COOKE INDUSTRIES

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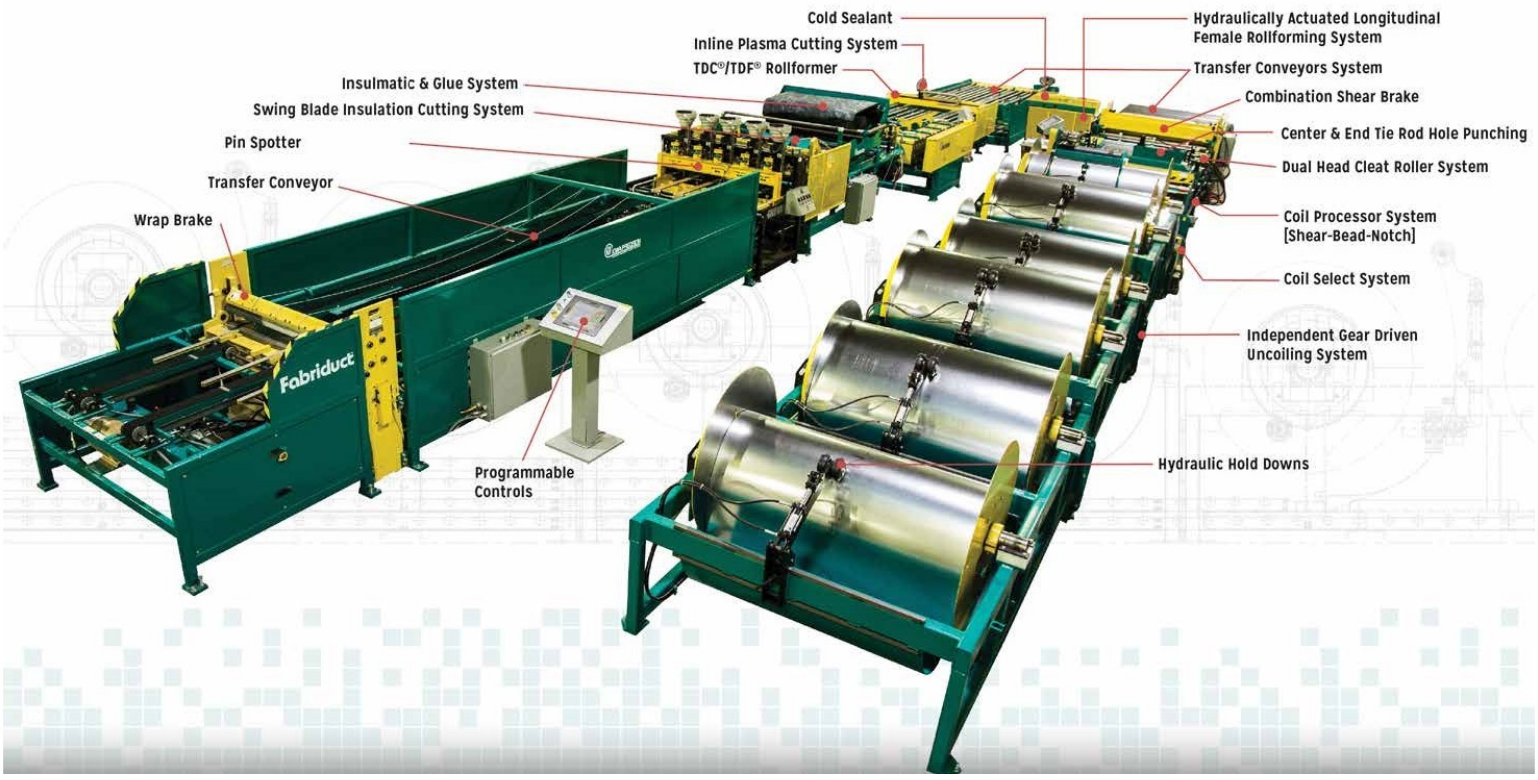
Ductwork Manual



Introduction

The purpose of this engineering manual is to ensure that ductwork is installed to a recognised minimum standard in respect of design, construction, and installation. It has been divided into two parts.

Part 1 of the manual is aimed at the customer. It covers our standard conditions of quotation and duct manufacture, and the rectangular and round duct construction schedules (pressure files). It sets out information to enable the detailing of ductwork and the production of working drawings utilising Cooke Industries standard duct manufacturing details. It also covers recommended installation practices to achieve a successful installation.

Part 2 of the manual covers the manufacturing details and quality procedures as maintained by Cooke Industries in their ductshop.

Overleaf - The Fabriduct automated duct fabrication line at the Cooke Industries sheetmetal shop automatically de-coils, beads, notches, cuts-to-length, seams, flanges, and folds rectangular duct. Blanks are also prepared for the laser cutting of fittings.

Part 1: Duct Construction Standards

Figure 1 - The Trimble AutoBid and FabShop software drives our SLTL Rapid-G laser cutter system and automated Cornermatic flange corner insertion machines at the Cooke Industries Sheetmetal Shop. It provides automated pricing, detailing of ductwork, works out the optimum nesting of components, and automatically controls the laser-cutting unit and automated coil line for rectangular duct production.

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Conditions of Quotation and Duct Manufacture

Our offer to manufacture ductwork is based upon the following standard conditions, unless otherwise agreed in writing.

General Items

1. Scope of Work: We have allowed for the ductwork detailed on the engineers' drawings, and where appropriate, itemised in the schedule, all as per our covering letter. Changes in the extent or nature of the work will vary the price accordingly.

2. Prices: The prices quoted are $NZ net ex our Penrose works, and are GST exclusive. Our lump sum price is based upon current labour and material rates, and is subject to escalation. Increased costs will be claimed.

3. Standard Exclusions: The following items are standard exclusions.
    - Grilles and diffusers
    - Flexible ducting and connections
    - Multi-blade volume control dampers
    - Fire dampers
    - Round/Spiral Duct and Fittings
    - Duct hangers, supports, and flashings
    - External thermal insulation and cladding
    - Equipment items & plant
    - Installation

4. Terms of Payment: Ducting will be progressively invoiced upon delivery of duct items or batch lots as agreed. In the event that manufactured duct is unable to be delivered, off-site claims and storage charges will apply. Subject to credit availability, payment will be due by the 20th of the month following delivery. No retentions will be accepted. Cooke Industries Ltd Terms and Conditions of Sale will apply in all cases.

Construction

1. Ductwork Standards: We have allowed to manufacture the ductwork in accordance with SMACNA Standards "HVAC Duct Construction Standards Metal and Flexible" 2005 Edition and current revisions. This is customised where appropriate to use our proprietary accessories and components. A copy of our Duct Construction Standards is available for inspection at our offices.

2. Shop Drawings: We understand that you will provide all "shop drawings" and that these will be prepared to suit our standard fittings, duct lengths, and proprietary accessories. A suitable instruction manual can be provided.

   We would require your shop drawings to note the pressure classification for the section of ductwork or the entire system as appropriate, and to note any other specification requirements to which the ductwork must comply.

3. Manufacturing Errors: Where manufacturing errors occur, the defective items must be returned to our works. They will be modified or replaced ex our works free of charge.

4. Installation: All site works, including testing, are your responsibility. We stress that correct procedures should be utilised in handling ductwork on site to avoid damage prior to installation. Installation procedures should ensure that ductwork is not deformed or over stressed, and that care is taken to minimise leaks. Attention is drawn to the section covering site installation.

5. Leak Testing: SMACNA nominates joint sealing requirements and acceptable leakage limits for ducts, and also nominates duct test procedures (Refer to SMACNA HVAC Air Duct Leakage Test Manual). We stress that installation techniques must be directed at meeting these standards. Upon request, we will factory test a sample duct run to demonstrate air tightness.

General

Drawings should be made on A1 or A2 sheet size to a scale of not less than 1:50. Details should be to a scale of at least 1:25 to ensure adequate clarity. Two copies of all drawings are required for manufacturing purposes.

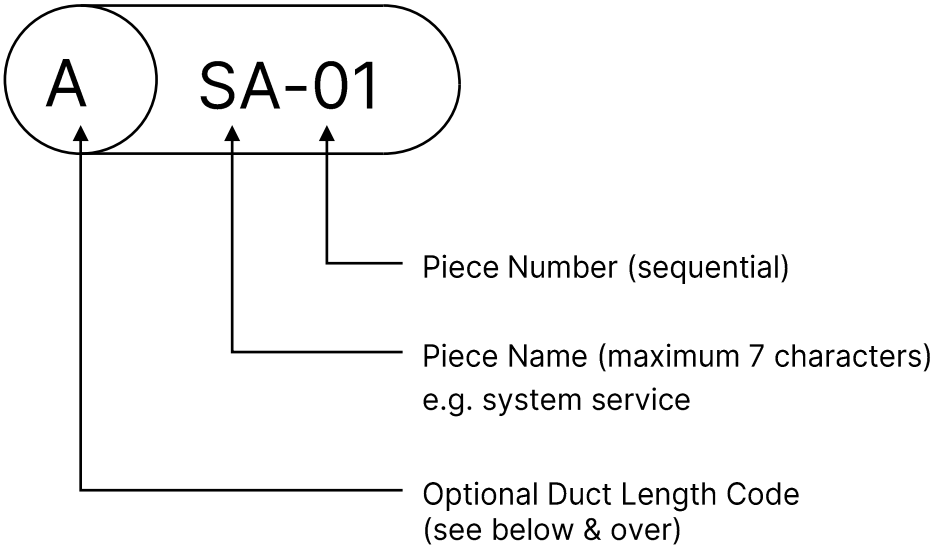
Each drawing should indicate the following as a ***minimum standard***:

- The name of the duct service and the direction of flow.
- The duct construction standard (pressure file) and seal class.
- Pressure testing requirements (if any).
- Piece identification with a name & number that is both unique to that system and sequential. Our standard identification label on each piece of ductwork has the following information:
    - Project Name
    - Cooke Job No. Internal job number
    - Drawing No. maximum of 12 characters
    - Floor/Level Name: maximum of 12 characters (e.g. Level 3)
    - System Name maximum of 12 characters (e.g. AHU 6)
    - Piece Name maximum prefix of 7 characters (e.g. SA)
    - Piece Number sequential piece number (e.g. 19)

  Numbering of pieces with letters is not possible, and must be avoided. Take-offs (e.g. branches and boots but excluding spigots) should be given a separate piece number from the duct to which they connect.
- Site measure and trim on site pieces suitably placed to facilitate the installation. To speed manufacture and installation, site measure pieces should be kept to a minimum. The use of trim on site pieces is preferable.
- All dimensions are to be **overall sheetmetal sizes**. Mark OA (overall) or AS (airstream) where confusion may occur (e.g. at connections to proprietary equipment).
- Ducts dimensioned with the first view x the other view. Units shall be millimetres.
- The length of each piece.
- The internal insulation type and thickness (where required).
- Fitting particulars (offsets, bend radii, bend angles, fitting throat lengths, turning vane & splitter requirements, spigot sizes & position, dampers etc.). Refer to the section on standard duct and fitting details for further information.
- Connection details for proprietary items of plant and equipment.

Duct Numbering

The recommended method of duct numbering & identification is as follows:



Straight Duct

Code (optional)	Duct Length	Connection End 1	Connection End 2	Notes
A	1430	TDC	TDC	
B	1405	TDC	TDC	25mm step in for insulation
C	1380	TDC	TDC	50mm step in for insulation
D	1500	Flat Drive	Flat Drive	
E	1475	Flat Drive	Flat Drive	25mm step in for insulation
F	1450	Flat Drive	Flat Drive	50mm step in for insulation
G	1478	TDC	Raw Edge	
H	1453	TDC	Raw Edge	25mm step in for insulation
I	1428	TDC	Raw Edge	50mm step in for insulation
J	1512	Flat Drive	Raw Edge	
K	1487	Flat Drive	Raw Edge	25mm step in for insulation
L	1462	Flat Drive	Raw Edge	50mm step in for insulation

Duct Fittings

Set Over/Down (Non transition, mitred or curved)

N 1200 Long
O 600 Long
P 601 - 1199 Long

Radius Elbow Any Angle (Quote angle if not 90º)

Q Short Radius R = 0.25 x Duct Width
R Medium Radius R = 0.5 x Duct Width
S Long Radius R = Duct Width

Transition (Includes square to round)

T 1200 Long
U 600 Long
V 601 - 1199 Long

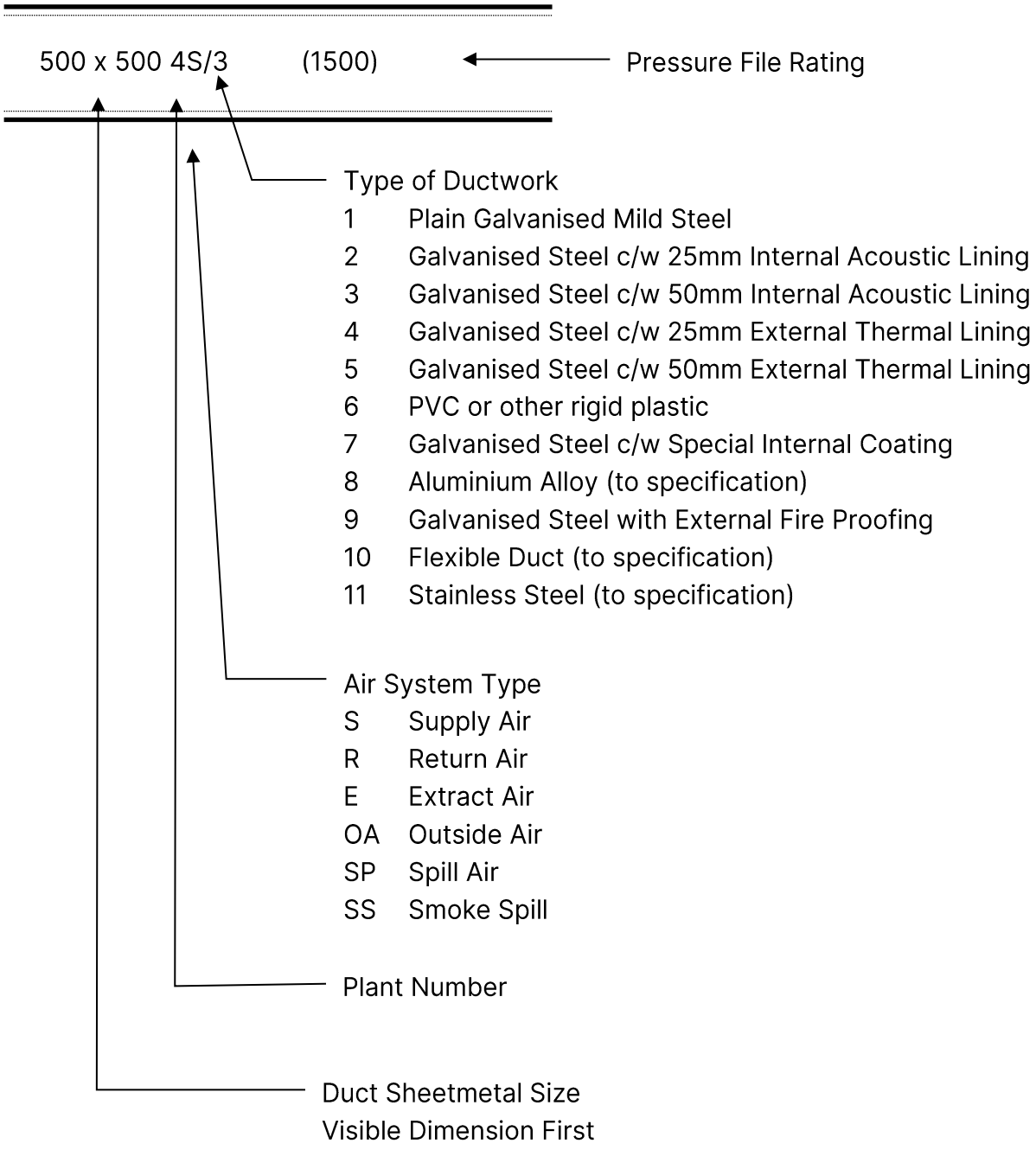
Square Elbow Any Angle

W 150 Throat (unless otherwise noted)

X Any other type of duct that is not otherwise specified

Duct Size

The recommended method of indication of duct size is as follows:



Drawing Legend

Manufacturing drawings should be to the following legend and symbols.

AP	Access Panel
BD	Single Blade Regulating (butterfly) Damper
FD	Fire Damper (by others)
MD	Motorised Damper (by others)
SC	Smoke Control Damper (by others)
SD	Splitter Damper
VC	Volume Control Damper (by others)
(SA 19)	Sequential duct identification - piece name and number
BE	Blank End
C	C-cleat Joint
LF	Loose Flange
F	TDC Joint
OE	Open End (c/w birdmesh)
RE	Raw Edge
S	S-cleat Joint
S&D	Slip & Drive (combination S-cleat / C-cleat joint)
SF	Sheetmetal Turn-out (self) Flange (dimension required e.g. 25mm)
MOS	Measure on Site (measurement to be confirmed later)
TOS	Trim on Site (flange will be supplied loose for site fixing)
BL	Bottom Level
BSD	Bottom Sets Down (dimension & airflow direction required)
BSU	Bottom Sets Up (dimension & airflow direction required)
ET	Equal Taper
FA	From Above
FB	From Below
FOB	Flat on Bottom (Elevations)
FOT	Flat on Top (Elevations)
FTS	Flat this Side (Elevations)
SD	Set Down (dimension & airflow direction required)
SU	Set Up (dimension & airflow direction required)
TA	To Above
TB	To Below
TL	Top Level
TSD	Top Sets Down (dimension & airflow direction required)
TSU	Top Sets Up (dimension & airflow direction required)

(Note that all offsets should be in the direction of airflow)

Duct Pressure Files

All ductwork shop drawings shall nominate the static pressure rating for the respective duct sections to be manufactured.

SMACNA provides for all ductwork to be manufactured to the 250Pa (1"wg) rating unless otherwise specified, except for variable volume duct upstream of VAV boxes, which has a 500Pa (2"wg) basis of compliance. It also permits changes in the pressure rating as the pressure in the system drops (e.g. at runouts to grilles and diffusers).

Cooke Industries standard rectangular pressure files are detailed in the appendix to this section. Special pressure files can be set up for any specific requirements. Typical classifications are:

System	Service Description		Pressure (Pa)
Ventilation	Toilet supply & exhaust		125
	Carpark exhaust		250
	Incidental ventilation		125
Air Conditioning	Fan coil unit runouts		125
	Air handling units	mains	500
		runouts	125
	Constant volume central plant	plant rooms	750
		risers	500
		runouts	125 - 250
	Variable volume central plant	plant rooms	750
		risers	500
		runouts	250

Duct Sealing Requirements

SMACNA provides for the following sealing requirements.

Seal Class	Pressure File	Sealing Required
A	1000Pa and above	All transverse joints, longitudinal seams and duct wall penetrations.
B	750Pa	All transverse joints and longitudinal seams.
C	500Pa and below	Transverse joints only.

Notes:

(i) *Transverse joints* are connections of two duct or fitting elements orientated perpendicular to the flow.

(ii) *Longitudinal seams* are joints orientated in the direction of airflow.

(iii) *Duct wall penetrations* are openings made by screws, non-self-sealing fasteners, tie rods etc.

(iv) All other connections are considered transverse joints, including but not limited to spin-in spigots, taps and other branch connections, access doorframes, and duct connection to equipment.

ASHRAE recommends the following duct seal levels (ref. Fundamentals Handbook 1997):

Duct Location	Supply ≤ 500Pa	Supply > 500Pa	Exhaust	Return
Outdoors	A	A	A	A
Unconditioned Spaces	B	A	B	B
Conditioned Spaces (concealed ductwork)	C	B	B	B
Conditioned Spaces (exposed ductwork)				
Office type spaces	A	A	B	B
Factory type spaces	C	B	B	B

Transverse Joints and Stiffeners

The transverse joints and stiffeners used by Cooke Industries have the following SMACNA & HVCA ratings.

Item	SMACNA Class Joint	SMACNA Class Reinforcement	HVCA Class Joint	HVCA Class Reinforcement
C-cleat	A[1]	n/a	C1	n/a
S-cleat	A[1]	n/a	C1	n/a
TDC	Gauge Dependent	n/a	J2	n/a
30 x 30 x 3 RS Angle	G	F	J3	S2
40 x 40 x 3 RS Angle	H	G	J4	S3
50 x 50 x 3 RS Angle	J	H	J5	S4
50 x 50 x 5 RS Angle	K	J	J6	S5
60 x 60 x 6 RS Angle	L	K	n/a	S6
WDCI 25mm	H	n/a	J4	n/a
Ductmate 25	F	n/a	J3	n/a
Ductmate 35	J	n/a	J4/5	n/a

Notes:

(i) Flat drive is 'A' rated subject to maximum duct width, duct gauge, and reinforcement spacing. Refer to SMACNA HVAC Duct Construction Standards 2005 Table 2-48 for further information.

The following section sets out Cooke standard straight duct and fitting details. Duct and fittings are sorted by type into rectangular and round & oval.

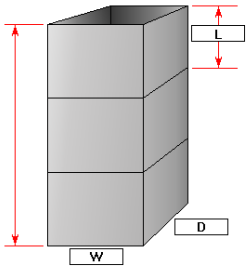
The necessary designer information required such as overall duct size, piece length, throat lengths, offsets, bend angles and radii should be shown on the drawings. Where suggested fitting dimensions are given below, these represent the minimum practical length required to form seams and fit flanges.

If you have specific requirements not detailed here, please ask.

Rectangular Duct & Fittings

Straight Duct

Fitting Designation Code: SD



Options:

SD Style 1	L shaped
SD Style 2	1 piece
SD Style 3	4 piece, MF-MF seams
SD Style 4	4 piece, MM-FF seams
SD Style 5	U shaped

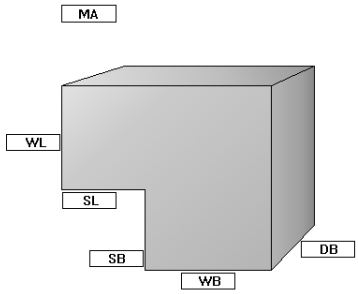
Nominal Lengths:

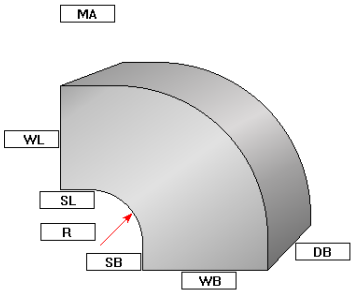
Joint Type	Raw Edge or Blank End	Flat Drive	TDC Flange
Raw Edge	1524	-	-
Flat Drive	1512	1500	n/a
TDC Flange	1477	n/a	1430
Slip on Flange	1527	n/a	1480
25 Turn Out	1499	1486	1452

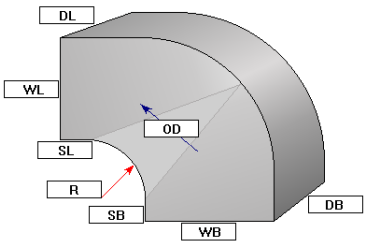
Note that for a 25 or 50 step-in either end (e.g. when going from lined to unlined duct), reduce the above lengths by the respective step-in amount.

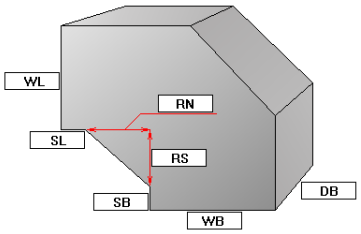
90° Elbow

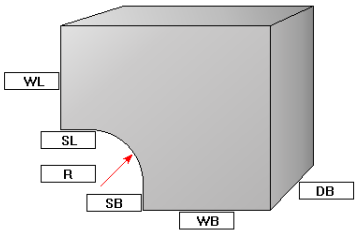
Fitting Designation Code:	EL	Straight elbow
	DE	Drop cheek elbow











Options:	EL Style 1	Square throat and radius heel
	EL Style 2	Radius throat and heel
	EL Style 3	Square throat and heel
	EL Style 4	Radius throat and square heel
	EL Style 5	Mitred throat and square heel
	EL Style 6	Square throat and mitred heel
	EL Style 7	Mitred throat and mitred heel
	DE Style 8 & 9*	Drop cheek radiused elbow

Minimum Throat Straight Length: SB/SL = 150mm for square throat
SB/SL = 50mm for radius or mitre throats.

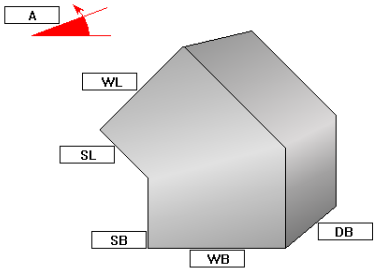
Throat Radius Options: The minimum practical inside throat radius is 150mm

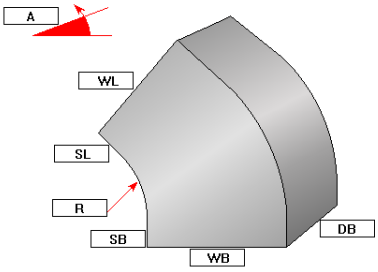
Short radius	R = 0.25 duct width (c/w splitter vanes)
Medium radius	R = 0.5 duct width (c/w splitter vanes)
Long radius	R = duct width

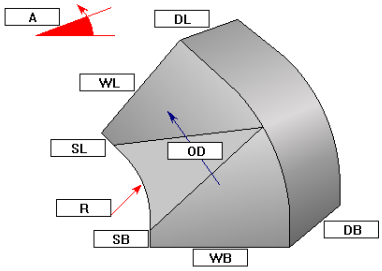
Styles marked * can move out of plane and elevation. These fittings should have a minimum of a medium throat radius, preferably a long radius, and cannot be supplied with splitter vanes.

Non 90º Elbow

Fitting Designation Code:	NE	Straight elbow
	DE	Drop cheek elbow







Options:	NE Style 1	Square throat and radius heel
	NE Style 2	Radius throat and heel
	NE Style 3	Square throat and heel
	NE Style 4	Radius throat and square heel
	DE Style 5 & 6*	Drop cheek radiused elbow

Minimum Throat Straight Length: SB / SL = 150mm for square throat
SB / SL = 50mm for radius or mitre throats.

Throat radius options: The minimum practical inside throat radius is 150mm

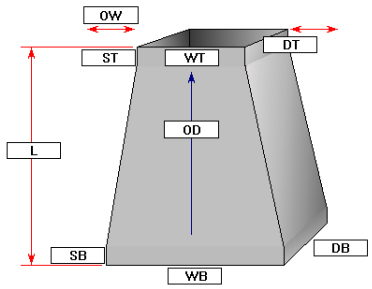
Short radius	R = 0.25 duct width (c/w splitter vanes)
Medium radius	R = 0.5 duct width (c/w splitter vanes)
Long radius	R = duct width

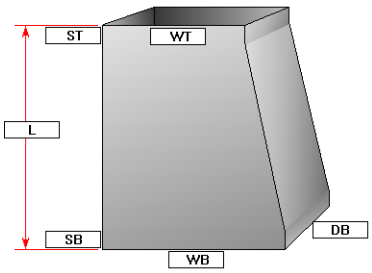
Splitter/turning vanes are only provided on bends over 45°

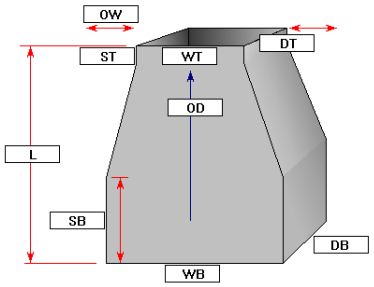
Styles marked * can move out of plane and elevation. These fittings should have a minimum of a medium throat radius, preferably a long radius, and cannot be supplied with splitter vanes.

Transition

Fitting Designation Code: TR







Options:	TR Style 1*	Four piece
	TR Style 2	Two piece
	TR Style 3	Four piece centred
	TR Style 4* & 5*	Four piece closed end

Standard Lengths: 600 or 1200

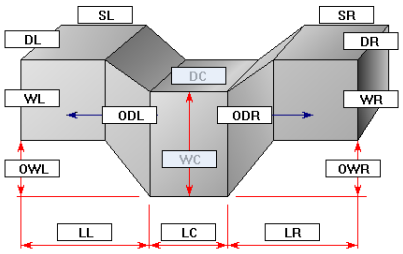
Maximum Practical Length: 1350mm

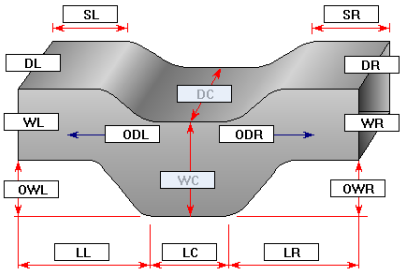
Minimum Throat Straight Length: ST / SB = 50mm

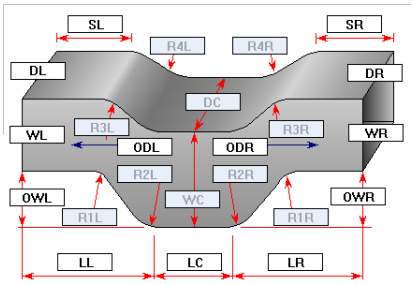
Styles marked * can move out of plane and elevation

Drop Beam Offset

Fitting Designation Code: DB







Options:	DB Style 1*	Straight offset
	DB Style 2*	Radius calculated
	DB Style 3*	Radius entered

Standard Lengths: n/a

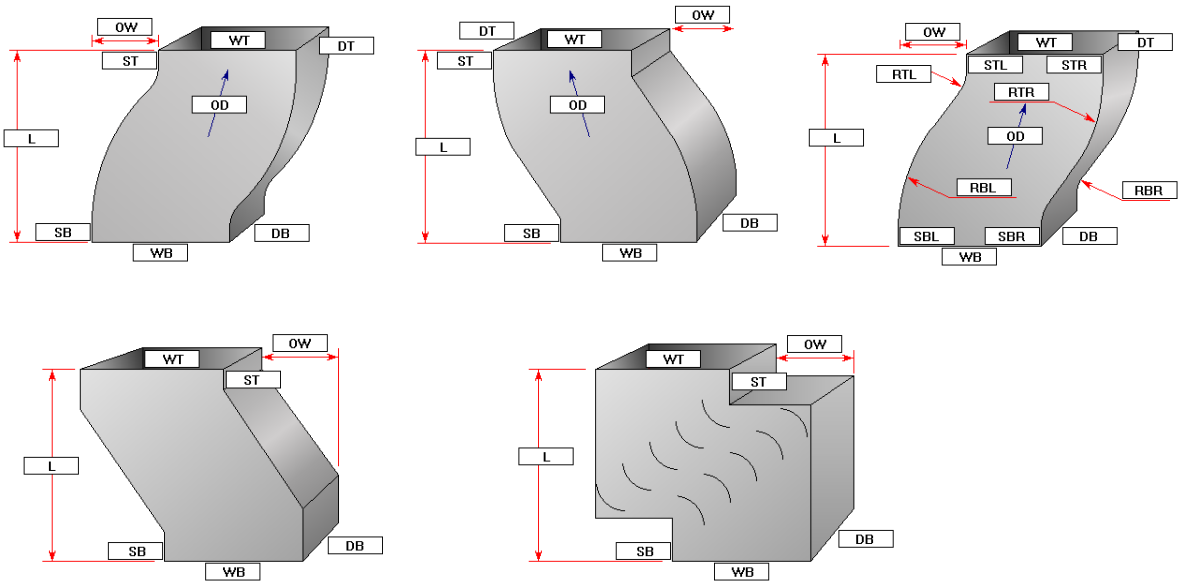
Maximum Practical Length: 1350mm

Minimum Throat Straight Length: SL / SR = 50mm

Styles marked * can move out of plane and elevation

Offset

Fitting Designation Code:	TO	Transitioning offset
	SO	Straight offset

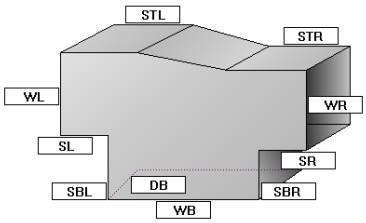


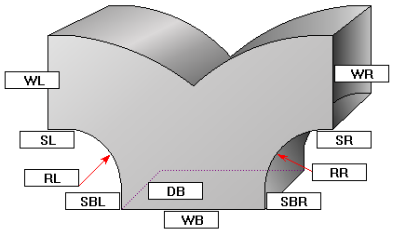
Options:	TO Style 1 & 4*	Double radius calculated
	TO Style 2 & 5*	Single radius
	TO Style 3 & 6	Double radius entered
	SO Style 7	Jogged offset
	SO Style 8	Dogleg offset
Standard Lengths:	600 or 1200	
Maximum Practical Length:	1350mm	
Minimum Throat Straight Length:	ST / SB = 50mm	

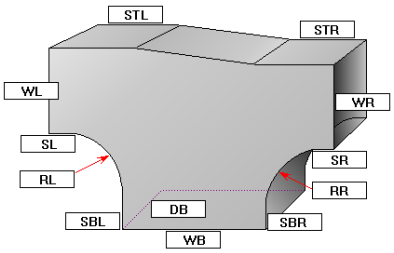
Styles marked * can move out of plane and elevation

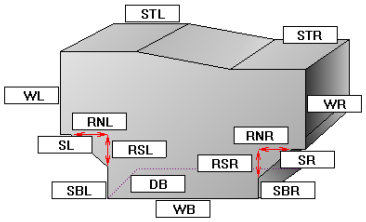
Tee

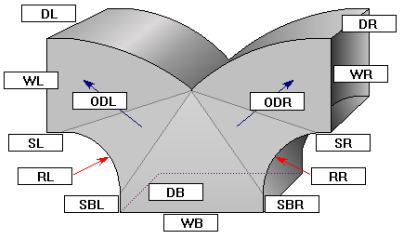
Fitting Designation Code:	TE	Straight tee
	DT	Drop cheek tee











Options:	TE Style 1	Square throat and heel
	TE Style 2	Square throat and radius heel
	TE Style 3	Radius throat and heel
	TE Style 4	Radius throat and square heel
	DT Style 5 & 6*	Drop cheek c/w radius throat and heel

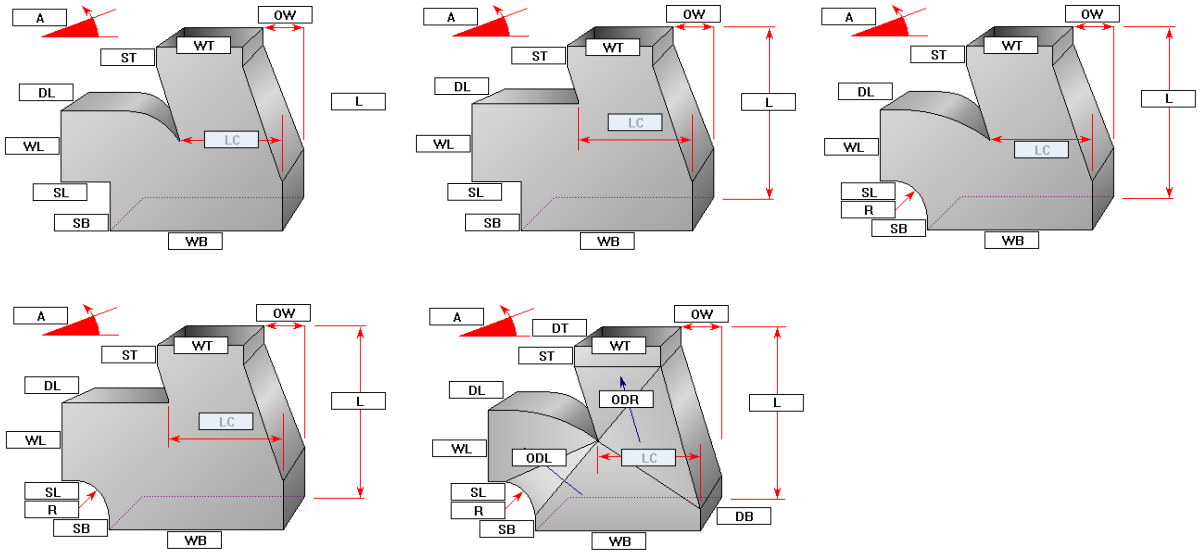
Minimum Throat Straight Length: SB / SR / STL / STR / SBL / SBR = 150mm for square throat
SB / SL / SBL / SBR = 50mm for radius or mitre throats.

Styles marked * can move out of plane and elevation. These fittings should have a minimum of a medium throat radius, and cannot be supplied with splitter vanes.

The above styles can all be made as nested fittings, with centre splitter.

Y - Branch

Fitting Designation Code: YB



Options:

YB Style 1	Square throat and radius heel
YB Style 2	Radius throat and heel
YB Style 3	Square throat and heel
YB Style 4	Radius throat and square heel
YB Style 5 & 6*	Drop cheek with radius throat and heel

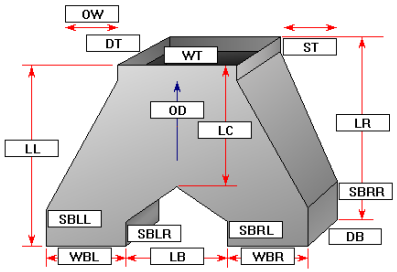
Minimum Throat Straight Length: SB / SL = 150mm for square throat
SB / SL / ST = 50mm for radius throat.

Styles marked * can move out of plane and elevation. These fittings should have a minimum of a medium throat radius, preferably a long radius, and cannot be supplied with splitter vanes.

The above styles can all be made as nested fittings, with centre splitter, or for <90° angles.

Pants Fitting

Fitting Designation Code: PT

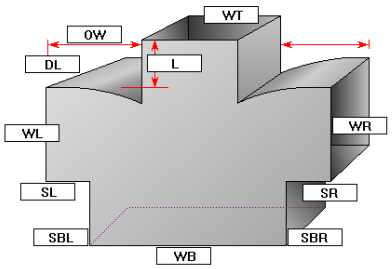


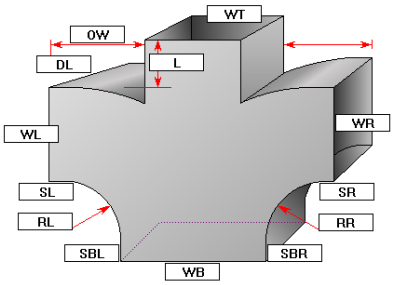
Minimum Throat Straight Length: SBLR / SBRL / ST = 50mm

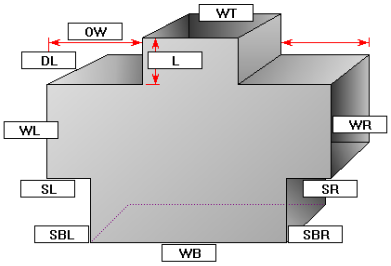
Style can move out of plane and elevation

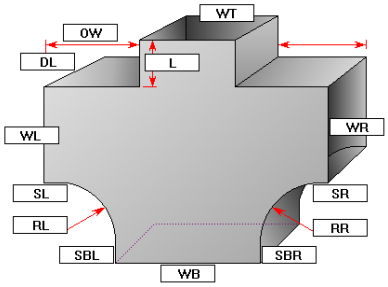
Cross Tee

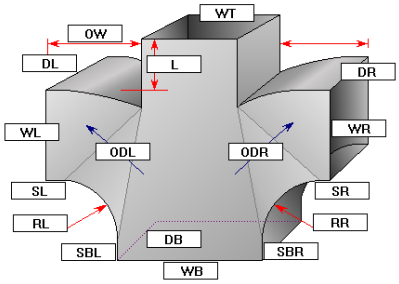
Fitting Designation Code: CT











Options:	CT Style 1	Square throat and radius heel
	CT Style 2	Radius throat and heel
	CT Style 3	Square throat and heel
	CT Style 4	Radius throat and square heel
	CT Style 5 & 6*	Drop cheek with radius throat and heel

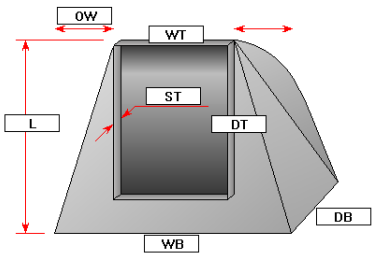
Minimum Throat Straight Length: SL / SR / SBL / SBR / L = 150mm for square throat
SB / SL / SBL / SBR = 50mm for radius throat.

Styles marked * can move out of plane and elevation. These fittings should have a minimum of a medium throat radius, preferably a long radius, and cannot be supplied with splitter vanes.

The above styles can all be made as nested fittings, with centre splitter.

Parker Fitting

Fitting Designation Code: PF

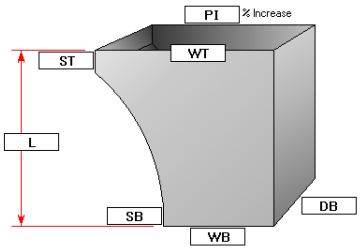


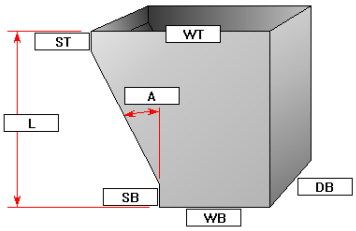
Options:	PF Style 1	Right hand outlet
	PF Style 2	Centered Outlet
	PF Style 3	Left hand outlet

Minimum Throat Straight Length: ST = 50mm

Increased Take-off

Fitting Designation Code: IA





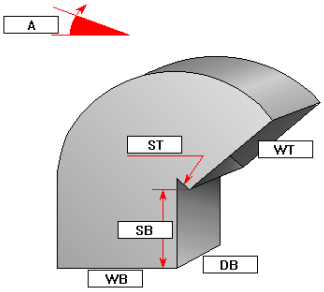
Options:	IA Style 1	4 piece radius throat % increase
	IA Style 2	2 piece radius throat % increase
	IA Style 3	4 piece straight throat % increase
	IA Style 4	2 piece straight throat % increase

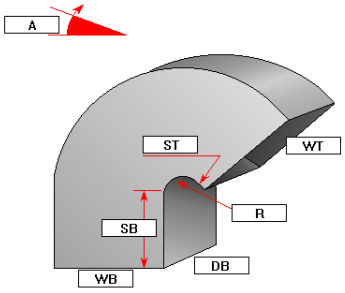
Maximum Practical Length: 1350mm

Minimum Throat Straight Length: SB / ST = 50mm

Goose Neck

Fitting Designation Code: GN





Options:	GN Style 1	Square throat (angle 90º to 160º)
	GN Style 2	Radius throat (angle 90º to 180º)

Minimum Throat Straight Length: SB / ST = 150mm for square throat
SB / ST = 50mm for radius throat.
Note SB must be greater than ST

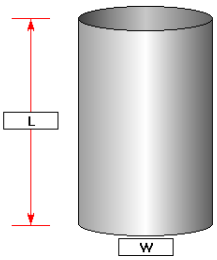
Throat radius options: The minimum practical inside throat radius is 150mm

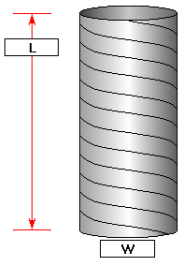
Outlet height is generally computed as WT = WB x 125%. Outlet is generally fitted with a galvanised birdmesh screen.

Round/Oval Duct & Fittings

Round Pipe

Fitting Designation Code: RP



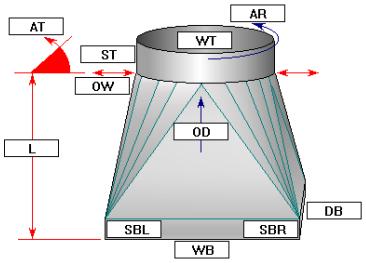


Maximum Length	Longitudinal Seam	1200mm
	Spiral Seam	3000mm

The above fitting can be round or oval

Round to Square

Fitting Designation Code: RS



Options: Centred or flat seams*

Standard Throat Straight Length: SBL / SBR = 50mm

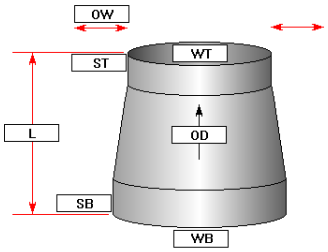
Minimum Collar Length: ST = 75mm

Styles marked * can move out of plane and elevation

The above fittings can be round or oval

Round Reducer

Fitting Designation Code: RR



Maximum Practical Length: 1350mm

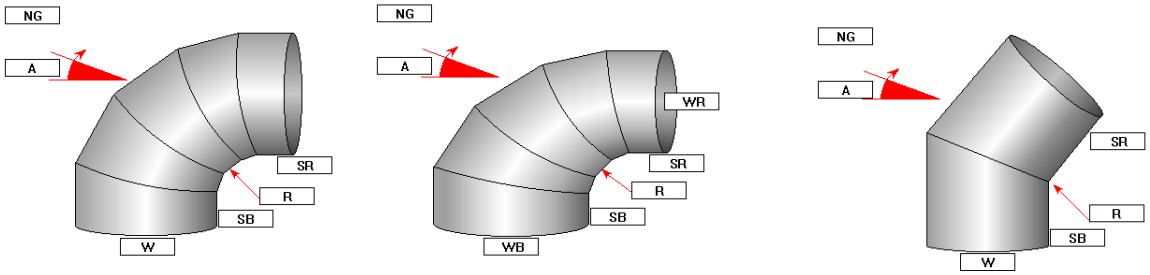
Minimum Collar Length: T=75mm

Styles marked * can move out of plane and elevation

The above fittings can be round or oval

Round Elbow

Fitting Designation Code: RE



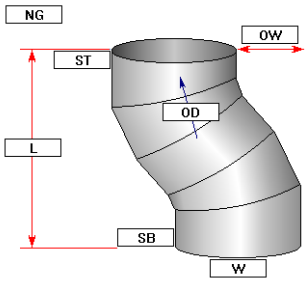
Options:

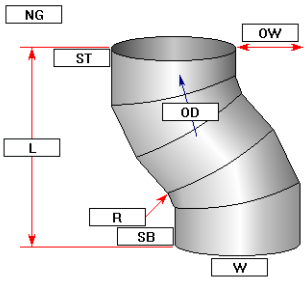
RE Style 1 Standard single blank (0º to 90º, 2 to 15 gores)
RE Style 2 Reducing multiple blank (0º to 90º, 2 to 15 gores)
RE Style 3 Round tap from elbow
RE Style 4 Round pieced elbow c/w 2 piece gores (0º to 90º, 2 to 15 gores)

The above fittings can be round or oval

Round Offset

Fitting Designation Code: RF





Options:
RF Style 1* Single blank (odd number of gores, 3 to 29 gores)

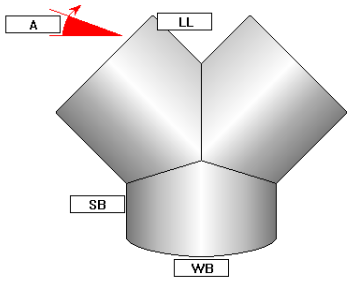
RF Style 2* Multiple blanks (odd number of gores, 3 to 29 gores)

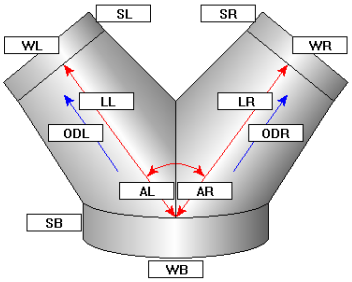
Styles marked * can move out of plane and elevation

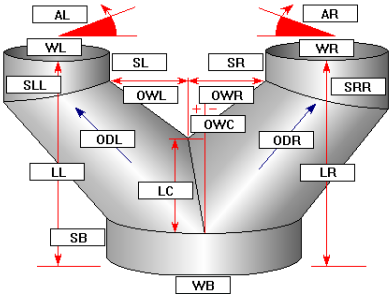
The above fittings can be round or oval

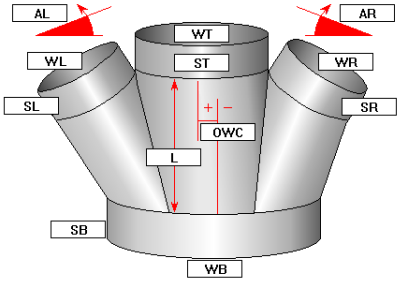
Round Y-Branch

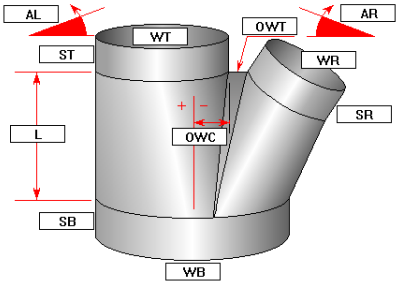
Fitting Designation Code: RY











Options:	RY Style 1 & 2*	2 way split throat
	RY Style 3 & 4	2 way joined throat, edge seam
	RY Style 5 & 6	3 way joined throat, edge seam
	RY Style 7	2 way joined throat, center seam
	RY Style 8	3 way joined throat, center seam

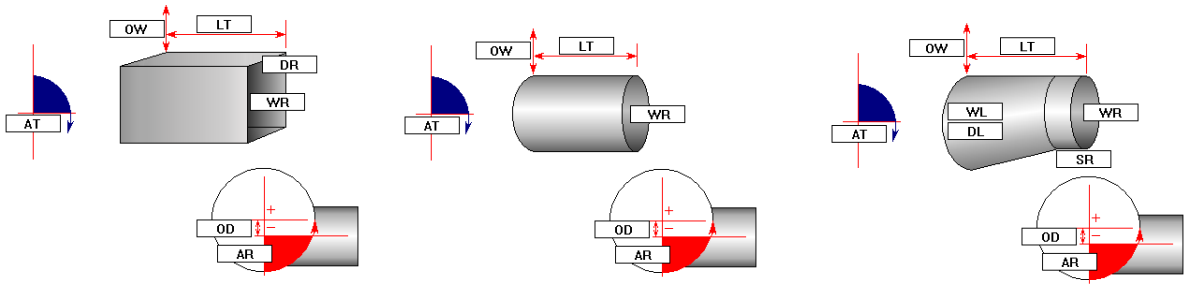
Minimum Collar Length: T=75mm

Styles marked * can move out of plane and elevation

The above fittings can be round or oval

Rectangular & Round Taps

Fitting Designation Code: RA



Options:		
	Rectangular Tap	0º to 90º angle to duct
	Round Tap*	0º to 90º angle to duct

Styles marked * can move out of plane and elevation

TDC/Ductmate Flange

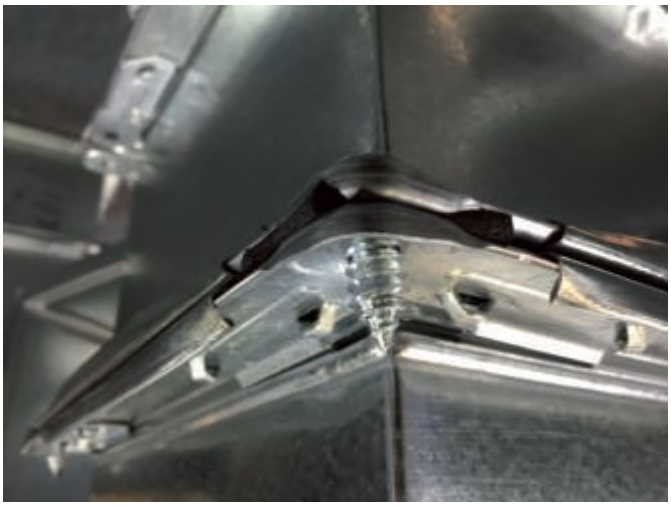
Cooke Industries utilises the TDC-IH flange system for transverse joints with matching Ductmate 35 slip-on flange where necessary for site trim pieces. The following recommendations should be observed to achieve airtight joints.

(a) Gasket Sealing - The selection and use of the correct gasket width and thickness plays a very important part in achieving a good seal.

We recommend using a 5mm pressure memory tape (Ductware DW-PMG15 or Ductmate 440) in either 15mm or 35mm widths, which will enable the seal to move as the duct system energises and de-energises, thereby reducing the potential for leakage. The 15mm width is preferred, but the 35mm width is more "idiot proof" when fitting to the duct flange.

When applying the gasket, start at the centre of one side and position 5mm from the inner edge of the flange. At each corner, ensure that it covers the three points of the corner to cover the ends of the flanges and the raw end of the duct. Some gasket will protrude into the airstream. Work around the circumference of the frame. The ends of the gasket should be side-by-side overlapped 20mm minimum.

(b) Corner Bolts – We utilise the Ductware QuikCorner™ TDF connector for a reduced installation time. The teardrop shaped hole connector produces a tight connection without use of drift pins and clamps. Connection should be made using the QuikScrew fasteners and screw gun.



(c) Additional Fixings - The flanges should have 150mm cleats installed as follows:

Pressure File	Cleat Spacing
Up to 750Pa	150 cleat on 380 centres
750Pa & over	150 cleat on 300 centres

Alternatively screws may be used in lieu of cleats. Install at 25mm from end of corner piece and at maximum 150mm intervals.

(d) Trim on Site (Loose Flange) Pieces - Trim on site pieces will be supplied with a Ductmate 35 slip on flange. The flange is generally pop riveted on with only 4 rivets and left unsealed. Prior to installing the trim-on-site piece, the flange attachment should be completed using pop rivets or sheetmetal screws at 600mm maximum centres, and the corners sealed with duct sealant in the normal manner.

Acoustic Lining

The standard acoustic lining for Cooke ductwork is a semi-rigid fibreglass board with a perforated foil facing (HDP). Alternatively, a black matt facing (BMF) may be employed.

Acoustic lining may suffer minor damage in transport and handling. Small cuts, tears or abrasions may be repaired with silver tape for HDP facing or PVA adhesive (e.g. Ados AD20, Fullers X3801) for a BMF facing, depending upon the insulation facing type.

The occasional exposure to wet weather during transportation or pre-building enclosure conditions in new construction will not necessarily impair the performance of the liner. In such cases drying or other corrective measures recommended by the manufacturer should be followed. However corrective action should be taken immediately to avoid damaging the liner fastenings (i.e. corrosion failure at the pin weld).

Ductwork Testing

The pressure testing of installed ductwork is an occasional requirement of the design engineer. This requirement should be kept under control, and testing, where agreed, should be carried out in accordance with SMACNA or HVCA procedures. Active steps should be taken to ensure that the ducting is airtight and is erected competently regardless of testing requirements.

Generally SMACNA does not recommend the testing of duct systems where the operating pressure is less than 750Pa (3" wg).

SMACNA 250Pa (1"wg) Pressure File

Seal Class C: Seal all transverse joints

Rectangular Duct Construction with TDC & Tie Rods - 1524 (5-foot) Wide Coil Stock

SMACNA 2005

Max Duct	Metal	Material	Longitudinal	Transverse	Additional Reinforcing (between transverse joints)					
Dimension	Gauge	Thickness	Seam	Joint	JTR	Qty	MPT	Qty	Angle	Spacing
250	24	0.6	Snaplock	Flat Drive	N	-	N	-	N	-
350	24	0.6	Snaplock	Flat Drive	N	-	N	-	N	-
450	24	0.6	Snaplock	Flat Drive	N	-	N	-	N	-
500	24	0.6	Snaplock	Flat Drive	N	-	N	-	N	-
600	24	0.6	Snaplock	TDC	N	-	N	-	N	-
750	24	0.6	Snaplock	TDC	N	-	N	-	N	-
900	24	0.6	Snaplock	TDC	N	-	N	-	N	-
1050	24	0.6	Snaplock	TDC	N	-	N	-	N	-
1200	22	0.8	Snaplock	TDC	N	-	N	-	N	-
1350	22	0.8	Snaplock	TDC	N	-	N	-	N	-
1500	22	0.8	Snaplock	TDC	N	-	Y	1	N	-
1800	22	0.8	Snaplock	TDC	N	-	Y	1	N	-
2100	20	1.0	Lg Pittsburgh	TDC	Y	1	Y	1	N	-
2400	18	1.2	Lg Pittsburgh	TDC	Y	1	N	-	N	-
2700	18	1.2	Lg Pittsburgh	TDC	Y	1	N	-	50 x 50 x 5	762
3000	18	1.2	Lg Pittsburgh	TDC	Y	1	N	-	50 x 50 x 5	762
3001 & above	18	1.2	Lg Pittsburgh	TDC	Y	At 1500c/c	Y	At 1500c/c	75 x 50 x 5	762

Notes:

Tie rod is 1/2" EMT Conduit (ERW 19x1.6 GAL) with Condu-Lock fasteners. Not to be used for external ductwork.

Refer to Smacna Duct Construction Standards - Section 2.5 & 2.7 for commentary on construction for negative pressure mode.

Under negative pressure mode, tie rods above 1200mm in length may require larger size to avoid compression flexing. This is dependent upon duct width. Refer SMACNA Table 2.43

SMACNA 500Pa (2"wg) Pressure File

Seal Class C: Seal all transverse joints

Rectangular Duct Construction with TDC & Tie Rods - 1524 (5-foot) Wide Coil Stock

SMACNA 2005

Max Duct	Metal	Material	Longitudinal	Transverse	Additional Reinforcing (between transverse joints)					
Dimension	Gauge	Thickness	Seam	Joint	JTR	Qty	MPT	Qty	Angle	Spacing
250	24	0.6	Snaplock	Flat Drive	N	-	N	-	N	-
350	24	0.6	Snaplock	Flat Drive	N	-	N	-	N	-
400	24	0.6	Snaplock	Flat Drive	N	-	N	-	N	-
500	24	0.6	Snaplock	TDC	N	-	N	-	N	-
600	24	0.6	Snaplock	TDC	N	-	N	-	N	-
750	24	0.6	Snaplock	TDC	N	-	N	-	N	-
900	22	0.8	Snaplock	TDC	N	-	N	-	N	-
1050	22	0.8	Snaplock	TDC	N	-	Y	1	N	-
1200	22	0.8	Snaplock	TDC	N	-	Y	1	N	-
1350	22	0.8	Snaplock	TDC	N	-	Y	1	N	-
1500	22	0.8	Snaplock	TDC	Y	1	Y	1	N	-
1800	20	1.0	Lg Pittsburgh	TDC	Y	1	Y	1	N	-
2100	20	1.0	Lg Pittsburgh	TDC	Y	1	Y	2	N	-
2400	20	1.0	Lg Pittsburgh	TDC	Y	1	Y	2	N	-
2700	18	1.2	Lg Pittsburgh	TDC	Y	1	N	-	75 x 50 x 5	762
3000	18	1.2	Lg Pittsburgh	TDC	Y	2	N	-	75 x 50 x 5	762
3001 & above	18	1.2	Lg Pittsburgh	TDC	Y	At 1500c/c	Y	At 1500c/c	75 x 50 x 5	762

Notes:

Tie rod is 1/2" EMT Conduit (ERW 19x1.6 GAL) with Condu-Lock fasteners. Not to be used for external ductwork.

Refer to Smacna Duct Construction Standards - Section 2.5 & 2.7 for commentary on construction for negative pressure mode.

Under negative pressure mode, tie rods above 1200mm in length may require larger size to avoid compression flexing. This is dependent upon duct width. Refer SMACNA Table 2.43

SMACNA 750Pa (3"wg) Pressure File

Seal Class B: Seal all joints & seams

Rectangular Duct Construction with TDC & Tie Rods - 1524 (5-foot) Wide Coil Stock

SMACNA 2005

Max Duct	Metal	Material	Longitudinal	Transverse	Additional Reinforcing (between transverse joints)					
Dimension	Gauge	Thickness	Seam	Joint	JTR	Qty	MPT	Qty	Angle	Spacing
300	24	0.6	Snaplock	Flat Drive	N	-	N	-	N	-
350	24	0.6	Snaplock	TDC	N	-	N	-	N	-
400	24	0.6	Snaplock	TDC	N	-	N	-	N	-
500	24	0.6	Snaplock	TDC	N	-	N	-	N	-
600	24	0.6	Snaplock	TDC	N	-	N	-	N	-
750	22	0.8	Snaplock	TDC	N	-	N	-	N	-
900	22	0.8	Snaplock	TDC	N	-	Y	1	N	-
1050	22	0.8	Snaplock	TDC	N	-	Y	1	N	-
1200	22	0.8	Sm Pittsburgh	TDC	Y	1	Y	1	N	-
1350	22	0.8	Sm Pittsburgh	TDC	Y	1	Y	1	N	-
1500	20	1.0	Lg Pittsburgh	TDC	Y	1	Y	1	N	-
1800	20	1.0	Lg Pittsburgh	TDC	Y	1	Y	2	N	-
2100	20	1.0	Lg Pittsburgh	TDC	Y	1	Y	2	N	-
2400	18	1.2	Lg Pittsburgh	TDC	Y	1	Y	2	N	-
2700	18	1.2	Lg Pittsburgh	TDC	Y	1	N	-	75 x 50 x 5	762
3000	18	1.2	Lg Pittsburgh	TDC	Y	2	N	-	75 x 50 x 5	762
3001 & above	18	1.2	Lg Pittsburgh	TDC	Y	At 1500c/c	Y	At 1500c/c	75 x 50 x 5	762

Notes:

Tie rod is 1/2" EMT Conduit (ERW 19x1.6 GAL) with Condu-Lock fasteners. Not to be used for external ductwork.

Refer to Smacna Duct Construction Standards - Section 2.5 & 2.7 for commentary on construction for negative pressure mode.

Under negative pressure mode, tie rods above 1200mm in length may require larger size to avoid compression flexing. This is dependent upon duct width. Refer SMACNA Table 2.43

SMACNA 1000Pa (4"wg) Pressure File

Seal Class A: Seal all joints, seams & penetrations

Rectangular Duct Construction with TDC & Tie Rods - 1524 (5-foot) Wide Coil Stock

SMACNA 2005

Max Duct	Metal	Material	Longitudinal	Transverse	Additional Reinforcing (between transverse joints)					
Dimension	Gauge	Thickness	Seam	Joint	JTR	Qty	MPT	Qty	Angle	Spacing
300	24	0.6	Sm Pittsburgh	Flat Drive	N	-	N	-	N	-
350	24	0.6	Sm Pittsburgh	TDC	N	-	N	-	N	-
400	24	0.6	Sm Pittsburgh	TDC	N	-	N	-	N	-
500	24	0.6	Sm Pittsburgh	TDC	N	-	N	-	N	-
600	22	0.8	Sm Pittsburgh	TDC	N	-	N	-	N	-
750	20	0.8	Sm Pittsburgh	TDC	N	-	N	-	N	-
900	22	0.8	Sm Pittsburgh	TDC	N	-	Y	1	N	-
1050	20	1.0	Lg Pittsburgh	TDC	N	-	Y	1	N	-
1200	18	1.2	Lg Pittsburgh	TDC	N	-	Y	1	N	-
1350	18	1.2	Lg Pittsburgh	TDC	N	-	Y	1	N	-
1500	20	1.0	Lg Pittsburgh	TDC	Y	1	Y	1	N	-
1800	20	1.0	Lg Pittsburgh	TDC	Y	1	Y	2	N	-
2100	18	1.2	Lg Pittsburgh	TDC	Y	1	Y	2	N	-
2400	18	1.2	Lg Pittsburgh	TDC	Y	1	Y	2	N	-
2700	18	1.2	Lg Pittsburgh	TDC	Y	1	N	-	75 x 50 x 5	762
3000	18	1.2	Lg Pittsburgh	TDC	Y	2	N	-	75 x 50 x 5	762
3001 & above	18	1.2	Lg Pittsburgh	TDC	Y	At 1500c/c	Y	At 1500c/c	75 x 50 x 5	762

Notes:

Tie rod is 1/2" EMT Conduit (ERW 19x1.6 GAL) with Condu-Lock fasteners. Not to be used for external ductwork.

Refer to Smacna Duct Construction Standards - Section 2.5 & 2.7 for commentary on construction for negative pressure mode.

Under negative pressure mode, tie rods above 1200mm in length may require larger size to avoid compression flexing. This is dependent upon duct width. Refer SMACNA Table 2.44

SMACNA 1500Pa (6"wg) Pressure File

Seal Class A: Seal all joints, seams & penetrations

Rectangular Duct Construction with TDC & Tie Rods - 1524 (5-foot) Wide Coil Stock

SMACNA 2005

Max Duct	Metal	Material	Longitudinal	Transverse	Additional Reinforcing (between transverse joints)					
Dimension	Gauge	Thickness	Seam	Joint	JTR	Qty	MPT	Qty	Angle	Spacing
300	24	0.6	Sm Pittsburgh	TDC	N	-	N	-	N	-
400	22	0.8	Sm Pittsburgh	TDC	N	-	N	-	N	-
600	22	0.8	Sm Pittsburgh	TDC	N	-	N	-	N	-
650	22	0.8	Sm Pittsburgh	TDC	N	-	Y	1	N	-
700	22	0.8	Sm Pittsburgh	TDC	N	-	Y	1	N	-
750	22	0.8	Sm Pittsburgh	TDC	N	-	Y	1	N	-
900	20	1.0	Sm Pittsburgh	TDC	N	-	Y	1	N	-
1050	18	1.2	Lg Pittsburgh	TDC	N	-	Y	1	N	-
1200	20	1.0	Lg Pittsburgh	TDC	Y	1	Y	1	N	-
1350	20	1.0	Lg Pittsburgh	TDC	Y	1	Y	1	N	-
1500	20	1.0	Lg Pittsburgh	TDC	Y	1	Y	1	N	-
1800	18	1.2	Lg Pittsburgh	TDC	Y	1	Y	1	N	-
2100	18	1.2	Lg Pittsburgh	TDC	Y	1	Y	2	N	-
2400	18	1.2	Lg Pittsburgh	TDC	Y	1	Y	1	50 x 50 x 5	762
2700	18	1.2	Lg Pittsburgh	TDC	Y	1	Y	1	75 x 50 x 5	600
3000	18	1.2	Lg Pittsburgh	TDC	Y	2	Y	1	75 x 50 x 5	600
3001 & above	18	1.2	Lg Pittsburgh	TDC	Y	At 1500c/c	Y	At 1500c/c	75 x 50 x 5	600

Notes:

Tie rod is 1/2" EMT Conduit (ERW 19x1.6 GAL) with Condu-Lock fasteners. Not to be used for external ductwork.

Refer to Smacna Duct Construction Standards - Section 2.5 & 2.7 for commentary on construction for negative pressure mode.

Under negative pressure mode, tie rods above 1200mm in length may require larger size to avoid compression flexing. This is dependent upon duct width. Refer SMACNA Table 2.45

SMACNA 2500Pa Positive (+10"wg) Round Pressure File

Max Duct Dimension	Longitudinal Seam Gauge	Spiral Seam Gauge	Longitudinal Seam	Transverse Joint	
350	26	26	Groove	Beaded Sleeve	
450	24	26	Groove	Beaded Sleeve	
600	24	26	Groove	Beaded Sleeve	
1050	22	24	Groove	Beaded Sleeve	
1500	20	22	Groove	Beaded Sleeve	
2100	18	20	Groove	50 x 50 x 3	Note: Companion angle flange only to retain shape.
2400	18	20	Groove	50 x 50 x 5	Note: Companion angle flange only to retain shape.
2401 & above	16	16	Groove	75 x 50 x 5	Note: Companion angle flange only to retain shape.

Seal Class A: Seal all joints, seams & penetrations
For fittings, use longitudinal seam gauge.

SMACNA 500Pa Negative (-2"wg) Round Pressure File

Max Duct Dimension	Longitudinal Seam Gauge	Spiral Seam Gauge	Longitudinal Seam	Transverse Joint	Additional Reinforcing			
					Long Seam Size	Spacing	Spiral Seam Size	Spacing
300	26	28	Groove	Beaded Sleeve	-	-	-	-
400	24	26	Groove	Beaded Sleeve	-	-	-	-
550	22	24	Groove	Beaded Sleeve	-	-	-	-
600	24	22	Groove	As Noted Over	25 x 25 x 3	1524	Beaded Sleeve	3000
1050	24	26	Groove	As Noted Over	25 x 25 x 3	1524	25 x 25 x 3	3000
1200	24	26	Groove	As Noted Over	25 x 25 x 3	1524	25 x 25 x 3	3000
1350	24	24	Groove	As Noted Over	25 x 25 x 3	1524	25 x 25 x 3	3000
1500	24	24	Groove	As Noted Over	25 x 25 x 3	1524	30 x 30 x 5	3000
1800	22	24	Groove	As Noted Over	30 x 30 x 5	1524	30 x 30 x 5	3000
2100	22	22	Groove	As Noted Over	30 x 30 x 5	1524	40 x 40 x 5	3000
2400	22	20	Groove	As Noted Over	30 x 30 x 5	1524	50 x 50 x 5	3000
2401 & above	22	18	Groove	As Noted Over	50 x 50 x 5	1524	75 x 75 x 5	3000

Notes:
Longitudinal seam gauge assumes 1524mm reinforcement spacing. Spiral seam gauge assumes 3048mm reinforcement spacing.
Seal Class A: Seal all joints, seams & penetrations
For fittings, use longitudinal seam gauge.