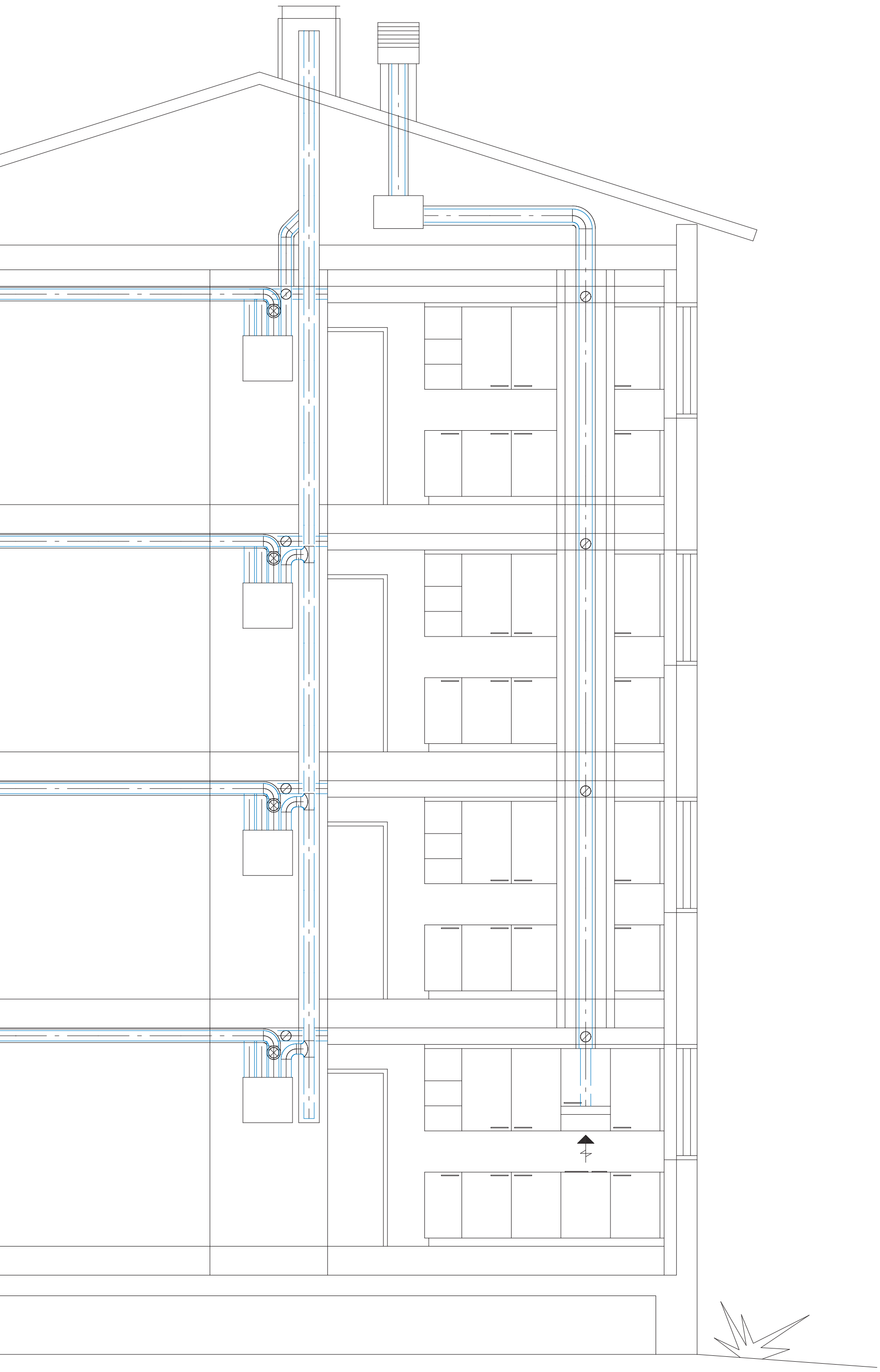


Design and installation guide Flat-specific intake and exhaust ventilation system for blocks of flats

NEW BUILDINGS AND REFURBISHMENT

Contents

Introduction

Uponor Suomi Oy manufactures ducts, components, and products designed for flat-specific ventilation. The ducts and components are manufactured from polypropylene plastic. The tightness class is D. Because of the manufacturing technique and the material, the interior surfaces are clean, oil-free, and smooth. Dust and other impurities do not adhere well to the smooth interior surface, and any required cleaning is easy.

The ducts are delivered from the factory with the ends covered by protective caps and the components packed in an airtight plastic bag, keeping them clean.

The plastic Uponor ventilation system ducts and components have a VTT product certificate, code VTT-C-6220-10. Plastic Uponor system ventilation ducts have been used in the implementation of ventilation systems for detached houses from the autumn of 2000.

This manual is a compilation of installation examples of ventilation implementation, describing in text and illustrative drawings how the flat-specific ventilation of blocks of flats is implemented with plastic Uponor ventilation ducts.

In the installation examples of ventilation for blocks of flats, the kitchen hood exhaust duct is always made from zinc-coated sheet metal. The use of plastic ducts is forbidden.

Uponor and environmental issues

Uponor Suomi Oy is part of the international Uponor Group. We deliver solutions that create better living environments in co-operation with professionals. Uponor's solutions are technologically advanced, cost-efficient in life-cycle terms, environmentally friendly, and ethically sound. It is the company's policy to take account of stakeholder expectations and corporate social responsibility.

Our operation system has been established to meet the requirements set by SFS-EN ISO 9001 and SFS-EN ISO 14001. In order to ensure expertise and consistent corporate policy throughout the organisation, the company provides all staff with training. In all of our operations, the aim is continuous improvement and minimum environmental hazards. We develop our environmentally friendly product systems in co-operation with the stakeholders.

Our main goal in relation to environmental issues is the continuous development of production processes, development of environment-friendly products, minimisation of the waste generated, and utilisation of recyclable plastics.

The functionality of our operations system is regularly evaluated both internally and by an outside auditor. These evaluations ensure the functionality of the system and continuous development in accordance with our environmental aims and the goals set.

Uponor ventilation systems

The instructions in this manual are designed for the implementation of flat-specific ventilation systems for P1 category blocks of flats.

Uponor has complemented the selection of its ventilation products and introduced pre-insulated ventilation ducts and components.

With insulated ducting, intake air can be cooled in a safer manner and the energy is not dissipated into the structures. On the other hand, the pre-insulated ducts located in the insulation space above the ceiling are denoted as 'safe', avoiding the risks related to condensation and installation errors.

- The ducting and components are clean and protected, all the way from production to installation.
- The product selection includes pre-insulated ducts and components.
- The system does not collect dust or dirt: the antistatic PP material is resistant to all impurities
- Installation is fast and simple
- The material is easy to work with
- Ducting can be installed without separate sealing and locking
- The structure is of sound technical construction 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 joint solutions

Technical specifications of the duct material

Raw material:	polypropylene; odourless and non-toxic
Colour:	blue
Density:	≈ 900 kg/m³
Tensile strength:	30 MPa
Heat expansion:	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
- VTT certificate Code VTT-C-6220-10
  Date 1.12.2010
- Compliance with the fire safety regulations has been demonstrated in accordance with Section E1:1.3.2 of the National Building Code of Finland.
  VTT research reports
  Code VTT-R-05113-10
  Date 1.10.2010
  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 inner duct surface and components are measured in production in accordance with the test procedure ANSI/EOS/ESD-S11.11.

Heat-resistance:

Continuous	–50 °C...+85 °C,
momentary	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.

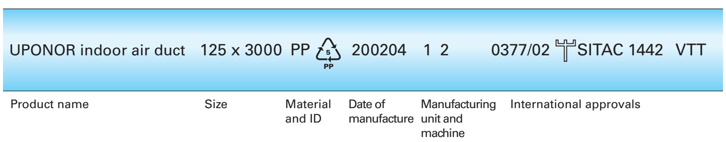
Cleanliness class:
Cleanliness class M1. Developed in co-operation with the Finnish Allergy and Asthma Association.

Technical specifications of duct insulation

Raw material:	foamed polyethylene,
Colour:	blue
Density:	30 kg/m³, insulation thickness 15 mm

Fire performance: Not fire classified.

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.



Noise suppressors

The noise suppressors are made of PE plastic.
The noise suppressors were tested by VTT, for Certificate VTT-S-03839-07
Date 24.4.2007

- square suppressors have round duct outlets
- lightweight and easy to handle
- excellent in the noise suppression characteristics
- impact- and corrosion-resistant
- black in colour
- interior suppression material of suppressors is Dacron
- no loose fibres or moisture absorption
- 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

Air-tightness classification of the ducting: D. 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.

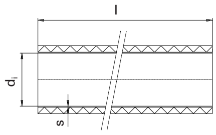
Storage

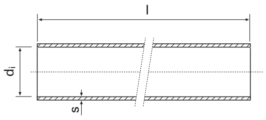
Withstands outdoor storage for one year in Central European climate conditions. The ducts are UV-protected. A maximum of two superimposed layers.

Insulated and uninsulated ventilation ducts and components

Clean ventilation ducts

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

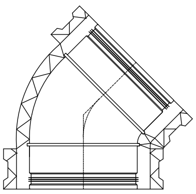


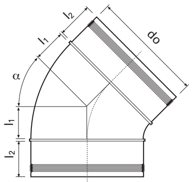


	di x l	Uponor no.	HVAC no.	s
Round pre-insulated duct Delivered in three-metre poles.	100 x 3000	1046 156	8274 000	
	125 x 3000	1046 157	8274 001	
	160 x 3000	1046 158	8274 002	
	200 x 3000	1046 159	8274 004	
Round duct Delivered in three-metre poles.	100 x 3000	1046 152	8273 002	2.1
	125 x 3000	1046 153	8273 004	2.1
	160 x 3000	1046 154	8273 006	2.5
	200 x 3000	1046 155	8273 007	3.0

Clean duct components

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

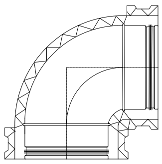


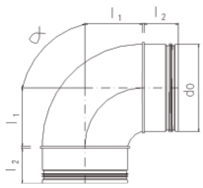


	do x α	Uponor no.	HVAC no.	l_1	l_2
Curved 45°, pre-insulated	100 x 45°	1046 197	8273 017		
	125 x 45°	1046 198	8273 018		
	160 x 45°	1046 199	8273 019		
	200 x 45°	1046 196	8273 016		
Curved 45°	100 x 45°	1046 172	8273 102	46	40
	125 x 45°	1046 173	8273 104	36	50
	160 x 45°	1046 174	8273 106	45	50
	200 x 45°	1046 171	8273 107	54	50

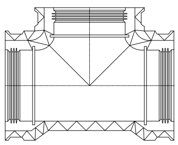
Clean duct components

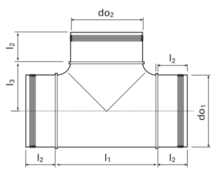
Duct material: polypropylene. Colour: blue.
Insulation material: foamed polyethylene. Colour: blue
Insulation thickness: 15 mm



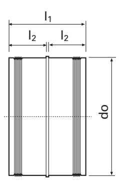


	do x α	Uponor no.	HVAC no.	l_1	l_2
Curved 90°, pre-insulated	100 x 90°	1046 193	8274 013		
	125 x 90°	1046 194	8274 014		
	160 x 90°	1046 195	8274 015		
	200 x 90°	1046 192	8274 012		
Curved 90°	100 x 90°	1046 168	8273 122	81	40
	125 x 90°	1046 169	8273 124	84	50
	160 x 90°	1046 170	8273 126	160	50
	200 x 90°	1046 167	8273 127		





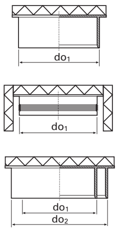
	do_1/do_2	Uponor no.	HVAC no.	l_1	l_2	l_3
Tee, pre-insulated	100/100	1046 200	8274 020			
	125/100	1046 204	8274 024			
	125/125	1046 201	8274 021			
	160/100	1046 205	8274 025			
	160/125	1046 202	8274 022			
	160/160	1046 203	8274 023			
	200/160	1046 206	8274 026			
Tee	100/100	1046 175	8273 222	142	40	71
	125/100	1046 179	8273 223			
	125/125	1046 176	8273 224	168	50	71
	160/100	1046 180	8273 225			
	160/125	1046 177	8273 226	168	50	101
	160/160	1046 178	8274 023			
	200/160	1046 181	8273 230			



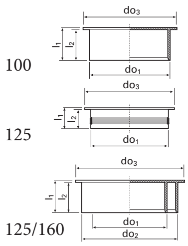
	do	Uponor no.	HVAC no.	l_1	l_2
Internal joint	100	1046 164	8273 402	83	40
	125	1046 165	8273 404	103	50
	160	1046 166	8273 406	103	50
	200	1046 163	8273 407	103	50

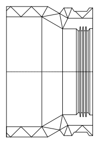
Clean duct components

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

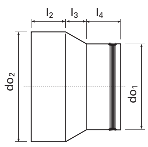


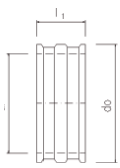
	do_1/do_2	Uponor no.	HVAC no.	do_3	l_1	l_2
Plug, pre-insulated	100	1046 207	8273 027	120	43	40
	125	1046 208	8273 028	145	33	30
	125/160	1046 209	8273 029	180	53	50
Plug	100	1046 182	8273 462	120	43	40
	125	1046 183	8273 464	145	33	30
	125/160	1046 184	8273 467	180	53	50





	do_1/do_2	Uponor no.	HVAC no.	l_2	l_3	l_4
Reducer, pre-insulated	100/125	1046 210	8274 030			
	125/160	1046 211	8274 031			
	160/200	1046 212	8274 032			
Reducer	100/125	1046 185	8273 302	50	20	40
	125/160	1046 186	8273 306	51	30	50
	160/200	1046 187	8273 308			



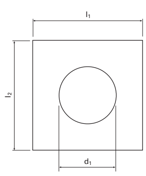


	do	Uponor no.	HVAC no.	di	do	l_1
Internal joint insulation sleeve	100	1046 189	8274 009	134	164	
	125	1046 190	8274 010	159	189	
	160	1046 191	8274 011	195	225	
	200	1046 188	8274 008	235	265	

Clean duct components

	Product	Uponor no.	HVAC no.
Clamping band	Clamping band (10 pcs/bag)	1054 916	8273 920

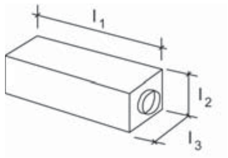
Please note: Clamping bands are delivered, in the required number, with pre-insulated ventilation joints for sealing of the joints.



	Size d_1	Uponor no.	HVAC no.	l1	l2	thickness
Vapour barrier penetration seal	100	1046 252	8273 822	240	240	10
	125	1046 251	8273 824	240	240	10

Self-adhesive; PE plastic

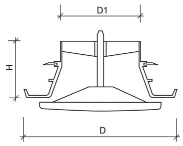
Clean duct components



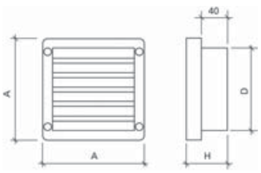
	Joint size and model	Uponor no.	HVAC no.	l_1	l_2	l_3
Noise suppressors	USI - 125 - 300	1046 253	8273 930	300	190	270
	USI - 125 - 650	1046 254	8273 931	650	190	270
	USI - 125 - 1000	1046 255	8273 932	1000	190	270
	USI - 160 - 650	1046 256	8273 933	650	225	300
	USI - 160 - 1000	1046 257	8273 934	1000	225	300

Intake and exhaust air valves

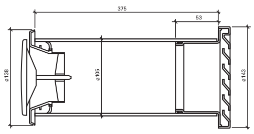
Approved valves must be used in mechanical intake and exhaust ventilation, and the maximum allowed room-specific air flow through the throttle is 42 dm3/s with a 100 Pa pressure difference.



	Joint size and model	Uponor no.	HVAC no.	D	D_1	H
Disc valves (gravity ventilation)	100	1046 236	8273 782	138	72	58
	125	1046 237	8273 792	168	90	66



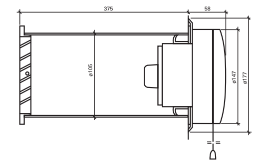
	Joint size and model	Uponor no.	HVAC no.	A	D	H
Outdoor grilles	USS-100 with a door screen	1046 238	8273 851	143	123	57
	USS-125 with a door screen	1046 239	8273 856	143	123	57
	USS-160 with a removable framed screen	1046 240	8273 861	235	160	74
	USS-200 with a removable framed screen	1046 241	8273 866	235	200	74
	160/200 framed screen for outdoor grille	1046 242	8273 874			

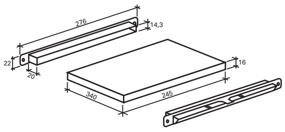


	Joint size and model	Uponor no.	HVAC no.
Clean air valve	URS-100	1046 243	8273 882

Intake and exhaust air valves

Approved valves must be used in mechanical intake and exhaust ventilation, and the maximum allowed room-specific air flow through the throttle is 42 dm3/s with a 100 Pa pressure difference.





	Joint size and model	Uponor no.	HVAC no.
Fresh air valves	UKS-100, for wall	1046 244	8273 892
	UKTL-100, for vent hole	1046 245	8273 902
Slit valve	URV-18, 18 x 245 x 340	1046 246	8273 922

Design of flat-specific intake and exhaust ventilation

These design instructions apply to flat-specific intake and exhaust ventilation equipped with heat recovery equipment for P1-class blocks of flats.

Definitions

- **An outdoor air duct** supplies fresh outdoor air to the ventilation machine.

- **Intake air ducts** distribute the fresh air from the machine to rooms.

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

- **An extract air duct** conducts the exhaust air by conveying it from the ventilation machine to the exhaust pipe on the roof.

The recommended starting point for 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 ducts are used as flat-specific ventilation ducts in accordance with the regulations and instructions of the National Building Code of Finland.

The design must take into consideration which of the flat-specific ventilation ducts are implemented with steel sheet ducts and which with Uponor plastic ducts. Steel sheet ducting is always used for the kitchen hood's local exhaust duct. The ventilation of the kitchen hood is implemented either with a dedicated exhaust air ducting reaching all the way to the roof or by connecting the hood's exhaust air duct to the flat-specific ventilation machine. The extract air duct from the ventilation machine to the roof must then be flat-specific and the duct material must be stainless steel or corresponding.

In the section of this manual on system descriptions for ventilation solutions, some examples of the design starting points for designing for sites of different types and the possible applications of plastic Uponor ventilation ducts in different building types are given.

Kitchen hood exhaust duct

The local exhaust ducting for kitchen hoods is made of non-combustible spiral steel sheet ducting with a minimum thickness of 0.5 mm. The duct is fire-insulated with insulation of EI30 fire-resistance in accordance with these design and installation instructions.

Location of ducting

Supply and exhaust air ducts are normally installed

- above a suspended ceiling

- below the ceiling, in a housing

The supply air valves are mainly installed in living rooms and bedrooms for a constant supply of fresh outdoor air.

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. Air flows from rooms with intake air valves through door slits to those with exhaust air valves.

Official regulations

In the design of air ducting and its installation, the regulations and instructions set forth in parts D2, E1, E7, and C1 of the National Building Code of Finland must be followed.

Ducting lining and housing

Ventilation ducting must be protected by means of a suspended ceiling or a housing from the side of inhabited spaces in accordance with section E1 of the National Building Code of Finland, by means of at least class A2-s1, d0 materials.

Duct insulation

The thermal, condensation-water-, and fire-insulation of ducting are specified in the ventilation plan.

Insulation is marked in the drawings.

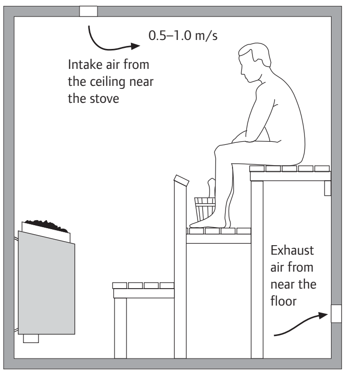
To facilitate on-site insulation work, using pre-insulated ducts and components with 15 mm expanded PE plastic insulation is recommended.

Sauna room ventilation

When one is designing sauna ducting, temperature limitations have to be observed. 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.

NB: Only use heat-resistant sauna valves designed for the purpose in the upper part of the sauna room.

Sauna valves must always be installed in combination with the mounting frame. The mounting frame must be fastened with screws to the wooden material of the sauna ceiling, after which the valve can be installed in its place. Avoid installing the valve directly above the sauna stove.



Sauna room ventilation

Energy consumption of the different exhaust ventilation solutions for kitchen hoods

The system descriptions of the ventilation solutions in this manual present three alternative solutions for the exhaust ventilation of a kitchen hood.

When comparing **energy-efficiency** between the different kitchen hood exhaust ventilation solutions, one should estimate how many hours the kitchen hood is in augmentation mode each day. Three hours per day could be considered a good baseline for calculations. The general ventilation of the kitchen operates 24 hours a day, whether the hood augmentation mode is on or off.

In comparison of the energy consumption of the various alternatives, the one where the hood exhaust ventilation is implemented as its own system is the most recommendable. This alternative is also the most economical when one considers service and maintenance work. In this solution, the ducting of the flat-specific ventilation machine's area of effect, usually with the exclusion of the extract air duct from the machine, is implemented with Uponor ventilation ducting. See the examples on the following pages.

The shared duct exhaust ventilation of the hoods will then be implemented traditionally with sheet metal spiral ducts.

In this solution, the hood's augmentation ventilation will not needlessly augment the ventilation of other rooms, which also has a favourable effect on the flat's heating energy consumption.

In examination of the alternatives from the perspective of energy-efficiency, the **costs related to service and maintenance** must also be taken into consideration.

In the first solution, the flat ventilation is implemented as its own system, and the kitchen hood's exhaust ventilation as its own system. The kitchen hood exhaust ventilation will then be implemented on the shared duct principle only with a pressure-controlled exhaust air fan in the service of hood exhaust ventilation.

In the second solution, where the kitchen hood exhaust air is conducted outdoors via the heat recovery of the flat-specific ventilation machine, it must be estimated how much the heat recovery cells will be dirtied because of this, and whether the hood filter is powerful enough to remove impurities without causing too much pressure loss.

In the third solution, the latter idea can also be implemented via a ventilation machine with which the kitchen exhaust air ventilation is channelled through the flat-specific ventilation machine, bypassing heat recovery while still using the shared extract air duct to the outdoors.

When comparing the effects of the different ventilation solutions described above for their energy consumption and energy-efficiency, one must investigate very carefully how the ventilation actually works in the various usage situations.

The comparison must also take into consideration all costs related to servicing and maintenance, the annual efficiency of heat recovery, and the effect the fouling of the heat recovery cells has on the annual efficiency.

System descriptions for ventilation solutions

This section presents installation examples for flat-specific ventilation systems for blocks of flats, where the implementation of the ducting is based on the use of Uponor ducts and components in the extent shown by the model drawings. The kitchen hood exhaust air duct is always manufactured from steel sheet spiral ducting all the way to the roof.

A. Flat-specific ventilation and heat recovery machine and kitchen exhaust ventilation

In this system, ventilation is implemented with a flat-specific ventilation and heat recovery machine located in the room space or above the flat's door.

The ventilation ducts of the machine are plastic Uponor ducts. The extract air from the flat-specific ventilation and heat recovery machine is conducted separately from each machine to the roof. Two alternatives are presented for extract air ducting.

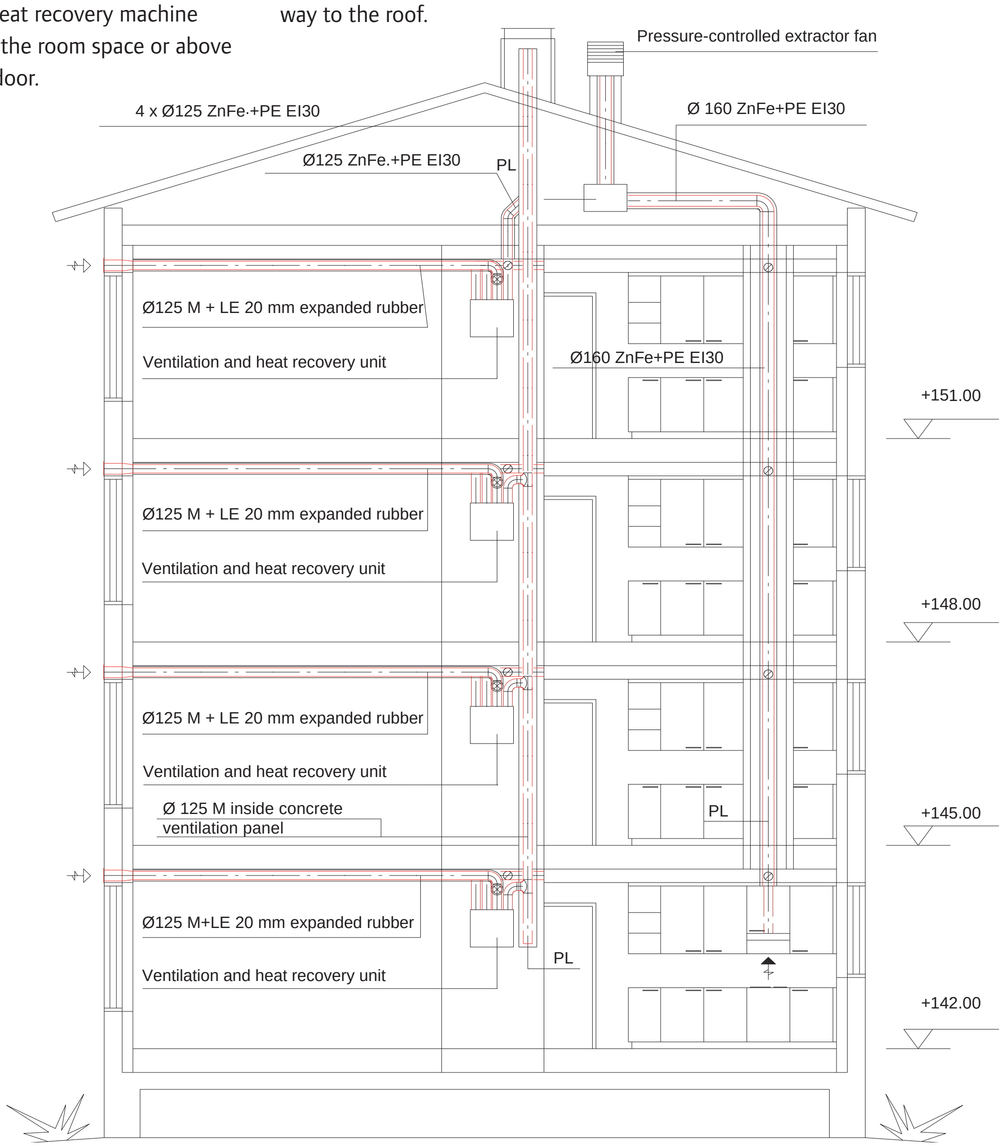
In the first version, the extract air duct is plastic Uponor ducting, installed inside a concrete ventilation panel. The section in the attic area is a fire-insulated steel sheet spiral duct.

In the second version, the extract air duct is a steel sheet spiral duct, fire-insulated from the ventilation and heat recovery machine all the way to the roof.

The flat-specific ventilation is presented with two different ventilation and heat recovery machines.

In both versions, the kitchen exhaust ventilation is presented as a dedicated shared duct exhaust from the hood to a pressure-controlled extractor fan or a shared duct fan. The kitchen exhaust air duct is a steel sheet spiral duct, fire-insulated all the way to the roof. If the kitchen exhaust air duct is located inside a concrete ventilation panel, the duct is a steel sheet spiral duct, and the ducting section in the attic area is fire-insulated.

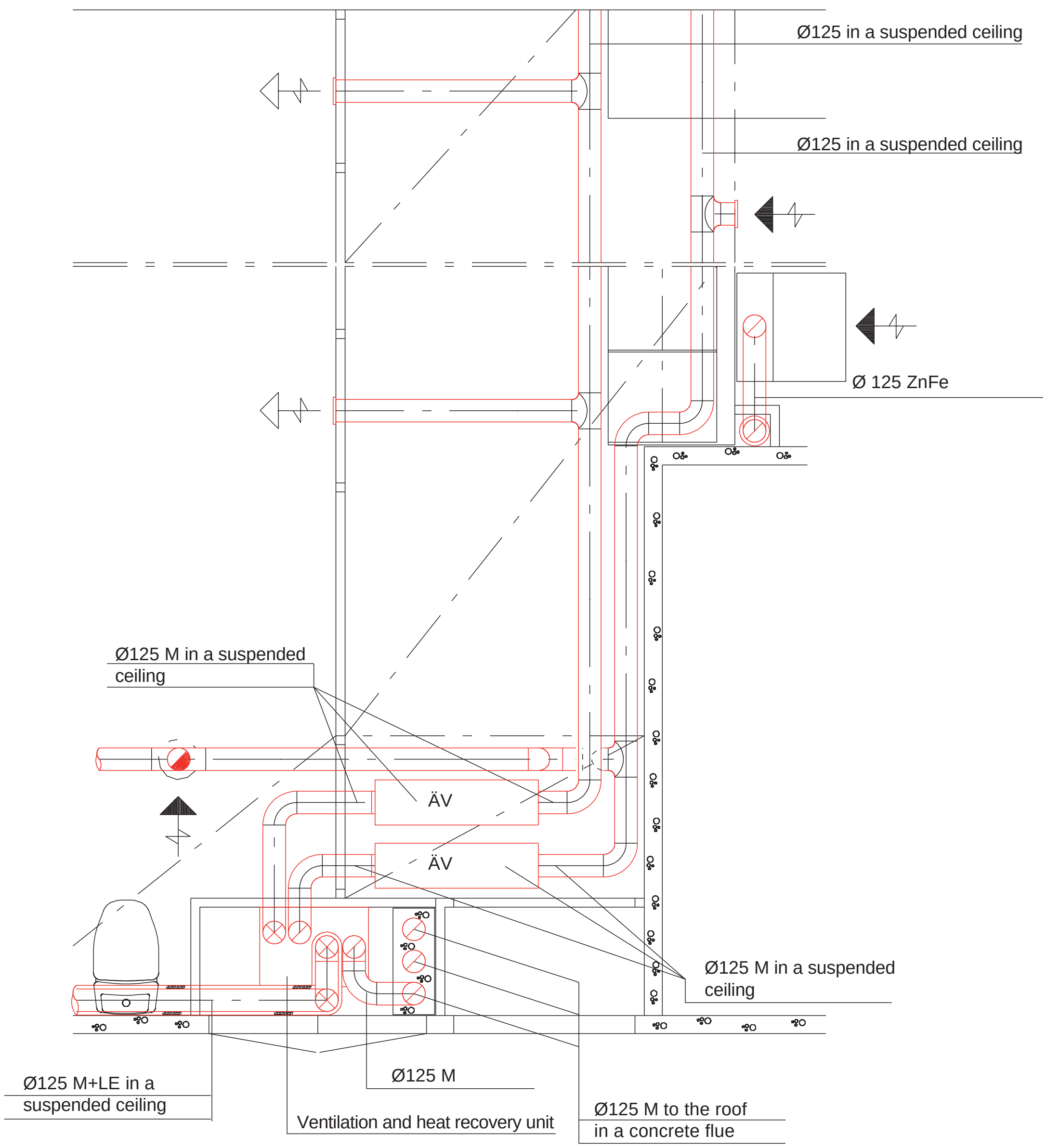
Example 1



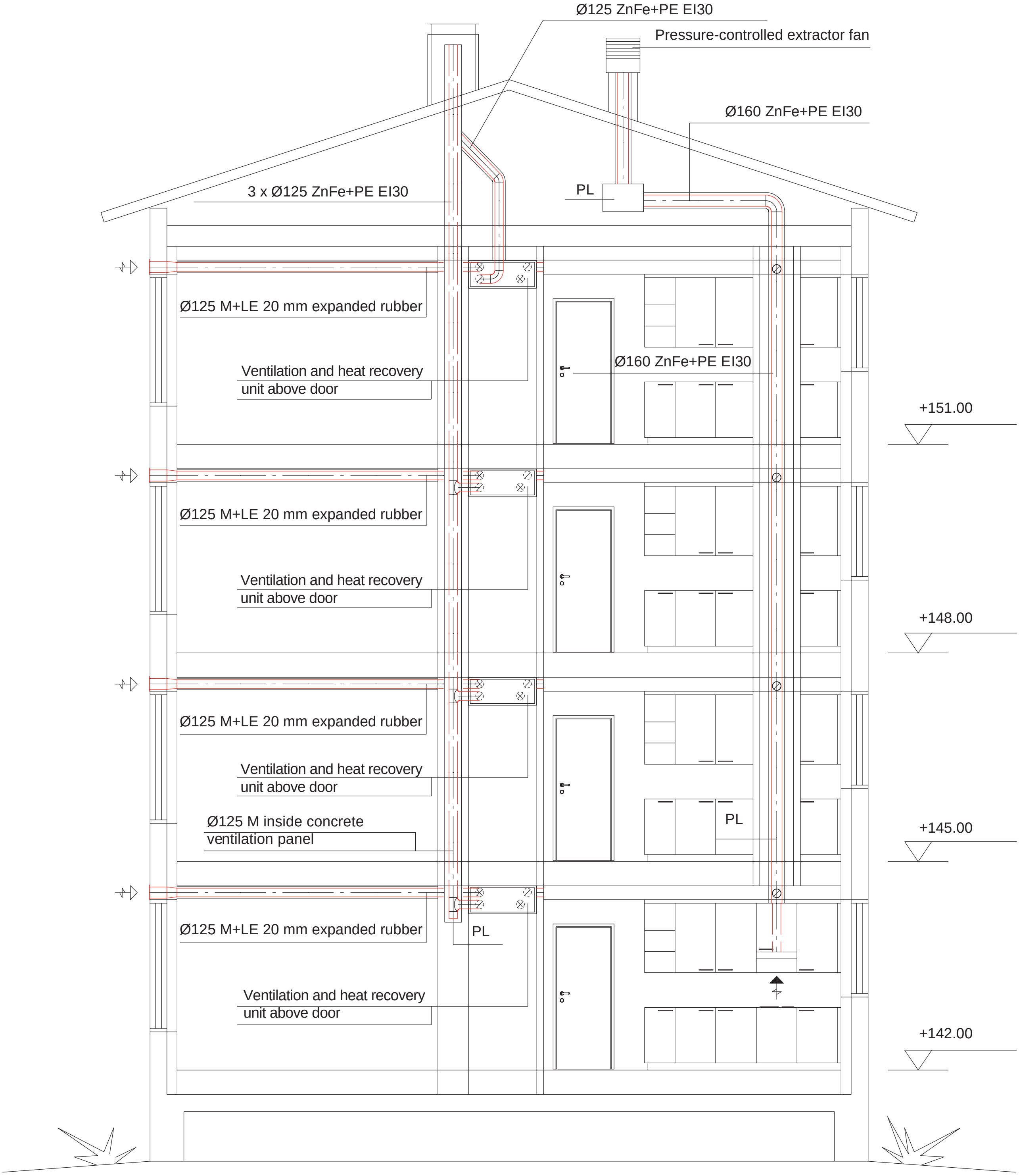
Example 1A

NB!

The exhaust ventilation of kitchen hoods is implemented with the shared duct principle with a dedicated pressure-controlled extractor fan



Example 2

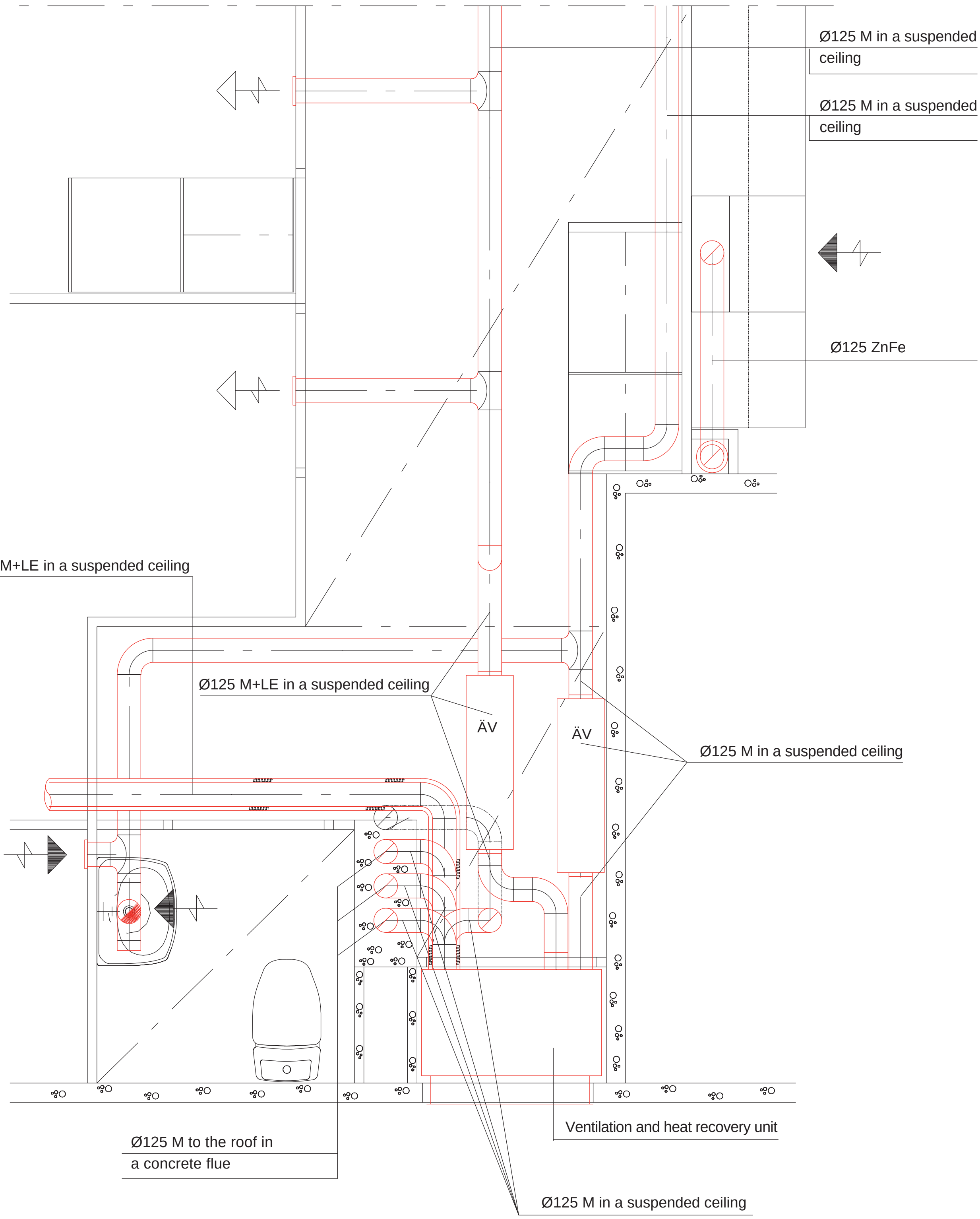


Ø125 ZnFe+PE EI30
Pressure-controlled extractor fan
Ø160 ZnFe+PE EI30
3 x Ø125 ZnFe+PE EI30
PL
Ø125 M+LE 20 mm expanded rubber
Ventilation and heat recovery
unit above door
Ø160 ZnFe+PE EI30
+151.00
Ø125 M+LE 20 mm expanded rubber
Ventilation and heat recovery
unit above door
+148.00
Ø125 M+LE 20 mm expanded rubber
Ventilation and heat recovery
unit above door
Ø125 M inside concrete
ventilation panel
PL
+145.00
Ø125 M+LE 20 mm expanded rubber
PL
Ventilation and heat recovery
unit above door
+142.00

Example 2A

NB!

The exhaust ventilation of kitchen hoods is implemented with the shared duct principle with a dedicated pressure-controlled extractor fan



B. Flat-specific ventilation and heat recovery machine, extract air from the exterior wall and kitchen exhaust ventilation

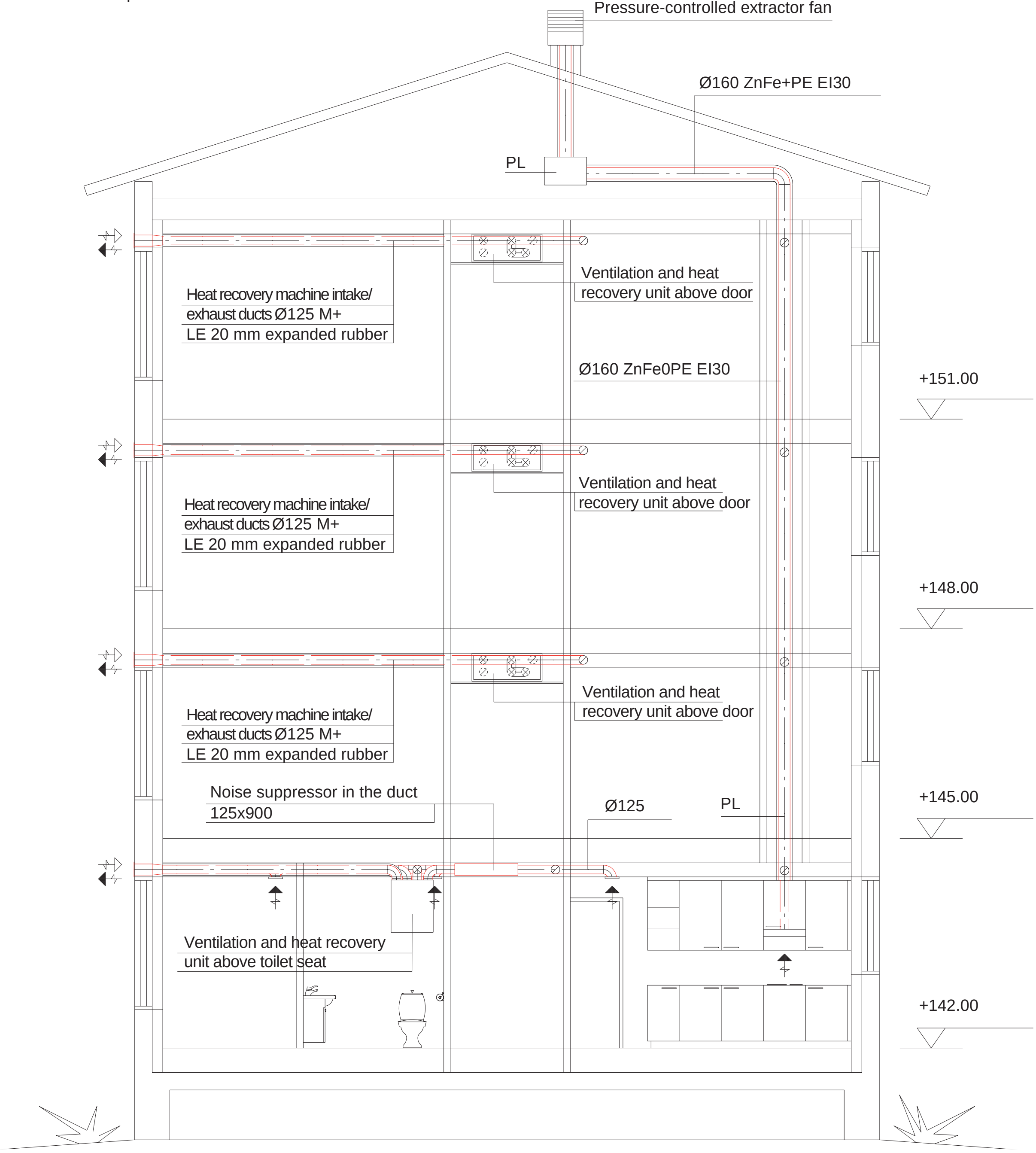
In this system, ventilation is implemented with a flat-specific ventilation and heat recovery machine located above the toilet seat or above the flat's door.

The ventilation ducts of the machine are plastic Uponor ducts. With the permission of the building inspection authority, in new buildings and on refurbishment sites, the extract air from a flat-specific ventilation and heat recovery machine can be conducted outside through the flat's exterior wall via a suitable stove-enamelled exterior wall valve manufactured from steel sheeting.

The flat-specific ventilation is presented with two different ventilation and heat recovery machines.

In both versions, the kitchen exhaust ventilation is presented as a dedicated shared duct exhaust from the hood to a pressure-controlled extractor fan or a shared duct fan. The kitchen exhaust air duct is a steel sheet spiral duct, fire-insulated all the way to the roof. If the kitchen exhaust air duct is located inside a concrete ventilation panel, the duct is a steel sheet spiral duct, and the ducting section in the attic area is fire-insulated.

Example 2



Example 3A

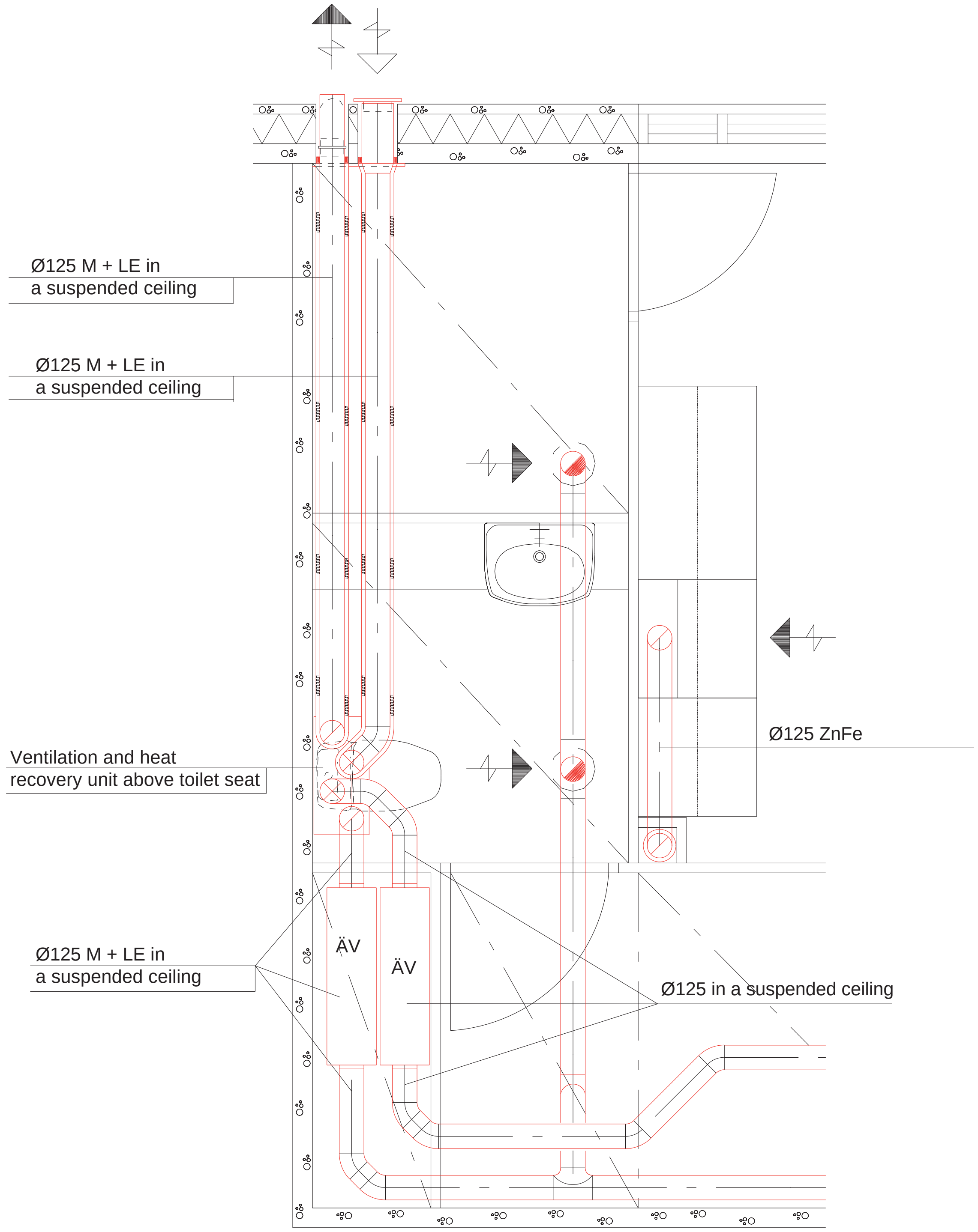
Ventilation and heat recovery unit above toilet seat

NB!

A suitable stove-enamelled exterior wall valve for extract air, manufactured from steel sheet.

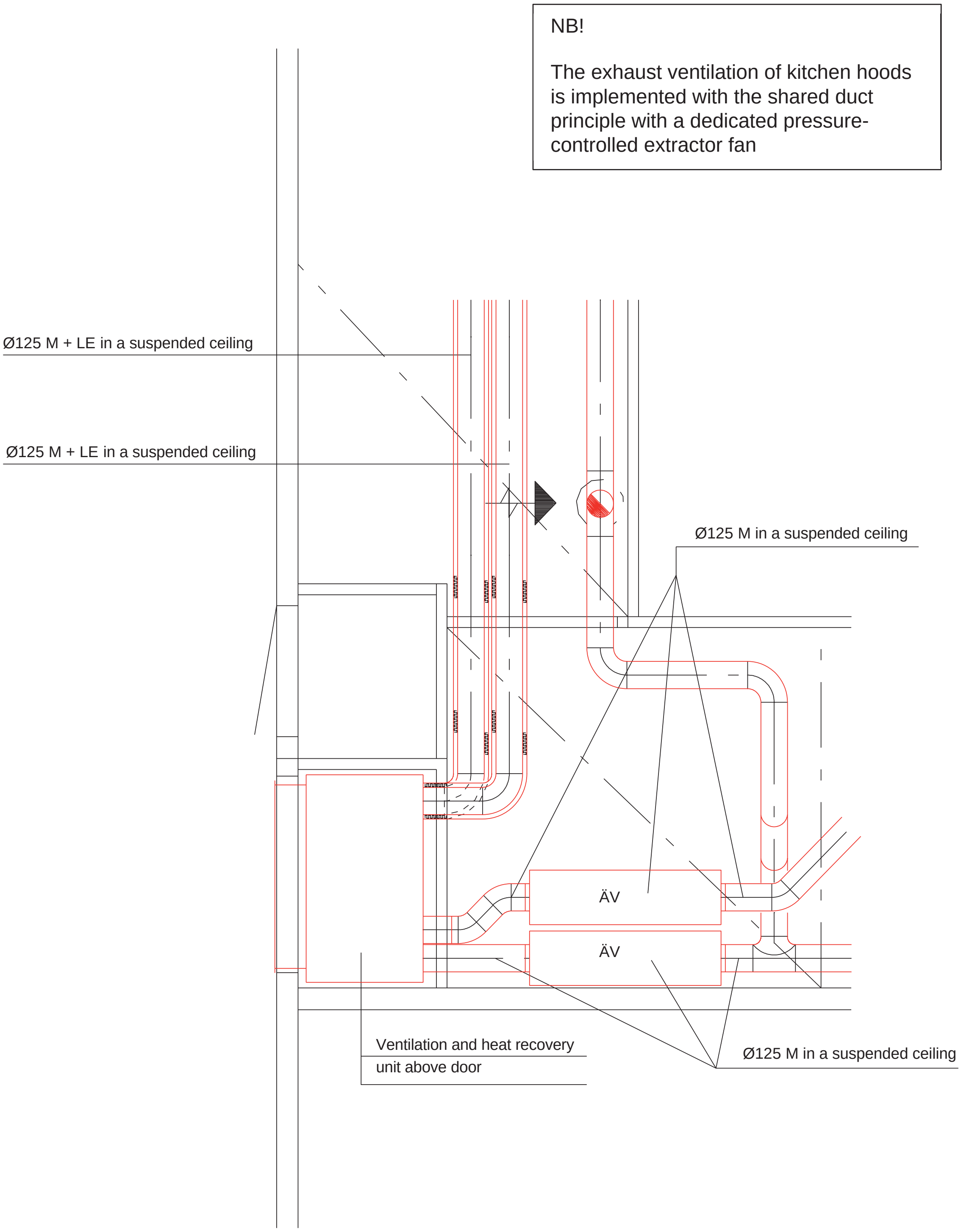
NB!

The exhaust ventilation of kitchen hoods is implemented with the shared duct principle with a dedicated pressure-controlled extractor fan



Example 3B

VENTILATION AND HEAT RECOVERY UNIT ABOVE FLAT DOOR

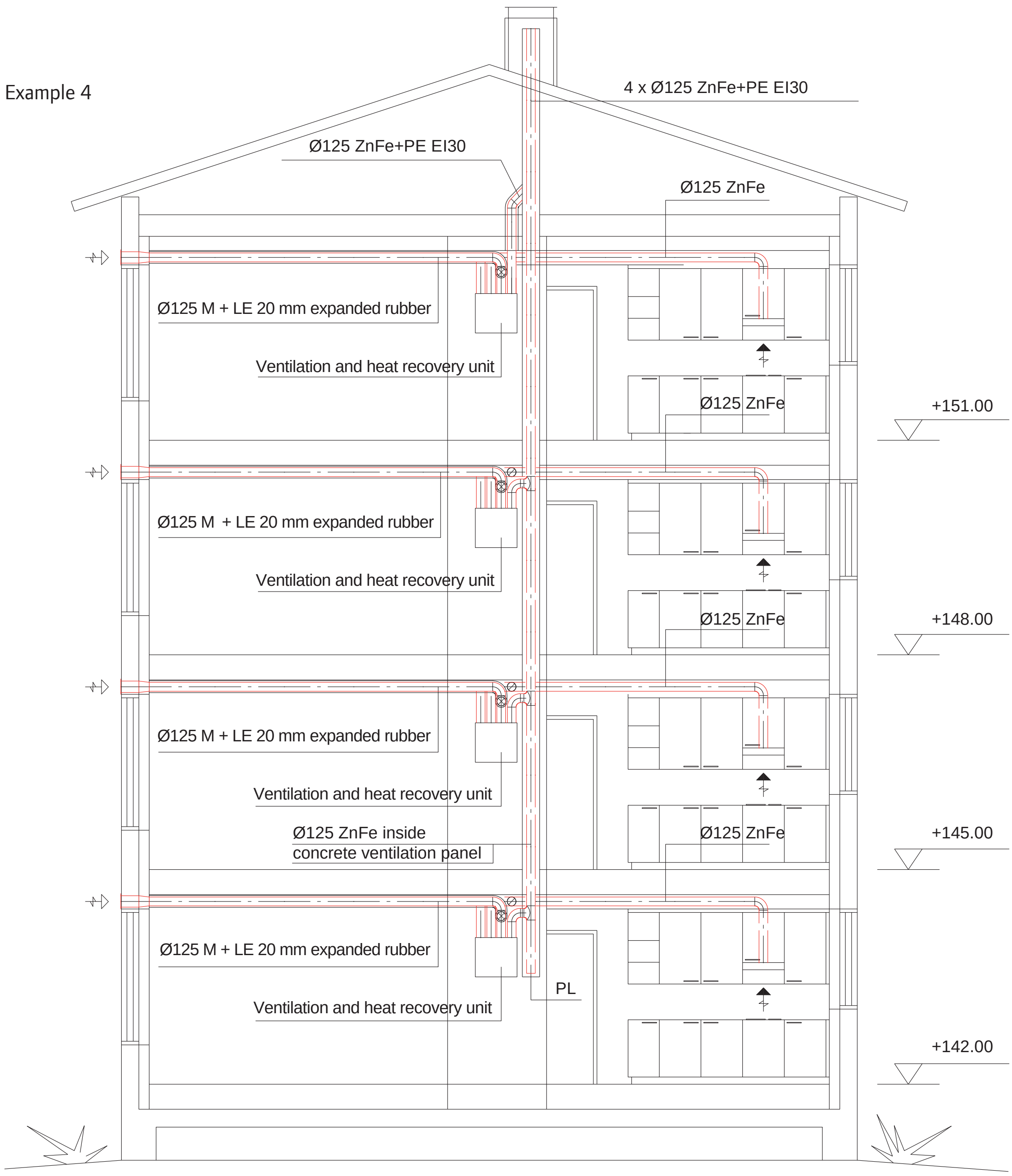


C. The exhaust air from the kitchen hood is conducted via a dedicated duct to the ventilation machine bypassing heat recovery

In this system, ventilation is implemented with a flat-specific ventilation and heat recovery machine.

The ventilation ducts of the ventilation and heat recovery machine are plastic Uponor ducts with the exception of the hood and extract air ducts, which are steel sheet spiral ducts. The hood exhaust air is conducted to the ventilation and heat recovery machine bypassing heat recovery. The general exhaust and the plastic exhaust air ducts from the other rooms are combined into one duct close to the ventilation and heat recovery machine. The extract air from the flat-specific ventilation and heat recovery machine is conducted separately from each machine to the roof.

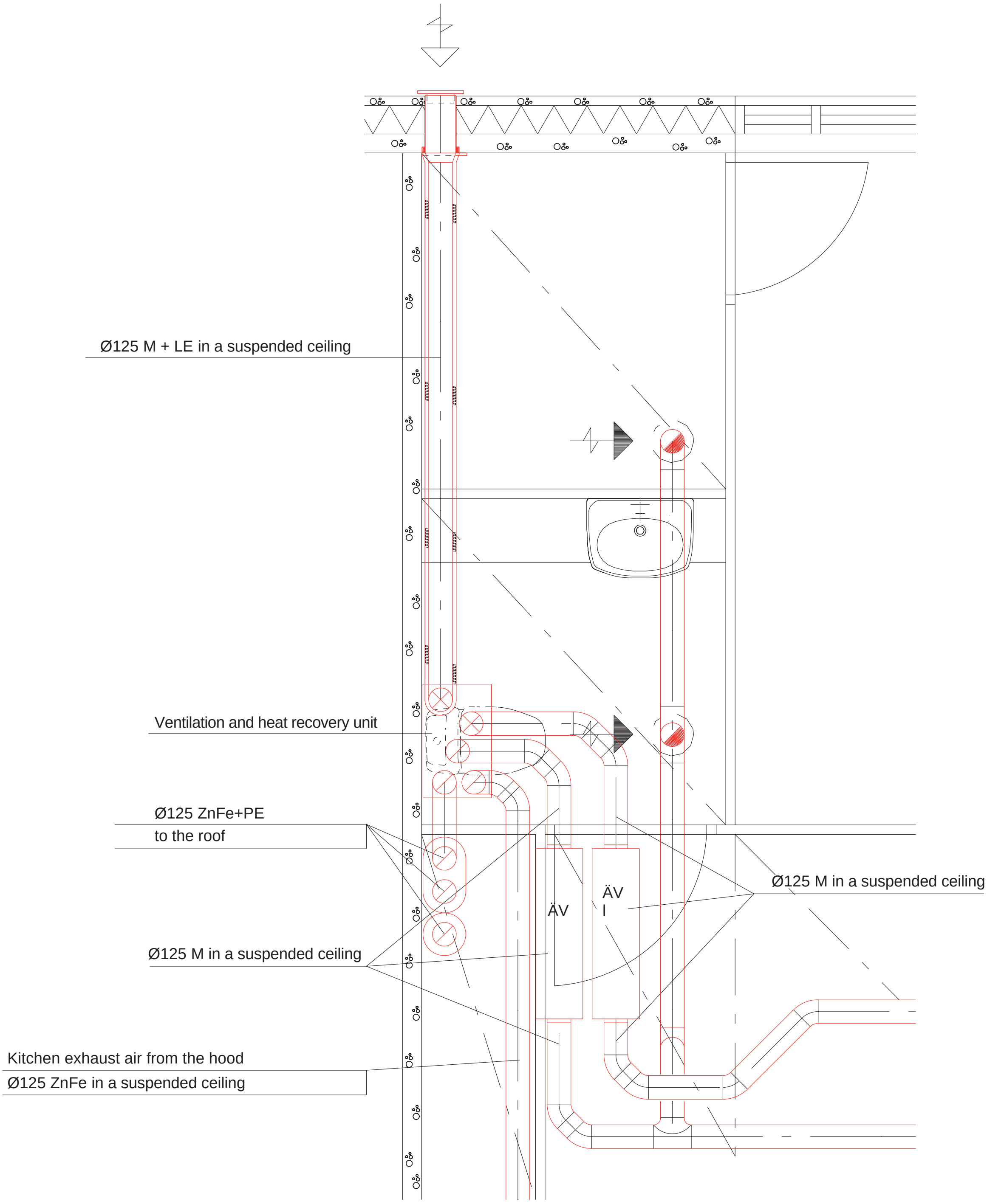
Example 4



NB!

In this system, extract air may not be blown outside from the wall.

Example 4A



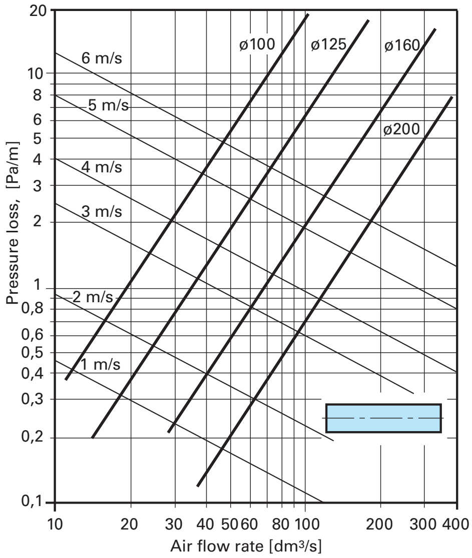
Ø125 M + LE in a suspended ceiling
Ventilation and heat recovery unit
Ø125 ZnFe+PE
to the roof
Ø125 M in a suspended ceiling
Kitchen exhaust air from the hood
Ø125 ZnFe in a suspended ceiling
ÄV
ÄV
I
Ø125 M in a suspended ceiling

Dimensioning of the ducting and noise suppressors, and the pressure loss graphs

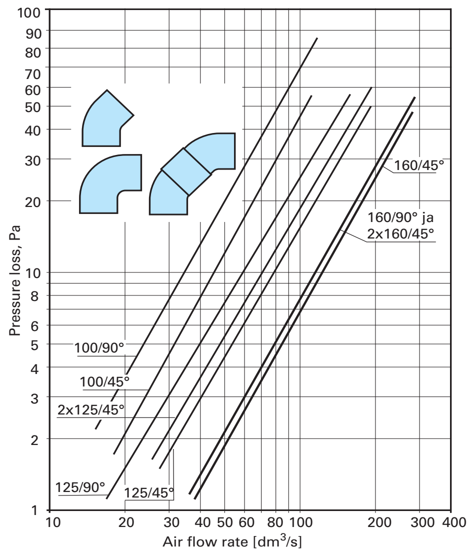
The main supply and exhaust air ducts must be dimensioned loose to the maximum extent possible, which minimises the pressure loss of the ducting.

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

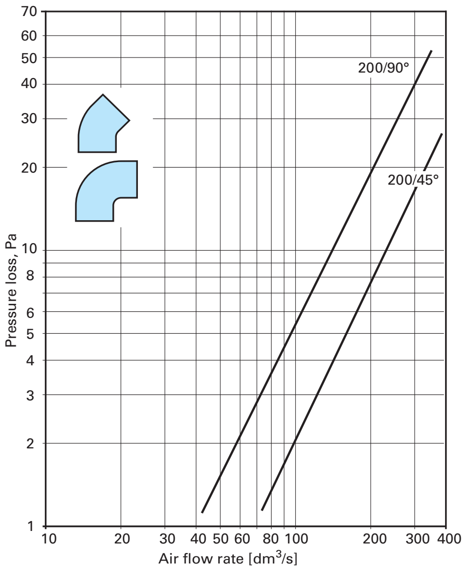
Ducts ø 100, ø 125, ø 160 ja ø 200



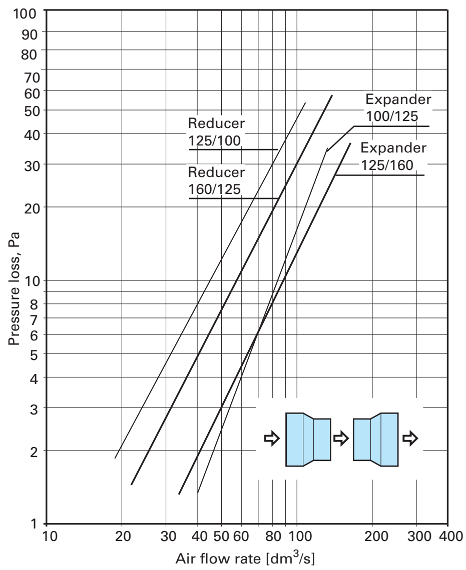
Curves 100/45°, 100/90° 125/45°, 2x125/45°, 125/90°, 160/45°, 2x160/45° ja 160/90°



Curves 200/45° ja 200/90°

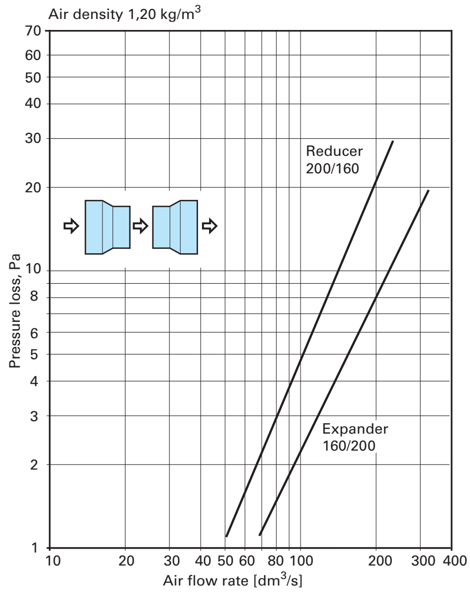


Reducer/expander: Reducers125/100, 160/125, and expanders 100/125 ja 125/160



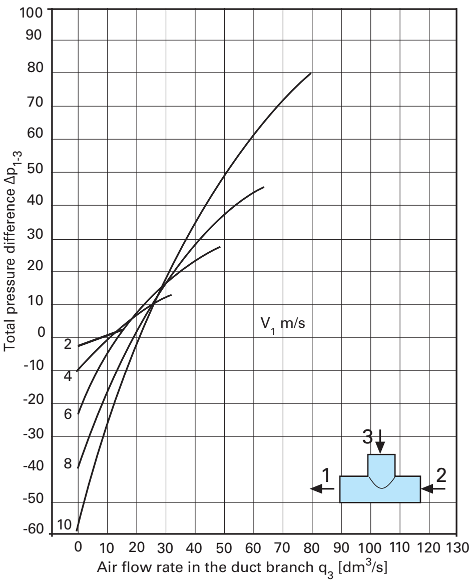
Reducer/expander: Reducer 200/160 and expander 160/200

Air density 1,20 kg/m³



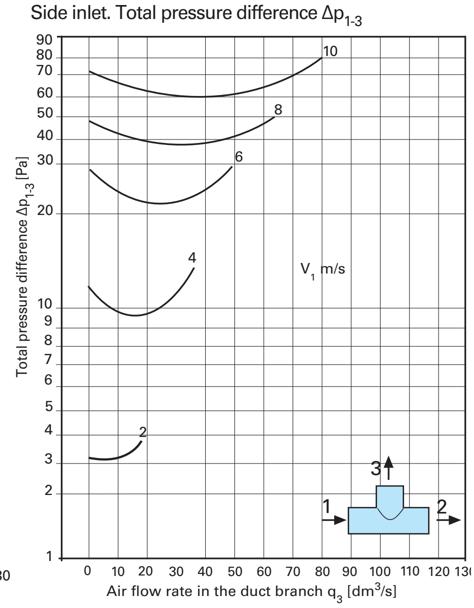
Tee 100/100

Exhaust from the side. Total pressure difference $\Delta p_{1\text{-}3}$



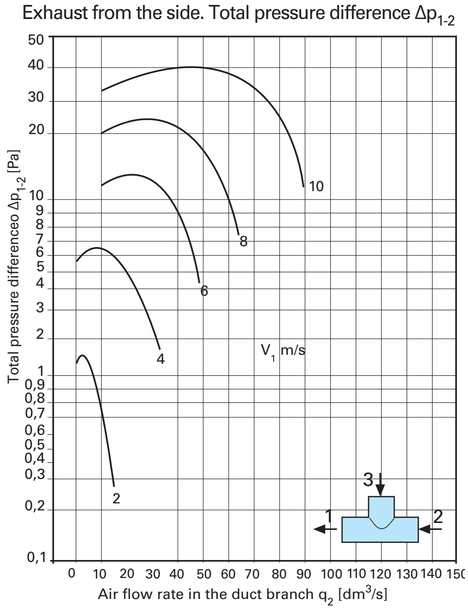
Tee 100/100

Side inlet. Total pressure difference $\Delta p_{1\text{-}3}$



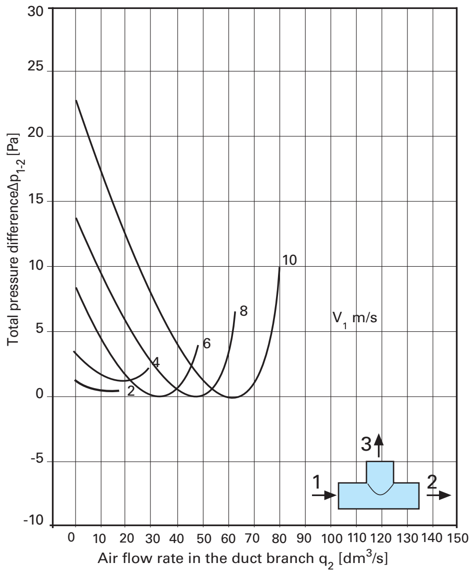
Tee 100/100

Exhaust from the side. Total pressure difference $\Delta p_{1\text{-}2}$



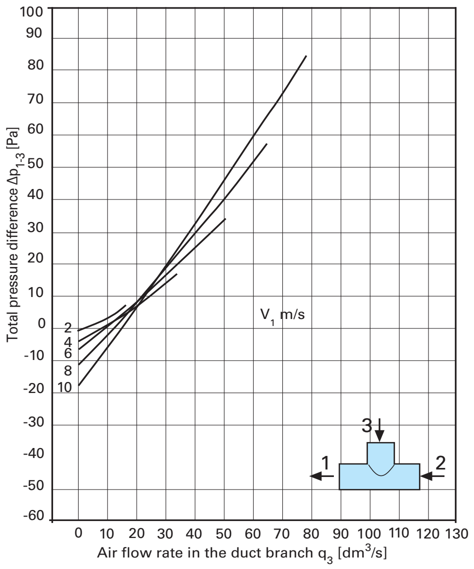
Tee 100/100

Side inlet. Total pressure difference $\Delta p_{1\text{-}3}$



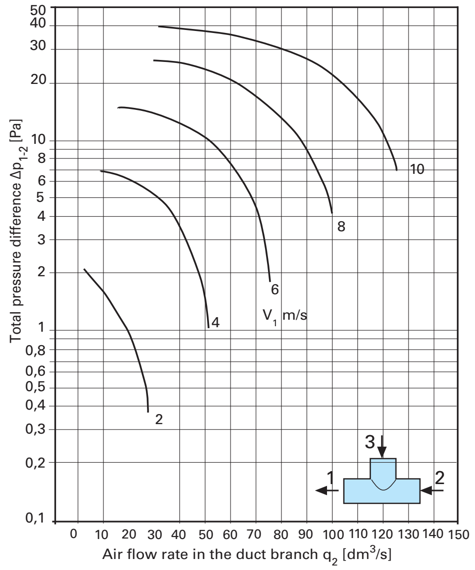
Tee 125/100

Exhaust from the side. Total pressure difference $\Delta p_{1\text{-}3}$



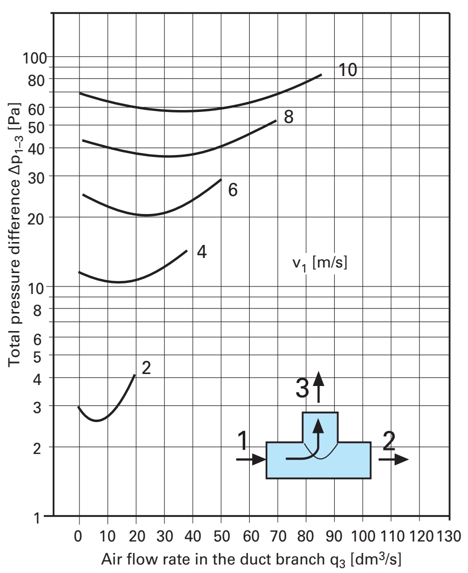
Tee 125/100

Exhaust from the side. Total pressure difference $\Delta p_{1\text{-}2}$



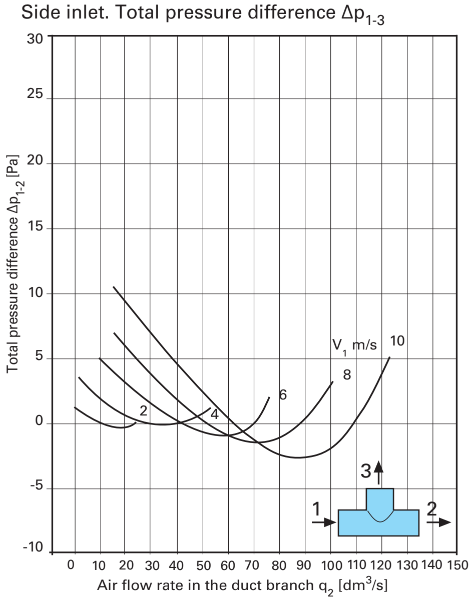
Tee 125/100

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



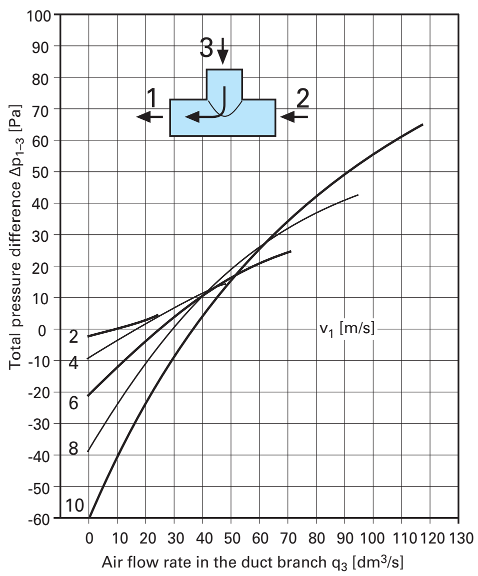
Tee 125/100

Side inlet. Total pressure difference $\Delta p_{1\text{-}3}$



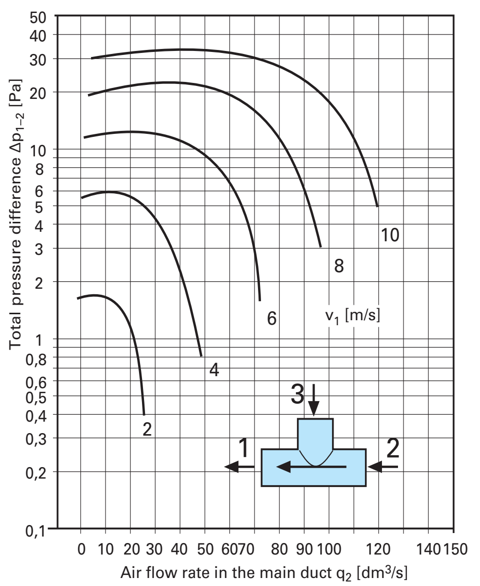
Tee 125/125

Exhaust from the side. Total pressure difference Δp_{1-3}



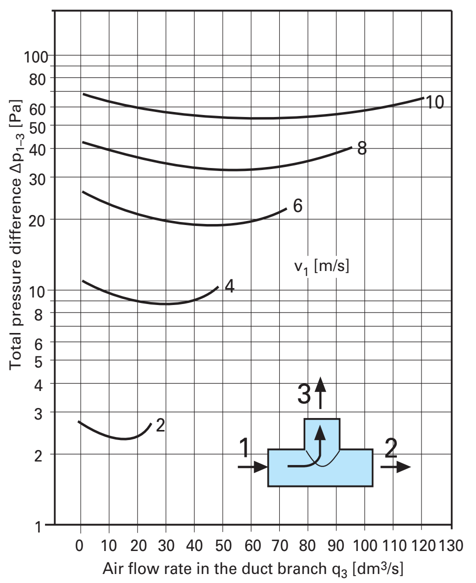
Tee 125/125

Exhaust from the side. Total pressure difference Δp_{1-2}



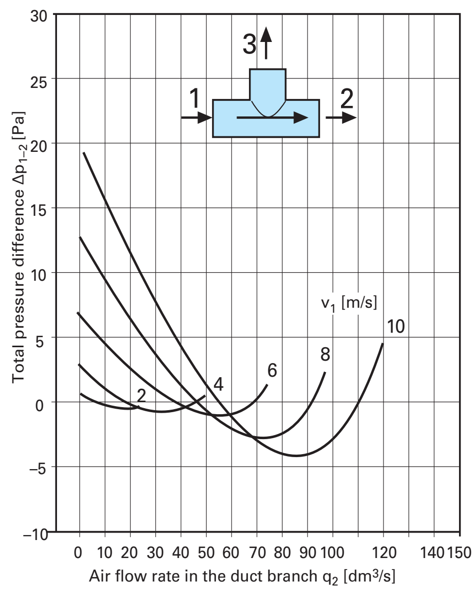
Tee 125/125

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

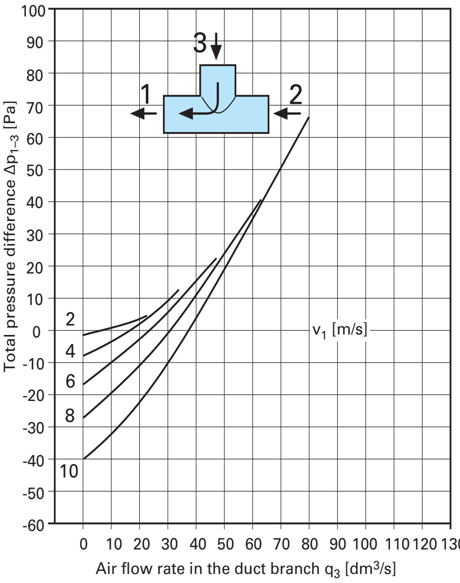


Tee 125/125

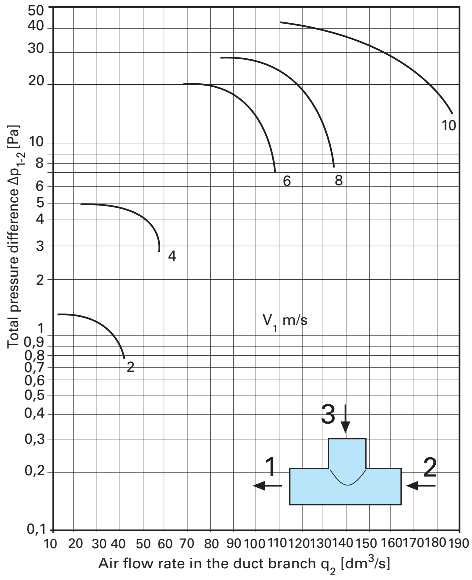
Side inlet. Total pressure difference Δp_{1-2}



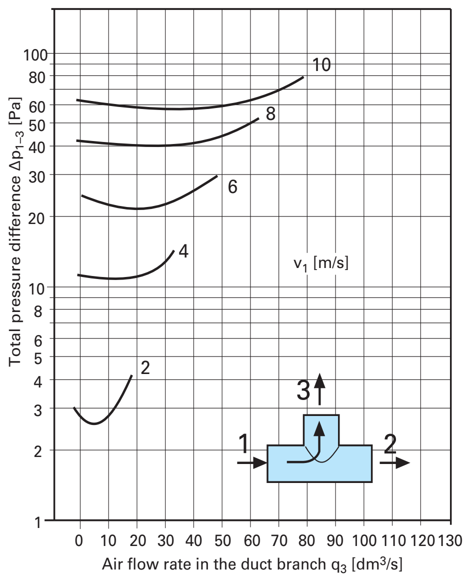
Tee 160/100
Exhaust from the side. Total pressure difference Δp_{1-3}



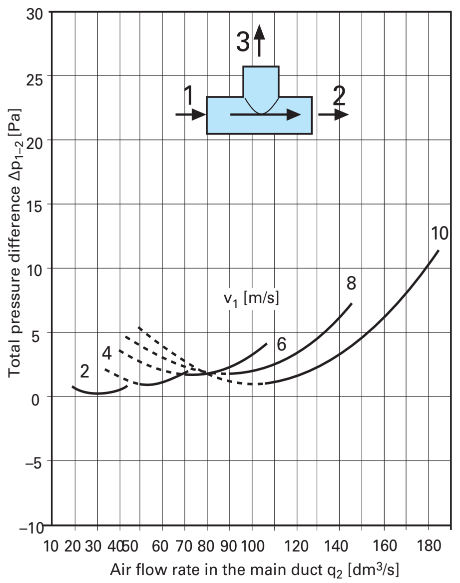
Tee 160/100
Exhaust from the side. Total pressure difference Δp_{1-2}



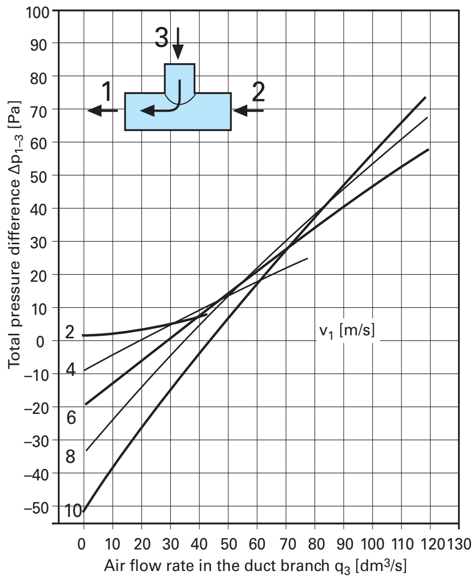
Tee 160/100
Side inlet. Total pressure difference Δp_{1-3}



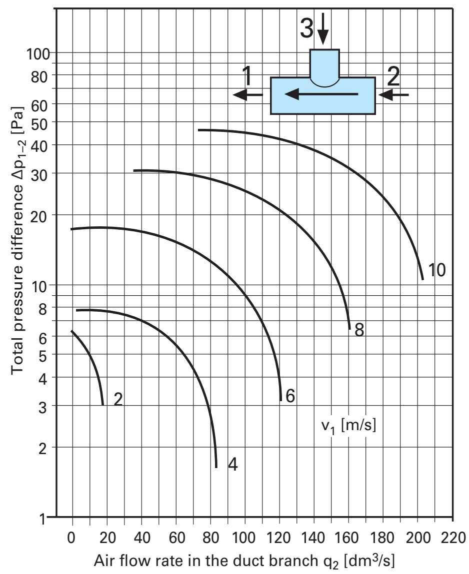
Tee 160/100
Exhaust from the side. Total pressure difference Δp_{1-2}



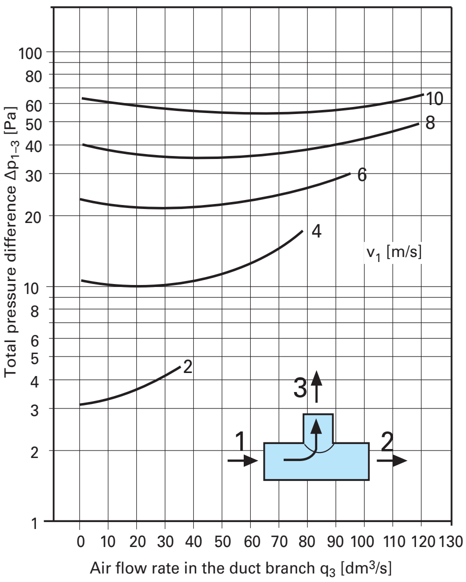
Tee 160/125
Exhaust from the side. Total pressure difference Δp_{1-3}



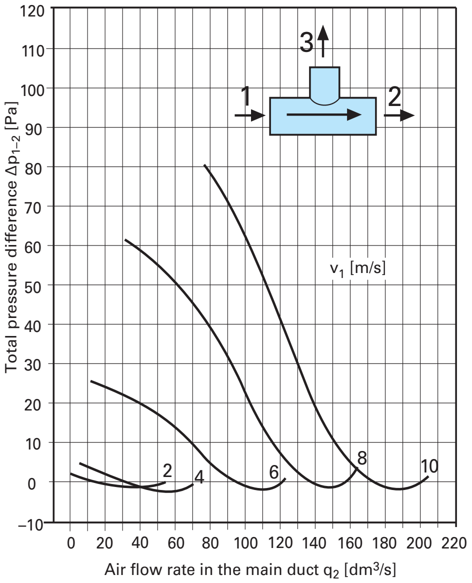
Tee 160/125
Exhaust from the side. Total pressure difference Δp_{1-2}



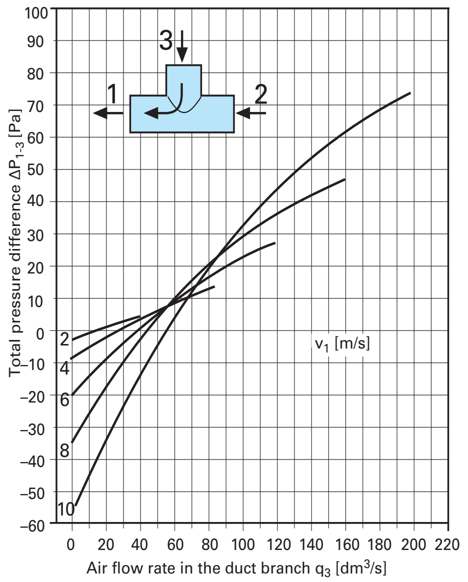
Tee 160/125
Side inlet. Total pressure difference Δp_{1-3}



Tee 160/125
Side inlet. Total pressure difference Δp_{1-2}

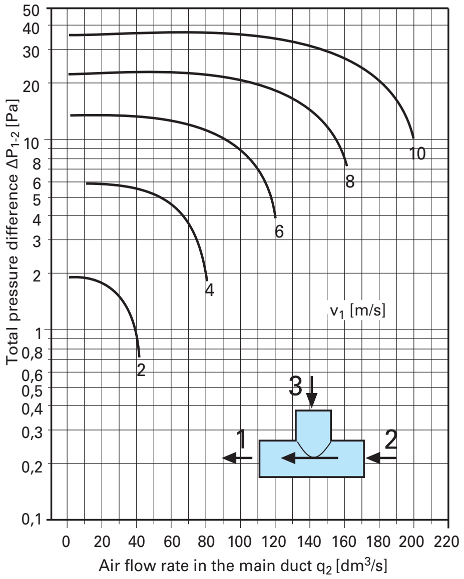


Tee 160/160
Exhaust from the side. Total pressure difference Δp_{1-3}



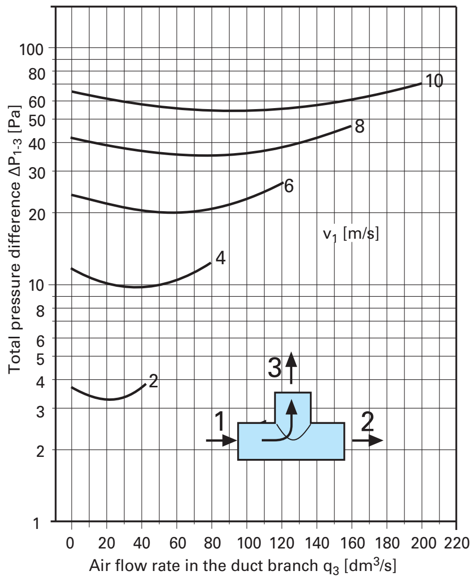
Tee 160/160

Exhaust from the side. Total pressure difference Δp_{1-2}



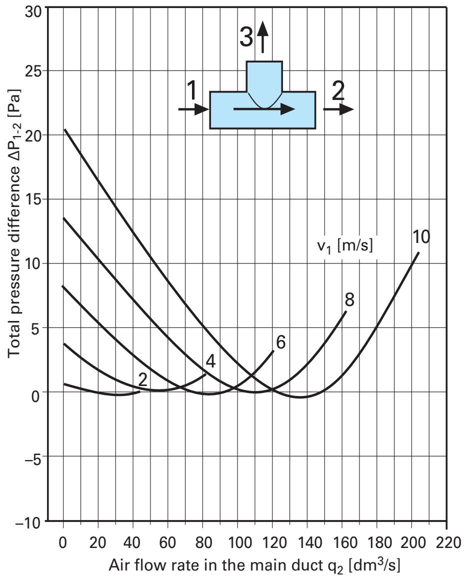
Tee 160/160

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



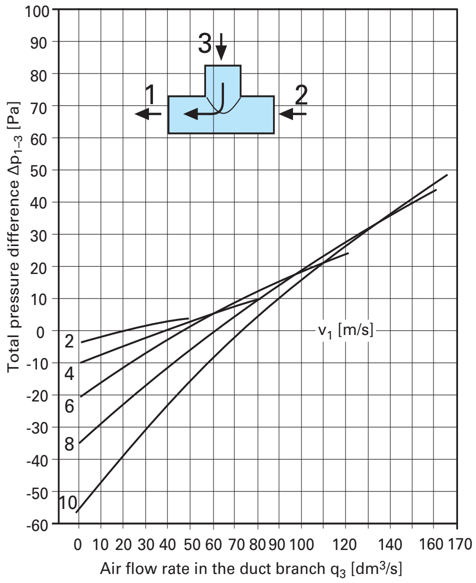
Tee 160/160

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



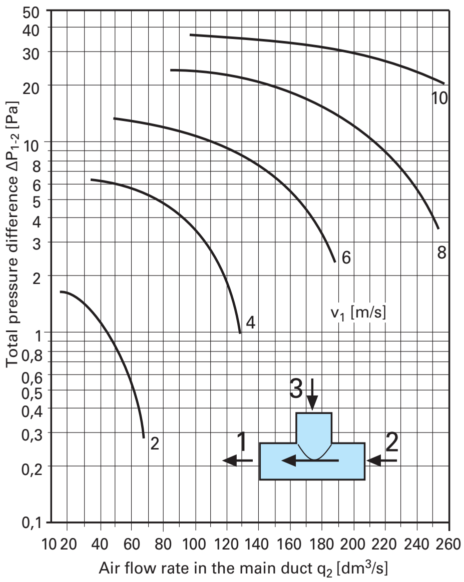
Tee 200/160

Exhaust from the side. Total pressure difference Δp_{1-3}



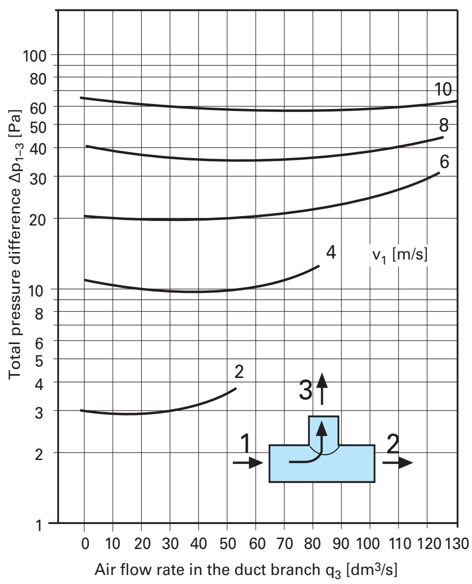
Tee 200/160

Exhaust from the side. Total pressure difference Δp_{1-2}



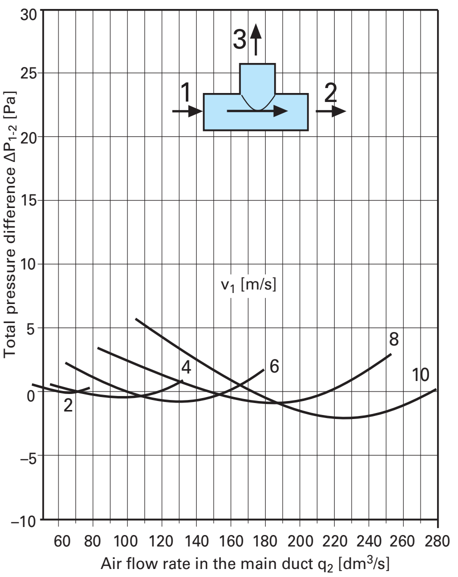
Tee 200/160

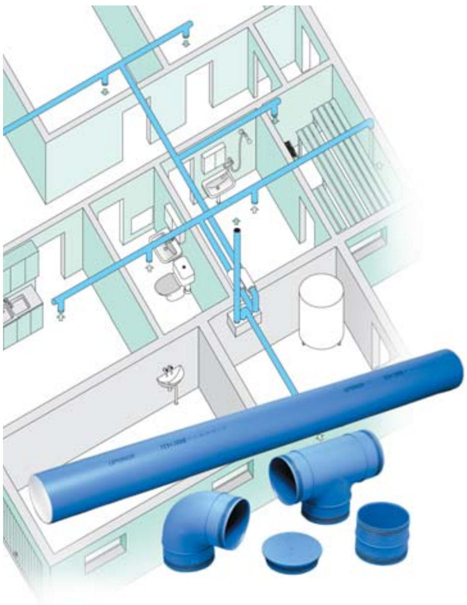
Side inlet. Total pressure difference Δp_{1-3}



Tee 200/160

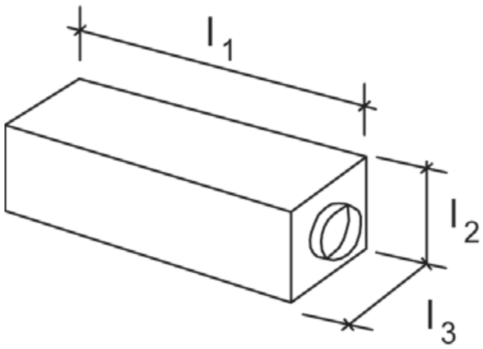
Side inlet. Total pressure difference Δp_{1-2}





Suppression effect of noise suppressors 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



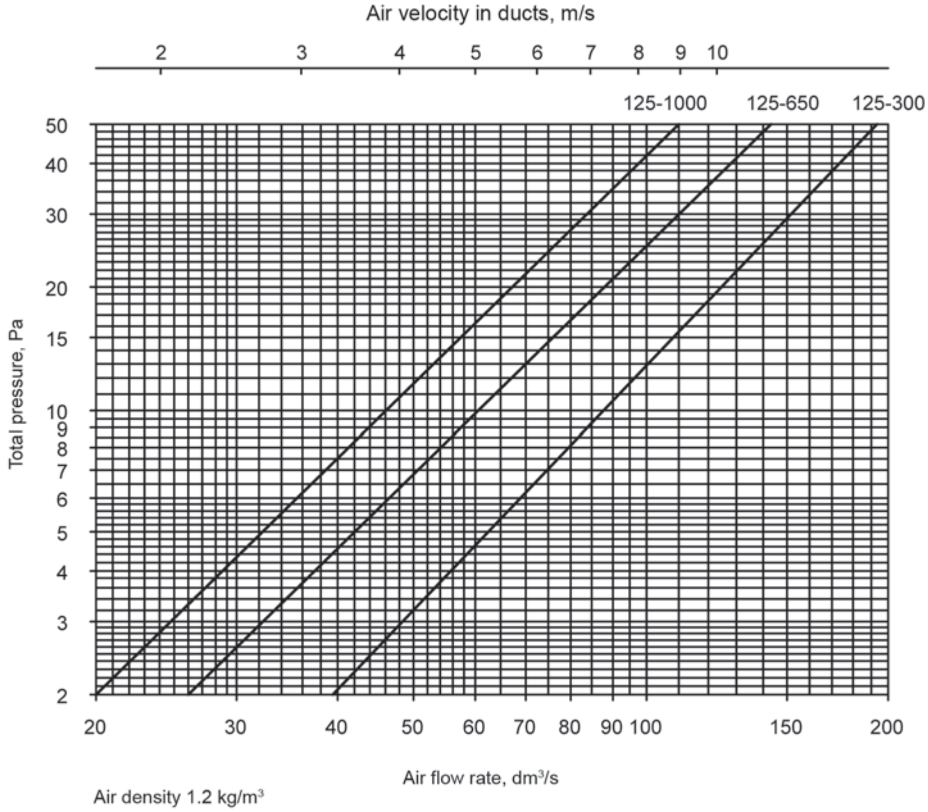
Noise suppressor pressure losses, ISO 7235:2003

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

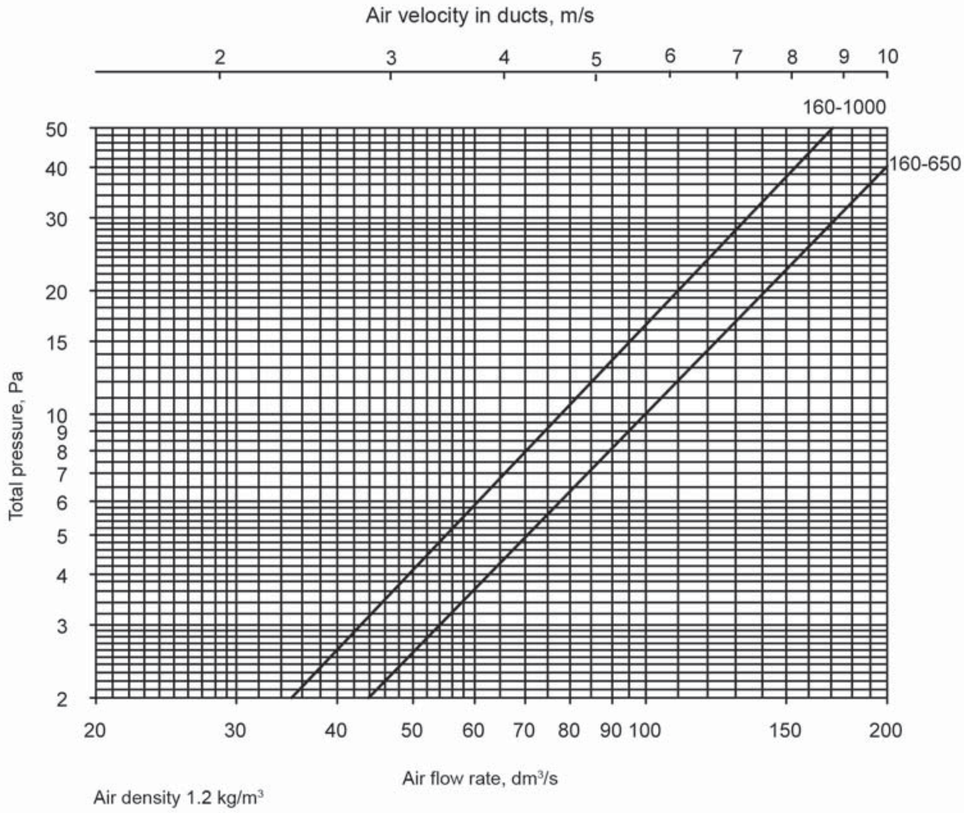
q_{VD} = Air flow rate, dm³/s
V_{al} = Air face velocity, m/s
P_{tD} = Total pressure loss of air, Pa
ζ_t = Total pressure drag coefficient, -

Noise suppressor pressure loss, ISO 7235:2003

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



USI-160-650 and USI-160-1000



Installation

Introduction

Uponor ventilation ducting and components are made of polypropylene plastic. They are lightweight and easy to handle. Duct installation is not recommended in 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 packed in plastic bags and cardboard boxes to keep them clean. The ducts and components must be prevented from contamination by keeping the ducts plugged and storing the components 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 pre-installed ducting must be protected with duct plugs, which must be left in place until the valves are installed and adjusted.

The cleaning hatches of the ducting must be positioned and installed so as to allow cleaning.

Connections are made by pushing the duct on top of the connection piece 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

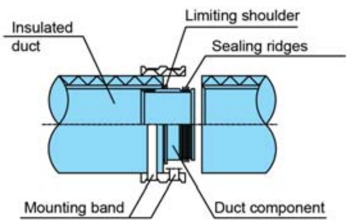
Cutting and connecting ducts

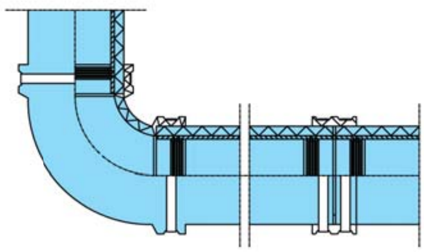
Uponor ducts must be cut perpendicularly by means of a saw with a fine tooth pitching (1–2 mm). Remove the sawdust from both the outside and inside surfaces, and bevel the inner edge of the cut head to facilitate insertion of the connection piece. Duct connections, changes in direction, and branching must be implemented with duct components. The components are equipped with sealing ridges made of the component material. The ducts do not have ridges.

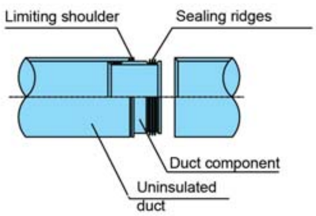
However, the vertical ducting sections must be supported so that their weight does not rest on the coupling. If brackets cannot be used, the connection may be secured with 8–10 mm pop rivets where necessary.

Cutting and connecting pre-insulated ducts and components

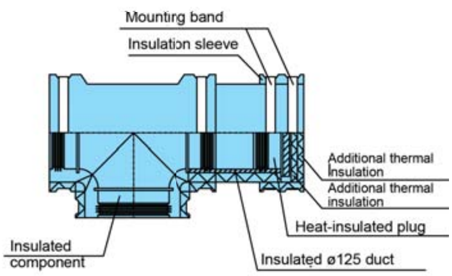
The pre-insulated ducts are cut with their insulation and connected to each other in the same way as uninsulated ducts and components. In some cases, it should be noted that the duct's thermal insulation must be removed in some places. For example, when the duct is penetrating a vapour barrier, the duct's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







Connecting uninsulated ducts to each other.



Additional thermal insulation of the pre-insulated cap installed at the end of a pre-insulated ø 125 duct. The installation company will deliver and install the additional thermal insulation.

Vapour barrier through holes

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

- Clean the vapour barrier from dust etc. Remove the protective plastic from the cap and press it tightly against the vapour barrier.
- Using a sharp knife, make an aperture corresponding with the size of the cap hole in the vapour barrier. 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.
- Align the head of the duct in place and connect it with the ducting.

Pre-insulated ducts and vapour barrier through holes

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

Pipe supports

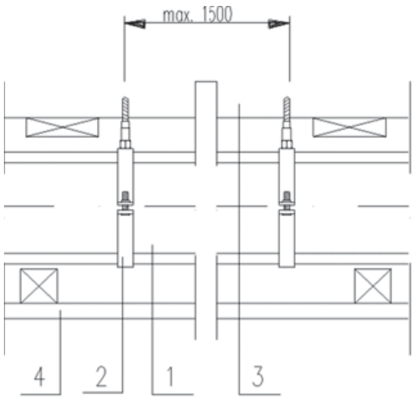
Supporting is implemented with supports designed for ventilation ducting.

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

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

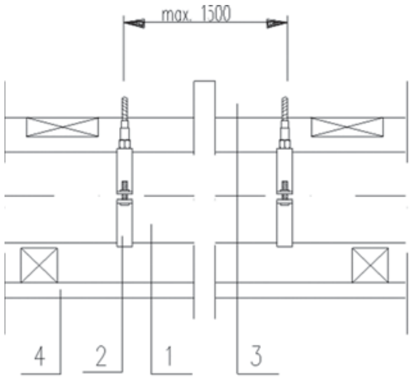
Support for pre-insulated ducts

Supports for pre-insulated ducts are implemented in the same way as those for uninsulated ducts. You must note, however, that the insulation is not cut in the locations of the supports; the supports rest over the insulation.



1 = Pre-insulated duct
2 = Support
3 = Lower roof truss support
4 = Suspended ceiling

Example of the supporting of a pre-insulated duct above a suspended ceiling.



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

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

Insulation

The insulation of plastic ducts is specified in the ventilation plans.

Normal insulation alternatives are as follows:

In a warm space (flat):

- **Intake and exhaust air ducts** do not require any insulation, with the exception of ducts inside sauna ceilings, which must be thermally insulated with uncoated 50 mm mineral wool. If the intake air is to be cooled, the intake air ducts must be insulated with expanded PE plastic. If the air flowing in the intake air duct will not be post-heated in winter, the ducts must be insulated with expanded PE plastic.

- Outdoor air ducts are insulated with expandable PE plastic insulation, functioning as condensation insulation.

Kitchen hood

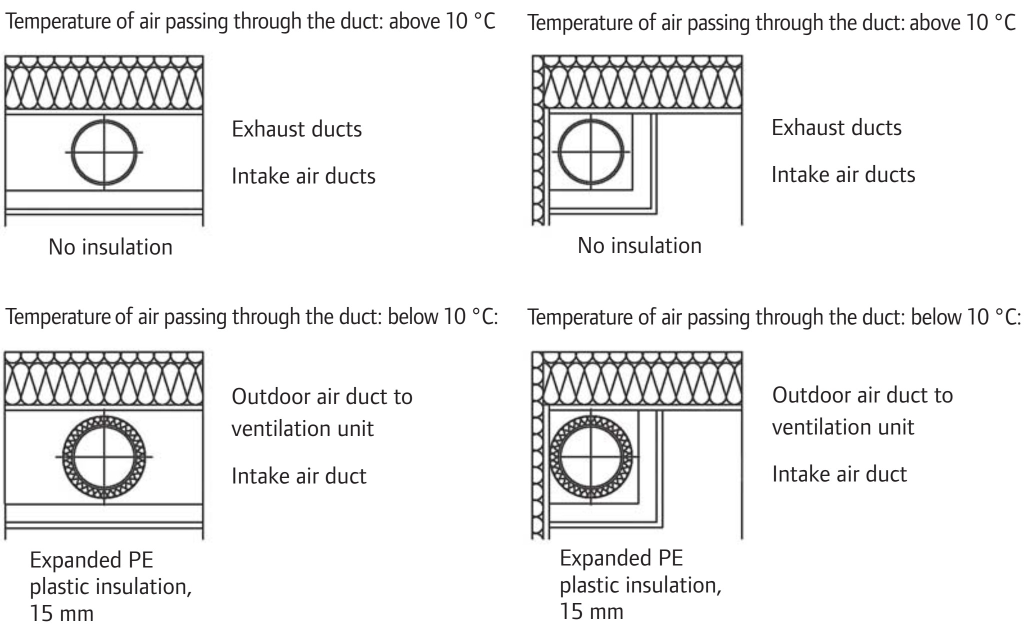
- **The kitchen hood's** steel sheet duct is fire-insulated with insulation of EI30 fire-resistance.

Intake and outdoor air ducts and components are condensation insulated by 15 mm expandable PE plastic insulation, pre-installed around the ducts at the factory.

If necessary, the PE plastic insulation may be cut open vertically, wrapped around the duct, and glued at the seam. In this case, the transverse and vertical seams are closed tightly with contact adhesive.

The condensation and thermal insulation of factory-insulated ducts can be tightly sealed through installation of separate internal joint insulation sleeves on the duct ends connected with internal joints. The connections are secured with duct clamps. The socket coupling of the thermal insulation and the pre-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 securing the connections with duct clamps.

Plastic ducting in a flat, inside a suspended structure or a housing



Insulation alternatives for plastic ducting. See also the 'Insulation' section.

Installing and adjusting valves

Introduction

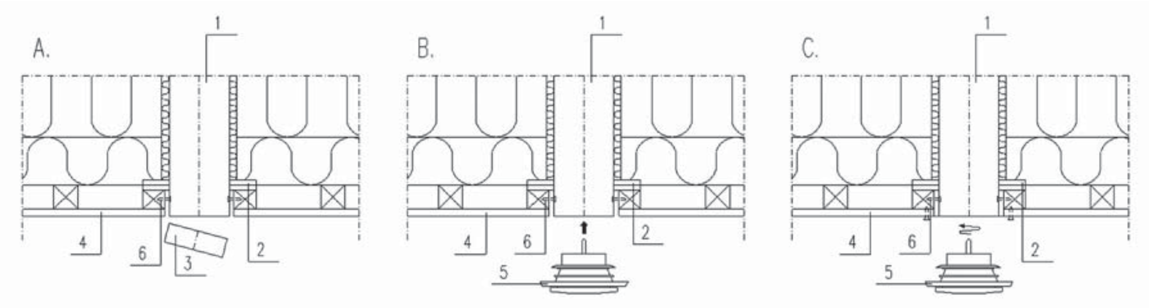
Valves are installed and adjusted after the final cleaning of the work site.

The ventilation system is taken into use only when the building is completely finished.

Approved valves must be used in mechanical intake and exhaust ventilation, and the maximum allowed room-specific air flow through the throttle is 42 dm3/s with a 100 Pa pressure difference.

An example of connecting a valve to ducting in a flat-specific intake and exhaust air ventilation system

1 = Pre-insulated duct
2 = Vapour barrier cap
3 = Duct section to be shortened
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 in the duct. The valve locks onto the end of the duct.

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.

Outdoor grille

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

The screen cassette must be cleaned regularly, up to once a month during the warm season (April–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.

NB:

In mechanical intake and exhaust air ventilation, no screen is used in the outdoor air grille.

Fresh air valve for wall mounting

(outdoor 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

(outdoor 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

(outdoor 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.

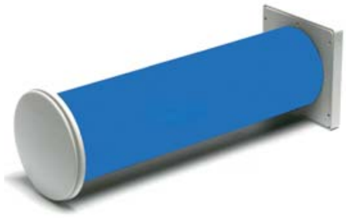
If the slit valve is located above the radiator line, the inner nozzle is directed up and the outer one down.

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 of the two mounting screws.

Clean 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.



Adjustment of the ventilation valves in a flat-specific intake and exhaust air ventilation system

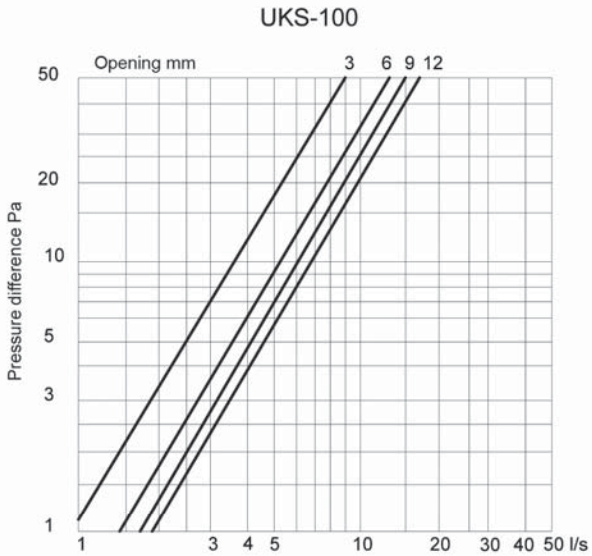
The valves are pre-adjusted before the actual adjustment and measurement.

Adjust the valves in accordance with the adjustment curves by rotating the valve disc (ceiling-mounted valves) or by opening rows of holes (wall-mounted valve). After adjusting it, lock the valve into position.

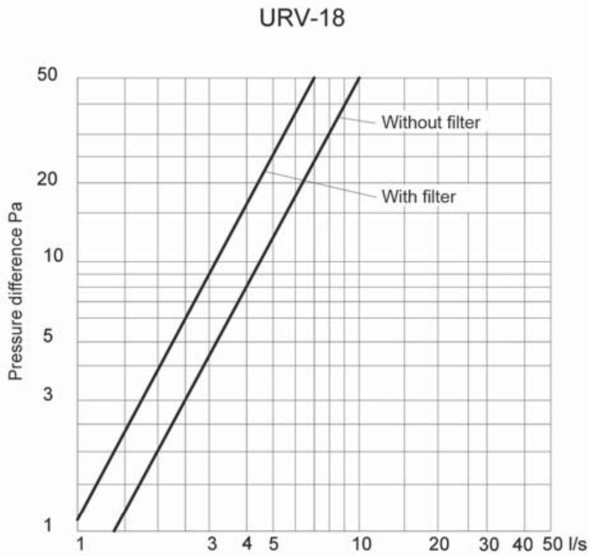
A gauge may also be used for adjusting and checking the adjustment of valves.

Flow rate and pressure difference

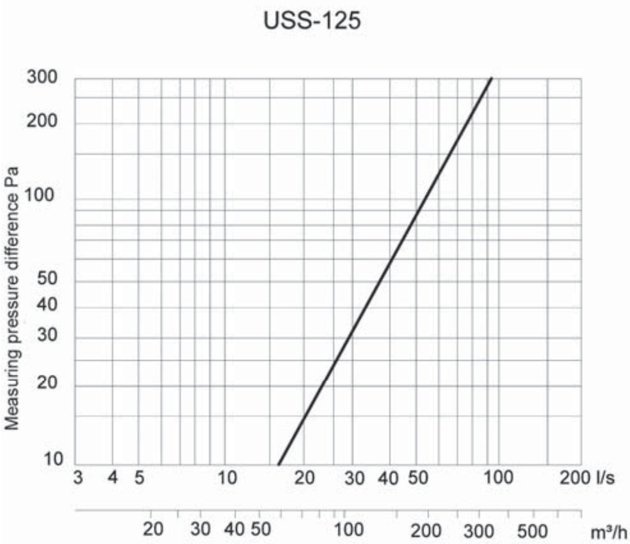
Fresh air valve ø100

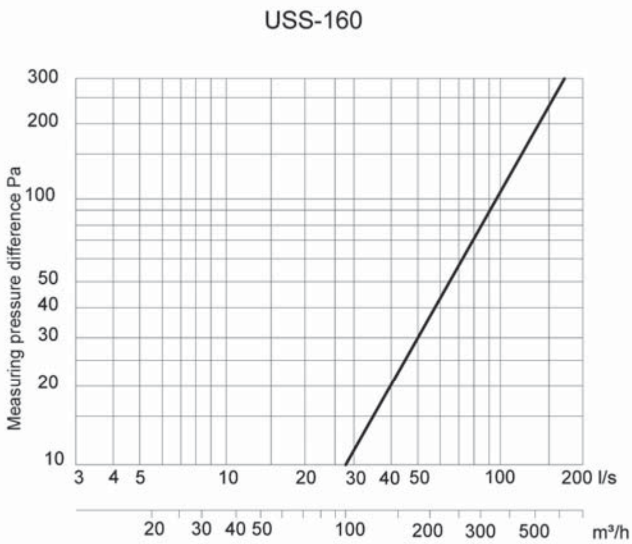


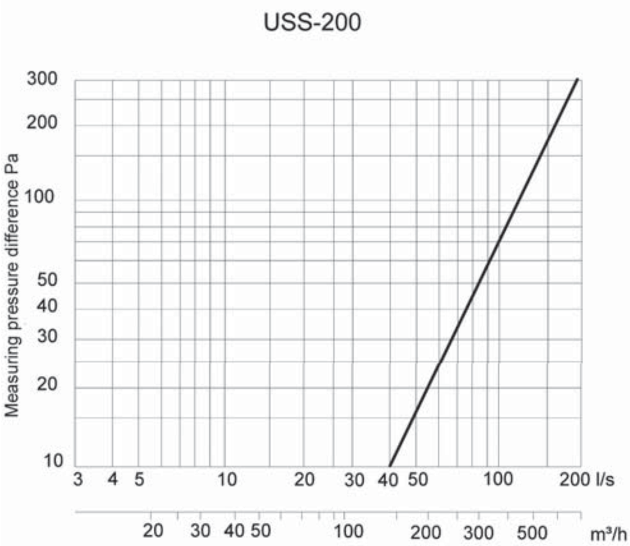
Slit valve 18x245x340



Outdoor grilles







31703 I EN I 0811 I SUUNNITTELUTIETO-TEAM OY I FORTUNA I ESA PRINT

ISO 9001
ISO 14001
DNV
SERTIFIOITU
ORGANISAATIO

ALL DUCTS

Uponor Finland
Nastola - Forssa

Uponor Finland

P.O.Box 21
FI-15561 Nastola
Finland

T +385 (0)20 129 211
F +385 (0)20 129 210
E infofi@uponor.com
W www.uponor.com

uponor