



Formula Air Product ranges

TOLERANCES and GENERAL INFORMATION of PRODUCTS

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1. Introduction

Although our productions follow strict guidelines as per quality, dimensions and finishes according to our technical catalogue, some variations may occur.

These variations are natural deviations that can occur during the cutting of the plates at the beginning of the production process, but it might also be due to manual manipulations of the products during the production processes.

These variations are defined in the following paragraphs



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2. Product materials

A wide range of materials and finishes are offered by Formula Air as a standard.

2.1. Galvanization

2.1.1. Round ducting

Our standard Sendzimir galvanized round ducting has a layer quality DX51 DZ 275 MAC. This means that the layer thickness is 275 g/m² measured on both sides according to the trihedral test. Sheet quality/Zinc quality is according to EN 10142 and the tolerance is according to EN 10143 (the zinc layer having an average thickness of 20 µm on both sides).

Our hot dipped galvanized ducting is according to DIN EN ISO 1461. Produced in black steel (mild steel) 1.0330, some color or surface irregularities may occur due to the galvanization process.

Some components can also be produced in black steel (mild steel) 1.0330 with an electro-galvanized protection layer of about 10 µm.

2.1.2. Square ducting

These ducting elements have an airtightness Class D level according to the Luka Quality Assurance chart.

These Sendzimir galvanized square ducting has a layer quality DX51 D 150 MAC. This means that the layer thickness is 275 g/m² measured on both sides according to the trihedral test. Sheet quality/zinc quality is according to EN 10142 and the tolerance is according to EN 10143 (the zinc layer having an average thickness of 10 µm on both sides).

2.2. Paint layer thickness

Painted products are produced in black steel (mild steel) 1.0330.

The standard painting method is by powder-coating, color shade RAL 7032 for ducting components and RAL 5010 for technical components. Physiologically unharful to foodstuffs, electrostatically conductive. Smooth, silk gloss finish with a thickness of 30 - 60 µm. This finish is permitted to be used in applications requiring direct contact with foodstuff according to FDA regulations 21 CFR 175.300.

The inside of the components is powder-coated as well to give a good visual finish and temporary corrosion protection while stored until put in use. This layer is expected to wear out in function of the material being transported.

Small touch-ups may be done with wet spray paint if small damages occurred during handling to prevent premature corrosion (but not in foodstuff applications).

2.3. Stainless steel

2.3.1. Standard thin gauge ducting elements

Our standard thin gauge ducting as a material thickness ranging from 0.6 to 0.8 mm although other thicknesses may be available upon request.

They are produced in untreated AISI 304 plates (1.4301). AISI 316 (1.4571) may be available upon request.

2.3.2. Thick gauge Chronital blasted ducting elements

The AISI ducting elements that are surface blasted with nickel-chrome dust have a roughness of Ra1,3 µm.

For these reasons, a tolerance should be taken into account for all calculations of product implementation within a new construction or in an existing plant.

Formula Air cannot be liable for any of these deviations.

3. Temperature range

Temperature range varies in function of the material used for the ducting elements but in general the following applies:

3.1. Galvanized ducting

The average temperature resistance of Sendzimir and electro-galvanized plates is up to +200°C for 1 mm thick plates although we do not recommend going over +120°C continuous.

The average temperature resistance of hot-dipped galva plates is up to +150°C for 2 mm thick plates, although peaks of +200°C are permitted.

As of +200°C the zinc-iron alloy layers may keep providing a level of protection from corrosion but some peeling, changes in mechanical properties, and reduction in the corrosion protection may occur. More importantly, zinc oxide emanations may occur which have been proven as being a source of lung disease.

3.2. Powder-coated ducting

The average temperature resistance is between -60°C and +120°C although peaks up to +200°C can be applied. There should be no visual changes up to +80°C and as of +200°C the protection layer may start peeling, change in mechanical properties, and reduce its protection purpose.

3.3. Stainless steel ducting

The thin gauge AISI ducting can reach high temperature but deformations may occur above +150°C while the average temperature resistance is up to +450°C for 2mm thick plates with peaks up to +550°C.

4. Surface smoothness variation (or rugosity)

Our standard Sendzimir ducting has a surface roughness of 0.6-1.9 µm for pipe thicknesses 0.75 to 2.0 mm.

Our standard untreated AISI ducting has a surface roughness of 0.25-0.3 µm for pipe thicknesses 0.6 to 2.0 mm.

Chronital blasted and painted ducting : see "Painted layer thickness" and "Chronital blasting"

5. Other possible variations

5.1. Edges and flanges

For the light gauge galvanized and stainless steel ducting, the measure is taken from INSIDE the component to the OUTSIDE of the edge (the whole flat part).

For the heavy gauge 2 and 3 mm ducting, the measure is taken on the heart of the material thickness to the OUTSIDE of the edge.

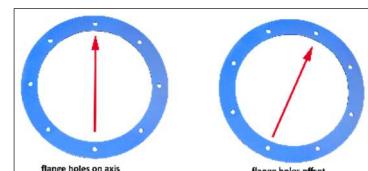
5.1.1. Flat edges on ducting

All edges on the elements produced to be used in combination with clamp rings have 6 mm lip with a tolerance of ± 1 mm (measured on the flat surface, including plate thickness).

5.1.2. Flanges on ducting

All edges on the ducting elements produced to be used in combination with loose flanges have 10 mm lip with a tolerance of ± 1 mm (measured on the flat surface, including plate thickness).

Ducting with welded flanges will have the flange fully welded along the pipe edge to guarantee airtightness. For the formed pieces (such as bends, branches, etc.), the flange hole pattern will be placed "offset".



5.2. Plate thickness

All plate thickness are scrupulously respected but some variations may be observed on products which are pressed or have been grinded.

5.3. Lengths

The linear dimensions are produced according to DIN ISO 2768 part 1, tolerance class V.

All lengths of our ducting elements are as stated on the technical datasheets with a tolerance of ± 4 mm.

5.4. Diameter and roundness

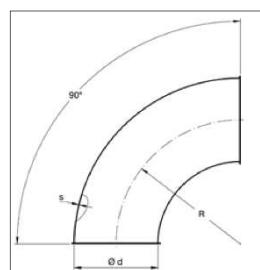
All our products are produced with strict guidelines in order to furnish a continuous quality over time. The ducting diameter and roundness are produced according to DIN EN 10296-1:2004-02.

The dimensions are standardized according to EN 1505. The nominal diameter of the products in light and medium pressure is given in mm and refer to the interior dimension of the product with a tolerance of $+\/- 0$ to 4 mm (Luka quality assurance).

5.5. Radius variations

The radius is measure from the base to the middle of the diameter of the bend (centerline).

For example ; a bend $\varnothing 200$ at 90° , will be $L=200$ from the base to the lower part of the bend, $L=300$ on the center of the bend (R), and $L=400$ on the upper part of the bend.



5.6. Angular variations

The angular dimensions are produced according to DIN ISO 2768 part 1, tolerance class V.

5.6.1. Round ducting

A variation of $+\/- 0,5$ degrees per segment can occur during the manufacturing process (Luka quality assurance). This variation can be emphasized depending on the number of elements assembled together. 90° bends shall have at least 5 segments.

5.6.2. Square ducting

A variation of $+\/- 2$ degrees per segment can occur during the manufacturing process (Luka quality assurance). This variation can be emphasized depending on the number of elements assembled together. 45° bends shall have at least 3 segments.

5.7. Color

All our painted ducting elements are based on the RAL color range but slight variations may occur due to surface treatment before handling, weather conditions and application process.

Note that the biggest variations can be noticed between powder coating and wet painting and we do not recommend mixing these two techniques.

5.8. Electrical variations

Electrical variations in electric control units or drives may occur. This is mostly due to electrical fluctuations in the electric provider grid. Normally, these are taken into account by the manufacturer of the drives. This information should be stated in the corresponding user guide supplied with the equipment.

5.9. Leakage values

All ducting elements assembled by rings or flanges allow for some degree of leakage where they are coupled and are not sold as airtight systems. Only fully welded-together ducting lines can be considered 100% airtight.

The use of a separate seal with the rings, or sealing kit (caulk) between flanges, increase the airtightness level of

the complete assembly.

5.9.1. Standard thin gauge ducting

Our standard thin gauge ducting are composed of laser welded pipes considered airtight along the welding line. The stitch-welded components are considered 100% airtight along the seam although no guarantee can be given. Boomed-overlapped and flat spot-welded components are generally considered as not airtight, although these can be foreseen with a sealing paste (caulk) along the welded plates.

5.9.2. Thick gauge ducting

All thick gauge ducting elements are fully welded and considered airtight with leakage only possible along the coupling.

5.9.3. Assembly method

If perfectly assembled, the use of flanges with seals can render the ducting line airtight.

The only rings can offer a 100% airtightness are the GGA & GBAE, and GAAG & GBAG with separate seal, or GAAH & GBAH with Terostat insert.

The GAAE & GBAE, and GAAG & GBAG with separate seal have been tested in a controlled environment and are certified to have resisted to an overpressure of 5 Bar from Ø80 to Ø315, and 3 Bar from Ø350 up to Ø630.

5.10. Seals and sealants

To increase, or guarantee airtightness, we use different types of seals or sealants.

5.10.1. Seals for ring connections

Some rings have integrated seals, and others have them as a separate item.

5.10.2. Sealants

In order to guarantee the airtightness, some components require the use of a sealant. For this reason, we use VERGACOL, although we can also propose silicone on request.

VERGACOL it is an aluminum-colored neoprene-based sealing mastic adhesive which forms a plasto-elastic rubber upon polymerization, retaining permanent elasticity after polymerization, is thixotropic, waterproof resistant to most chemicals (mildly acidic, protein products, etc.), is flammable when fresh but non-flammable and self-extinguishing after evaporation and polymerization (ASTM-D 568-61), not containing silicone components. It complies with the VOC legislation of 2011 (regulations aimed at reducing emissions of volatile organic compounds). Temperature range between -30 °C and 120 °C.

5.11. Under- & Over-pressure values

All our ducting ranges have been tested for maximum under- and over-pressure applications.

Refer to the tables in the technical datasheets of the individual products for these values.

5.12. Pressure surge values

Our thick gauge full welded range and ATEX certified components have been tested for pressure surge. Refer to the tables in the technical datasheets of the individual products for these values.

5.13. Resistance values

The resistance values on temperature, chemical resistance and friction are based on basic supplier information in nominal conditions on, a given plate thickness.

The results in a given situation will vary depending on the different variations on these conditions (weathering, temperature, humidity, altitude, etc.) or a combinations of multiple elements (for example thin plates with high temperature and high acidity).

5.14. Sound values and sound attenuation

The Sound levels and attenuation values are based on measurements taken in a controlled environment under certain conditions.

For example, our fan range noise level calculations were done according to UNI EN ISO 3746:1997, and refer to standard operating conditions of a fan mounted on silent blocks with ambient air at +20 °C and 0 meters above sea level, measured at 2m from the fan.

The results in a specific situation will vary depending on the different variations on these conditions. Some of these can be ; temperature, humidity, altitude, installation distance, ambient background noise, reverberation on surroundings and reflective surfaces, etc.)

5.15. Earthing (Conductivity)

Basic conductivity can be obtained by the metal-to metal contact by the edges of the different galvanized components.

Extra conductivity can be obtained by the use of specific coupling elements which can give more surface contact between the different components.

Installations requiring guaranteed conductivity (such as ATEX compliant installations) will require the use of earthing straps bolted to the ducting elements by earthing bolts, screws, or other means.

Products foreseen with earthing bolts have the bolts welded on the each extremity of the components at +/- 50mm from the edge.

In all cases, at least one earthing point will be required to ensure proper conductivity and discharge of any electrostatic build-up.

Further information on ATEX requirement : see ATEX directive 201/34/EC or NFPA 77 regulations.

5.16. Food applications

Normally, galvanized and untreated AISI components cannot be used in food applications. The only exception is for waste treatment outside food manufacturing areas.

Powder-coated components are authorized for applications requiring direct contact with food in accordance with FDA regulations 21 CFR 175.300. HOWEVER, an additional production step is required for the treatment of the internal weld of the piping elements.

AISI components sandblasted by "Chronital" are authorized for applications requiring direct contact with food in accordance with FDA regulations 21 CFR 175.300. HOWEVER, an additional production step is required for the treatment of the internal weld of the piping elements.

5.17. Product uses and functioning

Refer to the individual product user guides available on the website or in our Sales agencies.

5.18. Terms and Conditions

Refer to the Terms and Conditions available on the website or in our Sales agencies.

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