



JAPANESE  
INDUSTRIAL  
STANDARD

Translated and Published by  
Japanese Standards Association

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JIS K 6260 : 2017

(JRMA/JSA)

**Rubber, vulcanized or thermoplastic—  
Determination of flex cracking and crack  
growth (De Mattia Type)**

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ICS 83.060

Reference number : JIS K 6260 : 2017 (E)

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K 6260 : 2017

Date of Establishment: 1993-02-01

Date of Revision: 2017-03-21

Date of Public Notice in Official Gazette: 2017-03-21

Investigated by: Japanese Industrial Standards Committee

Standards Board for ISO area

Technical Committee on Chemical Products and

Analytical Methods

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JIS K 6260 : 2017, First English edition published in 2017-08

Translated and published by: Japanese Standards Association  
Mita MT Building, 3-13-12, Mita, Minato-ku, Tokyo, 108-0073 JAPAN

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## Foreword

This translation has been made based on the original Japanese Industrial Standard revised by the Minister of Economy, Trade and Industry through deliberations at the Japanese Industrial Standards Committee as the result of proposal for revision of Japanese Industrial Standard submitted by The Japan Rubber Manufacturers Association (JRMA)/ Japanese Standards Association (JSA) with the draft being attached, based on the provision of Article 12 Clause 1 of the Industrial Standardization Law applicable to the case of revision by the provision of Article 14. Consequently **JIS K 6260:2010** is replaced with this Standard.

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Attention is drawn to the possibility that some parts of this Standard may conflict with patent rights, applications for a patent after opening to the public or utility model rights. The relevant Minister and the Japanese Industrial Standards Committee are not responsible for identifying any of such patent rights, applications for a patent after opening to the public or utility model rights.

# Rubber, vulcanized or thermoplastic — Determination of flex cracking and crack growth (De Mattia Type)

## Introduction

This Japanese Industrial Standard has been prepared based on the fifth edition of **ISO 132** published in 2011 with some modifications of the technical contents.

The vertical lines on both sides and dotted underlines indicate changes from the corresponding International Standard. A list of modifications with the explanations is given in Annex JB.

## 1 Scope

This Standard specifies a method of test intended for use in comparing the resistance of vulcanized or thermoplastic rubbers to the formation and growth of cracks, when subjected to repeated flexing on the De Mattia type machine.

**NOTE :** The International Standard corresponding to this Standard and the symbol of degree of correspondence are as follows.

ISO 132 : 2011 *Rubber, vulcanized or thermoplastic — Determination of flex cracking and crack growth (De Mattia)* (MOD)

In addition, symbols which denote the degree of correspondence in the contents between the relevant International Standard and **JIS** are IDT (identical), MOD (modified), and NEQ (not equivalent) according to **ISO/IEC Guide 21-1**.

**WARNING 1** Persons using this Standard should be familiar with normal laboratory practice. This Standard does not purport to address all of the safety problems, if any, associated with its use. It is the responsibility of the user of this Standard to establish appropriate safety and health practices.

**WARNING 2** Certain procedures specified in this Standard might involve the use or generation of substances, or the generation of waste, that could constitute a local environmental hazard. Reference should be made to appropriate documentation on safe handling and disposal after use.

## 2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this Standard. For standards with the year indication, only the editions of the indicated year shall be applied and the revisions (including amendments) made thereafter shall not be applied. For those without the indication of the year, the most recent editions of the standards (including amendments) indicated below shall be applied.

JIS B 7507 *Vernier, dial and digital callipers*

JIS K 6200 *Rubber — Vocabulary*

JIS K 6250 *Rubber — General procedures for preparing and conditioning test pieces for physical test methods*

NOTE : Corresponding International Standard : ISO 23529 *Rubber — General procedures for preparing and conditioning test pieces for physical test methods* (MOD)

ISO 18899 : 2004 *Rubber — Guide to the calibration of test equipment*

## 2A Terms and definitions

For the purposes of this Standard, the terms and definitions given in JIS K 6200 apply.

## 2B Type of determination

The type of determination shall be as follows.

- a) **Determination of flex cracking** When the test piece is subjected to repeated flexing, the duration until cracks occur, and the number and size of cracks are to be determined.
- b) **Determination of crack growth** When the test piece having been pierced is subjected to repeated flexing, the speed of crack growth which starts from the piercing point is to be determined.

NOTE : The methods are suitable for vulcanized rubbers that have reasonably stable stress-strain properties, at least after a period of cycling, and do not show undue stress softening or set, or highly viscous behaviour.

Certain soft vulcanizates show marked resistance to crack initiation, but it is possible for these vulcanizates to have a low resistance to growth (propagation) of cracks. It is important, therefore, to measure both the resistance to crack initiation by flexing and the resistance to crack propagation.

The results obtained for some thermoplastic rubbers should be treated with caution if the elongation at yield is below, or close to, the maximum strain imposed during the test.

## 3 Apparatus

### 3.1 De mattia type machine

Example for De mattia type machine is shown in Figure 1. The machine has stationary parts, as shown in Figure 2, provided with grips for holding one end of each of the test pieces in a fixed position, and similar but reciprocating parts for holding the other end of each of the test pieces. The travel is  $57^{+0.5}_0$  mm and is such that the maximum distance between each set of opposing grips is  $75^{+1}_0$  mm.

The reciprocating parts are so arranged that their motion is straight and in the direction of, and in the same plane as, the common centreline of each opposing pair of

grips. The planes of the gripping surfaces of each opposing pair of grips remain parallel throughout the motion.

The eccentric which actuates the reciprocating parts is driven by a constant-speed motor to give  $5.00 \text{ Hz} \pm 0.17 \text{ Hz}$ ,  $[(300 \pm 10) \text{ cycles/min}]$  with sufficient power to flex at least six, and preferably 12, test pieces at one test. The grips hold the test pieces firmly, without undue compression, and enable individual adjustment to be made to the test pieces to ensure accurate insertion.

**NOTE :** It is useful to arrange the test pieces in two equal groups as shown in Figure 1, so that one group is being flexed while the other group is being straightened, thus reducing the vibration in the machine.

For testing at elevated or subnormal temperatures, the machine can be enclosed in a chamber with temperature control near the centre of the test piece to  $\pm 2 \text{ }^{\circ}\text{C}$ , if necessary, by using an air circulator.

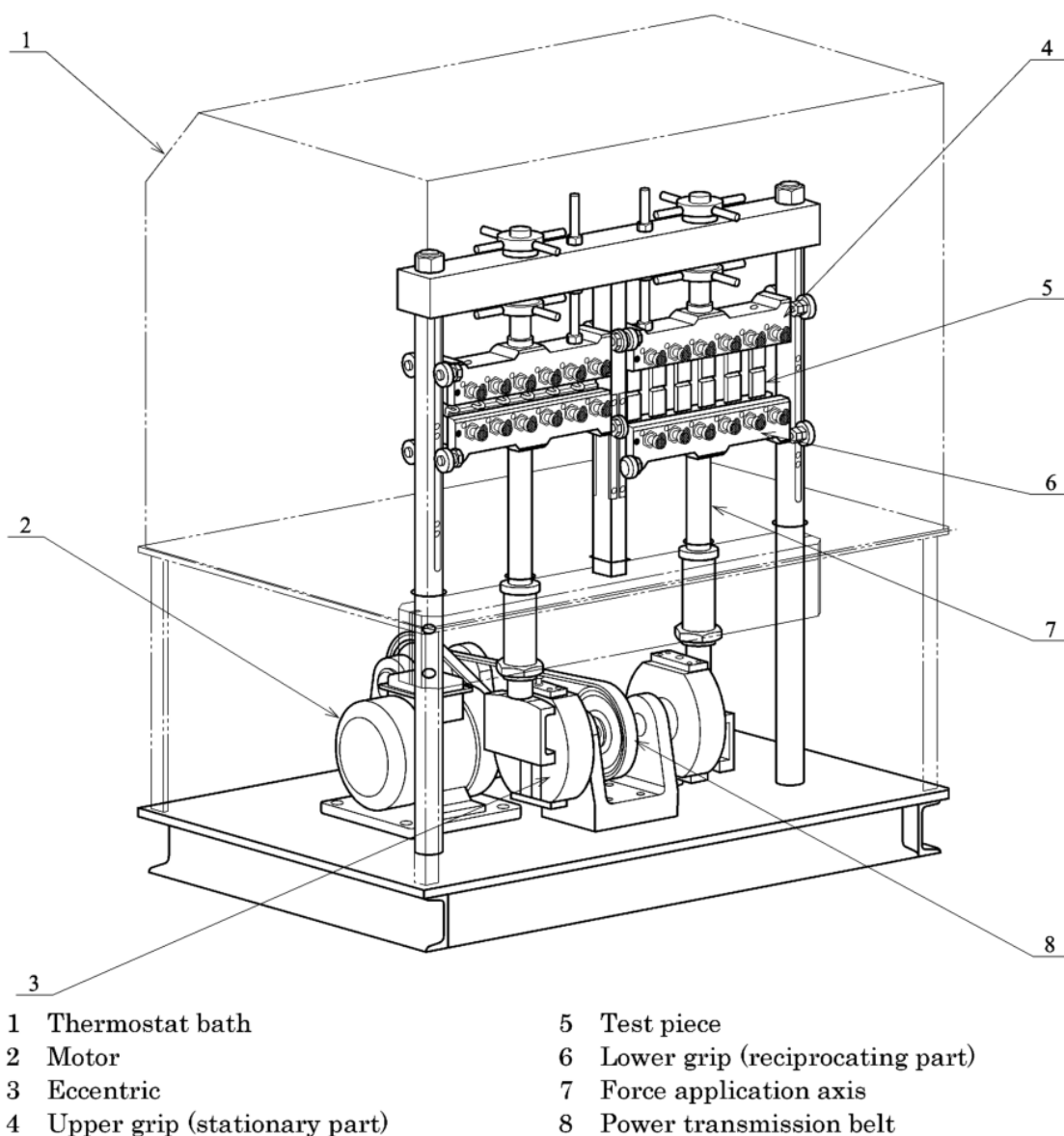


**Figure 1 Example for De mattia type test machine**

Unit: mm

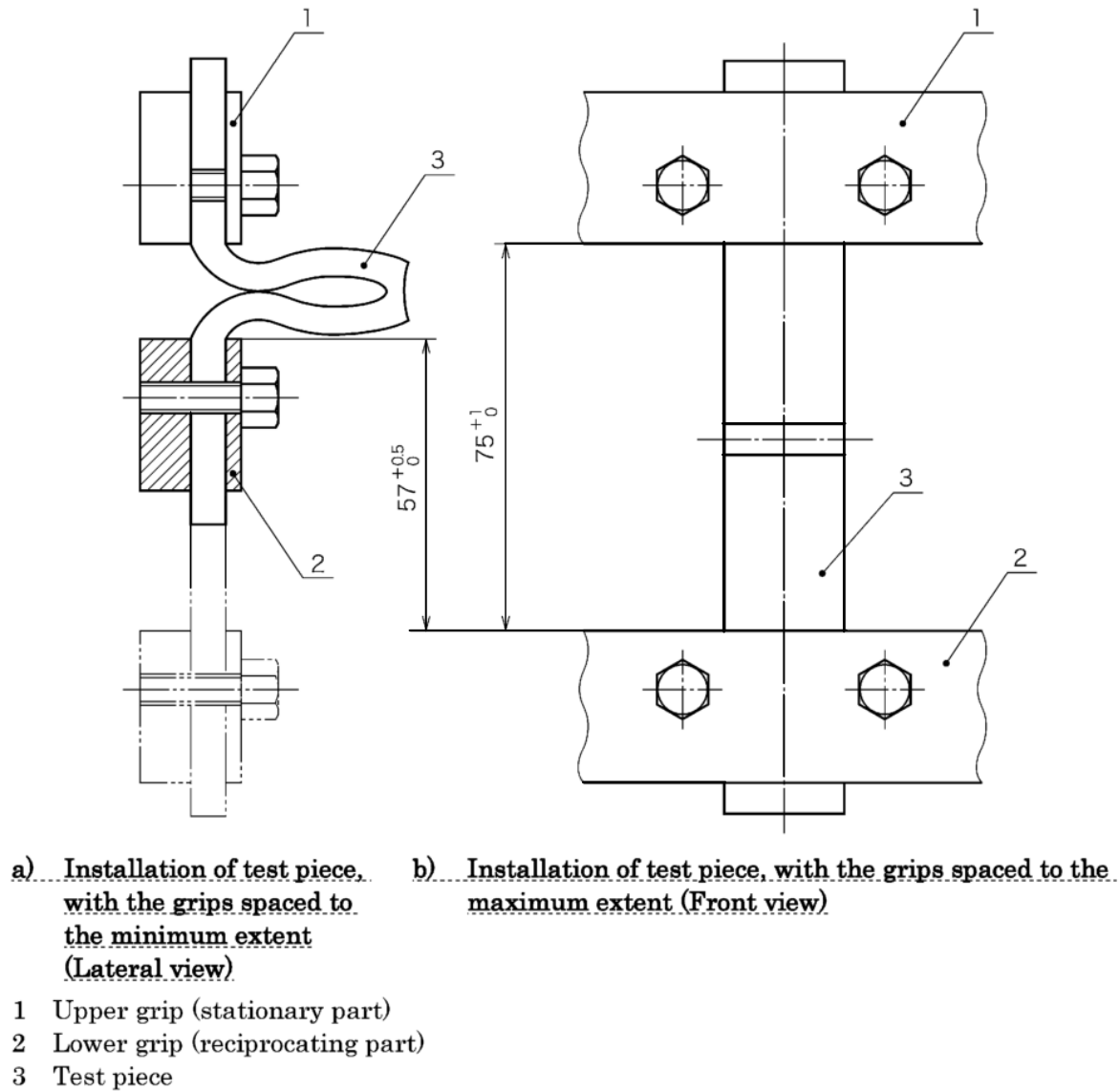


**Figure 2** Example for installation of grips and test piece in De mattia type test machine

### 3.2 Piercing tool and suitable jig

The piercing tool and suitable jig are shown in Figure 3 and Figure 4, respectively (see 5.2).

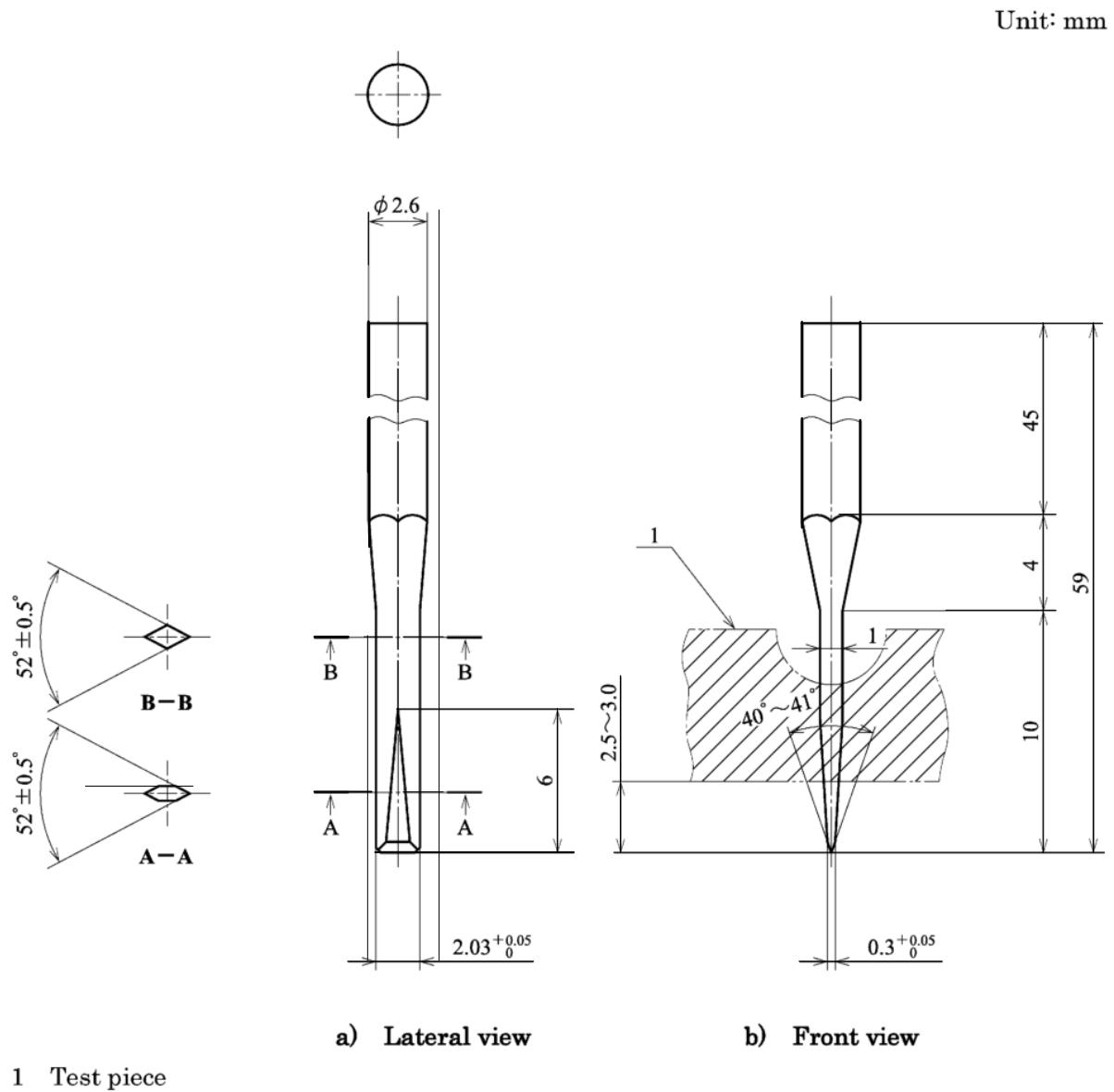


Figure 3 Shape and dimensions of piercing tool

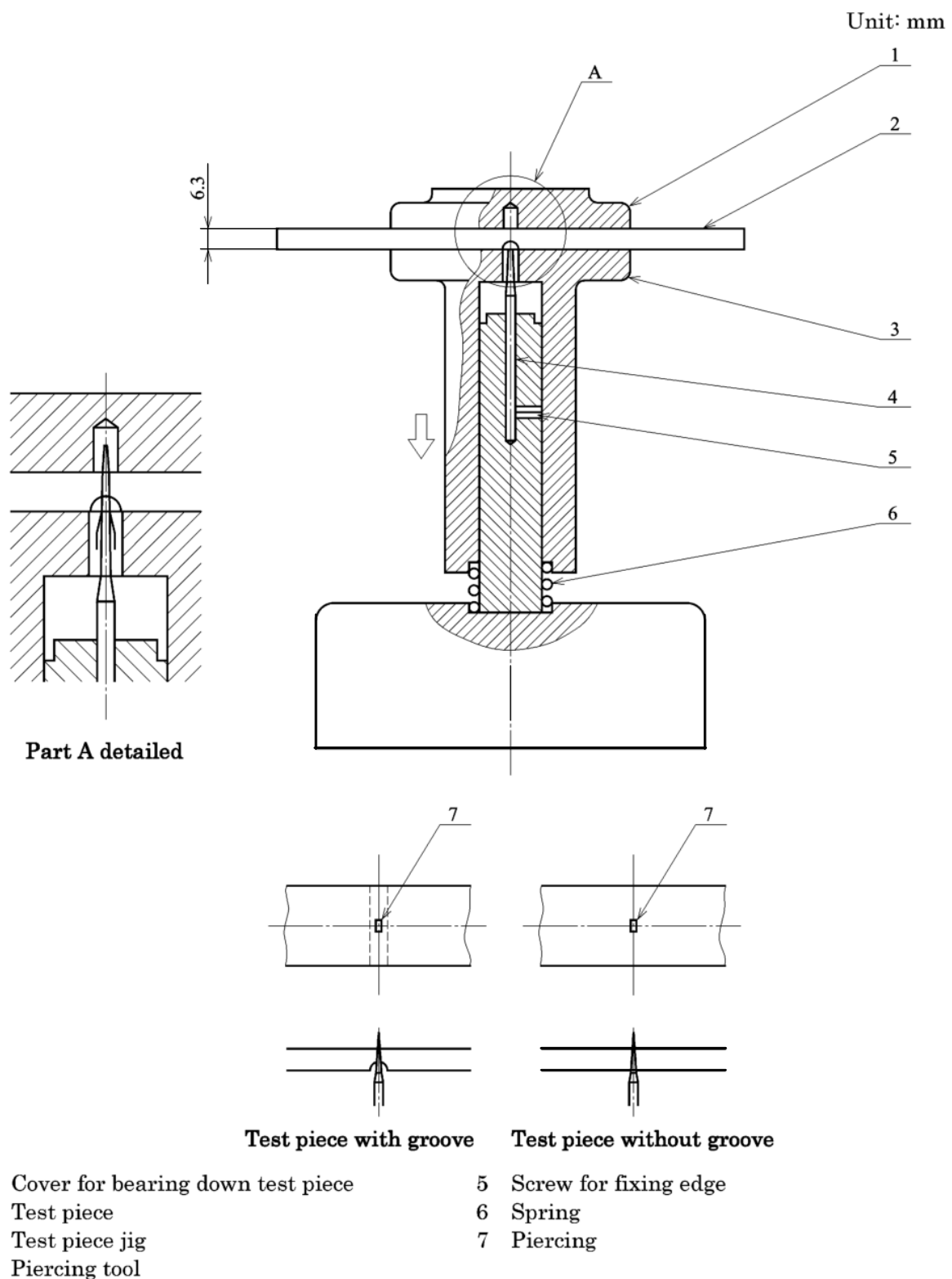


**Figure 4 Example for piercing tool and piercing point**

#### 4 Calibration

The calibration of test apparatus shall be as given in Annex A.