INTERNATIONAL STANDARD

ISO 16770

First edition
2004-02-01

Plastics — Determination of environmental stress cracking (ESC) of polyethylene — Full-notch creep test (FNCT)

Plastiques — Détermination de la fissuration sous contrainte dans un environnement donné (ESC) du polyéthylène — Essai sur éprouvette entièrement entaillée (FNCT)

Reference number
ISO 16770:2004(E)

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Published in Switzerland

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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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

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.

ISO 16770 was prepared by Technical Committee ISO/TC 61, *Plastics*, Subcommittee SC 9, *Thermoplastic materials*.

Plastics — Determination of environmental stress cracking (ESC) of polyethylene — Full-notch creep test (FNCT)

1 Scope

This International Standard specifies a method of determining the stress cracking resistance of polyethylene materials in any environment. The test is carried out on notched test specimens cut from compression-moulded sheet or finished products, as applicable. The test specimen is subjected to a static tensile load when immersed in an environment such as a surfactant solution held at a specified temperature, and the time to failure measured.

The method has been specifically developed for polyethylene materials but can be used to evaluate PE extrusions, such as pipe segments, PE fusion welds/fittings and blow-moulded PE containers to study the effect of aggressive environments, i.e. dangerous goods/chemicals. The method may also be adapted for other thermoplastic materials, e.g. polypropylene (PP). In this case, care must be taken in interpreting the results as the processing stresses/orientation in finished products may have an effect.

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.

ISO 2818, *Plastics — Preparation of test specimens by machining*

3 Terms and definitions

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

3.1
failure
complete separation of the two halves of the test specimen

NOTE The description of the failure surface has been simplified in this International Standard (see 3.2 and 3.3). Further information is available in the literature (see the Bibliography).

3.2
brittle failure
failure in which the fracture surface exhibits no permanent material deformation to the naked eye, e.g. stretching, elongation or necking down [see Figure 1a)]

NOTE In tougher materials, an extended ligament may form in the centre [see Figure 1b)].

3.3
ductile failure
failure in which the fracture surface clearly exhibits permanent material deformation with stretching, elongation and necking down [see Figure 1c)]

3.4
ligament area
cross-sectional area remaining after notching

