

Opleidingsprogramma PA (Phased Array)

Het opleidingsprogramma dient de kandidaat voor te bereiden voor de examens. Voor kandidaten niveau 3 wordt er tevens vanuit gegaan dat deze tevens de kennis bezitten van de hieronder aangevinkte onderwerpen bij niveau 2. De totale minimale cursus duur is vermeld in de Hobéon SKO Regelingen SKNDO (par. 6).

Structure ISO/TS 25107:2019			TOPICS	
Content			Level 2	Level 3
15.2.1 Introduction to terminology and history of phased array testing (UT-PA)	History			
	Introduction to ultrasonic phased array testing	Overview	X	
		Applicability and limitations	X	
		Difference between conventional and ultrasonic phased array techniques	X	
15.2.2 Physical principles and associated knowledge	Mathematical and physical basics	Basics of sound beam	X	
		Waves	X	
		— Sinusoidal movement	X	
		— Amplitude	X	
		— Frequency	X	
		— Wavelength	X	
		— Propagation velocity	X	
		— Longitudinal waves	X	
		— Transverse waves	X	
		Terms relating to sound	X	X
		— Side lobes	X	X
		— Grating lobes	X	X
		— Artifacts spelling	X	X
		Terms relating to arrays	X	X
		— Active aperture	X	X
		— Elementary aperture	X	X
		— Primary axis of an array	X	X
		— Secondary axis of an array	X	X
		Influence of band width	X	
		Electronical beam steering and focusing of sound beams	X	
15.2.3 Product knowledge and related capability of the method and derived techniques	Defects related to the manufacturing processes	Welding	X	
		Forgings	X	
		Castings	X	
	Implementation of ultrasonic phased array techniques according to products and to expected discontinuities		X	X
	Overall properties of specimen	Influence of surface conditions	X	X
		Geometry	X	X
		Attenuation	X	X

		Reference reflectors	X	X
		— Backwall	X	X
		— Side drilled holes	X	X
		— Flat bottom holes	X	X
15.2.4 Equipment	Test Instrument and combined equipment	Phased array instrument	X	X
		Multi-channel instrument	X	X
		Transmitting delay	X	X
		Receiving delay	X	X
		Delay laws	X	X
		Amplitude balancing	X	X
		Multi group capability	X	X
	Phased array probes	Linear array	X	X
		Annular array	X	X
		Annular sectorial array	X	X
		Acoustic properties of wedge materials that affect phased arrays	X	X
		Encircling array	X	X
		1,5D array	X	X
		Linear array with separate transmitters and receivers	X	X
	Multi group capabilities	Number of focal laws	X	X
	Encoders	Different types of scanners	X	
	Couplant and coupling techniques		X	
	Adjustment blocks	Block No. 1 according to ISO 2400	X	X
		Block No. 2 according to ISO 7963	X	X
		Reference block according to ISO 13588	X	X
		Different reference blocks	X	X
15.2.5 Information prior to test	Applied standards for UT — and ultrasonic phased array testing	Content	X	X
		Requirements for procedures	X	X
		Developing of test procedures	X	X
15.2.6 Testing	Techniques	Linear scanning with 0 deg (forgings and castings)	X	X
			X	X
		Linear scanning with constant angle (welding)	X	X
		Sectorial scanning (welding, forging)	X	X
		Multigroup scanning	X	X
		Range setting	X	X
		— Single point adjustment	X	X
		— Two point adjustment	X	X

		Sensitivity setting	X	X
		— Angle corrected gain (ACG)	X	X
		— Reference reflectors (BW, SDH, FBH)	X	X
		— Single reflector technique (reference height)	X	X
		— Requirements for reference blocks	X	X
		— DAC-method	X	X
		— TCG-method	X	X
		— DGS-method	X	X
		Typical applications of phased array techniques	X	X
15.2.7 Evaluation and reporting	Evaluation of indications	DGS-method	X	
		DAC-method	X	
		TCG-method	X	
		Distinction between defect and geometry echo	X	X
		Location of defects	X	X
		Interpretation and evaluation of indications	X	X
		Sizing of defects	X	X
		A-, E-, S-, B- and C-Scan interpretation	X	X
	Reporting	Recording	X	
		Classifying of results according to written procedure	X	
		Storage of data-files	X	
		Generation of reports	X	
15.2.8 Assessment		Evaluation and confirmation of test reports	X	
		Application of the acceptance criteria according to standards, codes and procedures	X	
15.1.9 Quality aspects	Personnel qualification	ISO 9712	X	
		Other NDT qualification and certification systems	X	
15.1.10 Developments	Not applicable			X