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**Rubber, vulcanized or  
thermoplastic — Determination of  
dynamic properties —**

**Part 3:  
Glass transition temperature ( $T_g$ )**

**iTEH Standards**  
Caoutchouc vulcanisé ou thermoplastique — Détermination des  
propriétés dynamiques —  
*Partie 3: Température de transition vitreuse ( $T_g$ )*  
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# Contents

Page

<b>Foreword</b>	iv
<b>Introduction</b>	v
<b>1 Scope</b>	1
<b>2 Normative references</b>	1
<b>3 Terms and definitions</b>	1
<b>4 Principle</b>	1
<b>5 Apparatus</b>	1
5.1 General	1
5.2 Force capability and measurement	2
5.3 Cycling capability	2
5.4 Damping measuring device	2
5.5 Test chamber	2
5.6 Grips	2
5.7 Measurement of test piece dimensions	2
<b>6 Test piece</b>	2
6.1 Preparation	2
6.2 Dimensions	2
<b>7 Number of test pieces</b>	3
<b>8 Conditioning</b>	3
<b>9 Procedure</b>	4
9.1 Measurement of the test piece dimensions	4
9.2 Measurement of properties	4
9.3 Test conditions	4
9.3.1 Strain	4
9.3.2 Frequency	4
9.3.3 Temperature	4
9.4 Clamping and testing	4
<b>10 Expression of results</b>	4
10.1 General	4
10.2 Calculation of $\tan \delta$	5
<b>11 Determination of glass transition temperature, <math>T_g</math></b>	5
<b>12 Precision</b>	5
<b>13 Test report</b>	6
<b>Annex A (informative) Temperature dependence of dynamic properties of vulcanized rubber</b>	7
<b>Annex B (informative) Precision results from an interlaboratory test programme</b>	9
<b>Bibliography</b>	11

## 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.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see [www.iso.org/directives](http://www.iso.org/directives)).

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For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see [www.iso.org/iso/foreword.html](http://www.iso.org/iso/foreword.html).

This document was prepared by Technical Committee ISO/TC 45, *Rubber and rubber products*, Subcommittee SC 2, *Testing and analysis*.

A list of all parts in the ISO 4664 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at [www.iso.org/members.html](http://www.iso.org/members.html).

## Introduction

Elastomers are viscoelastic in nature hence their response to dynamic stress is a combination of elastic and viscous response. Glass transition temperature,  $T_g$ , is the temperature at which an amorphous or semi crystalline polymer transforms from a rubbery viscous state to a brittle glass-like state. It is always lower than the melting temperature.

This document is based on a force induced vibration test from which the stiffness can be determined, (see [Annex A](#)) and modulus and  $\tan \delta$  can be calculated.  $\tan \delta$  is the ratio of viscous modulus to the elastic modulus.  $\tan \delta$  is plotted against temperature and the glass transition temperature is taken as the peak in the curve.

The measured value of  $T_g$  depends on the experimental conditions and the mode of deformation. Measurement of  $T_g$  in dynamic mode is more sensitive to the temperature dependent physical properties of the material and is relevant to understanding its service temperature.

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