

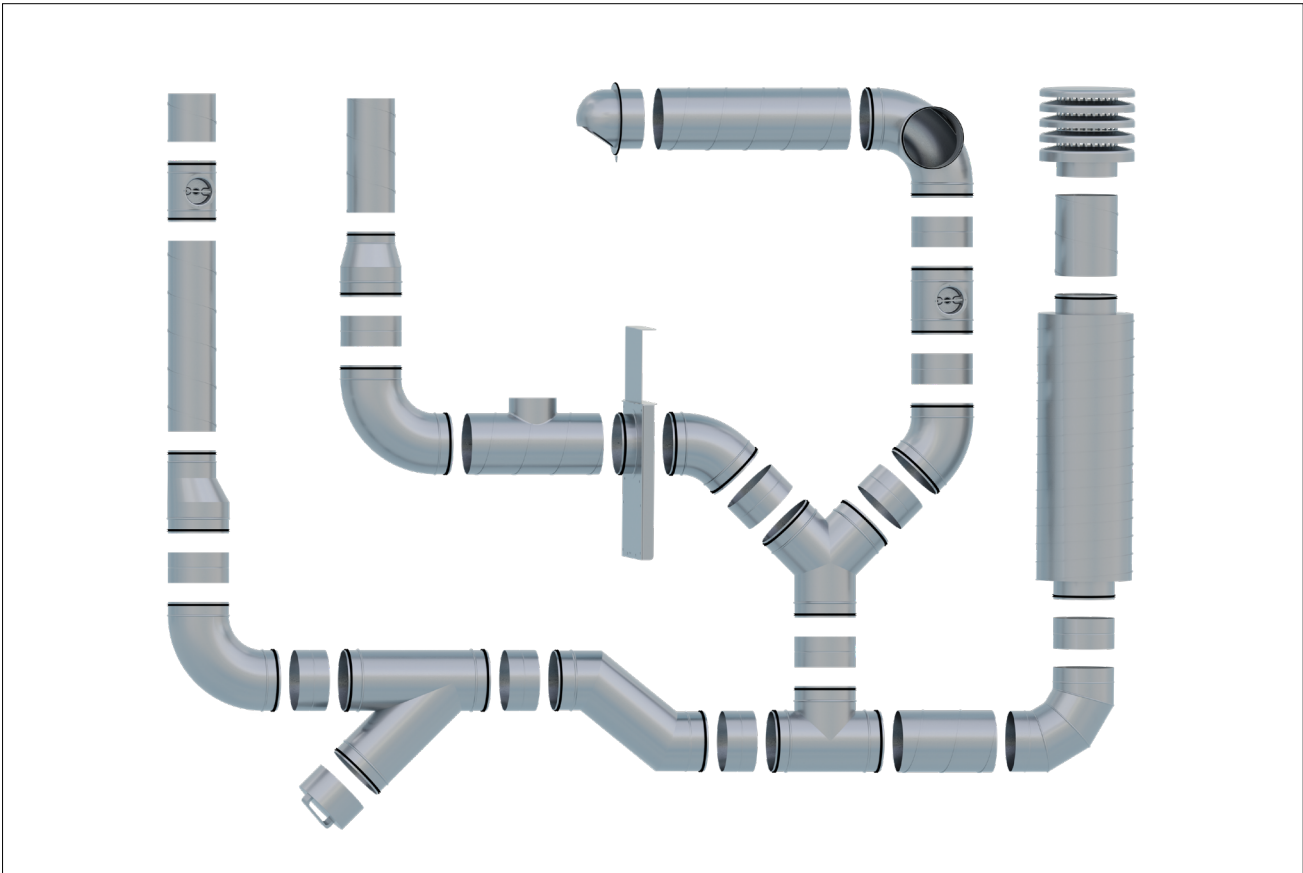
SPIRAL[®] System

Round Ventilation

Ducts and Fittings

ALNOR reserves the right to modify technical specifications
in line with the policy of continuous product improvement.

System description



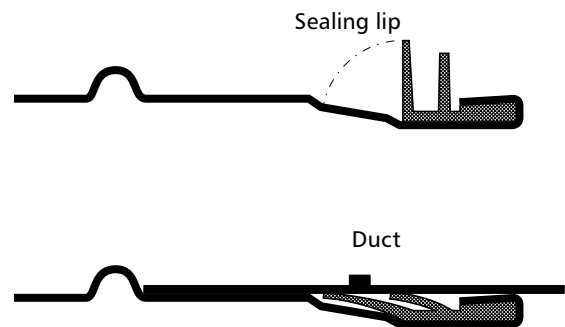
Cost-effective ventilation

Given the high costs of air treatment and a boom in the HVAC sector, ventilation systems must satisfy very stringent requirements. As a result, it is essential to ensure that duct connections are sufficiently leak-proof to keep the costs of operation at economically viable levels. To tackle this problem successfully, ALNOR Systemy Wentylacji Sp. z o.o. has developed a new end-to-end SPIRAL® system.

Application advantages

- Quick and easy installation.
- The gaskets are factory-installed without play to ensure their proper seating when connections are made.
- This allows accurate mounting of fittings without the risk of breaching the seal or air leaks.
- An environment-friendly installation method which requires no silicones containing toxic solvents that could evaporate into the ductwork.
- The system can be installed in all weather conditions.
- Temperature resistance: -30° to +100 °C.
- Maximum operating vacuum: up to 3000 Pa.
- Maximum operating pressure: up to 5000 Pa.
- Internal and external manufacturing control.
- An aesthetic finish which is particularly important for exposed systems.

Rubber gaskets



The gaskets are made from uniform EPDM rubber. The gasket is mounted at the end of the fitting and held tight in the fitting's hemmed rim. This keeps the gasket firmly in place during and after the installation phase.

Rubber gaskets must meet high quality standards, and therefore we have chosen to make them from EPDM rubber. This material has superior resistance to ozone, UV radiation, and temperature variations, thus providing longer service life.

EPDM gaskets can withstand temperatures of -30 °C to 100 °C.

Rubber gaskets and product quality control

EPDM gaskets can withstand temperatures of -30°C to 100°C.

For heat-resistant HVAC systems, SPIRAL[®] system is also available with silicone gaskets which can withstand continuous temperatures of -70°C to 150°C and transient temperatures of 90°C to 200°C.

SPIRAL[®] system round ducts and fittings are certified for compliance with hygienic standards:

- a) HK/B/1652/03/2007 - made from aluminium sheet
- b) HK/B/1652/01/2007 - made from galvanized or stainless steel sheet

//

SPIRAL[®] system round ducts and fittings with gaskets are certified by SITAC for air tightness class D - Certificate no. 0103/07.

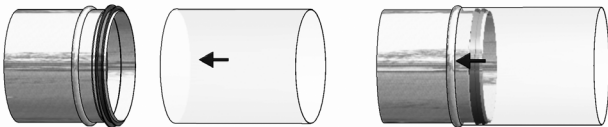
A leak-proof ductwork

The SPIRAL[®] system is a proven system of quick-coupled spiral ducts and fittings provided with factory-installed EPDM gaskets. The gaskets provide leak-proof and durable joints between SPIRAL[®] system components. The system components are available in a full range of diameters from Ø80 to Ø1250 mm. SPIRAL[®] system meets the requirements of PN-EN 12237 for air tightness class D (Certificate no. 0103/07).

The high-quality of workmanship and factory-installed rubber gaskets enable easy and quick assembly of ventilation ductwork. Ductwork based on SPIRAL[®] system components guarantees long and leak-proof service life and requires no additional sealants.

The key benefit

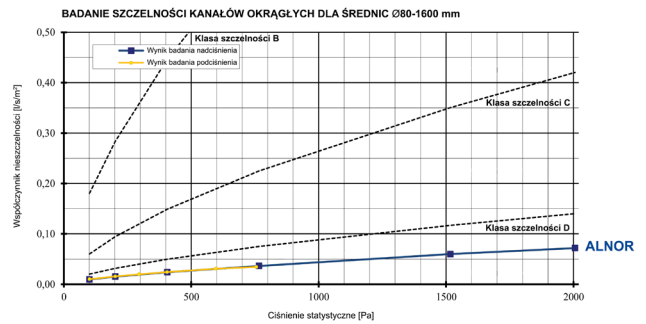
The gasket fits snugly along the entire circumference of the duct.



Leak testing

All SPIRAL[®] system components are leak-tested. SPIRAL[®] system meets the requirements of PN-EN 12237 for air tightness class D (Certificate no. 0103/07).

The sealing performance chart is available for the full diameter range, from Ø80 to Ø1250 mm.



All gaskets of SPIRAL[®] system components are leak-tested according to the procedure described below.

Testing procedure for SPIRAL[®] system gaskets:

- Visual inspection of the surface quality.
- Gauging of the gasket internal diameter which is important if different materials are used.
- Inspection of the gasket profile dimensions and compliance with pre-defined dimension tolerances.
- Deformation tests under simulated installation conditions using a test rig. Elasticity tests to check the final and complete seal of the gasket.

Round ducts and fittings with gaskets SPIRAL[®] system is certified by SITAC for air tightness class D.



Round ducts and fittings are TÜV-certified for the quality and safety performance.



Installation instructions

Installation

Before installation

Ducts to be installed must be clean.

Duct trimming

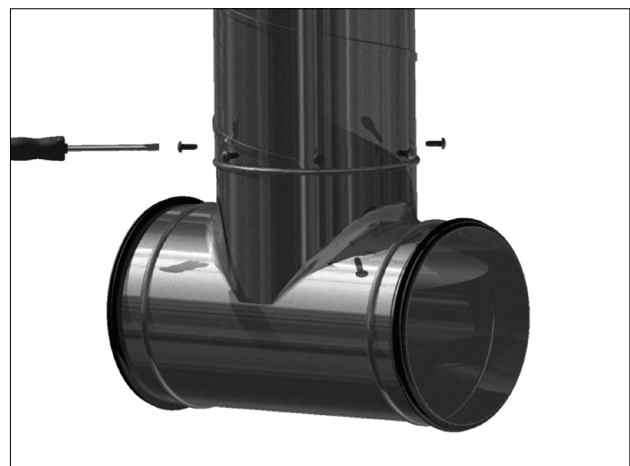
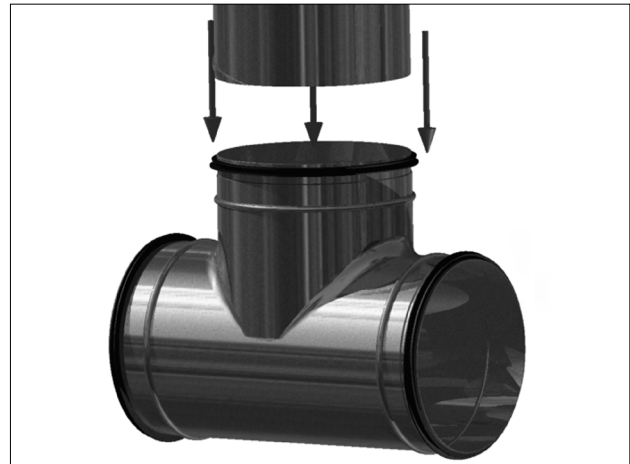
Trim the ducts to the correct angle and size, and deburr the edges.

Installation of fittings

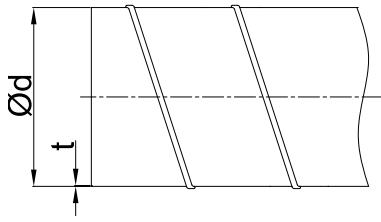
- Check that the ducts and fittings to be installed are not damaged.
Thoroughly inspect gaskets for damage.
- Slide the fitting into the duct up until you reach the stop.
Try sliding the piece in while twisting it left and right to make the joining easier.
- Fasten the piece to the duct with sheet metal screws or aircraft rivets.
Follow the bolting / riveting pattern to avoid misalignment between the joined ductwork components.
It is best to install the screws / rivets alternately on opposite sides.
- The table below shows the recommended thickness of sheet metal screws and aircraft rivets:

| $\varnothing d$ (mm) | min. diameter (mm) | number of screws |
|-------------------------|-----------------------|---------------------|
| 80 – 250 | 3.2 | 3 |
| 280 – 500 | 3.2 | 4 |
| 560 – 710 | 3.2 | 6 |
| 710 - 1250 | 4.0 | 12 |
| 1400 – 1600 | 4.0 | 16 |

Place the sheet metal screws (or aircraft rivets) at an even spacing around the joint. Make sure that you do not pierce the gasket. To do this, fasten the screws 10 mm away from the duct edge and the stop. If the joint is not properly coupled, it is best to use new components. If this is impossible, you can seal the screw / rivet holes.

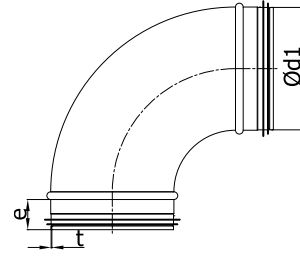


Tolerance limits for ducts



| diameter Ød_{nom} (mm) | min. - max. diameter $\text{Ød}_{min} - \text{Ød}_{max}$ (mm) | sheet thickness t_{nom} (mm) |
|------------------------------------|--|-----------------------------------|
| 80 | 80.0 - 80.5 | 0.4 |
| 100 | 100.0 - 100.5 | 0.4 |
| 112 | 112.0 - 112.5 | 0.4 |
| 125 | 125.0 - 125.5 | 0.4 |
| 140 | 140.0 - 140.6 | 0.4 |
| 150 | 150.0 - 150.6 | 0.4 |
| 160 | 160.0 - 160.6 | 0.4 |
| 180 | 180.0 - 180.7 | 0.4 |
| 200 | 200.0 - 200.7 | 0.4 |
| 224 | 224.0 - 224.8 | 0.4 |
| 250 | 250.0 - 250.8 | 0.4 |
| 280 | 280.0 - 280.9 | 0.4 |
| 300 | 300.0 - 300.9 | 0.4 |
| 315 | 315.0 - 315.9 | 0.4 |
| 355 | 355.0 - 356.0 | 0.5 |
| 400 | 400.0 - 401.0 | 0.5 |
| 450 | 450.0 - 451.1 | 0.5 |
| 500 | 500.0 - 501.1 | 0.5 |
| 560 | 560.0 - 561.2 | 0.5 |
| 600 | 600.0 - 601.2 | 0.5 |
| 630 | 630.0 - 631.2 | 0.5 |
| 710 | 710.0 - 711.5 | 0.6 |
| 800 | 800.0 - 801.6 | 0.7 |
| 900 | 900.0 - 902.0 | 0.7 |
| 1000 | 1000.0 - 1002.0 | 0.7 |
| 1120 | 1120.0 - 1122.5 | 0.9 |
| 1250 | 1250.0 - 1252.5 | 0.9 |
| 1400 | 1400.0 - 1403.0 | 1.2 |
| 1500 | 1500.0 - 1503.0 | 1.2 |
| 1600 | 1600.0 - 1603.3 | 1.2 |
| 1800 | 1800.0 - 1803.6 | 1.2 |
| 2000 | 2000.0 - 2004.0 | 1.5 |
| 2200 | 2200.0 - 2205.0 | 1.5 |
| 2400 | 2400.0 - 2406.0 | 1.5 |

Tolerance limits for fittings



| diameter Ød_{nom} (mm) | min. - max. diameter $\text{Ød}_{min} - \text{Ød}_{max}$ (mm) | sheet thickness t_{nom} (mm) |
|------------------------------------|--|-----------------------------------|
| 80 | 78.8 - 79.3 | 0.4 |
| 100 | 98.8 - 99.3 | 0.4 |
| 112 | 110.5 - 111.3 | 0.4 |
| 125 | 123.8 - 124.3 | 0.4 |
| 140 | 138.7 - 139.3 | 0.4 |
| 150 | 148.7 - 149.3 | 0.4 |
| 160 | 158.7 - 159.3 | 0.4 |
| 180 | 178.6 - 179.3 | 0.4 |
| 200 | 198.6 - 199.3 | 0.4 |
| 224 | 222.5 - 223.3 | 0.4 |
| 250 | 248.5 - 249.3 | 0.4 |
| 280 | 278.4 - 279.3 | 0.4 |
| 300 | 298.4 - 299.3 | 0.4 |
| 315 | 313.4 - 314.3 | 0.4 |
| 355 | 353.3 - 354.3 | 0.5 |
| 400 | 398.3 - 399.3 | 0.5 |
| 450 | 448.2 - 449.3 | 0.5 |
| 500 | 498.2 - 499.3 | 0.5 |
| 560 | 558.1 - 559.3 | 0.5 |
| 600 | 598.2 - 599.3 | 0.5 |
| 630 | 628.1 - 629.3 | 0.5 |
| 710 | 708.0 - 709.3 | 0.6 |
| 800 | 798.0 - 799.3 | 0.7 |
| 900 | 897.9 - 899.3 | 0.7 |
| 1000 | 997.9 - 999.3 | 0.7 |
| 1120 | 1117.8 - 1119.3 | 0.9 |
| 1250 | 1247.8 - 1249.3 | 0.9 |
| 1400 | 1397.3 - 1299.2 | 1.0 |
| 1500 | 1500.0 - 1503.0 | 1.0 |
| 1600 | 1597.1 - 1599.1 | 1.0 |
| 1800 | 1797.0 - 1799.0 | 1.0 |
| 2000 | 1996.8 - 1998.8 | 1.0 |
| 2200 | 2196.7 - 2198.7 | 1.0 |
| 2400 | 2396.5 - 2398.5 | 1.0 |

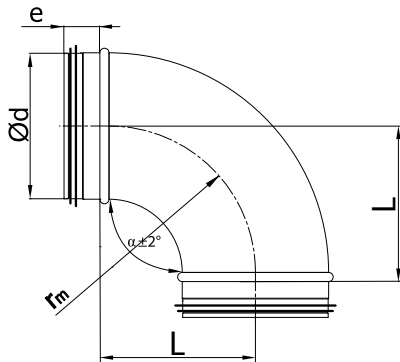
Tolerance limits and specifications

Dimensions - Fittings

SPIRAL system must meet the tolerance limits given in the table below to provide the required sealing performance.

| $\varnothing d$, nominal (mm) | e (mm) | tolerance (mm) | |
|-----------------------------------|-----------|-------------------|-----|
| 80-315 | 36 | +0 | -6 |
| 355-400 | 55 | +0 | -6 |
| 450-630 | 75 | +0 | -10 |
| 710-900 | 100 | +0 | -10 |
| 1000-1600 | 115 | +0 | -20 |

Dimension and angle tolerances



| length L, r_m [mm] | tolerance |
|-------------------------|--------------------|
| ≤ 15 | ± 3 mm |
| (15-100) | ± 7 mm |
| > 100 | + 10 mm - 15 mm |
| L (ducts) | $\pm 0.25\%$ |

Materials

Ducts and fittings are made from galvanized steel sheet.

Other materials are available on request:

- 1.4301/304 stainless steel sheet
- 1.4404/316L stainless steel sheet, molybdenum-enriched
- AW-1050A H24 aluminium sheet
- M1E z4 copper sheet

Always indicate the material code in your purchase order. If no material code is specified in the order, the default material will be used, i.e. galvanized steel sheet.

Examples of material codes:

- SPR-K-... - 1.4301/304
- SPR-K-.....-316L - 1.4404/316L
- SPR-A-.... - AW-1050A H24
- SPR-CU-.... - M1E z4

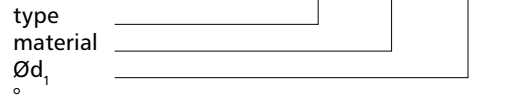
Components made from stainless steel have to be inspected at least every 6 months.

NOTE!

The stainless steel sheet products do not undergo pickling as a standard.

Product code example

Product code: BSL - A - 100 - 90



Marking

ALNOR products carry the Polish conformity mark B for construction products and product codes as shown in the technical specifications listed in this catalogue.



Round components with gaskets come with Eurovent Ventilation Ducts Certificate for air tightness class D.



Tolerance limits for stainless spiral ducts and fittings

1.4301 / 304 stainless steel sheet components

| Ducts | | Fittings | |
|--|-----------------------------------|--|-----------------------------------|
| diameter $\varnothing d_{nom}$ (mm) | sheet thickness t_{nom} (mm) | diameter $\varnothing d_{nom}$ (mm) | sheet thickness t_{nom} (mm) |
| 80 | 0.5 | 80 | 0.5 |
| 100 | 0.5 | 100 | 0.5 |
| 112 | 0.5 | 112 | 0.5 |
| 125 | 0.5 | 125 | 0.5 |
| 140 | 0.5 | 140 | 0.5 |
| 150 | 0.5 | 150 | 0.5 |
| 160 | 0.5 | 160 | 0.5 |
| 180 | 0.5 | 180 | 0.5 |
| 200 | 0.5 | 200 | 0.5 |
| 224 | 0.5 | 224 | 0.5 |
| 250 | 0.5 | 250 | 0.5 |
| 280 | 0.5 | 280 | 0.5 |
| 300 | 0.5 | 300 | 0.5 |
| 315 | 0.5 | 315 | 0.5 |
| 355 | 0.5 | 355 | 0.5 |
| 400 | 0.5 | 400 | 0.5 |
| 450 | 0.5 | 450 | 0.5 |
| 500 | 0.5 | 500 | 0.5 |
| 560 | 0.7 | 560 | 0.5 |
| 600 | 0.7 | 600 | 0.5 |
| 630 | 0.7 | 630 | 0.5 |
| 710 | 0.7 | 710 | 0.7 |
| 800 | 0.7 | 800 | 0.7 |
| 900 | 0.7 | 900 | 0.7 |
| 1000 | 0.7 | 1000 | 0.7 |
| 1120 | 0.7 | 1120 | 0.7 |
| 1250 | 0.7 | 1250 | 0.7 |

Spiral ducts and fittings made from stainless steel are recommended for environments featuring highly humid air, high temperatures or airborne contaminants which can cause corrosive damage to galvanized steel sheet. ALNOR has successfully tested its fittings with gaskets for compliance with EN 12237's requirements for air tightness class C. Except for the BP and BPL bends, which are provided with individual technical data sheets and manufactured by press forming, all ventilation components are made of sheet segments. Ventilation ducts with thermal insulation, which are available on request, can have stainless steel sheet installed inside and/or outside.

1.4404 / 316L stainless steel sheet components

| Ducts | | Fittings | |
|--|-----------------------------------|--|-----------------------------------|
| diameter $\varnothing d_{nom}$ (mm) | sheet thickness t_{nom} (mm) | diameter $\varnothing d_{nom}$ (mm) | sheet thickness t_{nom} (mm) |
| 80 | 0.6 | 80 | 0.6 |
| 100 | 0.6 | 100 | 0.6 |
| 112 | 0.6 | 112 | 0.6 |
| 125 | 0.6 | 125 | 0.6 |
| 140 | 0.6 | 140 | 0.6 |
| 150 | 0.6 | 150 | 0.6 |
| 160 | 0.6 | 160 | 0.6 |
| 180 | 0.6 | 180 | 0.6 |
| 200 | 0.6 | 200 | 0.6 |
| 224 | 0.6 | 224 | 0.6 |
| 250 | 0.6 | 250 | 0.6 |
| 280 | 0.6 | 280 | 0.6 |
| 300 | 0.6 | 300 | 0.6 |
| 315 | 0.6 | 315 | 0.6 |
| 355 | 0.6 | 355 | 0.6 |
| 400 | 0.6 | 400 | 0.6 |
| 450 | 0.6 | 450 | 0.6 |
| 500 | 0.6 | 500 | 0.6 |
| 560 | 0.6 | 560 | 0.6 |
| 600 | 0.6 | 600 | 0.6 |
| 630 | 0.6 | 630 | 0.6 |
| 710 | 0.6 | 710 | 0.6 |
| 800 | 0.6 | 800 | 0.6 |
| 900 | 0.6 | 900 | 0.6 |
| 1000 | 0.8 | 1000 | 0.8 |
| 1120 | 0.8 | 1120 | 0.8 |
| 1250 | 0.8 | 1250 | 0.8 |

Spiral ducts and fittings made from 1.4404 / 316L / VA4 stainless-steel sheet are designed for industrial use under heavy-duty conditions. Ducts and fittings made from molybdenum-enriched steel are suitable for swimming pools, where resistance to chlorine must be ensured. However, this material has a very high hardness and requires both a high degree of expertise and world-class processing machines. Stainless-steel sheet ducts and fittings with EPDM gaskets have been successfully tested for compliance with air tightness class C. All fittings are made of segments assembled by standard hemming and seaming.

Tolerance limits for aluminium or copper ventilation ducts and fittings

AW-1050A H24 aluminium sheet components

| Ducts | | Fittings | |
|--|-----------------------------------|--|-----------------------------------|
| diameter $\varnothing d_{nom}$ (mm) | sheet thickness t_{nom} (mm) | diameter $\varnothing d_{nom}$ (mm) | sheet thickness t_{nom} (mm) |
| 80 | 0.8 | 80 | 0.8 |
| 100 | 0.8 | 100 | 0.8 |
| 112 | 0.8 | 112 | 0.8 |
| 125 | 0.8 | 125 | 0.8 |
| 140 | 0.8 | 140 | 0.8 |
| 150 | 0.8 | 150 | 0.8 |
| 160 | 0.8 | 160 | 0.8 |
| 180 | 0.8 | 180 | 0.8 |
| 200 | 0.8 | 200 | 0.8 |
| 224 | 0.8 | 224 | 0.8 |
| 250 | 0.8 | 250 | 0.8 |
| 280 | 0.8 | 280 | 0.8 |
| 300 | 0.8 | 300 | 0.8 |
| 315 | 0.8 | 315 | 0.8 |
| 355 | 0.8 | 355 | 0.8 |
| 400 | 0.8 | 400 | 0.8 |
| 450 | 0.8 | 450 | 0.8 |
| 500 | 0.8 | 500 | 0.8 |
| 560 | 0.8 | 560 | 0.8 |
| 600 | 0.8 | 600 | 0.8 |
| 630 | 0.8 | 630 | 0.8 |
| 710 | 0.8 | 710 | 0.8 |
| 800 | 0.8 | 800 | 0.8 |
| 900 | 0.8 | 900 | 0.8 |
| 1000 | 0.8 | 1000 | 0.8 |
| 1250 | 0.8 | 1250 | 0.8 |

Whenever the weight of the ventilation system weight is a critical factor, aluminium spiral ducts and fittings are used. Aluminium is much lighter than galvanized steel and therefore it helps to reduce the overall system's weight by as much as 40%. Only the best-in-class manufacturers have the capacity to supply ventilation fittings with gaskets that meet the requirements of PN-EN 12237:2005 for air tightness class D. All fittings, whatever their size, are manufactured in spot-welded segments instead of seam-welded sections. Aluminium sheet can be used as an outer cladding for ventilation systems with thermal insulation to provide a very neat and modern finish of the ductwork.

M1E z4 copper sheet components

| Ducts | | Fittings | |
|--|-----------------------------------|--|-----------------------------------|
| diameter $\varnothing d_{nom}$ (mm) | sheet thickness t_{nom} (mm) | diameter $\varnothing d_{nom}$ (mm) | sheet thickness t_{nom} (mm) |
| 80 | 0.6 | 80 | 0.5 |
| 100 | 0.6 | 100 | 0.5 |
| 112 | 0.6 | 112 | 0.5 |
| 125 | 0.6 | 125 | 0.5 |
| 140 | 0.6 | 140 | 0.5 |
| 150 | 0.6 | 150 | 0.5 |
| 160 | 0.6 | 160 | 0.5 |
| 180 | 0.6 | 180 | 0.5 |
| 200 | 0.6 | 200 | 0.5 |
| 224 | 0.6 | 224 | 0.5 |
| 250 | 0.6 | 250 | 0.5 |
| 280 | 0.6 | 280 | 0.5 |
| 300 | 0.6 | 300 | 0.5 |
| 315 | 0.6 | 315 | 0.5 |
| 355 | 0.6 | 355 | 0.6 |
| 400 | 0.6 | 400 | 0.6 |
| 450 | 0.6 | 450 | 0.6 |
| 500 | 0.6 | 500 | 0.6 |

Copper ventilation systems are a new thing in Poland. Copper ductwork offers the natural benefits of the material, such as the deposition of patina which has bactericidal properties. This provides much healthier, germ-free air. This advantage is of essential importance for healthcare facilities or rooms used by allergy sufferers. Another advantage of copper ductwork is the colour which changes to greenish patina. As a result, copper ductwork is perfect for installation in historic buildings, churches, or retro-styled facilities.