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## **Rubber, vulcanized or thermoplastic — Determination of stress relaxation in compression —**

### **Part 1: Testing at constant temperature**

*Caoutchouc vulcanisé ou thermoplastique — Détermination de la  
relaxation de contrainte en compression —*

*Partie 1: Essais à température constante*



Reference number  
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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 3384-1 was prepared by Technical Committee ISO/TC 45, *Rubber and rubber products*, Subcommittee SC 2, *Testing and analysis*.

It cancels and replaces ISO 3384:2005, which has been technically revised. In addition, the number has been changed to ISO 3384-1. ISO 3384-1 deals with the determination of relaxation in compression at constant temperature, while ISO 3384-2 gives methods for the determination of relaxation in compression combined with temperature cycling.

ISO 3384 consists of the following parts, under the general title *Rubber, vulcanized or thermoplastic — Determination of stress relaxation in compression*:

- *Part 1: Testing at constant temperature*
- *Part 2: Testing with temperature cycling*

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## Introduction

When a constant strain is applied to rubber, the force necessary to maintain that strain is not constant but decreases with time; this behaviour is called "stress relaxation". Conversely, when rubber is subjected to a constant stress, an increase in the deformation takes place with time; this behaviour is called "creep".

The processes responsible for stress relaxation can be physical or chemical in nature, and under all normal conditions both types of process will occur simultaneously. However, at normal or low temperatures and/or short times, stress relaxation is dominated by physical processes whilst at high temperatures and/or long times chemical processes are dominant.

If the lifetime of a material is to be investigated, it can be determined using the air oven ageing test described in ISO 11346 (see the Bibliography).

In addition to the need to specify the temperatures and time intervals in a stress relaxation test, it is necessary to specify the initial stress and the previous mechanical history of the test piece since these might also influence the measured stress relaxation, particularly in rubbers containing fillers.

The most important factor in achieving good repeatability and reproducibility when making stress relaxation tests is to keep the temperature and compression constant during all measurements.