

1 General

This specification describes the minimum requirements for supply of steel (type SB) and fabric (type FBA and FBP) type bellows for WSA/SNOX plants.

These bellows are typically installed in low pressure ducting (design pressure max. 200 mbarg), with the purpose to absorb thermal expansion.

The process gas treated in these types of plants is extremely corrosive if cooled below the process gas dew point, f.ex. in case of leaks. 100% tightness of equipment and ducting - welds, flanges etc. - is therefore a mandatory requirement.

2 Specifications

Design and material for the bellow itself must be determined by the supplier based on the specifications of each bellow provided by the purchaser.

The following minimum information is foreseen to be provided to the supplier, and can be presented as per the tables in sections 3.8 and 4.7:

Pos. No.	Line no. – Bellow type – Bellow no.
DN	Nominal diameter of duct
Type	SB = Steel type bellow) FBP = Fabric type bellow – process gas service FBA = Fabric type bellow – air service
Ref. page	Page No. in Topsoe Ducting Specification M80001 describing design and materials. The page is foreseen to be included as part of the bellow requirements
Length	Bellow built-in length: For SB types - to be provided by the supplier, based on the design data. For FBP and FBA types – default length is 300 mm. Manufacturer to inform in case a longer built-in length is required.
Ends FLG/BW	Bellow to be provided with flanged (FLG) or butt-weld (BW) connections. Flanged connection always applies for FBP and FBA types. BW connections are recommended for SB types in process gas service.
Page No.	Page No. in Topsoe Ducting Specification M80001 describing design/dimensions of the connection
Ends Material	Material of connections (flanges or BW ends) Alternative materials for the connections ends to those indicated may be suggested by the supplier, and used if accepted by the purchaser

Medium	Medium inside duct / bellow
Design (Normal) temp.	Design and (normal operating) temperature
Design (Normal) Pressure	Design and (normal operating) pressure
Max. Velocity	Max. velocity of medium inside duct / bellow (can be calculated based on the design flow). Used in relation to if internal skirt is required or not.
Max. Dust Content	Max. estimated content of dust in the medium inside duct / bellow (Normally only relevant for spent acid plants – consult Topsoe for details). Used in relation to if internal skirt is required or not.
Position – Vertical / Horizontal	Position of bellow in duct, ie vertical or horizontal flow
Movements	Axial (“+” = extraction / “-” = compression), lateral and angular movements to be absorbed by the bellow

4 Fabric Type Bellows (FBP and FBA Type)

4.1 Reference Documents

- Topsoe Doc. No. M80001 – Ducting Specification

4.2 Requirements for Manufacture, Inspection and Test

4.2.1 Manufacture - General

- Tolerances on flanges shall in general be in accordance with TOPSOE Standard No. 4-2742.
- Material certificates must be supplied for all parts.

In general, material certificates type 2.2/EN 10204 or similar are the minimum requirement.

- Flanges in carbon steel must be hot galvanized.
- The bellows to be marked with:
Bellow Item No. – “Line no. – Bellow type – Bellow no.”, f.ex. “PG101.01-SB-01”
Flow direction arrow – if required (when f.ex. internal skirt installed)
Bellow “gas side” and “external side”

Impression stamping on the bellow itself is not allowed.

4.2.2 Review and Inspection

In general according to the Purchaser's General Conditions of Purchasing and the manufacturer's Quality Control Plan.

4.2.3 Test

Pneumatic Leak testing (bellows Type FBP in process gas service)

Test pressure = min. 0.2 barg

All fabric connections to be tested with leak detecting spray or soap water.

No indications allowed.

4.3 Documentation

For completion of the Purchase Order the manufacturer must compile and issue the following technical documentation:

- Assembly drawings
- Material Certificates type 2.2/EN 10204 – for all materials
- Installation and maintenance instructions