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Secretariat: NEN

~~Plastics piping systems for the supply of gaseous fuels —  
Unplasticized polyamide (PA-U) piping systems with fusion  
jointing and mechanical jointing — Part 7: Assessment of  
Conformity~~

~~*Systèmes de canalisations en matières plastiques pour la distribution de combustibles gazeux — Systèmes de canalisations en polyamide non plastifié (PA-U) avec assemblages par soudage et assemblages mécaniques — Partie 7: L'évaluation de la conformité*~~

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**Plastics piping systems for the supply of gaseous fuels — Unplasticized polyamide (PA-U) piping systems with fusion jointing and mechanical jointing — Part 7: Assessment of conformity**

*Systèmes de canalisations en matières plastiques pour la distribution de combustibles gazeux — Systèmes de canalisations en polyamide non plastifié (PA-U) avec assemblages par soudage et assemblages mécaniques — Partie 7: L'évaluation de la conformité*

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## Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part-1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part-2 (see [www.iso.org/directives](http://www.iso.org/directives)).

~~In addition to text written in the official ISO languages (English, French, Russian), this document gives text in German. This text is published under the responsibility of the Member Body for DE and is given for information as regional CEN requirement only. Only the text given in the official languages can be considered as ISO text.~~

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. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see [www.iso.org/patents](http://www.iso.org/patents)).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see [www.iso.org/iso/foreword.html](http://www.iso.org/iso/foreword.html).

This document was prepared by Technical Committee ISO/TC138/TC 138, *Plastics pipes, fittings and valves for the transport of fluids*, Subcommittee SC 4, *Plastics pipes and fittings for the supply of gaseous fuels*, in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 155, *Plastics piping systems and ducting systems*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

A list of all parts in the ISO 16486 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at [www.iso.org/members.html](http://www.iso.org/members.html).

## Introduction

This ~~part of ISO 16486 document~~ specifies requirements and guidance for the assessment of conformity (AoC) for a piping system and its components made from unplasticized polyamide (PA-U), and which is intended to be used for the supply of gaseous fuels.

Requirements and test methods for material and components of the piping system are specified in ISO\_16486-1, ISO 16486-2, ISO 16486-3, and ISO 16486-4.

Characteristics for fitness for purpose of the system and generic fusion parameters are covered in ISO\_16486-5.

Recommended practice for installation is ~~given provided~~ in ISO\_16486-6, which will not be implemented as European Standard under the Vienna Agreement.

~~NOTE 1 Recommended practice for installation is also given in will be given provided in CEN/TS 12007-6<sup>[1]</sup>, Gas infrastructure — Pipelines for maximum operating pressure up to and including 16 bar — Part 6: Design, handling, installation and operation of unplasticized polyamide (PA-U) piping systems with fusion joining and mechanical jointing — Functional recommendation, that has been,<sup>[1]</sup> prepared by Technical Committee CEN/TC234/TC 234, Gas infrastructure.~~

Training and assessment of fusion operators is given in ISO-/TS 16486-8.

~~This part of NOTE While ISO\_16486 covers guidance for the assessment of conformity of the system.~~

~~Parts\_1, ISO 16486-2, ISO 16486-3, ISO 16486-5, 6, ISO 16486-6 and ISO/TS 16486-7 (this part) document) and ISO/TS 16486-8 have been prepared by ISO/TC138/SC4. Part TC 138. SC 4. ISO 16486-4 has been prepared by ISO/TC138/TC 138, SC 7.~~

This document details the applicable characteristics to be assessed for type testing (TT), batch release ~~testtesting~~ (BRT), process verification ~~testtesting~~ (PVT), and audit ~~testtesting~~ (AT), as well as the frequency and sampling for testing.

The concept of testing and ~~organisation~~organization of those tests used for the AoC is shown, without or with certification, in Figures 1 and 2.

~~NOTE 2 Figures 1 and 2 are taken over from ISO/TS 15874-7<sup>[2]</sup>.~~

A typical scheme for the assessment of conformity of materials, compounds, pipes, fittings, valves, joints or assemblies by product manufacturers is given in Figure 1.



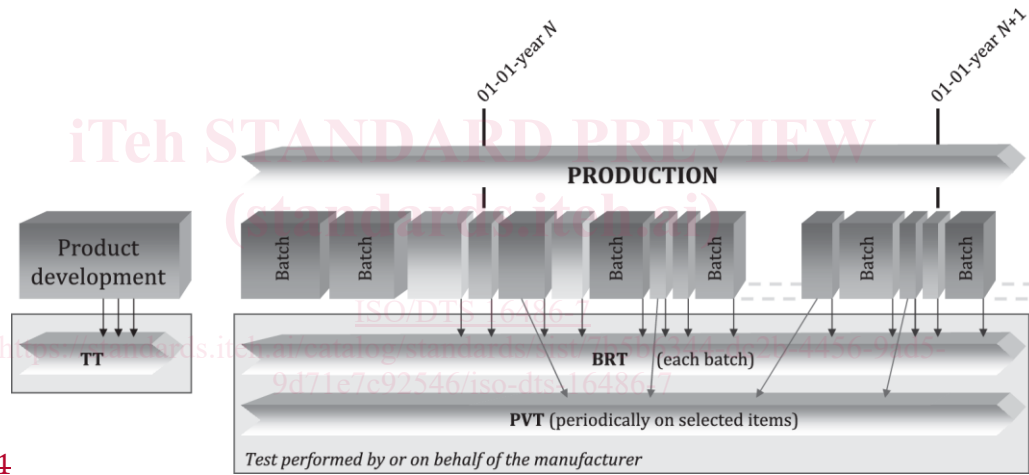
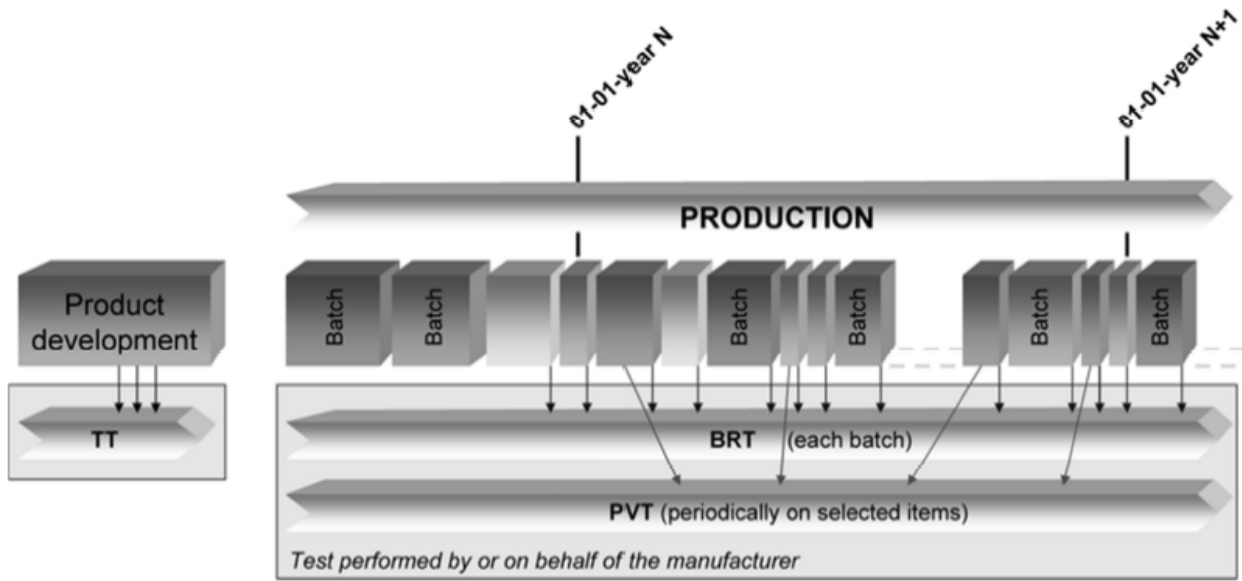
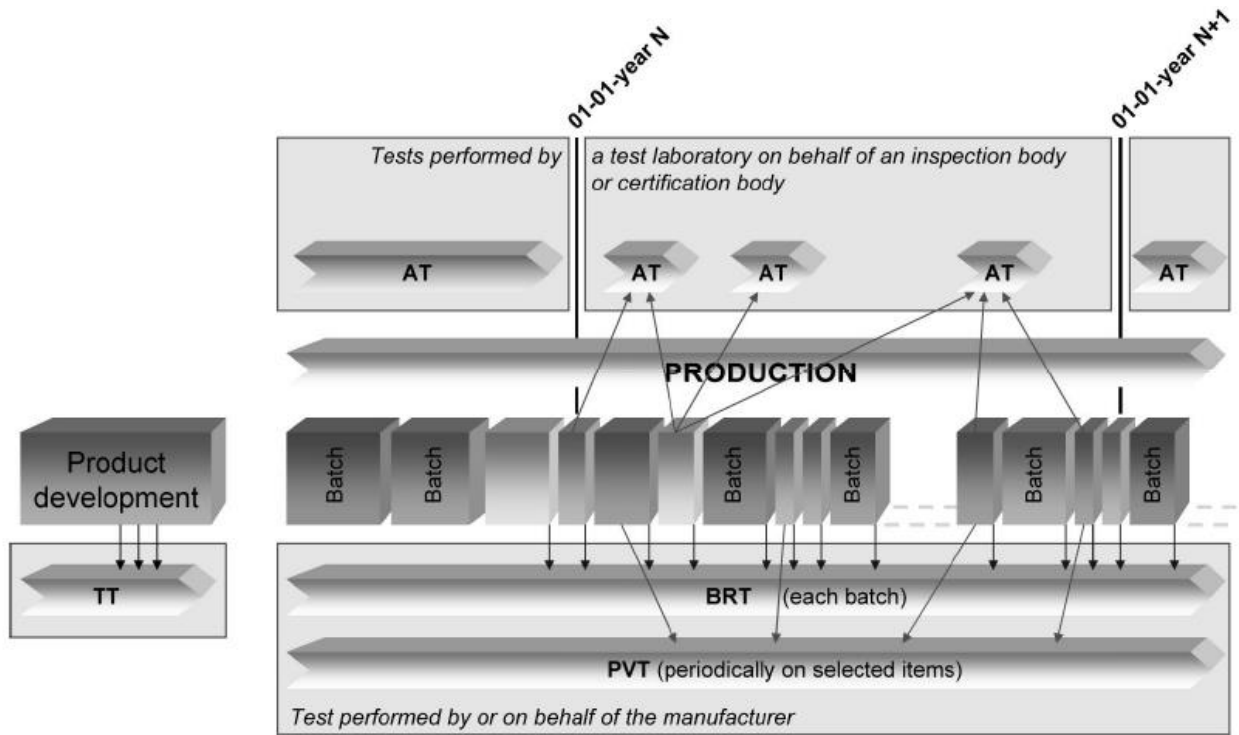


Figure 1

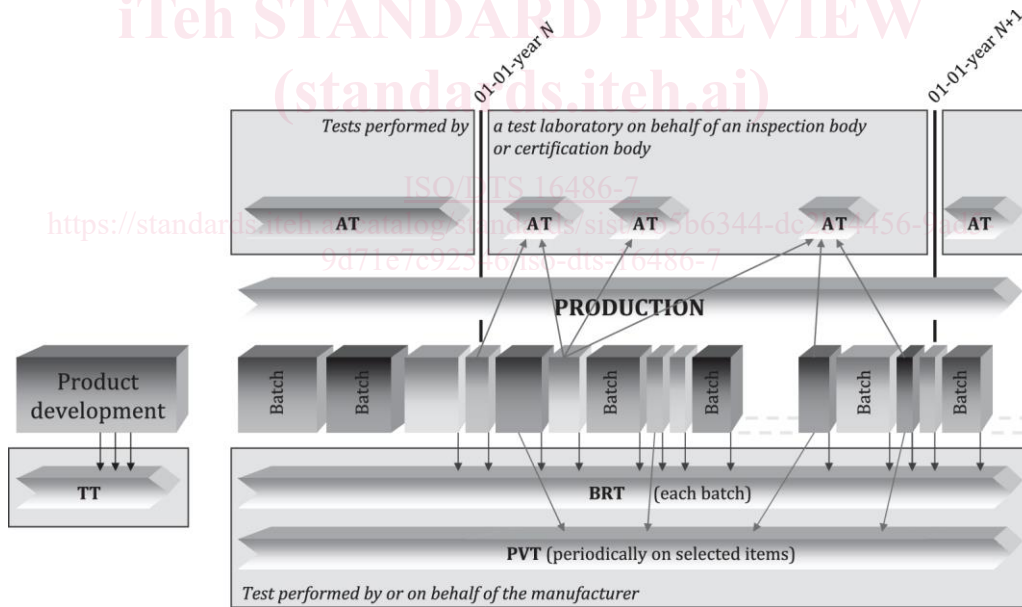
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**Figure 1 — Typical scheme for the AoC by a manufacturer, without certification**

A typical scheme for the assessment of conformity of compounds, pipes, fittings, valves, joints or assemblies by manufacturers, including certification, is given in Figure 2.



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Figure 22 — Typical scheme for the AoC by a manufacturer, including certification

# ~~Plastics piping systems for the supply of gaseous fuels — Unplasticized polyamide (PA-U) piping systems with fusion jointing and mechanical jointing — Part 7: Assessment of Conformity~~

## Plastics piping systems for the supply of gaseous fuels — Unplasticized polyamide (PA-U) piping systems with fusion jointing and mechanical jointing — Part 7: Assessment of Conformity

### 1 Scope

This document gives guidance and requirements for the assessment of conformity of compounds, products, joints and assemblies in accordance with the applicable part(s) of the ISO 16486 series which are intended to be included in the manufacturer's quality plan as part of the quality management system and for the establishment of certification procedures.

NOTE 1 A basic test matrix in Annex B provides an overview of the testing scheme in Annex B.

It is recommended that the manufacturer ~~has~~have a management system such as ISO 9001<sup>[4]</sup> or equivalent.

NOTE 2 If certification is involved, ~~the~~certification bodybodies and inspection bodybodies operating according to ISO/IEC 17065<sup>[5]</sup> and ISO/IEC 17020<sup>[6]</sup> are considered to be competent.

In conjunction with the other parts of the ISO 16486 series (see clause Clause 2 Normative References), this ~~Technical Specification document~~ is applicable to unplasticized polyamide (PA-U) piping systems intended to be buried and used for the supply of gaseous fuels. It is applicable to PA-U pipes, fittings, and valves, as well as to their joints and to joints with components of other materials intended to be used under the following conditions:

- ~~—~~a maximum operating pressure, ~~(MOP),~~ up to and including ~~18 bar~~<sup>[1]</sup> bar<sup>1</sup> (the MOP is limited to 16 bar for CEN member countries, where ~~part 6 of this standard~~ ISO 16486-6 is replaced by CEN- /TS 12007-6<sup>[1]</sup>);
- an operating temperature of 20 °C as the reference temperature.

NOTE 3 For operating temperatures different to 20 °C, derating coefficients can be used, ~~(see ISO 16486-6).~~ CEN member countries ~~have to base on use~~ CEN /TS 12007-6<sup>[1]</sup> and ISO- /TS 16486-7 (this specification), ~~document~~ as a basis, but they can ask for also request additional requirements. For non-CEN member countries ~~orientation, information~~ for dealing with special cases for PA-U can ~~also~~ be found in ISO- /TS 16486-7 (this specification document) and PPI TR-3<sup>[7]</sup>.

For mechanical fittings conforming to ISO 17885, guidance for assessment of conformity is not given in this ~~part of ISO 16486 document~~. When requested, a quality plan based on the tests mentioned ~~should~~can be set up in agreement between user and manufacturer.

The ISO 16486 series covers a range of maximum operating pressures and gives requirements concerning colours.

<sup>1</sup> 1 bar = 0,1 MPa = 10<sup>5</sup> Pa; 1 MPa = 1 N/mm<sup>2</sup>.

NOTE 4 It is the responsibility of the purchaser or specifier to make the appropriate selections from these aspects, taking into account their particular requirements and any relevant national regulations and installation practices or codes.

## 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.

1) 1 bar = 0,1 MPa. = 105 Pa; 1 MPa = 1 N/mm<sup>2</sup>

ISO 6259-1, *Thermoplastics pipes — Determination of tensile properties — Part 1: General test method*

ISO 12162, *Thermoplastics materials for pipes and fittings for pressure applications — Classification, designation and design coefficient*

ISO 13477, *Thermoplastics pipes for the conveyance of fluids — Determination of resistance to rapid crack propagation (RCP) — Small-scale steady-state test (S4 test)*

ISO 16486-1-1:2020, *Plastics piping systems for the supply of gaseous fuels — Unplasticized polyamide (PA-U) piping systems with fusion jointing and mechanical jointing — Part 1: General*

ISO 16486-2:2020, *Plastics piping systems for the supply of gaseous fuels — Unplasticized polyamide (PA-U) piping systems with fusion jointing and mechanical jointing — Part 2: Pipes*

*piping systems with fusion jointing and mechanical jointing — Part 1: General*

ISO 16486-2-3:2020, *Plastics piping systems for the supply of gaseous fuels — Unplasticized polyamide (PA-U) piping systems with fusion jointing and mechanical jointing — Part 3: Fittings*

*piping systems with fusion jointing and mechanical jointing — Part 2: Pipes*

ISO 16486-3-4:2022, *Plastics piping systems for the supply of gaseous fuels — Unplasticized polyamide (PA-U) piping systems with fusion jointing and mechanical jointing — Part 4: Valves*

*piping systems with fusion jointing and mechanical jointing — Part 3: Fittings*

ISO 16486-4-5:2021, *Plastics piping systems for the supply of gaseous fuels — Unplasticized polyamide (PA-U)*

*piping systems with fusion jointing and mechanical jointing — Part 4: valves*

ISO 16486-5, *Plastics piping systems for the supply of gaseous fuels — Unplasticized polyamide (PA-U) piping systems with fusion jointing and mechanical jointing — Part 5: Fitness for purpose of the system*

ISO 16486-6, *Plastics piping systems for the supply of gaseous fuels — Unplasticized polyamide (PA-U) piping systems with fusion jointing and mechanical jointing — Part 6: Code of practice for design, handling and installation*

ISO 17885, *Plastics piping systems — Mechanical fittings for pressure piping systems — Specifications*

## 3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 16486-1, ISO 16486-2, ISO 16486-3, ISO 16486-4 and ISO 16486-5 and the following apply.

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

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

### 3.1

#### certification body

third-party conformity assessment body operating certification schemes

Note 1 to entry: A certification body can be non-governmental or governmental (with or without regulatory authority).

### 3.2

#### laboratory

body that performs one or more of the following activities:

— testing;

— calibration;

— sampling, associated with subsequent testing or calibration

Note 1 to entry: ~~In~~Within the context of this document, the materials and products can be subjected to type testing, batch release testing, process verification testing and audit testing, as applicable.

### 3.3

#### quality management system

part of a management system with regard to quality

[SOURCE: ISO 9000:2015<sup>[8]</sup>, definition 3.5.4]

Note 1 to entry: Requirements for quality management systems are given in ISO 9001<sup>[4]</sup>.

[SOURCE: ISO 9000:2015, 3.5.4, modified — Note 1 to entry added.]

### 3.4

#### quality plan

document setting out the specific quality practices, responsibilities, resources and sequence of activities relevant to a particular product or range of products

### 3.5

#### type testing

TT

test performed to prove that the material, component, product, joint or assembly is capable of conforming to the requirement(s) given in the relevant standard

### 3.6

#### batch release test

BRT

test performed on a batch of material, components, products, joints or assemblies which has to be satisfactorily completed before the batch can be released

Note 1 to entry: A batch release test can be performed by the manufacturer or outsourced on behalf of the manufacturer.

### 3.7

#### process verification test

##### PVT

test performed on material, component, product, joint or assembly at specific intervals to confirm that the process continues to be capable of producing components, products which conform to the requirements given in the relevant standard

Note 1 to entry:- Process verification tests can be performed by the manufacturer or outsourced on behalf of the manufacturer.

Note 2 to entry:- Process verification tests are regularly performed to demonstrate that the product remains compliant with the type test results.

Note 3 to entry: ISO/~~WD~~-AWI 8149<sup>[3]</sup>:—<sup>2</sup> presents the stress rupture curves for PA-U and PPI TR-4<sup>[9]</sup> ~~list~~lists the long-term hydrostatic strength at different temperatures for a number of different PA-U piping materials.

### 3.8

#### audit test

##### AT

test performed on behalf of a certification body

Note 1 to entry: Audit tests are generally required to confirm that the compound, components, product, joint or assembly continues to conform to the requirements given in the relevant standard and to provide information to assess the effectiveness of the quality management system.

### 3.9

#### indirect test

##### IT

batch release test performed which differs from that specified test for that particular characteristic, having previously verified its correlation with the specified test

Note 1 to entry: Indirect tests can be performed by the manufacturer or outsourced on behalf of the manufacturer.

### 3.10

#### witness test

##### WT

type test or audit test which is performed in the presence of a representative of the certification body

### 3.11

#### material

generic term for compounds grouped by families, expressed by generic names

Note 1 to entry: Examples of generic names are PA-U 11, PA-U 12.

### 3.12

#### compound

---

<sup>2</sup> Under preparation. Stage and the time of publication: ISO/AWI 8149:2023.

homogenous mixture of substances used for the manufacture of the product as defined in the referring product standard

Note 1 to entry: **Annex A** gives testing requirements for changes made to the compound.

### 3.13

#### material batch

##### batch of material

quantity of a given homogeneous compound manufactured under uniform conditions defined and identified by the compound manufacturer

### 3.14

#### product

item as defined in the scope of ~~the standard~~ this document, e.g. pipe, fitting, valve

### 3.15

#### product batch

##### batch of products

clearly identified collection of products, manufactured consecutively or continuously under the same conditions, using the same compound conforming to the same specification

Note 1 to entry: The production batch is defined and identified by the product manufacturer.

### 3.16

#### lot

clearly identifiable sub-division of a batch for inspection purposes

### 3.17

#### sample

one or more units or products drawn from the same production batch or a lot, selected at random without regard to their quality

### 3.18

#### sampling plan

~~specification of the type of sampling to be used combined with the operational specification of the entities or increments to be taken, the samples to be constituted and the measurements to be made~~

~~EXAMPLE—A specific plan which indicates the type of test, the number of units of products or assemblies to be inspected~~

### 3.19

#### group

collection of similar components or products from which samples are selected for testing purposes

### 3.2019

#### component

item manufactured out of a specific compound, supplied as part of a product or as a spare part for that product

Note 1 to entry: Depending on the context, components may can potentially be considered as products and be individually approved (e.g. o-ring, gasket) or they are tested as an integral part of a finished product (e.g. in a valve).

### 3.2120

#### joint

connection between two or more products