BS EN 12882:2015

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Conveyor belts for general purpose use — Electrical and flammability safety requirements

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National foreword

This British Standard is the UK implementation of EN 12882:2015. It supersedes BS EN 12882:2008 which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee PRI/67, Conveyor belts.

A list of organizations represented on this committee can be obtained on request to its secretary.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

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Conveyor belts for general purpose use - Electrical and flammability safety requirements

Courroies transporteuses à usage général - Prescriptions de sécurité électrique et protection contre l'inflammabilité

Fördergurte für allgemeine Anwendung - Elektrische und brandtechnische Sicherheitsanforderungen

This European Standard was approved by CEN on 27 June 2015.

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European foreword

This document (EN 12882:2015) has been prepared by Technical Committee CEN/TC 188 “Conveyor belts”, the secretariat of which is held by SNV.

This document supersedes EN 12882:2008.

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of an identical text or by endorsement, at the latest by February 2016, and conflicting national standards shall be withdrawn at the latest by February 2016.

The main changes with respect to the previous edition are listed below:

— electrical conductivity test requirements for light conveyor belts have been removed from all categories except 1, 2A and 2B;

— the requirement for flame retardation testing has been added to category 4A, 4B, 5A, 5B and 5C;

— alternative fire simulation tests have been added to category 4A, 4B, 5A, 5B and 5C.

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For relationship with EU Directive(s), see informative Annex ZA, which is an integral part of this document.

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Introduction

This document is a type C standard as stated in EN ISO 12100.

The machinery concerned and the extent to which hazards, hazardous situations and events are covered are indicated in the scope of this document.

When provisions of this type C standard are different from those which are stated in type A or B standards, the provisions of this type C standard take precedence over the provisions of the other standards, for machines that have been designed and built according to the provisions of this type C standard.

During the preparation of this European Standard, the hazards which have been identified as being directly related to the use of conveyor belts are:

a) hazards associated with the discharge of static electrical energy;

b) hazards associated with the impingement of small naked flames on the cover and/or carcass of a conveyor belt at rest;

c) hazards caused by the stalling of a conveyor belt and the continued operation of the driving mechanism causing localized heating of the conveyor belt through contact with the driving drum or cylinder or some other source of frictional heat;

d) hazards caused by the propagation of a flame along a belt which has been exposed to a relatively high energy source such as a fire.

The risk, or probable rate of occurrence of these hazards and the degree of harm they can cause will vary depending upon the particular circumstances of the application or site of application, which are many and varied. Consequently, the level of safety required will vary from one application to another, depending upon the risks judged to be pertinent. The hazards listed above should not be taken as the only properties affecting safety in operation. Other aspects such as health or environmental requirements should be considered. Depending on the individual end use requirement, these other factors can affect the category of belt selected and additional safety precautions may need to be employed.

This European Standard is therefore designed to enable the user to select the category of conveyor belt most suited to the particular circumstances of the application.

1 Scope

This European Standard specifies electrical and flammability safety requirements for general purpose conveyor belts not intended for use in underground installations and a means of categorizing conveyor belts in terms of the level of safety sought in their end use application. This European Standard does not provide electrical safety requirements for volume resistance which may be measured by the methods in EN ISO 21178 and which is relevant to some types of light conveyor belts.

This European Standard is not applicable to conveyor belts which are manufactured before the date of publication of this document by CEN.

NOTE 1 Directive 94/9/EC concerning equipment and protective systems intended for use in potentially explosive atmospheres can be applicable to the type of machine or equipment covered by this European Standard. The present standard is not intended to provide means of complying with the essential health and safety requirements of Directive 94/9/EC, this being covered in EN 14973.

NOTE 2 EN 12882 is not a product standard but is intended to help users of conveyor belts to select the required electrical and flammability safety properties needed following a suitable risk assessment. No requirements are, therefore, included for marking, information to be supplied, etc., these matters being covered in relevant product standards such as EN ISO 14890 and EN ISO 15236-1.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 1554:2012, *Conveyor belts - Drum friction testing*

EN 12881-1:2014, *Conveyor belts - Fire simulation flammability testing - Part 1: Propane burner tests*

EN ISO 284, *Conveyor belts - Electrical conductivity - Specification and test method (ISO 284)*

EN ISO 340, *Conveyor belts - Laboratory scale flammability characteristics - Requirements and test method (ISO 340)*

EN ISO 21178, *Light conveyor belts - Determination of electrical resistances (ISO 21178)*

EN ISO 21179, *Light conveyor belts - Determination of the electrostatic field generated by a running light conveyor belt (ISO 21179)*

EN ISO 21183-1, *Light conveyor belts - Part 1: Principal characteristics and applications (ISO 21183-1)*

3 Terms and definitions

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

3.1
afterflame
flame which persists after the ignition source has been removed

3.2
afterglow
persistence of glowing, after cessation of flaming or, if no flaming occurs, after the ignition source has been removed

3.3
flame, noun
zone of combustion in the gaseous phase usually with emission of light

3.4
flame, verb
to undergo combustion in the gaseous phase with emission of light

3.5
glowing
made luminous by heat, (without flame)

3.6
undamaged
part remaining of a conveyor belt after the termination of the propane gallery fire test described in accordance with EN 12881-1 and which shows no evidence of embrittlement, cracking, blistering or other blemishes not originally present

4 Safety requirements

4.1 General

Conveyor belts within each category (1, 2A, 2B, 3A, 3B, 4A, 4B, 5A, 5B and 5C) shall meet the test requirements as indicated in Table 1 and in the specific subclauses below.

4.2 Electrical conductivity

4.2.1 When tested in accordance with EN ISO 284, all general purpose conveyor belts shall have an electrical surface resistance not greater than 300 MΩ.

4.2.2 Light conveyor belts as described in EN ISO 21183-1 shall have an electrical surface resistance not greater than 300 MΩ when tested in accordance with EN ISO 21178 unless the conditions described in 4.2.3 are met.

4.2.3 Light conveyor belts with an internal conductive layer shall not generate an electrostatic charge resulting in a surface potential of more than 1 000 V when tested in accordance with EN ISO 21179.

NOTE Under special service conditions, whereby higher electrostatic charges resulting in surface potentials of more than 1000 V can be generated due to friction between belt surface and conveyed goods, or due to friction within the conveyed goods like non-conductive bulk goods such as sugar, flour or plastic granules. The requirements for safety in this standard do not consider such critical service conditions, but only the run of the empty light conveyor belt and the electrostatic charges generated thereby.

In certain circumstances (e.g. in the transportation of electronic components), the dissipation of electrical charges through the belt may be required. This requirement can be specified in terms of volume resistance as measured by the method described in EN ISO 21178. However, the requirements for safety in this standard do not consider the volume resistance of light conveyor belts for the allocation to the different safety categories.

4.3 Flame retardation

4.3.1 Conveyor belts in category 2A, or 3A, (see Clause 5 and Table 1), when tested in accordance with EN ISO 340 with covers intact, shall have an aggregate of the times for duration of afterflame for all six tests of less than 45 s and no individual result shall be greater than 15 s**.**

4.3.2 Conveyor belts in category 2B, 3B, 4A, 4B, 5A, 5B and 5C (see Clause 5 and Table 1), when tested in accordance with EN ISO 340 with covers intact and also with covers removed, shall have an aggregate of the times for duration of afterflame for each group of six tests, (i.e. six tests with covers intact and six tests with covers removed) of less than 45 s and no individual result shall be greater than 15 s.

4.4 Fire simulation

4.4.1 Conveyor belts in categories 4A and 4B, 5A, 5B and 5C (see Clause 5 and Table 1), when tested in accordance with Method A, C or D of EN 12881-1:2014, shall retain a length of undamaged conveyor belt as indicated in Table 1.

4.4.2 The test methods in accordance with EN 12881-1 are not applicable for light conveyor belts as described in EN ISO 21183-1. Therefore light conveyor belts can only be assigned to the categories 1, 2A and 2B.

4.5 Drum friction

4.5.1 Conveyor belts in categories 3A, 3B and 4B (see Clause 5 and Table 1), when tested in accordance with Method B1 of EN 1554:2012 (constant load of 343 N), shall exhibit no flame whatsoever throughout the test, which shall continue for 60 min duration, or until the belt breaks, whichever is the shorter time.

4.5.2 Conveyor belts in category 5A (see Clause 5 and Table 1), when tested in accordance with Method B2 of EN 1554:2012, shall exhibit no flame whatsoever throughout the test, which shall continue for 150 min duration, or until the belt breaks, whichever is the shorter time.

4.5.3 Conveyor belts in category 5B (see Clause 5 and Table 1), when tested in accordance with Method B2 of EN 1554:2012, shall exhibit no flame or glowing whatsoever throughout the test, which shall continue for 150 min duration, or until the belt breaks, whichever is the shorter time.

4.5.4 Conveyor belts in category 5C (see Clause 5 and Table 1), when tested in accordance with Method B2 of EN 1554:2012, shall exhibit no flame or glowing whatsoever throughout the test, which shall continue for 150 min duration, or until the belt breaks, whichever is the shorter time, and at no time during the test shall the drum temperature exceed 400 °C.

4.5.5 The test methods in accordance with EN 1554 are not applicable for light conveyor belts as described in EN ISO 21183-1. Therefore light conveyor belts can only be assigned to the categories 1, 2A and 2B.

5 Safety categories

NOTE A summarized tabular presentation of the requirements in Clause 4 and Clause 5 is given in Table 1.

5.1 Category 1

A conveyor belt shall be designated only as a category 1 conveyor belt if it complies with the requirements in 4.2.

5.2 Category 2A

A conveyor belt shall be designated as a category 2A conveyor belt only if it complies with the requirements of 4.2 and 4.3.1.

5.3 Category 2B

A conveyor belt shall be designated as a category 2B conveyor belt only if it complies with the requirements of 4.2 and 4.3.2.

5.4 Category 3A

A conveyor belt shall be designated as a category 3A conveyor belt only if it complies with the requirements of 4.2, 4.3.1 and 4.5.1.

If it is not possible to conduct the test specified in 4.5.1, due to the constructional properties of the type of belt selected for safety category 3A, the conveyor belt shall be described as a category 2A conveyor belt.

In this case, additional safety precautions should be employed complying with EN ISO 12100, EN 619 or EN 620.

NOTE Light conveyor belts cannot be assigned to category 3A.

5.5 Category 3B

A conveyor belt shall be designated as a category 3B conveyor belt only if it complies with the requirements of 4.2, 4.3.2 and 4.5.1.

If it is not possible to conduct the test specified in 4.5.1 (drum friction test), due to the constructional properties of the type of belt selected for safety category 3B, the conveyor belt shall be described as a category 2B conveyor belt.

In this case, additional safety precautions should be employed complying with EN ISO 12100, EN 619 or EN 620.

NOTE Light conveyor belts cannot be assigned to category 3B.

5.6 Category 4A

A conveyor belt shall be designated as a category 4A conveyor belt only if it complies with the requirements of 4.2, 4.3.2 and 4.4.

NOTE Light conveyor belts cannot be assigned to category 4A.

5.7 Category 4B

A conveyor belt shall be designated as a category 4B conveyor belt only if it complies with the requirements of 4.2, 4.3.2, 4.4 and 4.5.1.

If it is not possible to conduct the test specified in 4.5.1, due to the constructional properties of the type of belt selected for safety category 4B, the conveyor belt shall be described as a category 4A conveyor belt.

In this case, additional safety precautions should be employed complying with EN ISO 12100, EN 619 or EN 620.

NOTE Light conveyor belts cannot be assigned to category 4B.

5.8 Category 5A

A conveyor belt shall be designated as a category 5A conveyor belt only if it complies with the requirements of 4.2, 4.3.2, 4.4 and 4.5.2.

If it is not possible to conduct the test specified in 4.5.2, due to the constructional properties of the type of belt selected for safety category 5A, the conveyor belt shall be described as a category 4A conveyor belt.

In this case, additional safety precautions should be employed complying with EN ISO 12100, EN 619 or EN 620.

NOTE Light conveyor belts cannot be assigned to category 5A.

5.9 Category 5B

A conveyor belt shall be designated as a category 5B conveyor belt only if it complies with the requirements of 4.2, 4.3.2, 4.4 and 4.5.3.

If it is not possible to conduct the test specified in 4.5.3 (drum friction test), due to the constructional properties of the type of belt selected for the safety category 5B, the conveyor belt shall be described as a category 4A conveyor belt.

In this case, additional safety precautions should be employed complying with EN ISO 12100, EN 619 or EN 620.

NOTE Light conveyor belts cannot be assigned to category 5B.

5.10 Category 5C

A conveyor belt shall be designated as a category 5C conveyor belt only if it complies with the requirements of 4.2, 4.3.2, 4.4 and 4.5.4.

If it is not possible to conduct the test specified in 4.5.4 (drum friction test), due to the constructional properties of the type of belt selected for safety category 5C, the conveyor belt shall be described as a category 4A conveyor belt.

In this case, additional safety precautions should be employed complying with EN ISO 12100, EN 619 or EN 620.

NOTE Light conveyor belts cannot be assigned to category 5C.

Table 1 — Safety requirements for conveyor belts for general purpose use

CATEGORY	EN ISO 284 (see 4.2)	EN ISO 21178 (see 4.2)	EN ISO 21179 (see 4.2)	EN ISO 340 (see 4.3)	EN 12881-1 Method A[a], C[b] or D[c] (see 4.4)	EN 1554 (see 4.5)
1	≤300 MΩ	≤ 300 MΩ	≤ 1000 V	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE
2A	≤300 MΩ	≤ 300 MΩ	≤ 1000 V	Covers intact. Aggregate duration of flame for the six tests shall be less than 45 s and no individual result shall be greater than 15 s.	NOT APPLICABLE	NOT APPLICABLE
2B	≤300 MΩ	≤ 300 MΩ	≤ 1000 V	Covers intact and covers removed. Aggregate duration of flame for each group of six tests shall be less than 45 s and no individual result shall be greater than 15 s.	NOT APPLICABLE	NOT APPLICABLE
3A	≤300 MΩ	NOT APPLICABLE	NOT APPLICABLE	Covers intact. Aggregate duration of flame for the six tests shall be less than 45 s and no individual result shall be greater than 15 s.	NOT APPLICABLE	Method A1 Constant load of 343 N for 1 h duration or until belt breaks. No flame.
3B	≤300 MΩ	NOT APPLICABLE	NOT APPLICABLE	Covers intact and covers removed. Aggregate duration of flame for each group of six tests shall be less than 45 s and no individual result shall be greater than 15 s.	NOT APPLICABLE	Method A1 Constant load of 343 N for 1 h duration or until belt breaks. No flame.
4A	≤300 MΩ	NOT APPLICABLE	NOT APPLICABLE	Covers intact and covers removed. Aggregate duration of flame for each group of six tests shall be less than 45 s and no individual result shall be greater than 15 s.	When tested in accordance with EN 12881-1 Method A[a], C[b] or D[c] requirements according table footnotes a, b or c shall be met.	NOT APPLICABLE
4B	≤300 MΩ	NOT APPLICABLE	NOT APPLICABLE	Covers intact and covers removed. Aggregate duration of flame for each group of six tests shall be less than 45 s and no individual result shall be greater than 15 s.	When tested in accordance with EN 12881-1 Method A[a], C[b] or D[c] requirements according table footnotes a, b or c shall be met.	Method B1 Constant load of 343 N for 60 min duration or until belt breaks. No flame.
5A	≤ 300 MΩ	NOT APPLICABLE	NOT APPLICABLE	Covers intact and covers removed. Aggregate duration of flame for each group of six tests shall be less than 45 s and no individual result shall be greater than 15 s.	When tested in accordance with EN 12881-1 Method A[a], C[b] or D[c] requirements according table footnotes a, b or c shall be met.	Method B2 Maximum load of 1715 N. Total duration 150 min or until belt parts. No flame.

CATEGORY	**EN ISO 284** (see 4.2)	**EN ISO 21178** (see 4.2)	**EN ISO 21179** (see 4.2)	**EN ISO 340** (see 4.3)	**EN 12881-1 Method A[a], C[b] or D[c]** (see 4.4)	**EN 1554** (see 4.5)
5B	≤300 MΩ	NOT APPLICABLE	NOT APPLICABLE	Covers intact and covers removed. Aggregate duration of flame for each group of six tests shall be less than 45 s and no individual result shall be greater than 15 s.	When tested in accordance with EN 12881-1 Method A[a], C[b] or D[c] requirements according table footnotes a, b or c shall be met.	Method B2 Maximum load of 1715 N. Total duration 150 min or until belt parts. No flame or glowing.
5C	≤300 MΩ	NOT APPLICABLE	NOT APPLICABLE	Covers intact and covers removed. Aggregate duration of flame for each group of six tests shall be less than 45 s and no individual result shall be greater than 15 s.	When tested in accordance with EN 12881-1 Method Aa, Cb or Dc requirements according table footnotes a, b or c shall be met.	Method B2 Maximum load of 1715 N. Total duration 150 min or until belt parts. No flame or glowing. Maximum drum temperature shall not exceed 400 °C.

[a] When tested in accordance with EN 12881-1 Method A, after the end of the test there shall be a piece of undamaged conveyor belting not less than 100 mm wide across the whole width of the belt.

[b] When tested in accordance with EN 12881-1 Method C but with an ignition time of 15 min, after the end of the test there shall be a piece of undamaged conveyor belting not less than 600 mm long across the whole width of the belt or the maximum average temperature rise shall not exceed 140 °C and the length of the test piece that remains undamaged shall not be less than 50 mm across the whole width of the conveyor belt.

[c] When tested in accordance with EN 12881-1 Method D, after the end of the test there shall be a piece of undamaged conveyor belting not less than 400 mm long (for belting to be supplied at up to 1 200 mm in width) and not less than 600 mm long (for belting to be supplied over 1 200 mm in width) across the whole width of the belt.

Annex A
(informative)

Suggested belt approval / certification options

Where a series of belts can be shown to have the same basic construction and contain the same materials then it may be acceptable to approve / certify this series on a range or family basis (for a single category) rather than test all options. For example, test lowest and highest tensile belts both fitted with minimum and maximum thickness covers.

Annex ZA
(informative)

Relationship between this European Standard and the Essential Requirements of EC Directive 2006/42/EC

This European Standard has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association to provide one means of conforming to Essential Requirements of the New Approach Directive for Machinery, 2006/42/EC.

Once this standard is cited in the Official Journal of the European Union under that Directive and has been implemented as a national standard in at least one Member State, compliance with the normative clauses of this standard confers, within the limits of the scope of this standard, a presumption of conformity with Essential Requirements

1.5.2 Static electricity

1.5.6 Fire

of that Directive and associated EFTA regulations.

WARNING — Other requirements and other EU Directives may be applicable to the product(s) falling within the scope of this standard.

Bibliography

[1] EN 619, *Continuous handling equipment and systems - Safety and EMC requirements for equipment for mechanical handling of unit loads*

[2] EN 620, *Continuous handling equipment and systems - Safety and EMC requirements for fixed belt conveyors for bulk materials*

[3] EN 14973, *Conveyor belts for use in underground installations - Electrical and flammability safety requirements*

[4] EN ISO 12100, *Safety of machinery - General principles for design - Risk assessment and risk reduction (ISO 12100)*

[5] EN ISO 14890, *Conveyor belts - Specification for rubber- or plastics-covered conveyor belts of textile construction for general use (ISO 14890)*

[6] EN ISO 15236-1, *Steel cord conveyor belts - Part 1: Design, dimensions and mechanical requirements for conveyor belts for general use (ISO 15236-1)*

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