INTERNATIONAL STANDARD

ISO 6133

Second 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

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 6133 was prepared by Technical Committee ISO/TC 45, *Rubber and rubber products*, Subcommittee SC 2, *Physical and degradation tests.*

This second edition cancels and replaces the first edition (ISO 6133:1981), which has been technically revised (two additional methods, E and F, have been included).

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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 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 may 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 1 In certain cases the methods of analysis given may 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 Definitions

For the purposes of this International Standard, the following definitions apply:

2.1 peak: A point at which the slope of a trace changes from positive to negative, e.g.an instantaneous maximum force.

2.2 median: If n measured values are arranged in increasing algebraic order of magnitude and numbered 1 to n, the median of these n values is:

if n is an odd number, the $[(n + 1) / 2]^{th}$ number

if n is an even number, the median lies between the $[n / 2]^{th}$ and $[n / 2 + 1]^{th}$ values and is not defined uniquely. Unless otherwise specified, it may be taken to be the arithmetic mean of these two measured values.

2.3 range: The difference between the greatest and the smallest observed values of observed force peaks.

2.4 complete trace: The 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

From the force peak values of the trace for adhesion strength or tear strength, determine the median peak force (see 2.2) and the range (see 2.3) of peak force values by the appropriate method specified in 3.1, 3.2 or 3.3.

NOTE 2 In applying the methods described in this International Standard, it should be 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 may 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

3.1 Method A (for traces having less than five peaks)

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

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

3.2 Method B [for traces having five to twenty peaks (see figure 1) or where peak values are automatically computed]

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

NOTE 3 Although it is possible to use this method for traces having more than twenty peaks, it is not recommended for manual calculations.

3.3 Method C [for traces having more than twenty peaks which are clearly defined and can be readily measured (see figure 2) and which are not automatically computed]

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 of these nine values.

3.4 Method D [for undulating traces (see figure 3)]

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.

3.5 Method E [for traces too close for counting (see figures 4)]

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) a reference to this International Standard;
b) a reference to the test for which the calculation was made;
c) the method of calculation used (A, B, C, D or E);
d) the median peak force or, for methods D and E, the mean value;
e) the range of peak values;
f) the date of the calculation.

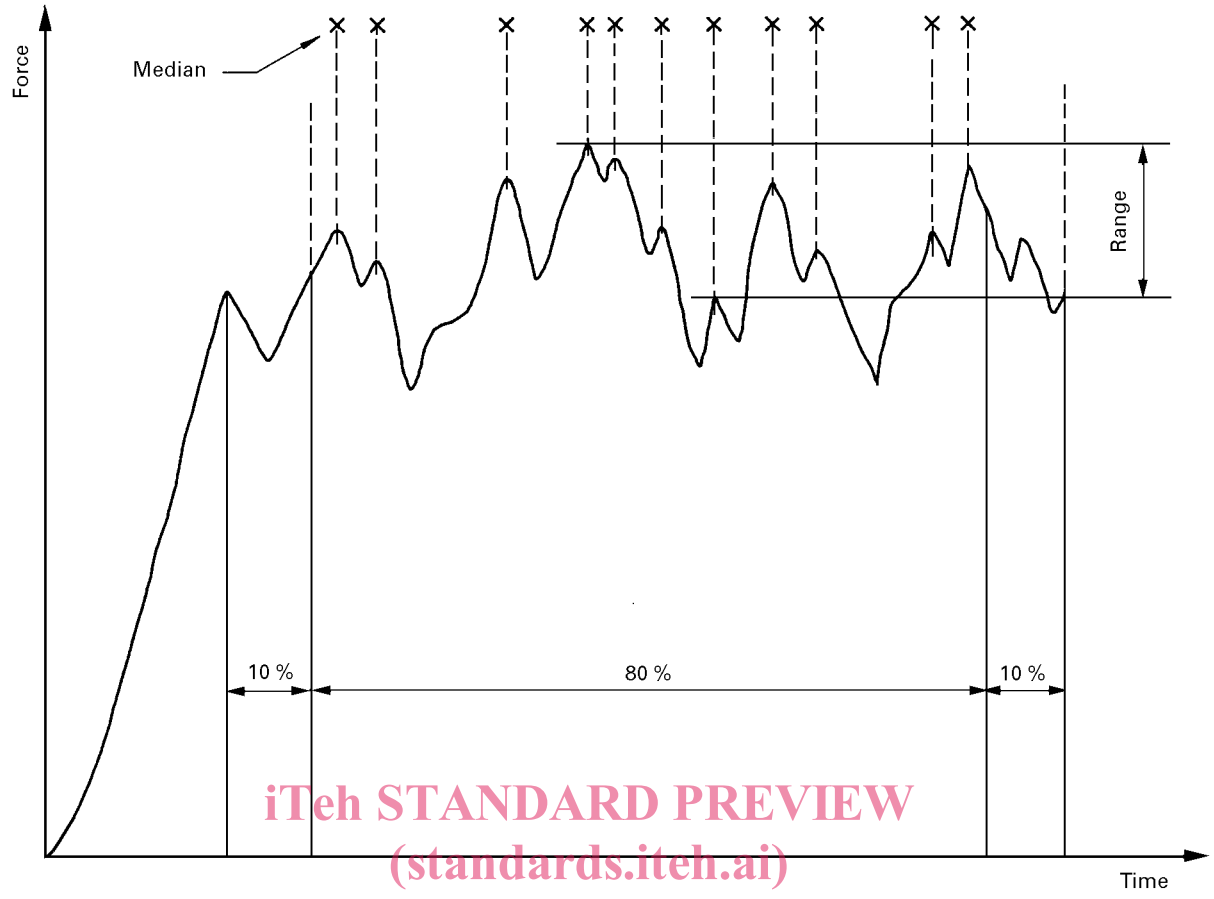

Figure 1 – Analysis of a trace with five to twenty peaks

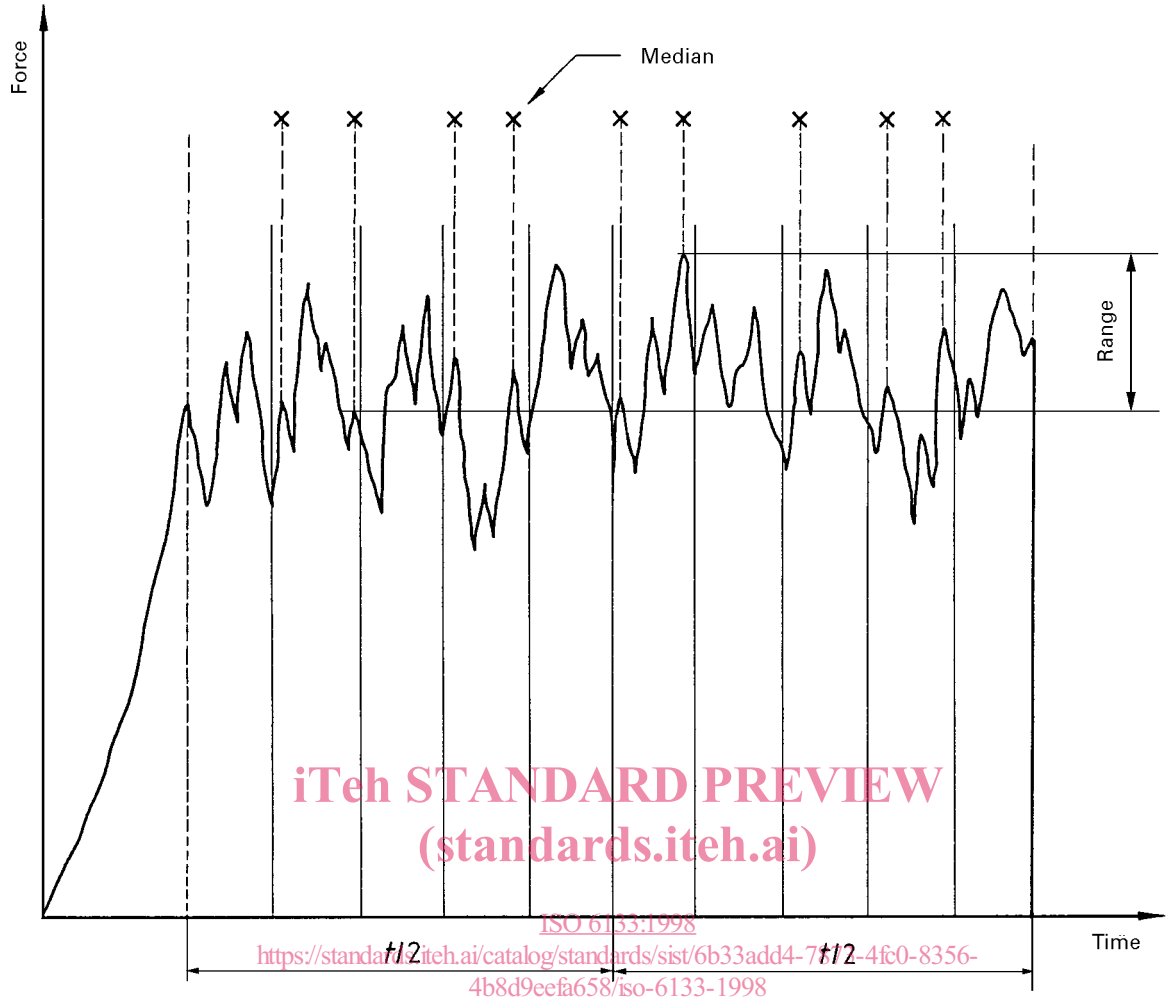

Figure 2 – Analysis of a trace with more than twenty clearly defined peaks

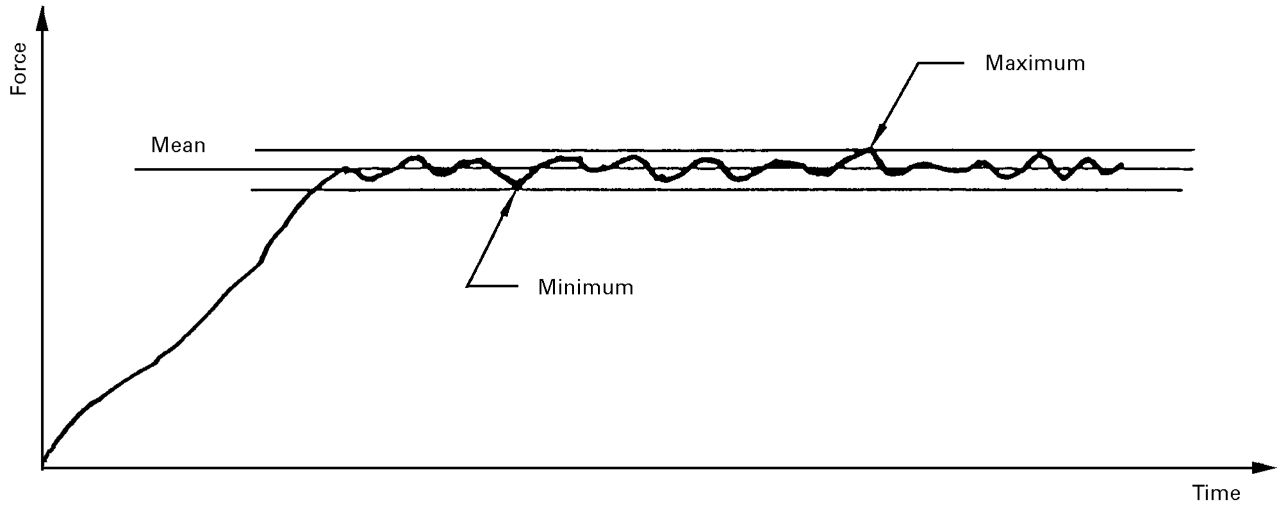

Figure 3 – Analysis of an undulating trace (range or median of no significance)

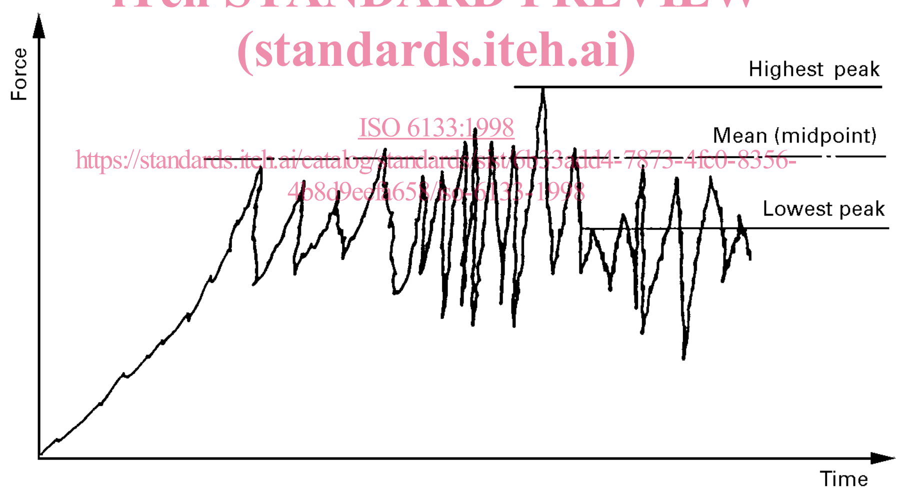

Figure 4 – Analysis of a trace with a large number of peaks (too close for counting)

ICS 83.060; 83.080.01

Descriptors: rubber, vulcanized rubber, fabrics coated with rubber, fabrics coated with plastics, tests, tear tests, adhesion tests, test results, rules of calculation.

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