

The background of the entire page is a close-up, vertical view of several large coils of metal sheet. The coils are stacked, creating a strong sense of depth and repetition. The lighting is dramatic, with bright highlights reflecting off the metallic surfaces and deep shadows in the gaps between the coils. The overall color palette is a range of blues, from deep navy to lighter, shimmering tones where the light hits.

arlo

Express Sheetmetals

Product Catalogue

Intro

Welcome to ARLO Express Sheetmetals where the words “customer satisfaction” really mean just that. We pride ourselves on finding a solution to fit your needs whatever the size and scope of the project, and deliver a service that you, our customer, is satisfied with.

Some of our high profile clients projects include; Auckland Airport, Te Kaha Stadium, ASB Bank, Fonterra, University of Auckland, Pak ‘N Save, the NZ International Conference Centre, to name but a few.

The combined strength of cutting-edge European methods with Kiwi ingenuity makes ARLO Express Sheetmetals a valuable offer for both the New Zealand, Australian and international marketplace.

We house a full installation team and manufacture for companies as far reaching as the USA and Fiji.



About Us

Acquired in 2007 by the ambitious duo, Gaspar Lalovich and Mike Arcari, ARLO Express Sheetmetals (NZ) Ltd has grown into the multi-faceted industry leader it is today. Express Sheetmetals' annual turnover has increased more than 6-fold since 2007. Cutting edge European methods combined with the Kiwi can-do attitude, eco-friendly practices, and a focus on customer satisfaction has assured the company's continued success.

With almost 50 years combined experience in the European and Australasian marketplaces, within supply, manufacturing, and installation of Air-conditioning systems, the duo have steadily grown Express Sheetmetal into a market leader within New Zealand.

The company head office and factory is located in Otahuhu, Auckland, with a new factory recently opened in Brisbane, Australia and a third factory in Christchurch, New Zealand. The team comprises professional, experienced, and highly trained tradesman with an industry reputation for prompt, reliable service and above all else, producing top quality products.

ARLO Express Sheetmetals has a unique relationship with, Spiro International, a Swiss based European market leader in the development of machines for the production of circular and oval ducting and other sheetmetal products. ARLO Express Sheetmetals is the only company in New Zealand producing rubber sealed spiral ducting and fittings using the Spiro System. The Spiro system is already pressure tested to Swiss and international standards (including Eurovent 2 Class D), and eliminates the need to further seal the installed product greatly simplifying and reducing the cost of installation, and allowing maximum efficiency from the entire HVAC system

ARLO Express Sheetmetals manufacture and supply products from its three factories in Auckland, Brisbane and Christchurch and ship them across New Zealand and internationally, more recently to Nevada, USA, and Fiji.

Key Benefits& Points of Difference

- The only company in New Zealand that manufactures a range of standard and custom spiral, circular, oval and rectangular ducting and fittings and provides complete installation services ... a true one-stop-shop.
- Australasian partner of Spiro International using the Spiro System to provide Eurovent Class D compliant “leak proof” ducting systems.
- Serving a diverse range of customer needs with extensive “off the shelf” availability of ducting and fittings from our Auckland, Brisbane and Christchurch factories.

Our People



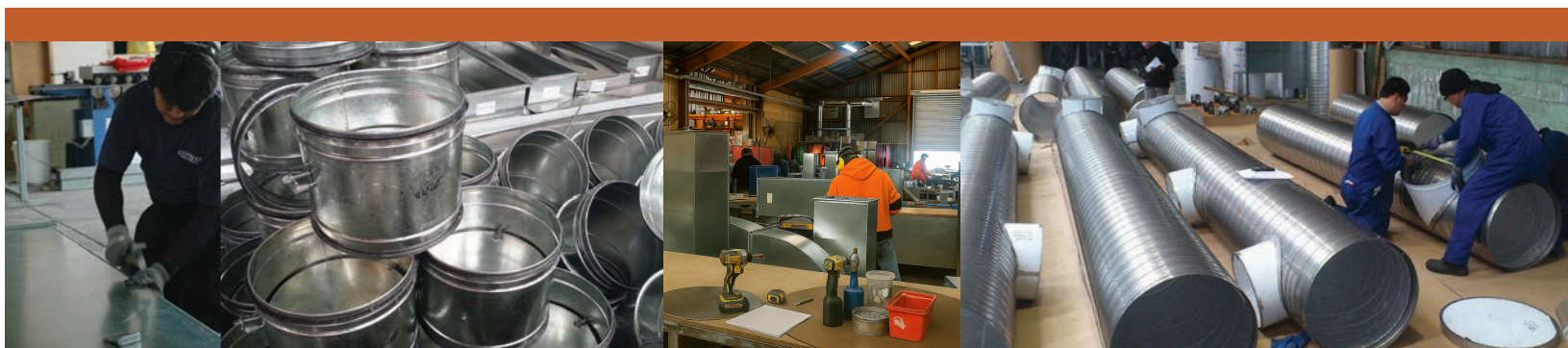
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SECTION 1

Custom Manufacture



Custom Manufacturing

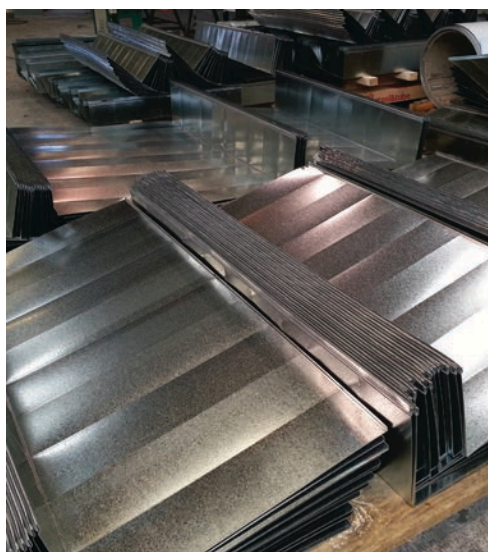
We use the latest software, technology and machinery to produce our duct components and custom sheet metal products in our three factories

We are specialists in high capacity manufacturing with a quick turnaround of rectangular and circular custom ducting in galvanised, stainless steel and aluminium.

All our rectangular, circular and oval products can be fitted with various types of internal/ external insulation, additional fittings and we can arrange custom paint or powder-coat finishes.

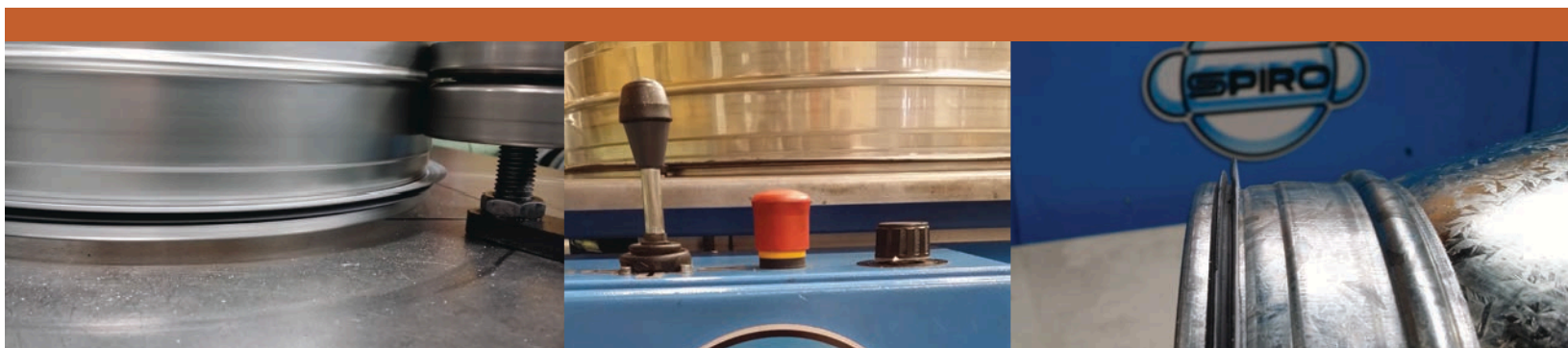
Custom Products include:

- * Galvanised and Stainless steel rectangular duct
- * Huge library of customised circular and ovalised products
- * Filter sections * Plenums and grille boxes
- * Electric heater housings
- * Welded roof upstands and flashings
- * AC condenser security cages



SECTION 2

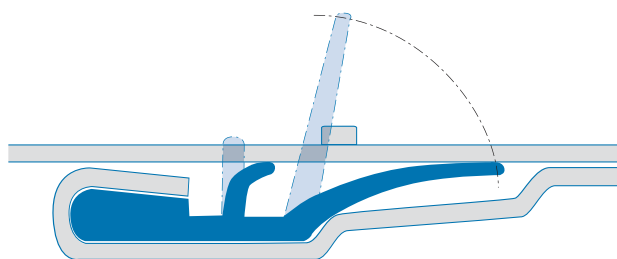
Spiro System





The SPIRO® System

The sealing gasket



The SPIRO® system sealing system is based on a profile of homogeneous EPDM rubber. The rubber gasket is located in a groove at the end of the fitting and is securely attached by means of an return edge. This design ensures that the rubber gasket is always held in its correct position.

The sealing gasket must comply to our strict quality requirements, so we have chosen EPDM rubber. This material is very resistant to ozone and UV rays, and at the same time unaffected by temperature fluctuations.

Economical air conditioning

Great demands are made on air-conditioning systems these days, and it is expensive to process air. So it is vital that the duct systems used must be tightly sealed to keep operating costs and overall economy at a reasonable level. Leaks mean higher operating costs, adjustment problems and over-dimensioned units and duct systems. To deal with these risks, SPIRO INTERNATIONAL S.A. has developed its complete SPIRO® system range.

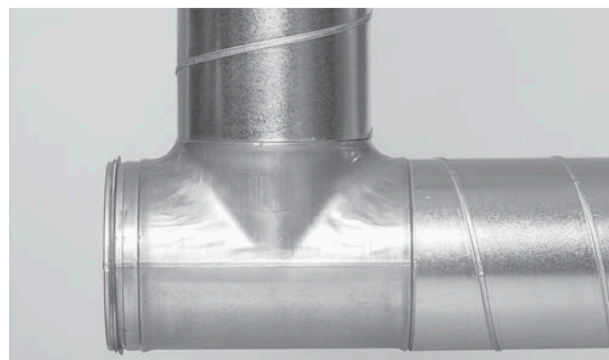
SPIRO® system

- the leakproof duct system

SPIRO system is an approved range of quick-fitting sealing gasket of EPDM rubber. The sealing gasket provides a tight and reliable joint. SPIRO® system is available as a complete range with dimensions Ø100mm up to Ø 2500mm.

SPIRO® system complies with DW 142 Class C (Eurovent 2.2 =IV (DIN 24194)) specification.

The high, uniform quality and the effective factory-fitted sealing system means that installation is fast and easy. SPIRO® system is leakproof when fitted and does not require any additional sealing.



The SPIRO-system

The SPIRO-system incorporates a sealing strip of age-resistant EPDM rubber, ensuring an air tight and lasting joint seal, immune to variations in temperature. Meeting the requirements of air tightness, Class C, the range extends from components with a diameter of 100 mm up to those with a diameter of 2500mm.

Because of the totally dependable quality of the factory-mounted sealing strips, SPIRO-system installation is quick and easy. Each application is fully sealed at the outset, no additional sealing is necessary.

The spirally wound tubes produced by our tubeformers feature a patented seam cavity, which both stabilises the tubes and locks the seams into place, ensuring that tolerances are maintained even during handling and transport. This "bubble" guarantees the high quality performance of SPIRO-systems.

The tubes are also stamped with the registered trademark "SPIRO-system". Both the trademark and "bubble" guarantee the high-quality performance of SPIRO-system.

Benefits of the SPIRO-system

- Fast and easy installation.
- Factory fitted gasket without any loose parts.
- Adjustable - twisting and fine adjustment mean there's no risk of leakage.
- Environmentally friendly - the system is fitted with solvent-free sealant.
- Can be installed in all kinds of weather.
- Temperature resistant from -30 to +100 C
- Withstands positive pressure up to 3000 Pa.

Type approval

Approval no1358/88 means that the SPIRO-system complies with the requirements for tightness class D without any demand for pressure testing after installation. The approval is only valid on condition that all fittings are marked by us in accordance with the example and are installed in accordance with the accompanying installation instruction.

Dimensions

Almost all products in the SPIRO-programme can also be delivered in intermediate dimensions.

Economy – Tightness

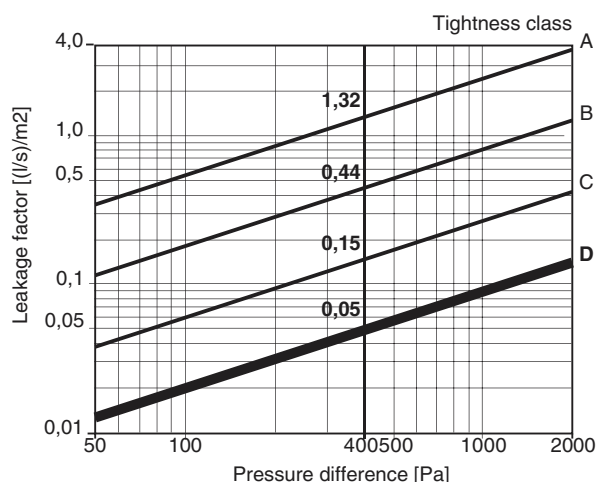
Present-day stringent demands for interior climate entail expensive air treatment. Leakage leads to uneconomical operation, adjustment difficulties and over-dimensioned equipment. For this reason, it is important that ventilation systems are very well sealed, to keep overall costs down.

This is why official requirements for sealing vary with the size and use of systems.

Tightness

An duct system will never be "completely tight". The system will normally have some leaks at joints between ducts and fittings. The leakage will also increase as the pressure difference between the in- and outside of the duct sides increases.

The leakage factor in (l/s)/m² is always specified in relation to the pressure difference in Pa. (The unit (l/s)/m² denotes the leakage flow in l/s in or out of the system in relation to its duct area in m².) The graph below shows the leakage factor for the sealing classes A–D as a function of the pressure difference.



The graph shows that sealing class D is 3 times better than class C, which in turn is 3 times better than class B etc. Class D thus entails demands on not only the seal moulding but also the fittings and how well the system is installed.

This is one reason why we have given all fittings a turned-over edge and have given still more fittings a stop bead. This gives us stable products which are better suited to withstand handling on site at the same time as the risk of skewed assembly falls.

Negative pressure

At big negative pressure there is a risk for a ventilation system to collapse. This risk is greater the bigger dimensions you have. In order to increase the strength of the ducts you can e.g. increase their sheet metal thickness. This is a simple way but the effect is rather small. It exists other ways with higher result. For bigger dimensions then the ducts may be stronger than the fittings. In order to increase the strength of the fittings other ways than thicker sheet metal thickness are more suitable. We can, as special, deliver duct systems that can withstand at least 5000 Pa negative pressure.

SECTION

3

Installation

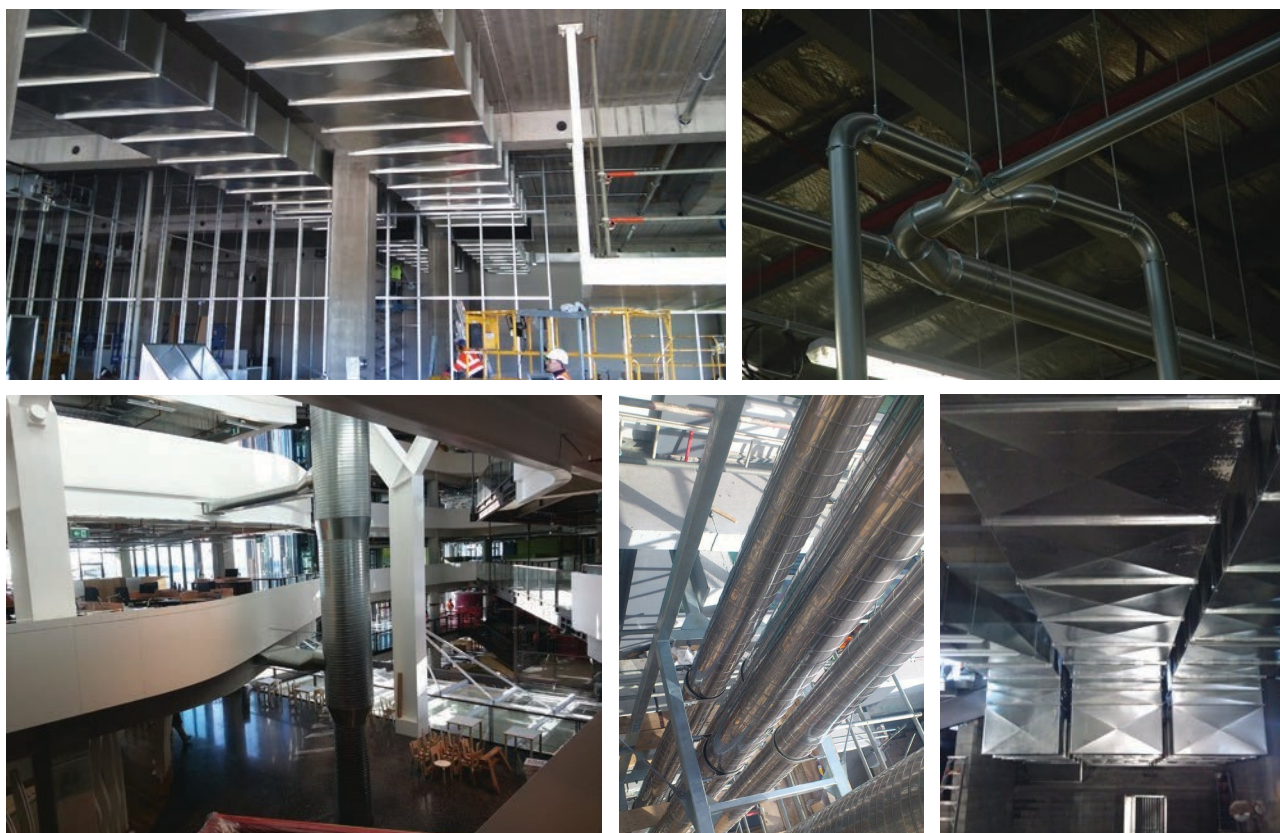


Express Sheet Metals Installation

ARLO Express Sheetmetals has built up the most sought after Installation Team in New Zealand! With approximately 30 installation experts, the team is qualified, experienced, reputable, friendly, and highly trained. We continually run competency training for employees and have implemented rigorous health and safety measures.

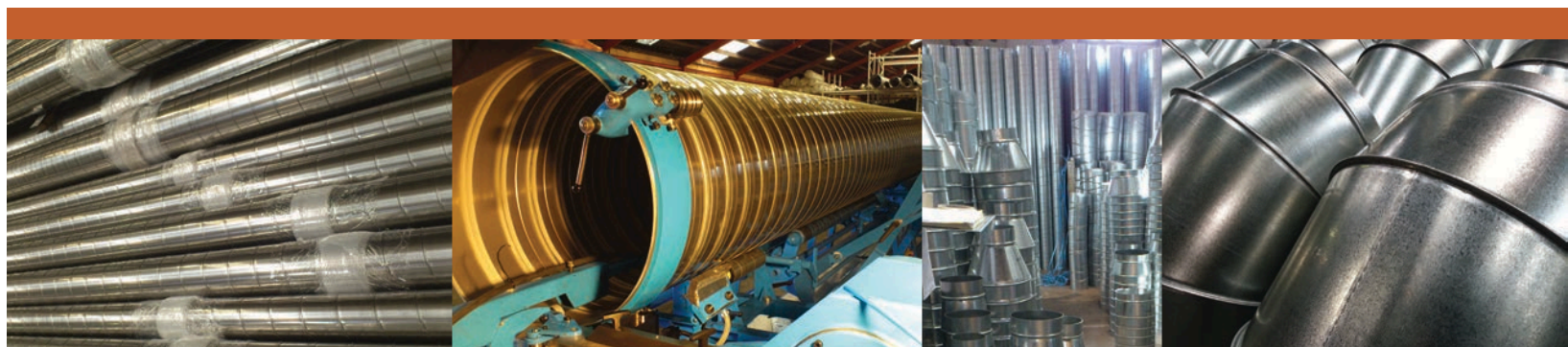
ARLO Express Sheetmetals believes in the 'Customer Satisfaction' ethos, and proves so by holding high training standards as evidenced by our membership of Site Safe and Site Wise (www.sitesafe.org.nz/) and accreditation by ACC for Workplace Safety Management Practices (www.acc.co.nz/for-business/small-medium-and-large-business/how-to-pay-less/workplace-safety-management-practices/index.htm).

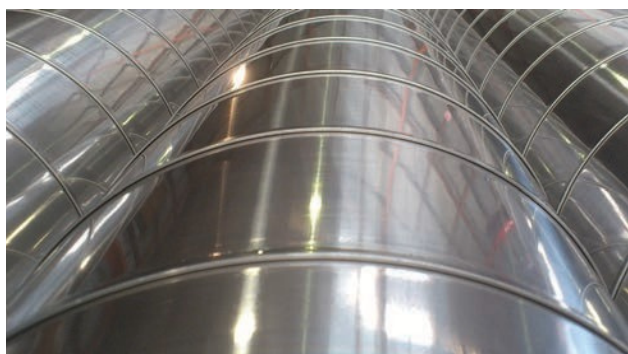
ARLO Express Sheetmetals is affiliated with Competenz – Skills for Industry (www.competenz.org.nz/), and believes in offering skilled training for local Kiwis



SECTION 4

Products





Ordering information

G= Galvanised A=Aluminium

S= Stainless304 M=Stainless 316

		SPD	G	3	Ø150
Code	_____	_____	_____	_____	_____
material	_____	_____	_____	_____	_____
length	_____	_____	_____	_____	_____
Ødia	_____	_____	_____	_____	_____

Spiral Duct / Spiro Pipe

Circular spiral lock seamed pipe Certified manufacturing process for air tight guarantee Rigid construction with no unwinding when cut Stamped and dimple locked with Spiro and Express certification Can be produced with or without corrugation on request Standard length is 3m but any lengths can be made to suit specific orders sizes range from Ø100mm-Ø2500mm Stainless pipes are in 304 2B grade (grade 316 requires a minimum order qty)

Technical data refer Section 6



Ordering information

		FB	90	Ø250
Code	_____	_____	_____	_____
Angle	_____	_____	_____	_____
Ødia	_____	_____	_____	_____

Fixed Bends 90deg and 45deg

Seam locked bend with a fixed angle
solid construction and superior stitch welded seams
Rubber gasket fitted as standard
45deg and 90deg Standard sizes range from Ø125mm-Ø1250mm
Item can be custom made to suit any angle or radius on request

Technical data refer Section 6



Ordering information

Code _____ PB 90 Ø150
Angle _____
Ødia _____

Pressed bends 90deg and 45deg

Fixed angle bend that has a smooth curved flow

Stitch welded seam

Rubber gasket fitted as standard

Standard sizes range from 100mm-180mm

Technical data refer Section 6



Ordering information

Code _____ SAB 90 Ø200
Angle _____
Ødia _____

Adjustable Bends

Circular bend that can be easily adjusted to make various angles

45deg comes with 3 segments - 90deg comes with 4 segments

Not recommended for use in air tight systems

Sizes range from Ø100mm-Ø400mm

Technical data refer Section 6



Ordering information

RED Ø300 Ø200

Code	_____
Ødia ₁	_____
Ødia ₂	_____

Reducer

Equal tapered reducer to join 2 different sized spiro pipes together

Ball swaged connector joints for solid air tight construction

Stitch welded seams

Rubber gasket fitted as standard

Standard sizes range from Ø100mm-Ø1250mm

This item can be custom manufactured to any size

Technical data refer Section 6



Ordering information

FB 135 Ø250

Code	_____
Angle	_____
Ødia	_____

Fixed Bend 135deg

Seam locked swan neck bend

Bird mesh fitted on 1 end

Solid construction and superior stitch welded seams

Standard sizes range from Ø125mm-Ø1250mm

Item can be custom made to suit any angle or radius on request

Technical data refer Section 6



Ordering information

EC Ø200

Code _____

Ødia _____

End Cap

Seam locked end cap Hassle free installation

Rubber gasket fitted as standard

Standard sizes range from Ø100mm-Ø1250mm

This item can be custom manufactured to any size

Technical data refer Section 6



Ordering information

ID Ø250

Code _____

Ødia _____

Inline Damper

Manual adjustment volume control damper

connects into spiro pipe

Solid construction

Rubber gasket fitted as standard

Standard sizes range from Ø100mm-Ø600mm

Technical data refer Section 6



Ordering information

Code _____ J Ø250
Ødia _____

Spiro Joiner (Male)

Internal connector used to join 2 spiro pipes together

Rubber gasket fitted as standard

Standard sizes range from Ø100mm-Ø1250mm

This item can be custom manufactured to any size on request

Technical data refer Section 6



Ordering information

Code _____ JE Ø300
Ødia _____

Spiro Joiner (Female)

External connector used to join 2 fittings together

Fits over rubber gasket as standard

Standard sizes range from Ø100mm-Ø1250mm

Technical data refer Section 6



Ordering information

FTOS 90 Ø250

Code

Angle

Ødia

Flat Take Off Shoe 90deg

Circular shoe type spigot attached to a flat plate

Standard sizes range from Ø100mm-Ø1250mm

This item can be custom manufactured to any size

Fitted with rubber gasket on request

Technical data refer Section 6



Ordering information

FTOSD 90 Ø350

Code

Angle

Ødia

Flat Take Off Shoe 90deg with Balancing Damper

Circular shoe type spigot with damper control attached to a flat plate

Standard sizes range from Ø100mm-Ø600mm

This item can be custom manufactured to any size

Fitted with rubber gasket on request

Technical data refer Section 6



Ordering information

Code _____ FTO 90 Ø250
Angle _____
Ødia _____

Flat Take Off 90deg

Circular shoe type spigot attached to a flat plate

Standard sizes range from Ø100mm-Ø1250mm

This item can be custom manufactured to any size

Fitted with rubber gasket on request

Technical data refer Section 6



Ordering information

Code _____ FTOD 90 Ø350
Angle _____
Ødia _____

Flat Take Off 90deg with Balancing Damper

Circular shoe type spigot with damper control attached to a flat plate

Standard sizes range from Ø100mm-Ø600mm

This item can be custom manufactured to any size

Fitted with rubber gasket on request

Technical data refer Section 6



Ordering information

STOS90 Ø150 Ø300

Code _____
Ødia 1 _____
Ødia 2 _____

Saddle Take Off Shoe 90deg

Shoe type branch fitted onto a saddle plate at 90deg for attaching to Spiro pipe

Item can be ordered with various dimensions of branch and pipe

Standard branch sizes range from Ø100mm-Ø600mm

This item can be custom manufactured to any size

Fitted with rubber gasket on request

Technical data refer Section 6



Ordering information

STOSD90 Ø150 Ø300

Code _____
Ødia 1 _____
Ødia 2 _____

Saddle Take Off Shoe 90deg with Balancing Damper

Shoe type branch with damper fitted onto a saddle plate at 90deg for attaching to Spiro pipe

Item can be ordered with various dimensions of branch and pipe

Standard branch sizes range from Ø100mm-Ø600mm

This item can be custom manufactured to any size

Fitted with rubber gasket on request

Technical data refer Section 6



Ordering information

STOD90 Ø150 Ø300

Code

Ødia₁

Ødia

Saddle Take Off 90deg with Balancing Damper

Straight branch with damper fitted onto a saddle plate at 90deg for attaching to Spiro pipe

Item can be ordered with various dimensions of branch and pipe

Standard branch sizes range from Ø100mm-Ø600mm

This item can be custom manufactured to any size

Fitted with rubber gasket on request

Technical data refer Section 6



Ordering information

STO90 Ø200 Ø350

Code

Ødia₁

Ødia₂

Saddle Take Off 90deg

Angled branch fitted onto a saddle plate at 90deg for attaching to Spiro pipe

Item can be ordered with various dimensions of branch and pipe

Standard branch sizes range from Ø100mm-Ø600mm

This item can be custom manufactured to any size

Fitted with rubber gasket on request

Technical data refer Section 6



Ordering information

STO45 Ø200 Ø300

Code

Ødia₁

Ødia₂

Saddle Take Off 45deg

Angled branch fitted onto a saddle plate at 45deg for attaching to Spiro pipe

Item can be ordered with various dimensions of branch and pipe

Standard branch sizes range from Ø100mm-Ø600mm

This item can be custom manufactured to any size

Fitted with rubber gasket on request

Technical data refer Section 6



Ordering information

STOD45 Ø200 Ø300

Code

Ødia₁

Ødia₂

Saddle Take Off 45deg with Balancing Damper

Angled branch with damper fitted onto a saddle plate at 45deg for attaching to Spiro pipe

Item can be ordered with various dimensions of branch and pipe

Standard branch sizes range from Ø100mm-Ø600mm

This item can be custom manufactured to any size

Fitted with rubber gasket on request

Technical data refer Section 6



Ordering information

Code _____ FTO 45 Ø250
Angle _____
Ødia _____

Flat Take Off 45deg

Circular spigot attached to a flat plate

Fitted with rubber gasket on request

Standard sizes range from Ø100mm-Ø600mm

This item can be custom manufactured to any size

Technical data refer Section 6



Ordering information

Code _____ FTOD 45 Ø350
Angle _____
Ødia _____

Flat Take Off 45deg with Balancing Damper

Circular spigot with damper control attached to a flat plate

Standard sizes range from Ø100mm-Ø600mm

This item can be custom manufactured to any size

Fitted with rubber gasket on request

Technical data refer Section 6



Ordering information

T Ø250

Code _____

Ødia _____

T Section

Standard Tee section with 3 equal connectors

Solid construction

Rubber gasket fitted as standard

Standard sizes range from Ø100mm-Ø600mm

Technical data refer Section 6



Ordering information

TC Ø250 Ø150 Ø150

Code _____

Ødia₁ _____

Ødia₂ _____

Ødia₃ _____

T Combined

Tee section with tapered sides for improved airflow

Solid construction

Item can be manufactured with various connector dimensions

Rubber gasket fitted as standard

Standard sizes range from Ø100mm-Ø600mm

Technical data refer Section 6



Ordering information

Y Ø250

Code _____

Ødia _____

Y Section Equal

Standard Y section with 3 equal connectors

Item can be made equal or

Solid construction

Rubber gasket fitted as standard

Standard sizes range from Ø100mm-Ø600mm

Technical data refer Section 6



Ordering information

YU Ø250 Ø150 Ø150

Code _____

Ødia₁ _____

Ødia₂ _____

Ødia₃ _____

Y Section Unequal

Unequal Y section with 3 varying sized connectors

Solid construction

Rubber gasket fitted as standard

Standard sizes range from Ø100mm-Ø600mm

Item can be custom manufactured with various end size combinations

Technical data refer Section 6



Ordering information

Code types- P=Plain I=Insulated A=Accoustic

FD A Ø250

Code

Type

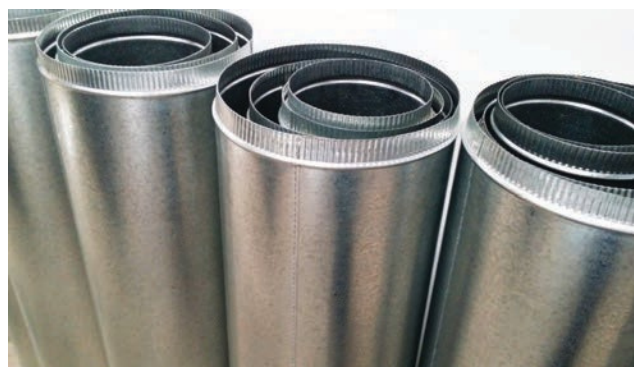
Ødia

Flexible Ducting

Available as plain, insulated or accoustically insulated

Comes in 3m and 6m lengths as standard

Technical data refer Section 6



Ordering information

G= Galvanised SS= Stainless

RP G Ø250

Code

Material

Ødia

Rolled Pipe

Circular rolled pipe with stitch welded seam

Ball swaged and crimped 1 end

Fitted with rubber gasket on request

Standard length is 1200mm

Standard sizes range from Ø100mm-Ø600mm

Technical data refer Section 6



Ordering information

WC Ø250

Code _____

Ødia _____

Weather Cowl

Circular weather cowl

Lightweight solid construction

Birdmesh fitted on request

Technical data refer Section 6



Ordering information

WCAD Ø250

Code _____

Ødia _____

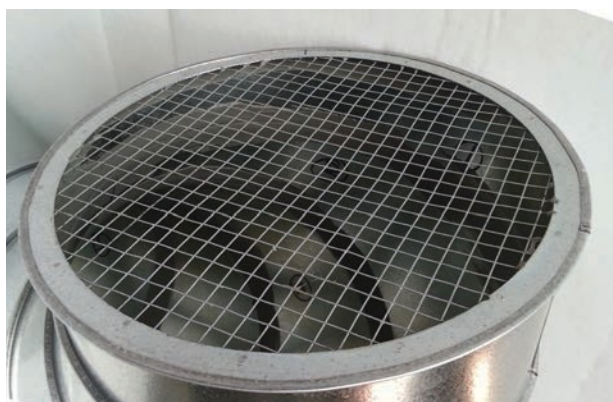
Weather Cowl Anti Downdraft

Circular weather cowl fitted with external wind shield

Lightweight solid construction

Birdmesh fitted on request

Technical data refer Section 6



Ordering information

Code _____ ECBM Ø200
 Ødia _____

End Cap with Bird Mesh

Seam locked end cap with 10x10 bird mesh

Hassle free installation

Standard sizes range from Ø100mm-Ø600mm

This item can be custom manufactured to any size

Technical data refer Section 6



Ordering information

G= Galvanised A=Aluminium

Code _____ DP G Ø1250
 material _____
 Ødia _____

Culvert / Duraduct

Heavy duty pipes design for underground purposes Extra large ball swage

corrugation ensures pipes are extremely rigid Manufactured with specialised long

life materials Available in steel or Aluminium Can be produced with or without

corrugation on request Various fittings can be custom made to suit projects

Standard sizes range from Ø300mm-Ø2100mm

Technical data refer Section 6



Stainless Steel Products

The majority of our catalogue parts can be manufactured in stainless steel

Rubber gasket is also available on stainless products

Technical data refer Section 6



Oval Ducting

Ovalised spiro ducting and fittings can be custom manufactured on request

Photo: ASB Head Office project

Technical data refer Section 6

SECTION 5

Our Projects





Our Projects

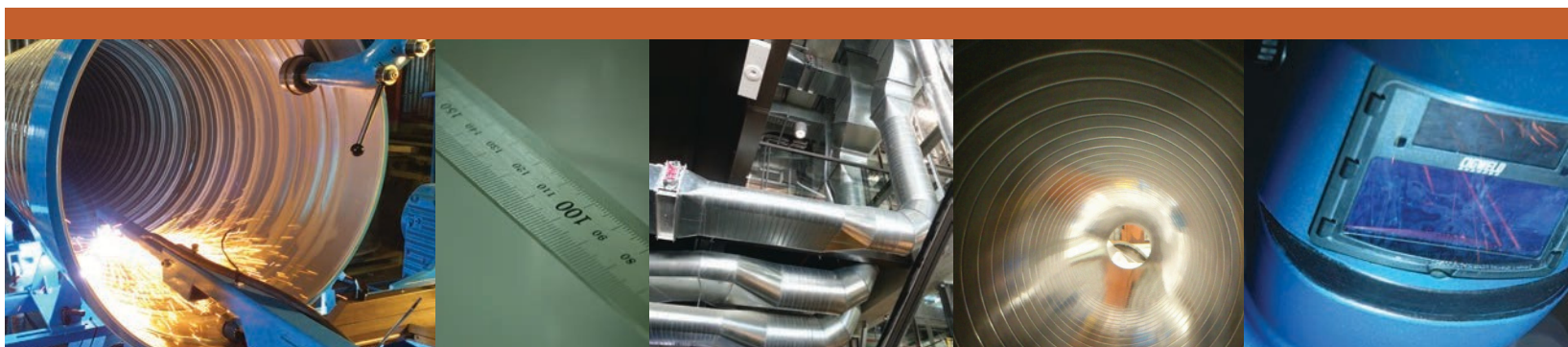
- Te Kaha, Christchurch Stadium
- Auckland Airport
- NZ International Convention Centre
- Waitakere Hospital
- ASB Headquarters North wharf
- The Cloud, Queens Wharf
- ASB Lincoln road
- ASB Greenlane
- Auckland airport domestic terminal
- Auckland airport international terminal
- UOA Medical school
- Countdown, Stoddard road
- Fonterra Dairy plant's, NZ wide
- Fonterra headquarters, Wynard quarter
- Burger King, Auckland wide
- Z Energy, NZ wide
- Luna apartments
- The grand apartments
- LDS church, Auckland
- Botany town shopping centre
- Cadbury distribution, Auckland
- Cadbury factory, Dunedin
- UOA Sector 300
- West wave Aquatic centre
- Otahuhu recreation centre
- Nosh supermarket
- Westfield, Manukau
- Silvia park shopping mall
- Telecom towers, Auckland
- North shore hospital
- The Warehouse, NZ wide
- Pak n save, NZ wide
- New world, Howick
- NZ correction facility, Wiri
- NZ correction facility, Springhill
- NZ correction facility upgrade, Paremoremo
- Hobsonville point high school
- Hobsonville point primary school
- The Base mall, Terapa
- Hoyts cinema, Hamilton
- Whangarei court
- Whangarei police station
- Whangarei hospital
- North tech, Whangarei



SECTION

6

Technical Data



SPIRO SYSTEM GASKET

The SPIRO[®] System

Resistance of seal mouldings to various substances

The table below gives a basic guide to how the rubber is affected by various substances.

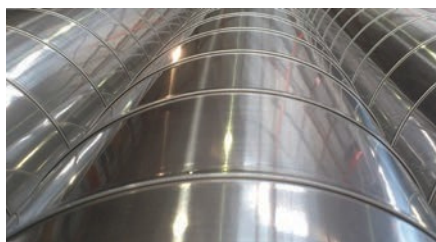
A figure for each type of rubber indicates its suitability.

- 4 Scarcely affected
- 3 Lightly affected
- 2 Strongly affected
- 1 Badly affected
- No information

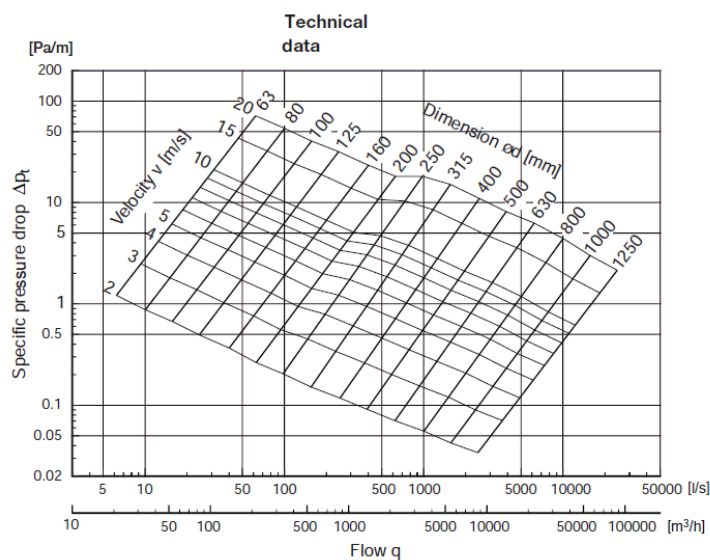
Recommended
Normally usable
Only useable in certain cases
Unsuitable

	EPDM	Silicone		EPDM	Silicone		EPDM	Silicone
A			Ethylene chloride	1	–	Oxalic acid	4	3
Acetaldehyde	4	4	Ethyl glycol, cellosolve	3	–	Ozone	4	4
Acetic acid dilute 30%	4	3	Ethyl chloride	4	1	Oxygen	4	4
crystalline acetic acid	4	3	Ethane, ethylene	1	–	P		
Acetic anhydride	3	2	F			Palmitic acid	3	–
Acetone	4	3	Fluoric silicate	4	2	Paraffin (kerosine)	1	1
Acetylene	3	3	Formic acid	4	2	Perchloroethylene	1	3
Aluminium salts (non-oxidizing)	4	4	Formaldehyde, formalin	4	–	Perchloric acid	3	1
Alun	4	4	Freon, see CFC	–	–	Petrol (gasoline), 65 octane	1	1
Ammonia, liquid	4	1	Furan, furfuran	2	–	Petrol (gasoline), 100 octane	1	1
Ammonia gas, cold	4	4	Furfural	3	–	Petroleum ether	1	1
Ammonia gas, hot 85 °C	3	3	G			Petroleum oils high aromatic content	1	1
Ammonium hydroxide, dil. ammonia	3	3	Glucose	4	4	low aromatic content	1	3
Ammonium salts (non-oxidising)	4	3	Glycerine, glycerol	4	4	Phenol	3	2
Amyl acetate	4	1	Green liquor, white liquor	4	3	Phosphoric acid 45%	4	1
Aniline	3	–	H			Phosphoric acid 85%	4	1
Aniline dyes	4	–	Heating oil	1	2	Plating solutions without chromium	4	3
Animal fats	2	3	Hydraulic oil, mineral oil based	1	3	Potassium hypochlorite,		
Arsenic acid	4	4	Hydraulic oil, phosphate ester based	4	4	pH 7 below 10 g/l	4	1
Asphalt	1	1	Hydrogen	4	4	over 10 g/l	3	1
B			Hydrogen peroxide 3%	4	4	Potassium hydroxide, potash	4	3
Barium salts (non-oxidizing)	4	4	30% 20 °C	4	4	Potassium salts (non-oxidizing)	4	3
Beer	4	4	90% 20 °C	2	4	Propane, LPG	1	1
Benzene, bensol	1	1	Hydrochloric acid dilute	4	1	Propanol, Propyl alcohol	4	4
Black liquor	1	–	conc 37% room temp	4	1	R		
Black water, waste water	4	3	conc 37% 70 °C	2	1	Radioactive radiation	3	2
Bleaching liquor, see Potassium hypochlorite			Hydrogen sulphide dry, room temp	4	4	Rape seed oil (canola oil)	4	4
Borax	4	3	damp, room temp	4	2	Rosin oil	1	1
Boric acid	4	4	damp, hot	3	1	S		
Bromide, liquid	–	1	Hydrofluosilicic acid	4	1	Salicylic acid	4	4
Bromic acid	4	1	Hydrofluoric acid 50%	4	1	Sodium salts (non-oxidizing)	4	4
Butane	1	4	Hydrofluoric acid, conc.	4	1	Sodium hydroxide, sodium hydrate	4	2
Butanol, butyl alcohol	4	3	I			Sodium hypochlorite max 10 g/l free Cl	4	–
Butter oils	1	1	Iodine	–	–	over 10 g/l free Cl	3	–
Butyl acetate	4	1	Iron salts (non-oxidizing)	4	3	Sugar solutions	4	4
C			L			Styrene	1	1
Caustic soda, sodium hydroxide	4	2	Lactic acid	4	4	Sulphur, melted	4	4
Calcium salts (non-oxidizing)	4	3	Lead salts (non-oxidizing)	4	2	Sulphur dioxide, dry gas	4	3
Cellosolve, ethylene glycol	3	–	Linseed oil	3	4	Sulphur chloride	1	–
Cellosolve acetate	3	–	Liquid manure	4	3	Sulphuric acid 60% room temp.	4	1
Chlorine gas dry	2	–	LPG (Propane/butane)	1	1	80% 50 °C	4	1
damp	2	–	M			60-75% 50 °C	3	1
Chlorine solutions 0,1 g/l free chlorine	4	–	Magnesium salts (non-oxidizing)	4	4	75-80% 50 °C	2	1
0,1-1 g/l free chlorine	4	–	Manganese salts (non-oxidizing)	4	4	85-98% 50 °C	1	1
1-10 g/l free chlorine	3	–	Mercury	4	4	fuming, Oleum	1	1
over 10 g/l free chlorine	2	–	Mercury salts (non-oxidizing)	4	4	Sulphurous acid	4	1
Chlorine sulphate acid	1	1	Methanol, methyl alcohol, wood alcohol	4	4	Sulphur trioxide, dry gas	3	2
Chromic acid	2	2	Methylene chloride	1	1	T		
CFC (e.g. Freon) 11	1	1	Methyl chloride	2	1	Tar	1	2
12	3	1	Methyl ethyl ketone MEK	4	–	Tannic acid	4	1
13	4	–	Methyl isobutyl ketone	3	2	Terpentine, terpenes	1	1
21	1	–	Methyl isopropyl ketone	3	2	Toluene, toluol	1	1
22	4	1	Milk	4	4	Trichlorethane, "thinner"	1	2
31	4	–	N			Transformer oil mineral oil based	1	3
32	4	–	Natural gas	1	4	chlorated hydrocarbon	1	1
112	1	–	Nickel salts (non-oxidizing)	4	4	V		
113	1	1	Nitrobenzene, Nitrobenzol	2	1	Vegetable oils	4	4
114	4	1	Nitric acid 20% room temp.	4	–	W		
115	4	–	20% 50 °C	3	1	Water fresh	4	4
Copper salts (non-oxidizing)	4	4	40% 50 °C	3	1	distilled	4	4
Citric acid	4	4	50% 50 °C	2	1	salt	4	4
D			60% room temp.	2	1	fresh & dist. 100 °C	4	2
Detergent	4	4	70% room temp.	1	1	White spirit (Dilutin)	1	1
Diesel oil	1	2	red fuming	1	1	Wine	4	4
Dilutin (White spirit)	1	1	Nitrogen	4	4	X		
Developing solutions	3	–	Nitrous gases	2	2	Xylene, xylol	1	1
E			O			Z		
Ethanol, ethyl alcohol	4	4	Olive oil	3	3	Zinc salts (non-oxidizing)	4	4
"Ether", diethyl ether, ethyl ether	2	–	Oleic acid	4	–			
Ethyl acetate	3	2						
Ethylene glycol	4	3						

SPIRO PIPE



Order code	End 1 Ød	Length (m)	Weight (kg)
SPDG3-100	100	3	3.9
SPDG3-125	125	3	4.9
SPDG3-150	150	3	5.8
SPDG3-180	180	3	7
SPDG3-200	200	3	7.7
SPDG3-225	225	3	8.7
SPDG3-250	250	3	9.7
SPDG3-275	275	3	12.2
SPDG3-300	300	3	13.1
SPDG3-350	350	3	15.2
SPDG3-400	400	3	17.5
SPDG3-450	450	3	27.7
SPDG3-500	500	3	30.8
SPDG3-550	550	3	33.8
SPDG3-600	600	3	36.9
SPDG3-650	650	3	39.9
SPDG3-700	700	3	43
SPDG3-750	750	3	46.1
SPDG3-800	800	3	49.2
SPDG3-850	850	3	64.8
SPDG3-900	900	3	68.6
SPDG3-950	950	3	72.5
SPDG3-1000	1000	3	76.2
SPDG3-1100	1100	3	83.9
SPDG3-1250	1250	3	117.5
SPDG3-1300	1300	3	122.3
SPDG3-1500	1500	3	182.9
SPDG3-1775	1775	3	277.8
SPDG3-2000	2000	3	313
SPDG3-2100	2100	3	328.7



SPIRO PIPE

Special versions

We can supply ducts with the following special designs:

- In intermediate dimensions.
- Extra tight, with nitrile rubber seal in the lock seam
- In other sheet metal thicknesses

Extra tight, with seam seal

When extremely good sealing is required in the spiral seam, the ducts can also be supplied with a special rubber seal in the seam.

This seal is very effective at stopping leakage of vegetable oils and greases, and most petroleum products including white spirit.

Other sheet metal thicknesses

If extra stability is needed in ducts, because of high negative pressure etc., they can be supplied with thicker sheet metal than standard. Remember that the thickness increase always reduces the inner diameter. Fittings for such special ducts must be specified separately and sometimes have to be made specially.

Reinforcement corrugations

Ducts of Ø250 mm and above are normally given stiffening corrugations to increase radial stiffness.

Strength

Positive pressure

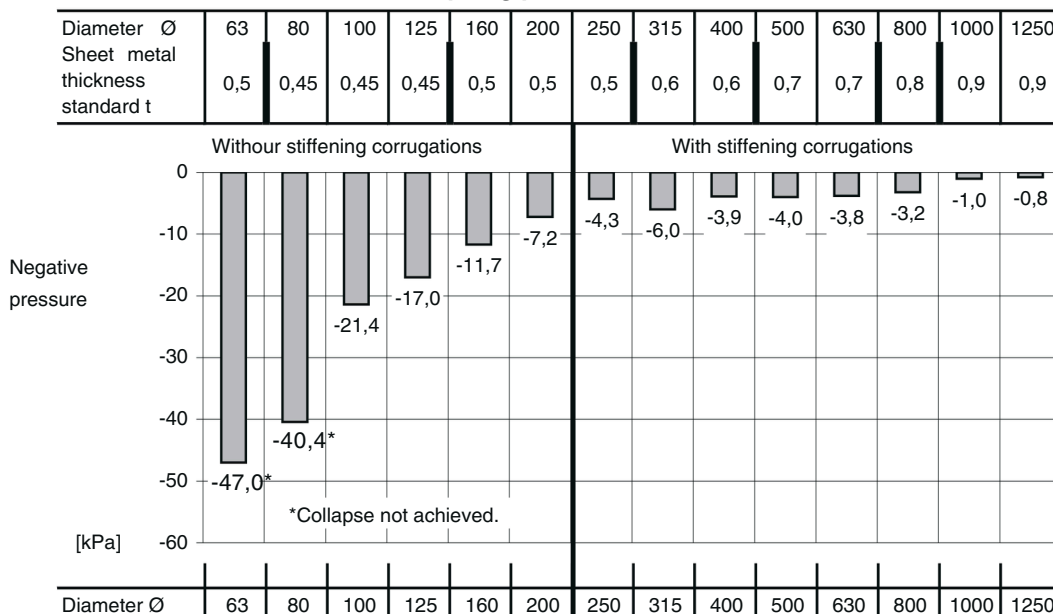
In case of high positive pressure, the seal moulding lips will first start to whistle. At considerably higher pressure, the joints between the ducts will be forced apart. If you manage to fix the connections very well, the ducts will burst at their seams at even higher pressure. The high pressures needed for this to happen are not relevant to ventilation installations.

Negative pressure

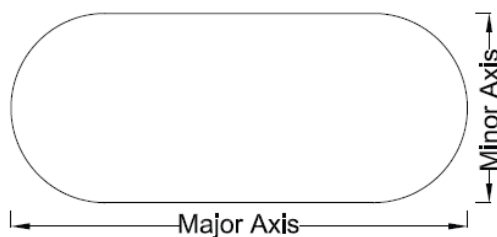
In installations with high negative pressure, there is a risk that the ducts could collapse.

This phenomenon is referred to as buckling, and can suddenly happen at the weakest point in the system. Buckling wanders along the duct, which can be completely flattened. The weakest point is frequently a "transport dent" on a duct. For this reason, only use undamaged ducts in systems which are close to the critical pressure!

Collapsing pressure for duct SR



SPIRO OVAL



Order code	Pipe Ød	Length (m)	Minor axis	Major axis	Weight (kg)
SPDOG3-150-389	300	3	150	389	13.1
SPDOG3-150-467	350	3	150	467	15.2
SPDOG3-150-547	400	3	150	547	17.5
SPDOG3-150-624	450	3	150	624	27.7
SPDOG3-150-703	500	3	150	703	30.8
SPDOG3-150-781	550	3	150	781	33.8
SPDOG3-150-860	600	3	150	860	36.9
SPDOG3-150-938	650	3	150	938	39.9
SPDOG3-150-1017	700	3	150	1017	43
SPDOG3-150-1092	750	3	150	1092	46.1
SPDOG3-150-1175	800	3	150	1175	49.2

SPDOG3-200-441	350	3	200	441	15
SPDOG3-200-519	400	3	200	519	18
SPDOG3-200-597	450	3	200	597	28
SPDOG3-200-672	500	3	200	672	31
SPDOG3-200-754	550	3	200	754	34
SPDOG3-200-832	600	3	200	832	37
SPDOG3-200-911	650	3	200	911	40
SPDOG3-200-990	700	3	200	990	43
SPDOG3-200-1068	750	3	200	1068	46
SPDOG3-200-1147	800	3	200	1147	49

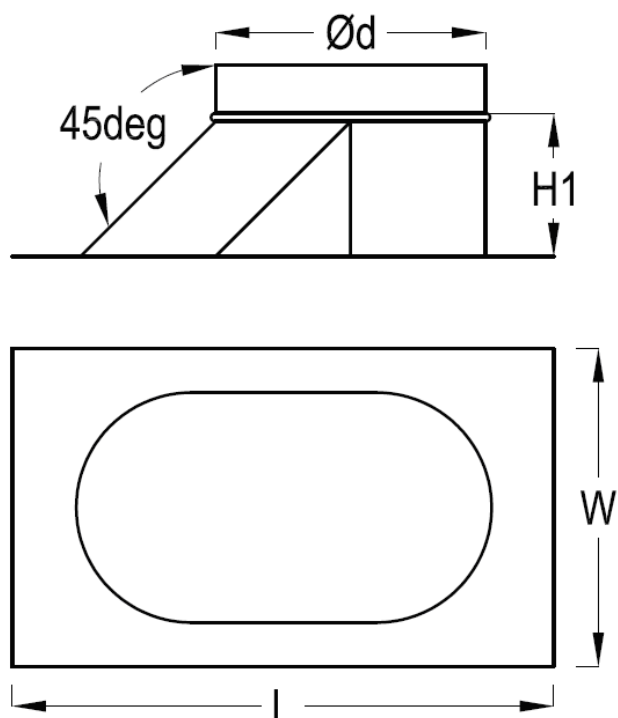
SPDOG3-250-488	400	3	250	488	18
SPDOG3-250-568	450	3	250	568	28
SPDOG3-250-644	500	3	250	644	31
SPDOG3-250-724	550	3	250	724	34
SPDOG3-250-804	600	3	250	804	37
SPDOG3-250-881	650	3	250	881	40
SPDOG3-250-961	700	3	250	961	43
SPDOG3-250-1040	750	3	250	1040	46
SPDOG3-250-1118	800	3	250	1118	49

SPDOG3-300-460	400	3	300	460	18
SPDOG3-300-539	450	3	300	539	28
SPDOG3-300-615	500	3	300	615	31
SPDOG3-300-696	550	3	300	696	34
SPDOG3-300-775	600	3	300	775	37
SPDOG3-300-853	650	3	300	853	40
SPDOG3-300-949	700	3	300	949	43
SPDOG3-300-1010	750	3	300	1010	46
SPDOG3-300-1091	800	3	300	1091	49

SPDOG3-350-510	450	3	350	510	28
SPDOG3-350-587	500	3	350	587	31
SPDOG3-350-667	550	3	350	667	34
SPDOG3-350-747	600	3	350	747	37
SPDOG3-350-824	650	3	350	824	40
SPDOG3-350-920	700	3	350	920	43
SPDOG3-350-981	750	3	350	981	46
SPDOG3-350-1062	800	3	350	1062	49

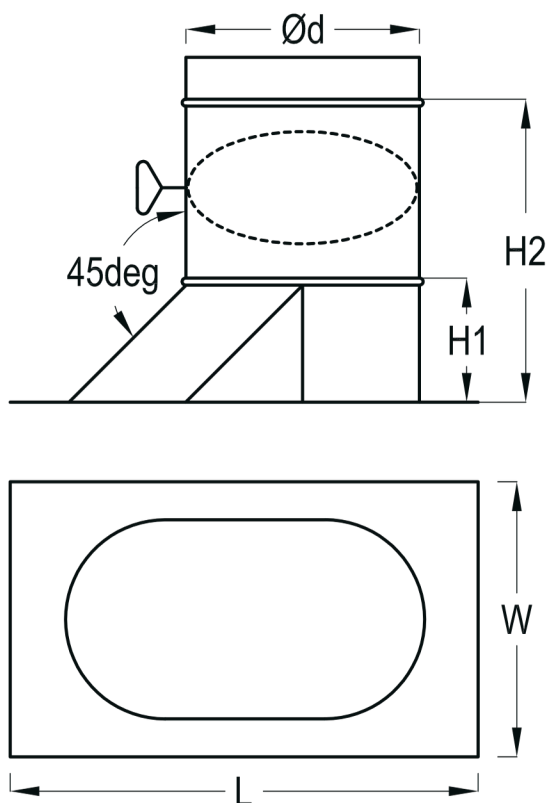
SPDOG3-400-639	550	3	400	639	34
SPDOG3-400-718	600	3	400	718	37
SPDOG3-400-796	650	3	400	796	40
SPDOG3-400-892	700	3	400	892	43
SPDOG3-400-953	750	3	400	953	46
SPDOG3-400-1034	800	3	400	1034	49

Flat Take off Shoe 90



Order code	End 1 Ød	Height	Plate length	Plate width	Weight (kg)
FTOS90-100	100	100	250	200	0.5
FTOS90-125	125	100	275	225	0.6
FTOS90-150	150	100	350	250	0.8
FTOS90-180	180	100	380	280	0.9
FTOS90-200	200	100	400	300	1
FTOS90-225	225	100	425	325	1.1
FTOS90-250	250	100	450	350	1.3
FTOS90-275	275	100	475	375	2.1
FTOS90-300	300	100	500	400	2.2
FTOS90-350	350	100	555	450	2.6
FTOS90-400	400	100	600	500	3
FTOS90-450	450	125	725	575	4
FTOS90-500	500	125	775	625	4.4
FTOS90-550	550	125	825	675	6.6
FTOS90-600	600	125	875	725	7.2
FTOS90-650	650	150	950	800	8.6
FTOS90-700	700	150	1000	850	9.2
FTOS90-750	750	150	1050	900	9.9
FTOS90-800	800	150	1200	1000	12.8
FTOS90-850	850	150	1250	1050	13.6
FTOS90-900	900	150	1300	1100	14.5
FTOS90-950	950	150	1350	1150	15.3
FTOS90-1000	1000	150	1400	1200	16.1
FTOS90-1100	1100	200	1500	1300	22
FTOS90-1250	1250	200	1650	1450	25.2

Flat Take off Shoe 90 with damper



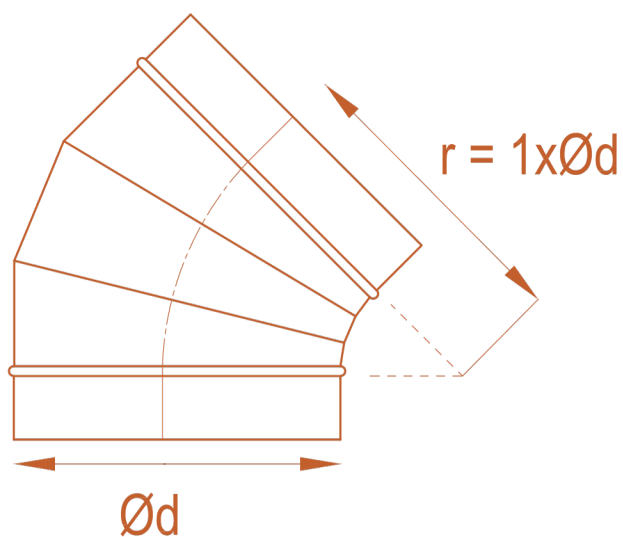
Order code	End 1 Ød	Height 1	Height 2	Plate length	Plate width	Weight (kg)
FTOSD90-100	100	100	157	250	150	0.5
FTOSD90-125	125	100	157	275	175	0.5
FTOSD90-150	150	100	170	350	250	0.6
FTOSD90-180	180	100	190	380	280	0.7
FTOSD90-200	200	100	205	400	300	0.8
FTOSD90-225	225	100	224	425	325	0.9
FTOSD90-250	250	100	243	450	350	0.9
FTOSD90-275	275	100	240	475	375	1.5
FTOSD90-300	300	100	259	500	400	1.6
FTOSD90-350	350	100	297	555	455	1.8
FTOSD90-400	400	100	334	600	500	2.1
FTOSD90-450	450	125	397	675	550	2.9
FTOSD90-500	500	125	434	725	600	3.2
FTOSD90-550	550	125	452	775	660	4.4
FTOSD90-600	600	125	489	825	700	4.8

End Cap

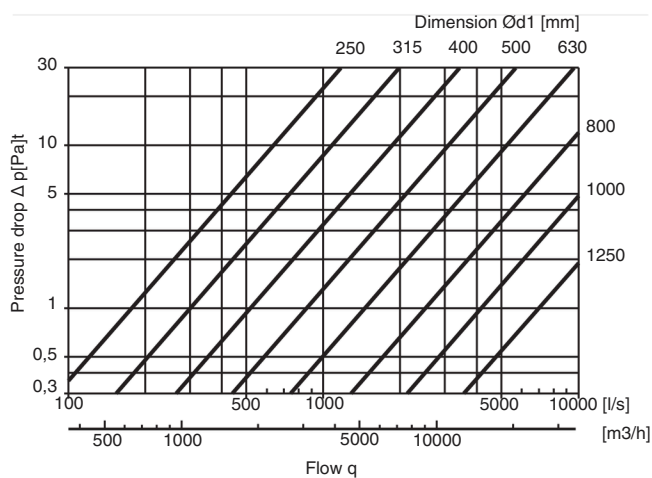


Order code	End 1 Ød	Weight(kg)
EC100	100	0.2
EC125	125	0.2
EC150	150	0.3
EC180	180	0.3
EC200	200	0.4
EC225	225	0.4
EC250	250	0.5
EC275	275	1.1
EC300	300	1.2
EC350	350	1.5
EC400	400	1.8
EC450	450	2.2
EC500	500	2.5
EC550	550	4.2
EC600	600	4.8
EC650	650	5.4
EC700	700	6
EC750	750	6.7
EC800	800	7.4
EC850	850	8.1
EC900	900	8.9
EC950	950	9.7
EC1000	1000	10.5
EC1100	1100	15.1
EC1250	1250	18.6

Fixed Bend 30

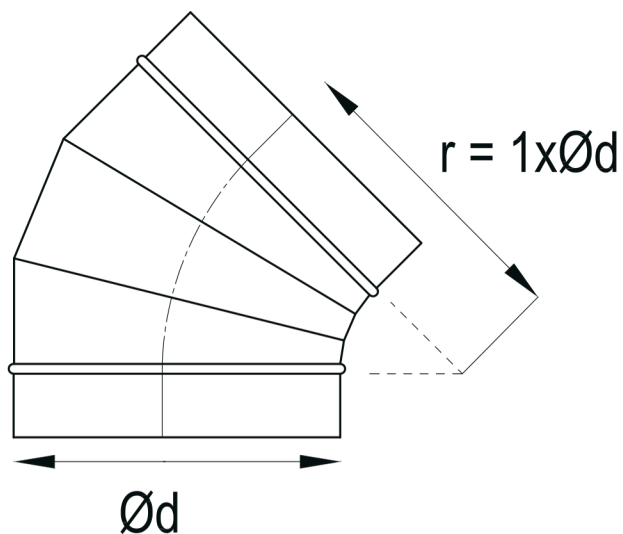


Technical data

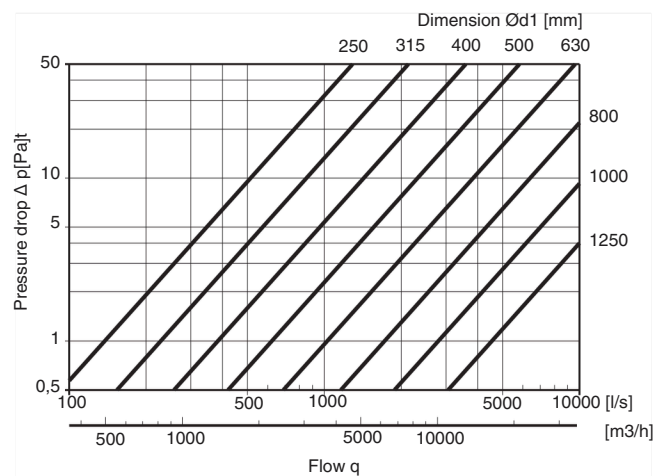


Order code	End 1 Ød	Angle	Weight (kg)
FB30-125	125	30°	0.5
FB30-150	150	30°	0.6
FB30-180	180	30°	0.8
FB30-200	200	30°	0.9
FB30-225	225	30°	1
FB30-250	250	30°	1.1
FB30-275	275	30°	1.3
FB30-300	300	30°	2.1
FB30-350	350	30°	2.2
FB30-400	400	30°	2.6
FB30-450	450	30°	3
FB30-500	500	30°	4
FB30-550	550	30°	4.4
FB30-600	600	30°	6.6
FB30-650	650	30°	7.2
FB30-700	700	30°	8.6
FB30-750	750	30°	9.2
FB30-800	800	30°	9.9
FB30-850	850	30°	12.8
FB30-900	900	30°	13.6
FB30-950	950	30°	14.5
FB30-1000	1000	30°	15.3
FB30-1100	1100	30°	16.1
FB30-1250	1250	30°	22

Fixed Bend 45

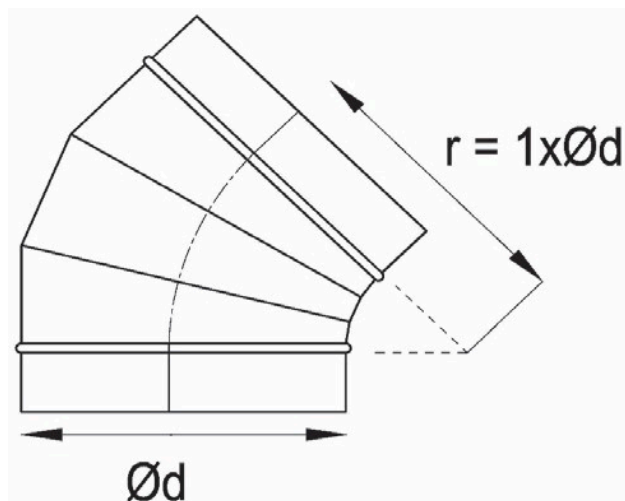


Technical data

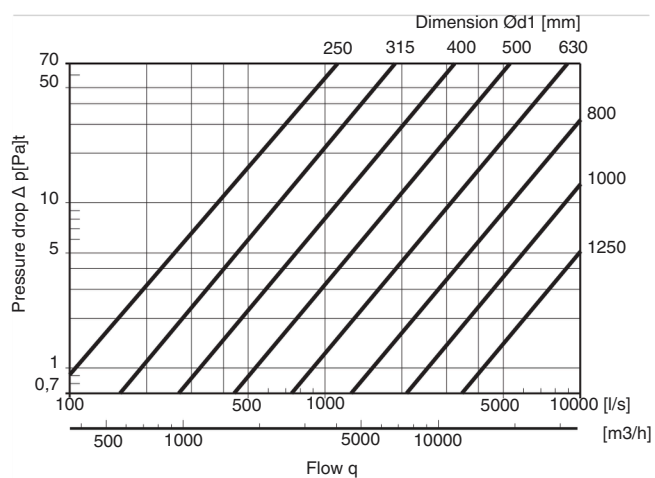


Order code	End 1 Ød	Angle	Weight (kg)
FB45-125	125	45°	0.5
FB45-150	150	45°	0.6
FB45-180	180	45°	0.8
FB45-200	200	45°	1
FB45-225	225	45°	1.1
FB45-250	250	45°	1.3
FB45-275	275	45°	2.2
FB45-300	300	45°	2.6
FB45-350	350	45°	3.3
FB45-400	400	45°	4.2
FB45-450	450	45°	5
FB45-500	500	45°	6
FB45-550	550	45°	9
FB45-600	600	45°	10.5
FB45-650	650	45°	12.1
FB45-700	700	45°	13.6
FB45-750	750	45°	15.3
FB45-800	800	45°	17.2
FB45-850	850	45°	19.1
FB45-900	900	45°	21.1
FB45-950	950	45°	24.3
FB45-1000	1000	45°	26.6
FB45-1100	1100	45°	39
FB45-1250	1250	45°	48.9

Fixed Bend 60



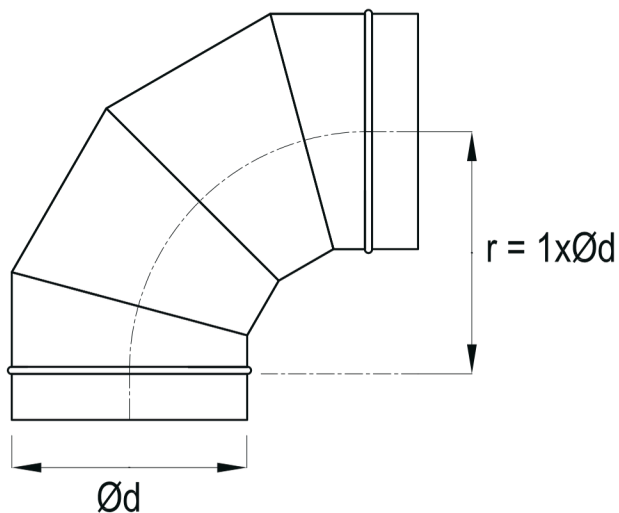
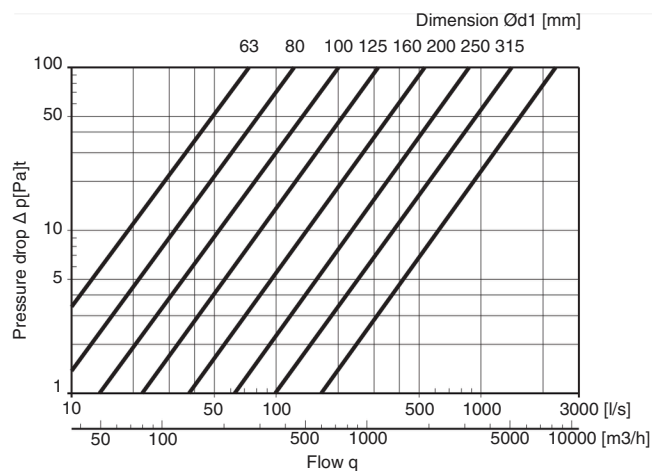
Technical data



Order code	End 1 Ød	Angle	Weight (kg)
FB60-125	125	60°	0.5
FB60-150	150	60°	0.7
FB60-180	180	60°	0.9
FB60-200	200	60°	1.1
FB60-225	225	60°	1.3
FB60-250	250	60°	1.5
FB60-275	275	60°	2.6
FB60-300	300	60°	3.1
FB60-350	350	60°	4
FB60-400	400	60°	5.1
FB60-450	450	60°	6.2
FB60-500	500	60°	7.4
FB60-550	550	60°	11.4
FB60-600	600	60°	13.3
FB60-650	650	60°	15.4
FB60-700	700	60°	17.4
FB60-750	750	60°	19.6
FB60-800	800	60°	22
FB60-850	850	60°	24.6
FB60-900	900	60°	27.2
FB60-950	950	60°	32.1
FB60-1000	1000	60°	35.1
FB60-1100	1100	60°	51.7
FB60-1250	1250	60°	64.9

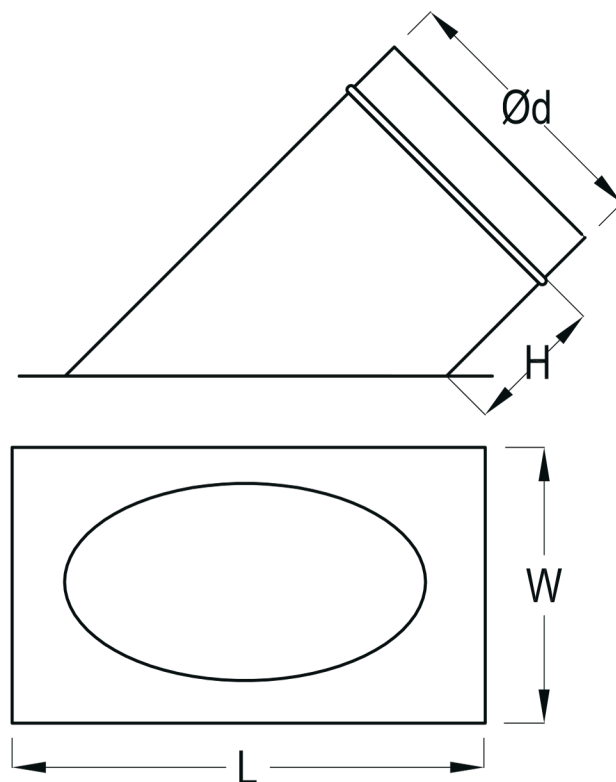
Fixed Bend 90

Technical data



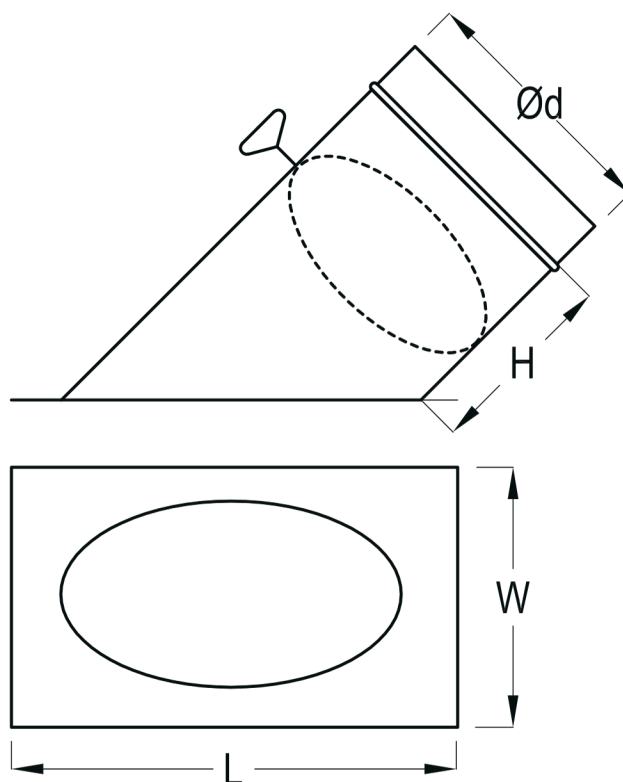
Order code	End 1 $\varnothing d$	Angle	Weight (kg)
FB90-125	125	90°	0.7
FB90-150	150	90°	0.9
FB90-180	180	90°	1.2
FB90-200	200	90°	1.4
FB90-225	225	90°	1.7
FB90-250	250	90°	2.1
FB90-275	275	90°	3.6
FB90-300	300	90°	4.3
FB90-350	350	90°	5.5
FB90-400	400	90°	7
FB90-450	450	90°	8.6
FB90-500	500	90°	10.4
FB90-550	550	90°	15.8
FB90-600	600	90°	18.5
FB90-650	650	90°	21.5
FB90-700	700	90°	24.5
FB90-750	750	90°	27.7
FB90-800	800	90°	31.1
FB90-850	850	90°	34.9
FB90-900	900	90°	38.7
FB90-950	950	90°	44.9
FB90-1000	1000	90°	49.2
FB90-1100	1100	90°	72.8
FB90-1250	1250	90°	91.9

Flat Take off 45



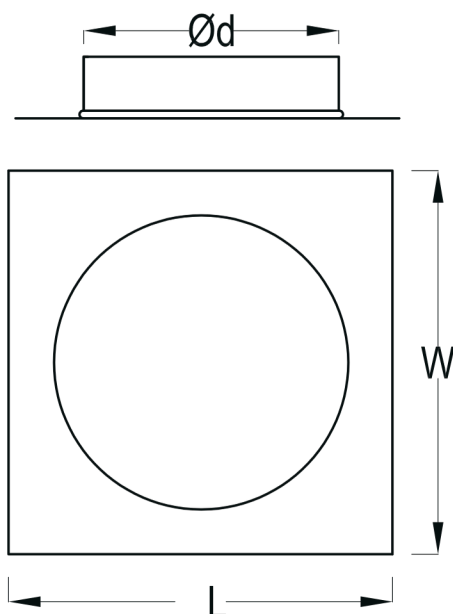
Order code	End 1 Ød	Height	Plate length	Plate width	Weight (kg)
FTO45-100	100	100	200	150	0.4
FTO45-125	125	100	237.5	175	0.5
FTO45-150	150	100	275	200	0.6
FTO45-180	180	100	320	230	0.7
FTO45-200	200	100	350	250	0.9
FTO45-225	225	100	375	275	1
FTO45-250	250	100	475	350	1.4
FTO45-275	275	100	500	375	2.5
FTO45-300	300	100	550	400	2.8
FTO45-350	350	100	625	450	3.5
FTO45-400	400	100	700	500	4.2
FTO45-450	450	125	775	550	5
FTO45-500	500	125	850	600	5.9
FTO45-550	550	125	940	660	8.6
FTO45-600	600	125	1000	700	9.7
FTO45-650	650	150	1075	750	11.9
FTO45-700	700	150	1165	810	13.5
FTO45-750	750	150	1225	850	14.9
FTO45-800	800	150	1300	900	16.5
FTO45-850	850	150	1375	950	18.2
FTO45-900	900	150	1450	1050	20.5
FTO45-950	950	150	1525	1100	22.4
FTO45-1000	1000	150	1600	1150	24.4
FTO45-1100	1100	200	1800	1250	35.9
FTO45-1250	1250	200	2025	1400	44.4

Flat Take off 45 with Damper



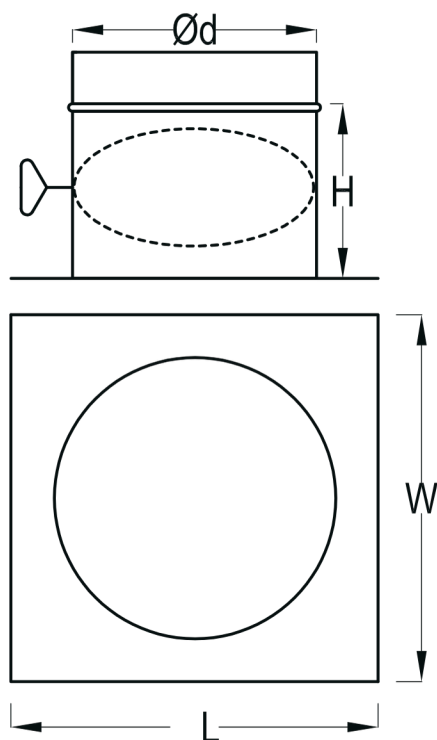
Order code	End 1 Ød	Height	Plate length	Plate width	Weight (kg)
FTOD45-100	100	100	200	150	0.4
FTOD45-125	125	100	237.5	175	0.5
FTOD45-150	150	100	275	200	0.7
FTOD45-180	180	100	320	230	0.9
FTOD45-200	200	100	350	250	1
FTOD45-225	225	100	375	275	1.3
FTOD45-250	250	100	475	350	1.7
FTOD45-275	275	100	500	375	2.9
FTOD45-300	300	100	550	400	3.4
FTOD45-350	350	100	625	450	4.4
FTOD45-400	400	100	700	500	5.5
FTOD45-450	450	125	775	550	6.7
FTOD45-500	500	125	850	600	8
FTOD45-550	550	125	940	660	11.8
FTOD45-600	600	125	1000	700	13.6

Flat Take off 90



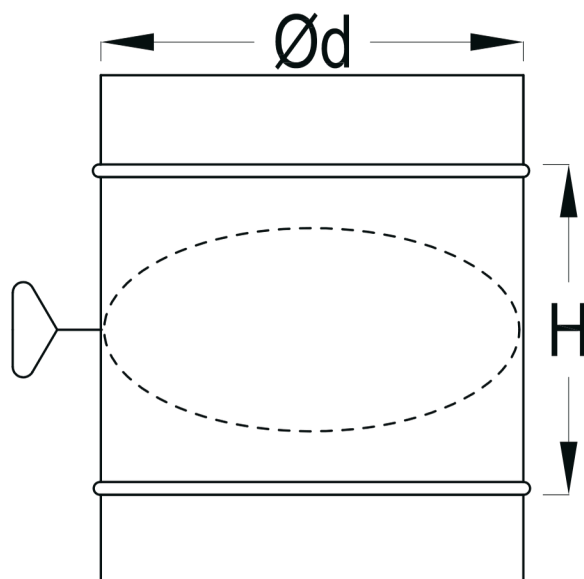
Order code	End 1 $\varnothing d$	Plate length	Plate width	Weight (kg)
FTO90-100	100	150	150	0.3
FTO90-125	125	175	175	0.3
FTO90-150	150	250	250	0.4
FTO90-180	180	280	280	0.5
FTO90-200	200	300	300	0.7
FTO90-225	225	325	325	0.7
FTO90-250	250	350	350	0.9
FTO90-275	275	375	375	1.2
FTO90-300	300	400	400	1.5
FTO90-350	350	450	450	1.7
FTO90-400	400	500	500	2
FTO90-450	450	550	550	2.3
FTO90-500	500	600	600	2.5
FTO90-550	550	650	650	3.6
FTO90-600	600	700	700	3.9
FTO90-650	650	750	750	4.2
FTO90-700	700	800	800	6
FTO90-750	750	850	850	6.4
FTO90-800	800	900	900	6.9
FTO90-850	850	950	950	7.3
FTO90-900	900	1000	1000	7.9
FTO90-950	950	1050	1050	8.4
FTO90-1000	1000	1100	1100	8.9
FTO90-1100	1100	1200	1200	12.3
FTO90-1250	1250	1350	1350	14.3

Flat Take off 90 with Damper



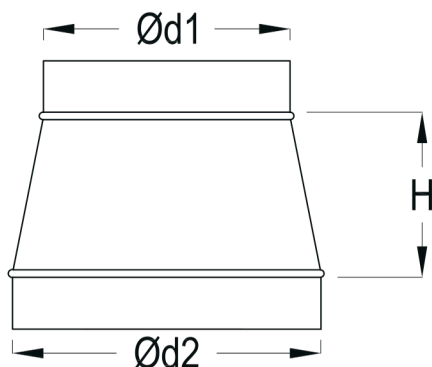
Order code	End 1 Ød	Height	Plate length	Plate width	Weight (kg)
FTOD90-100	100	100	150	150	0.3
FTOD90-125	125	100	175	175	0.4
FTOD90-150	150	100	250	250	0.5
FTOD90-180	180	125	280	280	0.6
FTOD90-200	200	150	300	300	0.8
FTOD90-225	225	175	325	325	0.9
FTOD90-250	250	200	350	350	1.1
FTOD90-275	275	200	375	375	1.7
FTOD90-300	300	225	400	400	2.1
FTOD90-350	350	250	450	450	2.7
FTOD90-400	400	300	500	500	3.5
FTOD90-450	450	300	550	550	4.2
FTOD90-500	500	350	600	600	4.9
FTOD90-550	550	400	650	650	7
FTOD90-600	600	450	700	700	8.2

Inline Damper



Order code	End 1 Ød	Height	Weight (kg)
ID100	100	100	0.3
ID125	125	100	0.3
ID150	150	113	0.4
ID180	180	135	0.5
ID200	200	150	0.6
ID225	225	169	0.7
ID250	250	188	0.8
ID275	275	206	1.3
ID300	300	225	1.6
ID350	350	263	2
ID400	400	300	2.7
ID450	450	338	3.5
ID500	500	375	4.4
ID550	550	413	6.7
ID600	600	450	8.1

Reducer



Order code	End 1 Ød	End 2 Ød	Height	Weight (kg)
RED125-100	125	100	125	0.4
RED150-100	150	100	150	0.5
RED150-125	150	125	125	0.5
RED180-100	180	100	180	0.6
RED180-125	180	125	155	0.6
RED180-150	180	150	130	0.6
RED200-100	200	100	200	0.7
RED200-125	200	125	175	0.7
RED200-150	200	150	150	0.7
RED200-180	200	180	120	0.7
RED225-100	225	100	225	0.8
RED225-125	225	125	200	0.8
RED225-150	225	150	175	0.8
RED225-180	225	180	145	0.8
RED225-200	225	200	125	0.8
RED250-100	250	100	250	1
RED250-125	250	125	225	1
RED250-150	250	150	200	0.9
RED250-180	250	180	170	0.9
RED250-200	250	200	150	0.9
RED275-100	275	100	275	1.7
RED275-125	275	125	250	1.7
RED275-150	275	150	225	1.7
RED275-180	275	180	195	1.6
RED275-200	275	200	175	1.6
RED275-225	275	225	150	1.5
RED300-100	300	100	300	1.9
RED300-125	300	125	275	1.9
RED300-150	300	150	250	1.9
RED300-180	300	180	220	1.8
RED300-200	300	200	200	1.8
RED300-225	300	225	175	1.7
RED300-250	300	250	150	1.7
RED300-275	300	275	125	1.7
RED350-100	350	100	350	2.4
RED350-125	350	125	325	2.4
RED350-150	350	150	300	2.4
RED350-180	350	180	270	2.3
RED350-200	350	200	250	2.3
RED350-225	350	225	225	2.2
RED350-250	350	250	200	2.1

Order code	End 1 Ød	End 2 Ød	Height	Weight (kg)
RED450-100	450	100	450	3.6
RED450-125	450	125	425	3.6
RED450-150	450	150	400	3.5
RED450-180	450	180	370	3.5
RED450-200	450	200	350	3.5
RED450-225	450	225	325	3.4
RED450-250	450	250	300	3.3
RED450-275	450	250	275	3.1
RED450-300	450	300	250	3.2
RED450-350	450	350	200	3
RED450-400	450	400	150	2.7
RED500-100	500	100	500	4.3
RED500-125	500	125	475	4.2
RED500-150	500	150	450	4.2
RED500-180	500	180	420	4.2
RED500-200	500	200	400	4.1
RED500-225	500	225	375	4.1
RED500-250	500	250	350	4
RED500-275	500	275	325	4
RED500-300	500	300	300	3.9
RED500-350	500	350	250	3.7
RED500-400	500	400	200	3.4
RED500-450	500	450	150	3
RED550-100	550	100	550	6.5
RED550-125	550	125	525	6.4
RED550-150	550	150	500	6.4
RED550-180	550	180	470	6.4
RED550-200	550	200	450	6.3
RED550-225	550	225	425	6.2
RED550-250	550	250	400	6.1
RED550-275	550	275	375	6.2
RED550-300	550	300	350	6
RED550-350	550	350	300	5.7
RED550-400	550	400	250	5.4
RED550-450	550	450	200	4.9
RED550-500	550	500	150	4.5
RED600-100	600	100	600	7.5
RED600-125	600	125	575	7.4
RED600-150	600	150	550	7.4
RED600-180	600	180	520	7.4
RED600-200	600	200	500	7.3
RED600-225	600	225	475	7.2
RED600-250	600	250	450	7.1
RED600-275	600	275	425	7.2
RED600-300	600	300	400	7
RED600-350	600	350	350	6.7
RED600-400	600	400	300	6.4

Reducer

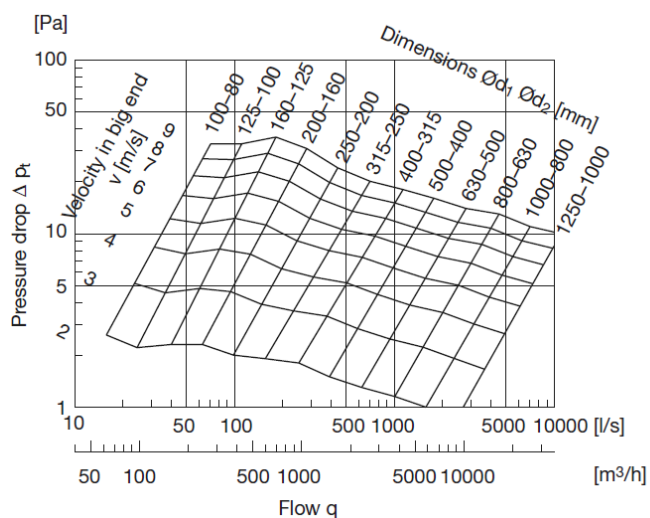
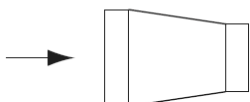
Order code	End 1 Ød	End 2 Ød	Height	Weight (kg)
RED600-450	600	450	250	5.9
RED600-500	600	500	200	5.4
RED600-550	600	550	150	5.2
RED650-350	650	350	400	7.8
RED650-400	650	400	350	7.5
RED650-450	650	450	300	7
RED650-500	650	500	250	6.5
RED650-550	650	550	200	6.2
RED650-600	650	600	150	5.6
RED700-500	700	500	300	7.6
RED700-550	700	550	250	7.3
RED700-600	700	600	200	6.7
RED700-650	700	650	150	6.1
RED750-550	750	550	300	8.5
RED750-600	750	600	250	7.9
RED750-650	750	650	200	7.2
RED750-700	750	700	125	6
RED800-550	800	550	350	9.8
RED800-600	800	600	300	9.2
RED800-650	800	650	250	8.5
RED800-700	800	700	200	7.8
RED800-750	800	750	150	6.9
RED850-600	850	600	350	10.5
RED850-650	850	650	300	9.9
RED850-700	850	700	250	9.1
RED850-750	850	750	200	8.3
RED850-800	850	800	150	7.4
RED900-400	900	450	600	14.2
RED900-650	900	650	350	11.3
RED900-700	900	700	300	10.5
RED900-750	900	750	250	9.7
RED900-800	900	800	200	8.8
RED900-850	900	850	150	7.8
RED950-700	950	700	350	13
RED950-750	950	750	300	12.2
RED950-800	950	800	250	11.3
RED950-850	950	850	200	10.3
RED950-900	950	900	150	9.3
RED1000-750	1000	750	350	13.8
RED1000-800	1000	800	300	12.9
RED1000-850	1000	850	250	11.9
RED1000-900	1000	900	200	10.9
RED1000-950	1000	950	150	10.8
RED1100-800	1100	800	400	20.2
RED1100-850	1100	850	350	19

Order code	End 1 Ød	End 2 Ød	Height	Weight (kg)
RED1100-900	1100	900	300	17.7
RED1100-950	1100	950	250	17.6
RED1100-1000	1100	1000	200	16.2
RED1250-850	1250	850	500	26.1
RED1250-900	1250	900	450	24.7
RED1250-950	1250	950	400	24.6
RED1250-1000	1250	1000	350	23.2
RED1250-1100	1250	1100	250	20.1

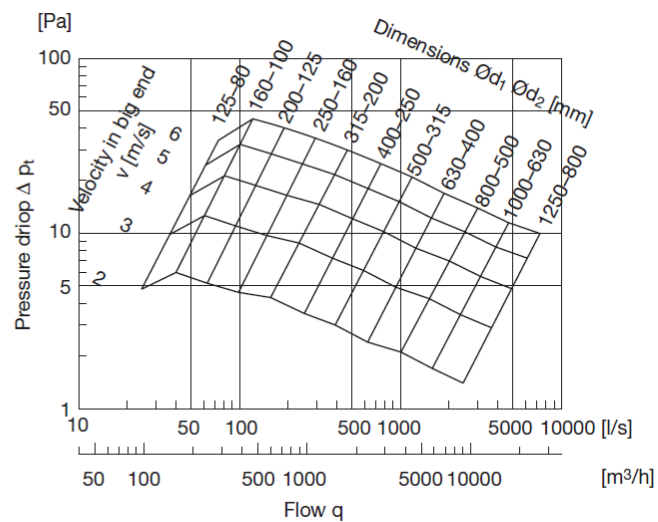
Reducer

Technical data

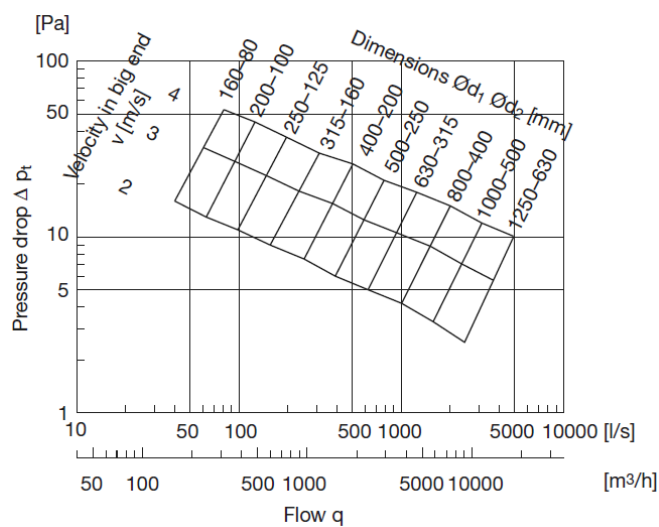
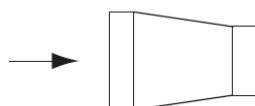
1 dimension step



2 dimension steps



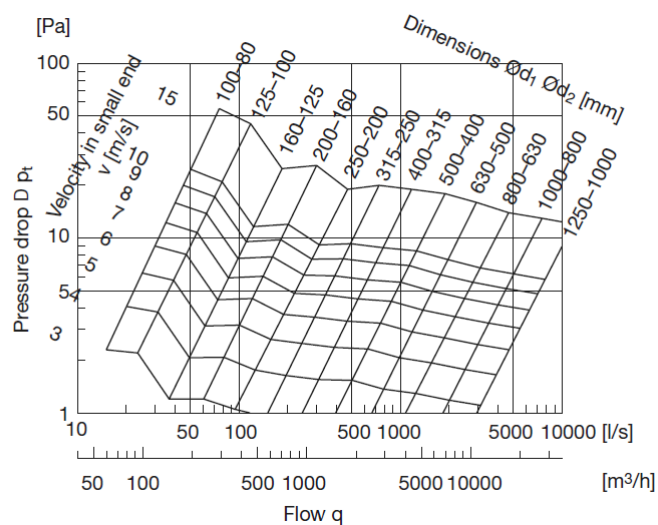
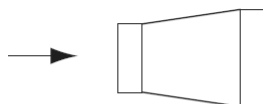
3 dimension steps



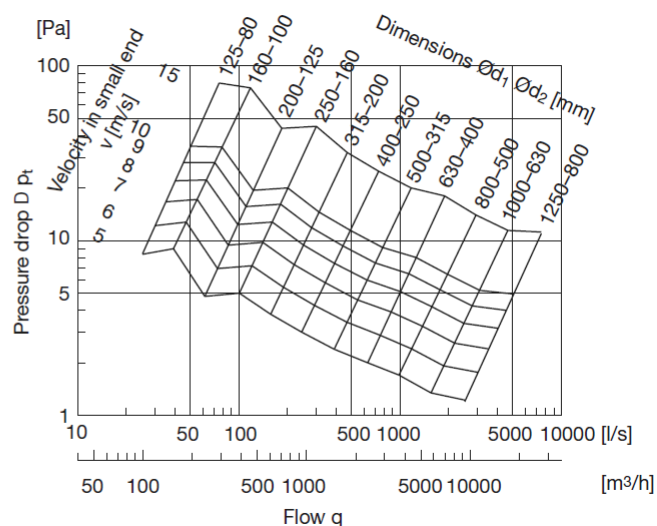
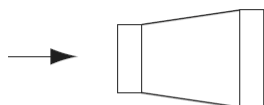
Reducer

Technical data

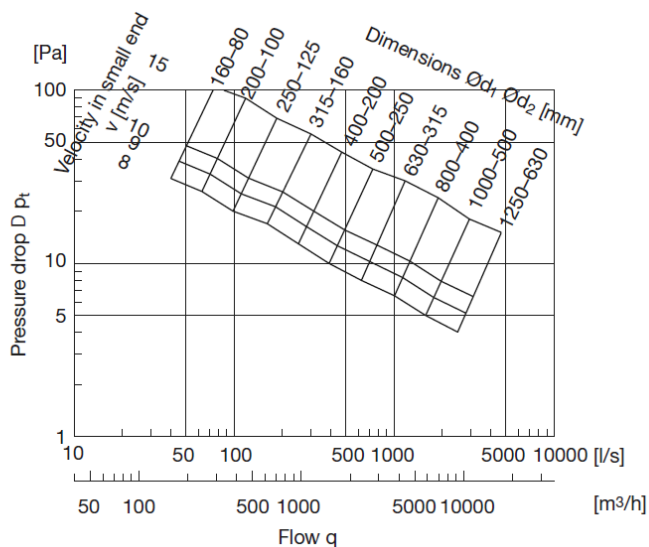
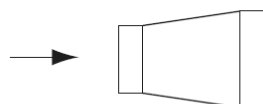
1 dimension step



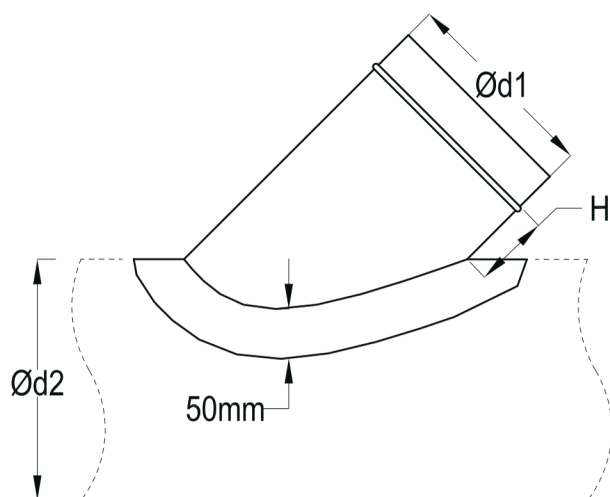
2 dimension steps



3 dimension steps



Saddle take-off 45



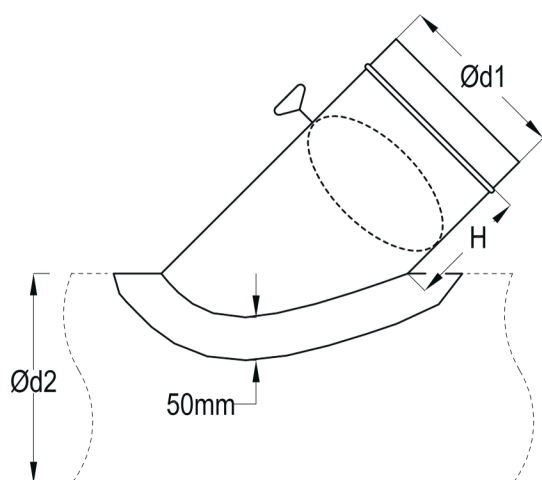
Order code	End 1 Ød	End 2 Ød	Height	Weight (kg)
STO45-100-100	100	100	100	0.3
STO45-100-125	100	125	100	0.3
STO45-100-150	100	150	100	0.3
STO45-100-180	100	180	100	0.3
STO45-100-200	100	200	100	0.3
STO45-100-225	100	225	100	0.3
STO45-100-250	100	250	100	0.3
STO45-100-275	100	275	100	0.3
STO45-100-300	100	300	100	0.3
STO45-100-350	100	350	100	0.3
STO45-100-400	100	400	100	0.3
STO45-100-450	100	450	100	0.3
STO45-100-500	100	500	100	0.3
STO45-100-550	100	550	100	0.3
STO45-100-600	100	600	100	0.3
STO45-125-125	125	125	100	0.4
STO45-125-150	125	150	100	0.4
STO45-125-180	125	180	100	0.4
STO45-125-200	125	200	100	0.4
STO45-125-225	125	225	100	0.4
STO45-125-250	125	250	100	0.4
STO45-125-275	125	275	100	0.4
STO45-125-300	125	300	100	0.4
STO45-125-350	125	350	100	0.4
STO45-125-400	125	400	100	0.4
STO45-125-450	125	450	100	0.4
STO45-125-500	125	500	100	0.4
STO45-125-550	125	550	100	0.4

Order code	End 1 Ød	End 2 Ød	Height	Weight (kg)
STO45-125-600	125	600	100	0.4
STO45-150-150	150	150	100	0.6
STO45-150-180	150	180	100	0.5
STO45-150-200	150	200	100	0.5
STO45-150-225	150	225	100	0.5
STO45-150-250	150	250	100	0.5
STO45-150-275	150	275	100	0.5
STO45-150-300	150	300	100	0.5
STO45-150-350	150	350	100	0.5
STO45-150-400	150	400	100	0.5
STO45-150-450	150	450	100	0.5
STO45-150-500	150	500	100	0.5
STO45-150-550	150	550	100	0.5
STO45-150-600	150	600	100	0.5
STO45-180-180	180	180	100	0.7
STO45-180-200	180	200	100	0.7
STO45-180-225	180	225	100	0.7
STO45-180-250	180	250	100	0.7
STO45-180-275	180	275	100	0.7
STO45-180-300	180	300	100	0.7
STO45-180-350	180	350	100	0.7
STO45-180-400	180	400	100	0.7
STO45-180-450	180	450	100	0.7
STO45-180-500	180	500	100	0.6
STO45-180-550	180	550	100	0.6
STO45-180-600	180	600	100	0.6
STO45-200-200	200	200	100	0.9
STO45-200-225	200	225	100	0.8
STO45-200-250	200	250	100	0.8
STO45-200-275	200	275	100	0.8
STO45-200-300	200	300	100	0.8
STO45-200-350	200	350	100	0.8
STO45-200-400	200	400	100	0.8
STO45-200-450	200	450	100	0.8
STO45-200-500	200	500	100	0.8
STO45-200-550	200	550	100	0.8
STO45-200-600	200	600	100	0.8
STO45-225-225	225	250	100	1
STO45-225-275	225	275	100	1
STO45-225-300	225	300	100	0.9
STO45-225-350	225	350	100	0.9
STO45-225-400	225	400	100	0.9
STO45-225-450	225	450	100	0.9
STO45-225-500	225	500	100	0.9
STO45-225-550	225	550	100	0.9
STO45-225-600	225	600	100	0.9
STO45-250-250	250	250	100	1.2
STO45-250-275	250	275	100	1.2
STO45-250-300	250	300	100	1.1
STO45-250-350	250	350	100	1.1

Saddle take-off 45

Order code	End 1 Ød	End 2 Ød	Height	Weight (kg)
STO45-250-400	250	400	100	1.1
STO45-250-450	250	450	100	1.1
STO45-250-500	250	500	100	1.1
STO45-250-550	250	550	100	1.1
STO45-250-600	250	600	100	1.1
STO45-275-300	275	300	100	2
STO45-275-350	275	350	100	1.9
STO45-275-400	275	400	100	1.9
STO45-275-450	275	450	100	1.8
STO45-275-500	275	500	100	1.8
STO45-275-550	275	550	100	1.8
STO45-275-600	275	600	100	1.8
STO45-300-300	300	300	100	2.3
STO45-300-350	300	350	100	2.2
STO45-300-400	300	400	100	2.1
STO45-300-450	300	450	100	2.1
STO45-300-500	300	500	100	2
STO45-300-550	300	550	100	2
STO45-300-600	300	600	100	2
STO45-350-350	350	350	100	2.9
STO45-350-400	350	400	100	2.8
STO45-350-450	350	450	100	2.7
STO45-350-500	350	500	100	2.6
STO45-350-550	350	550	100	2.6
STO45-350-600	350	600	100	2.6
STO45-400-400	400	400	125	3.9
STO45-400-450	400	450	125	3.7
STO45-400-500	400	500	125	3.6
STO45-400-550	400	550	125	3.5
STO45-400-600	400	600	125	3.5
STO45-450-450	450	450	125	4.7
STO45-450-500	450	650	125	4.2
STO45-450-550	450	550	125	4.3
STO45-450-600	450	600	125	4.3
STO45-500-500	500	650	125	5.1
STO45-500-550	500	550	125	5.3
STO45-500-600	500	600	125	5.2
STO45-550-550	550	550	125	8.2
STO45-550-600	550	650	125	7.6
STO45-600-600	600	600	125	10.6

Saddle take-off 45 with damper



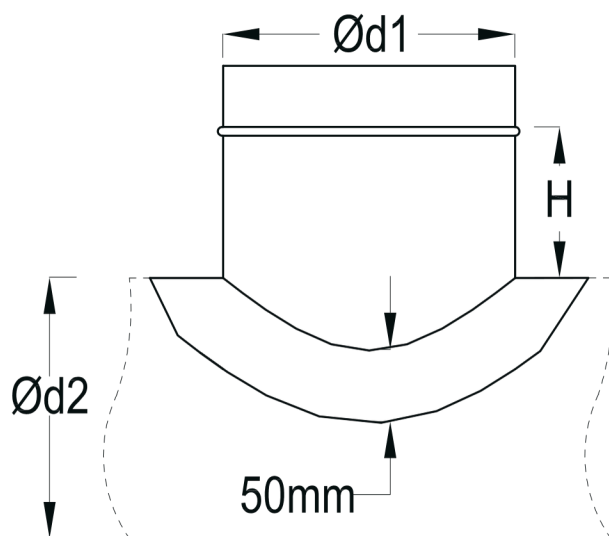
Order code	End 1 Ød	End 2 Ød	Height	Weight (kg)
STOD45-100-100	100	100	100	0.5
STOD45-100-125	100	125	100	0.5
STOD45-100-150	100	150	100	0.5
STOD45-100-180	100	180	100	0.5
STOD45-100-200	100	200	100	0.5
STOD45-100-225	100	225	100	0.5
STOD45-100-250	100	250	100	0.5
STOD45-100-275	100	275	100	0.5
STOD45-100-300	100	300	100	0.5
STOD45-100-350	100	350	100	0.5
STOD45-100-400	100	400	100	0.5
STOD45-100-450	100	450	100	0.5
STOD45-100-500	100	500	100	0.5
STOD45-100-550	100	550	100	0.5
STOD45-100-600	100	600	100	0.5
STOD45-125-125	125	125	125	0.7
STOD45-125-150	125	150	125	0.7
STOD45-125-180	125	180	125	0.7
STOD45-125-200	125	200	125	0.7
STOD45-125-225	125	225	125	0.7
STOD45-125-250	125	250	125	0.7
STOD45-125-275	125	275	125	0.7
STOD45-125-300	125	300	125	0.7
STOD45-125-350	125	350	125	0.7
STOD45-125-400	125	400	125	0.7
STOD45-125-450	125	450	125	0.7
STOD45-125-500	125	500	125	0.7

Order code	End 1 Ød	End 2 Ød	Height	Weight (kg)
STOD45-125-550	125	550	125	0.7
STOD45-125-600	125	600	125	0.7
STOD45-150-150	150	150	150	1
STOD45-150-180	150	180	150	0.9
STOD45-150-200	150	200	150	0.9
STOD45-150-225	150	225	150	0.9
STOD45-150-250	150	250	150	0.9
STOD45-150-275	150	275	150	0.9
STOD45-150-300	150	300	150	0.9
STOD45-150-350	150	350	150	0.9
STOD45-150-400	150	400	150	0.9
STOD45-150-450	150	450	150	0.9
STOD45-150-500	150	500	150	0.9
STOD45-150-550	150	550	150	0.9
STOD45-150-600	150	600	150	0.9
STOD45-180-180	180	180	180	1.3
STOD45-180-200	180	200	180	1.3
STOD45-180-225	180	225	180	1.2
STOD45-180-250	180	250	180	1.2
STOD45-180-275	180	275	180	1.2
STOD45-180-300	180	300	180	1.2
STOD45-180-350	180	350	180	1.2
STOD45-180-400	180	400	180	1.2
STOD45-180-450	180	450	180	1.2
STOD45-180-500	180	500	180	1.2
STOD45-180-550	180	550	180	1.2
STOD45-180-600	180	600	180	1.2
STOD45-200-200	200	200	180	1.5
STOD45-200-225	200	225	180	1.4
STOD45-200-250	200	250	180	1.4
STOD45-200-275	200	275	180	1.4
STOD45-200-300	200	300	180	1.4
STOD45-200-350	200	350	180	1.4
STOD45-200-400	200	400	180	1.4
STOD45-200-450	200	450	180	1.4
STOD45-200-500	200	500	180	1.4
STOD45-200-550	200	550	180	1.3
STOD45-200-600	200	600	180	1.3
STOD45-225-225	225	250	200	1.7
STOD45-225-250	225	250	200	1.7
STOD45-225-275	225	275	200	1.7
STOD45-225-300	225	300	200	1.7
STOD45-225-350	225	350	200	1.7
STOD45-225-400	225	400	200	1.6
STOD45-225-450	225	450	200	1.6
STOD45-225-500	225	500	200	1.6
STOD45-225-550	225	550	200	1.6
STOD45-225-600	225	600	200	1.6
STOD45-250-250	250	250	200	2.1
STOD45-250-275	250	275	200	2

Saddle take-off 45 with damper

Order code	End 1 Ød	End 2 Ød	Height	Weight (kg)
STOD45-250-300	250	300	200	2
STOD45-250-350	250	350	200	1.9
STOD45-250-400	250	400	200	1.9
STOD45-250-450	250	450	200	1.9
STOD45-250-500	250	500	200	1.9
STOD45-250-550	250	550	200	1.9
STOD45-250-600	250	600	200	1.9
STOD45-275-300	275	300	225	2.4
STOD45-275-350	275	350	225	2.4
STOD45-275-400	275	400	225	2.3
STOD45-275-450	275	450	225	2.3
STOD45-275-500	275	500	225	2.3
STOD45-275-550	275	550	225	2.3
STOD45-275-600	275	600	225	2.3
STOD45-300-300	300	300	250	2.8
STOD45-300-350	300	350	250	2.7
STOD45-300-400	300	400	250	2.7
STOD45-300-450	300	450	250	2.6
STOD45-300-500	300	500	250	2.6
STOD45-300-550	300	550	250	2.6
STOD45-300-600	300	600	250	2.6
STOD45-350-350	350	350	275	5.1
STOD45-350-400	350	400	275	4.9
STOD45-350-450	350	450	275	4.8
STOD45-350-500	350	500	275	4.7
STOD45-350-550	350	550	275	4.7
STOD45-350-600	350	600	275	4.7
STOD45-400-400	400	400	300	6.4
STOD45-400-450	400	450	300	6.1
STOD45-400-500	400	500	300	6
STOD45-400-550	400	550	300	5.9
STOD45-400-600	400	600	300	5.9
STOD45-450-450	450	450	325	7.7
STOD45-450-500	450	650	325	7.1
STOD45-450-550	450	550	325	7.3
STOD45-450-600	450	600	325	7.2
STOD45-500-500	500	650	350	8.6
STOD45-500-550	500	550	350	8.9
STOD45-500-600	500	600	350	8.7
STOD45-550-550	550	550	375	13.4
STOD45-550-600	550	650	375	12.8
STOD45-600-600	600	600	400	15.6

Saddle take-off 90



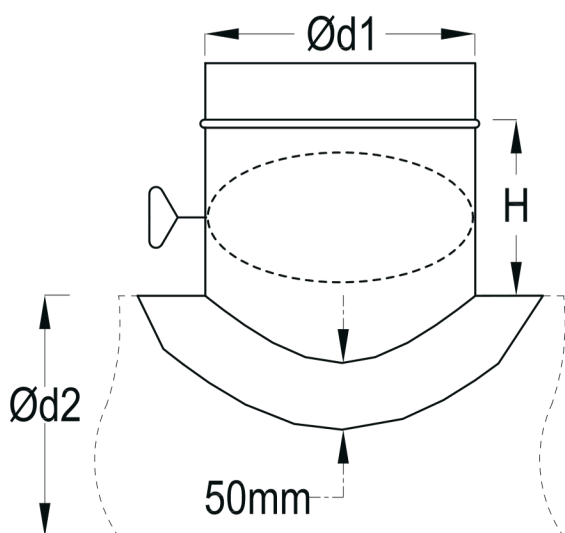
Order code	End 1 Ød	End 2 Ød	Height	Weight (kg)
STO90-100-125	100	125	75	0.4
STO90-100-150	100	150	75	0.4
STO90-100-180	100	180	75	0.3
STO90-100-200	100	200	75	0.3
STO90-100-225	100	225	75	0.3
STO90-100-250	100	250	75	0.3
STO90-100-275	100	275	75	0.3
STO90-100-300	100	300	75	0.3
STO90-100-350	100	350	75	0.3
STO90-100-400	100	400	75	0.3
STO90-100-450	100	450	75	0.3
STO90-100-500	100	500	75	0.3
STO90-100-550	100	550	75	0.3
STO90-100-600	100	600	75	0.3
STO90-125-125	125	125	100	0.5
STO90-125-150	125	150	100	0.5
STO90-125-180	125	180	100	0.5
STO90-125-200	125	200	100	0.5
STO90-125-225	125	225	100	0.5
STO90-125-250	125	250	100	0.5
STO90-125-275	125	275	100	0.5
STO90-125-300	125	300	100	0.5
STO90-125-350	125	350	100	0.5
STO90-125-400	125	400	100	0.5
STO90-125-450	125	450	100	0.4
STO90-125-500	125	500	100	0.4
STO90-125-550	125	550	100	0.4
STO90-125-600	125	600	100	0.4
STO90-150-150	150	150	100	0.6

Order code	End 1 Ød	End 2 Ød	Height	Weight (kg)
STO90-150-180	150	180	100	0.6
STO90-150-200	150	200	100	0.6
STO90-150-225	150	225	100	0.6
STO90-150-250	150	250	100	0.6
STO90-150-275	150	275	100	0.5
STO90-150-300	150	300	100	0.5
STO90-150-350	150	350	100	0.5
STO90-150-400	150	400	100	0.5
STO90-150-450	150	450	100	0.5
STO90-150-500	150	500	100	0.5
STO90-150-550	150	550	100	0.5
STO90-150-600	150	600	100	0.5
STO90-180-180	180	180	100	0.7
STO90-180-200	180	200	100	0.7
STO90-180-225	180	225	100	0.7
STO90-180-250	180	250	100	0.7
STO90-180-275	180	275	100	0.7
STO90-180-300	180	300	100	0.7
STO90-180-350	180	350	100	0.7
STO90-180-400	180	400	100	0.7
STO90-180-450	180	450	100	0.6
STO90-180-500	180	500	100	0.6
STO90-180-550	180	550	100	0.6
STO90-180-600	180	600	100	0.6
STO90-200-200	200	200	100	0.8
STO90-200-225	200	225	100	0.8
STO90-200-250	200	250	100	0.8
STO90-200-275	200	275	100	0.8
STO90-200-300	200	300	100	0.7
STO90-200-350	200	350	100	0.7
STO90-200-400	200	400	100	0.7
STO90-200-450	200	450	100	0.7
STO90-200-500	200	500	100	0.7
STO90-200-550	200	550	100	0.7
STO90-200-600	200	600	100	0.7
STO90-225-225	225	250	100	0.9
STO90-225-275	225	275	100	0.9
STO90-225-300	225	300	100	0.9
STO90-225-350	225	350	100	0.8
STO90-225-400	225	400	100	0.8
STO90-225-450	225	450	100	0.8
STO90-225-500	225	500	100	0.8
STO90-225-550	225	550	100	0.8
STO90-225-600	225	600	100	0.8
STO90-250-250	250	250	100	1
STO90-250-275	250	275	100	1
STO90-250-300	250	300	100	1
STO90-250-350	250	350	100	0.9
STO90-250-400	250	400	100	0.9
STO90-250-450	250	450	100	0.9

Saddle take-off 90

Order code	End 1 Ød	End 2 Ød	Height	Weight (kg)
STO90-250-500	250	500	100	0.9
STO90-250-550	250	550	100	0.9
STO90-250-600	250	600	100	0.9
STO90-275-300	275	300	100	1.7
STO90-275-350	275	350	100	1.7
STO90-275-400	275	400	100	1.6
STO90-275-450	275	450	100	1.6
STO90-275-500	275	500	100	1.6
STO90-275-550	275	550	100	1.6
STO90-275-600	275	600	100	1.6
STO90-300-300	300	300	100	1.9
STO90-300-350	300	350	100	1.8
STO90-300-400	300	400	100	1.8
STO90-300-450	300	450	100	1.7
STO90-300-500	300	500	100	1.7
STO90-300-550	300	550	100	1.7
STO90-300-600	300	600	100	1.7
STO90-350-350	350	350	100	2.3
STO90-350-400	350	400	100	2.2
STO90-350-450	350	450	100	2.1
STO90-350-500	350	500	100	2.1
STO90-350-550	350	550	100	2
STO90-350-600	350	600	100	2
STO90-400-400	400	400	100	2.7
STO90-400-450	400	450	100	2.5
STO90-400-500	400	500	100	2.5
STO90-400-550	400	550	100	2.4
STO90-400-600	400	600	100	2.4
STO90-450-450	450	450	100	3.1
STO90-450-500	450	650	100	2.7
STO90-450-550	450	550	100	2.8
STO90-450-600	450	600	100	2.8
STO90-500-500	500	650	125	3.4
STO90-500-550	500	550	125	3.6
STO90-500-600	500	600	125	3.5
STO90-550-550	550	550	125	5.6
STO90-550-600	550	650	125	5.1
STO90-600-600	600	600	125	6.3

Saddle take-off 90 with damper



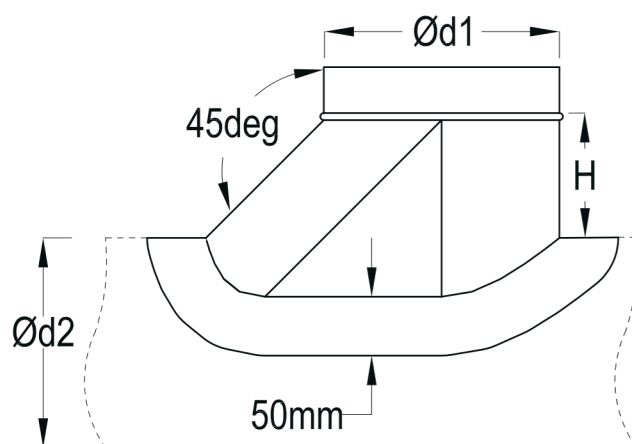
Order code	End 1 Ød	End 2 Ød	Height	Weight (kg)
STOD90-100-100	100	100	125	0.4
STOD90-100-125	100	125	125	0.4
STOD90-100-150	100	150	125	0.4
STOD90-100-180	100	180	125	0.3
STOD90-100-200	100	200	125	0.3
STOD90-100-225	100	225	125	0.3
STOD90-100-250	100	250	125	0.3
STOD90-100-275	100	275	125	0.3
STOD90-100-300	100	300	125	0.3
STOD90-100-350	100	350	125	0.3
STOD90-100-400	100	400	125	0.3
STOD90-100-450	100	450	125	0.3
STOD90-100-500	100	500	125	0.3
STOD90-100-550	100	550	125	0.3
STOD90-100-600	100	600	125	0.3
STOD90-125-125	125	125	125	0.5
STOD90-125-150	125	150	125	0.4
STOD90-125-180	125	180	125	0.4
STOD90-125-200	125	200	125	0.4
STOD90-125-225	125	225	125	0.4
STOD90-125-250	125	250	125	0.4
STOD90-125-275	125	275	125	0.4
STOD90-125-300	125	300	125	0.4
STOD90-125-350	125	350	125	0.4
STOD90-125-400	125	400	125	0.4
STOD90-125-450	125	450	125	0.4
STOD90-125-500	125	500	125	0.4
STOD90-125-550	125	550	125	0.4

Order code	End 1 Ød	End 2 Ød	Height	Weight (kg)
STOD90-125-600	125	600	125	0.4
STOD90-150-150	150	150	150	0.6
STOD90-150-180	150	180	150	0.6
STOD90-150-200	150	200	150	0.6
STOD90-150-225	150	225	150	0.6
STOD90-150-250	150	250	150	0.6
STOD90-150-275	150	275	150	0.6
STOD90-150-300	150	300	150	0.6
STOD90-150-350	150	350	150	0.6
STOD90-150-400	150	400	150	0.6
STOD90-150-450	150	450	150	0.6
STOD90-150-500	150	500	150	0.5
STOD90-150-550	150	550	150	0.5
STOD90-150-600	150	600	150	0.5
STOD90-180-180	180	180	150	0.7
STOD90-180-200	180	200	150	0.7
STOD90-180-225	180	225	150	0.7
STOD90-180-250	180	250	150	0.7
STOD90-180-275	180	275	150	0.7
STOD90-180-300	180	300	150	0.7
STOD90-180-350	180	350	150	0.7
STOD90-180-400	180	400	150	0.7
STOD90-180-450	180	450	150	0.7
STOD90-180-500	180	500	150	0.7
STOD90-180-550	180	550	150	0.7
STOD90-180-600	180	600	150	0.7
STOD90-200-225	200	225	150	0.8
STOD90-200-225	200	225	150	0.8
STOD90-200-250	200	250	150	0.8
STOD90-200-275	200	275	150	0.8
STOD90-200-300	200	300	150	0.8
STOD90-200-350	200	350	150	0.8
STOD90-200-400	200	400	150	0.7
STOD90-200-450	200	450	150	0.7
STOD90-200-500	200	500	150	0.7
STOD90-200-550	200	550	150	0.7
STOD90-200-600	200	600	150	0.7
STOD90-225-225	225	250	175	1
STOD90-225-250	225	250	175	1
STOD90-225-275	225	275	175	1
STOD90-225-300	225	300	175	1
STOD90-225-350	225	350	175	0.9
STOD90-225-400	225	400	175	0.9
STOD90-225-450	225	450	175	0.9
STOD90-225-500	225	500	175	0.9
STOD90-225-550	225	550	175	0.9
STOD90-225-600	225	600	175	0.9
STOD90-250-250	250	250	200	1.3
STOD90-250-275	250	275	200	1.2
STOD90-250-300	250	300	200	1.2

Saddle take-off 90 with damper

Order code	End 1 Ød	End 2 Ød	Height	Weight (kg)
STOD90-250-350	250	350	200	1.2
STOD90-250-400	250	400	200	1.1
STOD90-250-450	250	450	200	1.1
STOD90-250-500	250	500	200	1.1
STOD90-250-550	250	550	200	1.1
STOD90-250-600	250	600	200	1.1
STOD90-275-300	275	300	225	1.5
STOD90-275-350	275	350	225	1.4
STOD90-275-400	275	400	225	1.4
STOD90-275-450	275	450	225	1.4
STOD90-275-500	275	500	225	1.4
STOD90-275-550	275	550	225	1.4
STOD90-275-600	275	600	225	1.3
STOD90-300-300	300	300	250	1.8
STOD90-300-350	300	350	250	1.7
STOD90-300-400	300	400	250	1.6
STOD90-300-450	300	450	250	1.6
STOD90-300-500	300	500	250	1.6
STOD90-300-550	300	550	250	1.6
STOD90-300-600	300	600	250	1.6
STOD90-350-350	350	350	275	3.1
STOD90-350-400	350	400	275	2.9
STOD90-350-450	350	450	275	2.9
STOD90-350-500	350	500	275	2.8
STOD90-350-550	350	550	275	2.8
STOD90-350-600	350	600	275	2.8
STOD90-400-400	400	400	300	3.8
STOD90-400-450	400	450	300	3.6
STOD90-400-500	400	500	300	3.6
STOD90-400-550	400	550	300	3.5
STOD90-400-600	400	600	300	3.5
STOD90-450-450	450	450	325	4.6
STOD90-450-500	450	650	325	4.2
STOD90-450-550	450	550	325	4.3
STOD90-450-600	450	600	325	4.2
STOD90-500-500	500	650	350	5
STOD90-500-550	500	550	350	5.2
STOD90-500-600	500	600	350	5.1
STOD90-550-550	550	550	375	7.9
STOD90-550-600	550	650	375	7.4
STOD90-600-600	600	600	400	9.2

Saddle take-off shoe



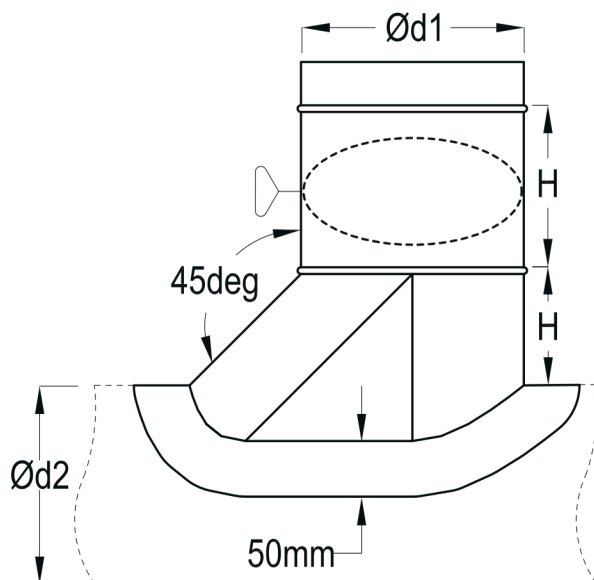
Order code	End 1 Ød	End 2 Ød	Height	Weight (kg)
STOS90-100-100	100	100	100	0.6
STOS90-100-125	100	125	100	0.6
STOS90-100-150	100	150	100	0.5
STOS90-100-180	100	180	100	0.5
STOS90-100-200	100	200	100	0.5
STOS90-100-225	100	225	100	0.5
STOS90-100-250	100	250	100	0.5
STOS90-100-275	100	275	100	0.5
STOS90-100-300	100	300	100	0.5
STOS90-100-350	100	350	100	0.5
STOS90-100-400	100	400	100	0.5
STOS90-100-450	100	450	100	0.5
STOS90-100-500	100	500	100	0.5
STOS90-100-550	100	550	100	0.5
STOS90-100-600	100	600	100	0.5
STOS90-125-125	125	125	100	0.7
STOS90-125-150	125	150	100	0.7
STOS90-125-180	125	180	100	0.7
STOS90-125-200	125	200	100	0.6
STOS90-125-225	125	225	100	0.6
STOS90-125-250	125	250	100	0.6
STOS90-125-275	125	275	100	0.6
STOS90-125-300	125	300	100	0.6
STOS90-125-350	125	350	100	0.6
STOS90-125-400	125	400	100	0.6
STOS90-125-450	125	450	100	0.6
STOS90-125-500	125	500	100	0.6
STOS90-125-550	125	550	100	0.6
STOS90-125-600	125	600	100	0.6
STOS90-150-150	150	150	100	0.9

Order code	End 1 Ød	End 2 Ød	Height	Weight (kg)
STOS90-150-180	150	180	100	0.8
STOS90-150-200	150	200	100	0.8
STOS90-150-225	150	225	100	0.8
STOS90-150-250	150	250	100	0.7
STOS90-150-275	150	275	100	0.7
STOS90-150-300	150	300	100	0.7
STOS90-150-350	150	350	100	0.7
STOS90-150-400	150	400	100	0.7
STOS90-150-450	150	450	100	0.7
STOS90-150-500	150	500	100	0.7
STOS90-150-550	150	550	100	0.7
STOS90-150-600	150	600	100	0.7
STOS90-180-180	180	180	100	1
STOS90-180-200	180	200	100	1
STOS90-180-225	180	225	100	0.9
STOS90-180-250	180	250	100	0.9
STOS90-180-275	180	275	100	0.9
STOS90-180-300	180	300	100	0.9
STOS90-180-350	180	350	100	0.9
STOS90-180-400	180	400	100	0.9
STOS90-180-450	180	450	100	0.8
STOS90-180-500	180	500	100	0.8
STOS90-180-550	180	550	100	0.8
STOS90-180-600	180	600	100	0.8
STOS90-200-200	200	200	100	1.1
STOS90-200-225	200	225	100	1.1
STOS90-200-250	200	250	100	1
STOS90-200-275	200	275	100	1
STOS90-200-300	200	300	100	1
STOS90-200-350	200	350	100	1
STOS90-200-400	200	400	100	0.9
STOS90-200-450	200	450	100	0.9
STOS90-200-500	200	500	100	0.9
STOS90-200-550	200	550	100	0.9
STOS90-200-600	200	600	100	0.9
STOS90-225-225	225	250	100	1.2
STOS90-225-250	225	250	100	1.2
STOS90-225-275	225	275	100	1.1
STOS90-225-300	225	300	100	1.1
STOS90-225-350	225	350	100	1.1
STOS90-225-400	225	400	100	1.1
STOS90-225-450	225	450	100	1
STOS90-225-500	225	500	100	1
STOS90-225-550	225	550	100	1
STOS90-225-600	225	600	100	1
STOS90-250-250	250	250	100	1.5
STOS90-250-275	250	275	100	1.3
STOS90-250-300	250	300	100	1.3
STOS90-250-350	250	350	100	1.2
STOS90-250-400	250	400	100	1.2

Saddle take-off shoe

Order code	End 1 Ød	End 2 Ød	Height	Weight (kg)
STOS90-250-450	250	450	100	1.2
STOS90-250-500	250	500	100	1.2
STOS90-250-550	250	550	100	1.2
STOS90-250-600	250	600	100	1.1
STOS90-275-300	275	300	100	2.4
STOS90-275-350	275	350	100	2.3
STOS90-275-400	275	400	100	2.2
STOS90-275-450	275	450	100	2.1
STOS90-275-500	275	500	100	2.1
STOS90-275-550	275	550	100	2.1
STOS90-275-600	275	600	100	2.1
STOS90-300-300	300	300	100	2.8
STOS90-300-350	300	350	100	2.5
STOS90-300-400	300	400	100	2.4
STOS90-300-450	300	450	100	2.3
STOS90-300-500	300	500	100	2.3
STOS90-300-550	300	550	100	2.2
STOS90-300-600	300	600	100	2.2
STOS90-350-350	350	350	100	3.3
STOS90-350-400	350	400	100	2.9
STOS90-350-450	350	450	100	2.8
STOS90-350-500	350	500	100	2.7
STOS90-350-550	350	550	100	2.7
STOS90-350-600	350	600	100	2.6
STOS90-400-400	400	400	100	3.8
STOS90-400-450	400	450	100	3.4
STOS90-400-500	400	500	100	3.3
STOS90-400-550	400	550	100	3.2
STOS90-400-600	400	600	100	3.1
STOS90-450-450	450	450	125	4.8
STOS90-450-500	450	500	125	3.9
STOS90-450-550	450	550	125	4.1
STOS90-450-600	450	600	125	4
STOS90-500-500	500	500	125	4.5
STOS90-500-550	500	550	125	4.9
STOS90-500-600	500	600	125	4.7
STOS90-550-550	550	550	125	8.1
STOS90-550-600	550	600	125	7
STOS90-600-600	600	600	125	9

Saddle take-off shoe with damper



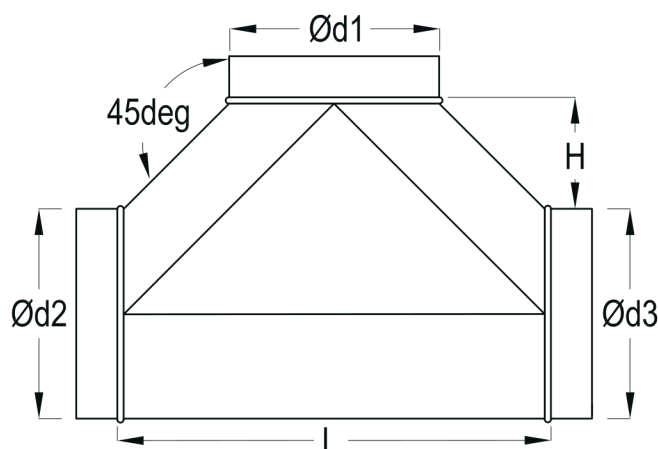
Order code	End 1 Ød	End 2 Ød	Height 1	Height 2	Weight (kg)
STOSD90-100-100	100	100	100	157	0.7
STOSD90-100-125	100	125	100	157	0.6
STOSD90-100-150	100	150	100	157	0.6
STOSD90-100-180	100	180	100	157	0.6
STOSD90-100-200	100	200	100	157	0.6
STOSD90-100-225	100	225	100	157	0.6
STOSD90-100-250	100	250	100	157	0.6
STOSD90-100-275	100	275	100	157	0.6
STOSD90-100-300	100	300	100	157	0.6
STOSD90-100-350	100	350	100	157	0.6
STOSD90-100-400	100	400	100	157	0.6
STOSD90-100-450	100	450	100	157	0.6
STOSD90-100-500	100	500	100	157	0.6
STOSD90-100-550	100	550	100	157	0.6
STOSD90-100-600	100	600	100	157	0.6
STOSD90-125-125	125	125	100	157	0.9
STOSD90-125-150	125	150	100	157	0.8
STOSD90-125-180	125	180	100	157	0.8
STOSD90-125-200	125	200	100	157	0.8
STOSD90-125-225	125	225	100	157	0.8
STOSD90-125-250	125	250	100	157	0.8
STOSD90-125-275	125	275	100	157	0.8
STOSD90-125-300	125	300	100	157	0.8
STOSD90-125-350	125	350	100	157	0.8
STOSD90-125-400	125	400	100	157	0.8
STOSD90-125-450	125	450	100	157	0.8
STOSD90-125-500	125	500	100	157	0.8

Order code	End 1 Ød	End 2 Ød	Height 1	Height 2	Weight (kg)
STOSD90-125-550	125	550	100	157	0.8
STOSD90-125-600	125	600	100	157	0.8
STOSD90-150-150	150	150	100	170	1.1
STOSD90-150-180	150	180	100	170	1
STOSD90-150-200	150	200	100	170	1
STOSD90-150-225	150	225	100	170	0.9
STOSD90-150-250	150	250	100	170	0.9
STOSD90-150-275	150	275	100	170	0.9
STOSD90-150-300	150	300	100	170	0.9
STOSD90-150-350	150	350	100	170	0.9
STOSD90-150-400	150	400	100	170	0.9
STOSD90-150-450	150	450	100	170	0.9
STOSD90-150-500	150	500	100	170	0.9
STOSD90-150-550	150	550	100	170	0.9
STOSD90-150-600	150	600	100	170	0.9
STOSD90-180-180	180	180	100	190	1.3
STOSD90-180-200	180	200	100	190	1.2
STOSD90-180-225	180	225	100	190	1.2
STOSD90-180-250	180	250	100	190	1.2
STOSD90-180-275	180	275	100	190	1.2
STOSD90-180-300	180	300	100	190	1.2
STOSD90-180-350	180	350	100	190	1.1
STOSD90-180-400	180	400	100	190	1.1
STOSD90-180-450	180	450	100	190	1.1
STOSD90-180-500	180	500	100	190	1.1
STOSD90-180-550	180	550	100	190	1.1
STOSD90-180-600	180	600	100	190	1.1
STOSD90-200-200	200	200	100	205	1.5
STOSD90-200-225	200	225	100	205	1.4
STOSD90-200-250	200	250	100	205	1.3
STOSD90-200-275	200	275	100	205	1.3
STOSD90-200-300	200	300	100	205	1.3
STOSD90-200-350	200	350	100	205	1.3
STOSD90-200-400	200	400	100	205	1.3
STOSD90-200-450	200	450	100	205	1.3
STOSD90-200-500	200	500	100	205	1.2
STOSD90-200-550	200	550	100	205	1.2
STOSD90-200-600	200	600	100	205	1.2
STOSD90-225-225	225	225	100	224	1.6
STOSD90-225-250	225	250	100	224	1.5
STOSD90-225-275	225	275	100	224	1.5
STOSD90-225-300	225	300	100	224	1.5
STOSD90-225-350	225	350	100	224	1.4
STOSD90-225-400	225	400	100	224	1.4
STOSD90-225-450	225	450	100	224	1.4
STOSD90-225-500	225	500	100	224	1.4
STOSD90-225-550	225	550	100	224	1.4
STOSD90-225-600	225	600	100	224	1.4
STOSD90-250-250	250	250	100	243	2
STOSD90-250-275	250	275	100	243	1.9

Saddle take-off shoe with damper

Order code	End 1 Ød	End 2 Ød	Height 1	Height 2	Weight (kg)
STOSD90-250-300	250	300	100	243	1.9
STOSD90-250-350	250	350	100	243	1.8
STOSD90-250-400	250	400	100	243	1.8
STOSD90-250-450	250	450	100	243	1.8
STOSD90-250-500	250	500	100	243	1.7
STOSD90-250-550	250	550	100	243	1.7
STOSD90-250-600	250	600	100	243	1.7
STOSD90-275-275	275	275	100	240	3.4
STOSD90-275-300	275	300	100	240	3.1
STOSD90-275-350	275	350	100	240	2.9
STOSD90-275-400	275	400	100	240	2.8
STOSD90-275-450	275	450	100	240	2.8
STOSD90-275-500	275	500	100	240	2.8
STOSD90-275-550	275	550	100	240	2.7
STOSD90-275-600	275	600	100	240	2.7
STOSD90-300-300	300	300	100	259	3.5
STOSD90-300-350	300	350	100	259	3.2
STOSD90-300-400	300	400	100	259	3.1
STOSD90-300-450	300	450	100	259	3
STOSD90-300-500	300	500	100	259	3
STOSD90-300-550	300	550	100	259	2.9
STOSD90-300-600	300	600	100	259	2.9
STOSD90-350-350	350	350	100	297	4.4
STOSD90-350-400	350	400	100	297	4.1
STOSD90-350-450	350	450	100	297	4
STOSD90-350-500	350	500	100	297	3.9
STOSD90-350-550	350	550	100	297	3.8
STOSD90-350-600	350	600	100	297	3.8
STOSD90-400-400	400	400	100	334	5.2
STOSD90-400-450	400	450	100	334	4.8
STOSD90-400-500	400	500	100	334	4.6
STOSD90-400-550	400	550	100	334	4.5
STOSD90-400-600	400	600	100	334	4.5
STOSD90-450-450	450	450	100	372	6.6
STOSD90-450-500	450	650	100	372	5.8
STOSD90-450-550	450	550	100	372	6
STOSD90-450-600	450	600	100	372	5.8
STOSD90-500-500	500	650	100	409	6.6
STOSD90-500-550	500	550	100	409	6.9
STOSD90-500-600	500	600	100	409	6.7
STOSD90-550-550	550	550	125	452	11.6
STOSD90-550-600	550	650	125	452	10.5
STOSD90-600-600	600	600	125	489	12.8

T Combined



Order code	End 1 Ød	End 2 Ød	End 3 Ød	Height 1	Length	Weight (kg)
TC100-100	100	100	100	100	300	0.9
TC125-100	125	100	100	100	325	1
TC125-125	125	125	125	100	325	1.1
TC150-100	150	100	100	100	350	1.1
TC150-125	150	125	125	100	350	1.2
TC150-150	150	150	150	100	350	1.4
TC180-100	180	100	100	100	375	1.2
TC180-125	180	125	125	100	375	1.3
TC180-150	180	150	150	100	375	1.5
TC180-180	180	180	180	100	375	1.7
TC200-100	200	100	100	100	400	1.2
TC200-125	200	125	125	100	400	1.4
TC200-150	200	150	150	100	400	1.6
TC200-180	200	180	180	100	400	1.8
TC200-200	200	200	200	100	400	1.9
TC225-100	225	100	100	100	425	1.3
TC225-125	225	125	125	100	425	1.5
TC225-150	225	150	150	100	425	1.7
TC225-180	225	180	180	100	425	1.9
TC225-200	225	200	200	100	425	2
TC225-225	225	225	225	100	425	2.2
TC250-125	250	125	125	100	450	1.6
TC250-150	250	150	150	100	450	1.8
TC250-180	250	180	180	100	450	2
TC250-200	250	200	200	100	450	2.2
TC250-225	250	225	225	100	450	2.3
TC275-150	275	150	150	100	475	2.8
TC275-180	275	180	180	100	475	3.1
TC275-200	275	200	200	100	475	3.4

Order code	End 1 Ød	End 2 Ød	End 3 Ød	Height 1	Length	Weight (kg)
TC275-225	275	225	225	100	475	3.6
TC275-250	275	250	250	100	475	3.9
TC275-275	275	275	275	100	475	4.5
TC300-150	300	150	150	100	500	3
TC300-180	300	180	180	100	500	3.3
TC300-200	300	200	200	100	500	3.5
TC300-225	300	225	225	100	500	3.8
TC300-250	300	250	250	100	500	4.1
TC300-275	300	275	275	100	500	4.7
TC300-300	300	300	300	100	500	4.9
TC350-150	350	150	150	100	550	3.3
TC350-180	350	180	180	100	550	3.6
TC350-200	350	200	200	100	550	3.9
TC350-225	350	225	225	100	550	4.2
TC350-250	350	250	250	100	550	4.5
TC350-275	350	275	275	100	550	5.1
TC350-300	350	300	300	100	550	5.3
TC350-350	350	350	350	100	550	6
TC400-200	400	200	200	100	600	4.3
TC400-225	400	225	225	100	600	4.6
TC400-250	400	250	250	100	600	4.9
TC400-275	400	275	275	100	600	5.5
TC400-300	400	300	300	100	600	5.8
TC400-350	400	350	350	100	600	6.5
TC400-400	400	400	400	100	600	7.2
TC450-200	450	200	200	125	700	5.2
TC450-225	450	225	225	125	700	5.5
TC450-250	450	250	250	125	700	5.9
TC450-275	450	275	275	125	700	6.6
TC450-300	450	300	300	125	700	6.9
TC450-350	450	350	350	125	700	7.6
TC450-400	450	400	400	125	700	8.4
TC450-450	450	450	450	125	700	9.2
TC500-200	500	200	200	125	750	5.6
TC500-225	500	225	225	125	750	6
TC500-250	500	250	250	125	750	6.4
TC500-275	500	275	275	125	750	7
TC500-300	500	300	300	125	750	7.4
TC500-350	500	350	350	125	750	8.2
TC500-400	500	400	400	125	750	9
TC500-450	500	450	450	125	750	9.8
TC500-500	500	500	500	125	750	10.7
TC550-300	550	300	300	125	800	10.1
TC550-350	550	350	350	125	800	11.1
TC550-400	550	400	400	125	800	12.1
TC550-450	550	450	450	125	800	13.2
TC550-500	550	500	500	125	800	14.3
TC550-550	550	550	550	125	800	16
TC600-350	600	350	350	125	850	11.8

T Combined

Order code	End 1 Ød	End 2 Ød	End 3 Ød	Height 1	Length	Weight (kg)
TC600-400	600	400	400	125	850	12.9
TC600-450	600	450	450	125	850	14
TC600-500	600	500	500	125	850	15.1
TC600-550	600	550	550	125	850	16.8
TC600-600	600	600	600	125	850	18.1
TC650-300	650	300	300	150	950	12.3
TC650-350	650	350	350	150	950	13.5
TC650-400	650	400	400	150	950	14.7
TC650-450	650	450	450	150	950	15.9
TC650-500	650	500	500	150	950	17.1
TC650-550	650	550	550	150	950	18.9
TC650-600	650	600	600	150	950	20.2
TC650-650	650	650	650	150	950	21.6
TC700-400	700	400	400	150	1000	15.5
TC700-450	700	450	450	150	1000	16.7
TC700-500	700	500	500	150	1000	18
TC700-550	700	550	550	150	1000	19.8
TC700-600	700	600	600	150	1000	21.2
TC700-650	700	650	650	150	1000	22.6
TC700-700	700	700	700	150	1000	23.9
TC750-400	750	400	400	150	1050	16.3
TC750-450	750	450	450	150	1050	17.6
TC750-500	750	500	500	150	1050	18.9
TC750-550	750	550	550	150	1050	20.8
TC750-600	750	600	600	150	1050	22.2
TC750-650	750	650	650	150	1050	23.6
TC750-700	750	700	700	150	1050	25
TC750-750	750	750	750	150	1050	26.4
TC800-500	800	500	500	150	1100	19.8
TC800-550	800	550	550	150	1100	21.7
TC800-600	800	600	600	150	1100	23.2
TC800-650	800	650	650	150	1100	24.7
TC800-700	800	700	700	150	1100	26.1
TC800-750	800	750	750	150	1100	27.5
TC800-800	800	800	800	150	1100	29
TC850-500	850	500	500	150	1150	20.8
TC850-550	850	550	550	150	1150	22.7
TC850-600	850	600	600	150	1150	24.2
TC850-650	850	650	650	150	1150	25.7
TC850-700	850	700	700	150	1150	27.2
TC850-750	850	750	750	150	1150	28.7
TC850-800	850	800	800	150	1150	30.2
TC850-850	850	850	850	150	1150	31.8
TC900-600	900	600	600	150	1200	25.2
TC900-650	900	650	650	150	1200	26.8
TC900-700	900	700	700	150	1200	28.3
TC900-750	900	750	750	150	1200	29.8
TC900-800	900	800	800	150	1200	31.3
TC900-850	900	850	850	150	1200	33
TC900-900	900	900	900	150	1200	34.5

Order code	End 1 Ød	End 2 Ød	End 3 Ød	Height 1	Length	Weight (kg)
TC950-650	950	650	650	150	1250	28.9
TC950-700	950	700	700	150	1250	30.4
TC950-750	950	750	750	150	1250	32
TC950-800	950	800	800	150	1250	33.6
TC950-850	950	850	850	150	1250	35.2
TC950-900	950	900	900	150	1250	36.8
TC950-950	950	950	950	150	1250	40.5
TC1000-700	1000	700	700	150	1300	31.6
TC1000-750	1000	750	750	150	1300	33.2
TC1000-800	1000	800	800	150	1300	34.8
TC1000-850	1000	850	850	150	1300	36.5
TC1000-900	1000	900	900	150	1300	38.2
TC1000-950	1000	950	950	150	1300	41.9
TC1000-1000	1000	1000	1000	150	1300	43.7
TC1100-750	1100	750	750	200	1500	48.3
TC1100-800	1100	800	800	200	1500	50.6
TC1100-850	1100	850	850	200	1500	52.9
TC1100-900	1100	900	900	200	1500	55.2
TC1100-950	1100	950	950	200	1500	60
TC1100-1000	1100	1000	1000	200	1500	62.5
TC1100-1100	1100	1100	1100	200	1500	66
TC1250-800	1250	800	800	200	1650	55.7
TC1250-850	1250	850	850	200	1650	58.2
TC1250-900	1250	900	900	200	1650	60.6
TC1250-950	1250	950	950	200	1650	65.6
TC1250-1000	1250	1000	1000	200	1650	68.2
TC1250-1100	1250	1100	1100	200	1650	73.6
TC1250-1250	1250	1250	1250	200	1650	81.7

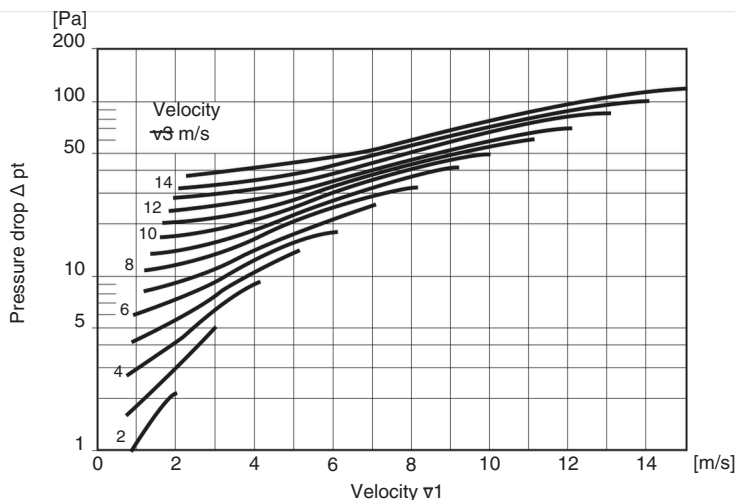
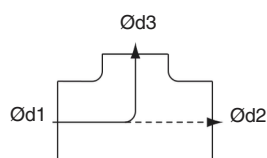
T Combined

T-piece and saddle

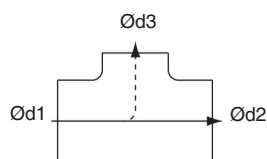
Technical data

Supply air

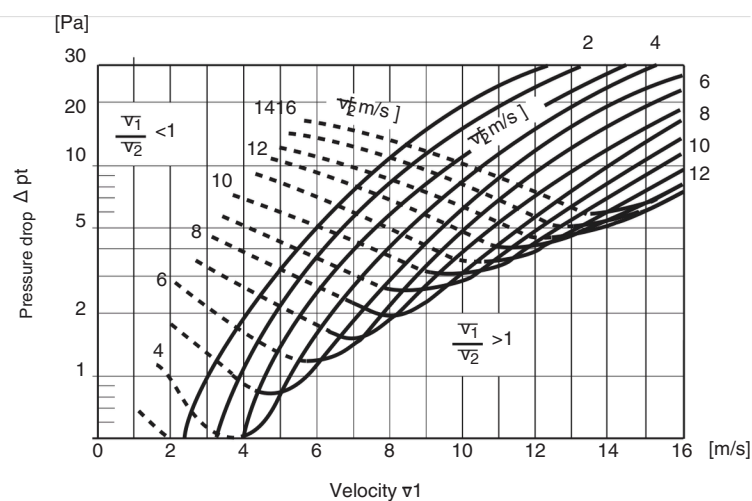
Diverging flow



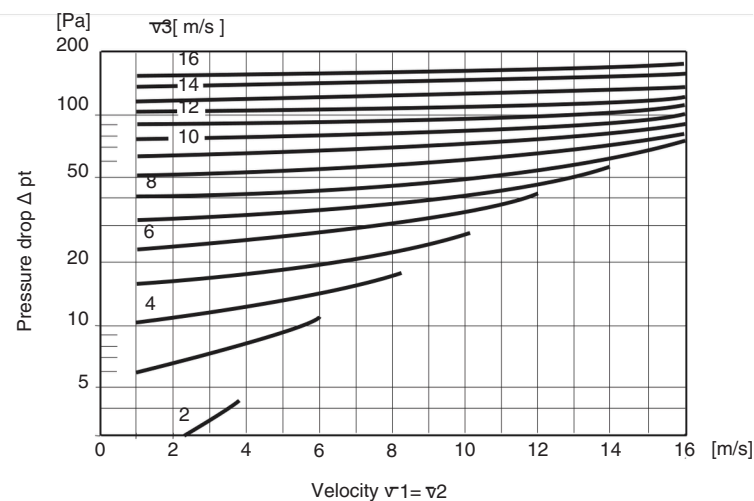
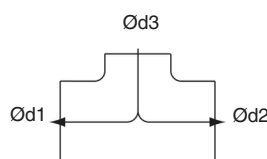
Diverging flow



The diagram is also applicable to reduction in Ød2.



Diverging flow



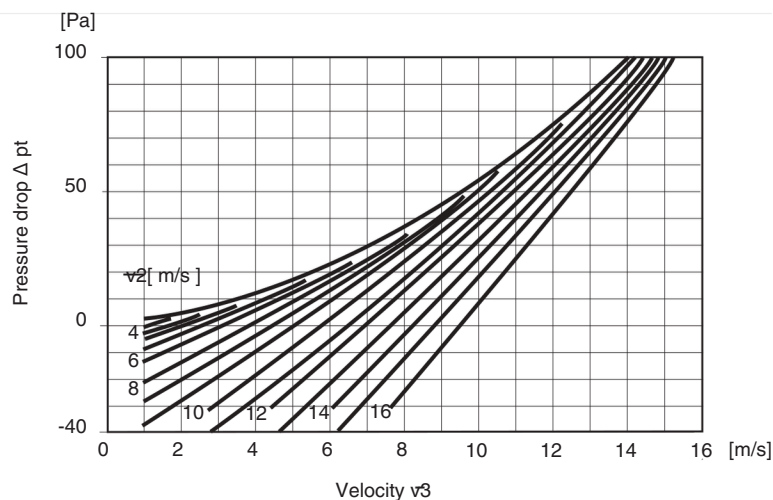
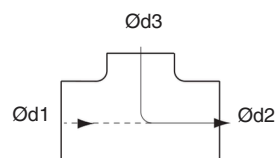
T Combined

T-piece and saddle

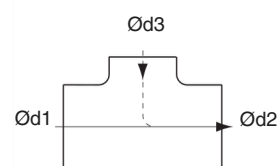
Technical data

Exhaust air

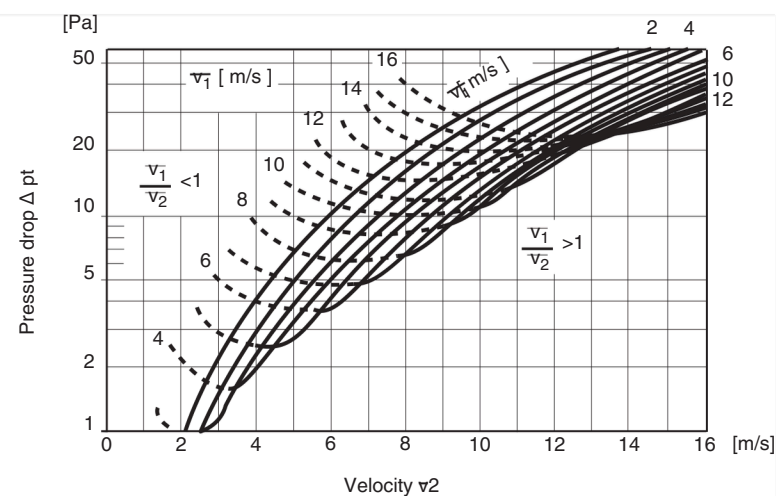
Converging flow



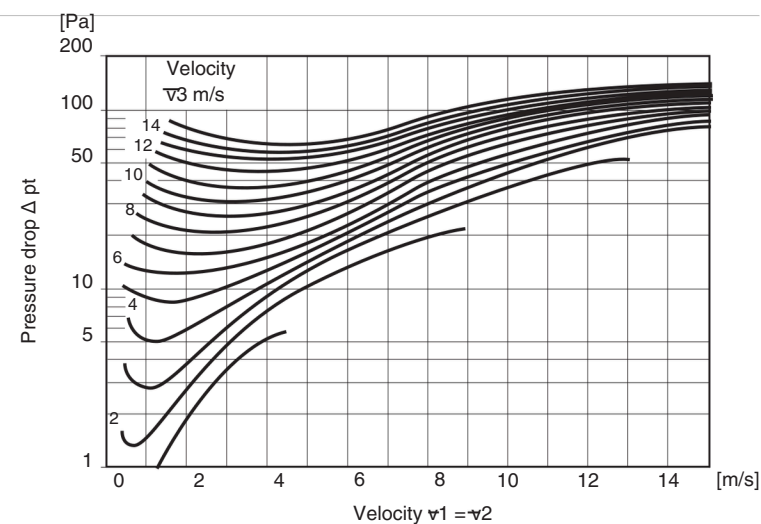
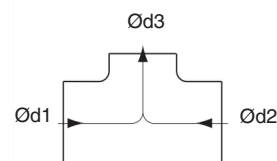
Converging flow



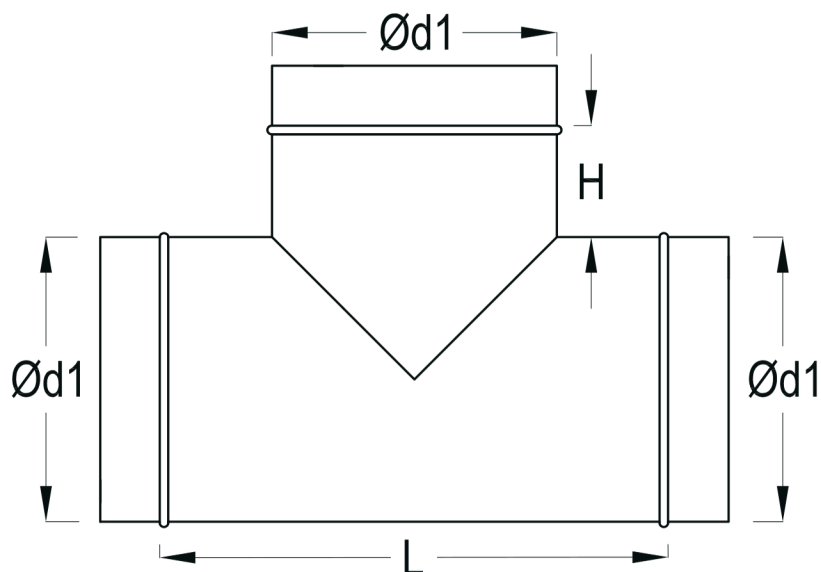
The diagram is also applicable to reduction in Ød1.



Converging flow

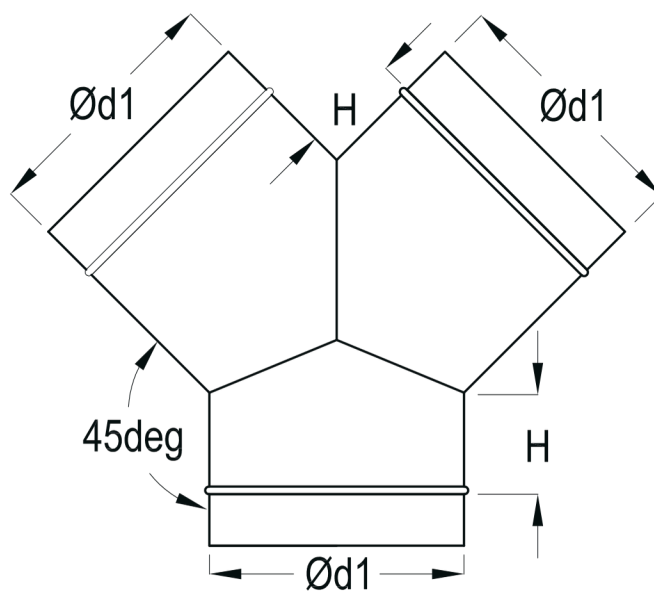


T90 Equal



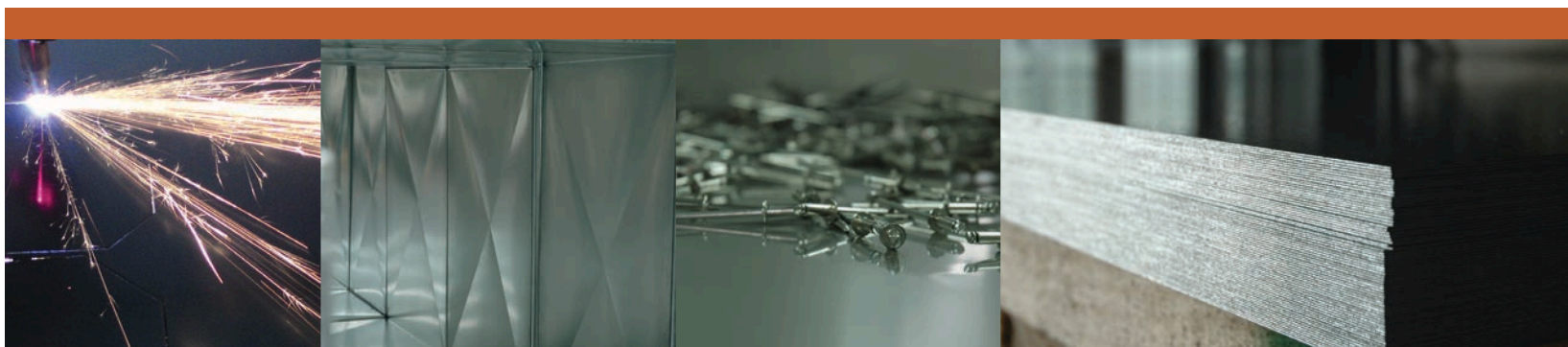
Order code	End 1 Ød	Height h	Length L	Weight (kg)
T90-100	100	75	250	0.8
T90-125	125	75	275	1.1
T90-150	150	75	300	1.3
T90-180	180	75	330	1.7
T90-200	200	75	350	1.9
T90-225	225	75	375	2.3
T90-250	250	75	400	2.5
T90-275	275	75	425	4.7
T90-300	300	75	450	5.4
T90-350	350	75	500	6.5
T90-400	400	100	600	8.5
T90-450	450	100	650	9.9
T90-500	500	100	700	11.5
T90-550	550	100	750	17.9
T90-600	600	100	800	20.2
T90-650	650	100	850	22.7
T90-700	700	100	910	25.3
T90-750	750	100	950	27.7
T90-800	800	150	1100	33.5
T90-850	850	150	1150	36.6
T90-900	900	150	1200	39.6
T90-950	950	150	1250	42.9
T90-1000	1000	150	1300	46.2
T90-1100	1100	150	1400	66.1
T90-1250	1250	150	1550	80.1

Y EQUAL



Order code	End 1 Ød	Collar height	Weight (kg)
Y100	100	75	0.8
Y125	125	75	1.1
Y150	150	75	1.3
Y180	180	75	1.7
Y200	200	75	1.9
Y225	225	75	2.3
Y250	250	75	2.5
Y275	275	75	4.7
Y300	300	75	5.4
Y350	350	75	6.5
Y400	400	100	8.5
Y450	450	100	9.9
Y500	500	100	11.5
Y550	550	100	17.9
Y600	600	100	20.2
Y650	650	100	22.7
Y700	700	100	25.3
Y750	750	100	27.7
Y800	800	150	33.5
Y850	850	150	36.6
Y900	900	150	39.6
Y950	950	150	42.9
Y1000	1000	150	46.2
Y1100	1100	150	66.1
Y1250	1250	150	80.1

Contact Details





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