INTERNATIONAL STANDARD

ISO 6133

Third edition
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Rubber and plastics — Analysis of multi-peak traces obtained in determinations of tear strength and adhesion strength

Caoutchouc et plastiques — Analyse des tracés multi-pics obtenus lors des déterminations de la résistance au déchirement et de la force d'adhérence

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ISO copyright office
Ch. de Blandonnet 8 • CP 401
CH-1214 Vernier, Geneva, Switzerland
Tel. +41 22 749 01 11
Fax +41 22 749 09 47
copyright@iso.org
www.iso.org

Contents

Page

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).

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. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: Foreword - Supplementary information.

The committee responsible for this document is ISO/TC 45, *Rubber and rubber products*, Subcommittee SC 2, *Testing and analysis*.

This third edition cancels and replaces the second edition (ISO 6133:1998), which has been technically revised to define the force difference for recognizing a peak.

Rubber and plastics — Analysis of multi-peak traces obtained in determinations of tear strength and adhesion strength

1 Scope

This International Standard specifies five methods of calculating, after testing, the tear strength and the adhesion strength of vulcanized rubber or fabrics coated with or adhered to rubber or plastics. The results are calculated by determining the median and range of peak values from a graphical plot of force versus time recorded during the test.

A trace for an adhesion strength test or tear strength test can show few or many force peaks, depending on the material under investigation. The choice of the method of calculation depends on the number of peaks in the trace.

The purpose of this International Standard is to obtain more uniformity in the evaluation and presentation of test results. It is applicable only, however, when specified in another International Standard, i.e. a method of test or a specification.

For other details, such as apparatus, test piece preparation, conditioning, procedure, etc., requirements given in the relevant International Standard shall apply.

NOTE In certain cases, the methods of analysis given might not be adequate, for example, for peak values showing a trend with time. In cases where the minimum force values are of interest, it is possible to use the same methods of calculation as when determining from a range of peak values.

2 Terms and definitions

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

2.1
peak
point at which the slope of a trace changes from positive to negative

Note 1 to entry: For example, a peak occurs when there is an instantaneous maximum force.

2.2
range
difference between the greatest and the smallest observed values of observed force peaks

2.3
complete trace
section of the graphical plot of force versus time between the time at which the first peak occurs and the time at which the test is terminated

3 Procedure

3.1 General

From the force peak values of the trace for adhesion strength or tear strength, determine the median peak force and the range of peak force values by the appropriate method specified in 3.2, 3.3, or 3.4. A

peak is taken as valid only if the force difference between the maximum and the following minimum is larger than 2 % of the maximal force.

NOTE In applying the methods described in this International Standard, it is assumed that the trace being evaluated is a time record of the variation of force during the period of test.

When analysing the trace with a computer, filter the signal to avoid too many small peaks. This can be done by allowing the measured force to drop a certain percentage and allowing a certain time to pass before a new peak is registered. It might be necessary to adjust these factors when testing different materials in order to obtain about the same number of peaks as can be seen on a chart recorder.

3.2 Method A

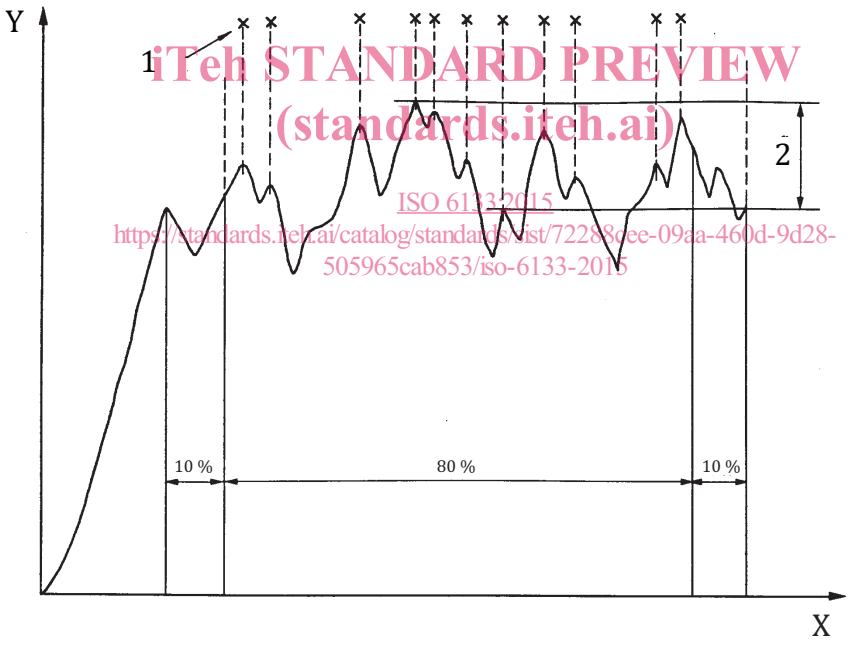
For traces having less than five peaks.

Determine the median, the range, the minimum and the maximum of the force peak values in the trace.

If there is only one force peak, consider its value to be the median.

3.3 Method B

For traces having five to 20 peaks (see Figure 1) or where peak values are automatically computed.



Key

X time
Y force
1 median
2 range

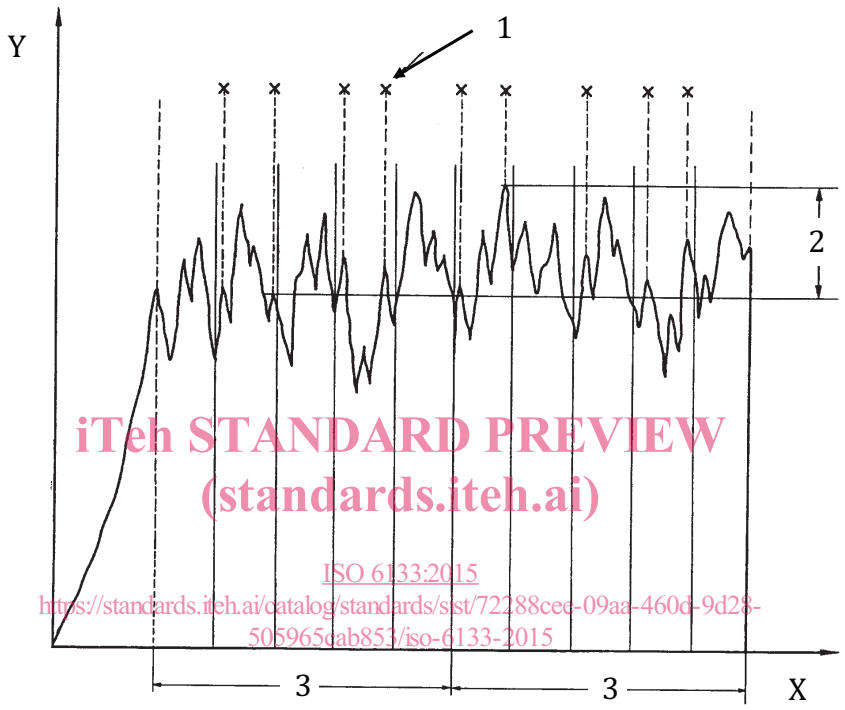
Figure 1 — Analysis of a trace with five to 20 peaks

Consider only the peak values of the central 80 % of the complete trace and determine the median peak force, the range, the minimum and the maximum of these values.

NOTE Although it is possible to use this method for traces having more than 20 peaks, it is not recommended for manual calculations.

3.4 Method C

For traces having more than 20 peaks which are clearly defined and can be readily measured (see Figure 2) and which are not automatically computed.



Key

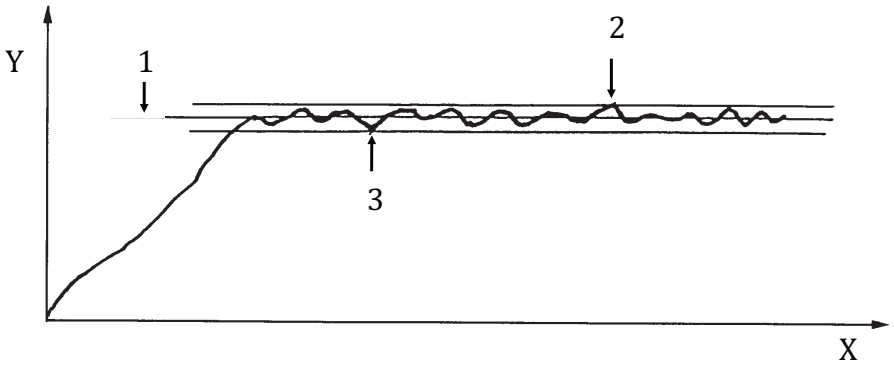
X time
Y force
1 median
2 range
3 t/2

Figure 2 — Analysis of a trace with more than 20 clearly defined peaks

Draw a series of nine vertical lines by starting at the centre of the complete trace and drawing four more lines on each side at equal distances of one-tenth of the length of the trace, to the nearest 1 mm. Consider only the peak value situated closest to each of the vertical lines. Determine the median peak force and the range, the minimum and the maximum of these nine values.

3.5 Method D

For undulating traces (see Figure 3).



Key

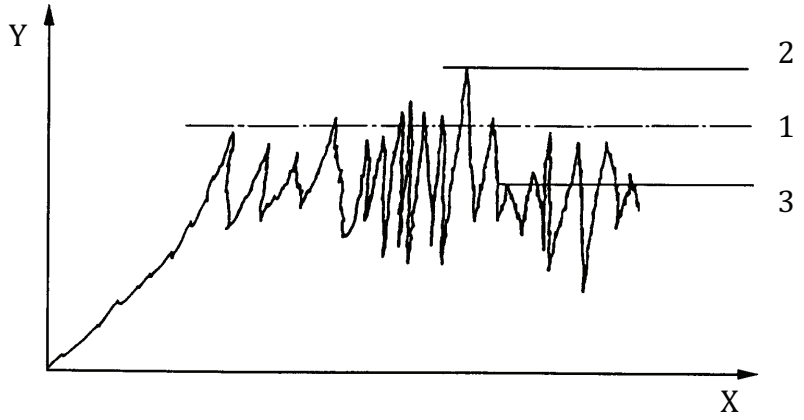
X time
Y force
1 mean
2 maximum
3 minimum

Figure 3 — Analysis of an undulating trace (range or median of no significance)

Where the peaks are not clearly defined but form an undulating curve, report only the arithmetic mean value. Report this arithmetic mean value as the midpoint between the maximum and the minimum deflections of the trace, ignoring the initial rise at the start of the test.

3.6 Method E

For traces too close for counting (see Figure 4).



Key

X time
Y force
1 mean (midpoint)
2 highest peak
3 lowest peak

Figure 4 — Analysis of a trace with a large number of peaks (too close for counting)

Where there are a large number of peaks which are clearly defined, but which are so close as to render their counting difficult, report only the arithmetic mean value. Report this arithmetic mean value as the midpoint between the highest and lowest peak, ignoring the initial rise at the start of the test.

4 Trace-analysis report

The trace-analysis report shall include the following information:

a) reference to this International Standard, i.e. ISO 6133;

b) reference to the test for which the calculation was made;

c) method of calculation used (A, B, C, D, or E);

d) median peak force or, for methods D and E, the mean value;

e) range of peak values;

f) date of the calculation.