INTERNATIONAL STANDARD

ISO 16946

First edition
2015-04-15

Non-destructive testing — Ultrasonic testing — Specification for step wedge calibration block

Essais non destructifs — Essais par ultrasons — Spécifications relatives aux blocs d'étalonnage à gradins

Reference number
ISO 16946:2015(E)

ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.org
Web www.iso.org

Published in Switzerland

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

ISO 16946 was prepared by Technical Committee CEN/TC 138, *Non-destructive testing*, and by ISO/TC 135, *Non-destructive testing*, Subcommittee SC 3, *Ultrasonic testing* in collaboration.

Introduction

A step wedge calibration block is not meant to check an ultrasonic instrument. A step wedge calibration block makes it possible, during practical testing, to check simply, from time to time, the setting of the time base and the sensitivity of the ultrasonic equipment.

Calibration block No. 1 is specified in ISO 2400.

Calibration block No. 2 is specified in ISO 7963.

Requests for official interpretations of any aspect of this International Standard are to be directed to the Secretariat of ISO/TC 135/SC 3 via your national standards body, a complete listing of which can be found at www.iso.org.

Non-destructive testing — Ultrasonic testing — Specification for step wedge calibration block

1 Scope

This International Standard specifies the dimensions, material, and manufacture of a step wedge steel block for the calibration of ultrasonic instruments.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 5577, *Non-destructive testing — Ultrasonic inspection — Vocabulary*

EN 1330-4, *Non-destructive testing — Terminology — Part 4: Terms used in ultrasonic testing*

EN 10025-2, *Hot rolled products of structural steels — Part 2: Technical delivery conditions for non-alloy structural steels*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 5577 and EN 1330-4 apply.

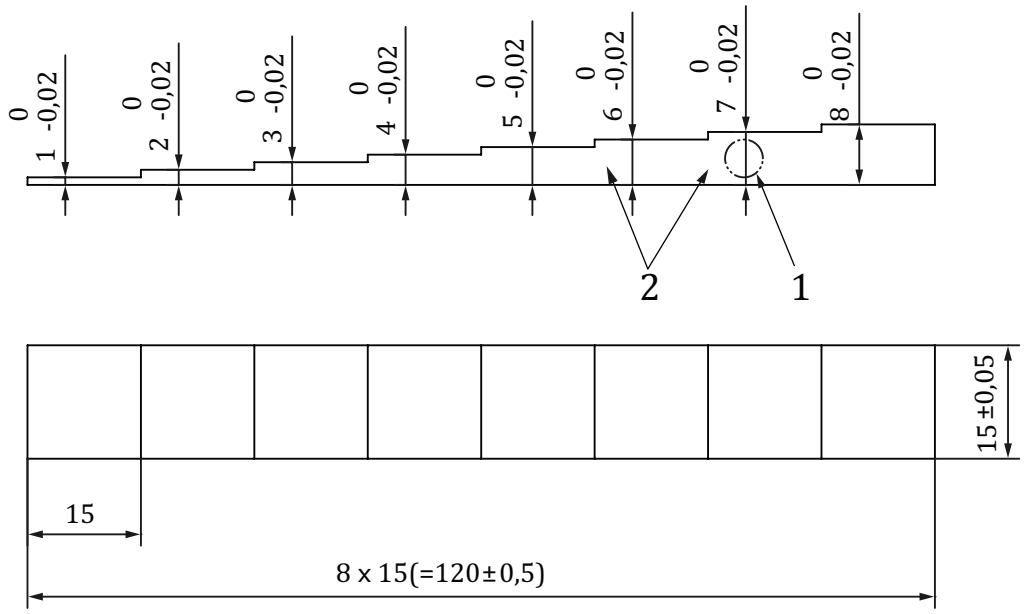
4 Dimensions

The dimensions of the block are given in Figure 1.

The tolerances are ±0,1 mm for length and width of the block and −0,02 mm for the step thickness.

All external surfaces shall be machined to an Ra value not greater than 0,8 µm.

Dimensions in mm



Key

1 manufacturer's trade mark

2 International Standard number, serial number

Figure 1 — Step wedge calibration block

5 Alternative dimensions

In the event of a different size of calibration block being required which is not described in this International Standard, the principles embodied in the design and manufacture of a calibration block to the requirements of this International Standard shall be applied to such a block.

The tolerances are ±0,1 mm for length and width of the block and −0,02 mm for the step thickness up to 12,5 mm and −0,1 mm for larger thickness.

6 Material

The calibration block shall be made from steel of grade S355J0 in accordance with EN 10025-2 or from equivalent steel grade.

7 Preparation

Blocks shall be rough-machined to a plan parallel plate, which is at least 3 mm larger at all sides than the dimensions of the finalised step block.

In order to obtain a fine grain structure and good homogeneity, the block shall be heat treated as follows:

a) maintain at 920 °C for 30 min;

b) rapid cooling (quenching) in water;

c) tempering by heating to 650 °C for at least 3 h;

d) cooling in still air.

After heat treatment, at least 2 mm shall be removed from all surfaces.

Prior to final machining, the block shall undergo ultrasonic testing to prove that the block is free from internal discontinuities.

For this purpose, an ultrasonic test shall be performed with a longitudinal wave normal-beam probe of at least 10 MHz nominal centre frequency and having a transducer size of 10 mm to 15 mm. The block shall be checked from at least two long surfaces to cover the complete volume. The following two acceptance criteria apply:

1) with the probe scanning as shown in Figure 2, the noise level produced by the grain structure shall always be at least 50 dB lower than the amplitude of the fourth back wall echo;

2) no echo arising from any discontinuity in the material shall have an amplitude greater than the grain scatter noise level.

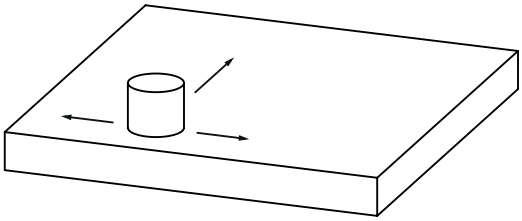


Figure 2 — Scan pattern

The velocity of longitudinal waves shall be verified as being 5 920 m/s ± 30 m/s.

8 Marking

The block shall be permanently marked with

a) manufacturer's trade mark,

b) number of this International Standard, and

c) unique serial number.

9 Declaration of conformity

For each block, a declaration shall be issued by the manufacturer stating

a) that the block complies with this International Standard, and

b) the mean value of the measured longitudinal wave velocities, v_l.