

A high-quality belt has to be used for these belt conveyors in order to ensure their function.

## EN ISO 15236

Part 1 Design, dimensions and mechanical requirements for conveyor belts for general use

Part 2 Preferred belt types

Part 4 Vulcanised belt joints

The EN ISO 15236 standard has to be taken as a basis and as minimum requirement if nothing else is determined below:

The stress resistance of the vulcanised connections of the belt to be used has to be proven according to DIN 22110-2 and 22113-3.

### General system data:

Centre distance	app. 8741 m
Difference in height	app. -8 m
Max. angle of inclination	10°
Type of troughing	
- upper strand, curve	
- upper strand, straight	
- lower strand, curve	
- lower strand, straight	
Vertical curves - Convex curve radius -	
Concave curve radius	150/200 400/800/1000 mm
Horizontal curve radius	2000/5000 m
Conveying speed	3,1 m/s
Braking time max.	35 s
Material/items transported	limestone
Conveying capacity in normal operation	1500 t/h
Power required Pa	1295 kW
Drive power Pm	1600 kW
Number of drive units	4

Drive unit arrangement 3 x head, 1 x rear

Drive unit, frequency-controlled FU

Speed control

Belt safety rating regarding

the connection 6,3

- Stationary 6,0

- Start-up

Number of feeding points 1

Take-up station winch (fixed axel)

Tractive forces of the belt min.57 kN max.390 kN

Tension way 20 m

Belt turning station ca. 26,4 m

Climate and installation data Ambient temperature min. -27°C

max. +34° C build close to sea side

Installation height <1000 m

Snow load 1,75 kN/m<sup>2</sup>

Wind load 0,4 kN/m<sup>2</sup>

Operating times 4000 h/year

General belt specification

Belt type ST2000

Belt width  $\leq \pm 10$  mm 1200 mm

Thickness of cover plate 8 mm

Face S2 6 mm

Back S3

Belt thickness S1 approx. 19,0 mm (manufacturer's specification)

Belt weight  $\pm 2$  % 34,5 kg/m belt length

Belt tracking stability  $\pm 60$  mm

Measured after vulcanising of the individual belt sections at a place located in a straight line section of the belt conveyor related to a fixed spot to be determined there relative to the conveyor belt passing by.

Modulus of elasticity of the belt

To be indicated by the supplier at short notice

Physical characteristics of the cover plates (quality classes)

The material of the cover plates should at least correspond to the quality class "D"(according to 15236-2). On the idler contact side the cover plate has to be the quality class "EOB" (energie optimised belt).

	Cover plate D	Cover plate EOB
Breaking strength >	18,0 N/mm <sup>2</sup>	10,0 N/mm <sup>2</sup>
Elongation at break >	400 %	450 %
Spillage <	100 mm <sup>3</sup>	100 mm <sup>3</sup>
Shore hardness	60° $\pm 5$ Shore A	60° $\pm 5$ Shore A

Friction characteristics of the cover plates on the back of the belt

In order to generate the functional characteristics of the belt guiding forces, a regular friction between the surface of the belt's back and the idlers engaging with it is necessary over the whole belt width.

During dimensioning of the horizontal curves, it has, of course, been taken into consideration that there may be different coefficients of friction. This results in more or less severe transverse movements of the belt in the idler stands. The enclosed reference table can be taken as a basis for specifying the friction ratios, i.e. for a comparison with a necessary production standard of the surface of the belt's back. This table includes the coefficients of friction depending on the idler load with different idler inclinations.

It has to be observed that it is not important to reach the reference values for the coefficient of friction indicated in the table, but the achieved coefficients of friction have to be constant over the whole width of the belt located on the idler stand in question.

Angle of camber    0.5    1.0    1.5    2.0    2.5

Idler [N/mm]

0.22	0.285	0.345	0.38	0.415	50
0.175	0.245	0.295	0.34	0.375	200
0.135	0.205	0.25	0.295	0.335	350

Table: Coefficients of friction between idlers and back of belt; dry surfaces

#### Indentation rolling resistance (manufacturer's specification)

Various examinations have shown that the total resistance of a belt conveyor consists to a

considerable degree of the indentation rolling resistance between idler and cover plate on the back of the belt. This indentation rolling resistance is mainly determined by the design of the cover plate. It has to be ensured that an energy-optimised cover plate design is used.

Before manufacture of the belt, a sample of approx. 40 m length is to be manufactured and put at the customer's disposal. On the basis of this sample, the indentation rolling resistance is determined by an independent institute. The values determined must be in the area of the above mentioned energy-optimised cover plates.

**Troughing capacity** In order to reach the belt guiding in horizontal curves defined during dimensioning, it is necessary that the belt has a certain troughing capacity. The values for the troughing capacity and the testing method are specified in EN ISO 15236, part 1, paragraph 7.9.

A sufficient troughing capacity for the idler stand used in the conveyor flight has to be ensured.

#### Belt connection

The dynamic strength of the (vulcanised) connections is decisive for a long service life of the belt.

Regarding the vulcanised belt connections it has proven useful in the past few years to refer to a reference fatigue strength which can be determined during a test process on a test appliance according to DIN 22110-3. In order to ensure that the belt connections for this application achieve a long service life, a relative reference fatigue strength of 0.45 is requested.