

## PERLAKSANAAN LATIHAN DAN PEPERIKSAAN PRAKTIKAL KAEDAH ULTRASONIK

### 1.0 LATIHAN PRAKTIKAL

#### a. Latihan Praktikal Ultrasonik Tahap 1

- i. PB perlu menyediakan dan memastikan peralatan seperti berikut dalam keadaan baik dan berfungsi:

<b>Equipment and Accessories</b>		<b>Ratio</b>
1.	<i>Ultrasonic equipment (UTFD)</i>	1:1
2.	<i>Twin crystal probe (2 to 5 MHz) and cables</i>	1:1
3.	<i>Single crystal (normal) probe (2 to 5 MHz) and cables</i>	1:1

<b>Calibration Block</b>		<b>Ratio</b>
1.	<i>Calibration block - V1</i>	1:1
2.	<i>Calibration block - V2</i>	1:1
3.	<i>Calibration block - step wedge</i>	1:1
4.	<i>Flat Bottom Hole Calibration Block, material Carbon Steel (1 set)</i>	1:20

<b>Specimen</b>		<b>Ratio</b>
1.	<i>Testing sample - lamination</i>	1:1
2.	<i>Testing sample – thickness (different material velocity)</i>	1:1

<b>Consumables</b>		<b>Ratio</b>
1.	<i>Ultrasonic couplant (low to high viscosity)</i>	1:1
2.	<i>Post cleaning:</i> <i>i. Tissue or cotton rag</i> <i>ii. Hand wash</i>	1:1

<b>Teaching Aid</b>		<b>Ratio</b>
1.	<i>Written Instruction (thickness and lamination test)</i>	1:1
2.	<i>Acceptance &amp; Rejection Criteria</i>	1:1
3.	<i>Classroom</i>	1:20
4.	<i>Practical lab</i>	1:20
5.	<i>Testing report form</i>	1:1
6.	<i>Stationery</i>	1:1
7.	<i>White board</i>	1:20
8.	<i>PPE</i>	1:1
9.	<i>Computer</i>	1:20
10.	<i>Printer</i>	1:20

11.	<i>Table</i>	1:1
12.	<i>Chair</i>	1:1

**b. Latihan Praktikal Ultrasonik Tahap 2**

- i. PB perlu menyediakan dan memastikan peralatan seperti berikut dalam keadaan baik dan berfungsi:

<b><i>Equipment dan Accessories</i></b>		<b><i>Ratio</i></b>
1.	<i>Ultrasonic equipment (UTFD)</i>	1:1
2.	<i>Probes:</i>	
	<i>(i) 45°, 2 to 5 MHz, single crystal and cable</i>	1:1
	<i>(ii) 60°, 2 to 5 MHz, single crystal and cable</i>	1:1
	<i>(iii) 70°, 2 to 5 MHz, single crystal and cable</i>	1:1
	<i>(iv) Twin crystal probe (2 to 5 MHz) and cables</i>	1:1
	<i>(v) Single crystal (normal) probe (2 to 5 MHz) and cables</i>	1:1

<b><i>Calibration Block</i></b>		<b><i>Ratio</i></b>
1.	<i>Calibration block - V1</i>	1:1
2.	<i>Calibration block - V2</i>	1:1
3.	<i>ASME Reference Block (DAC), thickness 19 mm &amp; 39 mm</i>	1:4
4.	<i>Flat Bottom Hole Calibration Block, Material Carbon Steel (1 set)</i>	1:20
5.	<i>Step wedge, material Carbon Steel</i>	1:1

<b><i>Specimen</i></b>		<b><i>Ratio</i></b>
1.	<i>Test samples - thickness (different velocity)</i>	1:1
2.	<i>Ultrasonic Test specimen-Welded plate Single V</i>	1:1
3.	<i>Ultrasonic Test specimen-Welded plate Double V</i>	1:1
4.	<i>Ultrasonic Test specimen- Welded pipe diameter 6" and 12" full/half</i>	1:1
5.	<i>Ultrasonic Test specimen "T" or "K" or "Y" welded joints</i>	1:5

<b><i>Consumables</i></b>		<b><i>Ratio</i></b>
1.	<i>Ultrasonic couplant (low to high viscosity)</i>	1:1
2.	<i>Post cleaning:</i>	1:1
	<i>i. Tissue or cotton rag</i>	
	<i>ii. Hand wash</i>	

<b><i>Teaching Aid</i></b>		<b><i>Ratio</i></b>
1.	<i>UT lamination inspection written procedure</i>	1:1
2.	<i>UT thickness measurement inspection written procedure</i>	1:1
3.	<i>UT welded specimen inspection written procedures</i>	1:20
4.	<i>Test specimen profile and shape (welded specimen only)</i>	1:20
5.	<i>Ultrasonic plotting card with slide ruler</i>	1:1
6.	<i>Written Instruction (thickness and lamination test)</i>	1:1
7.	<i>Acceptance &amp; Rejection Criteria</i>	1:1
8.	<i>Classroom</i>	1:1
9.	<i>Practical lab</i>	1:20
10.	<i>Testing Report Form</i>	1:20
11.	<i>Stationery</i>	1:1
12.	<i>White board</i>	1:1
13.	<i>PPE</i>	1:1
14.	<i>Computer</i>	1:1
15.	<i>Printer</i>	1:1
16.	<i>Table</i>	1:1
17.	<i>Chair</i>	1:1

**c. Latihan Praktikal Ultrasonik Tahap 3**

- i. PB perlu menyediakan dan memastikan peralatan seperti berikut dalam keadaan baik dan berfungsi:

<b>Equipment and Accessories</b>		<b>Ratio</b>
1.	<i>Ultrasonic Flaw Detector</i>	1:1
2.	<i>Probes:</i>	
	<i>i. 45°, 2 to 5 MHz, single crystal and cable</i>	1:1
	<i>ii. 60°, 2 to 5 MHz, single crystal and cable</i>	1:1
	<i>iii. 70°, 2 to 5 MHz, single crystal and cable</i>	1:1
	<i>iv. Twin crystal probe (2 to 5 MHz) and cables</i>	1:1
	<i>v. Single crystal (normal) probe (2 to 5 MHz) and cables</i>	1:1

<b>Calibration Block</b>		<b>Ratio</b>
1.	<i>V1 Standard Calibration Block</i>	1:1
2.	<i>V2 Standard Calibration Block</i>	1:1
3.	<i>IOW Beam Calibration Block</i>	1:4
4.	<i>ASME Reference Block (DAC), thickness 19 mm &amp; 39 mm</i>	1:20
5.	<i>Flat Bottom Hole Calibration Block, material Carbon Steel (1 set)</i>	1:20
6.	<i>Step-wedge material Carbon Steel</i>	

<b>Specimen</b>		<b>Ratio</b>
1.	<i>Test samples - thickness (different velocity)</i>	1:1
2.	<i>Ultrasonic Test specimen-Welded plate Single V</i>	1:1
3.	<i>Ultrasonic Test specimen-Welded plate Double V</i>	1:1
4.	<i>Ultrasonic Test specimen- Welded pipe diameter 6" and 12" full/half</i>	1:1
5.	<i>Ultrasonic Test specimen "T" or "K" or "Y" welded joints</i>	1:5

<b>Consumables</b>		<b>Ratio</b>
1.	<i>Ultrasonic couplant (low to high viscosity)</i>	1:1
2.	<i>Post cleaning:</i>	1:1
	<i>i. Tissue or cotton rag</i>	
	<i>ii. Hand wash</i>	

<b>Teaching Aid</b>		<b>Ratio</b>
1.	<i>NOSS NDT (PT, MT, RT, UT &amp; ET)</i>	1:1
2.	<i>MS/ISO 9712 NDT (PT, MT, RT, UT &amp; ET) Qualification &amp; Certification For NDT Personnel</i>	1:1
3.	<i>ASME Section V Article 4 (UT weld), 5 (UT material)</i>	1:1
4.	<i>UT Test Report</i>	1:1
5.	<i>NDT Personnel Certificate (Trainer SKM UT-3 or equivalent)</i>	1:1

6.	<i>NDT Organisation Chart.</i>	1:1
7.	<i>NDT Personnel Job Responsibilities/Description</i>	1:1
8.	<i>Quality manual</i>	1:1
9.	<i>UT welded inspection written procedures (sample)</i>	1:1
10.	<i>UT test report format</i>	1:1
11.	<i>NDT work contract sample</i>	1:1
12.	<i>Classroom</i>	1:20
13.	<i>Practical lab</i>	1:20
14.	<i>Report form</i>	1:1
15.	<i>Stationery</i>	1:1
16.	<i>White board</i>	1:20
17.	<i>PPE</i>	1:1
18.	<i>Computer</i>	1:20
19.	<i>Printer</i>	1:20
20.	<i>Table</i>	1:1
21.	<i>Chair</i>	1:1

## 2.0 PEPERIKSAAN PRAKTIKAL

### a. Peperiksaan Praktikal Ultrasonik Tahap 1

- i. PB dan Ketua Pemeriksa perlu menyediakan dan memastikan peralatan seperti berikut dalam keadaan baik dan berfungsi:

<b>Equipment and Accessories</b>		<b>Ratio</b>
1.	Ultrasonic equipment (UTFD & UTM)	1:1
2.	Twin crystal probe ( <del>2 to 5 MHz</del> ) and cables	1:1
3.	Single crystal (normal) probe ( <del>2 to 5 MHz</del> ) and cables	1:1

<b>Calibration Block</b>		<b>Ratio</b>
1.	Calibration block - V1	1:1
2.	Calibration block - V2	1:1
3.	Calibration block - step wedge	1:1

<b>Specimen (provided by JPK)</b>		<b>Ratio</b>
1.	Testing sample - lamination	1:1
2.	Testing sample – thickness (different material velocity)	1:1

<b>Consumables</b>		<b>Ratio</b>
1.	Ultrasonic couplant (low to medium viscosity)	1:1
2.	Post cleaning: i. Tissue or cotton rag ii. Hand wash	1:1

<b>Examination facilities</b>		<b>Ratio</b>
1.	Written Instruction (thickness and lamination test)	1:1
2.	Acceptance & Rejection Criteria	1:1
3.	Exam room	1:20
4.	Practical lab	1:20
5.	Testing report form	1:1
6.	Stationery	1:1
7.	White board	1:20
8.	PPE	1:1
9.	Computer	1:20
10.	Printer	1:20
11.	Table	1:1
12.	Chair	1:1

**b. Peperiksaan Praktikal Ultrasonik Tahap 2**

- i. PB dan Ketua Pemeriksa perlu menyediakan dan memastikan peralatan seperti berikut dalam keadaan baik dan berfungsi:

<b>Equipment and Accessories</b>		<b>Ratio</b>
1.	<i>Ultrasonic equipment (UTFD)</i>	1:1
2.	<i>Probes:</i>	
	<i>(i) 45°, 2 to 5 MHz, single crystal and cable</i>	1:1
	<i>(ii) 60°, 2 to 5 MHz, single crystal and cable</i>	1:1
	<i>(iii) 70°, 2 to 5 MHz, single crystal and cable</i>	1:1
	<i>(iv) Twin crystal probe (2 to 5 MHz) and cables</i>	1:1
	<i>(v) Single crystal (normal) probe (2 to 5 MHz) and cables</i>	1:1

<b>Calibration Block</b>		<b>Ratio</b>
1.	<i>Calibration block - V1</i>	1:1
2.	<i>Calibration block - V2</i>	1:1
3.	<i>ASME Reference Block (DAC), thickness 19 mm &amp; 39 mm</i>	1:4
4.	<i>Step wedge material Carbon Steel</i>	1:1

<b>Specimen (to be provided by JPK)</b>		<b>Ratio</b>
1.	<i>Ultrasonic Test specimen-Welded plate Single V</i>	1:1
2.	<i>Ultrasonic Test specimen-Welded plate Double V</i>	1:1
3.	<i>Ultrasonic Test specimen- Welded pipe diameter 6" and 12" full/half</i>	1:1
4.	<i>Ultrasonic Test specimen "T" or "K" or "Y" welded joints</i>	1:5

<b>Consumables</b>		<b>Ratio</b>
1.	<i>Ultrasonic couplant (low to high viscosity)</i>	1:1
2.	<i>Post cleaning:</i>	1:1
	<i>iii. Tissue or cotton rag</i>	
	<i>iv. Hand wash</i>	

<b>Examination facilities</b>		<b>Ratio</b>
1.	<i>UT lamination inspection written procedure</i>	1:1
2.	<i>UT thickness measurement inspection written procedure</i>	1:1
3.	<i>UT welded specimen inspection written procedures</i>	1:20
4.	<i>Test specimen profile and shape (welded specimen only)</i>	1:20
5.	<i>Ultrasonic plotting card with slide ruler</i>	1:1
6.	<i>Acceptance &amp; Rejection Criteria</i>	1:1
7.	<i>Classroom</i>	1:1
8.	<i>Practical lab</i>	1:20

9.	<i>Testing Report Form</i>	1:20
10.	<i>Stationery</i>	1:1
11.	<i>White board</i>	1:1
12.	<i>PPE</i>	1:1
13.	<i>Computer</i>	1:1
14.	<i>Printer</i>	1:1
15.	<i>Table</i>	1:1
16.	<i>Chair</i>	1:1

**c. Peperiksaan Praktikal Ultrasonik Tahap 3**

- i. PB dan Ketua Pemeriksa perlu menyediakan dan memastikan peralatan seperti berikut dalam keadaan baik dan berfungsi:

<b><i>Teaching Aid</i></b>		<b><i>Ratio</i></b>
1.	<i>NOSS NDT (PT, MT, RT, UT &amp; ET)</i>	1:1
2.	<i>MS/ISO 9712 NDT (PT, MT, RT, UT &amp; ET) Qualification &amp; Certification For NDT Personnel</i>	1:1
3.	<i>ASME Section V Article 4 (UT weld), 5 (UT material)</i>	1:1
4.	<i>UT welded inspection written procedures (sample)</i>	1:1
5.	<i>UT test report format</i>	1:1
6.	<i>Classroom</i>	1:20
7.	<i>Practical lab</i>	1:20
8.	<i>Stationery</i>	1:1
9.	<i>White board</i>	1:20
10.	<i>PPE</i>	1:1
11.	<i>Computer</i>	1:20
12.	<i>Printer</i>	1:20
13.	<i>Table</i>	1:1
14.	<i>Chair</i>	1:1