SLOVENSKI STANDARD
SIST EN ISO 18563-1:2015

01-september-2015

Neporušitvene preiskave - Ugotavljanje značilnosti in preverjanje ultrazvočne opreme faznih sistemov - 1. del: Naprave (ISO 18563-1:2015)

Non-destructive testing - Characterization and verification of ultrasonic phased array systems - Part 1: Instruments (ISO 18563-1:2015)

Zerstörungsfreie Prüfung - Charakterisierung und Verifizierung der Ultraschall-Prüfausrüstung mit phasengesteuerten Arrays - Teil 1: Prüfgeräte (ISO 18563-1:2015)

Essais non destructifs - Caractérisation et vérification de l'appareillage de contrôle multi-élément par ultrasons - Partie 1 : Instruments (ISO 18563-1:2015)

Ta slovenski standard je istoveten z: **EN ISO 18563-1:2015**

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19.100	Neporušitveno preskušanje	Non-destructive testing

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English Version

Non-destructive testing - Characterization and verification of ultrasonic phased array equipment - Part 1: Instruments (ISO 18563-1:2015)

Essais non destructifs - Caractérisation et vérification de l'appareillage de contrôle par ultrasons en multiéléments - Partie 1: Appareils (ISO 18563-1:2015)

Zerstörungsfreie Prüfung - Charakterisierung und Verifizierung der Ultraschall-Prüfausrüstung mit phasengesteuerten Arrays - Teil 1: Prüfgeräte (ISO 18563-1:2015)

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COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels

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European foreword

This document (EN ISO 18563-1:2015) has been prepared by Technical Committee CEN/TC 138 “Non-destructive testing” the secretariat of which is held by AFNOR, in collaboration with Technical Committee ISO/TC 135 "Non-destructive testing".

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by December 2015, and conflicting national standards shall be withdrawn at the latest by December 2015.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

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Endorsement notice

The text of ISO 18563-1:2015 has been approved by CEN as EN ISO 18563-1:2015 without any modification.

INTERNATIONAL STANDARD

ISO 18563-1

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Non-destructive testing — Characterization and verification of ultrasonic phased array equipment —

Part 1: Instruments

Essais non destructifs — Caractérisation et vérification de l'appareillage de contrôle par ultrasons en multiéléments — Partie 1: Appareils

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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

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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).

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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 18563-1 was prepared by the European Committee for Standardization (CEN), Technical Committee CEN/TC 138, *Non-destructive testing*, in collaboration with ISO/TC 135, *Non-destructive testing*, Subcommittee SC 3 *Ultrasonic testing*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

ISO 18563 consists of the following parts, under the general title *Non-destructive testing — Characterization and verification of ultrasonic phased array equipment*:

— *Part 1: Instruments*

— *Part 3: Combined systems*

An additional part on *Probes* is planned.

Non-destructive testing — Characterization and verification of ultrasonic phased array equipment —

Part 1: Instruments

1 Scope

This part of ISO 18563 identifies the functional characteristics of a multichannel ultrasonic phased array instrument used for phased array probes and provides methods for their measurement and verification.

This part of ISO 18563 can partly be applicable to ultrasonic phased array instruments in automated systems, but then, other tests might be needed to ensure satisfactory performance. When the phased array instrument is a part of an automated system, the acceptance criteria can be modified by agreement between the parties involved.

This part of ISO 18563 gives the extent of the verification and defines acceptance criteria within a frequency range of 0,5 MHz to 10 MHz.

The evaluation of these characteristics permits a well-defined description of the ultrasonic phased array instrument and comparability of 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 2400, *Non-destructive testing — Ultrasonic testing — Specification for calibration block No. 1*

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

EN 12668-1, *Non-destructive testing — Characterization and verification of ultrasonic examination equipment — Part 1: Instruments*

EN 16018, *Non-destructive testing — Terminology — Terms used in ultrasonic testing with phased arrays*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 1330-4, EN 12668-1, EN 16018, and the following apply.

3.1
maximum number of channels that can be simultaneously activated
maximum number of transmitting and/or receiving channels which can be used for one shot

3.2
parallel phased array instrument
phased array instrument featuring a *maximum number of channels that can be simultaneously activated* (3.1) equal to the number of channels in the instrument

EXAMPLE In a type 64/64 (or 64//), the number of channels that can be simultaneously activated is 64 and the number of channels of the instrument is 64.

3.3
multiplexed phased array instrument
phased array instrument featuring a *maximum number of channels that can be simultaneously activated* (3.1) smaller than the number of channels in the instrument and which are controlled by an internal multiplexing device

EXAMPLE In a type 16/64 multiplexed instrument, the number of channels that can be simultaneously activated is 16 and the number of channels available is 64. See Figure 1.

3.4
time resolution of the phased array instrument
inverse of the maximum digitization frequency without processing

4 Symbols and abbreviated terms

Table 1 — Symbols and abbreviations

Symbol	Unit	Meaning
A_{min}	%	Minimum amplitudes measured on a screen
A_{max}	%	Maximum amplitudes measured on a screen
A_0, A_n	dB	Attenuator settings used during tests
CT	dB	Cross-talk
f_0	Hz	Centre frequency for each frequency range
f_u	Hz	Upper frequency limit at −3 dB
f_l	Hz	Lower frequency limit at −3 dB
f_{max}	Hz	Frequency with the maximum amplitude in the frequency spectrum
f_h	Hz	Highest digitized frequency
Δf	Hz	Frequency bandwidth in each frequency range
f_{RR}	Hz	Screen refresh rate
FSH		Full screen height
ΔG	dB	Channel gain variation
G_D	dB	Input signal dynamic range
G_i	dB	Instrument gain on channel *i*
H_R	%	Reference screen height
I_{max}	A	Amplitude of the maximum current that can be driven by the proportional gate output
N_{in}	$\frac{V}{\sqrt{Hz}}$	Noise per root bandwidth for receiver input
R_A, R_B, R_l	Ω	Termination resistors
S	dB	Attenuator setting
Δt	s	Time increment
t	s	Time delay
t_0	s	Time to the start of distance amplitude curve
t_1	s	Dead time
t_d	s	Pulse duration
t_{final}	s	Time to the end of distance amplitude curve

Table 1 *(continued)*

Symbol	Unit	Meaning
t_r	s	Transmitter pulse rise time from an amplitude of 10 % to 90 % of peak amplitude
$t_{Target\ 0}$, $t_{Target\ i}$, t_{Pi}, $t_{P\ 0}$, t_{difi}, t_{dif}	s	Transmitter or receiver time delay
t_{A1}, t_{A2}	s	Temporal resolution
V_A, V_B	V	Pulse voltage amplitudes
V_{ein}	V	Receiver equivalent input noise
V_{in}	V	Input voltage when measuring the receiver equivalent input noise
V_l	V	Output voltage modified when measuring the output impedance of the analogue gate
V_{min}	V	Minimum input voltage of the receiver
V_{max}	V	Maximum input voltage of the receiver
V_O	V	Output voltage to get an indication at 80 % of FSH when measuring the output impedance of the analogue gate
V_{50}	V	Voltage amplitude of the 50 Ω loaded transmitter pulse
Z_0	Ω	Output impedance of transmitter
Z_A	Ω	Output impedance of proportional output

5 General requirements of conformity

An ultrasonic phased array instrument complies with this part of ISO 18563 if it fulfils all of the following requirements:

a) the ultrasonic phased array instrument shall comply with Clause 7;

b) a declaration of conformity shall be available, issued by either the manufacturer operating a certified quality management system (e.g. in accordance with ISO 9001) or by an organization operating an accredited test laboratory (e.g. in accordance with ISO/IEC 17025);

c) the ultrasonic phased array instrument shall carry a unique serial number;

d) manufacturer‘s technical specification corresponding to the instrument, which defines the performance criteria in accordance with Clause 6, shall be available.

6 Manufacturer’s technical specification for phased array ultrasonic phased array instruments

The manufacturer’s technical specification relative to a specific model of an ultrasonic phased array instrument shall contain, as a minimum, the information listed in Table 2. This table specifies the information which shall be supplied by the manufacturer in the instrument’s technical specification (M = Measurement, OI = Other information). The values obtained from the tests described in Clause 7 shall be established as nominal values, with tolerances given as indicated.