

Glossary of

Terms used in non-destructive testing —

Part 4: Ultrasonic flaw detection

UDC 001.4:620.179.16

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This British Standard, having been prepared under the direction of the General Mechanical Engineering Standards Committee, was published under the authority of the Board of BSI and comes into effect on 29 March 1985

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First published January 1965
First revision March 1985

The following BSI references relate to the work on this standard:
Committee reference GME/23
Draft for comment 83/78847 DC

ISBN 0 580 14361 9

Amendments issued since publication

Amd. No.	Date of issue	Comments

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Foreword

This revision of BS 3683-4 has been prepared under the direction of the General Mechanical Engineering Standards Committee and supersedes the 1965 edition which is withdrawn.

In this revision, the opportunity has been taken to update existing terms and introduce new terms and definitions used in the application of ultrasonic flaw detection techniques. As with the first edition, this revision has been prepared to promote understanding of the subject particularly with regard to the terms encountered in technical literature and reports. The drafting committee accordingly decided not to include general physical terms which are defined in other standards except in those cases where such terms have a particular application in this field of non-destructive testing.

In the interests of simplicity, the terms defined in this Part of the glossary are arranged alphabetically, and where two or more terms have come into use with virtually the same meaning, the term to be preferred has been selected for definition.

Other Parts of BS 3683 respectively define the terms commonly used in penetrant, magnetic particle, radio-logical and eddy-current flaw detection.

NOTE The titles of the publications referred to in this glossary are listed on the inside back cover.

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Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, pages 1 to 12, an inside back cover and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

Glossary

Term	Definition
A-scan display	A cathode-ray tube display in which pulse amplitude is represented as a displacement along one axis (usually the <i>y</i> -axis) and the travel time of the ultrasonic pulse is represented as a displacement along the other axis (usually the <i>x</i> -axis).
acoustical impedance matching	The coupling of two media using layers of material with suitable impedances so as to provide optimum transference of acoustical energy between them.
acoustical shadow	The effect produced in a body by its geometry, or by a discontinuity in it, whereby ultrasonic energy when travelling in a particular direction is prevented from reaching a certain region within the body.
angle of incidence	The angle which the axis of an ultrasonic beam makes with the normal to a tangent plane to a surface at its point of impingement as it travels towards that surface.
angle of reflection	The angle which the axis of an ultrasonic beam makes with the normal to the tangent plane to a reflecting interface, at the point of impingement of the incident wave, as it travels away from that interface in the same medium.
angle of refraction	The angle which the axis of an ultrasonic beam makes with the normal to a tangent plane at an interface as it travels away from that interface into the second material. NOTE A synonymous term is "beam angle".
angle of squirt	The angle between the side edge of the probe and the projection of the beam axis on the plane of the probe face. NOTE For angle probes this normally relates to deviation in the lateral direction.
angle probe	A contact probe from which the main lobe of waves propagates at any angle, other than 0° or 90°, to the normal to the tangent plane to the surface at the place where the probe is positioned.
ASME^a holes	Cross-drilled holes with diameter and position as required by the ASME pressure vessel code.
attenuation	A diminution in the level of acoustic energy as it propagates through material.
attenuation coefficient	A factor which is determined by the diminution in the amplitude of a wave per unit distance travelled. NOTE The attenuation coefficient is composed of two parts, one part being proportional to frequency and termed absorption, the other part being dependent on the ratio of grain size to wavelength and arising from scatter.
attenuator	An electrical device by which the amplitude of an ultrasonic signal can be adjusted by calibrated increments.
automatic scanning	Systematic relative displacement of the ultrasonic beam and the material under test by other than manual means.
AVG/DGS diagram	A series of curves which shows the relationship between distance along a beam to gain in dB compared to a particular back-wall echo and the size of a particular flatbottomed hole reflector.

^a American Society of Mechanical Engineers

Term	Definition
B-scan display	A two-dimensional graphical plot showing the apparent size and position of reflectors in the test piece on a cross-sectional plane which is normal to the test surface and contains the beam axis of the probe during a single line scan.
back-wall echo	A pulse of ultrasonic energy reflected from the boundary of a body directly opposite to the surface on which the probe (or probes) is positioned and returned to that surface by the shortest possible path. NOTE The term is generally restricted to normal compressional waves and is sometimes referred to as “bottom echo (first)”.
beam angle	See “angle of refraction”.
beam axis	The locus of points of maximum intensity in the far field in a beam of ultrasonic waves, and its geometrical prolongation into the near field.
beam index	The point on the surface of a body through which the beam axis passes. (cf. “probe index”).
beam spread	The divergence of the main lobe of an ultrasonic beam in the far field. NOTE The beam spread is proportional to the ratio of the wavelength to the diameter of the ultrasonic crystal.
boundary echo (first)	A pulse of ultrasonic energy reflected from any boundary of a body to the surface on which the probe (or probes) is positioned and returned to that surface by the shortest possible path. NOTE The term is generally restricted to shear and surface waves.
C- scan display	A two-dimensional graphical projection of the test surface showing in plan view the apparent size and position of reflectors in the volume inspected by scanning an area of test surface.
calibration block	A piece of material of specified composition, heat treatment, geometrical form and surface texture by means of which the performance of ultrasonic flaw detection equipment can be assessed and calibrated for the examination of material of the same general composition. NOTE For specification and use of calibration blocks, see respectively BS 2704 and BS 4331.
calibration reflector	A reflector of ultrasonic waves, such as a drilled hole, a machined slot or the end face of a specimen representative of the material under test, which can be used to calibrate or set up equipment for inspection purposes.
combined double probe	See “double crystal probe”.
compressional wave	A form of wave-motion in which the particle displacement at each point in a material is parallel to the direction of propagation. NOTE A synonymous term is “longitudinal wave”; it is also sometimes referred to as “dilatational wave”, or “irrotational wave”.
contact scanning	Scanning carried out by means of an ultrasonic probe (or probes) in contact with the body under examination.
convergence point	The point of intersection of the axes of the transmitting and receiving sound fields in a double crystal probe.
corner effect	The reflection of ultrasonic energy back to a point coincident with, or very close to, its point of origin, after impinging successively on two or three orthogonal surfaces.