

The background of the entire page is a photograph of a large, modern cruise ship. The ship is white with multiple decks, blue railings, and orange lifeboats. It is sailing on a calm sea under a clear blue sky. The ship's hull is visible in the foreground, showing several rows of portholes and a large, dark, rectangular opening.

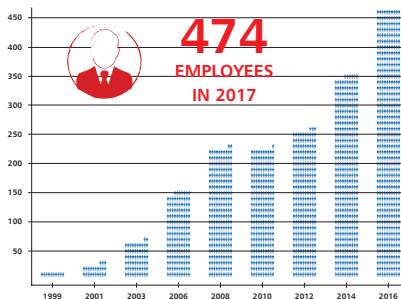
MARINE System – Ventilation Duct & Equipment

ABOUT COMPANY



DEVELOPMENT

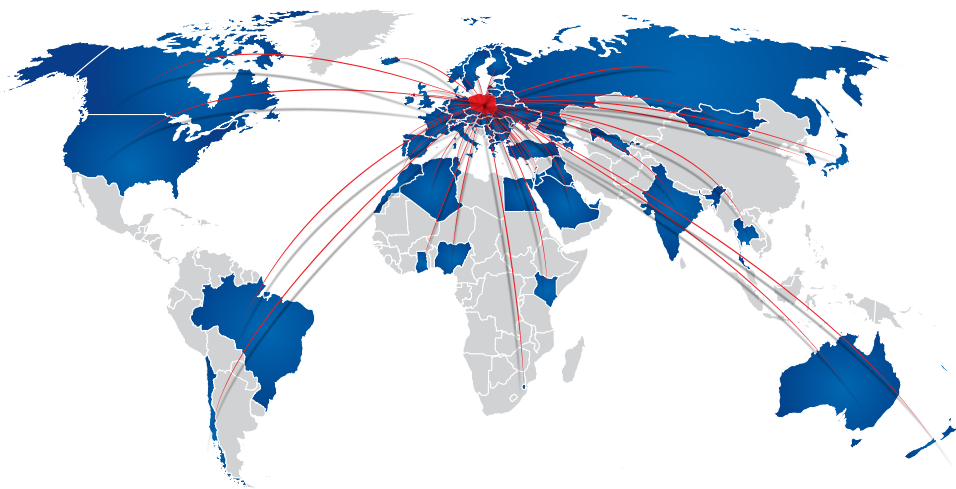
NUMBER OF EMPLOYEES



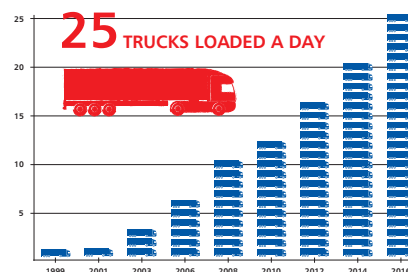
ALNOR® Ventilation Systems Ltd. started its business activity in the year 1994 as the manufacturer of spiral ducts. The young and dynamic team quickly ensured the position of the leading manufacturer of round ducts in Poland to the company.

In the year 2004, the company moved to the modern facility in Wola Mrokowska nearby Warsaw, owing to which the assortment was extended to include the rectangular duct systems and a number of ventilation accessories.

WE SELL TO OVER 70 COUNTRIES!

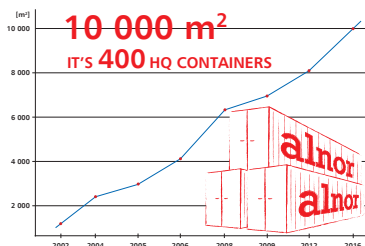


LOADING

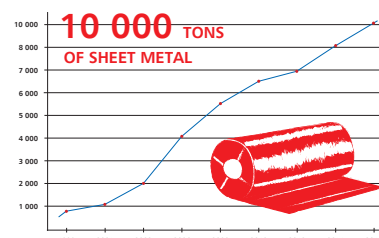


The dynamic organisation, the excellent working conditions, the modern machine park and innovative enterprises cause ALNOR to be one of the most rapidly developing companies in the industry.

WAREHOUSE SPACE



ANNUAL STEEL CONSUMPTION



We use about 10 000 tonnes of sheet per year. The total area of our warehouse halls is over 10 000 m² owing to which we shorten the delivery time of our products to the maximum.



ROUND DUCT AND FITTINGS



COST-EFFECTIVE VENTILATION

Considering how high the cost of air processing can be and how rapidly markets are growing, ventilation systems are supposed to meet high requirements. It is necessary, therefore, that ducting systems be airtight enough to keep running costs at reasonable levels. To address this issue, Alnor Ventilation Systems Ltd. has developed a new comprehensive SPIRAL® system.

AIRTIGHT DUCTING SYSTEM

SPIRAL® is a well-proven system of spirally wound quick-connect ducts and fittings with factory-installed EPDM rubber gasket. The gasket ensures a tight and permanent connection between SPIRAL® system components. The system is available in a full range of sizes, from Ø80 to the largest ones, such as Ø1250mm.

The SPIRAL system meets the requirements of tightness class D (certificate No. 0103/07) as defined in the EN 12237 standard. The high quality and efficient, factory-installed rubber gaskets make the installation of the system easy, and thus quick. When so installed, the SPIRAL® system ensures longstanding air tightness, and requires no further sealing.

BENEFITS OF USE

- Quick and easy installation
- Factory-installed gasket, with no loose components, ensuring proper adherence to the duct after joining.
- With fittings fixed tightly, no risk of leakage.
- Environmentally friendly, no need for silicones, which contain toxic solvents that may penetrate the duct.
- Installable in any weather conditions.
- Resistant to temperatures from -30°C to $+100^{\circ}\text{C}$
- Supports negative pressures of up to 3000Pa
- Supports overpressures of up to 5000Pa
- Internal and external production control.
- Attractive design, so important when ducts run uncovered

RUBBER GASKETS

The gasket adheres closely and tightly to the duct wall.

The gasket applied is based on homogeneous EPDM rubber. It is attached to the end of the fitting, running reliably mounted along the turned-out edge of the fitting. Such a design ensures that the gasket always remains in its place, regardless of installation conditions.

The rubber gasket needs to meet high quality requirements, and this is why we have chosen EPDM rubber. This material is very resistant to ozone and UV exposure as well as varying temperatures, thus contributing to extended durability.

The gasket supports temperatures ranging from -30°C to $+100^{\circ}\text{C}$. For ventilation systems that need to be resistant to high temperatures, the SPIRAL® system can be delivered with silicone gasket that supports continuous temperatures from -70°C to $+150^{\circ}\text{C}$ and temporary temperatures from -90°C to $+200^{\circ}\text{C}$.

SPIRAL® system round ducts and fittings have the hygiene certificates:

- a) HK/B/1652/03/2007 for those made of aluminium sheet
- b) HK/B/1652/01/2007 for those made of galvanised or stainless steel sheet

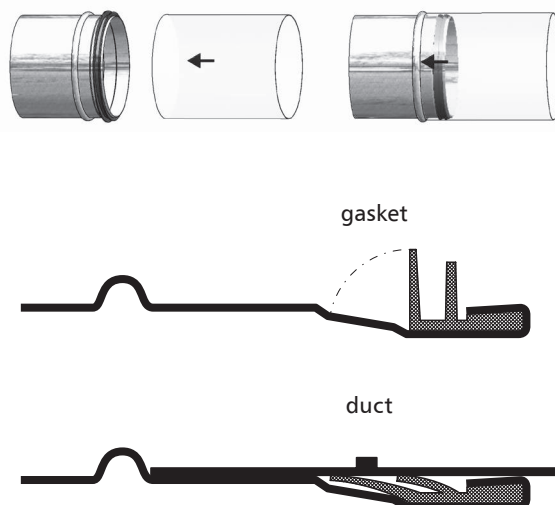
SPIRAL® system round ducts and fittings with gaskets are certified by SITAC for tightness class D – certificate No. 0103/07

All SPIRAL® system components are tested for gasket quality using the following procedure.

Testing the SPIRAL® system gasket:

- Visual inspection of surface quality.
- It is necessary to check the internal diameter of the gasket when various types of material are used.
- Examination of gasket profile dimensions and of dimensions against assumed tolerances.
- Deformation test for simulated joining using an appliance.
Gasket flexibility test for ultimate and accurate sealing.

Round ducts and fittings with gasket SPIRAL® system are approved by SITAC on tightness class D.

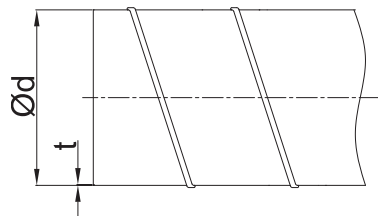


TOLERANCES

The SPIRAL® system is based on the duct tolerances specified below.

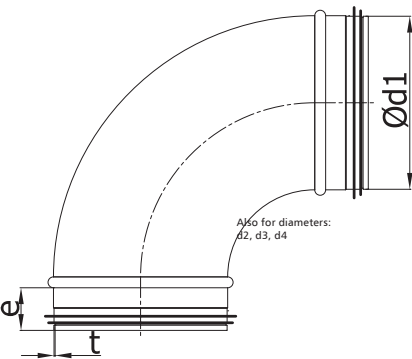
$\varnothing d_1$ nom [mm]	e [mm]	tolerance [mm]	
Ø 80–315	36	+0	-6

Tolerances for ducts



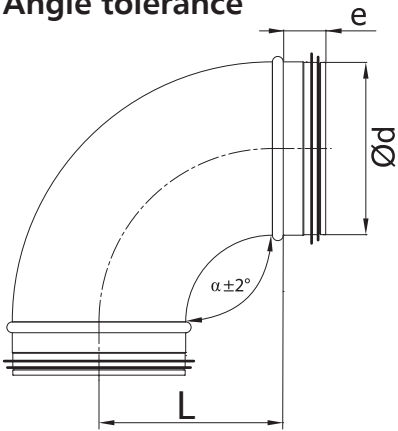
diameter $\varnothing d_{nom}$ [mm]	min. - max. diameter $\varnothing d_{nom min} - \varnothing d_{nom max}$ [mm]	thickness t_{nom} [mm]
80	80,0 - 80,5	0,5
100	100,0 - 100,5	0,5
112	112,0 - 112,5	0,5
125	125,0 - 125,5	0,5
140	140,0 - 140,6	0,5
150	150,0 - 150,6	0,5
160	160,0 - 160,6	0,5
180	180,0 - 180,7	0,5
200	200,0 - 200,7	0,5
224	224,0 - 224,8	0,5
250	250,0 - 250,8	0,5

Tolerances for fittings



diameter $\varnothing d_{nom}$ [mm]	min. - max. diameter $\varnothing d_{nom min} - \varnothing d_{nom max}$ [mm]	thickness t_{nom} [mm]
80	78,8 - 79,3	0,5
100	98,8 - 99,3	0,5
112	110,5 - 111,3	0,5
125	123,8 - 124,3	0,5
140	138,7 - 139,3	0,5
150	148,7 - 149,3	0,5
160	158,7 - 159,3	0,5
180	178,6 - 179,3	0,5
200	198,6 - 199,3	0,5
224	222,5 - 223,3	0,5
250	248,5 - 249,3	0,5

Angle tolerance



Length L, r, r_m	Tolerances [mm]
≤ 15	± 3
15 - 100	± 7
> 100	+ 10 - 15
L (DUCTS)	± 0,5%

MATERIAL SPECIFICATIONS

Ducts and fittings are made of galvanised steel. Other materials are available upon request:

- Stainless steel 1.4301 / 304
- Stainless steel with molybdenum 1.4404 / 316L
- Aluminum AW-1050A H24
- Copper M1E z4

For components made of stainless steel maintenance inspections should be made at least once every six months.



INTRODUCTION

We would like to introduce our offer for IZOL®system preinsulated ducts and fittings. Pre-insulated ducts and fittings, designed for both indoor and outdoor applications are called IZOL®system. IZOL®system consists of inner and outer galvanised wall, and insulated with mineral wool. Nominal dimension of diameter 100 -500 mm always defines inner ducts diameters and fittings diameters.

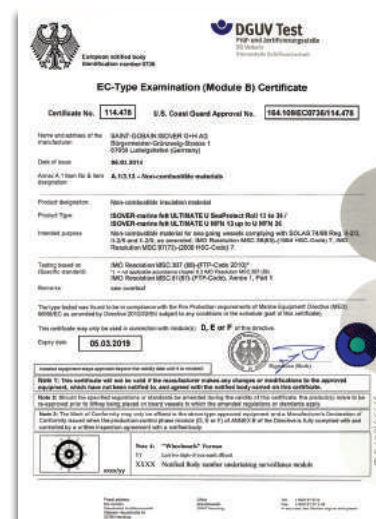
Insulation

Two type of isolation are used:

- **10 insulation** – nominal insulation thickness is 10 mm, strictly corresponds to inner and outer SPIRAL®system walls.
- **16 insulation** – nominal insulation thickness is 16 mm, strictly corresponds to inner and outer SPIRAL®system walls.

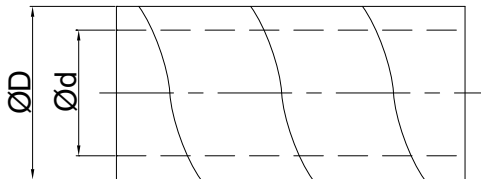
Walls

Inner and outer walls are made of galvanised sheet.



TOLERANCE

Tolerances for ducts



Above tolerances are standard dimensions for IZOL® system and ensure complete closure of the air flow. Diameters made of thinner sheet are provided with external corrugation:
t = + 0,2 mm.

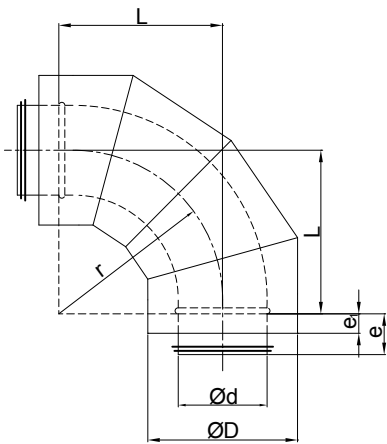
Ød is up to standard PN-EN-1506:2001

$\varnothing d_{nom}$ [mm]	min. - max. diameter $\varnothing d_{nom min} - \varnothing d_{nom max}$ [mm]
80	80,0 - 80,5
100	100,0 - 100,5
112	112,0 - 112,5
125	125,0 - 125,5
132	132,0 - 132,5
140	140,0 - 140,6
150	150,0 - 150,6
157	157,0 - 157,6
160	160,0 - 160,6
180	180,0 - 180,7
192	192,0 - 192,7
200	200,0 - 200,7
224	224,0 - 224,8
232	232,0 - 232,8
250	250,0 - 250,8

Inner and outer diameter of ducts and fittings

$\varnothing d_{inner}$ [mm]	$\varnothing d_{outer}$ [mm]	$\varnothing d_{inner}$ [mm]	$\varnothing d_{outer}$ [mm]	$\varnothing d_{inner}$ [mm]	$\varnothing d_{outer}$ [mm]
80	100	140	160	200	232
80	112	150	180	200	250
100	125	160	180	224	250
100	132	160	192	224	260
125	150	160	200	250	280
125	157	180	200	250	315
125	160	180	224	280	315
		200	224	315	355

Tolerances for fittings



$\varnothing d_{nom.}$ [mm]	e [mm]	e_1 [mm]	tolerance e, e_1 [mm]
80-224	36	20	0 -5
250-355	55	20	0 -5

$\varnothing d_{nom}$ [mm]	min. - max. średnica $\varnothing d_{nom min} - \varnothing d_{nom max}$ [mm]
80	78,8 - 79,3
100	98,8 - 99,3
112	110,8 - 111,7
125	123,8 - 124,3
132	130,8 - 131,3
140	138,7 - 139,3
150	148,7 - 149,3
157	155,7 - 156,3
160	158,7 - 159,3
180	178,6 - 179,3
192	190,6 - 191,3
200	198,6 - 199,3
224	222,5 - 223,3
232	230,5 - 231,3
250	248,5 - 249,3

AIRTIGHT DUCTING SYSTEM

Inner ducts and fittings of pre-insulated IZOL® system are the SPIRAL® system.

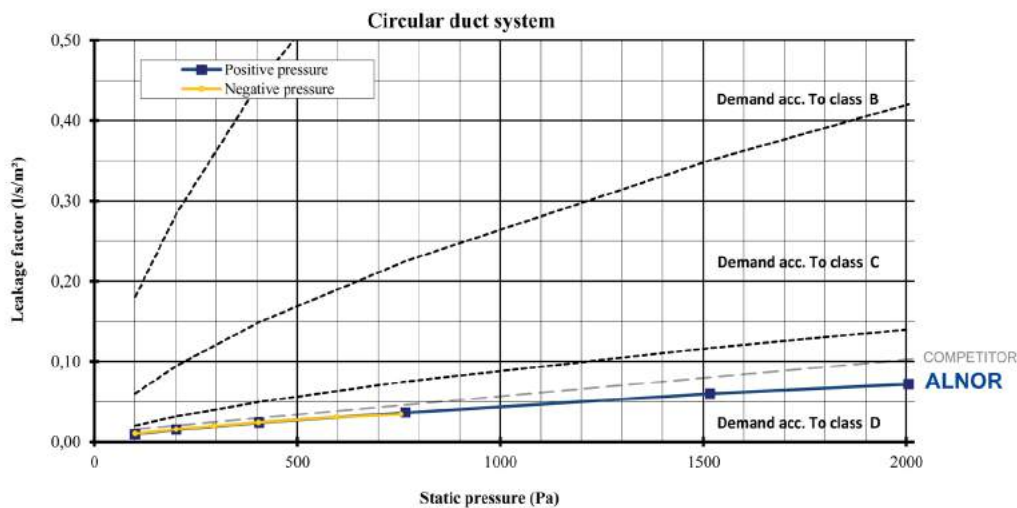
SPIRAL® is a well-proven system of spirally wound quick-connect ducts and fittings with factory-installed EPDM rubber gasket. The gasket ensures a tight and permanent connection between SPIRAL® system components. The system is available in a full range of sizes, from Ø80 to the largest ones, such as Ø1250mm.

The SPIRAL system meets the requirements of tightness class D (certificate No. 0103/07) as defined in the EN 12237 standard.

The high quality and efficient, factory-installed rubber gaskets make the installation of the system easy, and thus quick. When so installed, the SPIRAL® system ensures longstanding air tightness, and requires no further sealing.

TESTING AIR TIGHTNESS

All SPIRAL® system components are tested for their air tightness using the following diagram.





INTRODUCTION

We would like to introduce our offer for IZOL® safe-system pre-insulated ducts and fittings.

Pre-insulated ducts and fittings, designed for both indoor and outdoor applications are called IZOL® safe-system.

IZOL® safe-system consists of inner and outer galvanised wall, and air in the middle. The distance between inner and outer walls is maintained by means of special spacer. Nominal dimension of diameter 100 - 250 mm always defines inner ducts diameters and fittings diameters.

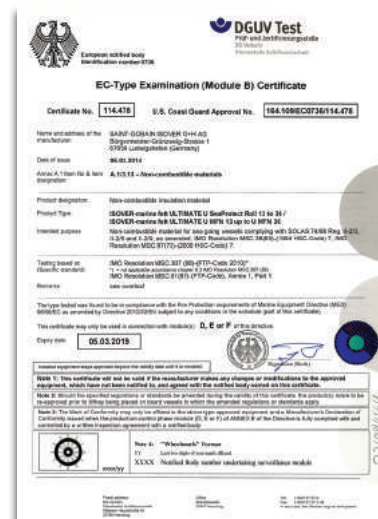
Insulation

Two types of insulation are used:

- **mineral wool** – nominal insulation thickness is 10 mm, strictly corresponds to inner and outer SPIRAL® system walls. Mineral wool is used for SPIRAL ducts.
- **air** – air thermal conductivity is about 0.025 W / mK. This means that the air is almost twice as much better isolator than wool insulation. This guarantees greater savings. All fittings in IZOL® safe-system are insulated air.

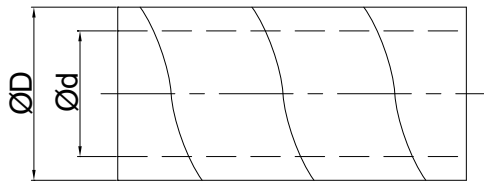
Walls

Inner and outer walls are made of galvanised sheet.



TOLERANCE

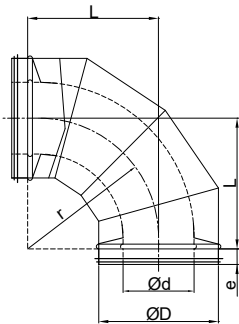
Tolerances for ducts



Above tolerances are standard dimensions for IZOL®system and ensure complete closure of the air flow. Diameters made of thinner sheet are provided with external corrugation:
t = + 0,2 mm.
Ød is up to standard PN-EN-1506:2001

$\varnothing d_{nom}$ [mm]	min. - max. diameter $\varnothing d_{nom min} - \varnothing d_{nom max}$ [mm]
80	80,0 - 80,5
100	100,0 - 100,5
125	125,0 - 125,5
150	150,0 - 150,6
160	160,0 - 160,6
180	180,0 - 180,7
200	200,0 - 200,7
250	250,0 - 250,8
280	280,0 - 280,9

Tolerances for fittings



$\varnothing d_{nom}$ [mm]	e [mm]	tolerance e_{tol} [mm]	
80-224	36	0	-5
250-280	55	0	-5

$\varnothing d_{nom}$ [mm]	min. - max. diameter $\varnothing d_{nom min} - \varnothing d_{nom max}$ [mm]
80	78,8 - 79,3
100	98,8 - 99,3
125	123,8 - 124,3
150	148,7 - 149,3
160	158,7 - 159,3
180	178,6 - 179,3
200	198,6 - 199,3
224	222,5 - 223,3
250	248,5 - 249,3
280	278,4 - 279,3

AIRTIGHT DUCTING SYSTEM

Internal ducts and fittings of pre-insulated IZOL®safe- system are the SPIRAL® system.
SPIRAL® is a well-proven system of spiral-seam quick-connect ducts and fittings with factory-installed EPDM rubber gasket. The gasket ensures a tight and permanent connection between SPIRAL® system components. The system is available in a full range of sizes, from Ø80 to the largest ones, such as Ø1250mm.
The SPIRAL system meets the requirements of tightness class D (certificate No. 0103/07) as defined in the EN 12237 standard.
The high quality and efficient, factory-installed rubber gaskets make the installation of the system easy, and thus quick. When so installed, the SPIRAL® system ensures longstanding air tightness, and requires no further sealing.

SILENCERS



SYSTEM

Together with ducts and fittings, silencers form a complete ventilation system. Considering how wide this product range is, they can be used practically in all conditions.

DIMENSIONS AND INSTALLATION

All the circular silencers have diameters matching round SPIRAL® system fittings. As for the dimensions of the rectangular silencers, each time they are adapted to the size of ducts and fittings. The remaining sizes are based on the tables and information provided in a product's catalogue datasheet.

The circular silencers are fitted using self-tapping screws or blind rivets in the part of the duct into which the connection flange is slid. All items with a diameter greater than 315mm are supplied with female ends, and two additional male ends have to be ordered to join them with ducts. The rectangular silencers are installed using screws near steel corners and a KLQ clamp that fastens flange mounting frames together. To save space, it is recommended to use slide channel PQW-R.

MEASUREMENT METHOD

Selected SPIRAL® system acoustic dampers were tested by the Institute of Power Engineering - Research Institute - "ITC" Heat Technology Department in Łódź. Echo chamber measurement method was used, in accordance with the standard PN-EN ISO 7235:2009 "Acoustics. Laboratory measurement procedures for ducted silencers and air-terminal units. Insertion loss, flow noise and total pressure loss", and PN-EN ISO 3741:2010 "Acoustics - Determination Of Sound Power Levels Of Noise Sources Using Sound Pressure - Precision Methods For Reverberation Rooms".

BENEFITS OF USE

Silencers are used to reduce noise in ventilation ductwork, coming from fans, air handling units and individual rooms. With their aesthetic design and consistency with other ventilation system components, the silencers can also be installed in visible place.

- High sound attenuation.
- Made from high quality materials.
- Safe-edge.
- Available versions: with EPDM rubber seals and with flanges on both ends.
- Aesthetic design.
- Easy assembly.

CERTIFICATES

SPIRAL® system silencers made of galvanised sheet metal have the hygiene certificate: HK/B/0867/01/2009.

The rectangular silencers have the hygiene certificates:

- a) HK/B/0100/02/2009 for those made of galvanised sheet metal
- b) HK/B/0101/01/2009 for those made of stainless steel sheet metal



SELECTION OF ACOUSTIC - AlnorSILENT

- Selection of the silencers for the fan and the expected acoustics level.
- Acoustic parameters of rectangular and round silencers.
- Export of technical parameters to the specification - full specification.
- Proposals of several models of silencers in reference to the expected acoustics.
- Possibility of automatic quotation for silencers in the case of the version for distributors.



VENTILATION DAMPERS



SYSTEM

Dampers together with spiral ducts and fittings create a complete ventilation duct system. Thanks to their variety they are applicable almost in all conditions.

DIMENSIONS AND INSTALLATION

All round dampers are of diameters corresponding to dimensions of round set of the SPIRAL® profiles. In the case of rectangular ducts - their dimensions are each time adjusted to sizes of ducts and profiles. The remaining dimensions are based on tables and informations specified in a technical sheet of each element.

Round dampers are mounted by means of self-drilling screws or rivets in a part of a duct where a connecting flange is inserted. Rectangular dampers are mounted at steel corners by means of screws and with use of the KLQ clamp clamping two flange frames. Servo-motors can be mounted as well on round as on rectangular dampers.

MATERIAL SPECIFICATIONS

Dampers are made of galvanised steel.

Other materials are available upon request:

- Stainless steel 1.4301/304
- Stainless steel with molybdenum 1.4404/316L

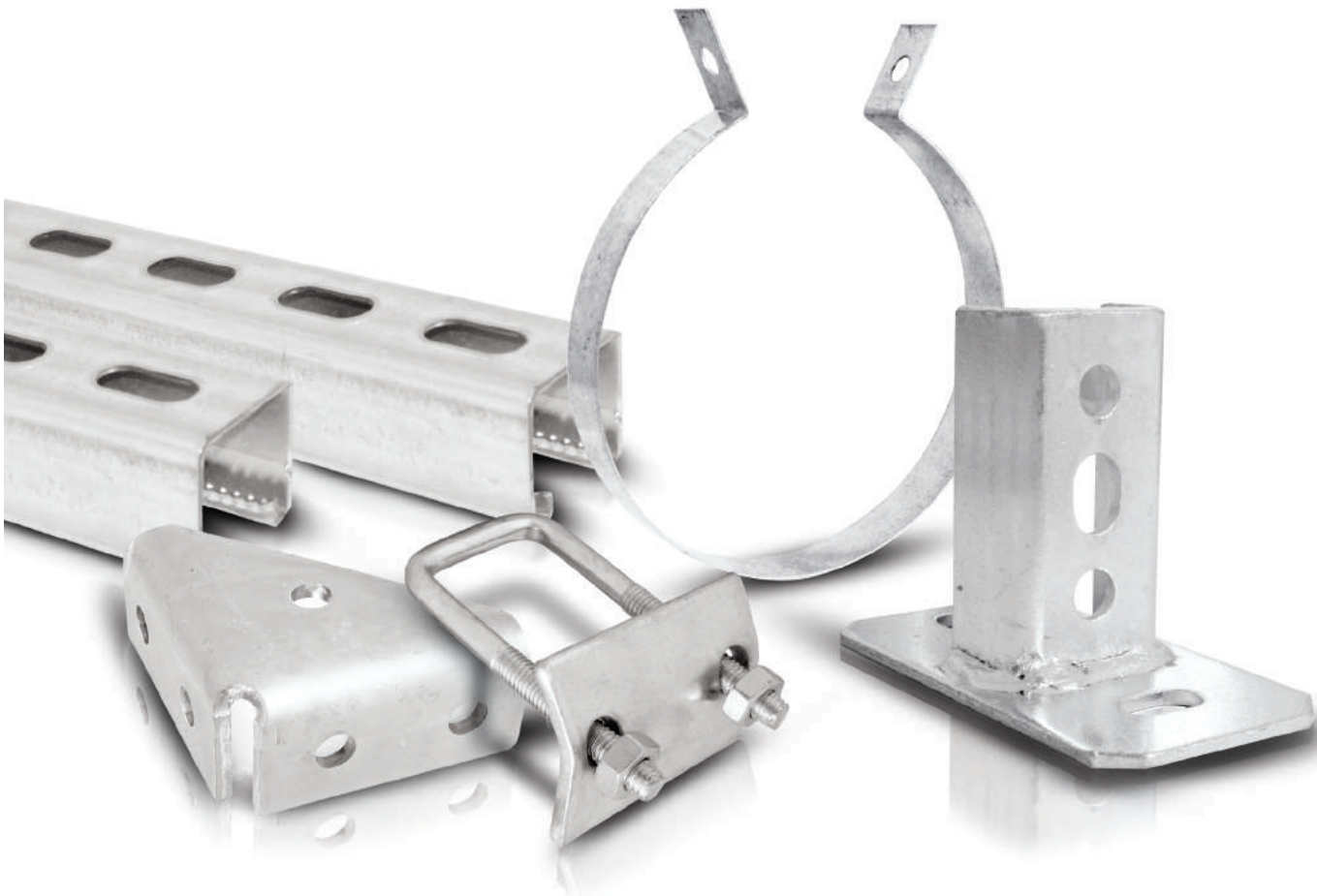


DUCT CLASSES

Duct Class	Material	Thickness or dimensions	Operating conditions
B	Stainless steel EN 10088 material No. 1.44.01 or UNS S31600	EUROVENT 2/3 (circular) EUROVENT 2/4 (rectangular)	Internal duct in corrosive environments such as laboratories, battery rooms, paint stores, etc.
C	Stainless steel EN 10088 material No. 1.4401 or UNS S31600	0,8mm for Ø80mm to Ø200mm 1,0mm for Ø250mm to Ø315mm 1,25mm for Ø400mm to 630mm	Internal duct in production and utility areas. Duct exposed to weather and saliferous atmosphere and/or mechanical strain
E	Pre-galvanized sheet steel	EUROVENT 2/3 EUROVENT 2/4	Internal duct in controlled environments such as LQ.
F	Stainless steel EN 10088 material No. 1.4401 or UNS S31600	0,8mm for Ø80mm to Ø200mm 1,0mm for Ø250mm to Ø315mm 1,25mm for Ø400mm to 630mm	Fire-rated duct (Class C with fire-rated expanding joints/gaskets approved by certifying authority)

ADVANTAGES OF GASKETS

- Very strong expansion and gap-filling properties (also under load), expanding a minimum 22 times its volume at 550 °C.
- High expansion pressure, at least 4 N/mm at 500 °C.
- Excellent thermal stability.
- Resistant to atmospheric influences: UV-light, CO₂, frost and humidity.
- Material prevents from the spread of fire and smoke through gaps and interior construction voids: ventilation ducts, cables and pipes.
- Can be processed very effectively with standard die-cutting equipment e.g. with scissors. Processing temperature: from -10 to 40 °C.



BENEFITS OF USE

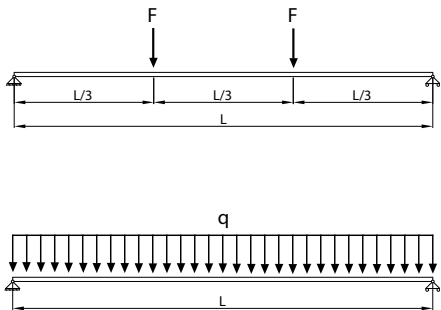
The mounting accessories provide a toolkit for easy and safe suspension of ventilation ducts, both circular and rectangular. All the components are suited for the size, weight and features of ventilation ducts. They permit easy and quick suspension of components, in multiple ways depending on the site conditions. Each component fits the shape of the ventilation duct. Joined together, individual parts of the suspension provide an installation system for duct suspension. All the values are based on the tables and information provided in a product’s catalogue datasheet.

LOAD PATTERNS

Permissible load mounting profiles LDBST for different load patterns.

LDBST-41-41-2,0							
Distance between supports <i>L</i> [mm]	250	500	1000	1400	2000	2500	3000
Load patterns <i>F</i> [N]	9125	4342	1086	554	271	174	121

LDBST-41-41-2,0							
Distance between supports <i>L</i> [mm]	250	500	1000	1400	2000	2500	3000
Load patterns <i>F</i> [N]	24335	11758	2940	1500	735	470	327



FLEXIBLE DUCTS



SYSTEM

Flexible ducts complement the ventilation ductwork. They are used for connecting rigid metal ducts with diffusers or plenum boxes. The flexibility of ducts allows them to be used in hard to reach places. Flexible ducts are available in 10 meter lengths, compressed in box 1.2m long for transport and storage. Mineral wool insulation and perforated inner coating give both thermal and acoustic performance.

CERTIFICATES

- MED certificate 164.112/1121/WCL MED0492TE
- MED certificate 164.112/1121/WCL MED0494TE
- MED certificate 164.112/1121/WCL MED0495TE
- MED certificate 114.478 - Non-combustible insulation material



GRILLS AND DIFFUSERS



SYSTEM

ALNOR accessories consist of a complete range of components to finish ventilation systems, such as grilles, nozzles, air diffusers, ventilation valves and plenum boxes.

DIMENSIONS AND INSTALLATION

Most of the products can be connected to standard round ducts. It can be made directly or through plenum boxes intended for this purposes. The remaining values are based on the tables and information provided in a product's technical sheet.

Installation depends on the type of products employed. In most cases this information results from the installation system of ventilation ducts.

BENEFITS OF USE

- Adaptation of the airflow to room conditions.
- Easy assembly.
- Aesthetic design.
- Wide range of air valves.



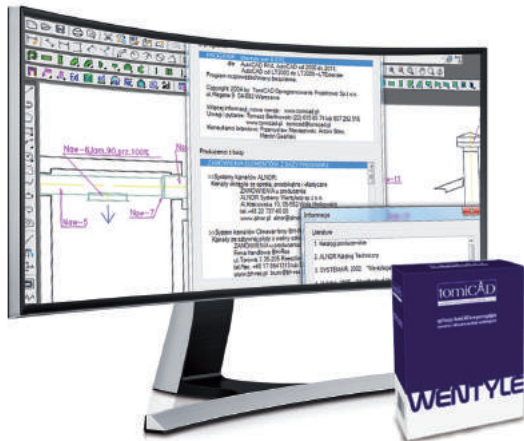


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- » check your stock levels,
- » monitor the status of your orders,
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Design support - WENTYLE

Unlimited design flexibility:

- » supports drawing and calculation of the ALNOR round and rectangular ventilation systems,
- » enables efficient construction of installations and their modifications,
- » automatic listing of all designed elements,
- » database of other producers are available,
- » three language versions: Polish, English and Russian.



Offer support - AlnorCAM

Be the Master of the situation:

- » reliability and flexibility of work, minimizing a number of mistakes at documentation works
- » shorter execution time with competitive price and quality,
- » knowing how many meters of ducts is required you avoid unpleasant surprises,
- » you can get more by combining Alnor CAM with internet B2B,
- » language versions: Polish and English.



Selection of Acoustics - Alnor SILENT

Optimisation with regards to acoustics

- » selection of the silencers for the fan and the expected acoustics level,
- » acoustic parameters of rectangular and round silencers,
- » export of technical parameters to the specification - full specification,
- » proposals of several models of silencers in reference to the expected acoustics,
- » possibility of automatic quotation for silencers in the case of the version for distributors,

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