International Standard 3383

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Rubber — General directions for achieving elevated or subnormal temperatures for test purposes

Caoutchouc — Directives générales pour l'obtention de températures élevées ou de températures inférieures à la température normale lors des essais

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Foreword

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Draft International Standards adopted by the technical committees are circulated to the member bodies for approval before their acceptance as International Standards by the ISO Council. They are approved in accordance with ISO procedures requiring at least 75 % approval by the member bodies voting.

International Standard ISO 3383 was prepared by Technical Committee ISO/TC 45, *Rubber and rubber products*.

This second edition cancels and replaces the first edition (ISO 3383-1976), of which it constitutes a technical revision.

Users should note that all International Standards undergo revision from time to time and that any reference made herein to any other International Standard implies its latest edition, unless otherwise stated.

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INTERNATIONAL STANDARD ISO 3383-1985 (E)

Rubber — General directions for achieving elevated or subnormal temperatures for test purposes

1 Scope and field of application

This International Standard specifies general requirements for achieving elevated or subnormal temperatures in the testing of rubber and other elastomeric materials. It specifies general principles of the construction and operation of temperature-controlled chambers for conditioning and/or testing. For some tests — for example ageing tests — special procedures, conditions or equipment which differ from those specified in this International Standard may be required. In such cases, the requirements should be included in the method of test and supersede the requirements of this International Standard.

2 Purpose of conditioning

The purpose of conditioning procedures is to ensure that the test piece is substantially at a uniform temperature thoughout its mass and in equilibrium with its environment.

3 Heat transfer media

For the control of temperature in the conditioning and/or test chambers, various temperature-control media may be employed, the most common being gaseous or liquid. Liquid media offer the most rapid heat transfer but may have deleterious effects on the rubber if the immersion is prolonged. Fluidized beds using glass ballotini have many of the advantages of liquid heat transfer combined with chemical inertness.

4 General requirements for temperature-controlled chambers

4.1 The immersion medium in the chamber shall be without significant effects on the rubber properties. Water, ethanol and ethylene glycol are examples of fluids that have been found to have insignificant effects on most solid rubbers, provided that the immersion period is kept to the absolute minimum required in the testing.

4.2 The portion of the chamber in which test pieces may be located shall be controlled within the specified tolerances of the relevant method of test.

4.3 The immersion medium shall be circulated thoroughly in the chamber. A fan or stirrer suitably located in the chamber may be used for this purpose.

4.4 Automatic temperature control is preferred.

4.5 Recovery to the set temperatures after the introduction of test pieces or test apparatus shall be as rapid as possible consistent with minimal overshoot or undershoot, but in any case shall not exceed 15 min, particular care being required for gaseous media.

4.6 The size of the chamber is optional, provided that uniform temperature is maintained throughout the space occupied by the test pieces.

4.7 The chamber shall be thermally insulated to prevent condensation on exterior surfaces when testing at subnormal temperatures and to prevent discomfort to the touch when testing at elevated temperatures.

The thermal insulation should be stable at the maximum design temperature, shall be protected from condensation at subnormal temperatures and shall ensure the maximum attainable uniformity of temperature. If a window is needed to observe test equipment indicators, it shall be constructed so as to ensure adequate thermal insulation and to prevent condensation. For example for a chamber operating at −100 °C, five layers of glass, suitably spaced, with dehydrated air between layers, has been found to be suitable.

4.8 The construction of the chamber depends on the type of immersion medium. For gaseous media, a side entrance for introducing test pieces is convenient, and is necessary where the test equipment is operated from the side. However, the chamber shall be designed to minimize the loss of gaseous media where the test pieces or equipment are introduced. The interior walls surrounding the chamber shall be made of a good thermal conductor, preferably aluminium or tinned copper, to ensure uniform temperature and minimum radiant effects. When manual operation of equipment (except for mounting and demounting of test pieces) inside the chamber is necessary, handholes equipped with gloves and insulated sleeves shall be installed in the walls of the chamber. The temperature shall not be controlled by cooling and heating elements within the chamber mounted in such a way that they can affect the temperature of test equipment or test pieces by radiation.

For liquid media, the temperature may be controlled by elements immersed in the medium or by circulating the medium to a heat-exchange system outside the chamber.