INTERNATIONAL STANDARD

ISO 1628-3

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Plastics — Determination of viscosity number and limiting viscosity number —

Part 3:
Polyethylenes and polypropylenes

Plastiques — Détermination de l'indice de viscosité et de l'indice limite de viscosité —

Partie 3: Polyéthylènes et polypropylènes

Reference number
ISO 1628-3:1991(E)

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.

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.

International Standard ISO 1628-3 was prepared by Technical Committee ISO/TC 61, *Plastics*.

It cancels and replaces International Standard ISO 1191:1975, of which it constitutes a technical revision.

ISO 1628 consists of the following parts, under the general title *Plastics — Determination of viscosity number and limiting viscosity number*:

— *Part 1: General conditions*

— *Part 2: Poly(vinyl chloride) resins*

— *Part 3: Polyethylenes and polypropylenes*

— *Part 4: Polycarbonate (PC) moulding and extrusion materials*

— *Part 5: Poly(alkylene terephthalates)*

— *Part 6: Methyl methacrylate polymers*

(The general title of ISO 1628-1 is *Guidelines for the standardization of methods for the determination of viscosity number and limiting viscosity number of polymers in dilute solution*)

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Plastics — Determination of viscosity number and limiting viscosity number —

Part 3:
Polyethylenes and polypropylenes

1 Scope

This part of ISO 1628 defines particular conditions for determining the viscosity number and limiting viscosity number of polyethylenes and polypropylenes at 135 °C in dilute solution. It is applicable to low, medium and high-density polyethylenes and to a wide range of polypropylenes, including pure isotactic, stereoblock and atactic polymers.

The viscosity of polymer solutions may be affected by additives present in the sample. The value of a viscosity number determined by this method may therefore be unreliable if the sample contains fillers or other additives.

NOTE 1 Viscosity number is also known as the Staudinger function (J_v) and limiting viscosity number as the Staudinger index (J_g).

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this part of ISO 1628. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this part of ISO 1628 are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 1628-1:1984, *Guidelines for the standardization of methods for the determination of viscosity number and limiting viscosity number of polymers in dilute solution — Part 1: General conditions.*

ISO 3105:1976, *Glass capillary kinematic viscometers — Specification and operating instructions.*

3 Principle

The times of flow of a solvent and a solution of polymer at a specified concentration in that solvent are measured at 135 °C. The viscosity number and limiting viscosity number are calculated from these measurements and from the known concentration of the solution.

Ethylene and isotactic polypropylene polymers are not soluble at room temperature in any known solvents. Precautions must therefore be taken during the test to avoid any precipitation of polymer, which would give an incorrect solution concentration.

4 Solvent

4.1 Decahydronaphthalene, analytical reagent grade, redistilled at a temperature not higher than 65 °C and a pressure of approximately 500 Pa; its peroxidation is prevented by suitable means, for example distilling in the presence of hydroquinone.

Immediately after redistillation, 0,2 % (m/m) of antioxidant shall be added to inhibit oxidation during the viscosity determination. Antioxidants which have been found satisfactory include:

— 4,4′-thio-bis-(6-*tert*-butyl-3-methyl)phenol;

— bis-(2-hydroxy-3-*tert*-butyl-5-methyl)phenylmethane;

— octadecyl-3-(3′,5′di-*tert*-butyl-4′-hydroxyphenyl) *n*-propionate;

— and tetrakis[methylene 3-(3′,5′di-*tert*-butyl-4′-hydroxyphenyl) *n*-propionate]methane.