



SLOVENSKI STANDARD
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Diesel and domestic heating fuels - Determination of cold filter plugging point

Diesekraftstoffe und Haushaltsheizöle - Bestimmung des Temperaturgrenzwertes der Filtrierbarkeit

Combustibles pour moteurs diesel et pour installations de chauffage domestique - Détermination de la température limite de filtrabilité

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ICS:

75.160.20 V^[\ æ[\ !ãæ Liquid fuels

oSIST prEN 116:2009 **en,fr,de**

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EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

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September 2009

ICS 75.160.20

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English Version

Diesel and domestic heating fuels - Determination of cold filter plugging point

Combustibles pour moteurs diesel et pour installations de chauffage domestique - Détermination de la température limite de filtrabilité

Dieselmotoren und Haushaltsheizöle - Bestimmung des Temperaturgrenzwertes der Filtrierbarkeit

This draft European Standard is submitted to CEN members for enquiry. It has been drawn up by the Technical Committee CEN/TC 19.

If this draft becomes a European Standard, 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.

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Recipients of this draft are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

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COMITÉ EUROPÉEN DE NORMALISATION
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Foreword

This document (prEN 116:2009) has been prepared by Technical Committee CEN/TC 19 “Gaseous and liquid fuels, lubricants and related products of petroleum, synthetic and biological origin”, the secretariat of which is held by NEN.

This document is currently submitted to the CEN Enquiry.

This document will supersede EN 116:1997.

Significant technical differences between this European Standard and the previous edition of EN 116 are that an automated method is described in detail, and the previous cooling bath, which operated in several temperature stages, was replaced by a refrigeration unit with linear cooling. All temperatures mentioned in this standard use the °C for absolute temperatures and K for temperature deltas. In addition, biodiesel (FAME) blends in diesel have been checked, too.

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1 Scope

This European Standard specifies a method for the determination of the cold filter plugging point (CFPP) of diesel and domestic heating fuels.

This European Standard is applicable to distillate fuels, including those containing a flow-improving or other additive, intended for use in diesel engines and domestic heating installations.

The results obtained from the method specified in this European Standard are suitable for estimating the lowest temperature at which a fuel will give trouble-free flow in the fuel system.

NOTE In the case of diesel fuels the results are usually close to the temperature of failure in service except when the fuel system contains, for example, a paper filter installed in a location exposed to the weather or if the filter plugging temperature is more than 12 °C below the cloud point of the fuel. Domestic heating installations are usually less critical and often operate satisfactorily at temperatures somewhat lower than those indicated by the test results.

WARNING — The use of this standard may involve hazardous materials, operations and equipment. This standard does not purport to address all of the safety problems associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.

2 Normative references

The following referenced documents are indispensable for the application 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 ISO 3170, *Petroleum liquids — Manual sampling (ISO 3170:2004)*

EN ISO 3171, *Petroleum liquids — Automatic pipeline sampling (ISO 3171:1988)*

ISO 261, *ISO general purpose metric screw threads -- General plan*

3 Terms and definitions

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

3.1
cold filter plugging point
CFPP
highest temperature at which a given volume of fuel fails to pass through a standardized filtration device in a specified time, when cooled under standardized conditions

4 Principle

This European Standards describes the use of automated test equipment only. Manual test equipment may be used, but for referee purposes only automated test equipment is allowed.

A test portion of the fuel is cooled under the specified conditions and is drawn at intervals of 1 °C into a pipette under a controlled vacuum of 2 kPa through a standardized wire mesh filter. The procedure is repeated, as the fuel continues to cool, for each 1 °C below the first test temperature. Testing is continued until the amount of wax crystals which have separated out of solution is sufficient to stop or slow down the flow so that the time taken to fill the pipette exceeds 60 s or the fuel fails to return completely to the test jar before the fuel has cooled by a further 1 °C.

The indicated temperature at which the last filtration was commenced is recorded as the cold filter plugging point.

5 Reagents and materials

- 5.1 **Hydrocarbon solvents**, e. g. Heptane
- 5.2 **Light hydrocarbon solvents**, e. g. Isopentane
- 5.3 **Lintless filter paper**,¹⁾
- 5.4 **Certified reference materials**

NOTE Certified reference materials may be obtained from the Commission of the European Communities. Community Bureau of Reference, DG XII, Rue de la Loi 200, B-1049 Brussels, who can be contacted to obtain further information.

6 Apparatus

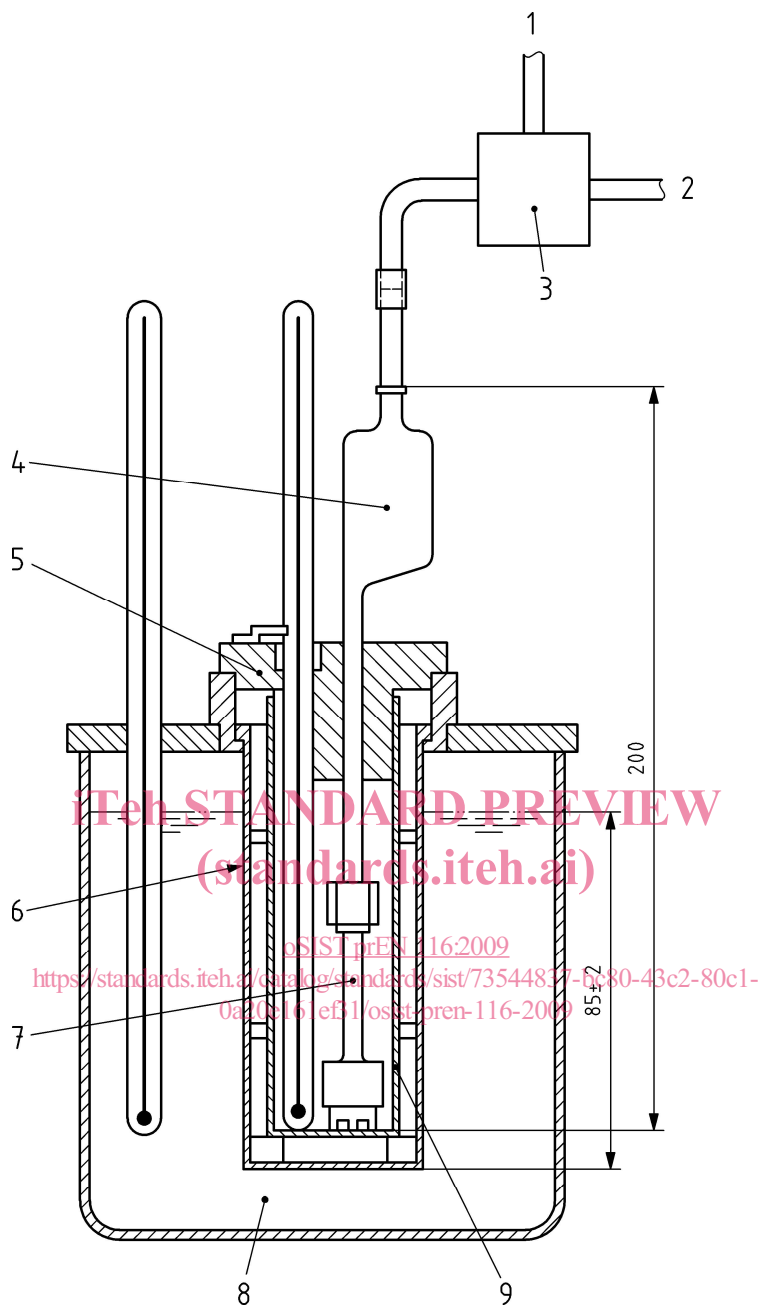
6.1 General

The description of the apparatus in this section covers the automated apparatus only. The equipment, as detailed in 6.2 to 6.12, shall be arranged as shown in Figure 1.

6.2 Test jar, cylindrical, of clear glass, flat bottomed, with an outside diameter of $(34 \pm 0,5)$ mm, a wall thickness of $(1,20 \pm 0,15)$ mm and a height of (120 ± 5) mm. The jar shall have a permanent mark at the 45 ml level.

6.3 Jacket, brass, watertight, cylindrical, flat bottomed, to be used as an air bath. It shall have an inside diameter of $(45 \pm 0,25)$ mm, an outside diameter of $(48 \pm 0,25)$ mm and a height of (115 ± 3) mm (see Figure 2).

1) Durrieux 120 and Whatman No. 3 are examples of suitable products available commercially. This information is given for convenience of the users of this European Standard and does not constitute an endorsement by CEN of these products.



Key

- | | | | |
|---|------------------------|---|---------------------|
| 1 | atmosphere (6.8) | 6 | jacket (6.3) |
| 2 | vacuum regulator (6.8) | 7 | filter unit (6.6.2) |
| 3 | valve unit (6.8) | 8 | cooling bath (6.10) |
| 4 | pipette (6.6.1) | 9 | test jar (6.2) |
| 5 | stopper (6.5) | | |

Figure 1 — General arrangement of apparatus

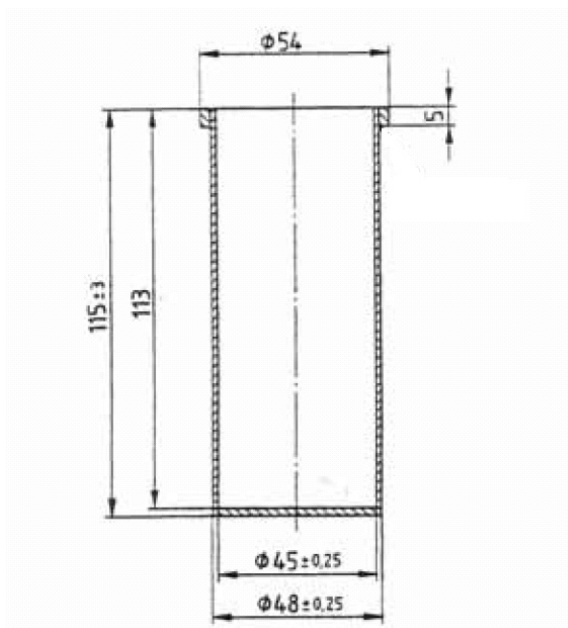


Figure 2 — Jacket made of brass

6.4 **Spacer**, made from POM-C²⁾, except for the stainless steel rods with 2 mm diameter, to be placed into the jacket (6.3). It shall conform to the dimensions as shown in Figure 3.

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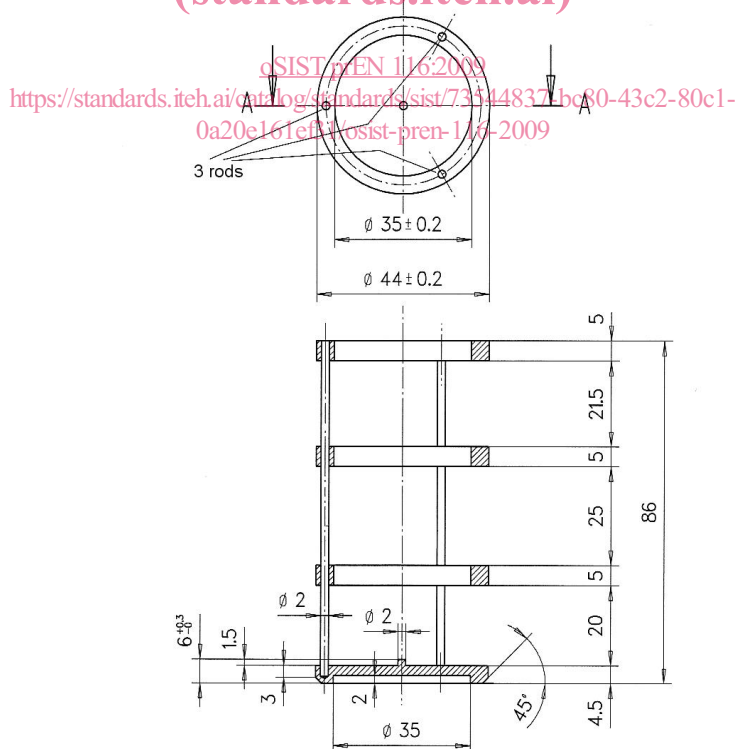


Figure 3 — Spacer

2) POM-C Polyoxymethylen Copolymer, Trade marks e.g. DELRIN

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6.5 Stopper, of oil-resistant and non thermal conductive material, to fit the test jar shown in figure 5. It shall have three holes to accommodate the pipette (6.6), the thermometer (6.9) and to allow venting of the system. The stopper shall ensure that pipette and thermometer are safely positioned in the test jar.

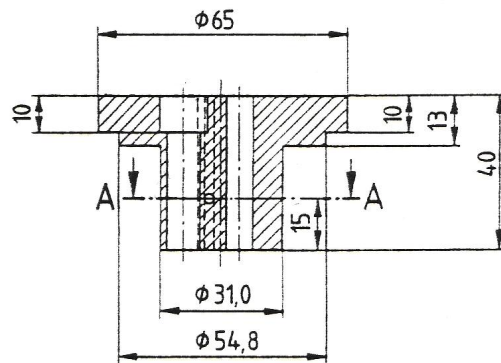


Figure 4— Stopper

6.6 Pipette with filter unit

6.6.1 A **pipette** of clear glass with a volume of $(20 \pm 0,2)$ ml at a point $(149 \pm 0,5)$ mm from the bottom of the pipette (see Figure 5). It shall be connected to the filter unit.

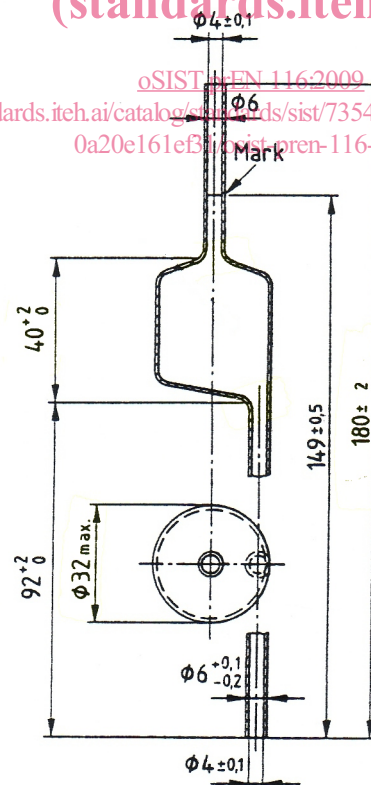


Figure 5 — Pipette

6.6.2 A **filter unit** (see Figure 6) of brass according to ISO 261 with ISO general purpose metric screw threads, further consisting of a filter holder (see Figure 7) and a disc, 15 mm diameter, stainless steel wire mesh gauze with a nominal aperture size of 45 μm in basket weave (not twill). The nominal diameter of the wire shall be 32 μm and the tolerance for the size of an individual aperture shall be as follows:

- 1) no aperture size shall exceed the nominal size by more than 22 μm ;
- 2) the average aperture size shall be within $\pm 3,1$ μm of the nominal size;
- 3) not more than 6 % of the apertures shall be above the nominal size by more than 13 μm .

NOTE The requirements for the wire mesh are taken from ISO 3310-1 [1], to which reference may be made for methods for testing the gauze.

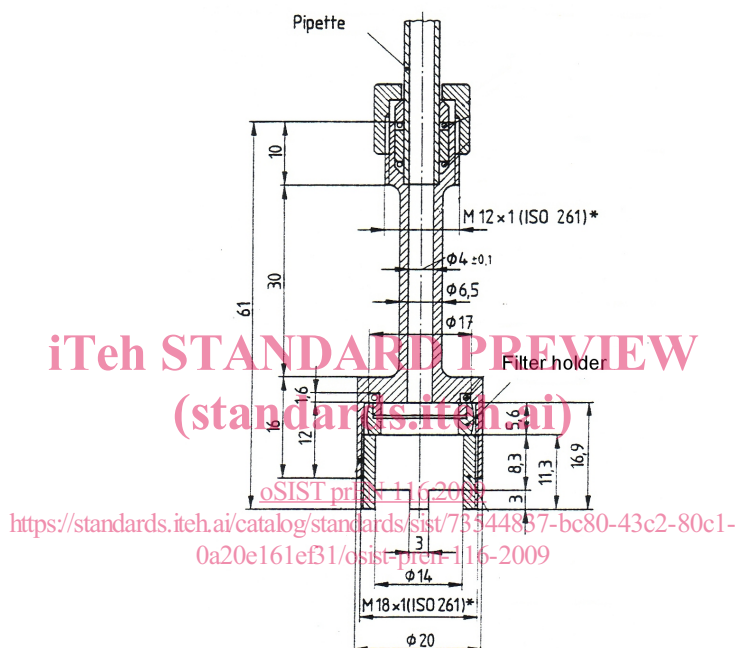


Figure 6 — Filter unit

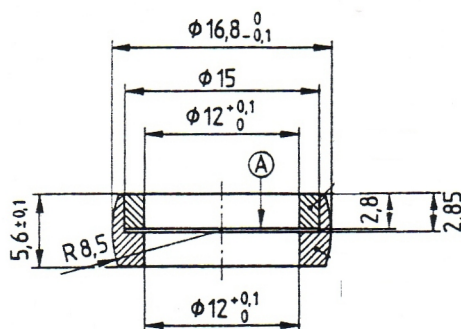


Figure 7 — Filter holder

6.7 An **automated detection system** comprising one sensor to record the filling of the pipette at a volume of $(20 \pm 0,2)$ ml and a second sensor to record the incomplete backflow of the product at a point (85 ± 4) mm from the bottom of the pipette prior to the subsequent aspiration cycle. In case of a manual apparatus pipettes with a top filling mark, called 20 ml mark, and a bottom filling mark needs to be used.