

Technical Specification of Ultrasonic Transducer

PART - 1 : Technical Requirement :

Item Sl. No.	Qty. Required		Technical Specification	Qualifying Criteria	
	Transducer	Cable			
1	2	8	Transducer with Longitudinal sound wave propagation, 5 MHz frequency, Dual crystal with 12 degree included angle, 13 X 25 mm size (Suitable for inspection of casting as per ASTM A609)	[1]	Able to detect a defect of 2.4 mm diameter flat bottom hole (with 80 % of Full Screen Height) at a depth of 3 mm, 6 mm, 13 mm, 19 mm & 25 mm from examination surface in a 50 mm thick carbon steel & Austenitic Stainless steel flat test piece.
				[2]	Grass echo height should be less than 20 % of defect echo height in all cases mentioned above
2	2	8	Transducer with Longitudinal sound wave propagation, 3.5 to 4.5 MHz frequency, Dual crystal, 20 to 30 mm diameter, having focal spot at approx. 6 to 8 mm from examination surface (Suitable for inspection of weld metal overlay cladding)	[1]	Able to detect a defect of 1.5 mm diameter side drilled hole & 3 mm diameter flat bottom hole (with 80 % of Full Screen Height) at a depth of 6 mm & 8 mm from examination surface in a 30 mm thick carbon steel & Austenitic Stainless steel flat test piece.
				[2]	Grass echo height should be less than 20 % of defect echo height in all cases mentioned above
3	4	16	Transducer with Longitudinal sound wave propagation, 3.5 to 4.5 MHz frequency, Dual crystal, 8 to 12 mm diameter, having focal spot at approx. 6 to 8 mm from examination surface (Suitable for inspection of weld metal overlay cladding)	[1]	Able to detect a defect of 1.5 mm diameter side drilled hole & 3 mm diameter flat bottom hole (with 80 % of Full Screen Height) at a depth of 6 mm & 8 mm from examination surface in a 30 mm thick carbon steel & Austenitic Stainless steel flat test piece.
				[2]	Grass echo height should be less than 20 % of defect echo height in all cases mentioned above
4	2	8	Transducer with Longitudinal sound wave propagation at an angle of 45 degree in steel, 3.5 to 4.5 MHz frequency, Dual crystal (Suitable for inspection of course grain material, steel castings & austenitic stainless steel welds)	[1]	In a zero to full skip (full 'Vee') path travel of transducer, it should be able to detect a defect of 3 mm diameter side drilled hole (with 80 % of Full Screen Height) at a depth of 10 mm, 20 mm & 30 mm from examination surface in a 38 mm thick Austenitic Stainless steel flat test piece
				[2]	In a half to full skip (half to full 'Vee') path travel of transducer, it should be able to detect a defect of a notch of 0.8 mm depth, 6 mm width & 25 mm length (with 80 % of Full Screen Height) in a 38 mm thick Austenitic Stainless steel flat test piece
				[3]	Grass echo height should be less than 20 % of defect echo height in all cases mentioned above

Bhupendra

M. Manish

B. S. Chandhary
Dy. Engr. (QND)

Manish K. Dewangan
Sr. Engr. (QND)

P. Upadhyay

Priyesh Kumar Upadhyay
Dy. Mgr. (QND)

V. K. Dongre

V. K. DONGRE
Addl. General Manager
Quality Control (QND)
BHEL, BHOPAL

8	2	8	Transducer with Longitudinal sound wave propagation at an angle of 60 degree in steel, 1.8 to 2.25 MHz frequency, Dual crystal (Suitable for inspection of course grain material, steel castings & austenitic stainless steel welds)	[1]	In a zero to full skip (full 'Vee') path travel of transducer, it should be able to detect a defect of 2.5 mm diameter side drilled hole (with 80 % of Full Screen Height) at a depth of 5 mm, 10 mm & 15 mm from examination surface in a 19 mm thick Austenitic Stainless steel flat test piece
				[2]	In a half to full skip (half to full 'Vee') path travel of transducer, it should be able to detect a defect of a notch of 0.4 mm depth, 6 mm width & 25 mm length (with 80 % of Full Screen Height) in a 19 mm thick Austenitic Stainless steel flat test piece
				[3]	In a zero to full skip (full 'Vee') path travel of transducer, it should be able to detect a defect of 3 mm diameter side drilled hole (with 80 % of Full Screen Height) at a depth of 10 mm, 20 mm & 30 mm from examination surface in a 38 mm thick Austenitic Stainless steel flat test piece
				[4]	In a half to full skip (half to full 'Vee') path travel of transducer, it should be able to detect a defect of a notch of 0.8 mm depth, 6 mm width & 25 mm length (with 80 % of Full Screen Height) in a 38 mm thick Austenitic Stainless steel flat test piece
				[5]	Grass echo height should be less than 20 % of defect echo height in all cases mentioned above
9	2	8	Transducer with Longitudinal sound wave propagation at an angle of 70 degree in steel, 1.8 to 2.25 MHz frequency, Dual crystal (Suitable for inspection of course grain material, steel castings & austenitic stainless steel welds)	[1]	In a zero to full skip (full 'Vee') path travel of transducer, it should be able to detect a defect of 2.5 mm diameter side drilled hole (with 80 % of Full Screen Height) at a depth of 5 mm, 10 mm & 15 mm from examination surface in a 19 mm thick Austenitic Stainless steel flat test piece
				[2]	In a half to full skip (half to full 'Vee') path travel of transducer, it should be able to detect a defect of a notch of 0.4 mm depth, 6 mm width & 25 mm length (with 80 % of Full Screen Height) in a 19 mm thick Austenitic Stainless steel flat test piece
				[3]	Grass echo height should be less than 20 % of defect echo height in all cases mentioned above
10	2	8	Transducer with Shear (Transverse) sound wave propagation at an angle of 45 degree in steel, 3.5 to 4.5 MHz frequency, Dual crystal (Suitable for inspection of thin carbon steel material & welds)	[1]	In a zero to full skip (full 'Vee') path travel of transducer, it should be able to detect a defect of 3 mm diameter side drilled hole (with 80 % of Full Screen Height) at a depth of 10 mm, 20 mm & 30 mm from examination surface in a 38 mm thick carbon steel flat test piece
				[2]	In a half to full skip (half to full 'Vee') path travel of transducer, it should be able to detect a defect of a notch of 0.8 mm depth, 6 mm width & 25 mm length (with 80 % of Full Screen Height) in a 38 mm thick carbon steel flat test piece
				[3]	Grass echo height should be less than 20 % of defect echo height in all cases mentioned above

Blupendra

M. Singh

R. K. Pandey

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14	2	8	Transducer with Shear (Transverse) sound wave propagation at an angle of 60 degree in steel, 1.8 to 2.25 MHz frequency, Dual crystal (Suitable for inspection of thin carbon steel material & welds)	[1]	In a zero to full skip (full 'Vee') path travel of transducer, it should be able to detect a defect of 2.5 mm diameter side drilled hole (with 80 % of Full Screen Height) at a depth of 5 mm, 10 mm & 15 mm from examination surface in a 19 mm thick carbon steel flat test piece
				[2]	In a half to full skip (half to full 'Vee') path travel of transducer, it should be able to detect a defect of a notch of 0.4 mm depth, 6 mm width & 25 mm length (with 80 % of Full Screen Height) in a 19 mm thick carbon steel flat test piece
				[3]	In a zero to full skip (full 'Vee') path travel of transducer, it should be able to detect a defect of 3 mm diameter side drilled hole (with 80 % of Full Screen Height) at a depth of 10 mm, 20 mm & 30 mm from examination surface in a 38 mm thick carbon steel flat test piece
				[4]	In a half to full skip (half to full 'Vee') path travel of transducer, it should be able to detect a defect of a notch of 0.8 mm depth, 6 mm width & 25 mm length (with 80 % of Full Screen Height) in a 38 mm thick carbon steel flat test piece
				[5]	Gross echo height should be less than 20 % of defect echo height in all cases mentioned above
15	2	8	Transducer with Shear (Transverse) sound wave propagation at an angle of 70 degree in steel, 1.8 to 2.25 MHz frequency, Dual crystal (Suitable for inspection of thin carbon steel material & welds)	[1]	In a zero to full skip (full 'Vee') path travel of transducer, it should be able to detect a defect of 2.5 mm diameter side drilled hole (with 80 % of Full Screen Height) at a depth of 5 mm, 10 mm & 15 mm from examination surface in a 19 mm thick carbon steel flat test piece
				[2]	In a half to full skip (half to full 'Vee') path travel of transducer, it should be able to detect a defect of a notch of 0.4 mm depth, 6 mm width & 25 mm length (with 80 % of Full Screen Height) in a 19 mm thick carbon steel flat test piece
				[3]	Gross echo should be less than 20 % of defect echo in all cases mentioned above
16	4	16	Protective face Transducer with Longitudinal sound wave propagation, 1.8 to 2.25 MHz frequency, Single crystal, zero degree, 20 to 30 mm diameter	[1]	Able to detect a defect of 3 mm diameter side drilled hole (with 80 % of Full Screen Height) at a depth of 10 mm, 20 mm & 30 mm from examination surface in a 38 mm thick carbon steel & Austenitic Stainless steel flat test piece.
				[2]	Able to resolve three distinct indication at a depth of 85 mm, 91 mm & 100 mm when performing Ultrasonic test on standard IIW-V1 calibration block made up of carbon steel & Austenitic stainless steel material
				[3]	Gross echo height should be less than 20 % of defect echo height in all cases mentioned above
17	2	8	Protective face Transducer with Longitudinal sound wave propagation, 3.5 to 4.5 MHz frequency, Single crystal, zero degree, 20 to 30 mm diameter	[1]	Able to detect a defect of 2.5 mm diameter side drilled hole (with 80 % of Full Screen Height) at a depth of 10 mm & 15 mm from examination surface in a 19 mm thick carbon steel & Austenitic Stainless steel flat test piece.
				[2]	Able to resolve three distinct indication at a depth of 85 mm, 91 mm & 100 mm when performing Ultrasonic test on standard IIW-V1 calibration block made up of carbon steel & Austenitic stainless steel material
				[3]	Gross echo height should be less than 20 % of defect echo height in all cases mentioned above

Blupendra

M. Nish

P. K. Jeyaraj

Prasanna

22	2	8	Wear Resistant (Hard face) Transducer with Longitudinal sound wave propagation, 3.5 to 4.5 MHz frequency, Single crystal, zero degree, 8 to 12 mm diameter	[1]	Able to detect a defect of 2.5 mm diameter side drilled hole (with 80 % of Full Screen Height) at a depth of 5 mm, 10 mm & 15 mm from examination surface in a 19 mm thick carbon steel & Austenitic Stainless steel flat test piece.
				[2]	Able to resolve three distinct indication at a depth of 85 mm, 91 mm & 100 mm when performing Ultrasonic test on standard IIW-V1 calibration block made up of carbon steel & Austenitic stainless steel material
				[3]	Grass echo height should be less than 20 % of defect echo height in all cases mentioned above
23	2	8	Wear Resistant (Hard face) Transducer with Longitudinal sound wave propagation, 1.8 to 2.25 MHz frequency, Single crystal, zero degree, 20 to 30 mm diameter	[1]	Able to detect a defect of 3 mm diameter side drilled hole (with 80 % of Full Screen Height) at a depth of 10 mm, 20 mm & 30 mm from examination surface in a 38 mm thick carbon steel & Austenitic Stainless steel flat test piece.
				[2]	Able to resolve three distinct indication at a depth of 85 mm, 91 mm & 100 mm when performing Ultrasonic test on standard IIW-V1 calibration block made up of carbon steel & Austenitic stainless steel material
				[3]	Grass echo height should be less than 20 % of defect echo height in all cases mentioned above
24	2	8	Wear Resistant (Hard face) Transducer with Longitudinal sound wave propagation, 3.5 to 4.5 MHz frequency, Single crystal, zero degree, 20 to 30 mm diameter	[1]	Able to detect a defect of 2.5 mm diameter side drilled hole (with 80 % of Full Screen Height) at a depth of 10 mm & 15 mm from examination surface in a 19 mm thick carbon steel & Austenitic Stainless steel flat test piece.
				[2]	Able to resolve three distinct indication at a depth of 85 mm, 91 mm & 100 mm when performing Ultrasonic test on standard IIW-V1 calibration block made up of carbon steel & Austenitic stainless steel material
				[3]	Grass echo height should be less than 20 % of defect echo height in all cases mentioned above
25	2	8	Transducer with Longitudinal sound wave propagation at an angle of 70 degree in steel, 2 to 4 MHz frequency, Dual crystal (Suitable for detection of underclad cracking in Nuclear application)	[1]	Able to detect an edge of 2 mm diameter flat bottom hole made at a junction of carbon steel material & incoloy cladding material at a depth of 6 mm from examination surface
				[2]	In a zero to full skip (full 'Vee') path travel of transducer, it should be able to detect a defect of 2.5 mm diameter side drilled hole at a depth of 5 mm, 10 mm & 15 mm from examination surface in a 19 mm thick Austenitic Stainless steel flat test piece
				[3]	In a half to full skip (half to full 'Vee') path travel of transducer, it should be able to detect a defect of a notch of 0.4 mm depth, 6 mm width & 25 mm length in a 19 mm thick Austenitic Stainless steel flat test piece
				[4]	Grass echo height should be less than 20 % of defect echo height in all cases mentioned above

Blupenda

M. Priya

P. K. S. S. S.

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PART - 2 : General Requirement :

[1]	A complete self explanatory probe technical data sheet including DGS diagram for each probe category having compliance certificate with the latest edition of EN 12668-2 or ASTM E 1065 shall be furnished.
[2]	Colored Sonogram of each probe category with proper 1:1 scale up to 500 mm beam sound path shall be provided with below minimum details :
2.1	Detailed information about the near resolution flaw detectability
2.2	Dead Zone
2.3	The area of best flaw detectability
2.4	Minimum detectability and corresponding equivalent disc reflector in all the beam ranges
2.5	Reduction in the flaw detectability due to the divergence of the sound beam and attenuation
[3]	Following list of information shall be available for each probe
3.1	Manufacture's Name
3.2	Type of Probe
3.3	Shape & Size of Probe
3.4	Material of transducers element
3.5	Material of wedge delay
3.6	Wear allowance
3.7	Working Temperatures
3.8	Echo Pulse duration
3.9	Housing material
3.10	Central Frequency, Band width of frequency, Relative bandwidth at 6dB
3.11	Focal Length
3.12	Element size (D or a X b)
3.13	Near field length
3.14	Beam angle (angle between the main angle and normal axis of the test surface (equivalent to steel))
3.15	Roof angle of dual crystal/element

Bhupendra

Manish

मनीष कु. देवांगन / Manish Ku. Dewangan
वरि. अभियंता / Sr. Engineer
बि.एन.डी. विभाग / Q.N.D. Division
बी.एच.ई.एल., भोपाल / BHEL, Bhopal

P.K. Upadhyay
PRIYESH K.U. UPADHYAY
Dy. Manager-QND
NDT IL-II (PT, MT, UT, RT)
BHEL, BHOPAL

V.K. Dongre

V. K. DONGRE
Addl. General Manager
Quality Control (QND)
B.H.E.L., BHOPAL