



**National Technical Assessment:**

ITB-KOT 2021/2004, Edition 1 and ITB-KOT 2021/2005, Edition 1

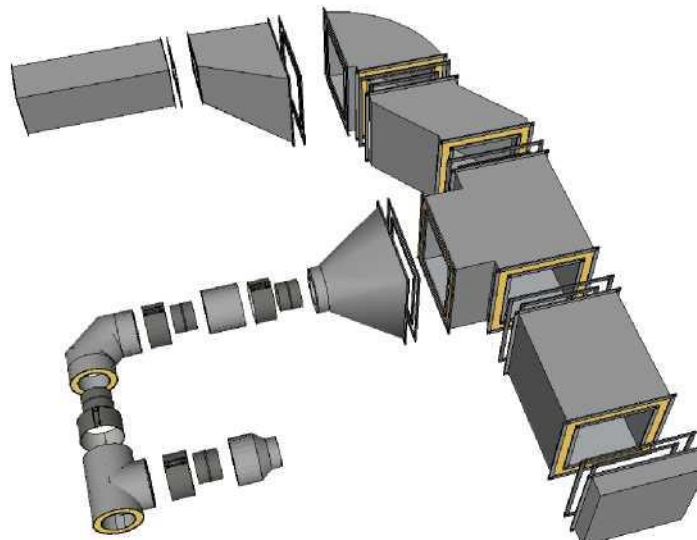


**National Declaration of Performance:**

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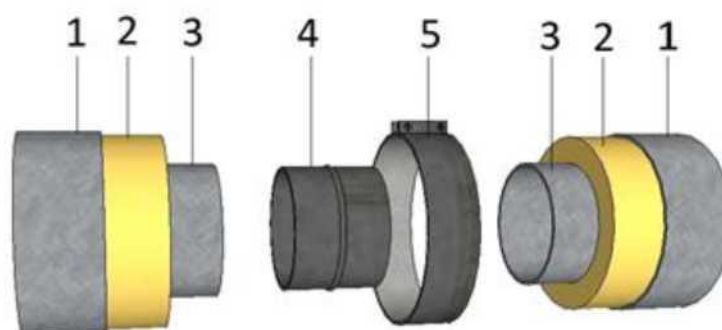
No. KDWU-08/2021 No. KDWU-10/2021





### Pre-insulated round ventilation ducts system

1	OUTER SPIRO PIPE
2	LAYER OF INSULATING FOAM, thickness 10-50 mm
3	INNER SPIRO PIPE
4	A NIPPLE JOINING THE INNER PIPES
5	MOUNTING CLAMP

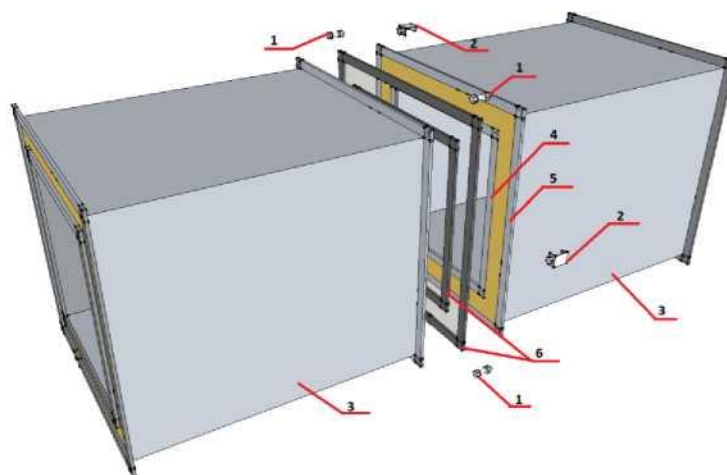


- Inner pipes nipple connection
- Injection of foam between the pipes - the foam is injected with a gun prior to pushing them together
- Connecting the outer pipes with a clamp





## A system of pre-insulated rectangular ventilation ducts



The range of internal dimensions: 100-2000 mm

*\* The dimensions given refers to the internal diameters of ducts - the foam insulation layer and the outer pipe (casing) are additional components.*

1	Bolt for joining corners
2	Mounting clamp
3	Components, ducts
4	Internal frame, type P20 or P-30, with a corner
5	External frame, P20 or P-30 type, with a corner
6	Seal



## PIANO-SYSTEM +I

The system of rectangular and round ventilation ducts, pre-insulated with polyurethane foam is an innovative solution for HVAC systems.

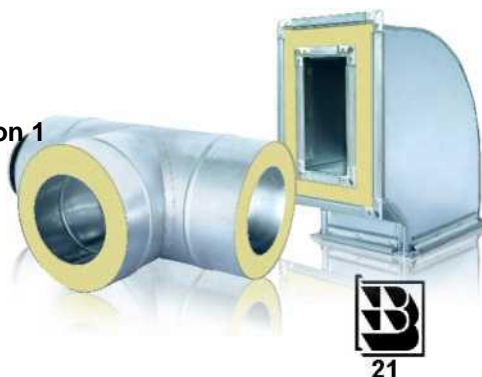
### ✓ Legal Requirements

National Technical Assessment:

ITB-KOT 2021/2004, Edition 1 and ITB-KOT 2021/2005, Edition 1

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### ✓ Widely used in HVAC systems

The system of double ducts with a layer of polyurethane foam insulation guarantees the highest durability, prevents heat loss, prevents condensation of water vapour on the surface of the ducts and effectively suppresses noise emitted by the airflow.

✓ **The highest class of duct tightness - "D" confirmed during the ITB test performed according to PN-EN 12237:2005 and PN-EN 1507:2007** PIANO-SYSTEM+I ducts are covered with foam. As a result of a chemical reaction, the foam expands and tightly fills the entire space between the carrying duct and the outer casing pipe, ensuring the highest class of tightness available in ventilation - Class "D". It refers both to round and rectangular pipes. The results of the test performed proved that there is technically no air loss - actually, the loss is within the measurement error limit. Designers choosing PIANO-SYSTEM +I do not have to take into account air losses when selecting air handling units. PIANO-SYSTEM +I pipes integrity not only meets the highest requirements of European standards but even exceeds them!

### ✓ Prevention of condensation and moisture ingress

Unlike other insulation materials, the polyurethane foam used to insulate the PIANO-SYSTEM +I system guarantees high resistance to water vapour diffusion, which prevents condensation and moisture penetration, which is the main cause of corrosion of pipes and ducts. The ducts can be installed outdoors - they are perfectly tight and rainwater cannot penetrate the insulation layer.

### ✓ No "thermal bridges"

The foam structure makes the ducts more rigid, improves their resistance to high-pressure deformations caused by high pressure and eliminates the "thermal bridge" phenomenon that occurs in other insulation materials. There are no "thermal bridges" in the PIANO-SYSTEM +I ducts since they are fully covered with foam that expands to tightly fill all spaces between the inner pipe and the casing pipe.

✓ **Excellent thermal insulation properties**

The PIANO-SYSTEM+I ventilation ducts have a thermal transmittance index more than twice lower than the generally used mineral wool, i.e. the foam layer can be over 50% thinner. Initial thermal conductivity of the foam is 10 °C EN 12667 W/m °K 0.020

The thickness of the foam insulation layer is performed in the range of:

- 10 mm - 50 mm for round ducts
- 25 mm-100 mm for rectangular ducts

✓ **Classification of reaction to fire**

They meet the requirements for building products. The ducts are non-flammable, non-drip and non-spreading fire. They do not fall under the influence of fire. B-s3, d0 in accordance with PN-EN 13501-1:2019-02

✓ **Increasing the rigidity of the duct without the use of any internal steel bracing**

PIANO-SYSTEM+I ducts, because they are covered with foam which expands as a result of a chemical reaction and tightly fills all spaces between the inner pipe and the outer casing pipe, are extremely rigid and even the ducts with a side of up to 2000 mm do not have to be braced and still do not deform, which has been confirmed by ITB tests. In practice, the ducts with larger cross-sections and bracing may generate an increased level of noise due to expansion and contraction of the steel sheet and the bracing.

✓ **Significant shortening of the project completion time and lower cost, as well as simple and quick installation**

Faster installation of the pre-insulated system by eliminating many stages of the conventional method including: Installation of ventilation ducts in the building; Welding pins with spacing; Welding or screwing special "Z" spacers to keep the appropriate distance from the insulation wool and to maintain the right angle to drain water; the direct on-site measurement of the sheet metal jacket constructed with appropriate overlaps and seams, and then its installation.

All these works require additional time, appropriate weather conditions and qualified employees with many years of experience.

Whereas PIANO-SYSTEM +I is a ready-made product that can be quickly installed in the building.

✓ **Anti-corrosion - Durability of the coating**

Durability (the components are made of galvanised steel sheet):

- weight of the zinc coating, g/m<sup>2</sup>> 275
- zinc coating thickness, µm 20 (tolerance according to PN-EN 10346)

No need to use an additional steel jacket, insulation and assembly pins, the welding of which weakens the surface of the sheet.

PIANO-SYSTEM+I ducts do not need pins welded to the surface of the ventilation duct that would destroy the protective zinc coating or even burn a hole. Moreover, this method does not guarantee a tight adhesion of the insulation wool to the duct surface.





### Typical fittings of the round ducts system:

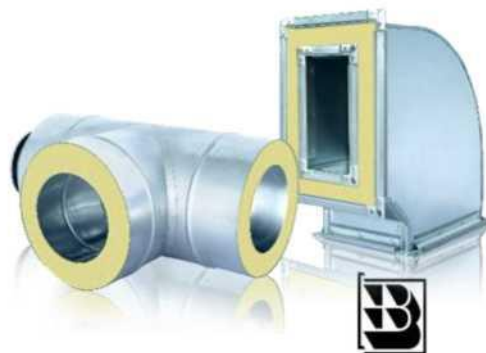
- PIANO-SYSTEM SPIRO+I straight ducts
- PIANO-SYSTEM KS+I segment elbows
- PIANO-SYSTEM TS+I symmetrical tees
- PIANO-SYSTEM TSA+I asymmetric tees
- PIANO-SYSTEM RSS+I symmetrical segment adapters
- PIANO-SYSTEM RSA+I asymmetric segment adapters
- PIANO-SYSTEM CZO+I cross fitting
- PIANO-SYSTEM N+I nipples
- PIANO-SYSTEM FO+I caps
- PIANO-SYSTEM SP+I straight collars
- PIANO-SYSTEM SO+I mesh collars
- OTHER PIANO-SYSTEM .....+I” fittings



### Typical fittings of the rectangular ducts system:

- PIANO-SYSTEM K+I straight ducts;
- PIANO-SYSTEM BS+I symmetrical elbows;
- PIANO-SYSTEM BS+I asymmetrical elbows;
- PIANO-SYSTEM ŁP+I bends;
- PIANO-SYSTEM US+I; diffusers/symmetrical adapters
- PIANO-SYSTEM UA+I; diffusers/asymmetrical adapters
- PIANO-SYSTEM RS+I symmetrical round/rectangular adapters;
- PIANO-SYSTEM RA+I asymmetrical round/rectangular reductions adapters;
- PIANO-SYSTEM TRS+I symmetrical tees;
- PIANO-SYSTEM TRA+I asymmetric tees;
- PIANO-SYSTEM TRO+I rectangular tees with round branch duct;
- PIANO-SYSTEM CZ+I cross fittings;
- PIANO-SYSTEM ES+I offset pipes;





## PERFORMANCE OF THE SYSTEM AND METHODS APPLIED TO ITS ASSESSMENT

### 1. Dimensions

The dimensions are checked using common measuring instruments with appropriate accuracy.

### 2. The thickness of the wall

The wall thickness is checked using common measuring instruments with adequate accuracy.

### 3. Tightness

The pre-insulated AIRWENT SYSTEM ventilation ensures **Class D tightness**

**ROUND** - according to PN-EN 12237:2005 WO-KOT/36/01, Ed. 2; Test conditions: -750 to 2000 Pa

**RECTANGULAR** - according to PN-EN 1507:2007 WO-KOT/36/01, Ed. 2; Test conditions: -500 to 1000 Pa

### 4. Strength

**ROUND** - No permanent deformation or sudden change of tightness at the limit values of static pressure according to PN-EN 12237:2005 WO-KOT/36/01, Ed. 2; Test conditions: -750 to 2000 Pa

**RECTANGULAR** - No permanent deformation or sudden change of tightness at the limit values of static pressure according to PN-EN 1507: 2007 WO-KOT/36/01, Ed. 2; Test conditions: -500 to 1000 Pa

### 5. Zinc coating durability

Due to the requirements for corrosion resistance, pre-insulated PIANO-SYSTEM +I ventilation ducts made of galvanised DX51D Z275 steel sheet, according to PN-EN 10346:2015 standard, have high durability and can be used in C1, C2 and C3 corrosivity atmospheres, according to PN-EN ISO 9223:2012.

### 6. Fire classification

Pre-insulated PIANO-SYSTEM +I ventilation ducts have been classified as B-s3, d0 reaction to fire class, according to PN-EN 13501-1:2019 and as non-flammable, non-drip and non-spreading fire from the building's interior, according to the ordinance of the Minister of Infrastructure of 12 April 2002 (Journal Of Laws No. 75 of 12 April 2002, Item 690 as amended). At the same time, the products are classified as not falling during a fire. The above classification applies to pre-insulated PIANO-SYSTEM+I ventilation ducts mounted directly to components with reaction to fire classes A1 or A2, according to PN-EN 13501-1:2019 or at any distance from them.

### 7. The apparent density of the PUR foam core

*Report ITB-LZM00-01800/21/Z00NZM*

### 8. Dimensional stability of the duct after 24 h at 100 degrees Celsius

*Report ITB-LZM00-01800/21/Z00NZM*

### 9. Tensile strength of layered samples

*Report ITB-LZM00-01800/21/Z00NZM*



## ROUND DUCTS

A system of pre-insulated spiral-wound pipes and fittings with a round cross-section, made of galvanised steel DX51D Z275, 137 mm wide and 0.45-0.5 mm thick for spiral pipes and made of galvanised steel sheet DX51D Z275, 0.5 mm thick for fittings.

The pre-insulated duct consists of the inner pipe, a layer of polyurethane foam and the outer pipe (casing) with a correspondingly larger diameter. For spiral-wound pipes with a diameter of more than 300 mm - the strip the pipes are manufactured of is ribbed to improve the stiffness.

The pre-insulated fitting consists of the inner pipe, a layer of polyurethane foam and the outer pipe (casing) with a correspondingly larger diameter.

The individual components of the system are connected with nipples (internal component) equipped with permanently fixed EPDM rubber seals. Joints - the gaps between the successive components are unavoidable because of the shoulder on the nipples - the gaps are filled with polyurethane foam at the stage of assembly. On the outside, a mounting clamp is installed on the joint. The range of the foam insulation layer thickness: 10 mm-50 mm

### The range of internal dimensions: 100-480 mm

Diameter of the duct d, mm	Sheet metal thickness, mm	
	Straight ducts	Fittings
$d \leq 315$	0,45	0,50
$315 < d \leq 480$	0,50	0,50

### INTENDED USE OF THE PRODUCT

Pre-insulated AIRWENT SYSTEM ventilation ducts are intended for air distribution in ventilation and air-conditioning systems installed in buildings, including residential buildings, multi-apartment residential buildings and public utility buildings. They can also be used in warehouses, industrial buildings and farm buildings.

Straight sections of ducts and fittings may be used in the following environmental conditions:

- carried air temperature range -30 °C to 70 °C,
- carried air relative humidity up to 100%,
- the carried air must not contain aggressive chemicals or abrasive particles,
- airflow speeds up to 16 m/s,
- the static air pressure difference between the inside and the outside of the duct -750 Pa to 2000 Pa (construction class S, according to WO-KOT/36/01, Edition 2)

Pre-insulated AIRWENT SYSTEM ventilation ducts should be suspended in the manner specified in the technical design.

Pre-insulated AIRWENT SYSTEM ventilation ducts should be installed in accordance with:

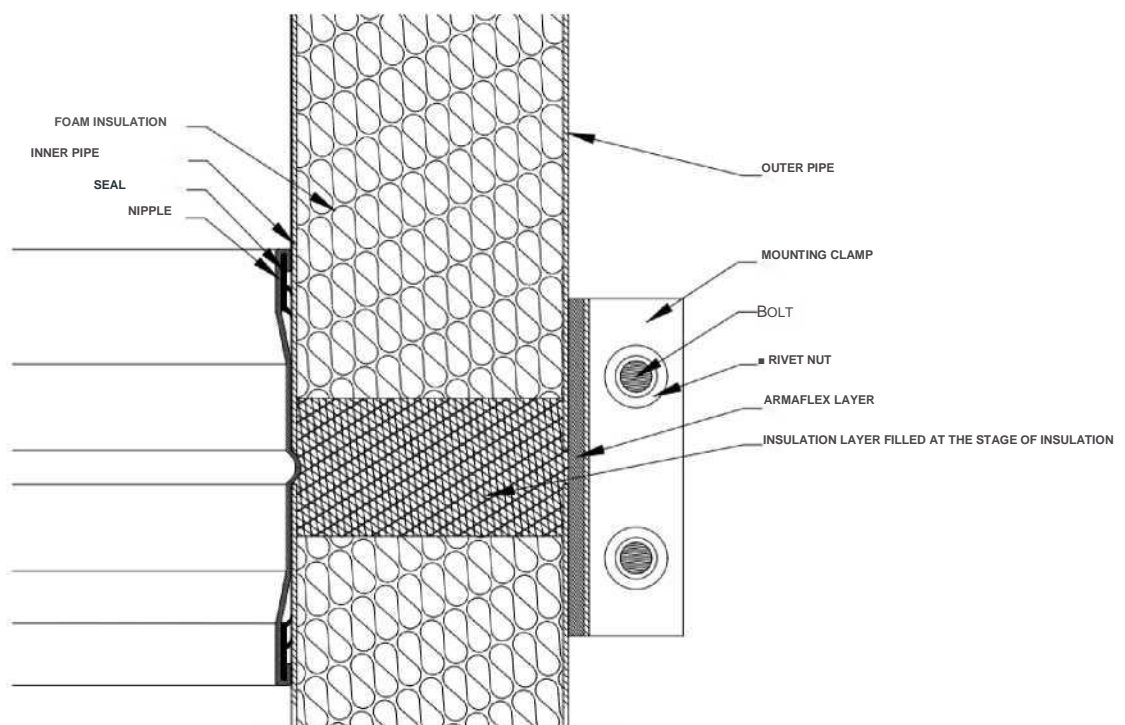
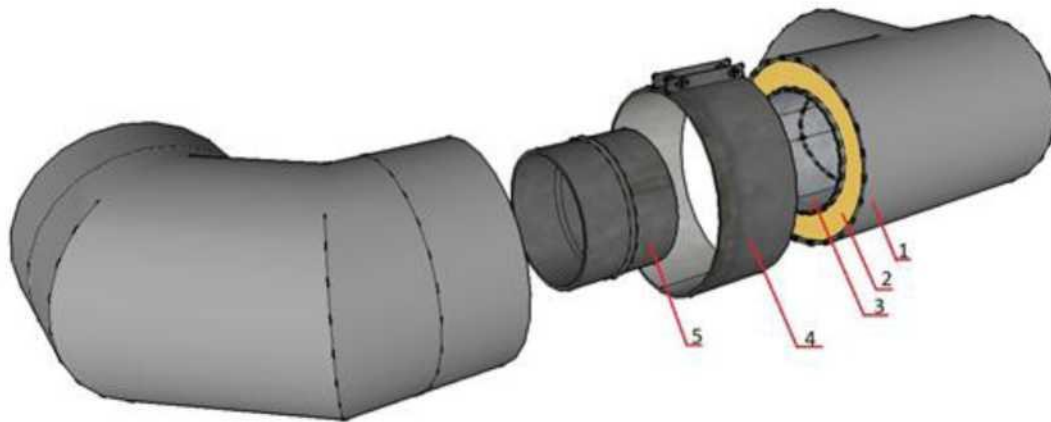
- the technical design intended for the specific facility, taking into account Polish technical and construction standards and regulations, in particular, the ordinance of The Minister of Infrastructure of 12 April 2002 on the technical conditions to be met by buildings and their location (Journal Of Laws of 2015, Item 1422, as amended)



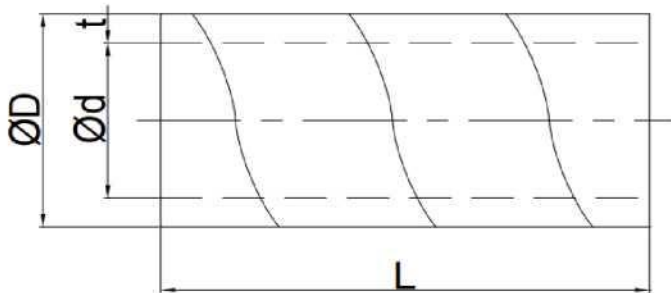
For installing and sealing PIANO- SYSTEM +I pre-insulated ventilation ducts joints the following components should be used:

- M8 hexagonal head bolts made of galvanised steel,
- mounting clamps made of galvanised steel,
- rigid polyurethane foam, reaction to fire Class E, according to PN-EN 13501-1:2019, placed on the market in accordance with applicable regulations and the intended use

- 1 - outer pipe (casing); 2 - insulation, polyurethane foam; 3 - inner pipe; 4 - mounting clamp with bolts;  
5 - nipple with seal



## SPIRO+ PIANO-SYSTEM+I



### Dimensions

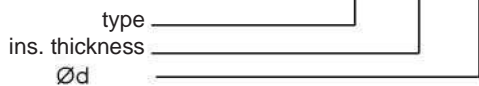
Duct diameter Ød, mm	Diameter ØD, mm		Duct length L, mm
100 ÷ 480	120 ÷ 500		≤ 3000
Dimension tolerances according to PN-EN 1506:2007			

### Description

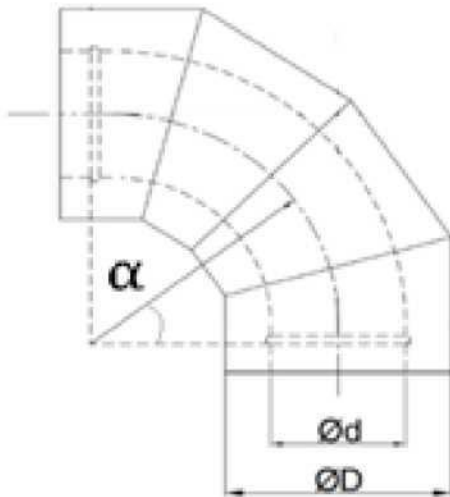
**SPIRO+I** - A duct made of the inner pipe, the outer pipe and the space between the pipes filled with polyurethane foam. Typical duct section length is 3000 mm and they are made of steel spiral pipes, with diameters ranging from 100 mm to 500 mm.

type of material - marking example  
 SPRO+I-...-... - galvanised steel sheet

Marking example  
 Product code: SPRO+I - 25 - 200



## Dimensions



Duct diameter Ød, mm	Diameter ØD, mm	α, °
100 ÷ 480	120 ÷ 500	0 ÷ 135

Dimension tolerances according to PN-EN 1506:2007

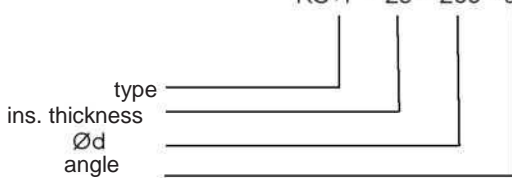
## Description

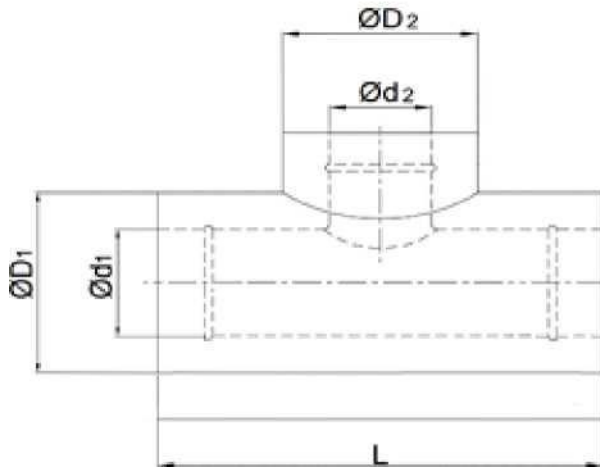
KS+I - an insulated elbow made of galvanised steel sheets, manufactured in diameters ranging from 100 mm to 480 mm. The elbow consists of an inner and outer elbow. The space between the inner and outer pipes is filled with polyurethane foam

type of material - example of marking  
KS+I-...-...-... - galvanised steel sheet

Marking example

Product code: KS+I - 25 - 200 - 90





### Dimensions

Duct diameter Ød1, Ød2, mm	Diameter ØD1, ØD2, mm	Stub pipe dimension, mm	Dimension L, mm
100 ÷ 480	120 ÷ 500	70 + thickness of the insulating layer	220 ÷ 600
Dimension tolerances according to PN-EN 1506:2007			

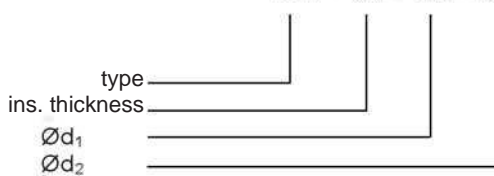
### Description

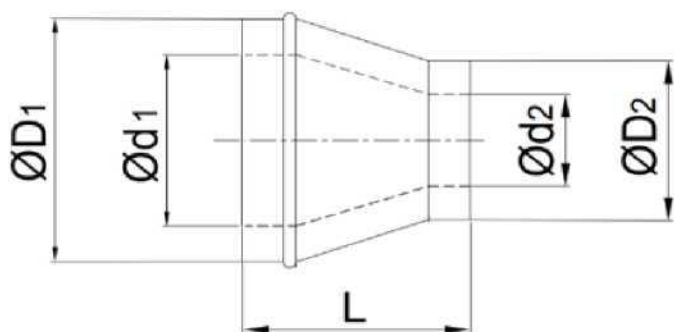
TS+I - insulated tee that consists of an inner tee and an outer tee and is made of galvanised steel sheets. The tee is produced in the range of diameters from 100 mm to 480 mm. The space between the inner and outer pipes is filled with polyurethane foam

type of material - example of marking TS+I-  
..... - galvanised steel sheet

Marking example

Product code: TS+I - 25 - 200 - 125





## Dimensions

Duct diameter Ød1, Ød2, mm	Duct ØD1, ØD2, mm	Stub pipe dimension, mm	Dimension L, mm
100 ÷ 480	120 ÷ 500	70 + thickness of the insulating layer	220 ÷ 500

Dimension tolerances according to PN-EN 1506:2007

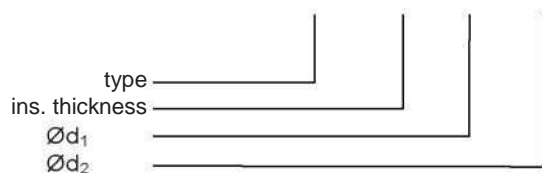
## Description

RSS+I - insulated adapter that consists of an inner adapter and an outer adapter, made of galvanised steel sheet, produced in the diameter range of 100 mm to 480 mm. The space between the inner and outer pipes is filled with polyurethane foam

type of material - example of marking  
RSS+I-...-...-... - galvanised steel sheet

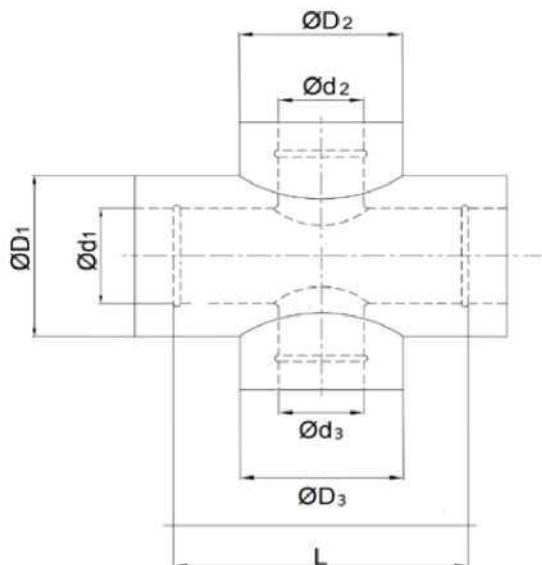
Marking example

Product code: SPRO+I - 25 - 200 - 125





### Dimensions



Duct diameter Ød1, Ød2, Ød3, mm	Duct ØD1, ØD2, ØD3, mm	Stub pipe dimension, mm	Dimension L, mm
100 + 480	120 + 500	70 + thickness of the insulating layer	220 + 600
Dimension tolerances according to PN-EN 1506:2007			

### Description

CZO+I - insulated cross that consists of an inner cross and an outer cross made of galvanised steel sheet, produced in the diameter range of 100 mm to 480 mm.

The space between the inner and outer pipes is filled with polyurethane foam

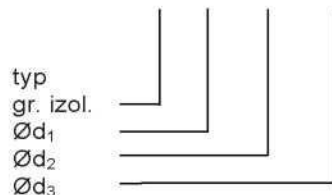
type of material - marking example

CZO+I-.....-..... - galvanised steel sheet

Marking example

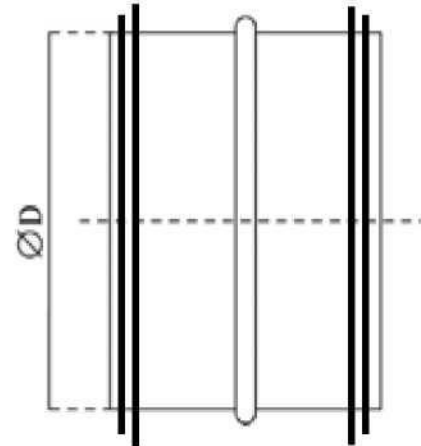
Product code:

SPRO+I - 25 -100 - 100 - 100



## Dimensions

ØD (mm)	Stub pipe dimension (mm)
100 ÷ 480	70 ÷ 80

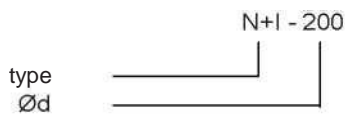


## Description

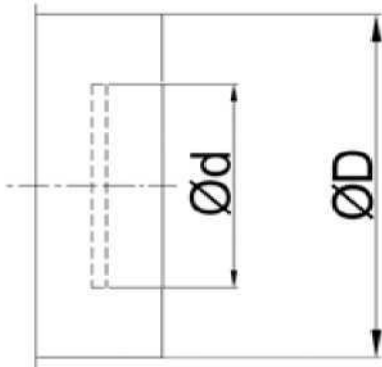
N+I- A nipple designed to connect pipes and fittings, made of galvanised steel sheets, manufactured in diameters of 100 mm to 480 mm, equipped with a seal on both ends and central shoulder

type of material - marking example  
N+I... - galvanised steel sheet

Marking example Product code:



## Dimensions



Ød, mm	ØD, mm	Stub pipe length, mm	Foam layer thickness
100-480	120-500	60	10-50 mm

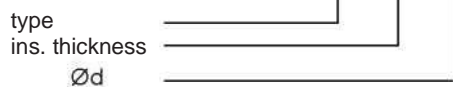
## Description

FO+I - an insulated cap intended for plugging fittings and ducts, made of galvanised steel sheets and produced in the diameter range of 100 mm to 480 mm.

type of material - marking example  
FO+I-...-... - galvanised steel sheet

Marking example

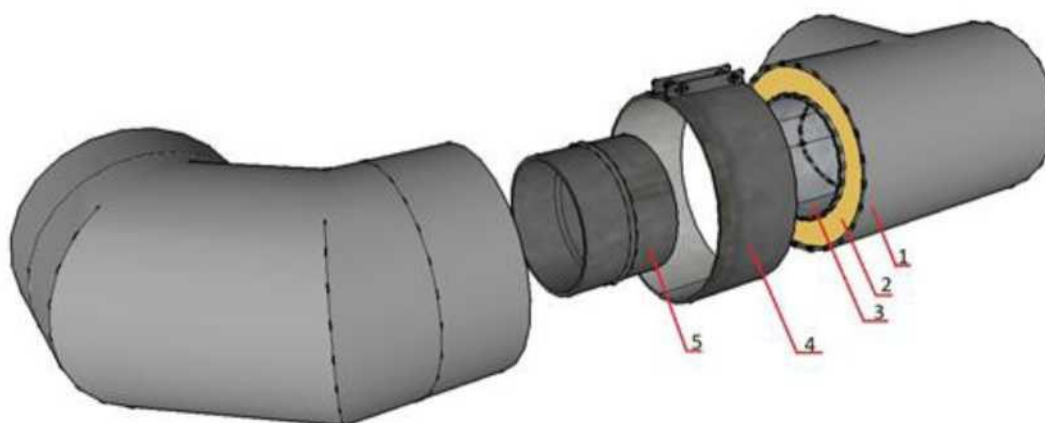
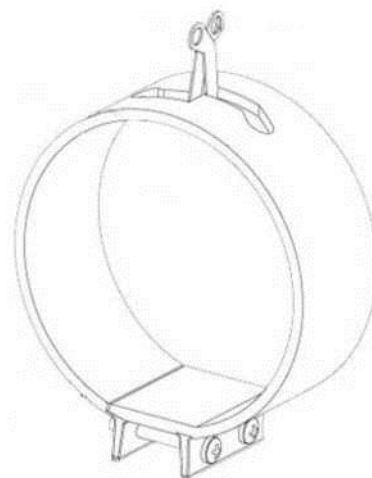
Product code: FO+I - 25 - 200



### Description

OP - . The mounting clamp is designed for quick and reliable connecting of ventilation system components such as ducts, fans, grilles, elbows or branches. Duct and fittings clamp up to Ø 160 mm are equipped with catches, above Ø 315 without catches. The clamps are made of galvanised steel with a minimum width of 60mm \* and a layer that dampens vibration and noise. The clamps are installed with bolts.

(\* ) - We can make clamps of any width - to order



- 1 - outer pipe (casing); 2 - polyurethane foam insulation ; 3 - inner pipe; 4 - clamp with bolts;  
5 - nipple with a seal

**National Technical Assessment:** ITB-CAT 2021/2004, Edition 1

**National Declaration of Performance:** No. KDWU-08/2021

PIANO- SYSTEM +I ventilation ducts and fittings are made of **0.5 mm** galvanised steel sheet and pre-insulated with rectangular foam. They are made of DX51D Z275 steel grade, according to PN-EN 10346:2015 with a foam insulation layer thickness range of 25-100 mm.

Ducts and fittings with a rectangular cross-section used in the **PIANO-SYSTEM+I** system are normally made as **low-pressure pipes** (-500 1000Pa), in the size range of 100 mm to 2000 mm.

**The standard length of a duct section is 1500 mm.**

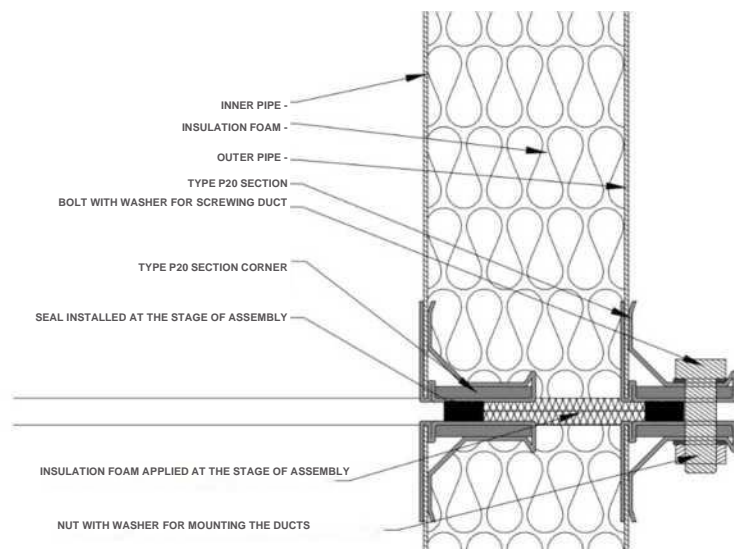
AIRWENT SYSTEM ventilation ducts are made in airtightness Class D, according to PN-EN 1507:2007.

**PIANO-SYSTEM+I** ventilation ducts are connected with

Pittsburgh locks or welded. Ducts' corners are sealed with a silicone compound. During assembly, between the frames of flange connections, it is necessary to apply a seal made of self-adhesive polyethylene foam (PES) tape, at least 12 mm wide and 4 mm thick.

Sections of **PIANO-SYSTEM+i** ventilation pipes should be joined with flanges screwed with M8 bolts/nuts (for the P-20 section) or M10 bolts/nuts (for the P-30 section).

Transverse joints (flanged frames) are made of P20 or P30 flange sections (frames) and N20 or N-30 corners manufactured from galvanised steel sheets.



**Rules for using frames in pipes and fittings:**

<1500 (inner pipe)	>1500
P20 + N20	P30 + N30

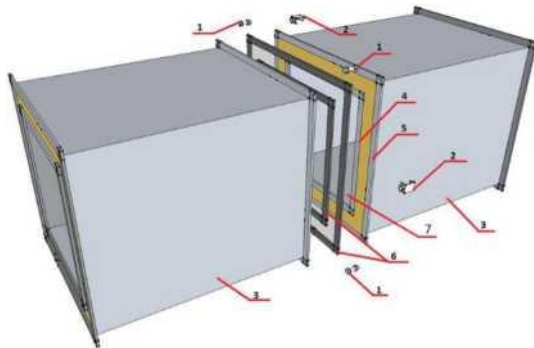
If the side length of the duct is greater than 200 mm, **PIANO-SYSTEM** ventilation duct frames must be screwed together with the use of mounting clamps made of galvanised steel sheet.



Mounting clamp

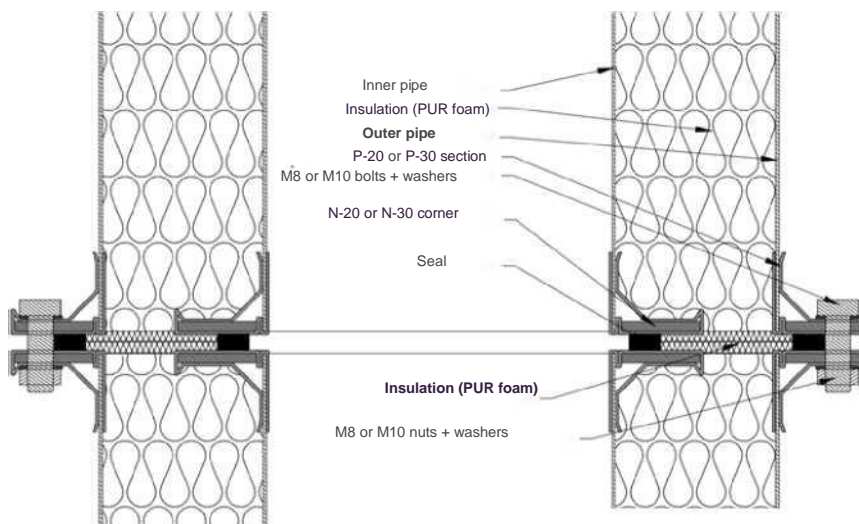


## Rectangular **PIANO-SYSTEM +I** pre-insulated ventilation ducts - structure

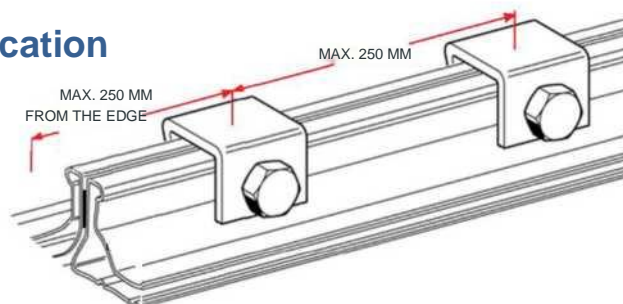


- 1 - bolt; 2 - mounting clamp; 3 - casing pipe;
- 4 - inner frame; 5 - outer frame; 6 - seal; 7 inner pipe

## Method of making joints on IANO-SYSTEM +I pre-insulated ventilation ducts with a rectangular cross-section



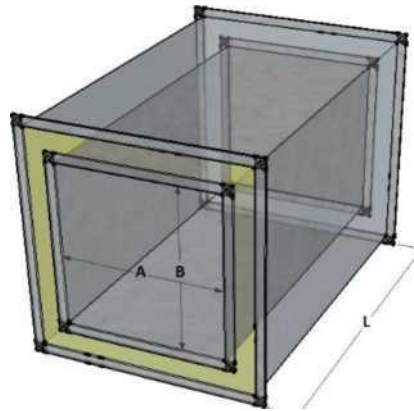
## Flange sections scope of application



## Mounting clamps the scope of application

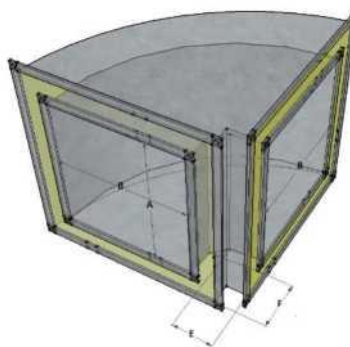
Duct side dimension A, B, mm	
100 ÷ 1500	1501 ÷ 2000
P-20 + N-20	P-30 + N-30

# K+I PIANO-SYSTEM straight duct section



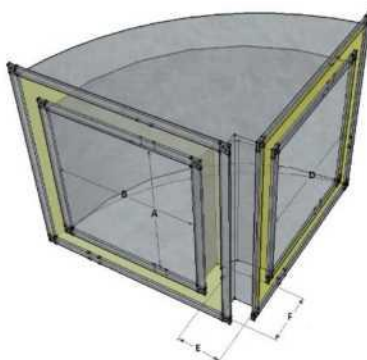
Duct diameter A, B, mm	Duct length L, mm
100 ÷ 2000	50 ÷ 1500
Dimension tolerances according to PN-EN 1505:2001	

# Symmetrical elbow BS+I PIANO-SYSTEM+I



Duct side dimension A, B, mm	Dimension E, F, mm	$\alpha$ , °
100 ÷ 2000	$\geq 100$	0 ÷ 135
Dimension tolerances according to PN-EN 1505:2001		

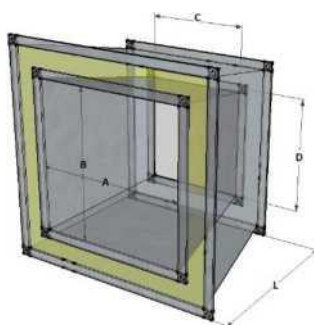
# PIANO-SYSTEM+I **BA+I** asymmetrical elbow



Duct side dimension A, B, D, mm	Dimension E, F, mm	$\alpha$ , °
100 ÷ 2000	$\geq 100$	0 ÷ 135
Dimension tolerances according to PN-EN 1505:2001		

## Diffuser / symmetric adapter

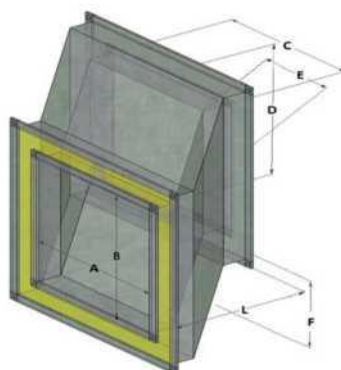
**US+I** PIANO-SYSTEM+I



Duct side dimension A, B, C, D, mm	Dimension L, mm
100 ÷ 2000	100 ÷ 1500
Dimension tolerances according to PN-EN 1505:2001	

## Diffuser / asymmetric adapter

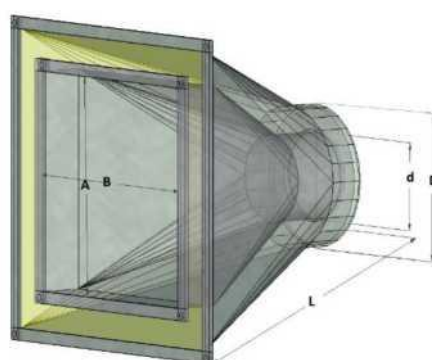
**UA+I** PIANO-SYSTEM



Duct side dimension A, B, C, D, mm	Dimension E, F, mm	Dimension L, mm
100 ÷ 2000	0 ÷ 2000	100 ÷ 1500
Dimension tolerances according to PN-EN 1505:2001		

## Symmetrical round - rectangular adapter

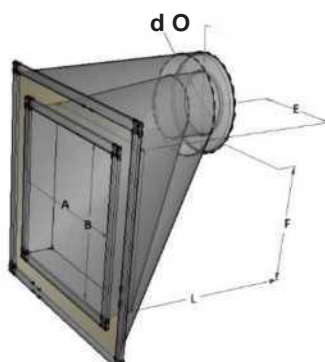
**RS+I** PIANO-SYSTEM+I



Duct side dimension A, B, mm	Diameter D, mm	Diameter d, mm	Stub pipe length, mm	Dimension L, mm
100 ÷ 1000	120 ÷ 500	100 ÷ 480	70	200 ÷ 1000
Dimension tolerances according to PN-EN 1505:2001				

# Round - rectangular symmetrical adapter

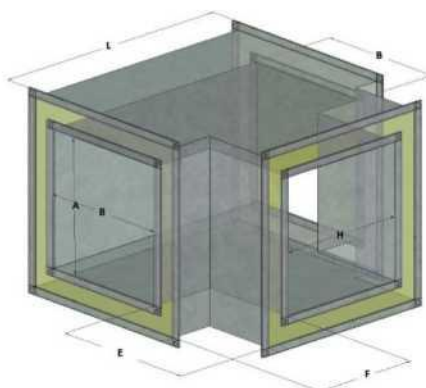
**RA+I** PIANO-SYSTEM+I



Duct side dimension A, B, mm	Diameter D, mm	Diameter d, mm	Stub pipe length, mm	Dimension L, mm	Dimensions E, F, mm
100 ÷ 1000	120 ÷ 500	100 ÷ 480	70	200 ÷ 1000	≤ 1000
Dimension tolerances according to PN-EN 1505:2001					

# Symmetrical tee **TRS+I**

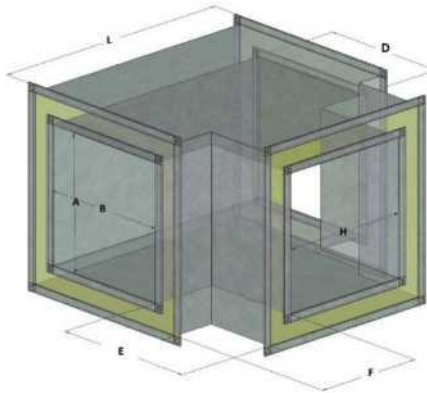
PIANO-SYSTEM+I



Duct side dimension A, B, H, mm	Dimension E, F, mm	Dimension L, mm
100 ÷ 2000	≥ 100	300 ÷ 1500
Dimension tolerances according to PN-EN 1505:2001		



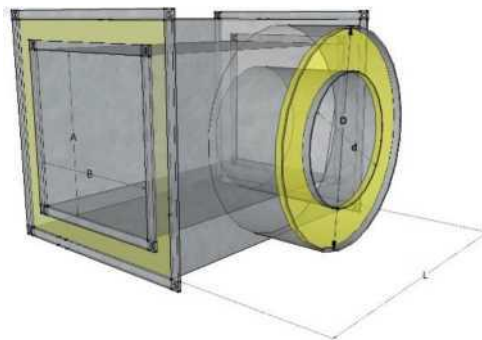
# TRA+I PIANO-SYSTEM+I asymmetrical tee



Duct side dimension A, B, D, H, mm	Dimension E, F, mm	Dimension L, mm
100 + 2000	≥ 100	300 + 1500
Dimension tolerances according to PN-EN 1505:2001		

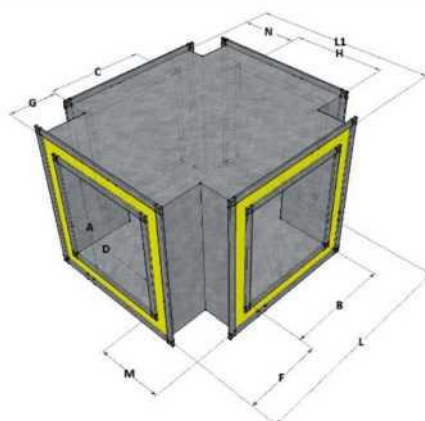
## A rectangular tee with a round branch duct

# TRO+I PIANO-SYSTEM+I



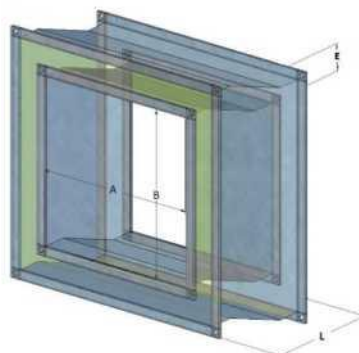
Duct side dimension A, B, mm	Diameter D, mm	Diameter d, mm	Stub pipe length, mm	Dimension L, mm
100 + 2000	120 + 500	100-480	70 + thickness of the insulating layer	220 + 600

## CZ+I PIANO-SYSTEM+I rectangular cross

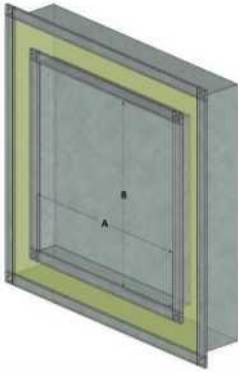


Duct side dimension A, B, C, D, H, mm	Dimension F, G, M, N, mm	Dimension L, L1, mm
100 ÷ 2000	≥ 100	$L = B + 2 \cdot F$ $L1 = H + M + N$
Dimension tolerances according to PN-EN 1505:2001		

## ES+I PIANO-SYSTEM+I offset pipe



Duct side dimension A, B, mm	Dimension E, mm	Dimension L, mm
100 ÷ 2000	0 ÷ 2000	100 ÷ 1500
Dimension tolerances according to PN-EN 1505:2001		

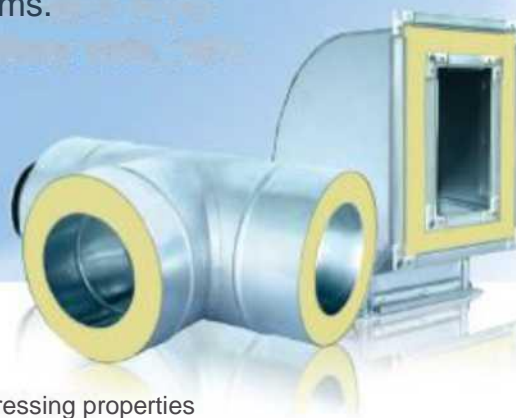


<b>Duct side dimension A, B, mm</b>
100 ÷ 2000
Dimension tolerances according to PN-EN 1505:2001



## PIANO-SYSTEM +I

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- Excellent thermal insulation and noise-suppressing properties
- Low thermal conductivity, space saving compared to wool
- The highest class of duct tightness - "D" confirmed during the ITB testing
- Classification of reaction to fire B-s3, d0 in accordance with PN-EN 13501-1:2019-02
- Increasing the rigidity of the duct without the use of any internal steel bracing
- Protection against water vapour condensation
- Widely used in HVAC systems
- Simple and quick assembly
- No need to use an additional steel jacket, insulation and assembly pins, the welding of which weakens the surface of the sheet.
- Shorter project completion time and cost reduction by elimination of the insulation fixing stage
- Initial thermal conductivity of the foam, 10 °C EN 12667 W/m °K 0.020
- The range of the foam insulation layer thickness: 10 mm-100 mm

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