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**Prožne spojke - 2. del: Lastnosti in preskušanje prožnih spojk s kovinskim trakom, adaptorjev in puš**

Flexible couplings - Part 2: Characteristics and testing for metal banded flexible couplings, adaptors and bushes

Flexible Kupplungen - Teil 2: Eigenschaften und Prüfung von flexiblen Kupplungen, Übergangsbau teilen und Ausgleichsringen mit Metallband

Raccords flexibles - Partie 2: Caractéristiques et essais des raccords flexibles équipés de bandes métalliques, des raccords d'adaptation et des bagues

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**Ta slovenski standard je istoveten z: EN 16397-2:2014**

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**ICS:**

23.040.60 Prirobnice, oglavki in spojni elementi Flanges, couplings and joints

**SIST EN 16397-2:2015**

**en,fr,de**

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EUROPEAN STANDARD

EN 16397-2

NORME EUROPÉENNE

EUROPÄISCHE NORM

November 2014

ICS 23.040.60

English Version

## Flexible couplings - Part 2: Characteristics and testing for metal banded flexible couplings, adaptors and bushes

Raccords flexibles - Partie 2: Caractéristiques et essais des raccords flexibles équipés de bandes métalliques, des raccords d'adaptation et des bagues

Flexible Kupplungen - Teil 2: Eigenschaften und Prüfung von flexiblen Kupplungen, Übergangsbauteilen und Ausgleichsringen mit Metallband

This European Standard was approved by CEN on 30 August 2014.

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## Foreword

This document (EN 16397-2:2014) has been prepared by Technical Committee CEN/TC 165 "Wastewater engineering", 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of an identical text or by endorsement, at the latest by May 2015 and conflicting national standards shall be withdrawn at the latest by August 2016.

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

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.

EN 16397, *Flexible couplings*, contains the following parts:

- *Part 1: Performance requirements;*
- *Part 2: Characteristics and testing for metal banded flexible couplings, adaptors and bushes.*

This standard takes into account the requirements of EN 476.

According to the CEN-CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

**EN 16397-2:2014 (E)****1 Scope**

This European Standard specifies the materials and dimensions for metal banded flexible couplings and adaptors and bushes for use with pipes and fittings in drain and sewer systems, usually operated under gravity and periodic hydraulic surcharge, both above and below ground inside or outside buildings and intended to connect pipes for:

- repair of damaged pipelines;
- connecting pipes of different materials and/or diameters;
- jointing short/cut lengths of pipe;
- jointing specific pipe systems;
- jointing post-inserted preformed junctions.

The coupling consists of a moulded or extruded rubber sleeve with two stainless steel clamping bands with or without a stainless steel shear band. The clamping bands enable the sleeve to form a seal with the pipes to be joined. The shear band gives resistance to shear forces. Connections may be made between pipes which cannot be satisfactorily joined by a coupling alone, of dissimilar sizes or material, by using an appropriate bush or bushes with the coupling or by using an appropriate adaptor.

**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 681-1, *Elastomeric seals - Materials requirements for pipe joint seals used in water and drainage applications - Part 1: Vulcanized rubber* <https://standards.iteh.ai/catalog/standards/sist-en-16397-2-2015>

EN 10088-1:2014, *Stainless steels — Part 1: List of stainless steels*

EN 10088-2, *Stainless steels - Part 2: Technical delivery conditions for sheet/plate and strip of corrosion resisting steels for general purposes*

EN 10151:2002, *Stainless steel strip for springs - Technical delivery conditions*

EN 13501-1, *Fire classification of construction products and building elements — Part 1: Classification using data from reaction to fire tests*

EN 16397-1:2014, *Flexible couplings — Part 1: Performance requirements*

EN ISO 7500-1, *Metallic materials - Verification of static uniaxial testing machines - Part 1: Tension/compression testing machines - Verification and calibration of the force-measuring system (ISO 7500-1)*

EN ISO 9445-1:2010, *Continuously cold-rolled stainless steel - Tolerances on dimensions and form - Part 1: Narrow strip and cut lengths (ISO 9445-1:2009)*

ISO 3302-1:2014, *Rubber — Tolerances for products — Part 1: Dimensional tolerances*

**3 Terms and definitions**

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

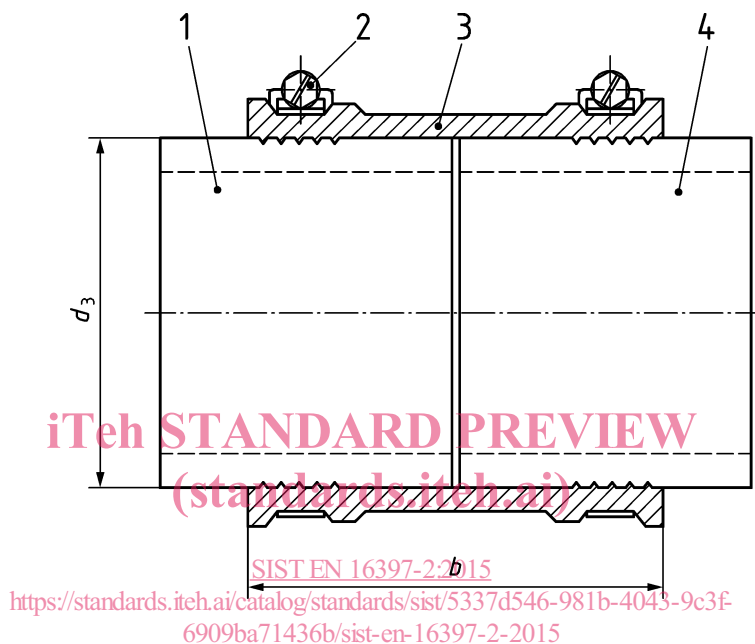
**3.1****metal banded flexible coupling**

moulded or extruded and joined rubber sleeve, with or without bushes or shear band, with adjustable stainless steel clamping bands by which it is secured to the pipe ends

**3.1.1****Type 1 coupling (without shear band)**

moulded or extruded and joined rubber sleeves with adjustable stainless steel clamping bands by which it is secured to the pipe ends without shear band

Note 1 to entry: An example of a typical Type 1 coupling is shown in Figure 1.

**Key**

- 1 pipe 1
- 2 clamping band with drive unit
- 3 sleeve
- 4 pipe 2
- $b$  width of sleeve
- $d_3$  outside diameter

NOTE More than one drive unit could be used where required.

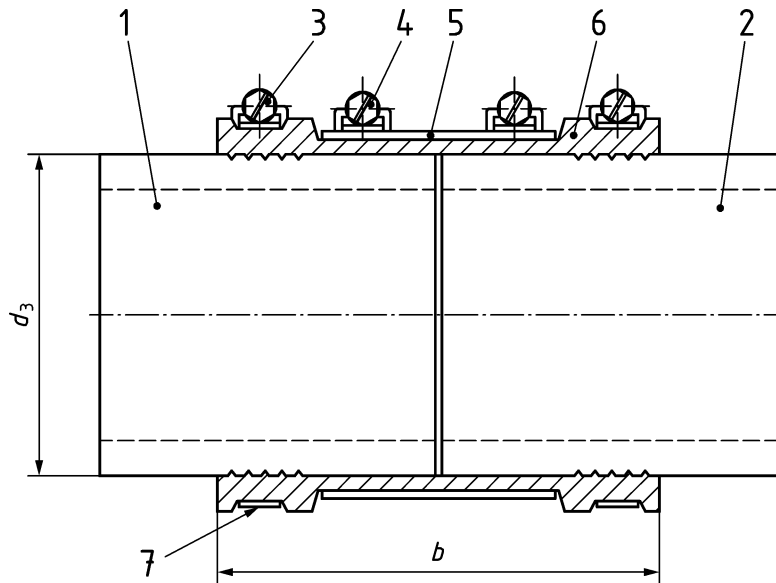
**Figure 1 — Example of Type 1 coupling (without shear band)**

**3.1.2****Type 2 coupling (with shear band)**

moulded or extruded and joined rubber sleeve with adjustable stainless steel clamping bands by which it is secured to the pipe ends and a shear band to give resistance to shear loads

Note 1 to entry: An example of a typical Type 2 coupling is shown in Figure 2 and Figure 3.

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**Key**

- 1 pipe 1
- 2 pipe 2
- 3 drive unit
- 4 adjustor unit
- 5 shear band
- 6 sleeve
- 7 clamping band
- $b$  width of sleeve
- $d_3$  outside diameter

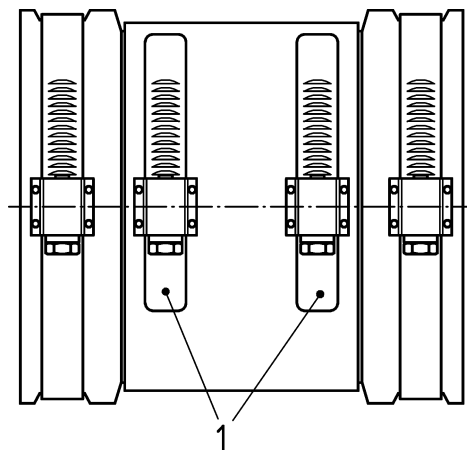
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NOTE More than one drive unit could be used where required.

**Figure 2 — Example of Type 2 coupling (with shear band)**

**Key**

- 1 shear band adjustors

**Figure 3 — Example of elevation showing shear band adjustors**

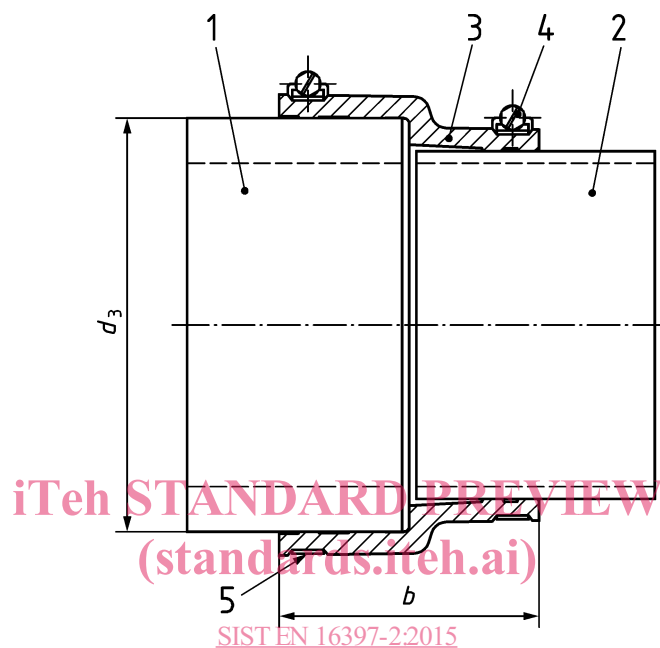


### 3.2

#### metal banded adaptor

moulded stepped rubber sleeve with adjustable stainless steel clamping bands by which it is secured to pipes of different outside diameters

Note 1 to entry: Adaptors may incorporate an abrupt change of section. An example of a metal banded adaptor is shown in Figure 4.



#### Key

- |                       |                  |
|-----------------------|------------------|
| 1                     | pipe 1           |
| 2                     | pipe 2           |
| 3                     | moulded rubber   |
| 4                     | drive unit       |
| 5                     | clamping band    |
| <i>b</i>              | width of sleeve  |
| <i>d</i> <sub>3</sub> | outside diameter |

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NOTE More than one drive unit could be used where required.

**Figure 4 — Example of metal banded adaptor**

### 3.3

#### bush

moulded or extruded and joined rubber section only used with couplings having shear bands to compensate for variations between the outside diameters of pipes which cannot be satisfactorily joined by a coupling alone

### 3.4

#### nominal size of a flexible coupling and an adaptor

maximum outside diameter of the pipes with which a flexible coupling or adaptor can be used

**EN 16397-2:2014 (E)****3.5****shear band**

component for bearing of shear loads after installation

**3.6****clamping band**

means of clamping the flexible coupling to a pipe using a specified force

**3.7****adjustor strip****shear band fixing**

means of clamping the shear band to the flexible coupling using a specified force

**4 Characteristics****4.1 General**

Metal banded flexible couplings and adaptors and bushes shall be free from such defects as would impair their function when in service.

Coupling, adapter and bush size is defined by the range of pipe outside diameter (OD) with which it will meet the performance requirements of this European Standard.

**4.2 Materials****4.2.1 Stainless steel**

Stainless steels used for clamping bands, shear band clamps and adjustor units shall be either 1.4307, 1.4301, 1.4404, 1.4401, 1.4571, 1.4303 or 1.4567 listed in EN 10088-1:2014, Table 4 or have equivalent or greater corrosion resistance.

The components formed from strip material shall be manufactured from tempered rolled steel to the above specification with a tensile strength level of +C850 according to EN 10088-2 or hardness HV (300 ± 25) according to EN 10151:2002.

All stainless steel parts shall be edge dressed and free from sharp edges to prevent injury to the installer and damage to the rubber sleeve.

The worm drive units used for shear bands shall be of the same design and specification as those for the clamping bands.

**4.2.2 Rubber****4.2.2.1 General**

Rubber used in coupling and adaptor bodies and bushes shall comply with EN 681-1.

**4.2.2.2 Joining rubber sections**

Where it is necessary to join rubber sections this shall be using the vulcanisation process.

## 4.3 Product characteristics

### 4.3.1 Dimensional tolerances

#### 4.3.1.1 General

Only minimum dimensions are specified in Table 1 and Table 2. Manufacturers can use dimensions greater than these to suit the specific application.

#### 4.3.1.2 Rubber components

The tolerances on the manufactured dimensions of moulded and fabricated rubber components shall comply with ISO 3302-1:2014, Class M3.

#### 4.3.1.3 Extruded rubber

The tolerances on the manufactured dimensions of extruded rubber strip shall comply with ISO 3302-1:2014, Class E3.

#### 4.3.1.4 Adaptors and Type 1 couplings

Dimensions of rubber and metal components shall be in accordance with the manufacturers declared specifications.

#### 4.3.1.5 Type 2 couplings

Minimum dimensions of the rubber and metal components shall comply with Table 1 for Type 2A couplings or Table 2 for Type 2B couplings. Tolerances on stainless steel thicknesses shall comply with EN ISO 9445-1:2010, Table 1, normal grade.

Type 2A couplings can be used where the jointed pipes are of the same outside diameter to tight tolerances. In addition the pipe ends shall be square, for example to the tolerance specified in EN 295-1:2013, 5.4, and with a maximum separation of 10 mm. For larger separations and tolerances on squareness of ends and other applications, Type 2B couplings are required.

**Table 1 — Minimum dimensions of Type 2A couplings**

Dimensions in millimetres

Nominal coupling size <sup>a</sup>	Width of sleeve	Thickness under clamping band	Width of shear band	Thickness of shear band	Width of clamping band	Thickness of clamping band
Up to 400	102	3,0	32	0,4	12	0,6
401–1000	160	3,5	32	0,5	12	0,6

<sup>a</sup> maximum outside diameter of the pipe which can be used with a metal banded flexible coupling or adaptor.

Table 2 — Minimum dimensions of Type 2B couplings

Dimensions in millimetres

Nominal coupling size <sup>a</sup>	Width of sleeve	Thickness under clamping band	Width of shear band	Thickness of shear band	Width of clamping band	Thickness of clamping band
Up to 200	120	7,0	54	0,35	12	0,6
201–300	150	7,5	78	0,35	12	0,6
> 301	185	9,0	97	0,75	12	0,6

<sup>a</sup> maximum outside diameter of the pipe which can be used with a metal banded flexible coupling or adaptor. The minimum thickness of rubber under the shear band shall be 4 mm.

### 4.3.2 Tightness of joint assemblies

Metal banded flexible couplings and adaptors and bushes shall be tested and declared in accordance with EN 16397-1:2014, 5.4.

### 4.3.3 Strength of clamping and shear bands

#### 4.3.3.1 Testing of clamping band assemblies

##### 4.3.3.1.1 General

Metal banded flexible couplings and adaptors and bushes shall be tested and declared in accordance with 4.3.3.

Unless features are in place to prevent accidental over tightening, the clamping band assembly for nominal coupling sizes of < 600 mm shall stand the minimum torque of 17 Nm when tested in accordance with the test method in 5.1 where a lever device such as a ratchet spanner is required or recommended for tightening. For nominal coupling sizes of 600 mm to 1 000 mm the minimum torque shall be 17 Nm or 1,25 times the manufacturer's recommended torque, whichever is the greater.

Where a lever device is not required or recommended for tightening for couplings of less than 300 mm nominal size, the clamping band assembly shall stand a minimum torque of 10 Nm when tested in accordance with the test method in 5.1.

##### 4.3.3.1.2 Visual testing

When subjected to the test specified in 5.1, clamping band and shear band assemblies including adjustors and their means of fixing shall not exhibit any obvious signs of physical distress or degradation.

#### 4.3.3.2 Testing of means of fixing clamping and shear band adjustor strips

##### 4.3.3.2.1 General

The means of fixing adjustor strips to clamping or shear bands shall be stronger than the parent material as demonstrated by the failure of the parent material rather than the means of fixing when tested in accordance with 5.2. The assembly shall withstand a minimum force of 6 000 N.

##### 4.3.3.2.2 Visual testing

When subjected to the test specified in 5.2, the test piece shall remain joined.