

# Tolerances of products

Although all the measurements within our technical catalogue are as precise as possible based on the production processes of our different production sites, 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 could affect the following:

## 1. Edges

All edges on the elements produced to be used in combination with clamp rings have 6 mm lip with a tolerance of  $\pm 1$  mm.

All edges on the ducting elements produced to be used in combination with flanges have 10 mm lip with a tolerance of  $\pm 1$  mm.

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.

## 2. 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  $\pm 4$  mm.

## 3. 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  $\pm 0$  to 4 mm (Luka quality assurance).

## 4. Angular variations

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

### *a. Round ducting*

A variation of  $\pm 0,5$  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.

### *b. Square ducting*

A variation of  $\pm 2$  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. 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.

## 6. 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.

## 7. Surface smoothness variation (or rugosity)

Our standard Sendzimir ducting has a surface rugosity of 0.6-1.9  $\mu\text{m}$  for pipe thicknesses 0.75 to 2.0 mm. Our standard untreated AISI ducting has a surface rugosity of 0.25-0.3  $\mu\text{m}$  for pipe thicknesses 0.6 to 2.0 mm. Chronital blasted and painted ducting : see "Painted layer thickness" and "Chronital blasting".

## 8. Galvanization

### a. Round ducting

Our standard Sendzimir galvanized round ducting has a layer quality DX51 DZ 275 MAC. This means that the layer thickness is 275  $\text{g}/\text{m}^2$  measured on both sides according to the trihedral test. Sheet quality/Zin quality is according to EN 10142 and the tolerance is according to EN 10143 (the zinc layer having an average thickness of 20  $\mu\text{m}$  on both sides). Our hot dipped galvanized ducting is according to DIN EN ISO 1461.

### b. 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  $\text{g}/\text{m}^2$  measured on both sides according to the trihedral test. Sheet quality/Zin quality is according to EN 10142 and the tolerance is according to EN 10143 (the zinc layer having an average thickness of 10  $\mu\text{m}$  on both sides).

## 9. Paint layer thickness

The standard painting method is by powder coating, color shade RAL 7032. Physiologically unharmed to foodstuffs, electrostatically conductive. Thickness of 30 - 60  $\mu\text{m}$  with a resistance up to +80°C.

## 10. Chronital blasting

The AISI ducting elements that are surface blasted with nickel-chrome dust have a roughness of 1,3  $\mu\text{m}$ . 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.

## 11. Resistance values

The resistance values on temperature, chemical resistance and friction are based on basic supplier information in nominal conditions. The results in a given situation will vary depending on the different variations on these conditions (temperature, humidity, altitude, etc.) or a combinations of multiple elements (for example high temperature and high acidity).

## 12. 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.)