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APPROVED TRAINING ORGANISATION

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NASA 214

Ultrasonic Testing Curriculum

Revision control sheet:

Rev No:	Date:	Compiled by:	Reviewed by:	Revision Description:
0	n/a	Nish Kanhaye	Nish Kanhaye	Complete rewrite of T-03-04-10 Rev 0 - Training Curriculum
1	09-Jan-2018	Meyuri Moodley	Nish Kanhaye	Revised toward improvement Name change Aligned to BINDT approved course notes
2	02-Apr-2025	Acacia Sureschandra	Nish Kanhaye	The document format was updated.
3	04-Jun-2025	Acacia Sureschandra	Nishaan Kanhaye	The training duration was changed from Hours to Days following the publication of ISO 9712:2021. In this revision NASA has retained the hours and added the number of days.

1.0 Course Duration:

1.1 Level 1 and 2 Combined:

a) The minimum training administered in Level 1 shall be 8 days (64 Hours).

b) The minimum training administered in Level 2 shall be 10 days (80 Hours).

c) NASA shall provide a combined Level 1 and 2 course with a total of 18 days (144 Hours).

1.2 In all cases, level 1, level 2 or combined level 1 and 2, NASA shall administer the full theory content of Level 1 and 2.

2.0 Course Content:

2.1 Theory: The table below shows theory aspects covered:

Chapter Reference:	Level 1 and 2
Chapter 1: Course Overview	Course Content Stationery Requirements Student conduct during classroom training End of Course and PCN Examination Breakdown Passing grade End of Course Examination Rules

Chapter 2: Qualification and Certification	SNT-TC-1A and ISO 9712 Levels of Qualification

Chapter 3: History	The History of NDT The History of Ultrasonic Testing

Chapter 4: Basic principles	Objectives Advantages and Limitations Terminology and definitions Vibrations The Acoustic Spectrum Units and Abbreviations Elasticity and Rigidity Summary Modes of Wave Propagation Velocity of sound Propagation Properties of Sound Waves The Ultrasonic Beam Beamspread Side lobes The Ultrasonic pulse Pulse length Resolution Couplant Attenuation Scatter Absorption The decibel (dB) **Sound generation** The polarisation of ceramics Magnetostrictive Versus Piezoelectric Transducers

Chapter 5: Sources of Non-Relevant Indications	Non relevant Indications Surface Interference

Chapter 6: Equipment	The Cathode Ray Tube Cathode Ray Tube Controls Flaw Detector Controls Pulse Generator Controls Amplifier Controls Displaying Ultrasonic Indications A-Scan B-scan C-Scan Calibration Standards Calibration Blocks *Chapter 6: Equipment continued:* Reference Blocks Advanced UT Systems Probes types Broadband and Narrowband Transducers Probe Selection Immersion transducers Single crystal angle probes Twin Crystal Zero degree probe

Chapter 7: Assessing the Performance Characteristics of Ultrasonic Equipment	Timebase Linearity Amplifier Linearity Resolution Maximum Penetrative Power

Chapter 8: Scanning Techniques	Compression Wave Techniques Thickness Measurement A-Scan Rectified Display Velocity correction, if required. Lamination Testing Standard Procedure Multiple Echo Technique Examination of Brazed Bonded Joints Shear Wave Techniques Calculation of Various Distances When Using Angled Probes Surface Wave Techniques Advantages of Surface Waves Limitations of Surface Waves Calibration Defect Location Immersion Testing Techniques Compression Wave Techniques Shear Wave Testing Through-Transmission Technique

Chapter 9: Examination of Welds	Inspection Procedure Root Conditions and Testing Procedures Choice of Probe Angle Probe Angle for fusion face. Plotting Weld Defects Double V Welds Tandem Technique: Tandem Probes for Critical Root Examination

Chapter 10: Equipment Check Procedures	Time Base (Range) Calibration- Range: 50mm on V2 (20mmT) Time Base (Range) Calibration- Range: 100mm on V2 (20mmT) Time Base (Range) Calibration- Range: 200mm on V1 (25mmT) Time Base Linearity Amplifier Gain Linearity Probes (Transducers) Equipment Resolution on V1 Probe Angle (Shear Wave Probes) Probe Angle Check: Alternate Method (More Accurate) Time Base (Range) Calibration (Shear Wave Probe) Beam Alignment (Squint) Resolving Power (Depth and Angular) Probe Resolution Signal to Noise Ratio (Reverberation) 6dB Horizontal Beam Spread (45º / 60º / 70º) 6dB Vertical Beam Spread (45º / 60º / 70º) 20db Horizontal Beam Spread (45º / 60º / 70º) 20db Vertical Beam Spread (45º / 60º / 70º) DAC Curve Construction

Chapter 11: Data Sheets and Formulas	Formulas Velocity, Density and Acoustic Impedance Data Sheet

Chapter 12: Essential Reading Material	Codes and Specifications

Chapter 13: Written Instruction	Written Instruction Example

Chapter 14: Sample Test Report	UT Test Report Sheet

2.2 Practical: The table below shows practical aspects covered:

Level 1	Level 2
Pre-test checks and calibrations Construction of DAC curves Identifying specimen reference points Compression wave scanning techniques Shear wave scanning techniques Lamination testing (Rolled plates) Weld scanning (Single V plate butt welds) Sizing techniques (6dB drop) Plotting of defect locations Reporting of defects	Level 1 content plus: Additional pre-test checks and calibrations Beam profiles Equipment and probe selection Interpretation of codes, specifications and acceptance criteria's Weld scanning (Single and double V butt welds in plate and pipe of varying thicknesses) Sizing techniques (20dB drop and max amplitude) Interpretation and evaluation of defects

3.0 Learning outcomes:

3.1 Upon completion of training, students should be able to carry out and understand the following regarding ultrasonic testing:

Level 1	Level 2
Basic principles General advantages and limitations Discontinuity categories Carry out pre-test checks, set up equipment, carry out tests and report results according to written instructions	Basic principles General advantages and limitations Discontinuity associated with manufacturing processes, categories and types Select test technique to be used Interpret codes, specifications and procedures. Compile instructions according to specifications, codes or procedures Carry out pre-test checks, set up equipment, perform tests and report results Interpret and evaluate test results according to specifications, codes or procedures

4.0 Course Outcome:

4.1 Successful Completion of Training:

Upon successful completion of the course, a successful completion of training certificate at the level attempted will be issued which meets eligibility to undertake the external PCN examination.