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- A wide range of belt specifications in stock
- Cutting services to customise belts to width and length
- Hole punching service for elevator belts
- A « one stop shop » for conveyor belt related products such as splice kits, glues, mechanical fasteners, idlers, loading stations, belt cleaners, vulcanising presses...
- Buckets for elevator belts together with related fastening and installation equipment (eg:bolts, clips...)
- Short delivery times

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For further information on DEPREUX or the COBRA GROUP ACTIVITIES please contact your closest COBRA subsidiary or your head office.



12, rue Henry Guy BP 40081 - 70303 LUXEUIL-LES-BAINS Cedex - France  
[www.cobra-cs.com](http://www.cobra-cs.com) - [cobra@cobra-cs.com](mailto:cobra@cobra-cs.com)  
Tél. (33) 3 84 93 89 30 - Fax : (33) 3 84 40 44 92

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## SAFETY CONVEYOR BELT TO BE USED UNDERGROUND, COMPLYING WITH EUROPEAN STANDARD EN 14973

### FABRIC CARCASE

GI  
Multiply with rubber covers

PVG  
Solid-woven with rubber covers

PVC  
Solid-woven with PVC covers

DX-FLEXAMID  
Aramid straight-warp conveyor belt with rubber covers

### STEEL CARCASE

DX/ST  
Steel cord belts with rubber covers





# Safety conveyor belt to be used underground

complying with European standard EN 14973



## Preamble

This brochure describes the heavy-duty DEPREUX belts, to be used underground, that are antistatic and fire-resistant and that comply with the European standard, EN 14973.

Product range : 250 N/mm to 5400 N/mm maximum width of 2400 mm.

A standard conveyor belt is a highly flammable product as it is composed of chemical product derived from petrochemicals. In a safety belt, special agents are added in the dipping solution of the fabrics, in the impregnation paste, and in the different rubber components that compose a conveyor belt in order to increase the electrical conductivity of the belt, increase its fire-resistance and decrease the heat build-up or the friction factor when rubbing against metal elements. These agents act on their own or in synergy with one another at different high temperature level. These added fire-retardant agents will generally degrade the mechanical properties of the covers.

DEPREUX has more than a hundred years experience in designing safety belts that comply with the different world safety standards, and for which at the same time the mechanical parameters are optimised for the different conveying application and maximise belt longevity.

## Applications

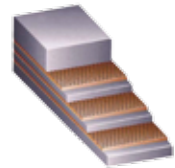
The safety belts described in this brochure are used for conveying material in underground mines or for tunnelling application. For each application a risk analysis is to be done by the user in order to assess the extent of the following hazards :

- Limited means of escape
- Potentially flammable environment
- Presence of flammable dust or transport of flammable material
- Presence of additional fuel combustion elements such as wood, plastics.

This brochure is to be used for underground application in Europe and in the countries that have decided to adopt the European standard, EN 14973 as their national standard.

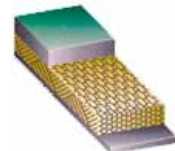
## Range

DEPREUX offers different types of constructions and different types of covers as indicated herebelow :



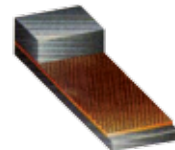
### GI - Textile multiply belt

GI is a belt with a traditional « multiply » construction, composed by several fabric plies, rubber interplies and rubber top and bottom covers.



### PVG ou PVC - Solid-Woven

PVG and PVC have a single ply textile carcass and rubber or PVC covers. This solid woven offers good impact resistance, and a long life expectancy.



### DX FLEXAMID - Aramid Textile belt « straight-warp »

DX-FLEXAMID is textile « straight-warp » belt, the warp is made of thick aramid twisted yarns, protected on two sides by a textile polyamide weft. DXFLEXAMID will offer better impact resistance and tear resistance than steel-cord, and could be used in case of emergency with mechanical fasteners.



### DX/ST - Steel-cord belt

Steel-cord carcass.

DX-ST is a belt composed of steel-cords extending along the overall length of the belt. As a standard, the belt is proposed with no weft. However, as indicated in this drawing, a steel breaker (or a textile breaker) can be added in the top cover to offer some resistance to tearing.



## The different safety classes for the belt following the risk assessment process

The European standard EN 14973 defines different safety classes for the following belt to be used for the application following the risk assessment process performed by the user. This is the description of the different classes required for the different hazards assessed.

Safety classe	Limited access and means of escape	Potentially flammable atmosphere	Combustible dust or combustible material conveyed	Additional fuel sources (fire load)
A	X			
B1	X	X		
B2*	X	X		
C1	X	X	X	
C2*	X	X	X	X

\* For safety classes **B2** and **C2**, it is necessary to **add special safety features** on the conveyor to cater with the risk of friction and heating in case of belt slippage on the pulleys or belt rubbing against metal parts.

## The different hazards experienced when the belt is running

- 1 Hazard due to electrostatic charge build-up on the belt, which could cause an electrical spark to take place.
- 2 Hazard due to overheating caused by friction of a conveyor belt stalled on a rotating pulley drum or a moving belt in contact with a stationary pulley drum or roller and part of the conveyor structure
- 3 Hazard due to a localised small flame in contact with the cover and/or in contact with the carcass when the conveyor is stopped.
- 4 Hazard due to a flame propagating along the length of a belt

The frequency of occurrence and the level of hazard is a function of the application and of the working environment. Consequently, the safety level of belt required, varies with each application and the level of risk.

Hazards mentioned above, are not the only characteristics to consider. Other aspects to be considered are health, safety and environmental impacts.



**The different tests that the belt to satisfy to counteract the effect of the different hazards**

**1 Electrostatic charge build-up hazard**

**EN ISO 284** : the belt is required to be conductive and therefore the electrical resistivity of the cover surface is to be lower than 300 Mohm.



**2 For the hazard related to drum friction (belt slippage or belt blocked)**

**EN 1554** : The european standard EN 1554 describes two methods of drum friction test, method B1 and B2. For both methods, the sample size is 150mm wide and 1.5m long. The sample is mounted around the pulley. One end is fixed and the other end is attached to counterweights that have a function of applying a tension to the belt. The tests is conducted using a controlled air flow on the sample of 2m/s. During the tests, the following parameters are recorded: the presence of flame or glow and the temperature at the surface of the drum.



**Method B1** : the tension in the belt is constant at 343N ( 35 kg counterweight) and the test is limited to 1hour.

**Method B2** : the tension during the test is increased progressively from 343N(35 kg) to 1715N (175 kg) and the test is limited to 2h30.

B2 method is to be used except when the belt has a special construction, as in the case of steel-cord for which method B1 is to be used.

**3 Localised small flame hazard**

**EN ISO 340** : Laboratory test with small burner. Test are in accordance with ISO 340. Three samples are cut longitudinally and three cut transversally. A propane gas burner with standardized nozzle has a flame temperature of 1000°C, each sample is placed in this flame for 45 seconds. The time for the self extinction of the flame in each sample is recorded. The total time duration for all six samples to self extinguish must be less than 45 seconds and no individual sample time can exceed 15 seconds.



**4 Fire propagation test**

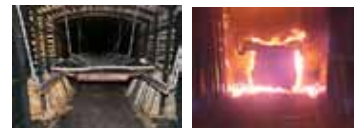
In order to assess the risk of fire propagation in situ through the belt, one of the three following simulation tests can be carried out :

**1) Simulate a fire propagation on a full width sample, 18m long in an underground gallery environment.**

The european standard EN12881-2 details the test. The fire is initiated by burning 260kg of wood and it is propagated in the gallery with a controlled air flow at 1.2m/s.

**EN 12881-2 : UNDERGROUND GALLERY**

Samples dimensions		Requirements at the end of the test Unburned section length
Length	Width	
18 m	Full width	8 m mini



**2) simulate a fire propagation test in a mini gallery.**

In that case, the sample width is limited to 1200mm and the length is only 2m or 2.5m. EN12881-1 describes the test and identifies two methods :

- A : the sample is ignited at one end for 10 minutes by a single burner

- B : the sample is ignited at one end for 20 minutes by a double burner

In both cases, the fire is propagated by a controlled air flow at 1.5m/s

**EN 12881-1 : MINI GALLERY**

Méthode	Samples dimensions		Requirements at the end of the test Unburned section length
	Length	Width	
Mini gallery simple burner (Method A)	2 m	Full width (1200 mm maxi)	100 mm mini full width
Mini gallery double burner (Method B)	2,50 m		section in full width



**3) Simulate a fire propagation using a small scale laboratory tunnel.**

In that case, the sample width is either 90mm or 230mm and its length is between 1.2m and 1.5m. EN12881-1 describes the test in detail and defines two methods :

-C : the sample is ignited during 50 minutes by a 3kw burner having six fire outlets with a controlled air flow in the tunnel at 1m/s

-D : the sample is ignited during 15 minutes by a single burner with a controlled air flow in the tunnel at 0.5m/s.

**EN 12881-1 : LABORATORY SCALE TUNNEL**

Method	Samples dimensions		Requirements at the end of the test Unburned section length
	Length	Width	
Laboratory scale tunnel Large width sample six fire outlets (method C)	1,50 m.	230 mm	600 mm mini in full width or maxi temperature 140°C and calculated length in mass lower than 1250 mm and 50 mm mini in full width
Laboratory scale tunnel Small width sample single burner (method D)	1,20 m	90 mm or 120 mm according to test condition	500 mm to 720 mm in full width (see details in standard)

**Method D is only valid for monopy and 2-ply belts, for a range of tensile strengths, and up to a maximum width of 1400 mm. for the details, please revert to EN12881-1.**

EN 12881-1  
Method C



EN 12881-1  
Method D



**The different safety classes for the belt and the safety test the belts have to satisfy**

**The following table describes safety tests the belt have to satisfy for each of the five safety classes described in european standard EN 14973 :**

The standard describes 3 main classes A, B, C, and two sub-classes 1 and 2. In the sub-class 1, no additional feature is required on the conveyor. In the sub-class 2, additional safety features (secondary devices) are required on the conveyor.

Safety class	Application	① Electrostatic charge build-up hazard EN ISO 284	② Hazards linked with drum friction-drum friction test EN ISO 1554 (B1 or B2) (a)			③ Small flames hazard-burner test EN ISO 340		④ Fire propagation hazard-full scale gallery or mini gallery or laboratory small scale tunnel
			Flame	Glow	Maximal temperature of the drum (°C)	Aggregate of six test pieces (s)	Maximum for one test piece (s)	
<b>A</b>	General use, only hazard being limited access and means of escape	≤ 300 MΩ	No	Permitted	No limit	45	15	Mini gallery single burner (Method A) except special cases (C)
<b>B1</b>	As Class A plus potentially flammable atmosphere. No secondary devices	≤ 300 MΩ	No	No	450	45	15	Mini gallery single burner (Method A) except special cases(c)
<b>B2</b>	As Class A plus potentially flammable atmosphere. With secondary devices	≤ 300 MΩ	No	Permitted	No limit	45	15	Mini gallery single burner (Method A) except special cases (c)
<b>C1</b>	As Class B1 plus combustible dust or material conveyed. No secondary devices	≤ 300 MΩ	No	No	325	18/30 (b)	10/15 (b)	Mini gallery double burner (Method B) or laboratory scale tunnel large sample width 6 fire outlets burner (Method C)
<b>C2</b>	As Class B1 plus combustible dust or material conveyed and additional fuel sources (fire load). With secondary devices	≤ 300 MΩ	No	Permitted	No limit	45	15	Underground gallery or laboratory scale tunnel small width sample only 1 burner (Method D) for some type of belts

(a) EN 1554, Method B1 (fixed load - 1h) may be used where Method B2 (increasing load - 2h30) cannot be used due to belt construction, e.g. steel cord belts.

(b) requirements for respectively tests with covers and without covers

(c) If the burner of method A is not powerful enough to light the sample, then use the laboratory scale tunnel method C; and if the sample does not start burning with this method, use the mini gallery method B



# Different covers proposed for different security classes defined by the European standard EN 14973



## The mechanical properties

DEPREUX has decided for some safety classes to offer :

- Different carcass construction and sometimes two types of covers
- With a standard quality and a premium quality offering higher mechanical performance and therefore a higher longevity.

## Rubber covers

At this moment, we do not offer a belt strictly complying with safety class B1. However, obviously, the belts complying with safety class C1 or with safety class C2 will comply with safety class B1. Please consult our technical services for further details.

Product	Safety class	Operating temperature	Type of cover	Abrasive resistance (mm <sup>3</sup> )	Tensile strength (Mpa)	Elongation at break (%)	Slope / inclination (approximate)
GI and DX-FLEXAMID*	A or B2	-20° C to +80° C	SBR	<180	>15	>350	20° to 22°
	C1		CR	<120	>18	>400	
	C2			<160	>17	>400	
DX/ST	A or B2	-20° C to +80° C	SBR	<180	>15	>350	
	C2		NR-SBR	<200	>15	>350	
PVG (CR)	C1 (a)	+0° C to +50° C	CR	<120	>18	>400	
	C2			<160	>17	>400	
PVG (NI)	C1 (b)	+0° C to +50° C	NBR	<180	>14	>380	16° to 20°
	C2			<180	>14	>380	

(a) for covers thickness ≥ 3 mm  
 (b) for covers thickness ≤ 4 mm  
 \* DX-FLEXAMID has a red skin that is a part of carcass



## PVC covers

Product	Safety class	Specification	Operating temperature	Type of cover	Abrasive resistance (mm <sup>3</sup> )	Tensile strength (Mpa)	Elongation at break (%)	Slope / inclination (approximate)
PVC	C1	Std quality	+0° C to +50° C	PVC	<200	>12,5	>250	13°
		Top Quality Vert			<200	>12,5	>300	



## Characteristics of carcass

All the characteristics of the carcass components for flame retardant conveyor or elevator belting are the same as described in the brochure « Conveyor or elevator belt to handle abrasive and sharp material, or with high loading impact in ambient temperature », especially a comparison of the different constructions was done on page 13 and recommendation for the minimum drum diameters was given on page 15.

## Splicing

Splicing methods available on request

## Denomination

GI 630/4 - 1000 - 6 + 2 - EN14973-C1  
 GI : Safety multiply belt  
 630 : Minimum full longitudinal (warp) tensile strength N/mm  
 4 : Number of ply  
 1000 : Belt width, in mm  
 6 + 2 : Thickness of the top and bottom cover, in mm  
 EN14973 C1 : Safety category