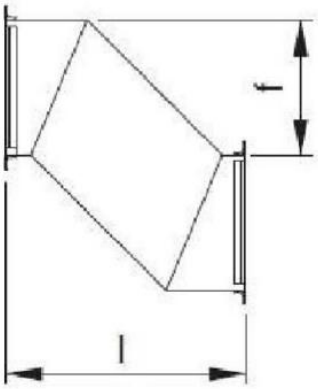
Dimensions

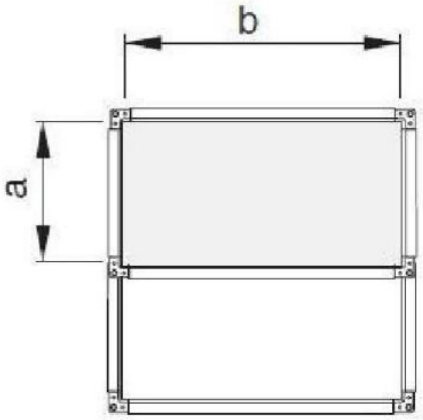


S-bend

Description
Used for deflections of the duct system, for example where ducts cross. Has a joining profile type RJFP at both ends, and is stiffened by trapezoid corrugations. A special relationship is needed between the a-dimension, fall f and length l for the LBSR to retain its cross-sectional area and not restrict the air flow. For this reason, standard lengths and standard drops have been prepared.

Dimensions





a mm	l std mm	f std mm
100	400	300
150	400	300
200	400	300
250	400	300
300	500	300
350	500	300
400	600	400
450	600	400
500	600	400
600	700	400
700	800	500
800	900	500
900	1000	500
1000	1100	500
1100	1200	500
1200	1300	500
1300	1400	500
1400	1500	500
1500	1600	500
1600	1700	500
1800	1900	500
2000	2100	500

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Taper

Description

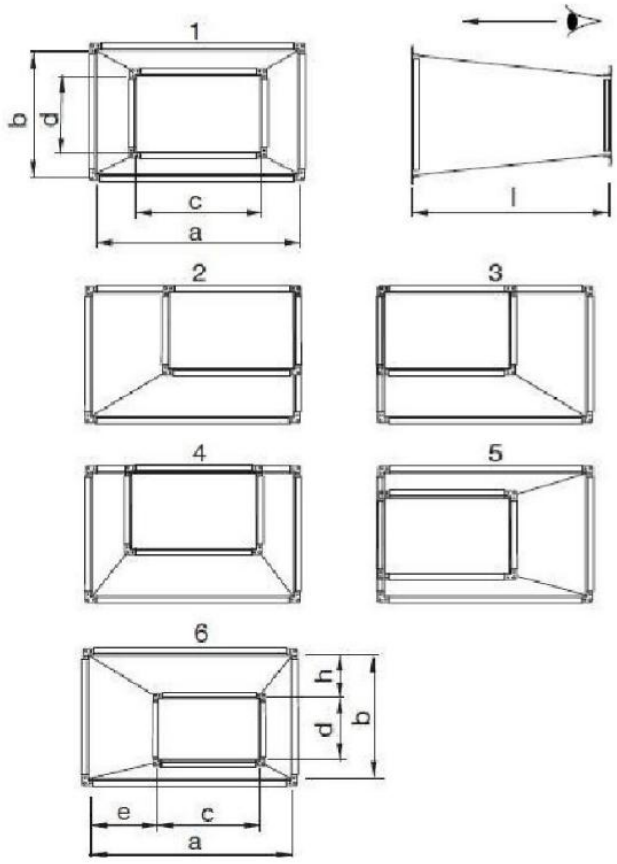
The taper is used as transition between different duct dimensions. The larger dimensions are available with offsets as in the coded sketches.

Dimension changes have a joining profile type RJFP at both ends, and are stiffened by trapezoid corrugations.

Measures e and h only need to be given for alterna ve 6.

Negative values for e, for example, mean that e is outside side a.

Dimensions



a mm	l std mm
100	300
150	300
200	300
250	300
300	300
350	300
400	450
450	450
500	450
600	450
700	450
800	600
900	600
1000	600
1100	600
1200	600
1300	600
1400	600
1500	600
1600	600
1800	600
2000	600

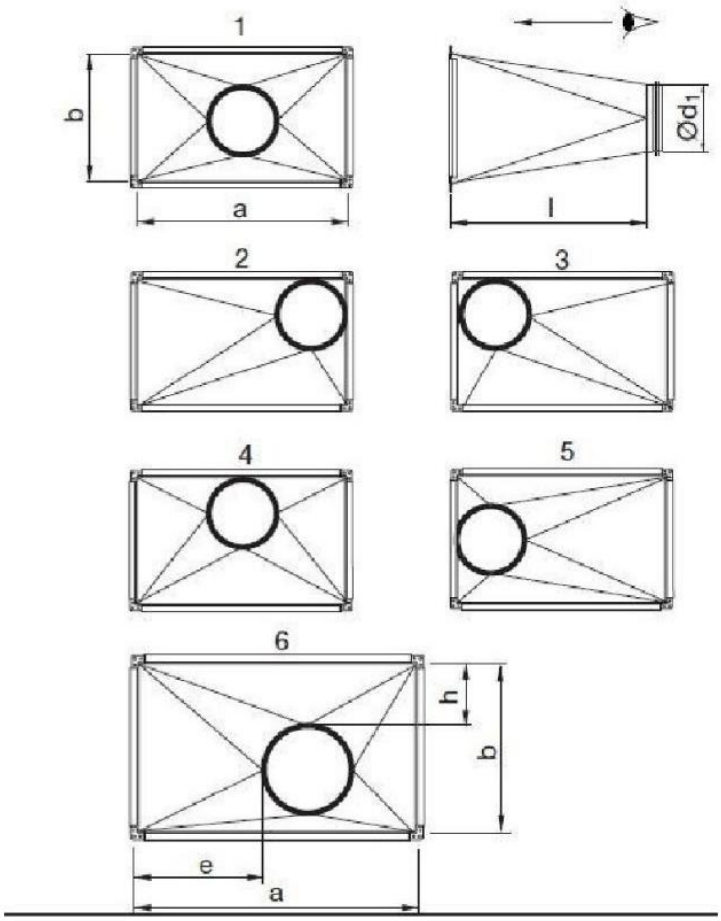
Rect-to-round transition

Description

Rect-to-round transition are used between rectangular and circular ducts. The rectangular connection has joining profiles type RJFP and the circular connection has Safe seal. The rectangular connection is available with offsets as in the coded sketches.

Measures e and h only need to be given for alterna ve 6.
Negative values for e, for example, mean that e is outside side a.

Dimensions



a mm	l std mm
100	300
150	300
200	300
250	300
300	300
350	300
400	450
450	450
500	450
600	450
700	450
800	600
900	600
1000	600
1100	600
1200	600
1300	600
1400	600
1500	600
1600	600
1800	600
2000	600

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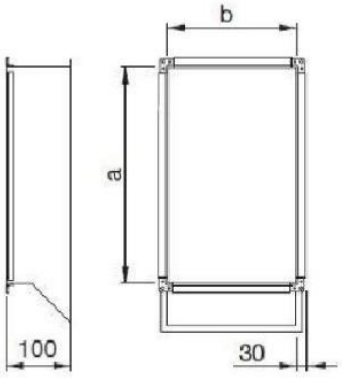
Collar

Description

The collar is used for connection to rectangular duct. The smaller joint end is provided with joining profiles type RJFP. The larger one has an edge, for fixing with blind rivets or self-tapping screws, but can also be given a folding tab to facilitate assembly.

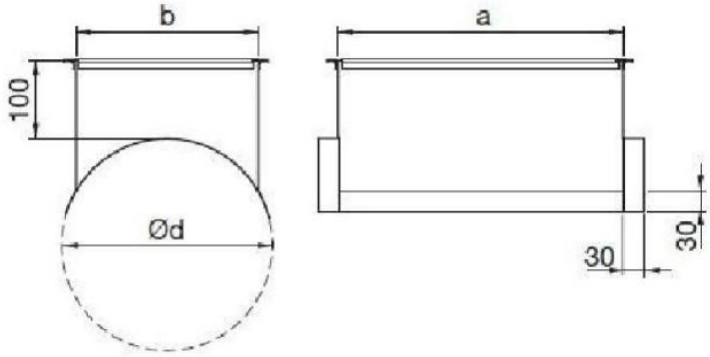
Dimensions

Sloping design: FAS



Collar on circular duct

Dimensions



Description

The collar is used for connection to circular duct. The rectangular end is provided with joining profiles type RJFP. The rounded end has an edge, for fixing with blind rivets or self tapping screws. Other lengths can also be supplied.

T-piece

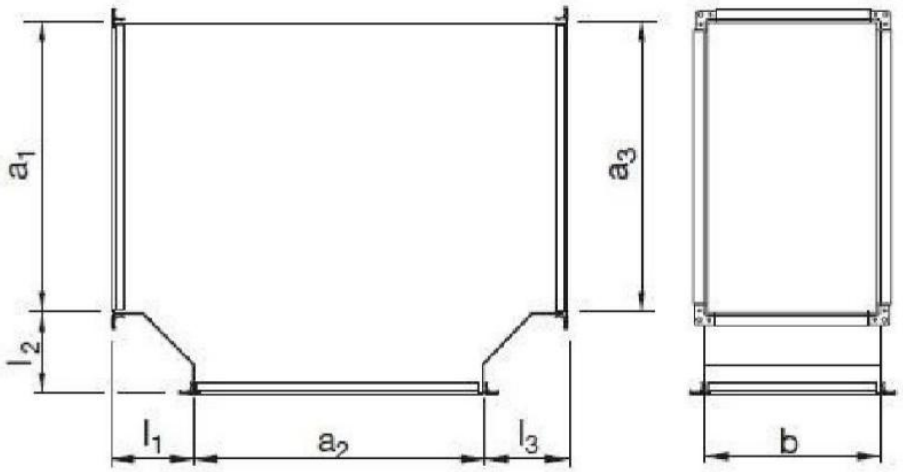
Description

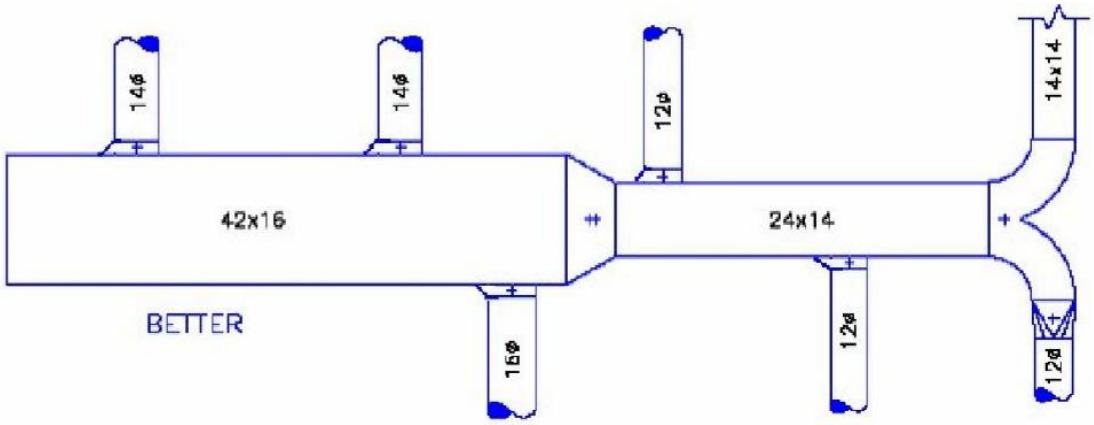
A T-piece which is provided with joining profiles type RJFP and is stiffened with trapezoid corrugations.

Standard design l1 = l2 = l3 = 125 mm.

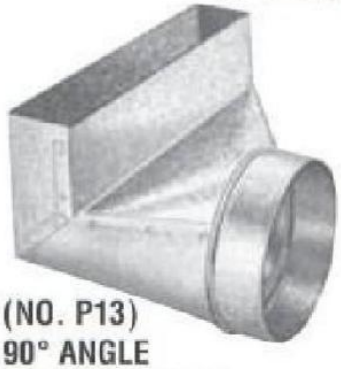
Other leg lengths can also be supplied.

Dimensions

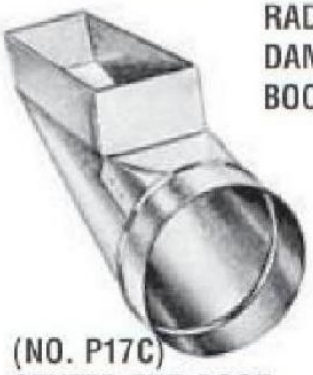




PERIMETER BOOTS



(NO. P13)
90° ANGLE
REGISTER BOOT



(NO. P17C)
CENTER END BOOT

RADIATION
DAMPER
BOOT

CEILING BOOT

(NO. P5)
STRAIGHT
REGISTER
BOOT

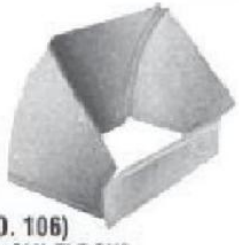
DUCT FITTINGS

(NO. 100)
TRUNK DUCT

(NO. 190)
90° BW ELBOW*

47C TRANSITION

(NO. 116)
90° SW ELBOW



(NO. 106)
45° SW ELBOW

(NO. 109)
45° BW ELBOW

(NO. 45)
STRAIGHT STARTING
COLLAR*

(NO. 50)
OFFSET
STARTING
COLLAR-2"
RISE*

(NO. 113)
TRUNK REDUCER

(NO. 212)
TRUNK END CAP

(NO. 49)
TRUNK ADAPTER
SIDE REDUCER

Plasma

Thanks to the plasma machine cu ng dimensions of 3200x1500 mm, you can easily cut your own expansions and drawings. In the cutting software that we use, the drawings of the parts needed by the ventilation market are readily available. You can cut the existing parts by simply dimensioning as well as you can draw and cut any part you needed. Machine allows you cut up to 5 mm aluminum and galvanized sheets. All the data can be transferred to the touch screen panel.

Required Air	189 L / min - 400 scfh
Pressure	6 bar - 87 psi
Net Working Area	3200mm (10,49 ft) X 1500 mm (4,92 ft)
Max. Working Speed	25 mt/min – 82 feet/min
Cutting Speed	5 - 11 mt/min 16,4 ft/min 36 ft/min
Table Capacity	1200 Nm²
Sheet Thickness	0,5 mm (27 gauge) - 5 mm (6 gauge) Galvanized- Stainless Steel-Aluminium-Mild Steel
Length X Width X Height	4,4 mt X 2,2 mt X1,4 mt (14,43 ft *7,21 ft* 4,59 ft)
Weight	960 kg / 2116 lbs
Motion Control System	X - Y Axis Trigger Belt, Z Axis Pneumatic
Motor	400 watt servo
Control System	Tecnos 2 axis / B&R 2 axis
Software	HVAC Fabrication CAM duct
Power Generator	USA Hypertherm (Powermax 45)
Plasma Cutting Table	Grilled Type Table
Sensitivity	± 0,5 mm
Options (cutting area)	6000 mm (19,68 ft) X 1500 mm (4,92 ft)

Elbow Maker Machine

This machine allows us to make the fittings (elbows) which you cut in the plasma cu er machine. By using this machine you can save me and man power up to %80. It allows you to use 1,2 mm. thickness of sheet in order to make fi ngs, reduc ons and end plates.

Air Pressure	6 bar	87 psi
Air Consumption	9 L / min	19 scfh
Diameter Range	Ø 125 mm (5 " inch) - Ø 1250 mm (50 " inch)	
Production Time	Ø 200 mm 90L elbow 4 pcs 2 min	
Sheet Thickness	0,5 mm /1.2mm	
Diameter Range	Flange Height	Diameter Range
	5 mm 0,196" inch	Ø 125 - 250 mm 5" inch X 10" inch
	7,5 mm 0,295 " inch	Ø 250 - 500 mm 10 " inch X 20 " inch
	10 mm 0,393 " inch	Ø 500 - 1250 mm 20 " inch X 50 " inch
Hydraulic oil	55 liters 46 viscosity	
Length X Width X Height	2,7 mt X 0,8 mt X 1,07 mt (8,85 ft - 2,62 ft- 3,51 ft)	
Weight	890 kg / 1962 lbs	

Flange profile fasteners

Rectangular Joint Bolt Clamp

Clamp which is fastened over the flanges of the two rectangular ducts to fasten them to each other.
The clamp is easy to use where there is sufficient space to fasten the clamp.

Rectangular Joint Seal Moulding

The 9 & 12 mm seal moulding is to be used

Duct Sealing Requirements

Seal Class	Sealing Required	Static Pressure Construction Class
A	All Transverse Joints Longitudinal Seams and Duct Wall Penetrations	4"W.G. AND UP
B	All Transverse Joint and Longitudinal Seams	3"W.G.
C	Transverse Joints	2"W.G.

Corner

DUCT MATERIALS

The majority of ducts are constructed of metal and installed by tradesmen called sheet metal workers. In fact, sheet metal use in HVAC is greater than all other materials combined. The steel and aluminum used for ductwork it sustainable for buildings because of the high recycling rates and cleanliness. A great majority of metallic ducts is made of galvanized steel. Next in popularity in metal ducts is aluminum. Each material has characteristics that may favor its use in specialized applications. Sheet metal has a number of advantages: It is made from recycled materials; it is non-combustible; it is the sturdiest material; and it is the easiest to clean. Following is a list of key characteristic of duct materials:

1. Galvanized Steel - Widely used as a duct material for most air handling systems; not recommended for corrosive product handling or temperatures above 400ºF. Advantages include high strength, rigidity, durability, rust resistance, availability, non-porosity, workability, and weldability.

2. Carbon Steel (Black Iron) - Applications include flues, stacks, hoods, other high temperature duct systems, and ducts requiring paint or special coating. Advantages include high strength, rigidity, durability, availability, weldability, and non-porosity. Some limiting characteristics are corrosion resistance and weight.

3. Aluminum - Aluminum ducting is most commonly used for clean room applications. These are also preferred systems for moisture laden air, special exhaust systems and ornamental duct systems. Some advantages include weight and resistance to moisture corrosion. Limiting characteristics include low strength, material cost, weldability, and thermal expansion.

4. Stainless Steel - Used in duct systems for kitchen exhaust, moisture laden air, and fume exhaust. Advantages include high resistance to corrosion from moisture and most chemicals and the ability to take a high polish. Limiting characteristics include labor and material costs, workability, and availability.

5. Flexible Nonmetallic Duct: Flexible or flex duct consists of a duct inner liner supported on the inside by a helix wire coil and covered by blanket insulation with a flexible vapor-barrier jacket on the outside. Flex duct is also commonly used as a return duct. Flex duct is factory-insulated and has fewer duct connections and joints. Flex duct is easily torn, crushed, pinched, or damaged during installation.. Flex duct, which is used extensively in commercial construc on, has more than 60% higher pressure drop than galvanized metal duct of the same diameter.

Classification of duct systems

Ducts are classified based on the load on duct due to air pressure and turbulence. The classification varies from application to application, such as for residences, commercial systems, industrial systems etc. Velocity Classification

1. Low Velocity Duct Systems: Low-velocity ducts are characterized by air velocities in the range of 400 to 2000 feet per minute (fpm).

2. Medium Velocity Duct Systems: Medium-velocity (MV) duct systems are characterized by air velocities in the range of 2000 to 2500fpm.

3. High Velocity Duct Systems: High-velocity (HV) duct systems are characterized by air velocities in the range of 2500 to 3500 fpm.

Low-velocity ductwork design is very important for energy efficiency in air distribution systems. Low-velocity design will lead to larger duct sizes, but it may be worth since, doubling of duct diameter will reduce friction loss by a factor of 32 times and will be less noisy. The low-velocity systems occupy more space and have higher first costs; facility owners are often reluctant to provide the space for more expensive ductwork, but significant energy savings can be realized even when the ductwork is only increased by one standard size.

High velocities in the ducts results in:

1. Smaller ducts and hence, lower initial cost and lower space requirement

2. Higher pressure drop and hence larger fan power consumption

3. Increased noise and hence a need for noise attenuation

Application	Velocity
Residences	600 fpm
Theaters, churches, auditoriums	800 fpm
Apartments, hotels rooms	1,000 fpm
Offices, libraries	1,200 fpm
Stores, restaurants, banks	1,500 fpm
Cafeteria	1,800 fpm

Pressure classification

Duct systems are also divided into three pressure classifications, matching the way supply fans are classified. The pressures are total pressure and include all losses through the air source unit, the supply ductwork, and the air terminals, return air grilles, and return ductwork. The pressure classifications are:

Low Pressure:	Up to 4.0 in-wg -	Class I Fan
Medium Pressure:	From 4.0 to 6.0 in-wg -	Class II Fan
High Pressure:	From 6.0 to 12 in-wg -	Class III Fan

1. Primary air ductwork (fan connections, risers, main distribution ducts) shall be medium pressure classification.

2. Secondary air ductwork (run-outs/branches from main to terminal boxes and distribution devices) shall be low pressure classification.

TABLE
STATIC PRESSURE

Duct Presure Class		Operating Pressure
(in.)	(Pa)	
1/2" w.g	125	Up to 1/2" w.g.
1 " w.g.	250	Over 1/2" up to 1" w.g.
2" w.g.	500	Over 1" up to 2" w.g.
3" w.g.	750	Over 2" up to 3" w.g.
4" w.g.	1000	Over 3" up to 4" w.g.
6" w.g.	1500	Over 4" up to 6" w.g.
10" w.g.	2500	Over 6" up to 10" w.g.

Duct Sheet Metal Thickness

Components are constructed from galvanized steel of thickness conforming to latest SMACNA's HVAC

Duct

" W.G. STATIC POS.OR NEG.	TABLE 1-3 RECTANGULAR DUCT REINFORCEMENT								
	NO REINFORCE-MENT REQUIRED	REINFORCEMENT CODE FOR DUCT GAGE NO.							
		REINFORCEMENT SPACING OPTIONS							
DUCT DIMENSION		10'	8'	6'	5'	4'	3'	21/2'	2'
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
10"dn.	26 ga.	NOT REQUIRED							
11, 12"	26 ga.								
13, 14"	26 ga.								
15, 16"	26 ga.								
17, 18"	26 ga.								
19, 20"	24 ga.	B-26	B-26	B-26	B-26	B-26	B-26	A-26	A-26
21, 22"	22 ga.	B-26	B-26	B-26	B-26	B-26	B-26	B-26	A-26
23, 24"	22 ga.	C-26	C-26	C-26	B-26	B-26	B-26	B-26	B-26
25, 26"	20 ga.	C-26	C-26	C-26	C-26	B-26	B-26	B-26	B-26
27, 28"	18 ga.	C-24	C-26	C-26	C-26	C-26	B-26	B-26	B-26
29, 30"	18 ga.	C-24	C-26	C-26	C-26	C-26	B-26	B-26	B-26
31-36"	16 ga.	D-22	D-24	C-26	C-26	C-26	C-26	C-26	B-26
37-42"	NOT DESIGNED	E-20	E-24	D-24	D-26	C-26	C-26	C-26	C-26
43-48"		E-20	E-22	E-24	E-26	D-26	D-26	C-26	C-26
49-54"		F-18	F-20	E-22	E-26	E-26	E-26	D-26	C-26
55-60"		G-18	F-20	F-22	E-24	E-24	E-26	E-26	D-26
61-72"		H-16	H-18	F-20	F-22	F-24	E-24	E-24	E-24
73-84"			I-16G	H-18G	H-22G	G-24	F-24	F-24	F-24
85-96"			I-16G	I-18G	H-20G	H-22G	G-22	F-22	F-22
97-108"					I-18G	I-18G	H-18G	H-18G	G-18
109-120"							I-18G	H-18G	H-18G

See page 1-15. Circles in the Table denotes only column numbers. For column 2, *see* Fig. 1-7. For columns 3 through 9, *see* Introduction to Schedules. The number in the box is minimum duct gage; the alphabet letter is the minimum reinforcement grade for joints and intermediates occurring at a maximum spacing interval in the column heading. A letter to the right of the gage gives a tie rodded reinforcement alternative. A "t" compels use of tie rod(s) for the reinforcement listing. For beading or crossbreaking, *see* Fig. 1-8.

W.G. STATIC POS.OR NEG. / DUCT DIMENSION	NO REINFORCEMENT REQUIRED	REINFORCEMENT CODE FOR DUCT GAGE NO. — REINFORCEMENT SPACING OPTIONS							
		10'	8'	6'	5'	4'	3'	21/2'	2'
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
10"dn	26 ga.	NOT REQUIRED							
11, 12"	26 ga.								
13, 14"	24 ga.	B-26	B-26	B-26	B-26	B-26	A-26	A-26	A-26
15, 16"	22 ga.	B-24	B-26	B-26	B-26	B-26	B-26	B-26	A-26
17, 18"	22 ga.	B-24	B-26	B-26	B-26	B-26	B-26	B-26	B-26
19, 20"	20 ga.	C-24	C-26	C-26	C-26	C-26	B-26	B-26	B-26
21, 22"	18 ga.	C-24	C-24	C-26	C-26	C-26	B-26	B-26	B-26
23, 24"	18 ga.	C-24	C-24	C-26	C-26	C-26	C-26	B-26	B-26
25, 26"	18 ga.	D-22	D-24	C-26	C-26	C-26	C-26	C-26	B-26
27, 28"	16 ga.	D-22	D-24	D-26	C-26	C-26	C-26	C-26	C-26
29, 30"	16 ga.	E-22	D-24	D-26	D-26	C-26	C-26	C-26	C-26
31-36"	NOT DESIGNED	E-20	E-22	E-24	D-24	D-26	C-26	C-26	C-26
37-42"		F-18	F-20	E-22	E-24	E-26	D-26	D-26	C-26
43-48"		G-16	G-18	F-20	F-22	E-24	E-26	E-26	D-26
49-54"		H-16	H-18	G-20	F-22	F-24	E-24	E-24	E-24
55-60"			H-18	G-20	G-22	F-24	F-24	E-24	E-24
61-72"				H-18G	H-18G	H-22G	F-24	F-24	F-24
73-84"				I-16G	I-18G	I-20G	H-22G	H-22G	G-22
85-96"					I-16H	I-18H	I-20G	H-20G	H-22G
97-108"						I-18G	I-18G	I-18G	I-18G
109-120"							I-18H	I-18H	I-18G

See page 1-15. Circles in the Table denotes only column numbers. For column 2, *see* Fig. 1-7. For columns 3 through 9, *see* Introduction to Schedules. The number in the box is minimum duct gage; the alphabet letter is the minimum reinforcement grade for joints and intermediates occurring at a maximum spacing interval in the column heading. A letter to the right of the gage gives a tie rodded reinforcement alternative. A "t" compels use of tie rod(s) for the reinforcement listing. For beading or crossbreaking, *see* Fig. 1-8.

TABLE 1-5
RECTANGULAR DUCT REINFORCEMENT

W.G. STATIC POS.OR NEG. / DUCT DIMENSION	NO REINFORCEMENT REQUIRED	REINFORCEMENT CODE FOR DUCT GAGE NO. — REINFORCEMENT SPACING OPTIONS							
		10'	8'	6'	5'	4'	3'	21/2'	2'
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
10"dn	26 ga.	NOT REQUIRED							
11, 12"	24 ga.		B-26	B-26	B-26	B-26	B-26	B-26	B-26
13, 14"	22 ga.		B-24	B-26	B-26	B-26	B-26	B-26	B-26
15, 16"	20 ga.	C-22	C-24	C-24	C-26	C-26	C-26	B-26	B-26
17, 18"	20 ga.	C-22	C-24	C-24	C-26	C-26	C-26	C-26	B-26
19, 20"	18 ga.	C-20	C-22	C-24	C-26	C-26	C-26	C-26	C-26
21, 22"	16 ga.	D-20	D-22	D-24	D-26	C-26	C-26	C-26	C-26
23, 24"	16 ga.	E-20	E-22	D-24	D-26	D-26	C-26	C-26	C-26
25, 26"		E-20	E-22	E-24	D-26	D-26	C-26	C-26	C-26
27, 28"		F-18	E-20	E-22	E-24	D-26	D-26	C-26	C-26
29, 30"		F-18	F-20	E-22	E-24	E-26	D-26	D-26	C-26
31-36"		G-16	G-18	F-20	F-22	E-24	E-26	D-26	D-26
37-42"			H-16	G-18	G-20	F-24	E-24	E-26	E-26
43-48"			I-16	H-18	H-20	G-22	F-24	F-24	E-24
49-54"				I-16G	H-18G	H-20G	G-24	F-24	F-24
55-60"				I-16G	I-18G	H-18G	G-22	G-24	F-24
61-72"					J-16H	I-18G	H-22G	H-22G	H-24
73-84"						I-18G	I-20G	I-22G	I-22G
85-96"						J-18H	I-18H	I-20H	I-22H
97-108"							K-18H	J-18H	I-18H
109-120"								K-18I	J-18I

NOT DESIGNED

See page 1-15. Circles in the Table denotes only column numbers. For column 2, *see* Fig. 1-7. For columns 3 through 9, *see* Introduction to Schedules. The number in the box is minimum duct gage; the alphabet letter is the minimum reinforcement grade for joints and intermediates occurring at a maximum spacing interval in the column heading. A letter to the right of the gage gives a tie rodded reinforcement alternative. A "t" compels use of tie rod(s) for the reinforcement listing. For beading or crossbreaking, *see* Fig. 1-8.

W.G. STATIC POS.OR NEG. DUCT DIMENSION	NO REINFORCEMENT REQUIRED	REINFORCEMENT CODE FOR DUCT GAGE NO. — REINFORCEMENT SPACING OPTIONS							
		10'	8'	6'	5'	4'	3'	21/2'	2'
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
10"dn	24 ga.	NOT REQUIRED		B-26	B-26	B-26	B-26	B-26	B-26
11, 12"	22 ga.		B-24	B-24	B-26	B-26	B-26	B-26	B-26
13, 14"	20 ga.		C-22	C-24	C-24	C-26	C-26	B-26	B-26
15, 16"	18 ga.		C-22	C-24	C-24	C-26	C-26	C-26	C-26
17, 18"	18 ga.		D-22	D-24	C-24	C-26	C-26	C-26	C-26
19, 20"	16 ga.	D-18	D-20	D-22	D-24	D-24	C-26	C-26	C-26
21, 22"	16 ga.	E-18	E-20	E-22	D-24	D-24	D-26	C-26	C-26
23, 24"	16 ga.	E-18	E-18	E-22	E-24	E-24	D-26	D-26	C-26
25, 26"		F-18	F-18	E-22	E-24	E-24	D-26	D-26	C-26
27, 28"		F-16	F-18	F-20	F-22	E-24	E-26	D-26	D-26
29, 30"		G-16	G-18	F-20	F-22	E-24	E-26	E-26	D-26
31-36"			H-16G	H-18G	G-20	F-22	F-24	E-26	E-26
37-42"				H-18G	H-20G	G-22	F-24	F-24	E-26
43-48"				I-16G	I-18G	H-20	G-22	G-24	F-24
49-54"					I-18G	I-18G	H-22G	G-24	G-24
55-60"					I-16G	I-18G	H-20G	H-22G	G-24
61-72"	NOT DESIGNED					J-16H	I-20G	I-22G	I-24G
73-84"							J-18H	I-20H	I-22G
85-96"							K-18I	J-18I	I-20H
97-108"								L-18I	K-18I
109-120"								L-18I	L-18I

See page 1-15. Circles in the Table denotes only column numbers. For column 2, *see* Fig. 1-7. For columns 3 through 9, *see* Introduction to Schedules. The number in the box is minimum duct gage; the alphabet letter is the minimum reinforcement grade for joints and intermediates occurring at a maximum spacing interval in the column heading. A letter to the right of the gage gives a tie rodded reinforcement alternative. A "T" compels use of tie rod(s) for the reinforcement listing. For beading or crossbreaking, *see* Fig. 1-8.

TABLE 1-7
F . DUCT I

W.G. STATIC POS. OR NEG. / DUCT DIM ENSION	NO REINFORCE-MENT REQUIRED	REINFORCEMENT CODE FOR DUCT GAGE NO. — REINFORCEMENT SPACING OPTIONS							
		10'	8'	6'	5'	4'	3'	21/2'	2'
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
8"dn	24 ga.	NOT REQUIRED		B-26	B-26	B-26	B-26	B-26	B-26
9, 10"	22 ga.			B-24	B-26	B-26	B-26	B-26	B-26
11, 12"	20 ga.	B-22	B-22	C-24	C-26	C-26	C-26	B-26	B-26
13, 14"	18 ga.	C-20	C-22	C-22	C-24	C-26	C-26	C-26	C-26
15, 16"	18 ga.	C-18	D-20	D-22	C-24	C-26	C-26	C-26	C-26
17, 18"	16 ga.	D-18	D-20	D-22	D-24	D-26	C-26	C-26	C-26
19, 20"		E-18	E-20	E-22	E-24	D-24	D-26	C-26	C-26
21, 22"		E-18	E-18	E-20	E-24	E-24	D-26	D-26	C-26
23, 24"		F-18	F-18	F-20	E-22	E-24	E-26	D-26	D-26
25, 26"		G-18	G-18	F-20	F-22	E-24	E-26	E-26	D-26
27, 28"		H-16G	G-18	G-20	F-22	F-24	E-26	E-26	D-26
29, 30"		H-16G	H-18G	G-18	G-22	F-24	E-26	E-26	E-26
31-36"				H-18G	H-20	G-22	F-24	F-26	E-26
37-42"				I-16G	I-18G	H-20G	G-22	G-24	F-26
43-48"					I-18G	I-18G	H-22G	H-24G	G-24
49-54"					I-16H	I-18G	I-20G	H-22G	H-24G
55-60"	NOT DESIGNED				J-16I	I-16H	I-20G	I-22G	H-24G
61-72"							J-18H	I-20H	I-22G
73-84"							6I	J-18I	I-20H
85-96"								K-18I	J-20I
97-108"								L-18I	L-18I
109-120"								L-18J	L-18J

See page 1-15. Circles in the Table denotes only column numbers. For column 2, *see* Fig. 1-7. For columns 3 through 9, *see* Introduction to Schedules. The number in the box is minimum duct gage; the alphabet letter is the minimum reinforcement grade for joints and intermediates occurring at a maximum spacing interval in the column heading. A letter to the right of the gage gives a tie rodded reinforcement alternative. A "t" compels use of tie rod(s) for the reinforcement listing. For beading or crossbreaking, *see* Fig. 1-8.

For quick Duct Sheet Metal Thickness

Rectangular Duct			Round Duct		
Greater Dimension	Galvanized Steel (gauge)	Aluminum (gauge)	Diameter	Galvanized Steel (gauge)	Aluminum (gauge)
Up to 30 inch	24	22	Up to 8 inch	24	22
31 – 60 inches	22	20	9 – 24 inches	22	20
61 – 90 inches	20	18	25 – 48	20	18

FABRICATION PROCEDURE

According to The Drawing / Take Off Provided by The Client, Engineers Start

The Operation Production Following The Consequent Steps:

a) Shop Drawings to be Prepared Using .

b) Accurate B.O.Qs to be Issued Including Accessories And Connectors (Refer to Page5).

c) An Estimation of The Cost Can be Provided to The Client Upon Issuance of B.O.Q. d)

Fabrication Begins By Linked to CNC Machines Based On CAD-Duct Drawings.

e) All Ductworks Are Fabricated According to Or .

f) Each Item to be Numbered On The Drawing Provided, Fabricated Items to be

Labeled; Each Label Shows The Project Name, Customer Name, Job Ref., Item Number,

Item Description

( ), Size & Length, Thickness, Weight And Area.

g) QA/QC to be Made For Each Item Before Collection (Delivery).

General rules for duct design

1. Air should be conveyed as directly as possible to save space, power and material
2. Sudden changes in directions should be avoided. When not possible to avoid sudden changes, turning vanes should be used to reduce pressure loss
3. Diverging sections should be gradual. Angle of divergence ≤ 20o
4. Aspect ra o should be as close to 1.0 as possible. Normally, it should not exceed 4
5. Air velocities should be within permissible limits to reduce noise and vibration
6. Duct material should be as smooth as possible to reduce frictional losses

Specification

MATERIAL (*) not available in pressed construction

- Galvanized steel conforming to ASTM standards A653 and A924
- Stainless steel type 304 conforming to ASTM standard A240*
- Stainless steel type 316 conforming to ASTM standard A240*
- Aluminum T3003*
- Insulation specifications:

SURFACE FINISH

- Galvanized steel (galvanized in accordance with SMACNA 2005 Duct Construc on Standards).
- Stainless steel type 304 - Mill Finish
- Stainless steel type 316 - #2 Mill Finish
- Coated with an average thickness of 4 mils (0.004") inside and out. Coa ng to meet or exceed 1,000 hour Salt Spray