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NATIONAL TECHNICAL ASSESSMENT

ITB-KOT-2021/2005 revision 1

This National Technical Assessment was issued in accordance with the Regulation of the Minister of Infrastructure and Construction of November 17, 2016 on national technical assessments (Journal of Laws of 2016, item 1968) by the Building Research Institute in Warsaw, at the request of:

Airwent System Sp. z o.o. Sp. komandytowa
ul. Mizikowskiego 3, 05-082 Stare Babice

The National Technical Assessment ITB-KOT-2021/2005 revision 1 is a positive assessment of the performance of the following construction products for the intended use:

Pre-insulated PIANO-SYSTEM + I ventilation ducts with a round cross-section

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Ph.D. Robert Geryło

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The document of the National Technical Assessment ITB-KOT-2021/2005, revision 1, contains 14 pages, including 2 Annexes. Content of this document can only be copied in whole. Publishing or disseminating fragments of the text of the National Technical Assessment, in any other form, requires a written agreement with the Building Research Institute.

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1. TECHNICAL DESCRIPTION OF THE PRODUCT

This National Technical Assessment covers pre-insulated PIANO-SYSTEM + I ventilation ducts with a round cross-section, manufactured by Airwent System Sp. z o.o. Sp. komandytowa, ul. Mizikowskiego 3, 05-082 Stare Babice, at the production plants in Stare Babice.

The National Technical Assessment covers the types of products specified by the manufacturer and resulting from the performance specified in point 3 and the combination of materials and components.

The National Technical Assessment covers:

- straight pipes PIANO-SYSTEM SPIRO + I, as shown in Fig. A1,
- segmented elbows PIANO-SYSTEM KS + I, as shown in Fig. A2,
- symmetric tees PIANO-SYSTEM TS + I, as shown in Fig. A3,
- symmetric segment reducers PIANO-SYSTEM RSS + I, as shown in Fig. A4,
- asymmetric segment reducers PIANO-SYSTEM RSA + I, as shown in Fig. A5,
- cross-pieces PIANO-SYSTEM CZO + I, as shown in Fig. A6,
- nipples PIANO-SYSTEM N + I, as shown in Fig. A7,
- lids PIANO-SYSTEM FO+I, as shown in Fig. A8,
- outlet grills PIANO-SYSTEM SO+I, as shown in Fig. A9.

Pre-insulated PIANO-SYSTEM + I ventilation ducts with a round cross-section consist of an inner pipe and an outer casing (as shown in Fig. A14), of galvanized steel sheet, grade DX51D + Z275 acc. to PN-EN 10346:2015 standard. Between the inner pipe and the outer casing there is polyurethane (PUR) foam insulation, 10-5-50 mm thick. The dimension of the outer casing results from the thickness of the applied insulation layer.

Straight pipes are made of metal sheets (tapes) as spirally wound, and the fittings are made of metal sheets connected by means of sheet metal locks and welds. The minimum thickness of the sheet metal (wall) of the inner pipe and the outer casing of straight ducts and fittings (acc. To Fig. A1 + A9) is given in Table 1.

Table 1

Duct diameter d, mm	Sheet thickness, mm	
	Straight ducts	Fittings
$D \leq 315$	0.45	0.5
$315 < d \leq 480$	0.5	0.5

Pre-insulated PIANO-SYSTEM + I ventilation ducts are made in tightness class D according to the PN-EN 12237:2005 standard.

Sections of straight ducts and fittings are connected with each other by means of nipple connectors - nipples (according to drawing A7), equipped with a rubber gasket (EPDM). The assembly connections are additionally reinforced from the outside with a mounting band. The method of making connections of pre-insulated PIANO-SYSTEM + 1 ventilation ducts with a round cross-section is shown in Fig. A11.

Elements and materials of the pre-insulated PIANO-SYSTEM + 1 ventilation ducts with a round cross-section are presented in Annex B.

2. INTENDED USE OF THE PRODUCT

Pre-insulated PIANO-SYSTEM + I ventilation ducts with a round cross-section are intended for air distribution in ventilation and air-conditioning systems in buildings, including residential buildings, collective residence and public utility buildings. They can also be used in warehouse, industrial and farm buildings.

Straight lines and fittings may be used under the following conditions:

- temperature of transported air in the range from -30 °C to + 70 °C,
- relative humidity of transported air up to 100%,
- air transport without chemically aggressive and abrasive factors,
- air flow speed up to 16 m/s,
- static air pressure difference inside and outside the duct from -750 Pa to 2000 Pa (execution class S, according to WO-KOT / 36/01 revision 2).

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

The connecting elements should be protected against corrosion in a manner appropriate to the corrosion resistance of the pipes.

Pre-insulated PIANO-SYSTEM + ventilation ducts with a round cross-section have been classified in class B-s3, d0 reaction to fire according to PN-EN 13501-1:2019 and as non-flammable, non-drip and non-spreading fire inside buildings according to the decision of the Minister of Infrastructure of 12 April 2002 (Journal of Laws No. 75 of April 12, 2002, item 690, as amended). At the same time, the products are classified as fire resistant. The above classification applies to pre-insulated PIANO-SYSTEM + I ventilation ducts mounted directly to elements of A1 or A2 reaction to fire class according to PN-EN 13501-1:2019 or at any distance from them.

Sealing elements according to p. 1 should be used to seal the connections of the pre-insulated PIANO-SYSTEM + I ventilation ducts.

The method of connecting pre-insulated PIANO-SYSTEM + I ventilation ducts with other elements and devices of the installation, as well as the method of thermal and / or acoustic insulation of the ducts should be specified in the technical design prepared for a specific building object.

Pre-insulated PIANO-SYSTEM + I ventilation ducts should be suspended or supported in the manner specified in the technical design.

Pre-insulated PIANO-SYSTEM + I ventilation ducts with a round cross-section should be used in accordance with:

- a technical design, developed for a specific facility, taking into account Polish standards and technical and construction regulations, in particular the decision of the Minister of Infrastructure of April 12, 2002 on technical conditions to be met by buildings and their location (Journal of Laws of 2019, item 1065, as amended),

- ruling of this National Technical Assessment,
- instructions prepared by the manufacturer and delivered to recipients.

3. PERFORMANCE OF THE PRODUCT AND METHODS USED FOR ITS ASSESSMENT

The performance of pre-insulated PIANO-SYSTEM + 1 ventilation ducts with a round cross-section and the methods used for its assessment are given in tables 1 and 2.

Table 2

Pos.	Basic characteristics	Performance	Assessment method
1	2	3	4
1	Dimensions	acc. to Annex A	checking with universal measuring instruments of appropriate accuracy
2	Wall thickness (inner pipe and outer casing), mm	acc. to table 1	
3	Duct tightness	class D	PN-EN 12237: 2005 WO-KOT / 36/01 revision 2 test conditions: from -750 to 2000 P
4	Ducts strength	no permanent deformation and no sudden change in tightness	
5	Durability (elements made of galvanized steel sheet): - weight of the zinc coating, g/m ² - thickness of the zinc coating, μm	≥ 275 20 (tolerance acc. to PN-EN 10346)	PN-EN 10346:2015, PN-EN ISO 2808:2020
6	Dimensional stability (PUR foam core), after 24 h at + 100 °C,%, in the direction of: - length and width - internal thickness	±2 ± 10	PN-EN 1604:2013
7	Tensile strength perpendicular to the faces (sandwich samples with a PUR foam core), kPa	≥ 35	PN-EN 1607:2013
8	Thermal conductivity at a temperature of 10 °C (PUR foam core), AD, W/m K	≤ 0.025	PN-EN 12667:2002
9	Fire classification in terms of reaction to fire, class	B-s3,d0	PN-EN 13501-1:2019

4. PACKING, TRANSPORT AND STORAGE AND THE METHOD OF MARKING THE PRODUCT

Products covered by the National Technical Assessment should be delivered in the manufacturer's packaging and stored and transported in a manner ensuring that their technical properties remain unchanged.

The method of marking products with a construction mark should comply with the decision of the Minister of Infrastructure and Construction of 17 November 2016 on the method of declaring the performance of construction products and the method of marking them with a construction mark (Journal of Laws of 2016, item 1966, as amended).

Marking the product with the construction mark should be accompanied by the following information:

- the last two digits of the year in which the construction mark was first placed on the construction product,
- the name and address of the manufacturer's registered office or an identification mark allowing for the unambiguous determination of the name and address of the manufacturer's registered office,

- name and designation of the construction product type,
- number and year of issue of the national technical assessment, according to which the performance were declared (ITB-KOT-2021/2005 revision 1),
- number of the national declaration of performance,
- level or class of declared performance,
- manufacturer's website address, if the national declaration of performance is available on it.

Along with the national declaration of performance, in special cases one should provide safety data sheet and / or information on hazardous substances contained in a construction product, referred to in Art. 31 or 33 of Regulation (EC) No. 1907/2006 of the European Parliament and of the Council on the Registration, Evaluation, Authorization and Restriction of Chemicals (REACH) and establishing a European Chemicals Agency.

In addition, the labelling of a construction product, which is a hazardous mixture according to the REACH Regulation, should comply with the requirements of Regulation (EC) No. 1272/2008 of the European Parliament and of the Council on classification, labelling and packaging of substances and mixtures (CLP), amending and repealing Directive 67/548/EEC and 1999/45/EC and amending Regulation (EC) No. 1907/2006.

5. ASSESSMENT AND VERIFICATION OF CONSTANCY OF PERFORMANCE

5.1. National system of assessment and verification of constancy of performance

In accordance with the decision of the Minister of Infrastructure and Construction of 17 November 2016 on the method of declaring the performance of construction products and the method of marking them with a construction mark (Journal of Laws of 2016, item 1966, as amended), the System 3 of Assessment and Verification of Constancy of Performance is applicable.

5.2. Test type

The performance, assessed in point 3, is a type test of the product, until there are any changes to the raw materials, components, production line or production plant.

5.3. Plant production control

The manufacturer should have a factory production control system in place in the manufacturing plant. All elements of this system, requirements and provisions adopted by the manufacturer should be documented in a systematic manner, in the form of rules and procedures, including test records. Factory production control should be adapted to the production technology and ensure that the declared performance of the product is maintained in series production.

Factory production control includes specification and checking of raw materials and ingredients, control and testing in the manufacturing process as well as control tests (according to p. 5.4), carried out by the manufacturer in accordance with the prescribed test plan and in accordance with the rules and procedures specified in the factory production control documentation.

The results of production control should be recorded systematically. The entries in the register should confirm that the products meet the criteria of assessment and verification of constancy of performance. Individual products or product batches and related production details must be fully identifiable and traceable.

5.4. Checks

5.4.1. Test program. The test program includes:

- a) current tests,
- b) periodical tests.

5.4.2. Current tests. Current tests cover the inspection of:

- a) ducts dimensions,
- b) duct wall thickness,
- c) apparent density of the PUR foam core,
- d) weight or thickness of the zinc coating.

5.4.3. Periodical tests. Periodical tests include checking:

- a) tightness,
- b) strength,
- c) dimensional stability of the PUR foam core,
- d) thermal conductivity coefficient of the PUR foam core,
- e) tensile strength perpendicular to the faces.

5.5. Frequency of testing

Current tests should be carried out in accordance with the established test plan, but not less frequently than for each batch of products. The size of the batch of products should be specified in the documentation of the factory production control.

Periodic examinations should be performed at least every 3 years.

6. INSTRUCTIONS

6.1. The National Technical Assessment ITB-KOT-2021/2005 revision 1 is a positive assessment of the functional properties of these essential characteristics of pre-insulated PIANO-SYSTEM + 1 ventilation ducts with circular cross-section, which, in accordance with the intended use, resulting from the provisions of the Assessment, have an impact on the fulfilment of the basic requirements by the construction facilities in which the product will be used.

6.2. The National Technical Assessment ITB-KOT-2021/2005 revision 1 is not a document authorizing the marking of a construction product with a construction mark.

Pursuant to the Act of 16 April 2004 on construction products (Journal of Laws of 2021, item 1213), the products covered by this National Technical Assessment may be marketed or made available on the domestic market, provided that the manufacturer performed the assessment and verification of constancy of performance, prepared the national declaration of performance in accordance with the National Technical

Assessment ITB-KOT-2021/2004, revision 1, and marked the products with a construction mark in accordance with applicable regulations.

6.3. The National Technical Assessment ITB-KOT-2021/2005, revision 1, does not infringe the rights resulting from the provisions on the protection of industrial property, in particular the Act of 30 June 2000 - Industrial Property Law (Journal Laws of 2021, item 324). Providing these rights is the responsibility of the users of this Building Research institute (ITB) National Technical Assessment.

6.4. ITB, by issuing the National Technical Assessment, is not responsible for any infringement of exclusive and acquired rights.

6.5. The National Technical Assessment does not release the producer of products from the responsibility for their proper quality, and the contractors of construction works from the responsibility for their proper use.

6.6. The validity of the National Technical Assessment may be extended for subsequent periods, not longer than 5 years.

7. LIST OF DOCUMENTS USED IN THE PROCEDURE

7.1. Reports, test reports, assessments, classifications

1. LZF00-01815/21/Z00NZF. Report on the tightness and strength tests of pre-insulated PIANO-SYSTEM + 1 ventilation ducts with a circular cross-section. Department of Thermal Physics, Acoustics and Environment ITB, 2021
2. LZF00-02480/21/Z00NZF. Report on the tightness and strength tests of pre-insulated PIANO-SYSTEM + 1 ventilation ducts with a circular cross-section. Department of Thermal Physics, Acoustics and Environment ITB, 2021
3. 02100/21/Z00NZP. Classification report on reaction to fire for pre-insulated ventilation duct system. Department of Fire Research ITB, 2021
4. LZF01-02400/21/Z00NZP. Report on testing pre-insulated ventilation ducts. Department of Fire Research ITB, 2021
5. LZM00-01800/21/Z00NZM. Report on testing pre-insulated ventilation ducts. Department of Construction Materials Engineering ITB, 2021
6. 00905/19/Z00NZM. Technical opinion on the durability of galvanized steel sheets intended for ventilation ducts in relation to the environmental corrosivity category according to PN-EN ISO 9223:2012. Department of Construction Materials Engineering ITB, 2019
7. LZM00-00905/19/Z00NZM. Report on the test of the zinc coating mass of ventilation ducts. Department of Construction Materials Engineering ITB, 2019

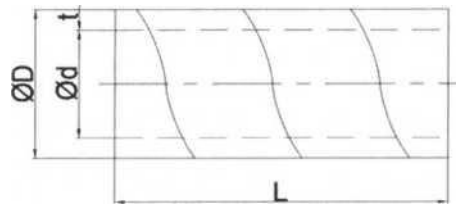
7.2. Reference standards and documents

PN-EN 1602:2013	<i>Thermal insulation products in construction. Determining the apparent density</i>
PN-EN 1604:2013	<i>Thermal insulation products in construction. Determining dimensional stability under certain temperature and humidity conditions</i>
PN-EN 1607:2013	<i>Thermal insulation products in construction. Determination of the tensile strength perpendicular to the faces</i>
PN-EN ISO 9223:2012	<i>Corrosion of metals and alloys. Corrosivity of atmospheres. Classification, determination and assessment</i>
PN-EN ISO 2808:2020	<i>Paints and varnishes. Determination of the thickness of the coating</i>
PN-EN 1506:2007	<i>Building ventilation. Ventilation straight ducts and sections of metal sheet of round cross-section. Dimensions</i>
PN-EN 10346:2015	<i>Continuously hot-dip coated steel flat products for cold forming. Technical delivery conditions</i>
PN-EN 12237:2005	<i>Building ventilation. Network of ducts. Strength and leak-tightness of ducts of metal sheet of round cross-section.</i>
PN-EN 13501-1:2019	<i>Fire classification of construction products and building elements. Part 1: Classification based on the results of reaction to fire</i>
PN-EN 12667:2002	<i>Thermal properties of building materials and products. Determination of thermal resistance by the methods of the shielded heating plate and the heat flux sensor. Products with high and medium thermal resistance</i>
PN-EN ISO 15979:2005	<i>Blind rivets with an open shank, drawn core and protruding head - St/St</i>
PN-EN ISO 4017:2014	<i>Connectors. Hexagon head screws fully threaded. Accuracy classes A and B</i>
PN-EN ISO 868:2005	<i>Plastics and ebonite. Determination of indentation hardness with the use of a durometer (Shore hardness)</i>
WO-KOT/36/01 revision 2	<i>Conditions for the assessment of the performance of a construction product. Ventilation ducts made of steel sheet</i>

ANNEXES

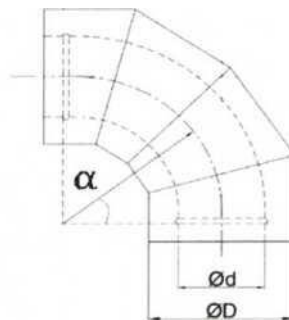
Annex A. Shape, dimensions and connection method	10
Annex B. Materials and components.....	14

Appendix A.



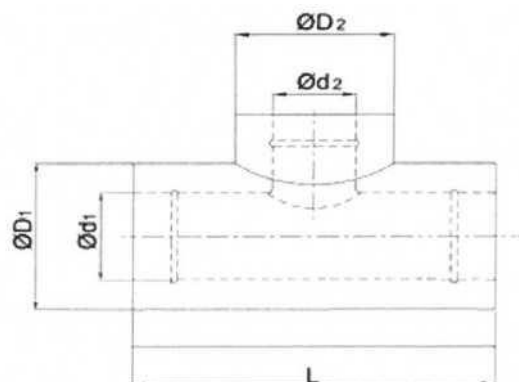
Duct diameter Ød, mm	Diameter ØD, mm	Duct length L, mm
100 ÷ 480	120 ÷ 500	≤ 3000
Dimension tolerances acc. to PN-EN 1506:2007		

Fig. A1. Straight duct PIANO-SYSTEM SPIRO+I



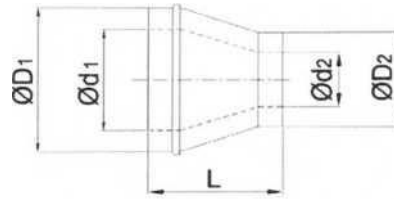
Duct diameter Ød, mm	Diameter ØD, mm	° α,
100 ÷ 480	120 ÷ 500	0 ÷ 135
Dimension tolerances acc. to PN-EN 1506:2007		

Fig. A2. Segmented elbow PIANO-SYSTEM KS+I

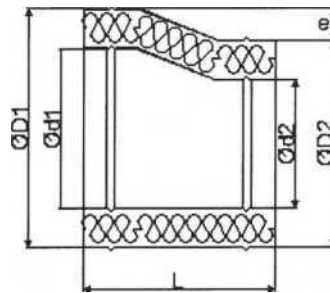


Duct diameter Ød1, Ød2, mm	Diameter ØD1, ØD2, mm	Dimension of the connecting stub pipe, mm	Dimension L, mm
100 ÷ 480	120 ÷ 500	70 + insulation layer thickness	220 ÷ 600
Dimension tolerances acc. to PN-EN 1506:2007			

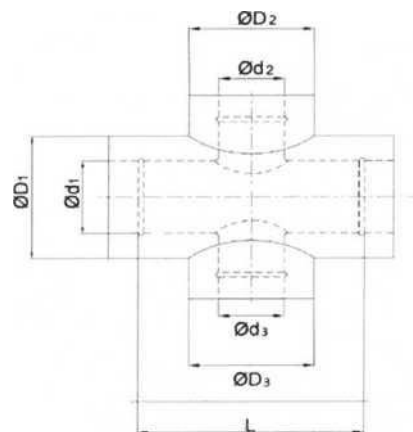
Fig. A3. Symmetric tee PIANO-SYSTEM TS+I



Duct diameter Ød1, Ød2, mm	Diameter ØD1, ØD2, mm	Dimension of the connecting stub pipe, mm	Dimension L, mm
100 ÷ 480	120 ÷ 500	70 + insulation layer thickness	220 ÷ 500
Dimension tolerances acc. to PN-EN 1506:2007			

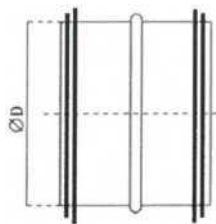
Fig. A4. Symmetric segmented reducer PIANO-SYSTEM RSS+I


Duct diameter Ød1, Ød2, mm	Diameter ØD1, ØD2, mm	Dimension of the connecting stub pipe, mm	Dimension L, mm	Dimension e, mm
100 ÷ 480	120 ÷ 500	70 + insulation layer thickness	220 ÷ 500	≤ 220
Dimension tolerances acc. to PN-EN 1506:2007				

Fig. A5. Asymmetric segmented reducer PIANO-SYSTEM RSA+I


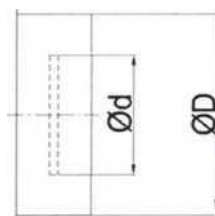
Duct diameter Ød1, Ød2, Ød3, mm	Diameter ØD1, ØD2, ØD3, mm	Dimension of the connecting stub pipe, mm	Dimension L, mm
100 ÷ 480	120 ÷ 500	70 + insulation layer thickness	220 ÷ 600
Dimension tolerances acc. to PN-EN 1506:2007			

Fig. A6. Cross-piece PIANO-SYSTEM CZO+I



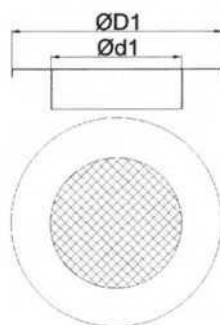
Duct diameter ØD, mm	Dimension of the connecting stub pipe, mm
100 ÷ 480	70 ÷ 80
Dimension tolerances acc. to PN-EN 1506:2007	

Fig. A7. Nipple PIANO-SYSTEM N+I



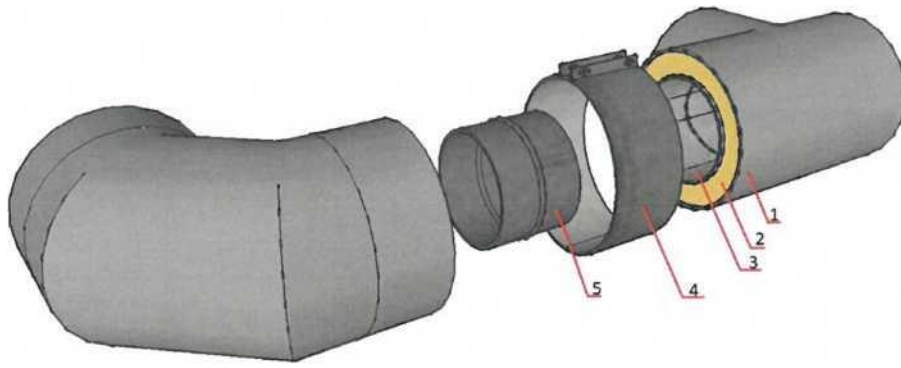
Duct diameter Ød, mm	Diameter ØD, mm	Dimension of the connecting stub pipe, mm
100 ÷ 480	120 ÷ 500	60
Dimension tolerances acc. to PN-EN 1506:2007		

Fig. A8. Lid PIANO-SYSTEM FO+I



Duct diameter Ød1, mm	Diameter ØD1, mm	Dimension of the connecting stub pipe, mm
100 ÷ 480	120 ÷ 500	60
Dimension tolerances acc. to PN-EN 1506:2007		

Fig. A9. Outlet grill PIANO-SYSTEM SO+I



- 1 - external casing 2 - insulation, polyurethane foam (PUR);
 3 - inner pipe;
 4 - clamp with screws;
 5 - nipple with a seal

Fig. A10. Pre-insulated PIANO-SYSTEM + I ventilation ducts with a round cross-section - design

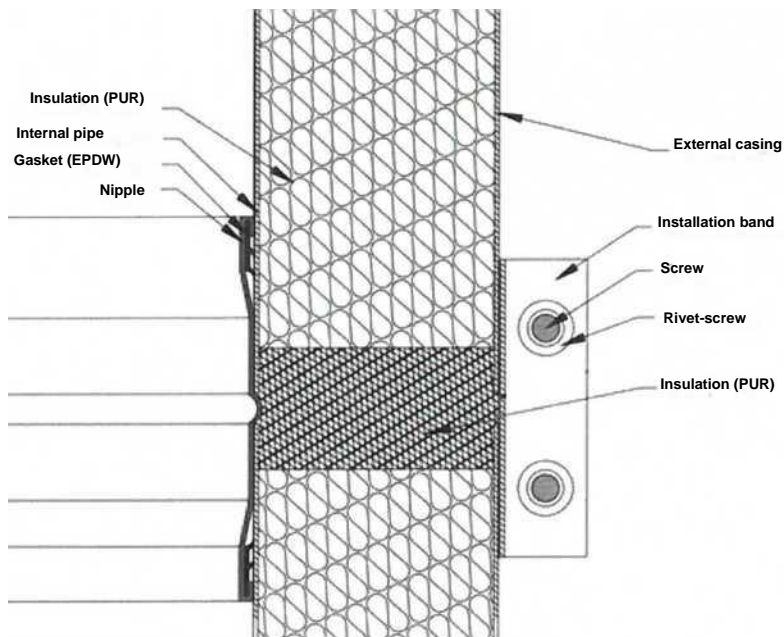


Fig. A11. Method of making connections of pre-insulated PIANO-SYSTEM + I ventilation ducts with a round cross-section

Annex B.

For the production of pre-insulated PIANO-SYSTEM + I ventilation ducts, the following should be used:

- galvanized steel sheet, grade DX51D + Z275 according to PN-EN 10346: 2015,
- rigid polyurethane foam (PUR), with the properties given in Table B1.

Table B1.

Pos.	Properties	Requirements	Test methods
1	2	3	4
1	Apparent density, kg/m ³	≥35	PN-EN 1602:2013
2	Reaction to fire class	E	PN-EN 13501-1:2019

The polyurethane foam is introduced into the space between the inner pipe and the outer casing by injection.

Pre-insulated PIANO-SYSTEM + I ventilation ducts should be installed and sealed with:

- nipple seals made of EPDM, Shore hardness class $60 \pm 5^\circ$ according to PN-EN ISO 868:2005,
- blind rivets, made of galvanized steel, 4 mm in diameter, according to PN-EN ISO 15979:2005,
- galvanized steel M8 hex head bolts, according to PN-EN ISO 4017:2014,
- mounting bands (clamps) made of galvanized steel.