



SLOVENSKI STANDARD
SIST EN 523:2003
01-november-2003

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Steel strip sheaths for prestressing tendons - Terminology, requirements, quality control

Hüllrohre aus Bandstahl für Spannglieder - Begriffe, Anforderungen und Konformität

Gaines en feuillard d'acier pour câbles de précontrainte - Terminologie, prescriptions,
contrôle de qualité

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Ta slovenski standard je istoveten z: EN 523:2003
SIST EN 523:2003
http://standards.iteh.ai/catalog/standards/sist/en-523-2003-913d-471c-b4aa-
b2511ea21bba/sist-en-523-2003

ICS:

01.040.77

77.140.75

91.080.40

SIST EN 523:2003

en

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English version

Steel strip sheaths for prestressing tendons - Terminology, requirements, quality control

Gaines en feuillard d'acier pour câbles de précontrainte -
Terminologie, prescriptions, contrôle de qualité

Hüllrohre aus Bandstahl für Spannglieder - Begriffe,
Anforderungen, Güteüberwachung

This European Standard was approved by CEN on 11 March 2003.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Management Centre or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Slovakia, Spain, Sweden, Switzerland and United Kingdom.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

Management Centre: rue de Stassart, 36 B-1050 Brussels

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Foreword

This document EN 523:2003 has been prepared by Technical Committee CEN/TC 104 "Concrete and related products", the secretariat of which is held by DIN.

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 2004, and conflicting national standards shall be withdrawn at the latest by February 2004.

This document supersedes EN 523:1997.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive(s).

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

This European Standard applies together with the standards of the EN 524 series which comprises test methods for sheaths.

Annex A is informative.

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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1 Scope

This European Standard is applicable to uncoated cylindrical steel sheaths with a corrugated profile and with a nominal internal diameter of up to 130 mm and their connectors (couplers) which are assembled to form ducts for prestressing tendons in post-tensioned prestressed concrete structures. It is only applicable to sheaths and connectors made of interlocked or welded steel strip¹⁾. It does not cover plastic sheaths²⁾.

The seals required between sheaths and couplers are not covered by this standard.

2 Normative references

This European Standard incorporates by dated or undated reference, 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 amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

EN 524-1, *Steel strip sheaths for prestressing tendons — Test methods — Part 1: Determination of shape and dimensions.*

EN 524-2, *Steel strip sheaths for prestressing tendons — Test methods — Part 2: Determination of flexural behaviour.*

1) In case of coated or galvanised steel additional requirements should be considered, which are not covered by this standard. Additional requirements may conform to the relevant provisions in the place of use of the product.

2) For plastic sheaths, see annex A.

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EN 524-3, *Steel strip sheaths for prestressing tendons — Test methods — Part 3: To-and-fro bending test.*

EN 524-4, *Steel strip sheaths for prestressing tendons — Test methods — Part 4: Determination of lateral load resistance.*

EN 524-5, *Steel strip sheaths for prestressing tendons — Test methods — Part 5: Determination of tensile load resistance.*

EN 524-6, *Steel strip sheaths for prestressing tendons — Test methods — Part 6: Determination of leaktightness (Determination of water loss).*

EN 10139, *Cold rolled uncoated mild steel narrow strip for cold forming - Technical delivery conditions.*

ENV 13670-1, *Execution of concrete structures - Part 1: Common.*

ISO 6932, *Cold-reduced carbon steel strip with a maximum carbon content of 0,25 %.*

3 Terms and definitions

For the purpose of this European Standard the following terms and definition apply.

3.1

type of sheath

sheaths are designated by the manufacturer according to specific delivery form having certain features, e.g. production procedure (welded or interlocked), shape of profile, etc.

3.2

connectors (couplers)

connectors are specific devices to join sheath sections. They are usually made from cut ends of sheaths with the same profile type but with larger diameter (see 5.2).

3.3

stiffener

is an additional components whose purpose is to increase the lateral load strength of the sheaths at supporting points, e.g. semi-circular sheathing sections placed between supports and tendons

4 Classification

Sheaths are classified by the requirements as given in Table 1.

Category 1 (normal sheaths)

Category 2 (rigid sheaths)

5 Requirements

5.1 Sheaths

5.1.1 General requirements

Sheaths shall have sufficient resistance against the mechanical actions and environmental exposure during storage, transport and construction period. Sheaths are deemed to be resistant against:

- mechanical actions, if they fulfil the requirements of clause 5.1.5 to 5.1.8;
- environmental exposure, if the requirements of 5.1.2 and clause 7 are fulfilled and the measurements recommended for handling the sheaths on site in accordance with ENV 13670-1 are taken into account.

Sheaths shall have a corrugated profile (see Figure 1) to provide a sufficient mechanical bond with the concrete externally and the grout internally.

Sheaths shall be leaktight (see 5.1.9). The sheaths and their connectors shall be designed in such a way as to allow this proper sealing of the joints.

5.1.2 Steel strip

Sheaths shall be made from rolled steel strip conforming to EN 10139, ISO 6932 or specified steel with similar properties. The nominal thickness of the steel strip shall be not less than the values given in Table 1, lines 1a and 1b.

5.1.3 Tolerances (ovality)

Deviations from the mean values of the internal diameter of any cross-section of the sheaths determined according to EN 524-1 shall not exceed $\pm 1\%$ or $\pm 0,5$ mm, whichever is the greater.

5.1.4 Relative volume of the profile

The relative volume of the profile V_{rel} determined in accordance with EN 524-1 shall be not less than $0,08 \text{ cm}^3/\text{cm}^2$. For nominal internal diameters greater than 25 mm, the height of the profile shall be not less than 2,5 mm (see EN 524-1).

5.1.5 Flexural behaviour

The relative load $F_{rel} = F_{pl}/d_1$ in N/mm and the load F_{pl} at the beginning of plastic deformation shall be determined in accordance with EN 524-2.

The relative load F_{rel} for category 2 shall not be less than the given values in Table 1, line 2.

For category 1 there are no requirements but test results shall be given for information to the user in the relevant documents (see 6.2).

5.1.6 Flexibility

When tested by means of the to-and-fro bending test described in EN 524-3, flexibility is sufficient if, after the bending test, no significant deformations of the corrugation appear so that the plunger can push in the specimen over its whole length. A straightening of the specimen by means of the tensile load test (see EN 524-5) is permitted.

5.1.7 Lateral load resistance

The irreversible reduction of the internal diameter shall not exceed 10 % or 5 mm whichever is the smaller when the loads given in Table 1, lines 4a to 4c are applied according to EN 524-4. If any type of sheaths of class 1 withstands the load $F_1 = 1500$ N without a stiffener a test with lower forces in accordance with Table 1, line 4a is not required.

5.1.8 Tensile load resistance

When loaded in accordance with EN 524-5, the tensile load strength is sufficient if the sleeve coupling (comprising sheaths and the corresponding coupler) does not fail by complete separation under the test loads specified in Table 1, line 5.

5.1.9 Leaktightness

When tested in accordance with EN 524-6, using a specimen tested earlier for flexibility, lateral load resistance and tensile load resistance, the water loss shall not exceed the values given in Table 1, line 6.

5.2 Connectors (couplers)

5.2.1 General requirements

Couplers made from corrugated metal strip sheaths shall fulfil the requirements given in 5.1.1.

5.2.2 Minimum length

The length of the couplers shall be at least three times the nominal internal diameter of the sheaths, but not less than 150 mm.

5.2.3 Nominal internal diameter and wall thickness of the couplers

When measured in accordance with EN 524-1, the nominal internal diameter of the couplers $d_{1,c}$ shall not exceed a value of

$$d_{1,c} = d_{1,s} + 8 t_s + c \quad (\text{for interlocked sheaths})$$

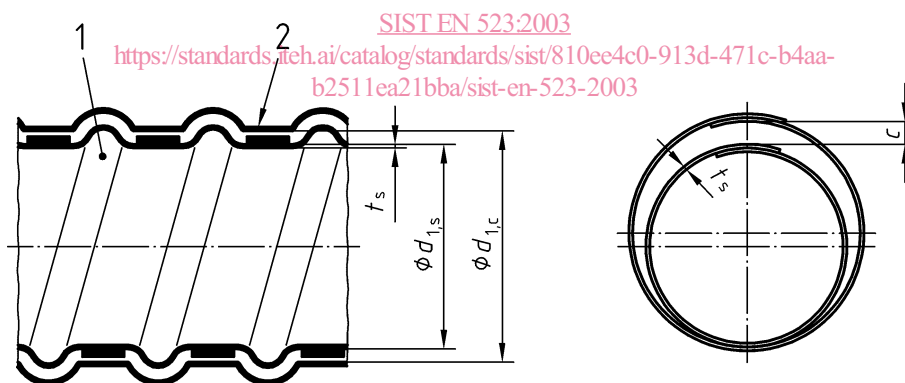
$$d_{1,c} = d_{1,s} + 3 t_s + c \quad (\text{for welded sheaths})$$

where (see also Figure 1)

$d_{1,s}$ is the nominal internal diameter of the sheath (in mm)

t_s is the nominal wall thickness of the sheath (in mm)

c is the clearance between the outer surface of the sheath and the inner surface of the coupler, taking into account the increase due to folds or seams (in mm)



Key

- 1 Sheath
- 2 Coupler

Figure 1 — Dimensions of couplers

The clearance, c , shall not exceed 2,0 mm for sheaths with an internal diameter of up to 55 mm or 3,0 mm for larger diameters.

The steel strips from which couplers are made shall at least fulfil the minimum requirements concerning the wall thickness as the sheaths which are to be connected (see Table 1, lines 1a to 1b).

5.3 Stiffeners

It shall be possible to strengthen locally those sheaths which do not possess the increased lateral load resistance specified in Table 1, line 4b. The size of the stiffeners shall not exceed half the circumference of the sheath and shall be designed such that, after concreting, no cavities remain between the sheath and the stiffener which could have

detrimental effects. This requirement can be met for instance by using the same profile and at least the same wall thickness for stiffener and sheath.

The length of the stiffeners shall not exceed 1,5 times the nominal internal diameter of the sheaths or 10 cm, whichever is the greater.

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