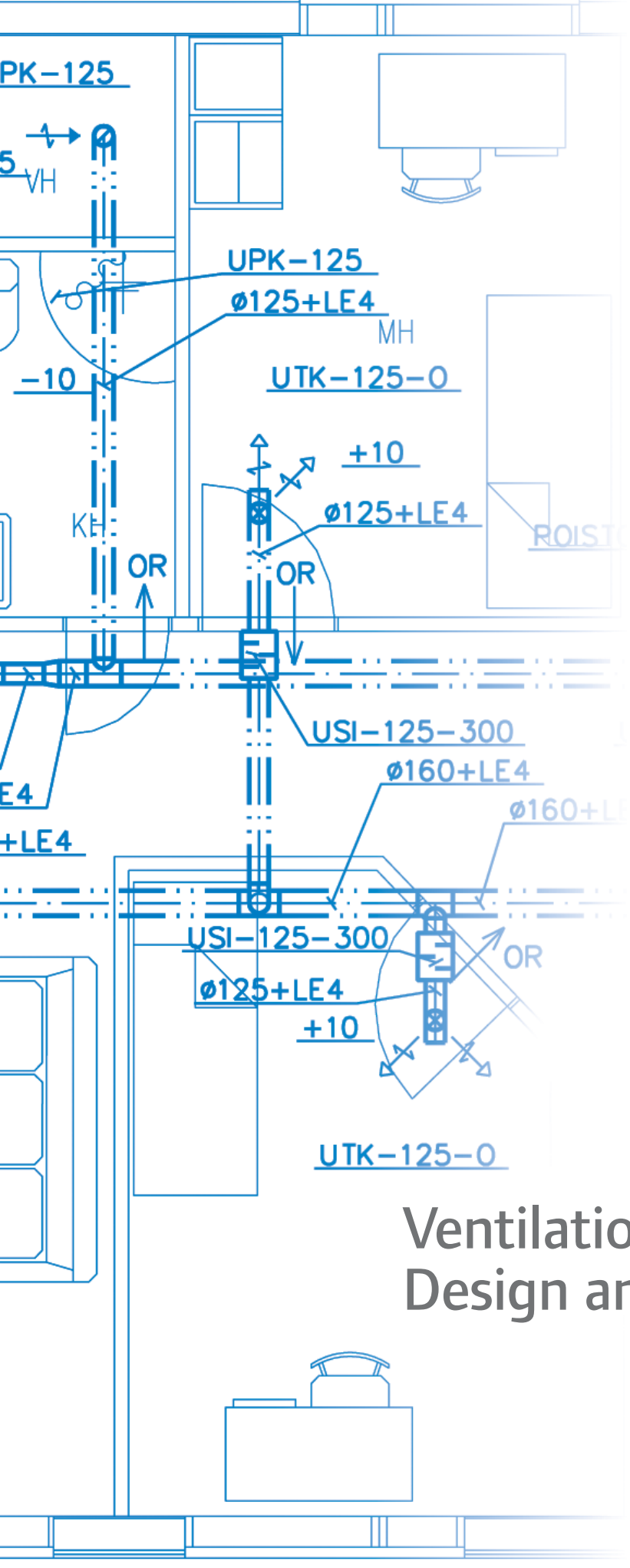


Ventilation system
Design and installation guide

Contents

Uponor ventilation systems

The instructions in this manual are designed for the implementation of apartment-specific ventilation systems of detached, terraced, or semi-detached houses. The structural fire compartmentalisation of the attic spaces of terraced and semi-detached houses must be apartment-specific.

The Uponor ventilation system comprises both uninsulated and insulated ducts and ducting components. With insulated ducting, supply air can be cooled in a safer manner and the energy is not dissipated into the structures. On the other hand, the insulated ducts located in the insulation space above the ceiling are denoted as 'safe', avoiding risks related to condensation and installation errors.

YHTEISTYÖSSÄ ALLERGIA- JA ASTMALIITON KANSSA

ILMANVAIHTOTUOTTEEN PUHTAUSLUOKKA M1

SISÄILMAYHDISTYS KANNATTAJAJÄSEN

- The ducting and components are clean and protected, all the way from production to installation
- The product selection also includes insulated factory-made ducts and components ready for installation
- The system does not collect dust or dirt: antistatic PP material is resistant to all impurities
- Installation is fast and simple
- Easy-to-handle material
- Ducting that can be installed without separate sealing and locking
- Technically excellent structure for air flow
- The system presents no corrosion problems
- Odour problems also are prevented
- The system guarantees clean indoor air throughout the home
- It has a patented structure and jointing solution.
- Patent Numbers:
  Finland: FI115664
  Sweden, Denmark and Estonia: EP1222418, Norway: application NO20021856

Technical specifications of the duct material

Raw material:	polypropylene; odourless and non-toxic
Colour:	black
Density:	≈ 900 kg/m^3
Tensile strength:	30 MPa
Heatexpansion:	0,06 mm/m °C

Technical characteristics of the ducting

The inner surface of the ducts and components is smooth and seamless.

Fire-related performance:
- Technical Research Centre of Finland Certificate 158/01
  Date 25/4/2014
- Compliance with the fire safety regulations has been demonstrated in accordance with the National Building Code of Finland, section E1:1.3.2.
  Technical Research Centre of Finland's reports
  Code VTT-S-12299-06
  Date 29/12/2006
  Code VTT-S-03927-07
  Date 14/5/2007
  Code VTT-M-03934-07
  Date 14/5/2007.

Impact-resistance: Meeting of the requirements set in SFS-EN 1411.

Corrosion-resistance: Chemical-resistance as described in the standard ISO/TR 10358.

Antistatic properties:
Antistatic product. The antistatic properties of the duct and components are ensured in production in accordance with the test procedure IEC61340-4-10.

Heat-resistance:
Continuous –50 °C...+85 °C,
Continuous +100 °C.

Resistance to cold:
Lowest recommended installation temperature of -15 °C, with resistance to cold verified by continuous quality control in accordance with the test method SFS/EN 1411.

Cleanliness class: Cleanliness class M1. Developed in co-operation with the Finnish Allergy and Asthma Association.

Product name	Size	Material and code	Manufacturing date	Manufacturing unit	International approvals

Duct markings

Technical specifications of duct insulation

Raw material:	foamed polyethylene
Colour:	grey
Density:	30 kg/m^3, insulation thickness 15 mm
Fire performance:	no fire classification.

VTT research reports

- Industrially insulated ventilation ducting of a detached house
  Laboratory measurements of surface temperature
  Date 6.11.2006
  Computational assessment of the insulation thickness required to prevent condensation in ventilation ducting and to restrict heat losses for product development and laboratory test purposes
  Date 10.5.2006.

Silencers

The silencers are manufactured of PE plastic. The silencers are tested by VTT (the Technical Research Centre of Finland), Certificate VTT-S-03839-07
Date: 24.4.2007

- Silencers of cleanliness class M1
- square silencers have round duct outlets
- they are lightweight and easy to handle
- they provide outstanding noise suppression properties
- they are impact- and corrosion-resistant
- they are black in colour
- the interior noise suppression material of the silencer is Dacron
- the material releases no fibres, and it absorbs no moisture
- the materials cause no skin or respiratory irritation
- no odour or mould problems.

Quality

The plastic Uponor ventilation system ducts and components have been granted a VTT product certificate.

Sizes and tolerances

The duct sizes are ø 100 (+0.5) mm, ø 125 (+0.5) mm, ø 160 (+0.6) mm, and ø 200 (+0.7) mm. The tolerances are in compliance with duct standard SFS 3282. The tolerances of injection-moulded components are more precise than the standard requires. Uponor ventilation ducts and components are compatible with duct components manufactured in accordance with the standard SFS 3282.

Tightness of ducting

The ducting air-tightness classification is D (VTT report VTT-S-11208-08). Duct connections must be made in accordance with the instructions in this manual. Connections may not be glued together, because solvents do not take effect on polypropylene.

Packing

The ducts are delivered with both ends plugged to keep them clean. Duct components are delivered packed in plastic bags and cardboard boxes.

Storage

Withstands outdoor storage for two years in Central European climate conditions. The ducts are UV-protected. A maximum of two superimposed-layers. Stored protected as much as possible from contamination.

Cleaning

The ducting is swept clean at least every 10 years. The ducting should also be checked and cleaned before commissioning, as necessary.

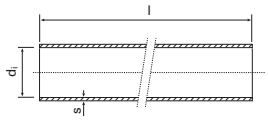
Ventilation ducts and components

Clean ventilation ducting

Duct material: polypropylene. Colour: black.

Round duct

Delivered in three-metre poles.

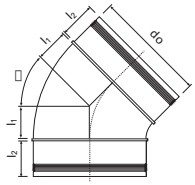


d_i x l	Uponor no.	HVAC no.	s
100 x 3000	1068037	8273024	2,1
125 x 3000	1068038	8273025	2,1
160 x 3000	1068039	8273026	2,5
200 x 3000	1068040	8273027	3,0

Clean duct components

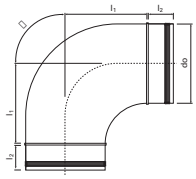
Material: polypropylene. Colour: black.

Bend 45°



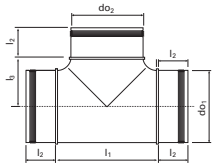
do x α	Uponor no.	HVAC no.	l_1	l_2
100 x 45°	1068057	8273029	46	40
125 x 45°	1068058	8273030	36	50
160 x 45°	1068059	8273031	45	50
200 x 45°	1068056	8273032	54	50

Bend 90°



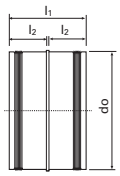
do x α	Uponor no.	HVAC no.	l_1	l_2
100 x 90°	1068053	8273033	81	40
125 x 90°	1068054	8273034	110	50
160 x 90°	1068055	8273035	160	50
200 x 90°	1068052	8273036	130	50

Branch



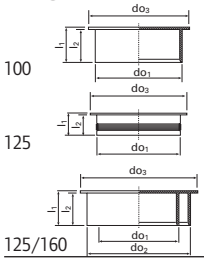
do_1/do_2	Uponor no.	HVAC no.	l_1	l_2	l_3
100/100	1068060	8273037	142	40	71
125/100	1068064	8273038	144	50	81
125/125	1068061	8273039	168	50	81
160/100	1068065	8273040	144	50	98
160/125	1068062	8273041	168	50	101
160/160	1068063	8273042	196	50	100
200/160	1068066	8273043	202	50	118

Connector



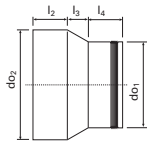
do	Uponor no.	HVAC no.	l_1	l_2
100	1068049	8273047	83	40
125	1068050	8273048	103	50
160	1068051	8273049	103	50
200	1068048	8273050	103	50

Plug



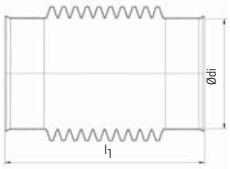
do_1/do_2	Uponor no.	HVAC no.	do_3	l_1	l_2
100	1068067	8273051	120	43	40
125	1068068	8273052	145	33	30
125/160	1068069	8273053	180	53	50

Reducer



do_1/do_2	Uponor no.	HVAC no.	l_2	l_3	l_4
100/125	1068070	8273044	50	20	40
125/160	1068071	8273045	51	30	50
160/200	1068072	8273046	51	40	50

Flexible bends

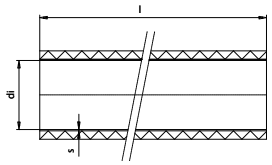


di x α	Uponor no.	HVAC no.	l_1
125 x 0-45°	1061401	8273020	261
125 x 0-90°	1061402	8273021	419
160 x 0-45°	1061403	8273022	333
160 x 0-90°	1061404	8273023	563

Insulated ducting

Duct material: polypropylene. Colour: black.
Insulation material: foamed polyethylene. Colour: grey.
Insulation thickness: 15 mm

Round duct



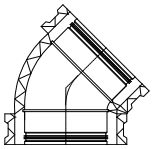
Delivered in three-metre poles.

d_i x l	Uponor no.	HVAC no.
100 x 3000	1068041	8273054
125 x 3000	1068042	8273055
160 x 3000	1068043	8273056
200 x 3000	1068044	8273058

Insulated duct components

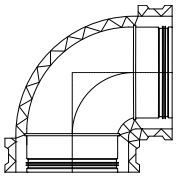
Material: polypropylene. Colour: black.
Insulation material: foamed polyethylene. Colour: grey.
Insulation thickness: 15 mm
The required number of fasteners are delivered with the components.

Bend 45°



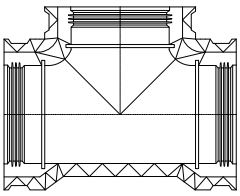
do x α	Uponor no.	HVAC no.
100 x 45°	1068082	8273071
125 x 45°	1068083	8273072
160 x 45°	1068084	8273073
200 x 45°	1068081	8273070

Bend 90°



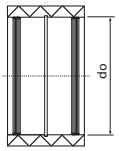
do x α	Uponor no.	HVAC no.
100 x 90°	1068078	8273067
125 x 90°	1068079	8273068
160 x 90°	1068080	8273069
200 x 90°	1068077	8273066

Branch



do_1/do_2	Uponor no.	HVAC no.
100/100	1068085	8273074
125/100	1068089	8273078
125/125	1068086	8273075
160/100	1068090	8273079
160/125	1068087	8273076
160/160	1068088	8273077
200/160	1068091	8273080

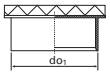
Connector



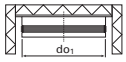
do	Uponor no.	HVAC no.
100	1068074	8273063
125	1068075	8273064
160	1068076	8273065
200	1068073	8273062

Plug

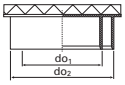
100



125

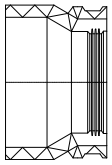


125/160



do_1/do_2	Uponor no.	HVAC no.
100	1068092	8273081
125	1068093	8273082
125/160	1068094	8273083

Reducer

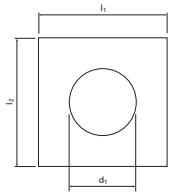


do_1/do_2	Uponor no.	HVAC no.
100/125	1068095	8273084
125/160	1068096	8273085
160/200	1068097	8273086

Fastener

Product	Uponor no.	HVAC no.
Kiristysnauhapussi, 10 kpl/pussi	1054916	8273920

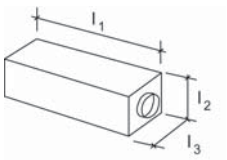
Vapour barrier inlet



Self-adhesive, PE plastic.

Koko d_1	Uponor no.	HVAC no.	l_1	l_2	thickness
100	1046252	8273822	240	240	10
125	1046251	8273824	240	240	10
160	1047036	8273825	320	320	10
200	1047037	8273826	320	320	10

Silencers



Square, Dacron as the noise suppression material.

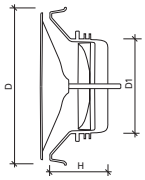
Joint size and model	Uponor no.	HVAC no.	l_1	l_2	l_3
USI - 125 - 300	1046253	8273930	300	200	279
USI - 125 - 650	1046254	8273931	650	200	279
USI - 125 - 1000	1046255	8273932	1000	200	279
USI - 160 - 650	1046256	8273933	650	230	300
USI - 160 - 1000	1046257	8273934	1000	230	300
USI - 200 - 1000	1057895	8273935	1000	250	360

Valves

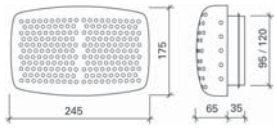
Standard colour; white.

Supply air valves (mechanical balanced ventilation)

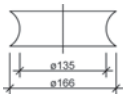
Ceiling-mounted valves



Wall-mounted valves



Valve collar

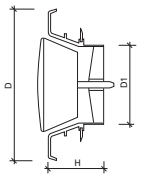


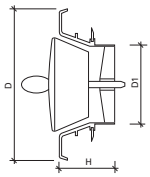
Connection size and model	Uponor no.	HVAC no.	D	D1	H
UTK-V-100, white	1046266	8273615	138	90	58
UTK-K-100, chrome	1046267	8273616	138	90	58
UTK-M-100, brass	1046268	8273617	138	90	58
* UTK-S-100, white	1046269	8273618	138	90	58
* UTK-S-M-100, brass	1046270	8273619	138	90	58
UTK-V-125-, white	1046271	8273620	175	115	66
UTK-K-125, chrome	1046272	8273621	175	115	66
UTK-M-125, brass	1046273	8273622	175	115	66
* UTK-S-125, white	1046274	8273623	175	115	66
* UTK-S-M-125, brass	1046275	8273624	175	115	66
UKK-125, valve collar	1046227	8273694	166	135	55
Wall-mounted valves UTS-100	1046226	8273682	Dimensions in the illustration		
UTS-125	1046218	8273524	Dimensions in the illustration		

* Withstands temperatures up to ~ 200 °C. The mounting frame supplied with the valve must always be used with the sauna valve.

Exhaust valves (mechanical balanced ventilation)

Ceiling-mounted valves

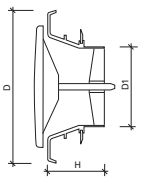




Connection size and model	Uponor no.	HVAC no.	D	D1	H
UPK-100	1046214	8273542	138	72	50
UPK-C-100, chrome	1046228	8273703	138	72	50
UPK-M-100, brass	1046229	8273704	138	72	50
UPK-125	1046213	8273544	168	90	60
UPK-C-125, chrome	1046230	8273713	168	90	60
UPK-M-125, brass	1046231	8273714	168	90	60
* UPK-S-100 with a wooden knob	1046232	8273745	138	72	50
* UPK-S-125, with a wooden knob	1046233	8273755	168	90	60
* UPK-S-M-100, brass, with a wooden knob	1046234	8273744	138	72	50
* UPK-S-M-125, brass, with a wooden knob	1046235	8273754	168	90	60

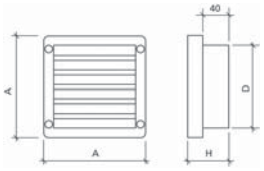
* Withstands temperatures up to ~ 200 °C. The mounting frame supplied with the valve must always be used with the sauna valve.

Disc valves (gravitational ventilation)



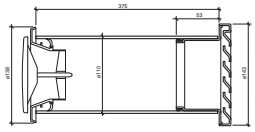
Joint size and model	Uponor no.	HVAC no.	D	D1	H
ULV-100	1046236	8273782	138	72	58
ULV-125	1046237	8273792	168	90	66

Outdoor grilles



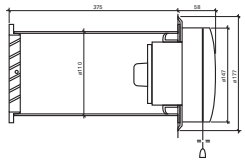
Joint size and model	Uponor no.	HVAC no.	A	D	H
USS-100 with a door screen	1046238	8273851	143	123	57
USS-125 with a door screen	1046239	8273856	143	123	57
USS-160 with a removable framed screen	1046240	8273861	235	160	74
USS-200 with a removable framed screen	1046241	8273866	235	200	74
160/200 framed screen for outdoor grille	1046242	8273874			

Fresh air valve



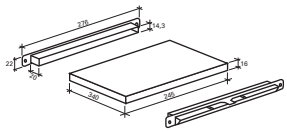
Joint size and model	Uponor no.	HVAC no.
URS-100	1046243	8273882

Fresh air valves



Joint size and model	Uponor no.	HVAC no.
UKS-100, for wall	1046244	8273892
UKTL-100, for vent hole	1046245	8273902

Slit valve



Joint size and model	Uponor no.	HVAC no.
URV-18, 18 x 245 x 340	1046246	8273922

Ventilation design

Definitions

- **A fresh air duct** supplies fresh air to the ventilation unit.

- **Supply air ducts** distribute the fresh air from the unit to the rooms.

- **Exhaust air ducts** conduct indoor air to the ventilation unit, which uses the thermal capacity to warm incoming fresh air, as necessary.

- **A waste air duct** removes exhaust air by conveying it from the ventilation unit to the exhaust pipe on the roofs.

- **Mineral wool** refers to both glass wool and rock wool. Mineral wool does not burn or rot.

The recommended starting point in ventilation system design and duct sizing is to use a relatively low air velocity in ducts – i.e., less than 3 m/s.

Uponor ventilation duct applications

Uponor ventilation ducting is used in accordance with section E1 of the National Building Code of Finland for the apartment-specific ventilation of detached, terraced, or semi-detached housing, excluding local exhaust ventilation ducting in kitchens.

Kitchen hood/fan exhaust duct

The exhaust ducts of kitchen hoods or fans are made of non-combustible steel sheet with a minimum thickness of 0.5 mm. The fire-insulation of the duct in the attic and attic cavities must be prepared with insulation that has class-EI30 fire-resistance. The local exhaust duct is not connected to the ventilation system of the rest of the house; instead, it is vented to the roof separately and equipped with a separate exhaust fan.

Location of ducting

Supply and exhaust air ducts are normally installed

- embedded in roof insulation above the ceiling,
- in the attic,
- inside the intermediate floor/ceiling,
- above a suspended ceiling, or
- below the ceiling, inside a housing.

The supply air valves are mainly installed in living rooms and bedrooms, for the constant supply of fresh air into the rooms. Because the exhaust air valves are designed for dehumidification and odour removal in addition to air circulation, they are situated in bathrooms, sauna and utility rooms, walk-in closets, kitchens, tambours, and toilets. Used air flows through door slits (min. 15 mm) from the rooms with supply air valves to those with exhaust air valves. Supply and exhaust air ducts are fitted with silencers (1000 mm) directly behind the ventilation unit, in order to prevent equipment noise from entering the rooms. Additionally, 300 mm long silencers can be installed for bedrooms.

Official regulations

In the design and installation of air ducting, the regulations and instructions provided by sections D2, E1, E7, and C1 of the National Building Code of Finland must be followed. Ventilation ducting must be protected by means of a suspended ceiling or housing structures from the side of inhabited spaces, in accordance with section E1 of the National Building Code of Finland, with materials of at least class D-s2, d2.

Duct insulation

The thermal, condensation water and fire insulation of ducting are specified in the ventilation plan. Insulation must be marked in the drawing with reference to codes, such as

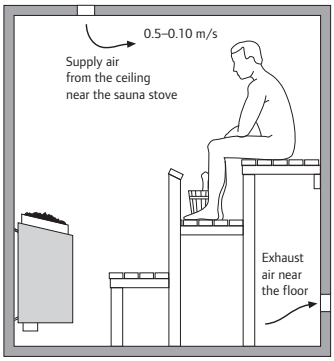
- LE1: thermal insulation, mineral wool, 50 mm
- LE2: thermal insulation, mineral wool 50 + 50 mm.
- LE3: thermal insulation, mineral wool, 50 + loose mineral wool or similar of at least 100 mm on top of the insulated duct
- LE4: In warm spaces, condensation- and thermal insulation, expanded PE plastic, 15 mm. When installed inside the thermal insulation of the ceiling , at least 100 mm of mineral-wool-based loose wool or similar mineral wool on top of the duct insulated with 15 mm PE plastic.
- LE5: condensation and thermal insulation, expanded PE plastic, 15 mm + mineral wool, 50 mm
- PE: fire-insulation, mineral wool EI30.

To facilitate on-site insulation work, use of insulated ducts and components with 15 mm expanded PE plastic insulation is recommended.

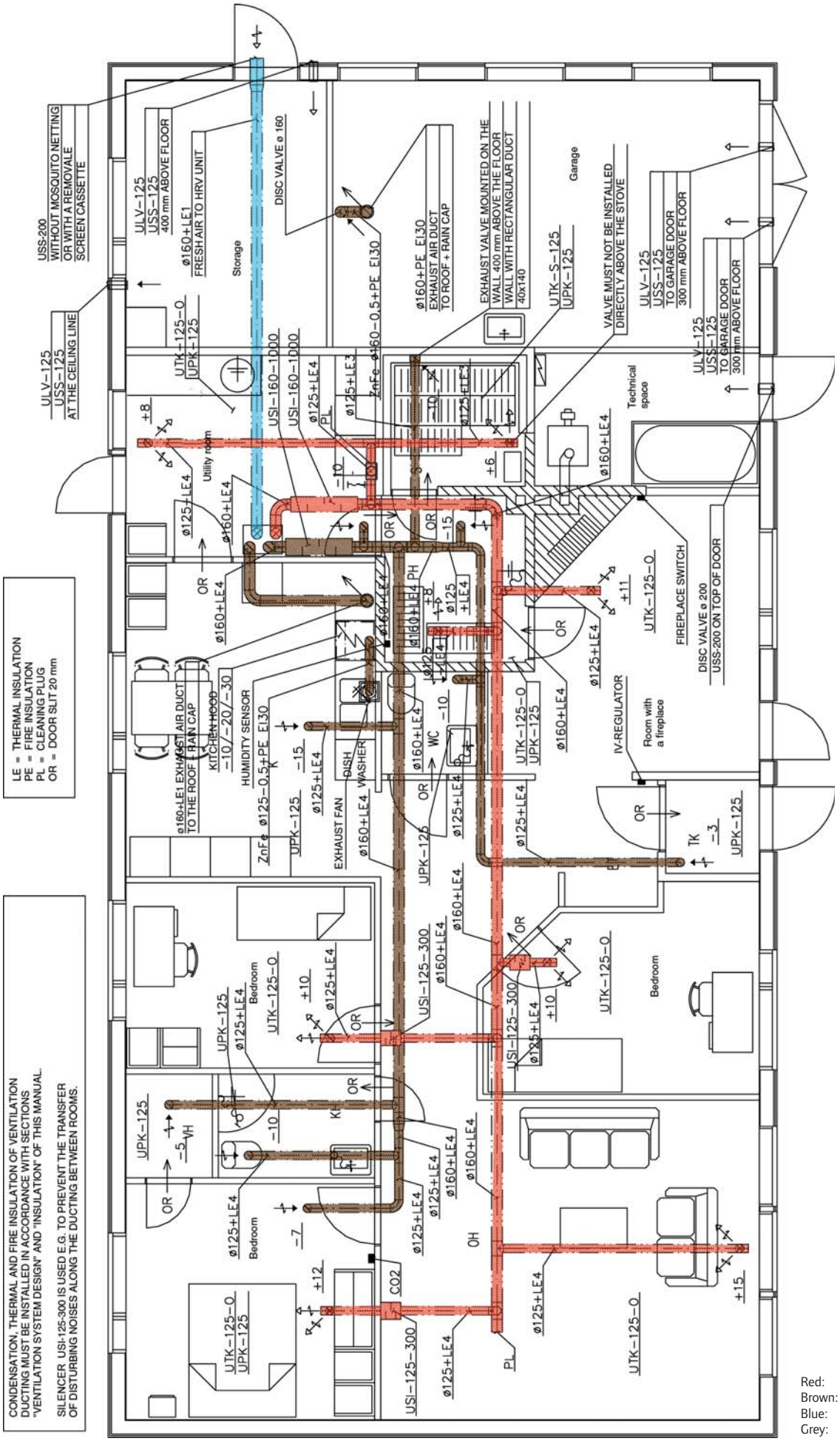
Sauna room ventilation

Temperature limitations must be observed in the design of sauna room ventilation. The ducting is either embedded in the sauna room insulation or installed above the insulation layer. In other circumstances, such as when immediately behind panelling, the ducting must be thermally insulated with 50 mm of mineral wool. The ducting and frame of ceiling-mounted valves must be firmly secured to the ceiling structures with screws.

Please note: Use only dedicated heat-resistant sauna valves near the ceiling in sauna rooms. The supply air valve is marked with a red label and the exhaust air valve has a wooden knob. Sauna valves must always be installed in combination with the mounting frame. The mounting frame must be attached to the wooden ceiling material with screws, after which the valve can be installed in place. The valve must not be installed directly on top of the sauna stove.



Ventilation of the sauna



Example of a ventilation system design for a detached house. Bill of materials on the following page.

Bill of materials for the example ventilation system for a detached house on the previous page

Uponor no.	Size/code	Name	Manufacturer	pcs	m
1068043	ø160	Round duct, insulated	Uponor Suomi Oy	13	36
1068042	ø125	Round duct, insulated	Uponor Suomi Oy	18	48
1068080	ø160	Bend 90°, insulated	Uponor Suomi Oy	3	
1068079	ø125	Bend 90°, insulated	Uponor Suomi Oy	12	
1068087	ø160/125	Branch, insulated	Uponor Suomi Oy	11	
1068086	ø125/125	Branch, insulated	Uponor Suomi Oy	12	
1068088	ø160/160	Branch, insulated	Uponor Suomi Oy	1	
1068076	ø160	Connector, insulated	Uponor Suomi Oy	8	
1068075	ø125	Connector, insulated	Uponor Suomi Oy	9	
1068094	ø125/160	Plug, insulated	Uponor Suomi Oy	1	
1068093	ø125	Plug, insulated	Uponor Suomi Oy	8	
1068096	ø125/160	Reducer, insulated	Uponor Suomi Oy	2	
1068097	ø160/200	Reducer, insulated	Uponor Suomi Oy	1	
1046251	ø125	Vapour barrier inlet	Uponor Suomi Oy	21	
1046271	UTK-V-125	Supply air valve with air controller	Uponor Suomi Oy	7	
1046274	UTK-S-125	Supply air valve for sauna	Uponor Suomi Oy	1	
1046213	UPK-125	Exhaust valve	Uponor Suomi Oy	9	
1046237	ULV-125	Disc valve	Uponor Suomi Oy	4	
1046241	USS-200	Outdoor grille with removable framed screen	Uponor Suomi Oy	2	
1046239	USS-125	Outdoor grille with mosquito net	Uponor Suomi Oy	4	
1046253	USI-125-300	Silencer	Uponor Suomi Oy	3	
1046257	USI-160-1000	Silencer	Uponor Suomi Oy	2	

In addition, a list of products not included in the Uponor Finland product range

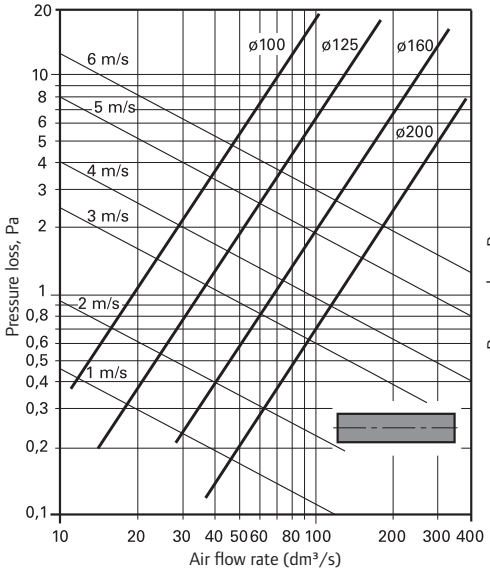
	Size/code	Name	pcs	m²
		Mineral wool thermal insulation, 50 mm, LE1 and LE3		7
		Mineral wool fire-insulation, 50 mm PE EI30		3
		Kitchen hood with through-hole to the roof and exhaust fan	1	
		Supply/exhaust ventilation unit with humidity sensor	1	
	ø125	Round ZnFe ventilation duct		5 m
	ø160	Round ZnFe ventilation duct		3 m
	ø125	Bend, ZnFe 90°	2	
	ø160	Bend, ZnFe 90°	2	
	40x140	Rectangular sauna ducting package	1	
	ø160	Waste air duct to roof and rain cap	2	
	ø160	Disc valve	1	
	ø200	Disc valve	1	

Dimensioning of the ducting and silencers, and the pressure loss graphs

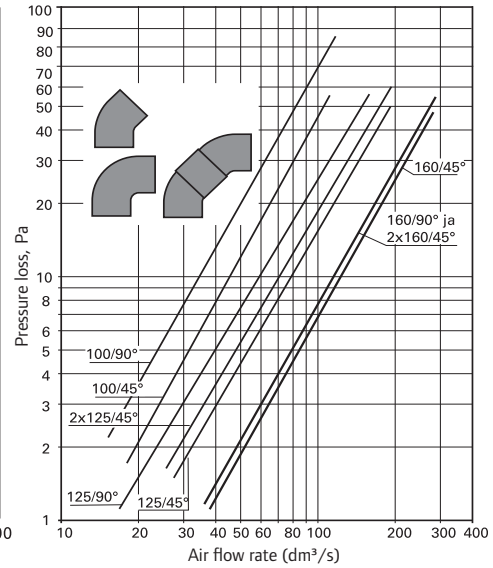
The main supply and exhaust air ducts must be dimensioned loose to the maximum extent possible, which minimises pressure loss in the ducting.

The supply air valves are connected to the main ducting with branches.

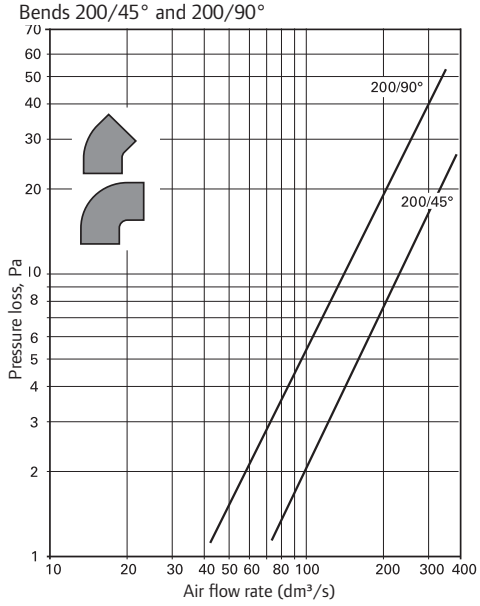
Ducts ø 100, ø 125, ø 160 and ø 200



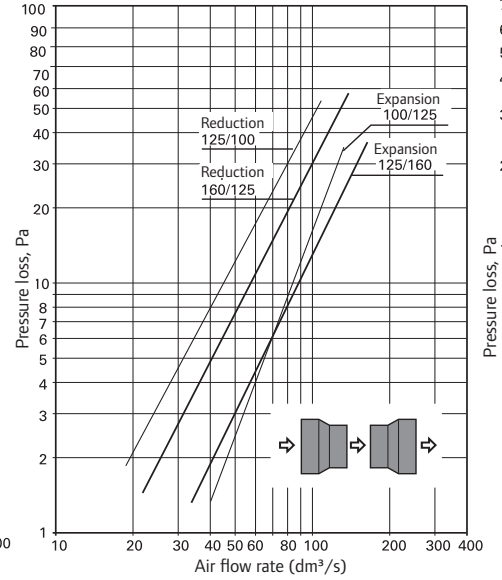
Bends 100/45°, 100/90°, 125/45°, 2x125/45°, 125/90°, 160/45°, 2x160/45° and 160/90°



Bends 200/45° and 200/90°

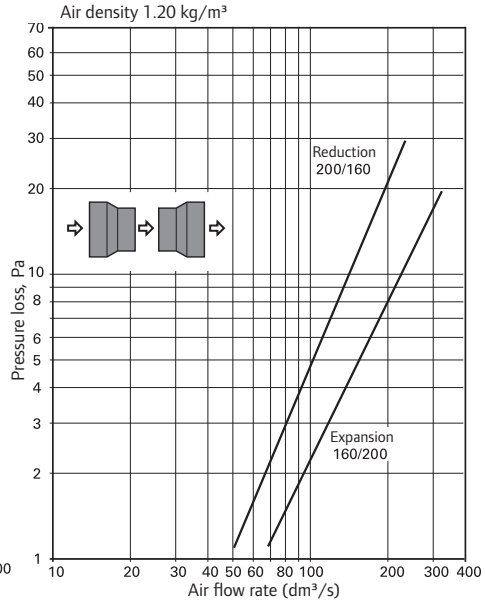


Reducer: Reducers 125/100, 160/125 and expanders 100/125 and 125/160



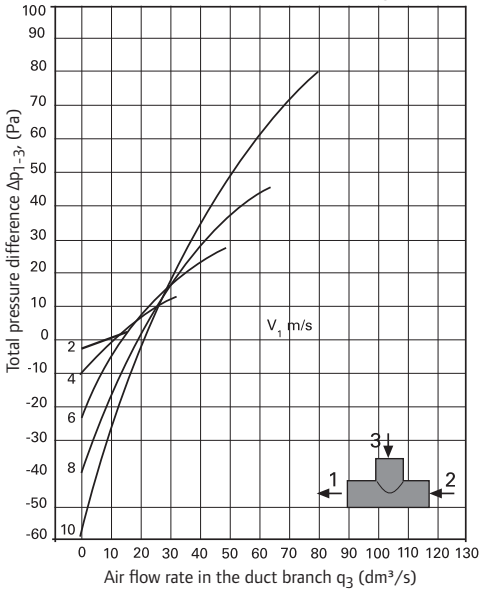
Reducer: Reducer 200/160, and expander 160/200

Air density 1.20 kg/m³



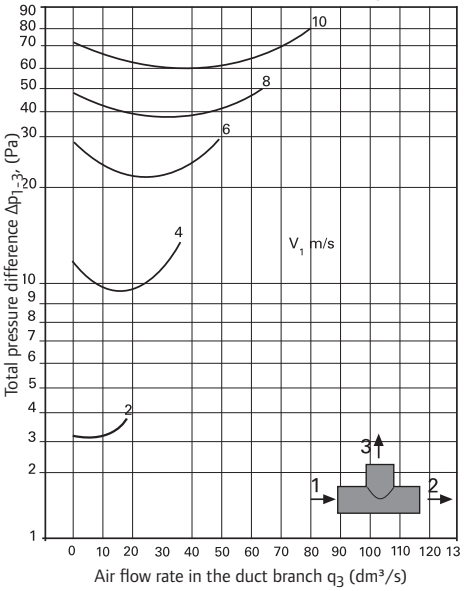
Branch 100/100

Side exhaust. Total pressure difference Δp_{1-3}



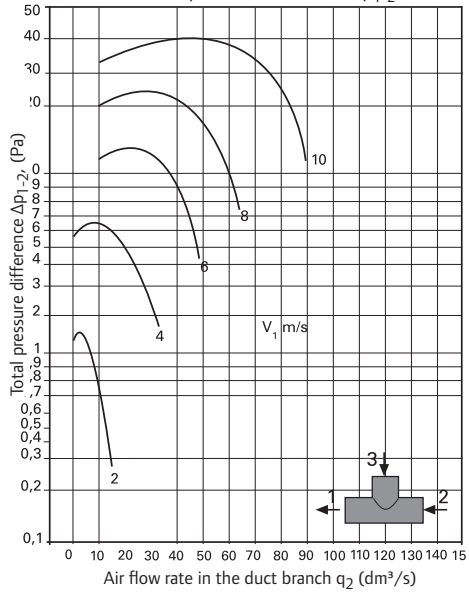
Branch 100/100

Side exhaust. Total pressure difference Δp_{1-3}



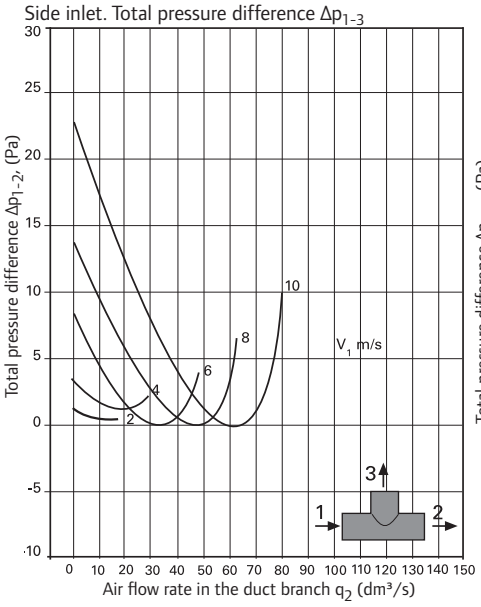
Branch 100/100

Side exhaust. Total pressure difference Δp_{1-2}



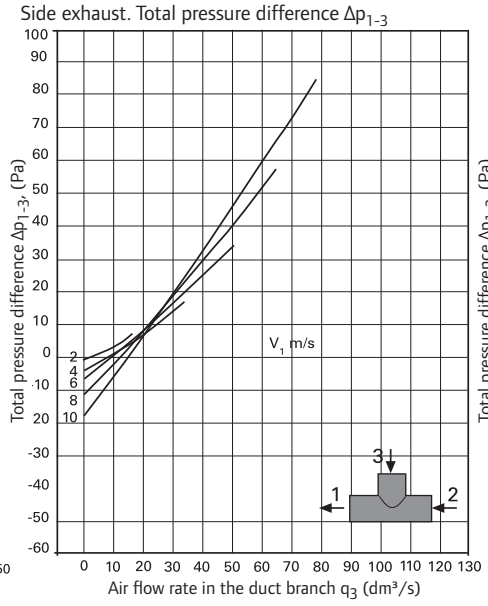
Branch 100/100

Side inlet. Total pressure difference Δp_{1-3}



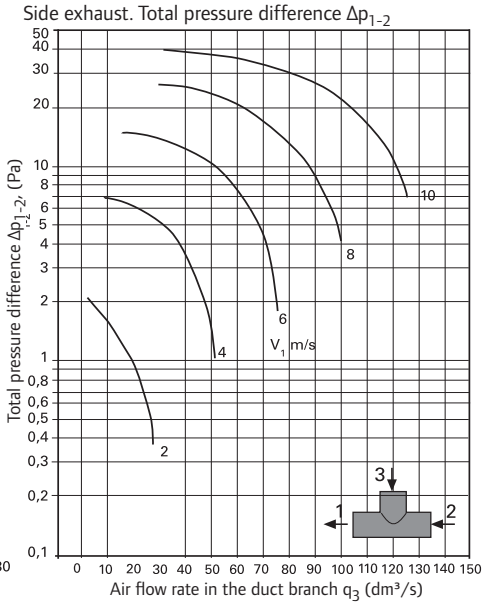
Branch 125/100

Side exhaust. Total pressure difference Δp_{1-3}



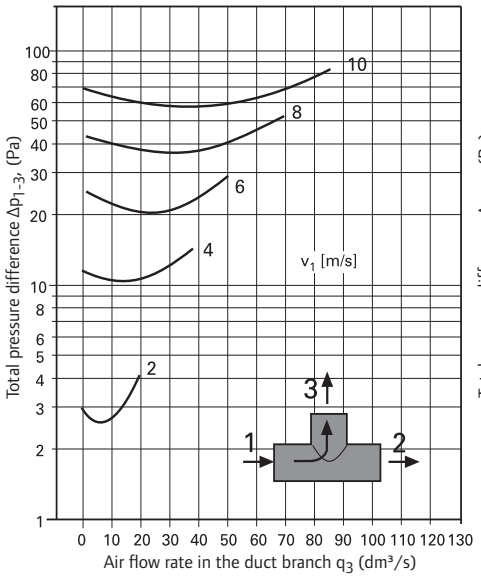
Branch 125/100

Side exhaust. Total pressure difference Δp_{1-2}



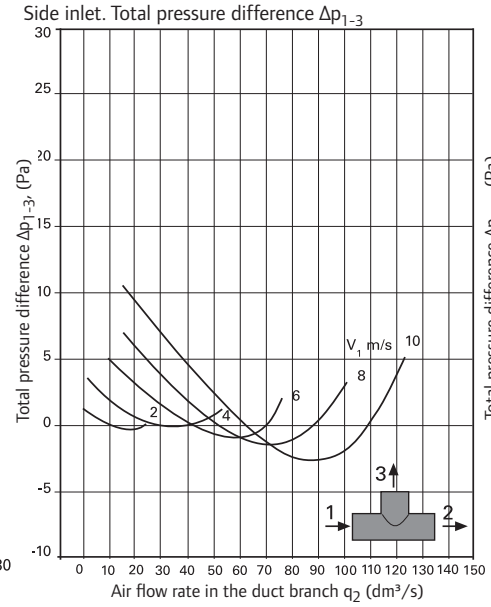
Branch 125/100

Side inlet. Total pressure difference Δp_{1-3}



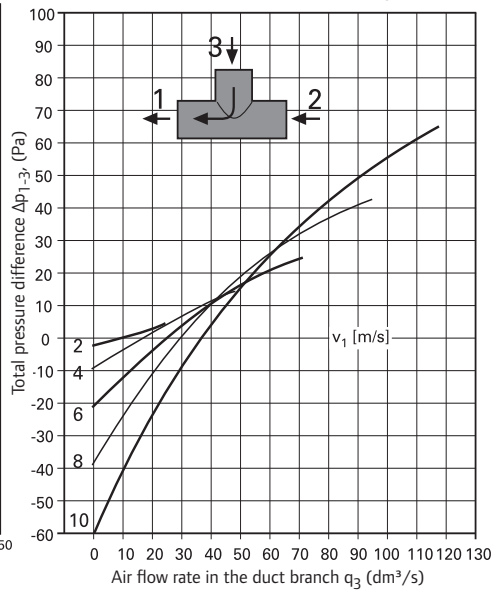
Branch 125/100

Side inlet. Total pressure difference Δp_{1-3}



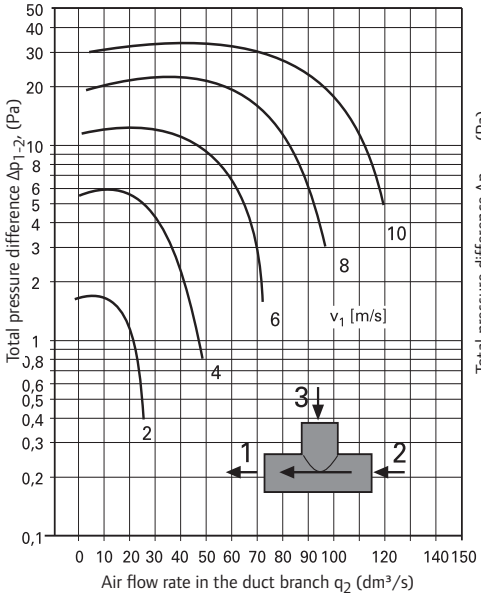
Branch 125/125

Side exhaust. Total pressure difference Δp_{1-3}



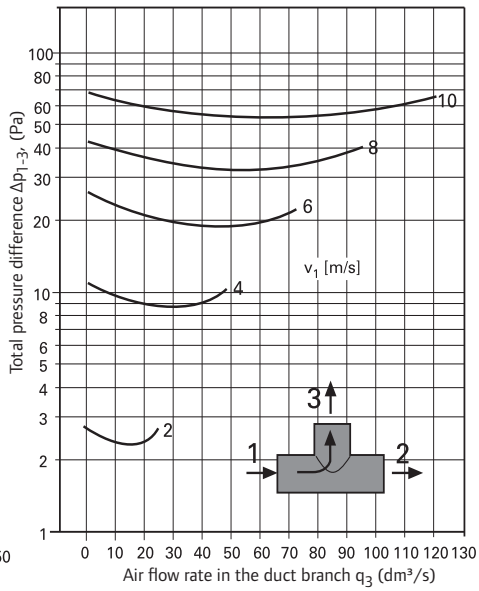
Branch 125/125

Side exhaust. Total pressure difference Δp_{1-2}



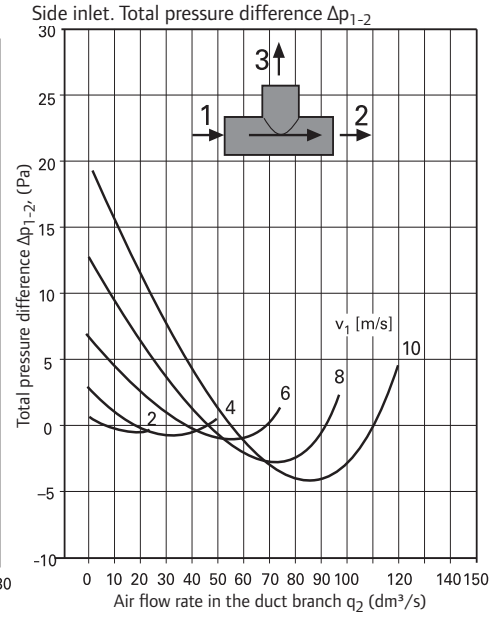
Branch 125/125

Side inlet. Total pressure difference Δp_{1-3}



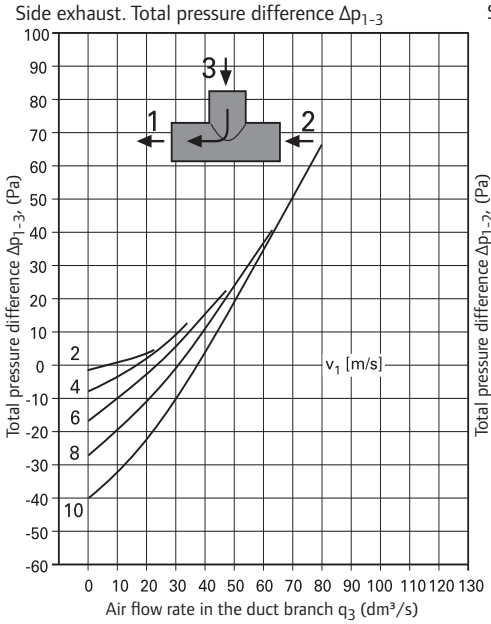
Branch 125/125

Side inlet. Total pressure difference Δp_{1-2}



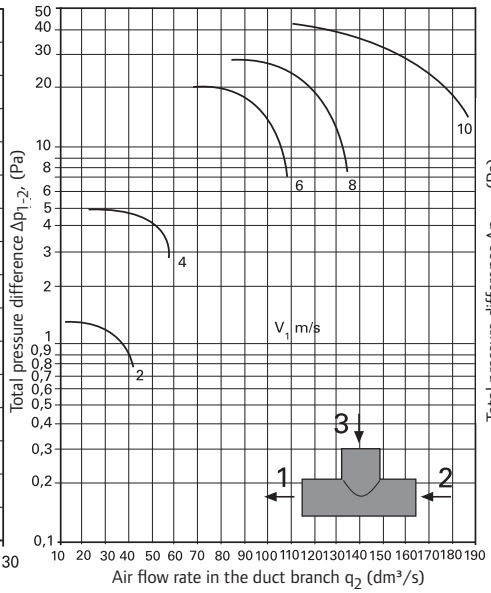
Branch 160/100

Side exhaust. Total pressure difference Δp_{1-3}



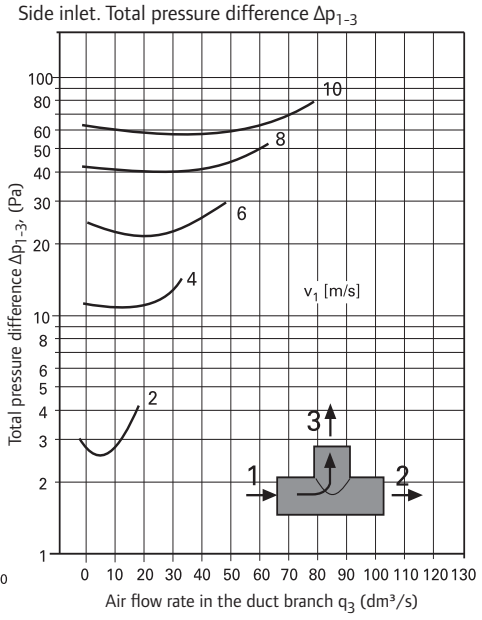
Branch 160/100

Side exhaust. Total pressure difference Δp_{1-2}



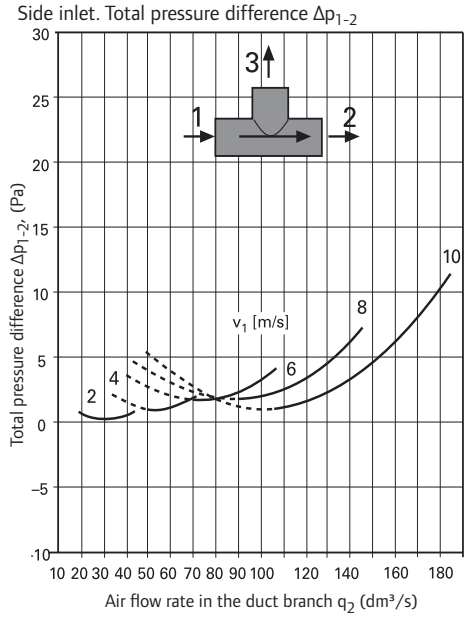
Branch 160/100

Side inlet. Total pressure difference Δp_{1-3}



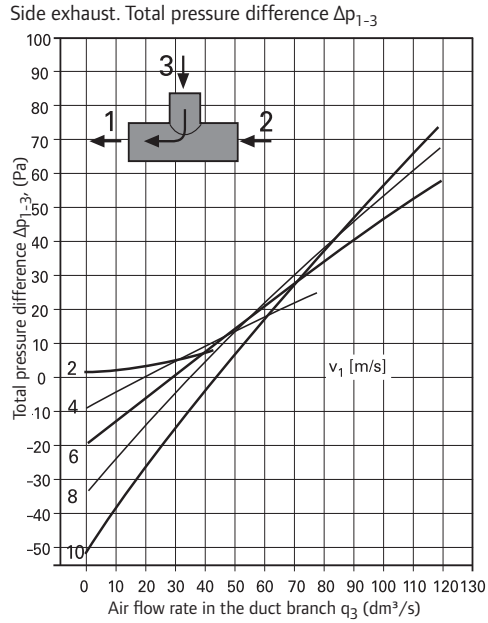
Branch 160/100

Side inlet. Total pressure difference Δp_{1-2}



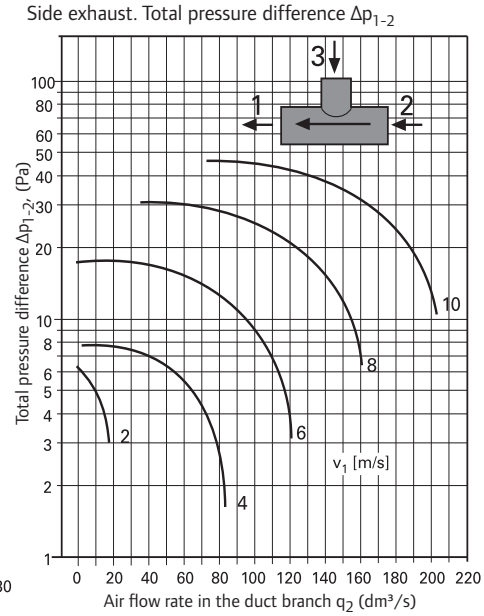
Branch 160/125

Side exhaust. Total pressure difference Δp_{1-3}



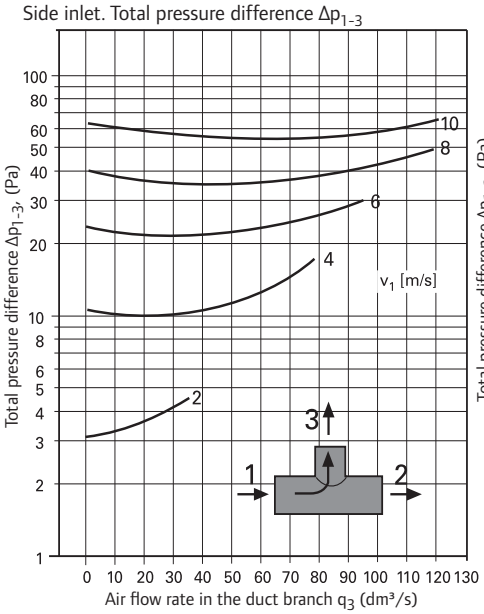
Branch 160/125

Side exhaust. Total pressure difference Δp_{1-2}



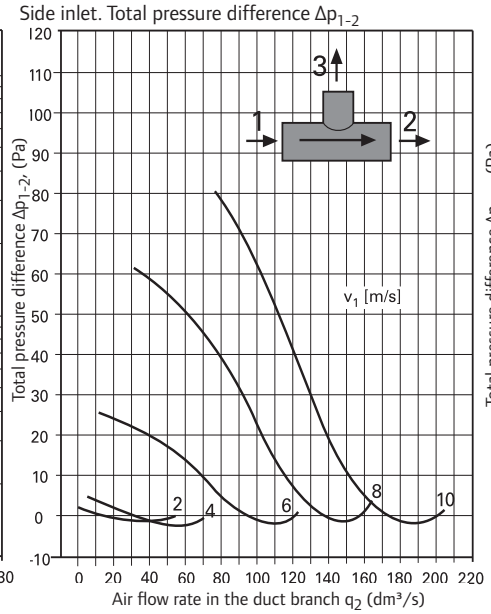
Branch 160/125

Side inlet. Total pressure difference Δp_{1-3}



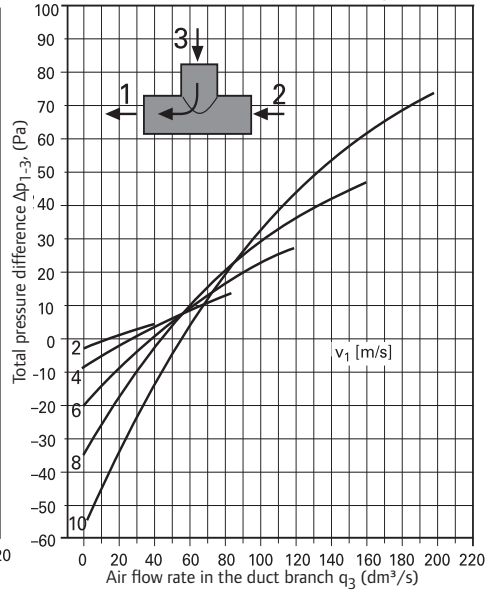
Branch 160/125

Side inlet. Total pressure difference Δp_{1-2}



Branch 160/160

Side exhaust. Total pressure difference Δp_{1-3}



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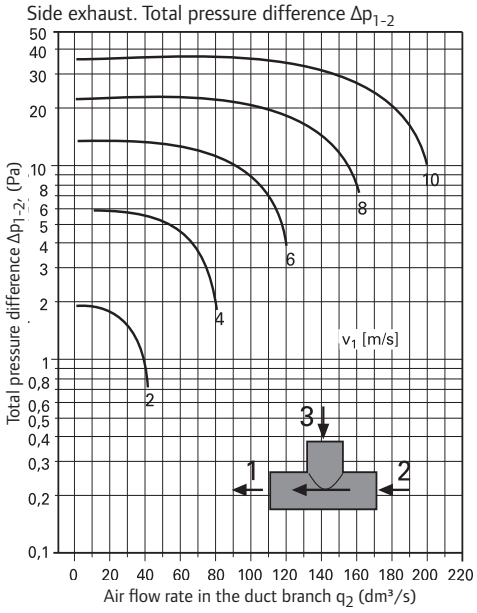
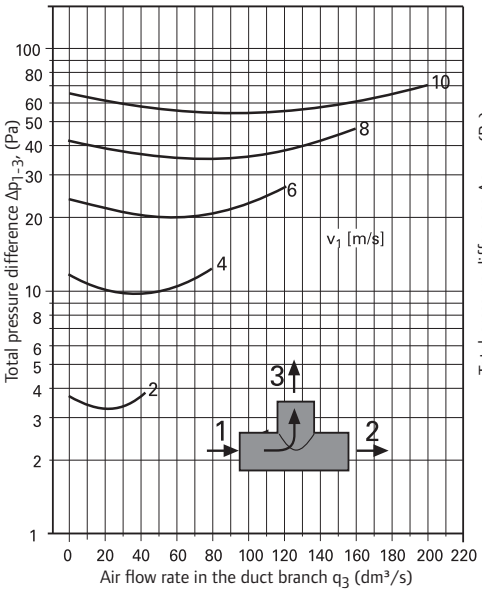
Side exhaust. Total pressure difference Δp_{1-2}



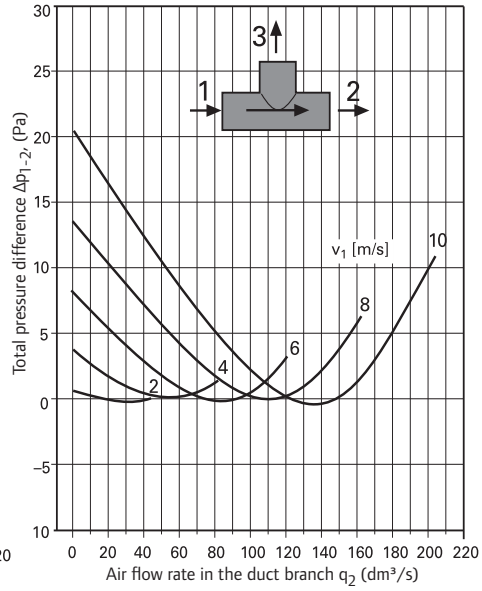
Branch 160/160

Side inlet. Total pressure difference Δp_{1-3}



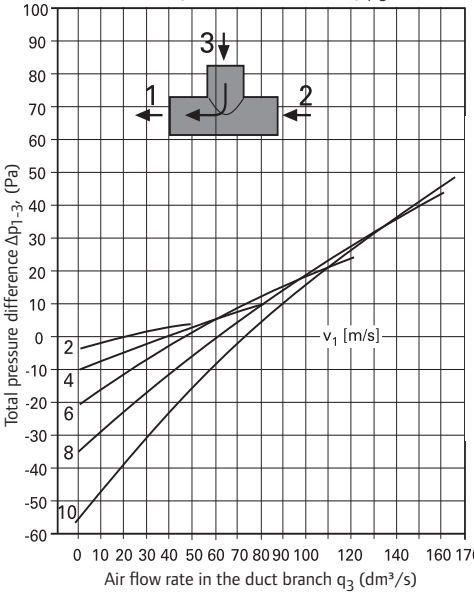
Branch 160/160

Side inlet. Total pressure difference Δp_{1-2}



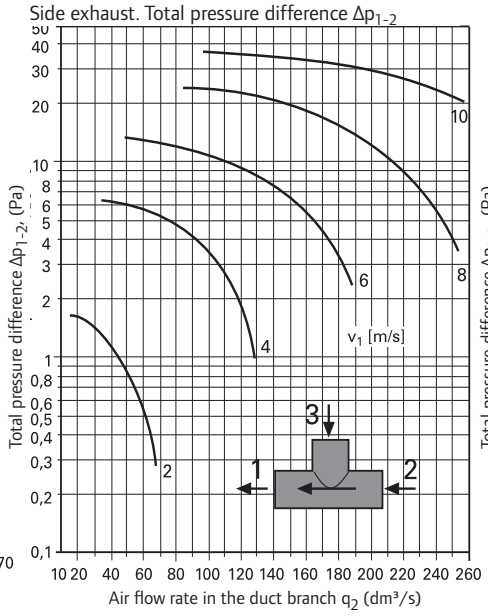
Branch 200/160

Side exhaust. Total pressure difference Δp_{1-3}



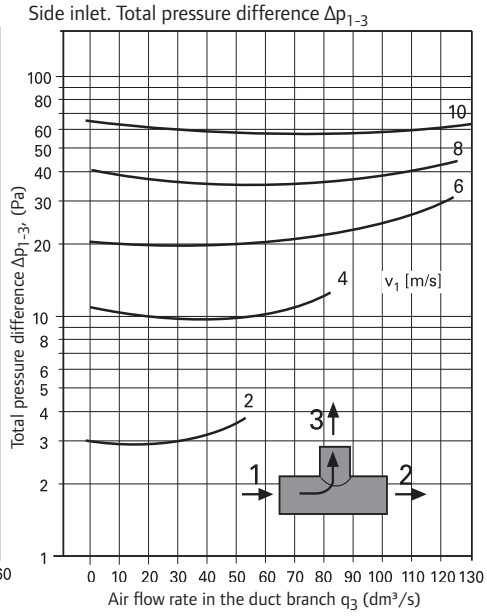
Branch 200/160

Side exhaust. Total pressure difference Δp_{1-2}



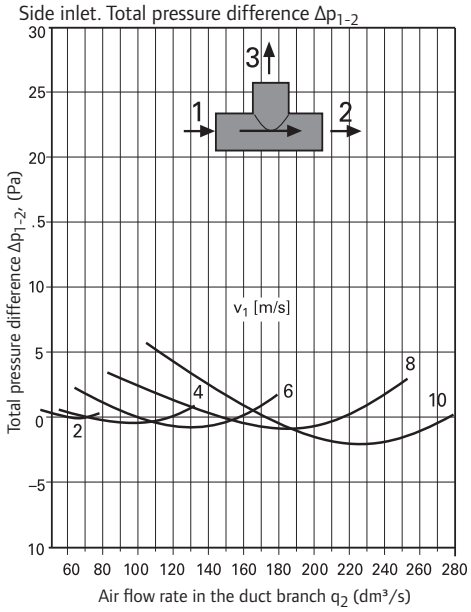
Branch 200/160

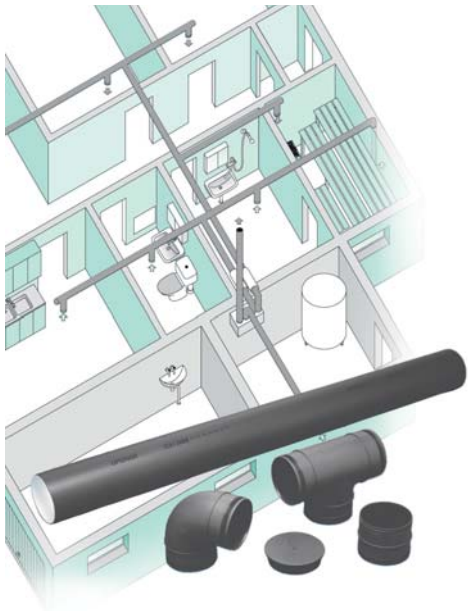
Side inlet. Total pressure difference Δp_{1-3}



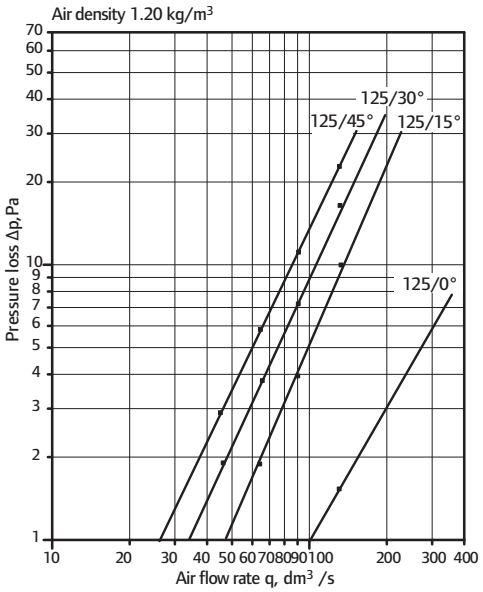
Branch 200/160

Side inlet. Total pressure difference Δp_{1-2}

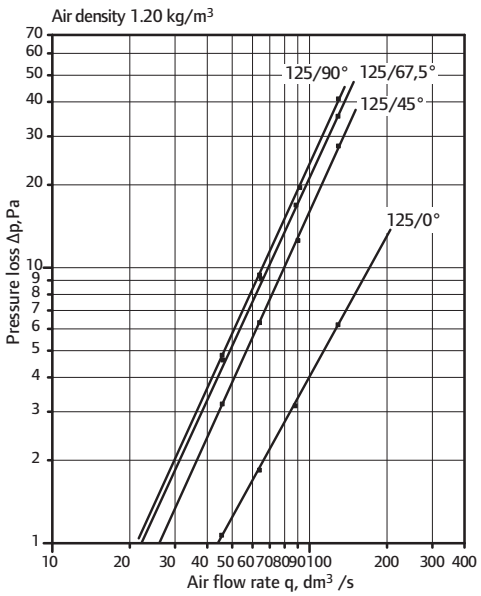




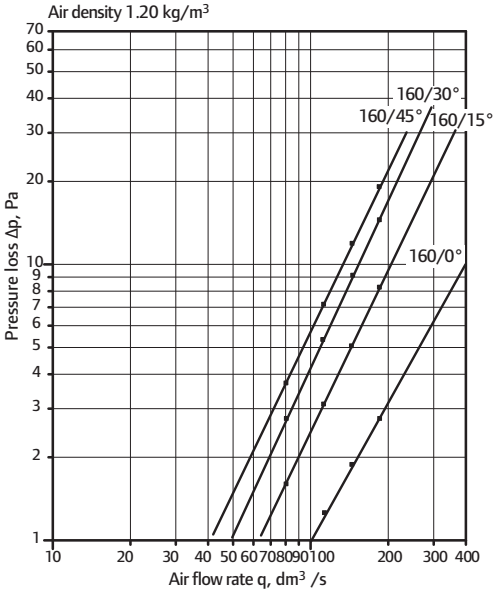
Flexible bend 125x0-45°



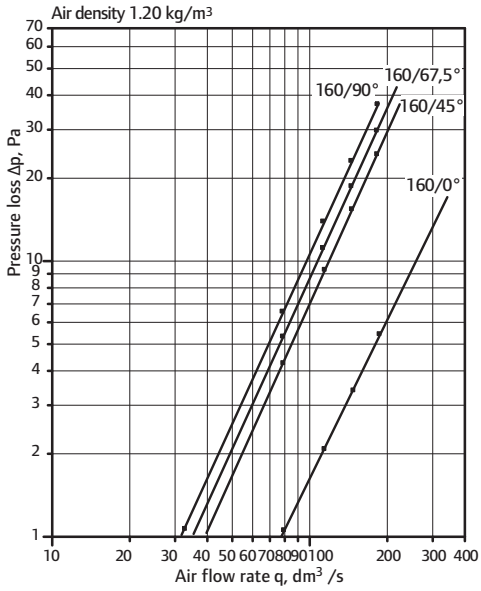
Flexible bend 125x0-90°



Flexible bend 160x0-45°



Flexible bend 160x0-90°



Noise suppression effect of silencers by octave band, ISO 7235:2003

	Noise suppression ΔL (dB)							
	Octave band centre frequency (Hz)							
Size	63	125	250	500	1000	2000	4000	8000
125x300	2.0	6.5	9.5	15.5	11.0	7.5	8.0	6.0
125x650	5.0	14.5	15.5	23.5	33.0	24.5	22.0	15.5
125x1000	10.5	18.0	20.5	29.0	37.0	36.0	36.5	26.5
160x650	6.0	12.5	12.0	21.0	29.5	18.0	14.5	11.5
160x1000	10.5	17.0	16.0	25.0	30.5	27.5	23.0	16.5
200x1000	15.0	10.5	14.5	21.0	27.5	17.5	12.5	9. 0

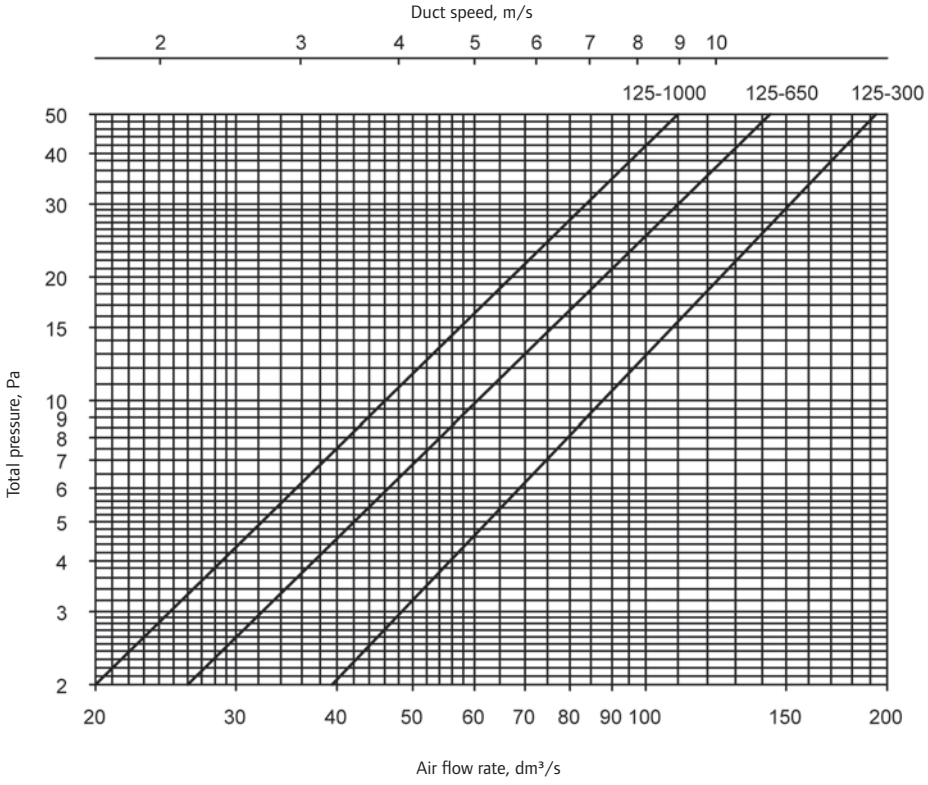
Silencer pressure losses, ISO 7235:20033

125x300	**1**	**2**	**3**	**4**	**5**
q_{VD} / dm³/s	43.7	51.4	65.4	77.5	100.4
V_{al} / m/s	3.6	4.2	5.3	6.3	8.2
P_{tD} / Pa	2.5	3.5	5.6	7.9	13.2
ζ_t / -	0.32	0.33	0.33	0.33	0.33
125x650	**1**	**2**	**3**	**4**	**5**
q_{VD} / dm³/s	43.1	49.6	62.4	76.1	93.9
V_{al} / m/s	3.5	4.0	5.1	6.2	7.7
P_{tD} / Pa	5.2	6.9	10.3	15.0	22.3
ζ_t / -	0.70	0.71	0.667	0.651	0.634
125x1000	**1**	**2**	**3**	**4**	**5**
q_{VD} / dm³/s	39.4	51.9	66.4	77.5	98.4
V_{al} / m/s	3.2	4.2	5.4	6.3	8.0
P_{tD} / Pa	7.2	12.4	19.3	26.2	40.8
ζ_t / -	1.17	1.15	1.10	1.09	1.06
160x650	**1**	**2**	**3**	**4**	**5**
q_{VD} / dm³/s	71.1	86.6	104	127	157
V_{al} / m/s	3.5	4.3	5.2	6.3	7.8
P_{tD} / Pa	5.2	7.9	11.1	16.4	25.2
ζ_t / -	0.70	0.71	0.696	0.686	0.689
160x1000	**1**	**2**	**3**	**4**	**5**
q_{VD} / dm³/s	74.1	95.2	116	144	180
V_{al} / m/s	3.7	4.7	5.8	7.2	8.9
P_{tD} / Pa	9.2	15.0	22.6	34.8	55.4
ζ_t / -	1.13	1.11	1.13	1.13	1.15
200x1000	**1**	**2**	**3**	**4**	**5**
q_{VD} / dm³/s	100	150	200	250	300
V_{al} / m/s	3.18	4.77	6.37	7.96	9.55
P_{tD} / Pa	5.2	11.7	20.9	32.6	46.9
ζ_t / -	0.858	0.858	0.858	0.858	0.858

q_{VD} = Air flow rate, dm³/s
V_{al} = Air face velocity, m/s
P_{tD} = Total pressure loss of air, Pa
ζ_t = Total pressure drag coefficient, -

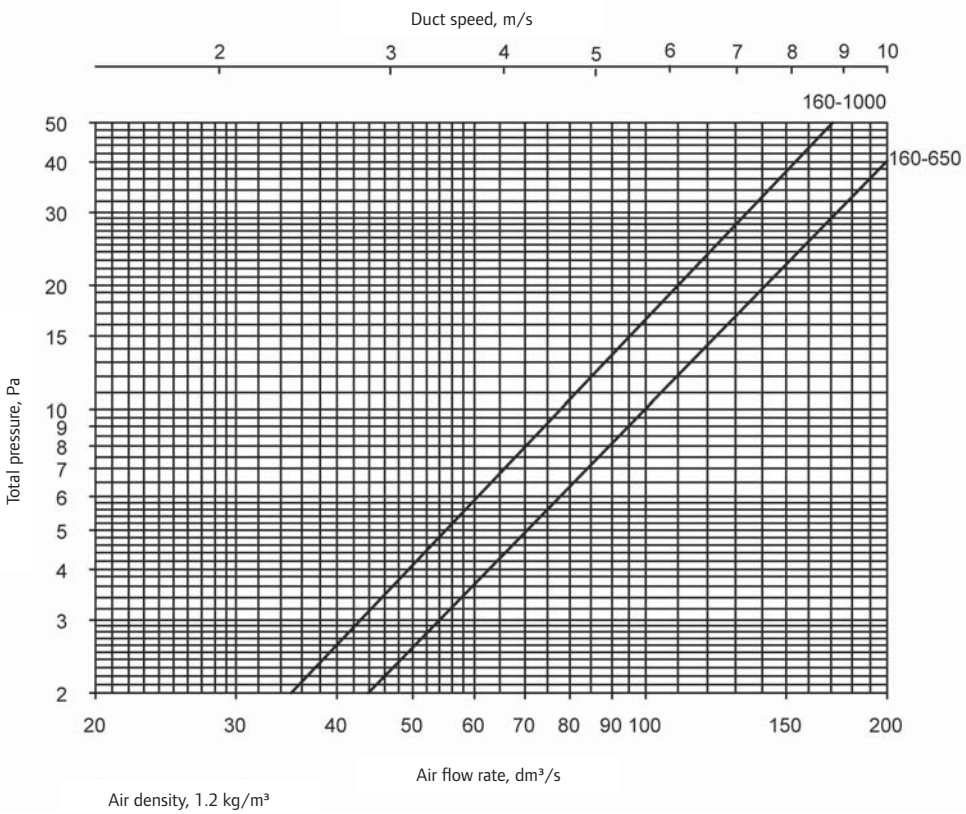
Silencer pressure losses, ISO 7235:2003

USI-125-300, USI-125-650, and USI-125-1000



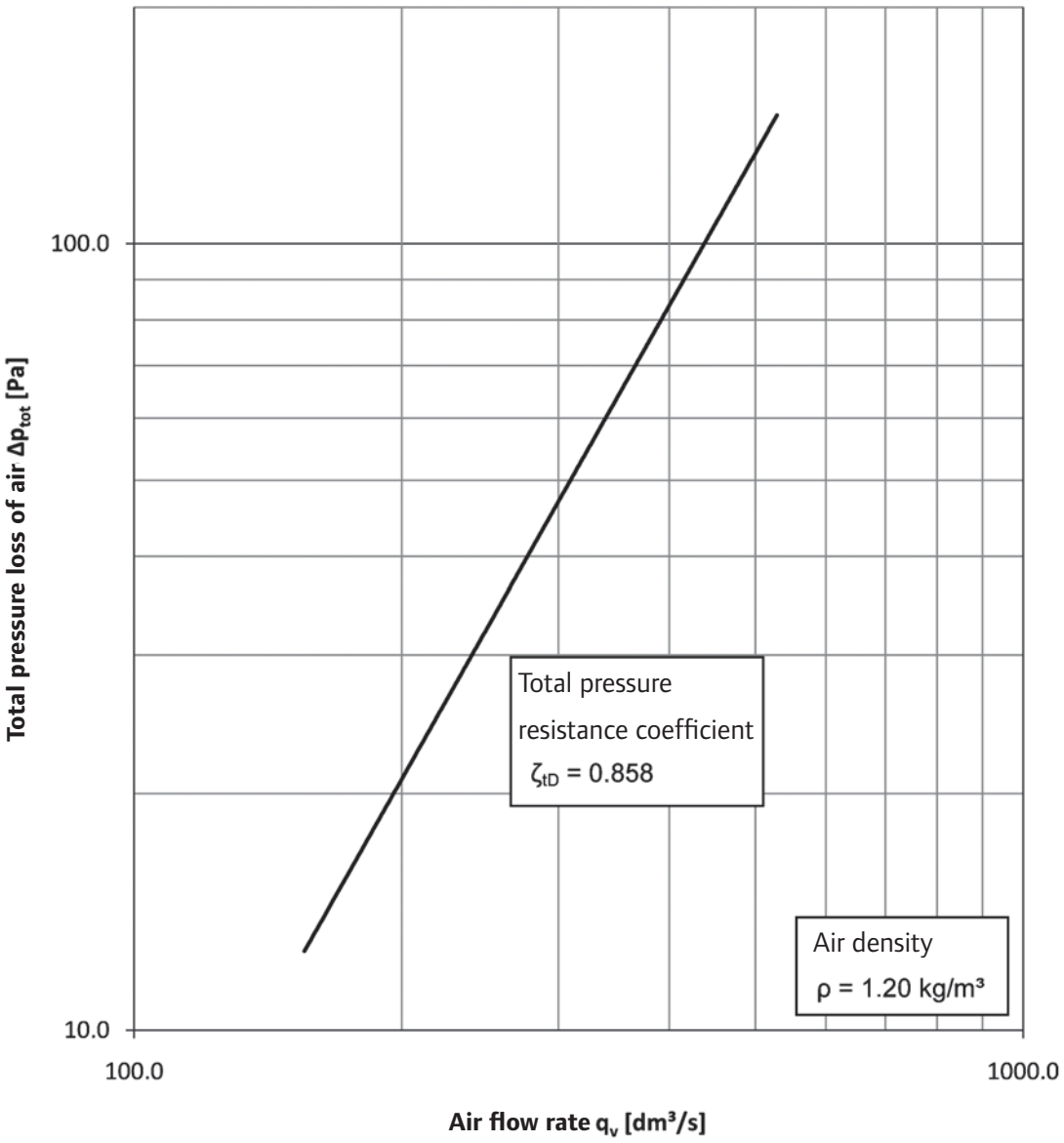
Air density, 1.2 kg/m³

USI-160-650 and USI-160-1000



Air density, 1.2 kg/m³

Silencer USI-200-1000



Installation

Introduction

Uponor ventilation ducting and components are made of polypropylene plastic. They are lightweight and easy to handle.

Duct installation is not recommended at temperatures below –15 °C. Ducts must not be thrown, dragged, dented, or otherwise damaged.

Ducts are delivered from the factory with both ends plugged and fittings are packed in plastic bags and cardboard boxes to keep them clean. The ducts and fittings must be prevented from contamination by keeping the ducts plugged and storing the fittings in the respective bags during on-site warehousing. They must be protected from direct sunlight during long-term storage.

Remove duct plugs and protective bags only at the time of installation. Open ends of installed ducting must be protected with duct plugs, which must be left in place until the valves are installed and adjusted.

Cleaning doors of the ducting must be positioned and installed in a manner that allows cleaning.

Connections are made by pushing the duct on top of the fitting as far as the limiting shoulder. Connections are made manually; the components may be lubricated with clean water or water mixed with washing-up liquid. The connections are made without screws or rivets.

Ducting

Cutting and connecting ducts

Uponor ducts must be cut perpendicularly by means of a saw with a fine tooth pitching (1–2 mm). Remove the sawdust from both the outside and inside surfaces, and bevel the inner edge of the cut head to facilitate insertion of the connection piece.

Duct connections, changes in direction, and branching must be implemented with duct components. The components are equipped with sealing ridges made of the component material. The ducts do not have ridges.

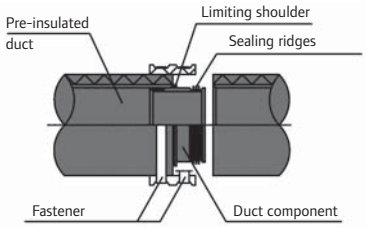
However, the vertical ducting sections must be supported so that their weight does not rest on the coupling. If brackets cannot be used, the connection may be secured with 8–10 mm pop rivets, where necessary.

Cutting and connecting insulated ducting and duct components

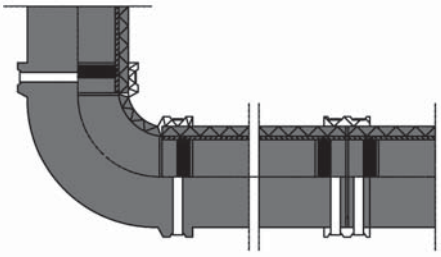
Insulated ducts are cut with the insulation material and connected to each other in the same way as uninsulated ducting and duct components. The connection is secured with a fastener delivered with the components. In some cases, it should be noted that the duct's thermal insulation must be removed in some places. For example, when the duct is penetrating a vapour barrier, the duct's insulation is removed from the warm-side section of the vapour barrier cap, if no condensation insulation is required.

Tip!

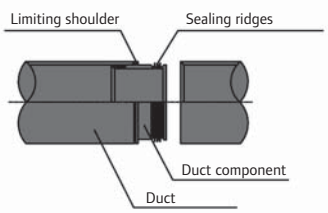
Make an installation mark 5 cm from the end of the duct. This will ensure that the duct has been pushed in all the way and that the connection is tight.



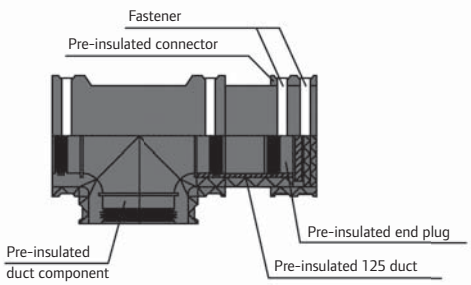
Connecting insulated ducts to each other.



Connecting insulated ducts and ducting components to each other.



Connecting uninsulated ducts to each other.



Installation of flexible bends

The flexible bends are manufactured by means of duct sizing, and they are connected to the system with fittings such as connector. Due to the manufacturing method of the flexible bends, the tightness of joints must be ensured by means of vulcanising tape.

Vapour barrier inlets

When a duct penetrates a structure with a vapour barrier (e.g., a roof), the through-hole is sealed with a vapour barrier cap. One side of closed-cell caps is self-adhesive.

The cap is usually installed above the vapour barrier, where it remains tight between the thermal insulation and the vapour barrier.

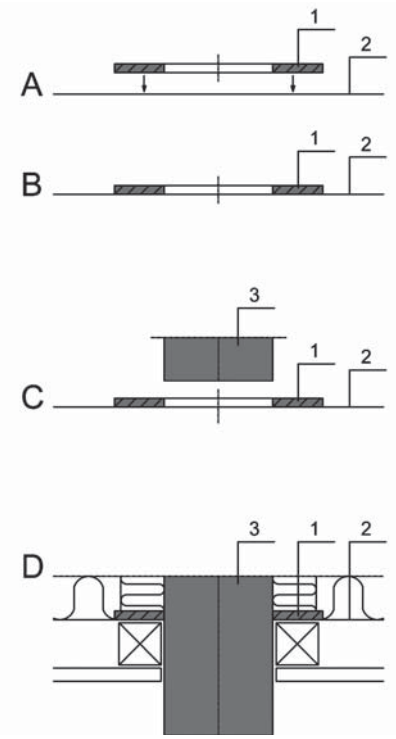
- Clean the vapour barrier of dust etc. Remove the protective plastic from the cap and press it tightly against the vapour barrier from above/outside (A).
- Using a sharp knife, make an aperture corresponding to the size of the cap hole in the vapour barrier (B). Ensure that the cap is pressed against the vapour barrier on each side.
- Carefully push/pull the duct through the cap hole while rotating the duct (C).
- Align the head of the duct in place and connect it to the ducting (D).

Insulated ducting and vapour barrier inlets

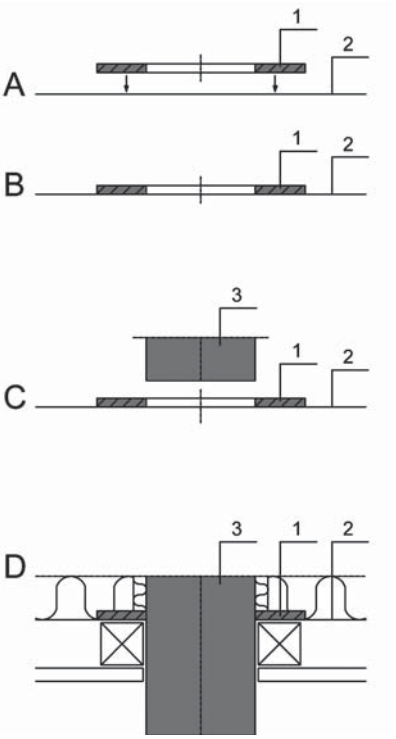
When cutting insulated ducts, you must bear in mind that the thermal insulation is cut from a different place than the actual duct.

The thermal insulation ends at the cold-side surface of the vapour barrier cap. Ducting on the warm side of the vapour barrier may be uninsulated, if the ducting does not require condensate-insulation.

The supply air duct on the warm side of the vapour barrier in, for example, a suspended ceiling, must be insulated with expanded PE plastic if the supply air is cooled or if the air in the supply air duct is not post-heated during the wintertime. In this case, the expanded PE insulation is cut at the vapour barrier cap and sealed air-tightly to the vapour barrier cap.



1 = Cap
2 = Vapour barrier
3 = Uninsulated duct



1 = Cap
2 = Vapour barrier
3 = Insulated duct

Supporting

Supporting is implemented with supports designed for ventilation ducting.

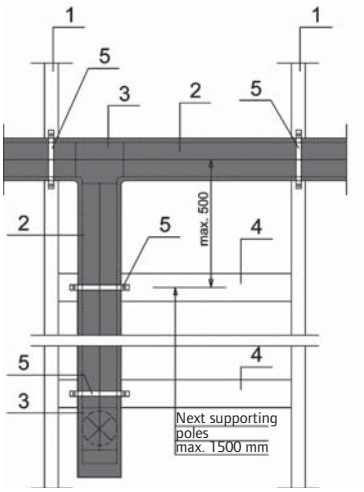
The maximum support interval for horizontal ducting is 1500 mm. A support should be installed adjacent to each connection/fitting.

Vertical ducting sections must be supported so that their weight does not rest on the coupling. In addition, the descending ducts must be supported well, in order to prevent movement when installing valves or cleaning the duct/valve. The supports can be mounted, for instance on the supporting pole nailed under the duct.

The ducting must also be attached to the roof structures, to prevent it from moving during, for example, cleaning.

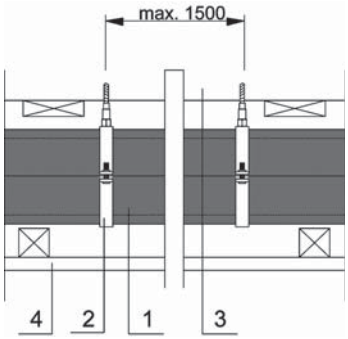
Supporting of insulated ducts

Supporting of insulated ducts is implemented in the same way as those for uninsulated ducts. You should note, however, that the insulation is not cut in the locations of the supports; the supports rest over the insulation. In this case, a larger duct support is used.



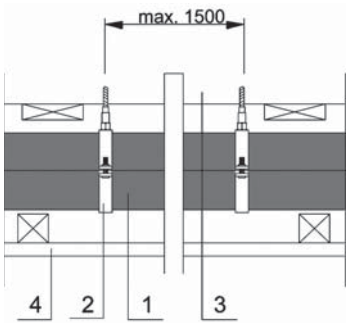
1 = Lower roof truss support
2 = Insulated (15 mm) duct
3 = Branch
4 = Support (if the duct support is not installed on the roof truss)
5 = Support

Example of supporting of an attic-mounted duct and a tee.



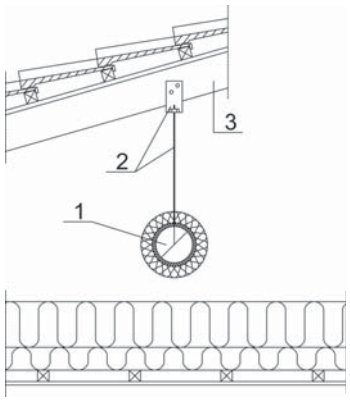
1 = Uninsulated duct
2 = Support
3 = Lower roof truss support
4 = Suspended ceiling

Example of supporting of an uninsulated duct above a suspended ceiling.



1 = Insulated duct
2 = Support
3 = Lower roof truss support
4 = Suspended ceiling

Example of supporting of an insulated duct above a suspended ceiling.



1 = Duct + thermal insulation LE5 (15+50)
2 = Support
3 = Upper roof truss support

Example of supporting of an insulated duct in an attic. Support interval max. 1500 mm.

Insulation

The insulation of ducts is specified in the ventilation plans.Usually, the alternatives are:

Warm spaces (inside the vapour barrier):

- **Supply and exhaust air ducts** require no insulation, with the exception of ducts in sauna ceilings, which must be thermally insulated with 50 mm mineral wool. If the supply air is to be cooled, the supply air ducts must be insulated with expanded PE plastic. If the air flowing in the supply air duct will not be post-heated in the winter, the ducts must be insulated with expanded PE plastic.

- **Fresh and waste air ducts** are insulated with expandable PE plastic insulation, which functions as insulation against condensation.

With extra-long fresh air ducts, the possibility of heat loss should be considered. If necessary, fresh air ducts can be insulated with 2x15 mm expanded PE plastic or, alternatively, 15 mm expanded plastic + 50 mm mineral wool insulation.

Cold spaces (outside the vapour barrier):

- **Supply and exhaust air ducts** as well as **fresh and waste air ducts** installed inside the thermal insulation of the ceiling with at least 100 mm of mineral-wool-based loose material or mineral wool insulation material on top of them, are installed with condensation- and thermal insulation of 15 mm of expanded PE plastic.

- Alternatively, for **waste, supply, and exhaust air ducts** installed inside the thermal insulation of the ceiling with at least 100 mm of mineral-wool-based loose material or similar on top of them, the duct may also be insulated with 50 mm mineral wool.

- **Supply and exhaust air ducts** located above the thermal insulation of the ceiling are always thermally insulated with 15 mm expanded PE plastic + 50 mm mineral wool or 50 + 50 mm mineral wool.

- **Waste air ducts** above the thermal insulation of the ceiling may be insulated with 50 mm mineral wool.

- **Fresh air ducts** located above the thermal insulationof the ceiling are insulated with mineral wool of at least 50 mm.

- **Kitchen fans or hoods** in the attic and attic cavities must be insulated with class-EI30-fireresistance insulation. Insulation of the duct, using the insulation material specified above, is recommended from the kitchen fan/hood up to the roof.

The mineral wool insulation is wrapped tightly around the duct and bound with steel wire or tensioning clamps.

General

Condensation-insulation of ducts and duct components is implemented with factory-installed 15 mm expanded PE plastic insulation.

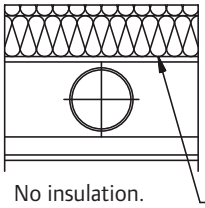
The condensation and thermal insulation of factory-insulated ducts can be tightly sealed through the installation of separate internal joint insulation sleeves on the duct ends connected withinternal joints. These connections are secured with two fasteners. The socket coupling of the thermal insulation and the insulated ducts and duct components can be tightly connected by inserting the insulated ducts as far as the stop collar of the insulated duct components and always securing the connections with one fastener.

In general, condensation and thermal insulation must be installed in such a manner that the result is an uninterrupted and perfectly sealed structure.

When expanded PE plastic is used for insulating ducts in cold spaces embedded inside the thermal insulation of the ceiling, the thermal insulation material of the ceiling must always be mineral-wool-based. Respectively, the thermal insulation of the ceiling may be implemented with any commercially available insulation material, when the duct is insulated with mineral wool.

Ducting in warm spaces, inside suspended structures or housings

- Air temperature inside the duct above 10 °C

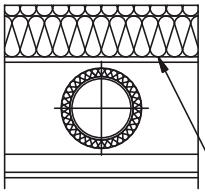


- Exhaust air ducts
- Supply air ducts

Vapour barrier

No insulation.
However, the ducts in the sauna ceiling are thermally insulated with 50 mm mineral wool.

- Air temperature inside the duct below 10 °C

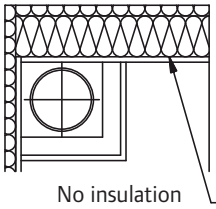


- Fresh air duct to the ventilation unit
- Waste air duct from the ventilation unit
- Supply air duct

Vapour barrier

Expanded PE plastic insulation, 15 mm, LE4

- Air temperature inside the duct above 10 °C

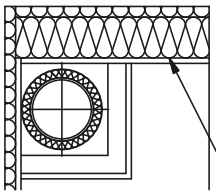


- Exhaust air ducts
- Supply air ducts

No insulation

Vapour barrier

- Air temperature inside the duct below 10 °C



- Fresh air duct to the ventilation unit
- Waste air duct from the ventilation unit
- Supply air duct

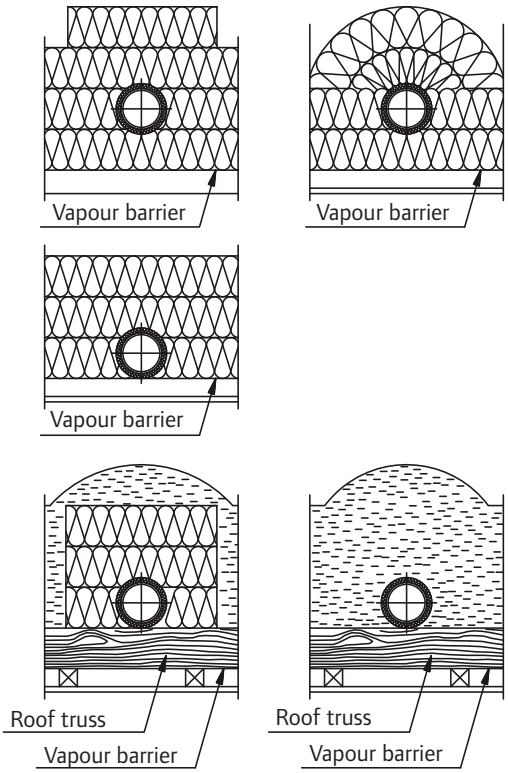
Vapour barrier

Expanded PE plastic insulation, 15 mm, LE4

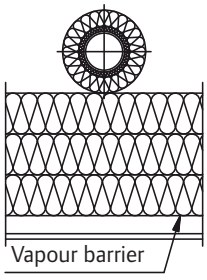
Ducting in cold spaces

(in attics, embedded in roof insulation, or above that)

- Supply air duct
- Exhaust air duct
- Fresh air duct to the ventilation unit
- Waste air duct from the ventilation unit



Duct in loose mineral wool or similar. PE expanded plastic insulation, LE 4, or 50 mm mineral wool, LE3, is used. Installation of a duct embedded in loose mineral wool or similar is not recommended.



Ducts located in cold spaces above the thermal insulation of the roof are insulated with 15 mm expanded PE plastic + 50 mm mineral wool, LE5 or 50 mm + 50 mm mineral wool, LE2.

Alternative duct insulation methods

Installing and adjusting valves

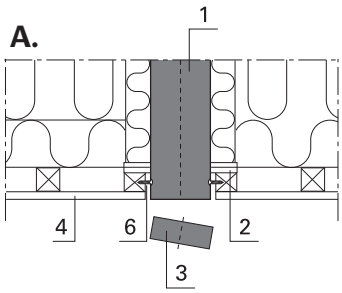
Introduction

Valves are installed and adjusted after the final cleaning of the work site. All visible dirt must be cleaned off the valves on a regular basis. Valve adjustments must not be changed during cleaning. Neither should the valves be blocked or closed at any stage. The ventilation system should be taken into use only when the building is completely finished.

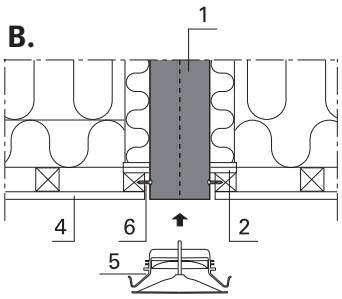
Uponor ventilation system valves are ready for use as supply or exhaust-valves in connection with Uponor ducting.

Connecting valves to ducting

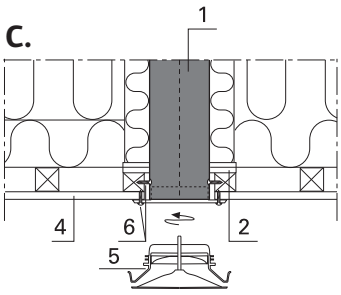
1 = Duct
2 = Vapour barrier cap
3 = Duct section to be truncated
4 = Finished ceiling surface
5 = Valve
6 = Mounting screw



A. Cut the duct to the level of the finished roofing, using, for example, a saw with fine tooth pitching, or duct cutting pliers. Secure the duct from inside with two mounting screws.



B. Insert the valve into the duct. The valve locks on the duct and no additional mounting procedures are required. Please note: If the roof valve is connected not to the duct but to a duct component, the valve seal must be replaced with a special seal ordered separately. For further information, please contact EH-muovi.



C. **The supply and exhaust valves of saunas**, intended for ceiling mounting, are equipped with mounting frames that are secured to the ceiling structure with screws. Attach the valve to the frame by rotating it. Ceiling-mounted frames installed above the sauna stove must always be secured with screws.

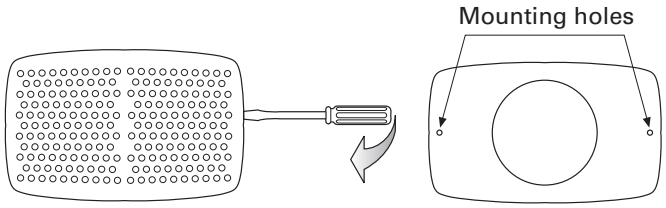
D. **The ceiling-mounted valve** (ø 125) collar is a raising ring that funnels the outgoing air flow away from the roof surface. This prevents impurities in indoor air from rising upwards and helps to keep the roof clean. The raising ring is suited both for new buildings and renovation.

Installing the collar:
Cut the duct head 50 mm below the roof surface. Install the collar on the valve. Pushing the valve onto the duct tightens the collar between the valve and the roof.

If the duct is cut on the level of the surface, the duct head is fitted with a ventilation extension. Cut the valve seal to a narrow measure along the breaking line and install the valve and the collar, as instructed above in step B.

Diameter 125
Product code 1046227

E. **The wall-mounted valve** is installed by pushing it into the duct, which is cut to the level of the wall surface. The valve cover may be removed by twisting it with a screwdriver. The base is equipped with holes for the mounting screws.



Outdoor grille

Outdoor grilles are equipped with an easily removable framed screen or a door screen.

The screen cassette must be cleaned regularly, up to once a month during the warm season (from April to October). The need for cleaning may vary greatly according to the location of the building.

The white ABS plastic screen can be painted with, for instance, spray paint and a separate undercoat is usually not required. The suitability of the paint for ABS plastic should be verified. Before painting, clean the surface with, for instance, acetone.

Fresh air valve for wall mounting

(fresh air valve with a filter for mechanical exhaust air ventilation) The valve is installed in a hole, ø 106 mm, drilled/sawed above the window. The valve is opened and closed with the pull cord.

Installation

Pull the inside valve open with the pull cord and unscrew the cover. Rotate the grille slightly anti-clockwise and pull it out.

Shorten the extension duct according to wall thickness. Install the duct and the valve body in their place and secure them with screws. Screw the grille and the cover back in place and adjust the opening.

Mount the base of the outdoor grille with screws. Install the outdoor grille by pressing it onto the grille base.

Maintenance

Clean the filter twice a year with warm water.

Fresh air valve for vent hole

(fresh air valve with a filter for mechanical exhaust air ventilation) The valve is installed in a hole, ø 106 mm, drilled/sawed above the vent hole of the window.

Installation

Pull the inside valve open with the pull cord and unscrew the cover. Rotate the grille slightly anti-clockwise and pull it out.

Install the valve body and the rear false cover with screws. If the vent hole is over 90 mm thick, extend the valve with the supplied raising ring.

Screw the grille and the cover back in place and adjust the opening by rotating the cover.

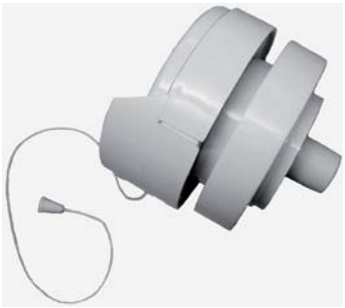
Air guide

The air guide can be directed upward, to the left, or to the right. If, for instance, a radiator is located to the left of the valve, the air guide is directed to the left.

The guide may be pulled out for rotation, by first opening the valve with the pull cord and unscrewing the cover.

Maintenance

Clean the filter twice a year with warm water.



Slit valve

(fresh air valve with a filter for mechanical exhaust air ventilation)
The valve is installed either in a 19 x 250 mm space tooled in the top window frame or between the window frame and wall structure.

If the slit valve is located above the radiator line, the inner nozzle is directed upwards and the outer one downwards.

Maintenance

Clean the filter twice a year with warm water. The filter in the duct section of the valve can be pulled out after removal of the shutter strips, by loosening the two mounting screws.

Fresh air valve

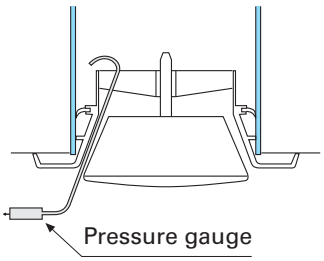
(exhaust air valve for mechanical exhaust air ventilation)
The valve is installed in a hole, ø 106 mm, drilled/sawed in the middle above the window.

Adjusting valves

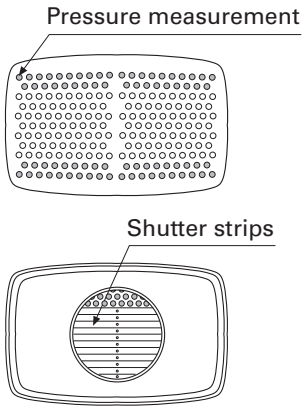
Adjust the valves in accordance with the adjusting curves on pages 30-32 by rotating the valve disc (ceiling-mounted valves) or by opening rows of holes (wall-mounted valve). The pressure difference is measured at points indicated in the adjacent drawings. After adjusting, lock the valve into position with the locking screws.

The valves are **pre-adjusted** before the actual adjustment and measurement. The preliminary adjustment values compatible with the 20 Pa pressure difference are presented in the tables on the following page.

Supply air valve air guides can be removed by cutting away from the body with, for example, a sharp knife.



- Measurement of pressure difference at the points indicated in the drawing.
- Adjustment by rotating the valve spindle, pitch 1 mm/revolution.
- Zero level = closed valve position.



- Side holes open/closed.
- Necessary number of holes are cut open with scissors or a knife.
- Reinstall the shutter strips by pressing them into place.

Valve pre-adjustment tables, pressure difference 20 Pa

Supply air valves

Supply air l/s	Ceiling/sauna valve 125 with controller Revolutions open	Ceiling/sauna valve 125 without a controller Revolutions open	Ceiling/sauna valve 100 with controller Revolutions open	Ceiling/sauna valve 100 without a controller Revolutions open	Wall-mounted valves 100 & 125, side holes open Hole rows open	Wall-mounted valves 100 & 125, side holes closed Hole rows closed
6	3	3	4	3	2	3
7	4	4	4	4	3	3
8	4	4	5	4	3	4
9	5	5	6	5	4	5
10	5	5	6	6	4	5
11	6	6		6	5	6
12	6	6		7	6	6
13	7	6		8	7	7
14	8	7		9	8	8
15	9	8		9	9	9
16	10	8		10	9	10
17	11	9		11	10	10

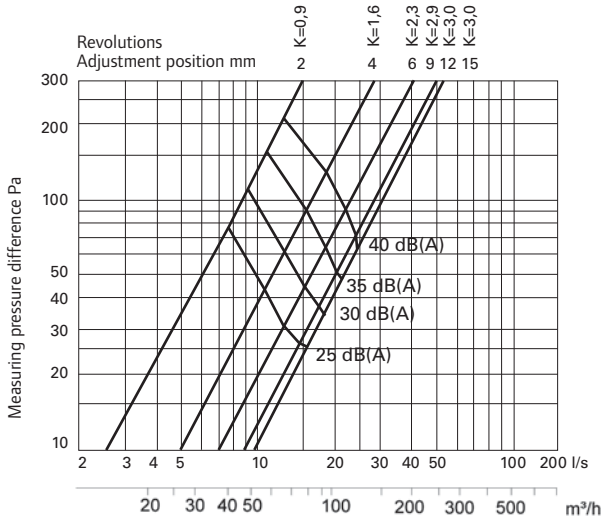
Exhaust valves

Exhaust air l/s	Exhaust air valve 125 Revolutions open	Exhaust air valve 100 Revolutions open
3	3	4
4	4	6
5	6	8
6	7	10
7	8	12
8	10	14
9	11	16
10	13	18

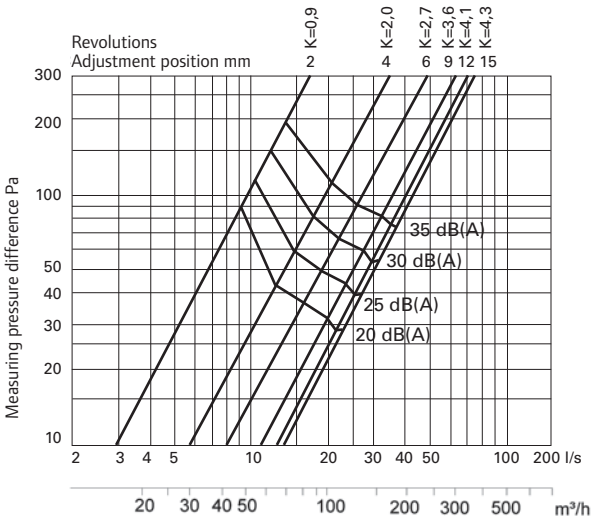
Exhaust air l/s	Exhaust air valve 125 Revolutions open	Exhaust air valve 100 Revolutions open
11	14	20
12	15	
13	16	
14	18	
15	20	
16	22	
17	23	
18	24	

Flow rate, pressure difference and noise level

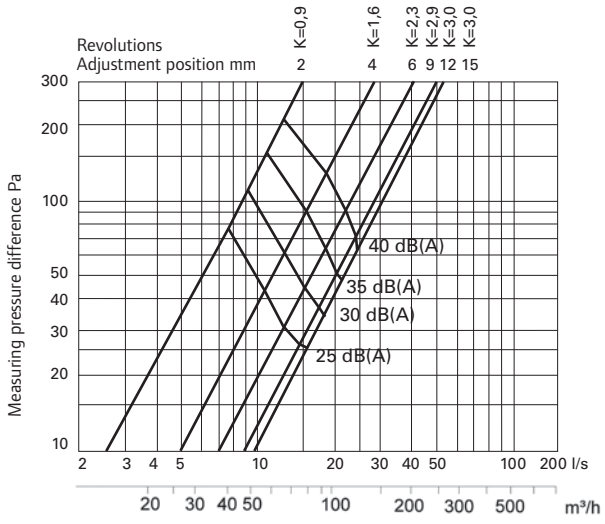
Supply air ceiling valves Ø100 with controller
UTK-100-O



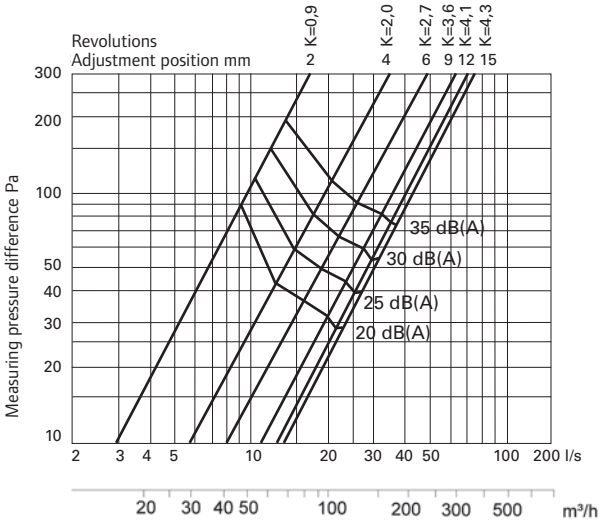
Supply air ceiling valves Ø125 with controller
UTK-125-O



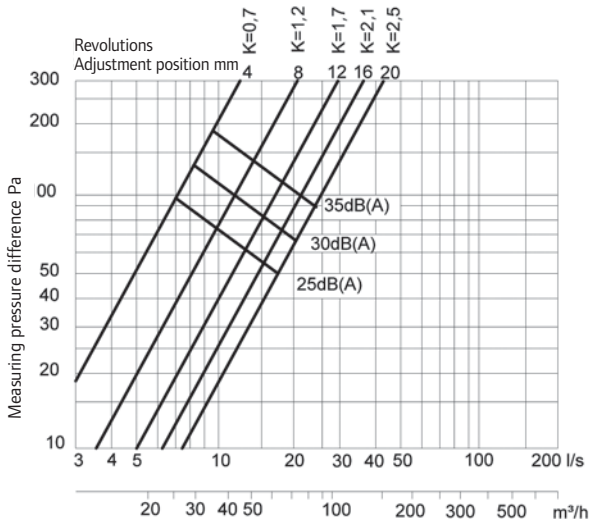
Sauna supply air valves Ø100
UTK-S-100



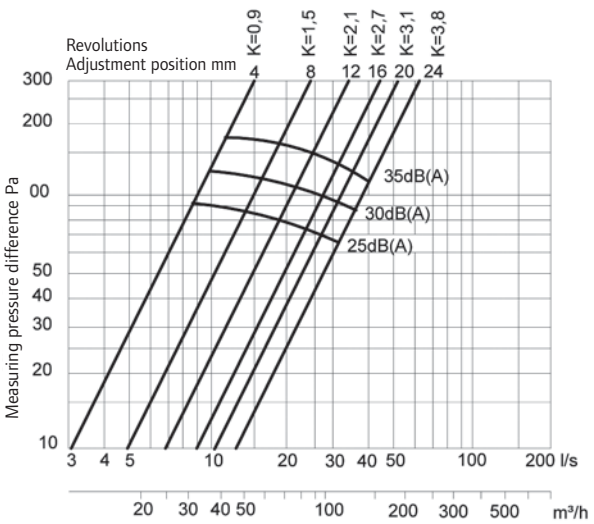
Sauna supply air valves Ø125
UTK-S-125



Exhaust valves Ø100
UPK-100

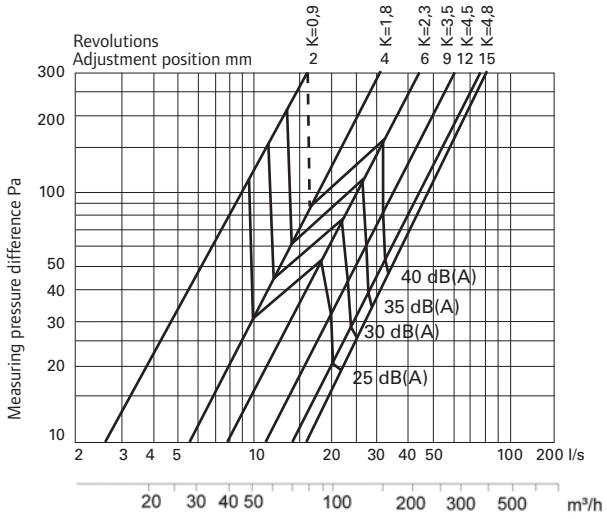


Exhaust valves Ø125
UPK-125

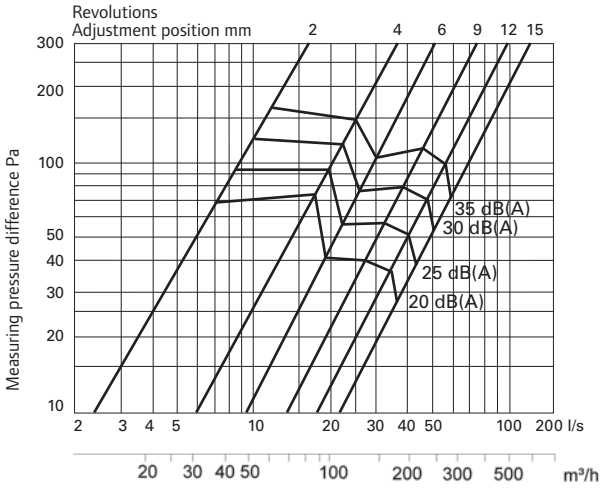


Flow rate, pressure difference and noise level

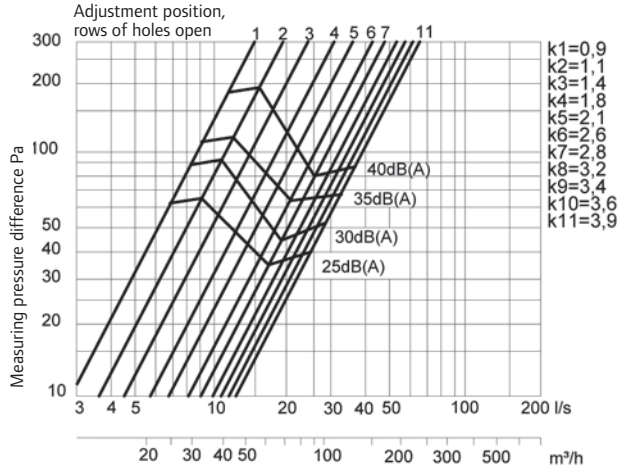
Supply air ceiling valves Ø100 without controller
UTK-100



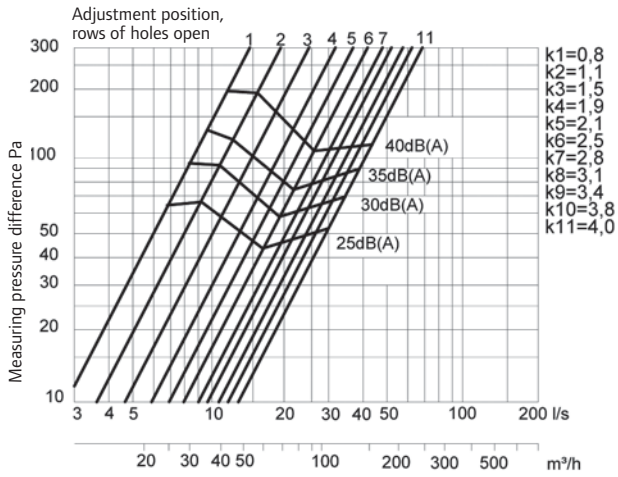
Supply air ceiling valves Ø125 without controller
UTK-125



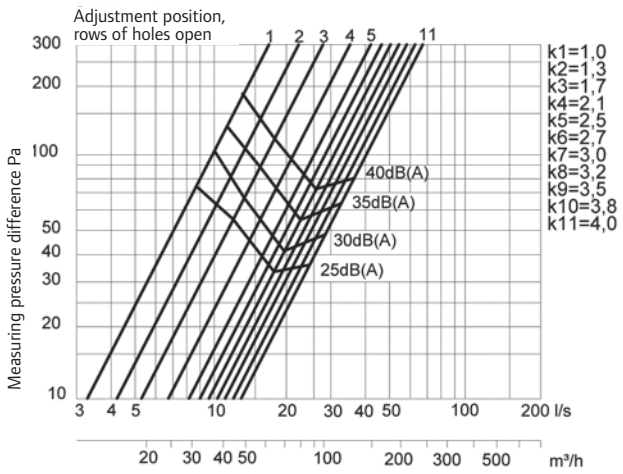
Supply air wall valves Ø100 with side holes closed
UTS-100



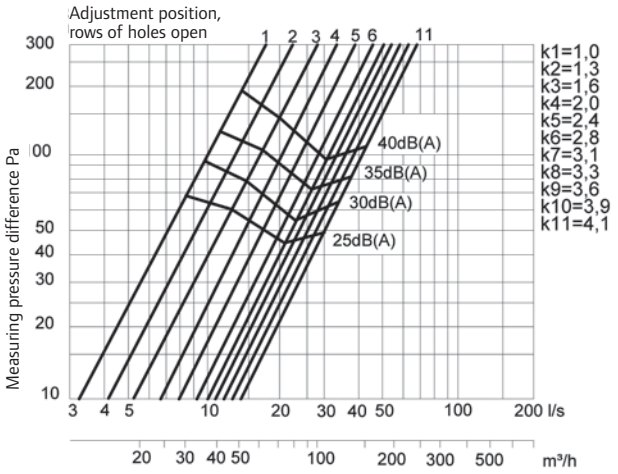
Supply air wall valves Ø125 with side holes closed
UTS-125



Supply air wall valves Ø100 with side holes open
UTS-100



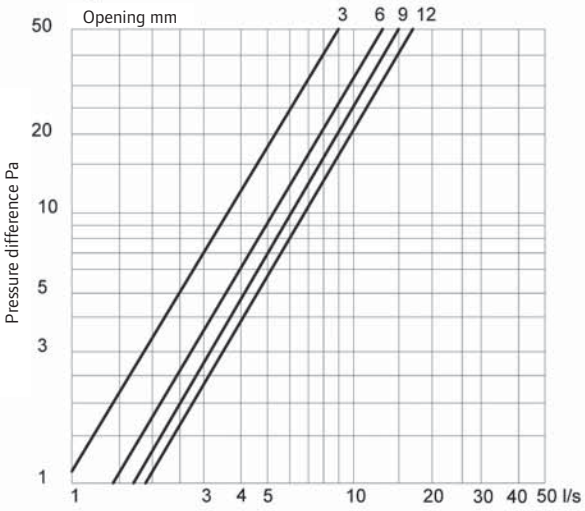
Supply air wall valves Ø125 with side holes open
UTS-125



Flow rate and pressure difference

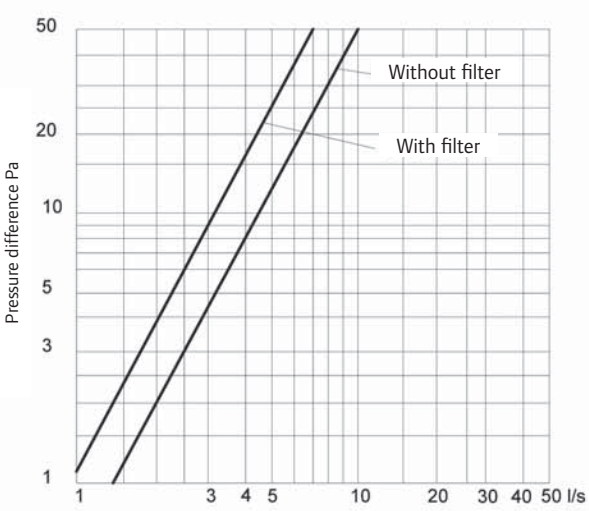
Fresh air valve ø100

UKS-100



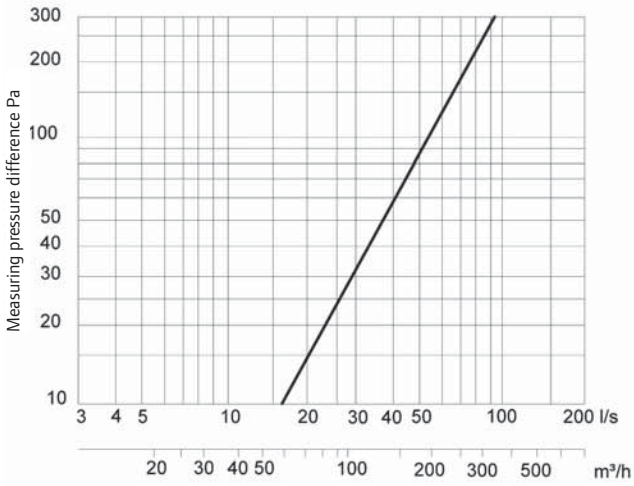
Slit valve 18x245x340

URV-18

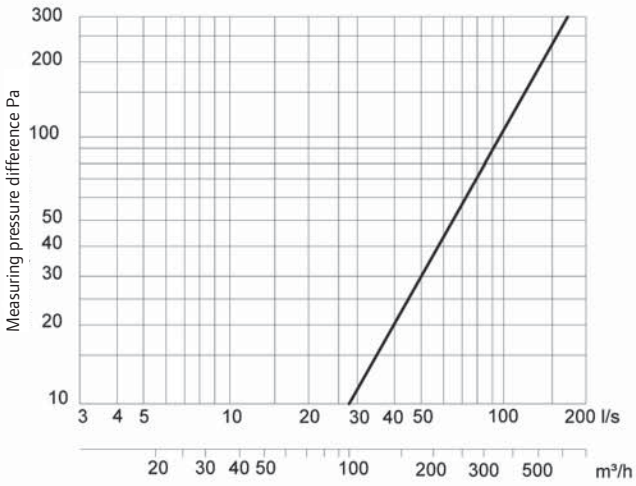


Outdoor grilles

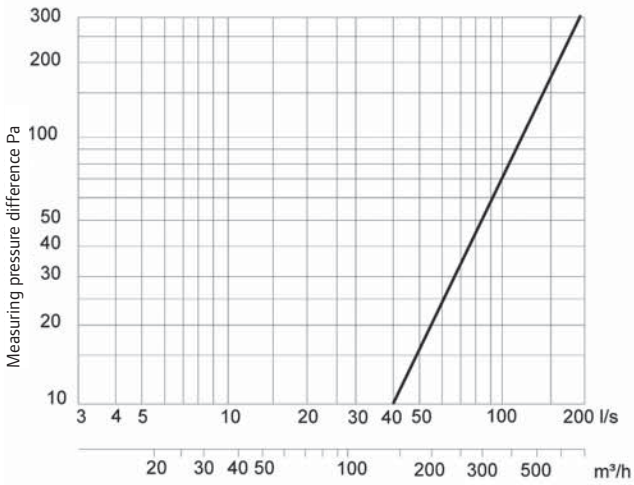
USS-125



USS-160



USS-200



Notes

31701-EN-04-14 Senewa Oy – Fortuna Subject to change without notice

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