

KENYA STANDARD

DKS 2970: 2022

ICS 23.040.01; 91.140.80

First Edition

**Polypropylene (PP) pipe fittings for soil,
waste and vent applications for above-
ground use — Specification**

DKS 2970: 2022

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Altek/ Sunace

Apex Piping Ltd.

General Industries Ltd.

Isole engineering

Kingspipe Ltd.

Krona Plastics Limited

Pipe Masters

Qatar Plastics Industries Ltd

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Polypropylene (PP) pipe fittings for soil, waste and vent applications for above-ground use — Specification

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Foreword

This Kenya Standard was prepared by the Plastic Pipes and Fittings Technical Committee under the guidance of the Standards Projects Committee, and it is in accordance with the procedures of the Kenya Bureau of Standards.

With the technological development in the Industry coupled with innovation, polypropylene pipes and fittings are coming in handy for use in the plastic industry.

During the preparation of this Standard, reference was made to the following documents:

KS ISO 7671:2003; Polypropylene pipes and fittings (jointed by means of elastomeric sealing rings) for soil and waste water discharge (Low and high temperature) systems inside buildings- Specifications

SANS 721:2018; Polypropylene (PP) pipe fittings for soil, waste and vent applications for above-ground use

Acknowledgement is hereby made for the assistance derived from these sources.

Polypropylene (PP) pipe fittings for soil, waste and vent applications for above-ground use — Specification

1 Scope

This Draft Kenya Standard specifies dimensions, sealing method and test methods for polypropylene (PP) pipe fittings of nominal sizes 32mm to 200mm intended for above-ground non-pressure applications for the conveyance of soil (human excrement or faeces) and waste water where continuous temperatures in excess of 60°C are not encountered.

This standard is applicable to polypropylene (PP) pipe fittings with an integral socket to be jointed by means of hot glue gun.

2 Normative references

The following referenced 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.

ISO 13264, *Thermoplastics piping systems for non-pressure underground drainage and sewerage — Thermoplastics fittings — Test method for mechanical strength or flexibility of fabricated fittings*

ISO 580, *Plastics piping and ducting systems — Injection-moulded thermoplastics fittings — Methods for visually assessing the effects of heating*

ISO/TR 7024, *Above-ground drainage — Recommended practice and techniques for the installation of unplasticized polyvinyl chloride (PVC-U) sanitary pipework for above-ground systems inside buildings*

3 Terms and definitions

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

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

— ISO Online browsing platform: available at <http://www.iso.org/obp>

3.1 nominal size
nominal inside diameter of the body of the main limb or, in the case of a reducer, the combination of the nominal sizes of the large and small ends

3.2 pipe fitting fitting
component that is used to so connect pipes as to form a soil and waste water installation

3.3 polypropylene (PP)
material based on the monomer propylene to which are added those additives needed to facilitate the manufacture of components that comply with the requirements of this standard

NOTE Polypropylene is type PP-H (homopolymer) or type PP-B (block copolymer) or type PP-R (random copolymer).

4 Abbreviations

DN/ID Nominal inside diameter/ Inside diameter

PP Polypropylene

5 Material

5.1 Base material

5.1.1 The base material shall be polypropylene (PP).

5.1.2 The use of non-PVC piping in drainage installations may entail additional material design requirements.

5.2 Melt mass-flow rate

Pipe fittings shall be made from PP materials with an MFR (230/2, 16) ≤ 0.25 g/10 min for pipe fittings.

5.3 Resistance to ultraviolet radiation

The fittings shall be sufficiently stabilized against thermal ageing and ultraviolet (UV) light.

5.4 Resistance to temperature cycling

The test assembly used shall meet the requirements given in annex D.

Annex E specifies the information to be provided in the test report.

6 General characteristics

6.1 Appearance

When viewed without magnification, the pipe fittings shall comply with the following requirements:

- a) the internal and external surfaces shall be smooth, clean and free from grooving, blistering, impurities, pores and any other surface irregularity likely to prevent compliance with this standard; and
- b) their ends shall be square to their axis.

6.2 Colour

The pipe fittings shall be coloured through the whole wall.

7 Geometrical characteristics

7.1 Dimensions of pipe fittings

7.1.1 Inside diameter

The mean inside diameter of the fitting shall be in accordance with Table 1.

Table 1 — Mean inside diameters

S/No.	Nominal size (mm)	Nominal Inside diameter (mm)	Mean inside diameter D mm	
			Minimum	Maximum
a)	32	32	32.3	32.5
b)	40	40	40.3	40.5
c)	50	50	50.3	50.5
d)	63	63	63.3	63.5
e)	75	75	75.3	75.6
f)	80	80	80.3	80.6
g)	82	82	82.3	82.6
h)	90	90	90.3	90.6
i)	100	100	100.3	100.6
j)	110	110	110.3	110.6
k)	125	125	125.3	125.6
l)	140	140	140.3	140.7
m)	160	160	160.3	160.7
n)	180	180	180.3	180.7
o)	200	200	200.3	200.8

7.1.2 Wall thickness

The wall thickness of the fitting shall be in accordance with Table 2.

Table 2 — Wall thickness of fitting body

S/No.	Nominal size	Nominal inside diameter (mm)	Minimum wall thickness (mm)
	DN/ID (mm)		
a)	32	32	1.8
b)	40	40	1.8
c)	50	50	1.8
d)	63	63	1.8
e)	75	75	1.9
f)	80	80	1.9
g)	82	82	1.9
h)	90	90	2.2
i)	100	100	2.2
j)	110	110	2.7
k)	125	125	3.1
l)	140	140	3.1
m)	160	160	4.0
n)	180	180	4.0
o)	200	200	4.9

7.1.3 Diameter and length of socket

The dimensions of the diameter and length of the socket shall conform to Table 3

Table 3 — Diameters and lengths of sockets (metric series) Dimensions in mm

S/No.	Nominal size	Nominal inside diameter (mm)	Minimum wall thickness (mm)
	DN/ID (mm)		
a)	32	31.9	25
b)	40	39.9	25
c)	50	49.9	30
d)	63	62.9	36
e)	75	74.8	40
f)	80	79.8	42
g)	82	81.8	43
h)	90	89.8	46
i)	100	99.8	46
j)	110	109.8	48
k)	125	124.7	51
l)	140	139.7	54
m)	160	159.7	58
n)	180	179.7	60
o)	200	199.7	60

8 Mechanical characteristics of fittings

8.1 Flexibility or mechanical strength

When the fitting is tested as per ISO 13264, there shall be no sign of splitting, cracking, separation and/or leakage.

8.2 Fitting Impact/Strength (Drop test)

8.2.1 Five fittings of each diameter and type applicable (homopolymer or copolymer) shall be conditioned for at least 30 min at a temperature of $23\text{ °C} \pm 2\text{ °C}$ for homopolymers and $0\text{ °C} \pm 1\text{ °C}$ for copolymers. Within 10 s after the conditioning treatment, each fitting shall be dropped freely in various positions on to a flat concrete floor from the heights specified below:

- a) for $D \leq 75\text{ mm}$, drop from $(2 \pm 0.1)\text{ m}$;
- b) for $D > 75\text{ mm}$, drop from $(1 \pm 0.1)\text{ m}$.

8.2.2 If none of the specimens is damaged in the test, the fittings shall be accepted. If one fitting is damaged, the test shall be repeated with five further fittings. None of these last five fittings shall be damaged.

NOTE In the context of this test, “damage” means any visible split or any complete breakage in the body of the fitting. Surface scratches, scuffing, or chipping of edges which may occur in the test does not constitute damage.

9 Physical characteristics of fittings

9.1 Oven test of fittings

9.1.1 When tested in accordance with annex A, fittings shall not exhibit excessive blistering, delamination, cracking or weld line splitting. Near to normal injection points, the depth of penetration of cracks, etc., shall not exceed 50 % of the wall thickness at that point.

9.1.2 When fittings are moulded by end gating techniques, the depth of penetration of cracks, etc., shall be not greater than 25 % of the corresponding socket depth.

10 Performance requirements

10.1 Watertightness

Joints between pipes and fittings, pipes and pipes, and fittings and fittings shall not leak when tested in accordance with annex B.

10.2 Airtightness

Joints between pipes and fittings, pipes and pipes, and fittings and fittings shall remain airtight when tested in accordance with annex C.

11 Marking

11.1 General

11.1.1 Marking elements shall be labelled or printed or formed directly on the pipe fitting (or any combination of these) or labelled or printed on the packaging.

11.1.2 Marking on a pipe fitting shall not initiate cracks or other types of defects likely to prevent compliance with the requirements of this standard.

10.2 Pipe fittings

10.1 The minimum required marking of fittings shall include the following:

- a) number of this standard KS.....
- b) manufacturer`s name and/or trademark
- c) nominal size for example 200
- d) nominal angle for example 45°
- e) material, (PP) and
- f) manufacturers information

10.2 To ensure traceability, the following details shall be given:

- i) the production period (year and month), in figures or in code; and
- ii) name or code for the production site if the manufacturer is producing at different sites.

Annex A (normative)

Oven test for fittings

A.1 Apparatus

Oven, in which the fittings can be exposed to a temperature of $150^{\circ}\text{C} \pm 2^{\circ}\text{C}$.

C.2 Test pieces

Select three test pieces from each type of fitting.

C.3 Test procedure

See ISO 580

Annex B **(normative)**

Watertightness test

B.1 Apparatus

B.1.1 Apparatus, to which the test assembly can be connected, allowing a controlled water pressure to be applied.

B.1.2 Precision pressure gauge.

B.2 Test assembly

Pipes, fittings and joints in accordance with this International Standard in all other respects shall be used.

The connection (joint) shall be made in accordance with the manufacturer's instruction.

B.3 Procedure

If the joint to be tested permits deflection, perform the test with the test assembly under the maximum possible deflection of the axis without forcing.

Connect the test assembly (see clause B.2) to the precision pressure gauge (B.1.2). By allowing water to enter the test assembly, gradually increase the internal pressure from 0 MPa to 0.05 MPa (0 bar to 0.5 bar) over a period of not greater than 15 min and maintain the pressure of 0.05 MPa (0,5 bar) for at least 15 min.

B.4 Test requirement

The test requirement (see 10.1) shall be fulfilled for all types of test assembly, including those combining minimum spigot ends and maximum sockets.

Annex C (normative)

Elevated-temperature cycling test - 5-cycle test

C.1 Apparatus

C.1.1 Apparatus, to which the test assembly can be connected, allowing a controlled air pressure to be applied.

C.1.2 Precision pressure gauge or manometer.

C.2 Test assembly

Pipes, fittings, and joints in accordance with this standard in all other respects shall be used. The connection (joint) shall be made in accordance with the manufacturer's instructions.

The test assembly shall consist of a specimen of pipe mounted in two clamped blocks. Seal one end of the pipe with a plug that has a combined water and air inlet. Insert any fitting or joint into the open end of the pipe. The joint or fitting shall then be sealed at all open ends with plugs, one of which has a water outlet and shut-off valve mounted centrally in the sealing plug.

C.3 Procedure

C.3.1 Apply a strong solution of soapy water or detergent around the annular space between the mouth of the fitting and the pipe.

C.3.2 Open the water outlet valve and close the air inlet valve on the pipe shut-off.

C.3.3 Open the water inlet valve. When the assembly is half full, that is, when water flows from the outlet, close the water inlet and outlet valves.

C.3.4 Open the air inlet valve and increase the internal air pressure to $0.01 \text{ MPa} \pm 0.001 \text{ MPa}$ ($0.1 \text{ bar} \pm 0.01 \text{ bar}$) at ambient temperature. Maintain this pressure for 5 min.

C.3.5 Note, during this 5 min period, any leaks which occur between the mouth of the fitting and the pipe, and which are evident by the formation of bubbles.

C.3.6 Deflect the pipe manually in the socket of the fitting until it reaches the maximum permissible deflection for the particular joint under test. Carry out this deflection at 0° , 90° , 180° and 270° maintaining it for 1 min in each of these directions.

C.4 Test requirements

No water leaks shall occur, but if bubbles appear at any time during the test, a new application of soapy water or detergent shall be made. If there is still a continuous emission of bubbles during the test, the joint shall be deemed not to meet the requirements of the test.

The test requirements (see 10.2) shall be fulfilled for all types of test assembly.

Annex D (normative)

Elevated-temperature cycling test — 5-cycle test

D.1 Test assembly

D.1.1 The test assembly shall consist of a vertical stack of pipes with fittings and two near-horizontal pipe assemblies with fittings.

D.1.2 Installation shall be carried out on a firm wall or frame with guide and anchor brackets, with no other support of the test assembly.

D.1.3 Anchor brackets shall be located directly below or behind the sockets of each pipe length. Guide brackets for near-horizontal assemblies shall be positioned appropriately.

D.1.4 It shall be checked that the test assembly exhibits no sagging greater than $0.1D$ at the mid-point between two guide brackets.

D.1.5 Devices shall be provided and positioned to measure any sagging f_1 and f_2 of the test assembly.

D.1.6 Room for expansion of pipes shall be provided for all spigot ends of pipes, but not for the spigot ends of fittings. The entry of hot water into the test assembly shall be direct; there shall be no heat absorbing intermediate pieces.

D.2 Procedure

D.2.1 Test the assembly for watertightness and airtightness in accordance with D.3.1 and D.3.2.

D.2.2 Subject the test assembly to the passage of hot and cold water according to the following schedule for 5 cycles:

- a) circulation of water at $93^{\circ}\text{C} \pm 2^{\circ}\text{C}$ for 15 min, at a flow-rate of 0.3 l/s (18 l/min); and
- b) circulation of water at $15^{\circ}\text{C} \pm 5^{\circ}\text{C}$ for 10 min, at a flow-rate of 0.3 l/s (18 l/min).

D.2.3 During the cycling test:

- a) check that the temperature of the water remains constant within the specified limits;
- b) note any leaks from the test assembly and any “incidents” which may have an influence on the results; and
- c) record the sagging f_1 and f_2 between guide brackets.

D.2.4 After completion of the cycling test, carry out the water-tightness test again, as described in D.3.1.

D.3 Tightness test procedures

D.3.1 Watertightness

Carry out the following procedure:

D.3.1.1 Seal off the lower end of the test assembly.

D.3.1.2 Apply a pressure of at least 0.01 MPa (0.1 bar) to each joint by filling the installation with water.

D.3.1.3 Maintain the pressure for a period of 1 min.

D.3.1.4 Take note of any leaks at each joint.

D.3.2 Airtightness

Carry out the following procedure:

D.3.2.1 Seal off the ends of the test assembly.

D.3.2.2 Coat the annular space between spigot and socket ends of joints with soapy water.

D.3.2.3 Apply an air pressure of 0.01 MPa (0.1 bar) at ambient temperature.

D.3.2.4 Maintain the pressure for a period of 1 min.

D.3.2.5 Take note of any leaks, evident through the formation of bubbles.

D.4 Test requirements

D.4.1 The joints shall remain watertight and airtight before and after the 5-cycle test.

D.4.2 The sagging at the mid-point between two guide brackets shall not exceed 0.1D.

Annex E (normative)

Cycling tests — General information for both 5-cycle tests

E.1 Test report

The test report shall include the following information:

- a) statement indicating the cycling test carried out (i.e. 5-cycle test);
- b) types and dimensions of the components used in the test assembly;
- c) all test parameters;
- d) results of leak-proofness tests before the cycling test;
- e) observations during the cycling test;
- f) any sagging noted;
- g) results of final inspection of the test assembly; and
- h) all details not provided for in this Standard, as well as any incidents which might have had an influence on the results.

E.2 Key to symbols

The symbols used to specify or report on a test assembly shall comply with ISO/TR 7024