Übersetzungen von DIN-Normen

Manuskriptübersetzungen

Translations of DIN-Standards

Typescript translations

Beuth Verlag GmbH · Berlin · Wien · Zürich

This page is intentionally blank.

Polyamide tubing for use in motor vehicles

DIN 73 378

ICS 23.040.20; 43.040.00

Supersedes December 1990 edition.

Descriptors: Tubes, Motor vehicles, polyamide.

Rohre aus Polyamid für Kraftfahrzeuge

In keeping with current practice in standards published by the International Organization for Standardization (ISO), a comma has been used throughout as the decimal marker.

Foreword

This standard has been prepared by the *Normenausschuß Kraftfahrzeuge* (Road Vehicles Standards Committee), Technical Committee *Polyamidrohre*.

Amendments

The following amendments have been made to the December 1990 edition.

a) Types PA 6-HIHL, PA 6-HIPHL, PA 6-HIPH, PA 11-PHLY, PA 12-HIPHL, PA 12-HIPH, and PA 12-PHLY moulding materials have been introduced.

b) The use of additional stabilizers to prevent deterioration due to UV radiation has been specified.

c) Symbol HI has been used to indicate that the material contains an impact modifier.

d) The modulus of elasticity has been specified as a criterion of the flexural strength of the material.

e) Specifications for PA 66 type tubes have been dropped.

Previous editions

DIN 73 378: 1973-08, 1975-02, 1990-12.

1 Scope

This standard specifies requirements for and methods of testing polyamide tubing intended for the transport of fuel in motor vehicles. The specifications of this standard take into account the general operating conditions pertaining to motor vehicles. If there is any doubt regarding the suitability of a particular moulding material, this shall be subject to agreement.

Tubes are manufactured by extrusion and, given their single-layer construction, are chiefly used in the low and medium pressure ranges (cf. Explanatory notes).

2 Normative references

This standard incorporates, by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the titles of the publications are listed below. For dated references, subsequent amendments to or revisions of any of these publications apply to this standard only when incorporated in it by amendment or revision. For undated references, the latest edition of the publication referred to applies.

DIN 16 773-1
Polyamide (PA) homopolymers for injection moulding and extrusion; classification and designation

DIN 16 773-2
Polyamide (PA) homopolymers for injection moulding and extrusion; preparation of specimens and determination of their properties

DIN 50 011-12
Artificial climates in technical applications; air temperature as a climatological quantity in controlled-atmosphere test installations

DIN 50 014
Artificial climates in technical applications; standard atmospheres

DIN 53 453
Impact testing of plastics by the torsion pendulum test

DIN 53 479
Determination of density of plastics and elastomers

DIN 53 736
Determination of the melting temperature of semicrystalline plastics

DIN 53 738
Determination of heat-extractable matter content of plastics

DIN 53 758
Short-term internal hydrostatic pressure test on plastics hollow bodies

DIN 73 377
Fittings for polyamide tubing; insert profiles

DIN 74 323
Coiled tubing for air braking systems

ISO 179 :1993
Plastics; determination of Charpy impact strength

Continued on pages 2 to 10.

ISO 1043:1987
Plastics; symbols; basic polymers and their special characteristics

ISO 1874-1:1992
Plastics; polyamide (PA) homopolymers and copolymers for moulding and extrusion; designation

ISO 3310-1:1990
Test sieves; technical requirements and testing; test sieves of metal wire cloth

3 Concepts

3.1 Stress utilization factor

The stress utilization factor is a measure of the utilization of the basic stress at a temperature of 23 °C.

NOTE: The stress utilization factors specified in table 6 refer to the actual basic stress.

3.2 Basic stress

The basic stress, σ_{vE}, in N/mm^2, is the stress sustained during continuous operation without failure of the tubing wall when exposed to a fluid under static stress. It is to be calculated using the following formula:

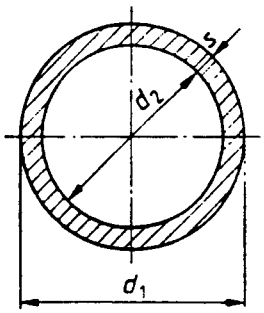

Figure 1

$$\sigma_{vE} = \frac{p_B \cdot d_m}{20s} \text{ in N/mm}^2 \qquad (1)$$

where

p_B is the bursting pressure, in bar;
d_m (= $d_1 - s_1$) is the mean tube diameter;
d_1 is the tubing outside diameter;
s is the tubing wall thickness.

3.3 Impact energy

The impact energy is the energy determined by means of an impact bending test. It is used for assessing the brittleness or toughness of the material.

4 Designation

Designation of tubing of nominal size 12,5 × 1,25, made from black (sw) polyamide moulding material of type PA 11-P, EHL, 22-004 (PA 11-PHL):

Tubing DIN 73 378–12,5 × 1,25–PA 11-PHL–sw

5 Requirements

5.1 Dimensions, mass and working pressures

See table 3.

5.2 Materials

5.2.1 Moulding materials

Tubing as specified in this standard shall be made from the moulding materials listed in table 1, the choice being based on the particular application.

5.2.1.1 Stabilization

Tubing may be stabilized against UV radiation by adding stabilizers or carbon black (designated by the letter L, as in DIN 16 773-1), the most effective method being the addition of carbon black.

Resistance to heat ageing shall be identified by the symbol H, as in DIN 16 773-1.

5.2.1.2 Colour

The standard colours of tubing are natural (nf) or black (sw), other colours being subject to agreement (bl = blue; gn = green; rt = red; ge = yellow).

5.2.2 Density

The density of PA moulding materials is given in table 7.

5.2.3 Melting temperature

The melting temperature of PA moulding materials is given in table 7.

5.2.4 Water content on delivery

PA 6 tubing shall, on delivery, have the water content specified in table 7, without any additives.

5.2.5 Extractable matter

Extractable matter may consist of monomers, oligomers, stabilizers, water and plasticizers, and shall be soluble when tested as described in subclause 6.4.4 (see table 7).

5.3 Workmanship

Tubing shall be free from defects, such as blisters, shrinkholes, voids, striated surfaces, inhomogeneities and impurities, which might impair its performance. The colour of the tubing shall be uniform throughout.

5.4 Properties

5.4.1 Pressure rating

Polyamide tubing is rated for the allowable working pressures specified in table 3. The values refer to tubing exposed to static and dynamic internal stress and assume tubing of nominal size and subjected to the basic stress, σ_v, specified in table 4. Unlike the $\sigma_{v\,min}$ values given in table 7, the σ_v values include a safety factor of 3.

5.4.2 Stress utilization factor

See table 6.

5.4.3 Basic stress

For values for basic stress, see table 7. When tested in accordance with subclause 6.4.5, the materials shall undergo no brittle fracture.

5.4.4 Impact strength

When tested in accordance with subclause 6.4.6, the impact energy shall comply with the values given in table 7. Tubing that has undergone testing without fracturing or incipient cracking shall be deemed to have passed the test, regardless of the actual impact energy measured.

5.4.5 Thermal stability

Tubing shall be thermally stable. This requirement shall be deemed satisfied if the requirements specified in subclause