

**SLOVENSKI STANDARD**  
**SIST EN 751-3:2022****01-november-2022****Nadomešča:****SIST EN 751-3:1997****SIST EN 751-3:1997/AC:1999**

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**Tesnilni materiali za kovinske navojne zveze v stiku s plini 1., 2. in 3. družine ter vročo vodo - 3. del: Nesintrani PTFE trakovi in vrvice**

Sealing materials for metallic threaded joints in contact with 1st, 2nd and 3rd family gases and hot water - Part 3: Unsintered PTFE tapes and PTFE strings

Dichtmittel für metallene Gewindeverbindungen in Kontakt mit Gasen der 1., 2. und 3. Familie und Heißwasser - Teil 3: Ungesinterte PTFE-Bänder und -Fäden

Matériaux d'étanchéité pour raccords filetés en contact des gaz du 1ère, 2ème et 3ème groupe et de l'eau chaude - Partie 3 : Bandes et cordons en PTFE non fritté

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## Sealing materials for metallic threaded joints in contact with 1st, 2nd and 3rd family gases and hot water - Part 3: Unsintered PTFE tapes and PTFE strings

Matériaux d'étanchéité pour raccords filetés en contact des gaz de la 1ère, 2ème et 3ème famille et de l'eau chaude - Partie 3 : Bandes et cordons en PTFE non fritté

Dichtmittel für metallene Gewindeverbindungen in Kontakt mit Gasen der 1., 2. und 3. Familie und Heißwasser - Teil 3: Ungesinterte PTFE-Bänder und -Fäden

This European Standard was approved by CEN on 27 April 2022.

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 CEN-CENELEC 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 CEN-CENELEC Management Centre has the same status as the official versions.

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COMITÉ EUROPÉEN DE NORMALISATION  
EUROPÄISCHES KOMITEE FÜR NORMUNG

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## European foreword

This document (EN 751-3:2022) has been prepared by Technical Committee CEN/TC 208 “Elastomeric seals for joints in pipework and pipelines”, the secretariat of which is held by BSI.

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 December 2022, and conflicting national standards shall be withdrawn at the latest by December 2022.

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

This document supersedes EN 751-3:1996.

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

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

The following main technical changes have been made compared to EN 751-3:1996:

- a) normative references have been updated;
- b) definitions have been added;
- c) requirements and tests for strings have been added;
- d) differentiation between PTFE tapes and PTFE strings has been added;
- e) restriction of use of APFO and PFOA has been added;
- f) requirements and testing of mass per area and mass per length have been specified and added;
- g) requirements and testing for the PTFE structure and material have been added;
- h) wrapping properties have been specified;
- i) possibility of adjustment has been deleted;
- j) for the determination of residual lubricant content, a thermogravimetric method has been added;
- k) for the determination of residual lubricant content, the quantities and associated vessel volumes were reduced in the analytical method;
- l) for the determination of structure and material, DSC method has been added;
- m) testing of wrapping properties has been added and specified;
- n) requirements for the test samples and their assembly have been added and specified;
- o) evaluation of failed samples after assembly has been added;

**EN 751-3:2022 (E)**

- p) temperature cycling test has been revised and specified;
- q) vibration test has been deleted;
- r) marking has been clarified;
- s) Annex ZA has been added.

The EN 751 series comprises the listed parts:

- Part 1: Anaerobic jointing compounds;
- Part 2: Non-hardening jointing compounds;
- Part 3: Unsintered PTFE tapes and strings.

Any feedback and questions on this document should be directed to the users' national standards body. A complete listing of these bodies can be found on the CEN website.

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

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SIST EN 751-3:2022

<https://standards.iteh.ai/catalog/standards/sist/a64f66f4-2600-4257-a8db-115bf28c56b8/sist-en-751-3-2022>

## Introduction

This document specifies requirements and test methods for tapes and strings produced from virgin unsintered polytetrafluorethylene (PTFE) for use with metallic threaded joints. It specifies two classes of PTFE tapes and PTFE strings – mainly differing in thickness and mass per area – for fine (F) and coarse (G) threads.

A universally applicable PTFE tape or PTFE string may be used for all gas, potable water and hot water installation.

In respect of potential adverse effects of the jointing compounds covered by this document on the quality of water intended for human consumption this document provides no information as to whether the jointing compounds may be used without restriction in any of the Member States of the EU or EFTA. The use and characteristics of the jointing compounds should comply with current regulations, where they exist, depending the acceptance of verifiable European criteria.

Compared to previous standard EN 751-3:1996, this document does not include an assessment of the turning back properties. It has been determined in practice and during periodic tests that these properties can only be reproduced to a limited extent. Turning back during installation should be avoided. Should a connection made with PTFE tapes or threads nevertheless (have to) be turned back during installation, this is the responsibility of the user. It is common sense that installations are checked for tightness after completion.

Although PTFE natural colour is white and most common for PTFE tapes and PTFE strings, other colours may be used as well.

Test practice since the standard was published has shown that the vibration test has not provided any additional information about the tightness of the threaded connections. Therefore, the test was removed from the test schedule of the standard.

[SIST EN 751-3:2022](https://standards.iteh.ai/catalog/standards/sist/a64f66f4-2600-4257-a8db-115bf28c56b8/sist-en-751-3-2022)

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**EN 751-3:2022 (E)****1 Scope**

This document specifies requirements and test methods for unsintered polytetrafluorethylene (PTFE) tapes and polytetrafluorethylene (PTFE) strings (PTFE tapes or PTFE strings, for short) which are suitable for sealing threaded metallic joints as specified in EN 10226-1:2004.

This document covers two classes of PTFE tapes and PTFE strings suitable for fine (F) and coarse (G) threads.

The PTFE tapes and PTFE strings are used as sealing materials for metallic threaded joints in contact with 1<sup>st</sup> family gases (town gas), 2<sup>nd</sup> family gases (natural gas) and 3<sup>rd</sup> family gases (liquefied petroleum gases (LPG)) up to 500 kPa, up to 700 kPa for hot water of heating systems, and up to 20 kPa in gas appliances and their auxiliary equipment. The maximum working pressure covered in this document is 2000 kPa which is relevant to LPG storage. The temperature range is limited to -20 °C to 125 °C.

**2 Normative references**

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 10242:1994,<sup>1</sup> *Threaded pipe fittings in malleable cast iron*

EN 10255:2004+A1:2007, *Non-alloy steel tubes suitable for welding and threading — Technical delivery conditions*

EN 12164:2016, *Copper and copper alloys — Rod for free machining purposes*

EN 10226-1:2004, *Pipe threads where pressure tight joints are made on the threads — Part 1: Taper external threads and parallel internal threads — Dimensions, tolerances and designation*

<https://standards.iteh.ai/catalog/standards/sist/a64f66f4-2600-4257-a8db->  
EN 10226-3:2005, *Pipes threads where pressure tight joints are made on the threads — Part 3: Verification by means of limit gauges*

EN ISO 11357-3:2018, *Plastics — Differential scanning calorimetry (DSC) — Part 3: Determination of temperature and enthalpy of melting and crystallization (ISO 11357-3:2018)*

EN ISO 11358-1:2014, *Plastics — Thermogravimetry (TG) of polymers — Part 1: General principles (ISO 11358-1:2014)*

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<sup>1</sup> This document is currently impacted by the stand-alone amendments EN 10242:1994/A1:1999 and EN 10242:1994/A2:2003.



### 3 Terms and definitions

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

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <https://www.electropedia.org/>

#### 3.1

##### **PTFE tape**

thread sealing tape manufactured from virgin unsintered polytetrafluorethylene (PTFE) without fillers or additives

#### 3.2

##### **PTFE string**

thread sealing string manufactured from virgin unsintered polytetrafluorethylene (PTFE) without fillers or additives

Note 1 to entry: PTFE strings are also known as “PTFE cords”.

#### 3.3

##### **gas family**

group of gaseous fuels with similar burning behaviour linked together by a range of Wobbe indices

Note 1 to entry: For further information on types of gases see EN 437:2021.

#### 3.4

##### **batch**

any quantity of PTFE-tapes or PTFE strings manufactured in a single mix at one time

### 4 Differentiation and classification of PTFE tapes and PTFE strings

#### 4.1 Differentiation

Tapes and strings differ in their geometry, weight per unit area and application. Both have a rectangular geometry, whereby the tapes are thin and wide, while the strings are thick and narrow. Therefore, tapes have to be wrapped overlapping, while strings are wrapped crosswise with a larger number of windings. In addition, the strings have a greater weight per unit area.

NOTE 1 Typical tape dimensions; 12 mm × 0,10 mm.

NOTE 2 String dimensions; e.g. 2 mm × 0,5 mm, other cross sections are possible.

#### 4.2 Classification

There are two classes of PTFE tapes and PTFE strings suitable only for fine (F) and for fine and coarse (G) threads in accordance with Table 1.

**Table 1 — Classification of PTFE tapes and PTFE strings**

Class	Thread		Nominal size
F	EN 10226-1:2004	taper/parallel	DN ≤ 10 <sup>a</sup>
G	EN 10226-1:2004	taper/parallel	DN ≤ 50

<sup>a</sup> Class F tapes and strings may also be used for other dimensions when the number of turns of the thread is ≥ 7,5 cm<sup>-1</sup>.

## 5 Requirements

### 5.1 Requirements to be met by the PTFE tape and PTFE strings as received

#### 5.1.1 General

PTFE shall be produced without using APFO (ammonium perfluorooctanoate) and PFOA (perfluorooctanoic acid).

The PTFE tape and PTFE string shall be free from inclusions or imperfections visible to the naked eye and shall be free from any surface or edge defects, when tested in accordance with 7.2.1.

#### 5.1.2 Tape and string dimensions

##### 5.1.2.1 Length

The actual length of the PTFE tape and PTFE string, when tested in accordance with 7.2.2.1, shall not be less than that marked on the spool/ dispenser.

##### 5.1.2.2 Width

The actual width of the PTFE tape, when tested in accordance with 7.2.2.2, shall not differ from that marked on the spool by more than ±0,5 mm.

The actual width of the PTFE string, when tested in accordance with 7.2.2.2, shall not differ from that marked on the dispenser by more than ±10 %.

##### 5.1.2.3 Thickness

The thickness of the PTFE tape and PTFE string, when tested in accordance with 7.2.2.3, shall not differ from the stated value by more than ±10 %.

#### 5.1.3 Mass

##### 5.1.3.1 Mass per area for PTFE tapes

The mass per area of the PTFE tape, when tested in accordance with 7.2.3.1, shall be greater than 90 % of the value declared by the manufacturer, but not less than:

- 60 g/m<sup>2</sup> for class F;
- 100 g/m<sup>2</sup> for class G.

##### 5.1.3.2 Mass per length for PTFE strings

The mass per length of the PTFE string, when tested in accordance with 7.2.3.2, shall be greater than 90 % of the value declared by the manufacturer, but not less than 0,3 g/m for both classes.

#### 5.1.4 Residual lubricant content

The residual lubricant content of the PTFE tape and PTFE string, when tested in accordance with 7.2.4.1 or 7.2.4.2, shall not exceed 0,1 % by mass.

#### 5.1.5 PTFE structure and material

Using DSC (differential scanning calorimetry) method. The conditions during manufacture shall be such that the tape or string remains in the unsintered state, during the test in accordance with 7.2.5 a shift or change in the peak temperature of the initial melting peak shall be given. The enthalpy for the first heating shall be significantly higher than for the second one. The following peak temperatures shall be met:

- $(345 \pm 5)$  °C during heating up from ambient temperature to  $(380 \pm 5)$  °C;
- $(312 \pm 5)$  °C during cooling down from  $(380 \pm 5)$  °C to  $(50 \pm 5)$  °C;
- $(327 \pm 5)$  °C during heating up from  $(50 \pm 5)$  °C to  $(380 \pm 5)$  °C.

NOTE Experience shows that these requirements only can be met by use of virgin materials.

PTFE tapes or PTFE strings shall be manufactured from virgin consistent PTFE that does not contain any filler (exception of colour) and is free of APFO and/or PFOA.

#### 5.1.6 Wrapping properties

When wrapped around the specified thread in accordance with 7.2.6.1 or 7.2.6.2, the PTFE tape shall conform to and hold the thread form. The finishing end of the PTFE tape shall remain in position with no tendency to unwind. During wrapping the PTFE tape shall not break, tear, or split.

When wrapped around the specified thread in accordance with 7.2.6.3 or 7.2.6.4, the PTFE string shall conform to and hold the thread form. The finishing end of the PTFE string shall remain in position with no tendency to unwind. During wrapping the PTFE string shall not break, tear, or split.

### 5.2 Requirements to be met by the PTFE tape and PTFE string after assembly

#### 5.2.1 Sealing properties

##### 5.2.1.1 General

When tested in accordance with the methods described in 7.3.1 the PTFE tape and PTFE string shall not permit any leakage, when each test assembly is tested in accordance with 7.3.1.2 and 7.3.1.3 in sequence.

##### 5.2.1.2 Tightness

When pressurized, within 1 h after preparation all the joints in the test assemblies shall not leak, when tested in accordance with 7.3.1.2.

##### 5.2.1.3 Resistance to temperature cycling

The sealing properties of the PTFE tapes and PTFE strings shall not be impaired by the temperature cycling test in accordance with 7.3.1.3.

#### 5.2.2 Dismantling

When dismantling the screwed joints with commercial tools, after all tests in accordance with 7.3.2 have been completed, there shall be no damage or corrosion of the threads.