
**Conveyor belts — Specification for
rubber or plastics covered conveyor belts
of textile construction for general use**

*Courroies transporteuses — Spécification pour courroies
transporteuses recouvertes de caoutchouc ou de plastique à structure
textile, d'usage général*

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Foreword

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The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 14890 was prepared by the European Committee for Standardization (CEN) in collaboration with Technical Committee ISO/TC 41, *Pulleys and belts (including veebelts)*, Subcommittee SC 3, *Conveyor belts*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

Throughout the text of this document, read “...this European Standard...” to mean “...this International Standard...”.

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Foreword

This document (EN ISO 14890:2003) has been prepared by Technical Committee CEN/TC 188 "Conveyor belts", the secretariat of which is held by BSI, in collaboration with Technical Committee ISO/TC 41 "Pulleys and belts (including veebelts)".

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by November 2003, and conflicting national standards shall be withdrawn at the latest by November 2003.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Slovakia, Spain, Sweden, Switzerland and the United Kingdom.

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Introduction

In the preparation of this Part of this standard, consideration has been given to the work of ISO Committee ISO/TC41/SC3, "Conveyor belts", and the following standards for conveyor belts have been followed as far as possible.

ISO 251:1987	Conveyor belts - Widths and lengths
ISO 252-1	Textile conveyor belts - Adhesive strength between constitutive elements - Part 1 : Methods of test
ISO 282:1992	Conveyor belts - Sampling
ISO 283-1	Textile conveyor belts - Full thickness tensile testing - Part 1: Determination of tensile strength, elongation at break and elongation of the reference load.
ISO 432:1989	Ply type conveyor belts - Characteristics of construction
ISO 433:1991	Conveyor belts - marking
ISO 583:1990	Conveyor belts with a textile carcass - Tolerances on total thickness and thickness of covers - Direct measurement method
ISO 703:1988	Conveyor belts - Troughability - Characteristics of transverse flexibility and test method

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1 Scope

This European Standard specifies requirements for rubber and/or plastics covered conveyor belting of textile construction for general surface use on flat or troughed idlers.

This standard is not suitable or valid for light conveyor belts as described in EN 873.

Items that are not requirements of this standard, but need to be agreed between the manufacturer and the purchaser, are included as an informative annex A.

A list of the details that should be supplied by the purchaser of belting with an enquiry is given in informative annex B.

2 Normative References

This European Standard incorporates by dated or undated references, provisions from other publications. These normative references are cited at the appropriate places in the text, and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by an amendment or revision. For undated references the last edition of the publication referred to applies (including amendments).

ISO 37, *Rubber, vulcanized or thermoplastic – Determination of tensile stress-strain properties.*

ISO 188, *Rubber, vulcanized or thermoplastic - Accelerated ageing and heat-resistance tests.*

ISO 282, *Conveyor belts – Sampling.*

ISO 4649, *Rubber, vulcanized or thermoplastic - Determination of abrasion resistance using a rotating cylindrical drum device.*

ISO 10247, *Conveyor belts – Characteristics of covers – Classification.*

EN ISO 252-1, *Textile conveyor belts - Adhesion strength between constitutive elements - Part 1: Methods of test (ISO 252-1:1999).*

EN ISO 283-1, *Textile conveyor belts – Full thickness tensile testing – Part 1: Determination of tensile strength, elongation at break and elongation at the reference load (ISO 283-1:2000).*

EN ISO 583-1, *Conveyor belts with a textile carcass - Total thickness and thickness of elements - Part 1: Methods of test (ISO 583-1:1999).*

EN ISO 703-1, *Conveyor belts - Transverse flexibility and troughability - Part 1: Test method (ISO 703-1:1999)*.

EN 12882, *Conveyor belting for general purpose use - Electrical and flammability safety requirements*.

prEN ISO 16851, *Textile conveyor belts - Determination of the net length of an endless (spliced) conveyor belt (ISO/DIS 16851:1998)*.

3 Terms and definitions

For the purposes of this European Standard, the following terms and definitions apply.

3.1

tensile strength

greatest measured force during the tensile test divided by the width of the test piece. It is expressed in N/mm

3.2

reference force (reference load)

one-tenth of the nominal tensile strength in the longitudinal direction multiplied by the width of the test piece in mm. It is expressed in Newtons

Example:

Nominal tensile strength = 1 600 N/mm

Reference force = 160N/mm

Reference force for 25 mm test piece = 25mm × 160 N/mm = 4 000 N.

NOTE This definition does not imply that a 10:1 factor should be used in design calculations, but it is important to bear in mind that any belt with any form of joint or splice should be capable of transmitting the desired working strength.

3.3

slab belting

conveyor belting made in wide widths and long lengths for subsequent slitting and cutting into narrower widths and shorter lengths to suit individual conveyor installations

3.4

solid woven belting

conveyor belting consisting of a carcass of more than one ply, the plies being interlocked in the weave, or bound together by binding threads in the course of weaving

3.5

mono-ply belting

conveyor belting with a carcass consisting of one ply of woven textile fabric

3.6

duo-ply belting

conveyor belting with a carcass consisting of two plies of woven textile fabric bonded together by an intermediate layer of elastomer of sufficient thickness to allow the incorporation of a tension element in the joint

3.7

multi-ply belting

Conveyor belting with a carcass of two or more plies of woven textile fabric, the adjacent plies being bonded together by an intermediate layer of elastomer

3.8

primary yarn

load carrying yarn which contributes more than 50 % of the tensile strength

3.9

secondary yarn

load carrying yarn which contributes less than 50 % of the tensile strength

4 Designation

4.1 Belting is designated by reference to the following conveyor belt characteristics :

- a) reference to this European Standard, i.e. EN ISO 14890;
- b) the required length in metres;
- c) the required width in millimetres (see Table 4);
- d) the fibre type of the carcass, in both the warp and weft directions, e.g. polyester (E) (warp) polyamide (P), (weft) (EP) (see Table 1);
- e) the full thickness tensile strength in N/mm of belt width (see Table 8);
- f) the number of plies or belt type (see clause 3);
- g) top cover thickness in millimetres;
- h) bottom cover thickness in mm (where relevant, see clause 5);
- j) cover classification (see Table 5), where appropriate;
- k) safety category according to EN 12882.

4.2 Examples of ordering are given below

Example 1: Multiply-ply belt

A 400 m long belt, 1 200 mm wide, textile material in the longitudinal direction of polyester (E) and in the transverse direction of polyamide (P), having a minimum full thickness tensile strength of 1 000 N/mm belt width, with 5 plies and a top cover thickness of 4 mm, a bottom cover thickness of 2 mm, a cover classification of H in accordance with Table 5, and complying with the safety requirements of category 1 of EN 12882.

Example 1 - Designation

EN ISO	Length	Width	Textile material		Tensile Strength N/mm	No of plies	Cover gauge (mm)		Cover Class	Safety category according to EN 12882
			Warp	Weft			Top	Bottom		
14890	(m)	(mm)								
	400	1 200	E	P	1 000	5	4	2	H	1

Example 2: Duo-ply belt

A 200 m long belt, 1 000 mm wide, textile material in the longitudinal direction of polyester cotton (EB) and in the transverse direction of polyamide cotton (PB), having a minimum full thickness tensile strength of 800 N/mm, with 2 plies and a top and bottom cover of 1,5mm, complying with the safety requirements of category 2A of EN 12882.

Example 2 - Designation

EN ISO	Length	Width	Textile material		Tensile Strength N/mm	No of plies	Cover gauge (mm)		Cover Class	Safety category according to EN 12882.
			Warp	Weft			Top	Bottom		
14890	(m)	(mm)								
	200	1 000	EB	PB	800	2	1,5	1,5	N/A	2A

Example 3: Mono-ply

A 150 m long, 1 200 mm wide Mono-ply belt, having a polyester warp (E) and a polyamide weft (P), a full thickness tensile strength of 630 N/mm belt width and a top cover thickness of 6 mm, a bottom cover thickness of 2 mm, and a cover classification of D in accordance with Table 5, complying with safety requirement of category 1 of EN 12882.

Example 3 - Designation

EN ISO	Length	Width	Textile material		Tensile Strength N/mm	No of plies	Cover gauge (mm)		Cover Class	Safety category according to EN 12882
							Top	Bottom		
14890	(m)	(mm)	Warp	Weft			6	2	D	1
	150	1 200	E	P	630	1	6	2	D	1

Example 4: Solid woven belt

A 300 m long, 1 600 mm wide Solid Woven belt having a combined polyester and polyamide warp (EP) and a polyamide cotton weft (PB) and an integrally woven cotton (B) warp pile, having a minimum tensile strength of 1 250 N/mm belt width and 1,5 mm top and bottom covers, complying with safety requirement of category 3A of EN 12882.

Example 4 - Designation

EN ISO	Length	Width	Textile material		Tensile Strength N/mm	No of plies	Cover gauge (mm)		cover class	Safety category according to EN 12882
							Top	Bottom		
14890	(m)	(mm)	Warp	Weft			1,5	1,5	N/A	3A
	300	1 600	EP(B)	PB	1250	SW(1)	1,5	1,5	N/A	3A

Table 1 - CODE DESIGNATION OF YARN	
Code Letter	Yarn
B	Cotton
Z	Staple Rayon
R	Rayon
P	Polyamide
E	Polyester
D	Aramid
G	Glass
<p>NOTE Where a fabric contains a secondary yarn, its identity shall be indicated by the use of bracketed characters to designate yarn type.</p>	

5 Construction

The carcass shall consist either of one or more plies of woven fabric or of solid woven fabric and shall be impregnated or coated with a rubber or plastics mix.

Where a breaker consisting of open mesh fabric, or cord fabric or cord layer is placed between the cover and carcass, or is embedded in the cover for the purpose of carcass protection, such a layer shall be considered to be part of the cover thickness and not counted as a fabric ply.

If a fabric pile is integrally woven with the carcass on either one or both of the surfaces of the carcass it shall be considered to be part of the carcass thickness.

NOTE The external surfaces of the conveyor belt will generally consist of a defined thickness and quality of elastomeric material. Belting may also be supplied with one or both surfaces consisting of bare or coated fabric, as appropriate for the conveyor design and intended duty.

6 Length

6.1 Belting that is ordered to an open-ended length shall be supplied subject to the tolerances specified in Table 2.

6.2 The length of belting supplied in the spliced endless form shall be described by the term 'net endless length'. The net endless length shall be supplied subject to the tolerances specified in Table 3 when measured in accordance with EN ISO 16851.

NOTE It is recommended that purchasers should, when placing orders for belting, specify a length of belting that includes such lengths as are required for testing and any additional lengths necessary for vulcanized joints.

Table 2 - Tolerances on open-end lengths of belting		
Belt delivery condition	Maximum permissible difference between delivered length and ordered length	
Slab belting	± 5 %	
As one length	+ 2,5 % - 0	
In several lengths	For each single length	For the sum of all lengths
	± 5 %	+ 2,5 % - 0

Table 3 - Tolerances on endless lengths of belting	
Length of belt	Tolerance
Up to and including 15 m	± 50 mm
Over 15 m and up to and including 20 m	± 75 mm
Over 20 m	± 0,5 %

7 Width

The width of the belting and its associated tolerance shall be one of those given in Table 4.

Table 4 - Widths and tolerances on width of conveyor belting	
Nominal width of belting (mm)	Tolerance on width
300 400 450 * 500	± 5 mm
600 650 750 * 800 900 * 1 000 1 050 * 1 200 1 350 * 1 400 1 500 * 1 600 1 800 2 000 2 200 2 250* 2 400 2 500* 2 600 2 750* 2 800 3 000 3 200	± 1 % of width
NOTE The widths marked '*' should only be used for replacement belting in existing installations and should not be used as a basis for future new designs.	

8 Rubber cover (see Table 5)

8.1 If the rubber cover is designated as type H, D or L category it shall comply with the appropriate requirements of Table 5, and, after ageing for 168 h at 70 °C in accordance with ISO 188, the values obtained for tensile strength and elongation at break shall not vary from the original unaged values by more than 25 % of those values.

8.2 If the thickness of the rubber cover as measured by the method described in EN ISO 583-1 is between 0,8 mm and 1,6 mm, the thickness of the test piece shall be the maximum obtainable and a tolerance of -15 % shall be permitted on the tensile strength and elongation values given in Table 5.

Table 5 - Classification of conveyor belt rubber covers			
Cover Class	Minimum Tensile Strength of rubber cover N/mm²	Minimum % Elongation at break	Maximum Abrasion loss in relative volume mm³
H	24	450	120
D	18	400	100
L	15	350	200
Method of test	ISO 37	ISO 37	ISO 4649 Method A
<p>NOTE 1 These values will help to determine the appropriate cover compound for the application or for the materials carried. Other values such as tear resistance may be considered if required. Reliable assessment of the behaviour of the covers in services for wear and cut resistance cannot be determined from tensile strength, elongation and abrasion values alone. The cover grades H, D and L are in accordance with ISO 10247.</p>			
<p>NOTE 2 Where other cover materials or qualities are required for a particular application, (e.g. safety, oil resistance or heat resistance), the cover properties need to be agreed between the customer and the manufacturer.</p>			

9 Tolerances on total belt thickness and cover thickness

9.1 Tolerance on total belt thickness

If the mean of the 3, 5 or 8 values of total belt thickness, when measured by the method in EN ISO 583-1, is 10 mm or less, the maximum permissible difference between the maximum thickness and the minimum thickness shall be not greater than 1 mm. For solid woven belting the maximum permissible difference shall be not greater than 1,5 mm.

If the mean of the 3, 5 or 8 values of the total belt thickness, when measured by the method in EN ISO 583-1, is greater than 10 mm, the maximum permissible difference between the maximum thickness and the minimum thickness shall be not greater than 10 % of the mean value. For solid woven belting the maximum permissible difference shall be < 15%.

9.2 Tolerance on cover thickness

When measured by one of the methods described in EN ISO 583-1, the mean value of the cover thickness shall not be less than the specified thickness by more than the amounts given in Table 6.

Table 6 - TOLERANCE ON COVER THICKNESS	
PROPERTY	REQUIREMENTS
Maximum permissible deviation of the specified thickness of each cover	plus: no limit
	minus: 0,2 mm if the specified thickness is equal to or less than 4 mm minus: 5 % of the specified thickness if it is greater than 4 mm

10 Transverse fabric joints in multi-ply belting

10.1 General

Transverse joints shall be at an angle of between 45° and 70° to the centre line of the belt.

10.2 Outer plies

Neither outer ply shall have more than one transverse joint per 100m length of belt.

10.3 Inner plies

No inner ply shall have more than two transverse joints per 100 m length of belt.

10.4 Adjacent plies and Non-adjacent plies

Transverse joints in adjacent plies and non-adjacent plies shall be not less than 3 m apart.

10.5 Joints in the same ply

Transverse joints in the same ply shall be 5 m apart or more.

10.6 Monoply, Duoply and Solid woven belting

Transverse joints are not permitted in Mono-ply, Duo-ply or Solid Woven belting.

11 Longitudinal fabric joints in multi-ply belting and Duo-ply belting

11.1 Spacing of joints

Longitudinal joints shall be at least 100 mm from the edge of the carcass. Each longitudinal joint shall be at least 100 mm from the joints in the other plies. The longitudinal joints in one ply of any piece of belting shall be separated by at least 300 mm where the width of the belting permits two joints in the same ply.

11.2 Number of joints

The maximum number of longitudinal joints in the plies shall be as given in Table 7.

Width of belt, in mm	External plies	Internal plies
mm $\leq 1\ 200$	0	1
$> 1\ 200 \leq 1\ 600$	1	2
$> 1\ 600 \leq 2\ 000$	2	2
$> 2\ 000$	2	3
NOTE This table does not apply to folded edge constructions.		

12 Longitudinal fabric or carcass joints in solid woven and mono ply belting

Longitudinal fabric or carcass joints are not permitted in solid woven or mono ply belting.

13 Elongation

The elongation of the finished belting in the longitudinal direction at the reference force (see 3.2) when tested by the method described in EN ISO 283-1 shall be not greater than 4 %.

14 Full thickness tensile strength (see clause 3)

The value of full thickness tensile strength in the longitudinal direction of the finished belting in N/mm belt width shall, when determined by the method described in EN ISO 283-1, be not less than the value given in Table 8 for the designated belt type (see clause 4).

Table 8 - Minimum full thickness tensile strength (N/mm) = Designated belt type							
Designated belt types	160	200	250	315	400	500	630
	800	1 000	1 250	1 600	2 000	2 500	3 150

15 Adhesion

The adhesion strengths when determined by the method described in EN ISO 252-1, shall be not less than the value given in Table 9 or Table 10 as appropriate.

Table 9 - Minimum adhesion strength of belts with synthetic filament carcass			
VALUE	Minimum adhesion between adjacent plies	Minimum adhesion between covers and carcass	
		Covers 0,8 to 1,5 mm thick	Covers more than 1,5 mm thick
	N/mm	N/mm	N/mm
Mean value of results	4,5	3,2	3,5
Lowest graphically recorded peak value in all tests	3,9	2,4	2,9

NOTE In no case should the highest recorded peak value in all the tests exceed 20 N/mm in order to avoid difficulties in preparing the belt end for splicing.

Table 10 - Minimum adhesion strength of belts with textile carcass containing natural fibres			
VALUE	Minimum adhesion between adjacent plies	Minimum adhesion between covers and carcass	
		Covers 0,8 to 1,5 mm thick	Covers more than 1,5 mm thick
	N/mm	N/mm	N/mm
Mean value of results	3,2	2,1	2,7
Lowest graphically recorded peak value in all tests	2,7	1,6	2,2
NOTE In no case should the highest recorded peak value in all the tests exceed 20 N/mm in order to avoid difficulties in preparing the belt end for splicing.			

16 Troughability

When tested in accordance with the method described in EN ISO 703-1, the minimum values for the ratio F/L shall be in accordance with those shown in Table 11 relative to the values for the angle of inclination shown.

Table 11 - MINIMUM TROUGHABILITY	
Angle of inclination of side rollers	Minimum value for the ratio $\frac{F}{L}$
up to and including 20	0,08
25	0,10
30	0,12
35	0,14
40	0,16
45	0,18
50	0,20
55	0,23
60	0,26

NOTE
F is the vertical deflection in the test piece in mm corrected for the belt thickness
L is the length of the test piece, in mm, when laid flat. It is equivalent to the installed width of the conveyor belt.

17 Sampling

Sampling shall be conducted in accordance with ISO 282.

18 Identification

It shall be possible to identify the name of the manufacturer of the conveyor belt, the fact that it conforms to this standard, its safety category according to EN 12882 and the date of manufacture. The manner in which this data is identified shall be decided by the manufacturer or by agreement with the purchaser.

NOTE Where it is decided to mark the conveyor belt using impression moulding, the depth of the impression should not exceed 1,5 mm and the characters should be between 20 mm and 80 mm high, repeated at longitudinal spacing of approximately 15 m. In the case of slab belting, the marks may be in the transverse direction.