

Proposed SANS Stub Standard

**SANS PE STUB STANDARD – STANDARD STUBS,
VICTAULIC STUBS and TAK STUBS**

1 Scope

This standard specifies the general aspects of various types of class 16 (PN16) SDR 11 stubs to be welded onto the ends of polyethylene (PE) pipes to facilitate joining pipes intended for use under the following conditions:

- i) a maximum pressure (MOP) up to and including 16 bar¹;
- ii) a reference operating temperature of 20° C.

NOTE 1 For applications operating at constant temperatures greater than 20° C and up to 40° C, see ISO 4427-1 Annexure A.

2 Normative references

The following referenced documents are indispensable in the application of this document and shall be the latest version of the said document:

ISO 1133 Plastics – Determination of the melt mass-flow (MFR) and the melt volume-flow rate (MVR) of thermoplastics

ISO 1167-1 Thermoplastics pipes, fittings and assemblies for the conveyance of fluids – Determination of resistance to internal pressure – Part 1: General method

ISO 1167-3 Thermoplastics pipes, fittings and assemblies for the conveyance of fluids – Determination of resistance to internal pressure – Part 3: Preparation of components

SANS 4427-1 Plastics piping systems – Polyethylene (PE) pipes and fittings for water supply – Part 1: General

SANS 4427-2, Plastics piping systems – Polyethylene (PE) pipes and fittings for water supply – Part 2: Pipes

SANS 4427-3, Plastics piping systems – Polyethylene (PE) pipes and fittings for water supply – Part 3: Fittings

SANS 4427-5 Plastics piping systems – Polyethylene (PE) pipes and fittings for water supply – Part 5: Fitness for purpose of the system

ISO 4433-1 Thermoplastic pipes – Resistance to liquid chemicals – Classification – Part 1: Immersion test method

ISO 4433-2 Thermoplastic pipes – Resistance to liquid chemicals – Classification – Part 2: Polyolefin pipes

SANS 4437-1, 2, 3 and 5 Plastics piping systems – Polyethylene (PE) pipes and fittings for the supply of gaseous fluids

ISO 9624 Thermoplastic pipes for fluids under pressure – Mating dimensions of flange adapters and loose backing flanges

ISO 10863 Welding – Use of TOFD technique for the examination of welds

ISO 11357-6 Plastics – Differential scanning calorimetry (DSC) – Part 6: Determination of oxidation induction time (isothermal OIT) and oxidation induction temperature (dynamic OIT)

ISO 12176-1 Plastics pipes and fittings – Equipment for fusion jointing polyethylene systems – Part1: Butt fusion

ISO 13951 Plastics piping systems – Test method for the resistance of polyolefin pipe/pipe or pipe/fitting assemblies to tensile loading

ISO 13953 Polyethylene (PE) pipes and fittings – Determination of the tensile strength and failure mode of test pieces from a butt-fused joint

ISO 13954 Plastics pipes and fittings – Peel decohesion test for polyethylene (PE) electro-fusion assemblies of nominal diameter greater than or equal to 90 mm

ISO 13955 Plastics pipes and fittings – Crushing decohesion test for polyethylene (PE) electrofusion assemblies

DIN 16963 Pipe joint assemblies and fittings for high density polyethylene (PE-HD) pressure pipes.

EN 681-1 Elastomeric seals – Materials requirements for pipe joint seals used in water and drainage applications – Part 1: Vulcanised rubber

EN 681-1 Elastomeric seals – Materials requirements for pipe joint seals used in water and drainage applications – Part 2: Thermoplastic elastomers

EN 5863-6 Non-destructive testing – TOFD technique for detection and sizing of discontinuities

EN 15617 Non-destructive testing – TOFD technique – Acceptance levels

SANS 1671-1 Welding of thermoplastics – Machines and equipment Part 1: Heated tool welding

SANS 1671-2 Welding of thermoplastics – Machines and equipment Part 2: Electro-fusion welding

SANS 10268-1 Welding of thermoplastics – Welding Processes Part 1: Heated tool welding

SANS 10268-2 Welding of thermoplastics – Welding Processes Part 2: Electro-fusion welding

SANS 10269 Welding of thermoplastics – Testing and approval of welders

SANS 10270 Welding of thermoplastics – Approval of welding procedures and welds

3 Terms, definitions, symbols and abbreviated terms

In this document, the terms, definitions, symbols and abbreviated terms given in SANS 4427-1, -2, -3 and -5 and the following terms and definitions apply.

3.1 electrofusion socket fitting

polyethylene (PE) fitting that contains integral heating elements which transform electrical energy into heat to fusion joint with a spigot end or pipe

3.2 stub spigot end

polyethylene (PE) stub where the outside diameter of the spigot end is equal to the nominal outside diameter, d_n , of the corresponding pipe

4 Material

4.1 PE compound

The compound from which the stubs are manufactured shall be PE100 conforming to SANS 4427-1 and 4427-2.

4.2 Material for non-polyethylene parts

4.2.1 General

The materials and constituent elements used in conjunction with the stub (including elastomers, greases and any metal parts) shall be as resistant to the external and internal environments as the other elements of the piping system and shall have a life expectancy under the following conditions at least equal to that of the PE pipe conforming to SANS 4427 with which they are intended to be used:

- a) during storage;
- b) under the effect of the fluids being conveyed;
- c) taking account of the service environment and operating conditions.

The requirements for the level of material performance for non-polyethylene parts shall be as least as stringent as that of the PE compound for the piping system.

Other materials used in conjunction with the stub and in contact with the PE pipe shall not adversely affect the performance or initiate stress cracking.

4.2.2 Metal parts

All parts susceptible to corrosion shall be adequately protected.

When dissimilar metallic materials are used, which may be in contact with moisture, steps shall be taken to avoid galvanic corrosion.

4.2.3 Elastomers

Elastomeric materials used for the manufacture of gaskets shall be suitable for the fluid being conveyed.

4.2.4 Other materials

Greases or lubricants shall not exude onto the fusion areas and shall not affect the long-term performance of the stub nor have any adverse effect on the quality of the water.

5 General characteristics

5.1 Appearance

When viewed without magnification, the internal and external surfaces of the stub shall be smooth, clean free from scoring, cavities and other surface defects such as would prevent conformity of the stub to this standard.

5.2 Design

The design of the stub shall be such that, when assembling the stub onto the pipe or other components in accordance with the manufacturer's recommendations, the loose flange and any gasket is not displaced.

5.3 Colour

The colour of the stub shall conform to the requirements of SANS 4427-2.

5.4 Electrical characteristics for electrofusion fittings

The machines and equipment shall conform to SANS 1671 and the welding process shall conform to SANS 10268-2.

5.5 Appearance of factory made joints

The following requirements apply only to joints made in the factory.

The internal and external surfaces of the pipe and stub after fusion jointing, examined visually and without magnification, shall be free from melt extrudate outside the confines of the stub apart from that which may be declared acceptable by the stub manufacturer or used for weld identification.

5.6 Effect on water

The stub shall conform to the requirements of SANS 4427 and national regulations.

6 Geometrical characteristics

6.1 Measurements and dimensions

The dimensions of the stubs shall be measured in accordance with ISO 3126. In case of dispute, the measurement of the dimensions shall be made not less than 24 hours after manufacture and after conditioning for at least 4 hours at 23° ($\pm 2^\circ$) C.

6.2 Dimensions of stubs

The finished dimensions of the stub, and the applicable tolerances, shall conform to the following:

- Standard stubs – Annexure I
- Victaulic stubs – Annexure II
- Takstubs – Annexure III

6.3 Dimensions of loose backing flanges

The dimensions of the loose backing flanges shall conform to the following:

- Loose flanges – Annexure IV

7 Mechanical characteristics

7.1 General

A stub shall be tested assembled with pipe or as part of an assembly of more than one fitting fused to pipe conforming to SANS 4427-2.

Each assembly shall be prepared from components (stubs, pipes and fittings) of the same pressure class.

7.2 Conditioning

Unless otherwise specified in the applicable test method, the test pieces shall be conditioned at 23° ($\pm 2^\circ$) C prior to testing.

7.3 Requirements

The test pieces shall be tested in accordance with Table 4 of SANS 4427-3. When tested using the test method and parameters specified therein, the stub shall have mechanical characteristics conforming to the requirements of Table 4.

7.4 Retest in case of failure at 80° C

Shall conform to “Retest in case of failure at 80° C” in SANS 4427-3.

7.5 Performance requirements

Shall conform to “Performance requirements” in SANS 4427-3 if applicable.

8 Physical characteristics

8.1 Conditioning

Unless otherwise specified in the applicable test method, the test pieces shall be conditioned at 23° (\pm 2°) C prior to testing.

8.2 Requirements

The processes by which the finished product is produced shall be at the discretion of the manufacturer on condition that the finished product conforms to this standard. The products shall conform to "Requirements" in SANS 4427-3 and as follows:

8.2.1 Dimensions and tolerances

The dimensions, and tolerances of PN16 (16 bar) SDR11 stubs, shall conform to the applicable values in Annexure I, II or III, as applicable. The dimensions and tolerances of all other pressure ratings shall be proven by the supplier with suitable testing.

The stub spigot shall be extended as necessary to accommodate the electro-fusion fitting where the stub is intended for such jointing method.

8.2.2 MFR

The MFR (Melt Flow Rate) of a sample taken from a finished product shall conform to the values in Table 1 of SANS 4427-1 and the requirements of Table 5 of SANS 4427-2.

8.2.3 OIT

The OIT (Oxidation Induction Time) of a sample taken from a finished product shall conform to the value in Table 5 of SANS 4427-1.

8.2.4 CBC and CBD

The carbon black content and dispersion of a sample taken from a finished product shall conform to the values in Table 1 of SANS 4427-1.

8.2.5 Structure

NDT (None Destructive Testing) shall be conducted using TOFD (Time of Flight Diffraction) Technique in accordance with ISO 10863, EN 5863-6 and EN 15617.

On any section cut through the finished product, an examination of the cut surface shall conform to the following:

- 8.2.5.1** The spigot of the stub shall have no voids, vacuoles, inclusions or any other structural discontinuities.

8.2.5.2 The distance of a void or vacuole from any external surface of the finished product shall not be less than the wall thickness of the spigot of the stub.

8.2.5.3 The maximum dimension of a void or vacuole shall not exceed 5% of the wall thickness of the spigot of the stub.

8.2.5.4 The profile of a void or vacuole, considered on any cross-section, shall have smooth curved edges with no angles.

8.2.5.5 The distance between adjacent voids or vacuoles shall not be less than the largest of their respective dimensions.

8.2.6 Surface

The stub shall have a clean smooth finish, except on the mating face where it may have concentric corrugations at regular spacing, with the edges free of lips and feathering.

8.2.7 Mating and welding faces

The stub mating and welding faces shall be parallel and perpendicular to the axis of the stub.

8.2.8 Mating face

The mating face of the stub shall have zero concavity and a maximum convexity of 0.4 mm.

8.2.9 Ovality

The maximum allowable ovality (out of roundness) shall conform to the values set out in Table 1 of SANS 4427-2.

8.2.10 Decohesion

The decohesion of a electro-fusion joint shall conform to the values set out in Table 2 of SANS 4427-1.

9 Chemical resistance of stubs in contact with chemicals

If, for a given installation, it is necessary to evaluate the chemical resistance of the stub, then the stub shall be classified in accordance with ISO 4433-1 and ISO 4433-2.

10 Performance requirements

When stubs conforming to this standard are assembled to components conforming to other parts of SANS 4427, the joints shall be in accordance with SANS 4427-5.

11 Marking

11.1 General

The finished product shall be marked in a clear and durable manner, e.g. laser printed, that shall contain, not less than, the following:

- 11.1.1 The manufacturer's name.
- 11.1.2 The OD (Outside Diameter) of the pipe for which the stub is intended.
- 11.1.3 The SDR (Standard Dimension Ratio) of the pipe for which the stub is intended.
- 11.1.4 The manufacturer shall affix a durable, e.g. laser printed, identification mark to their products to provide traceability as required in terms of their SANS 9001 QMS (Quality Management System) or equivalent approved.

11.2 Minimum required marking

The minimum required marking shall be in accordance with "Minimum required marking" SANS 4427-3.

11.3 Fusion system recognition

Shall conform to "Fusion system recognition" in SANS 4427-3.

12 Packaging

The stubs shall be packaged in bulk, or individually, in a manner that will prevent any deterioration after completion by the manufacturer to receipt by the customer.

The clearly marked packaging shall have at least one label with the manufacturer's name, type, SDR and number of units – any special storage conditions shall be clearly stated.

Annex I (normative)	Standard PN16 stubs
Annex II (normative)	Victualic PN16 stubs
Annex III (normative)	Takstubs PN16
Annex IV (normative)	Loose flanges
Annex V (normative)	Tolerances

Bibliography

N.B.: IFPA members shall have one year from the date of publication of this standard to comply with the requirements hereof.