

AIRBORNE ULTRASOUND METHOD (UT-AIR)

Sectors:

PRE-SERVICE AND IN-SERVICE TEST OF EQUIPMENT, PLANTS AND STRUCTURES	Tightness test	Qualification applications: Tightness test on hatches of vessels, on tanks (also underground) by the tank test system.
	Leak test	Qualification applications: Pressure and depression systems, loss of compressed air, steam and gas, valves, heat exchangers, boilers, condensers, tanks, pipes.□
	Electrical test	Qualification applications: Inspection on closed MV and HV boards/panels, transformers, insulators, □junction boxes, insulation loss, circuit breakers, contacts in general and dispersions.
	Mechanical test	Qualification applications: Inspection on bearings, hyper/hypo lubrication, pumps, motors, rotating machines, fans, condensate dischargers, compressors, conveyor belts, gears, gearboxes and friction dynamics, especially slow.

Note:

Level 3 includes all the above listed sectors.

Minimum training requirements

Level 1 (h)	Level 2 (h)	Level (h)
32*	32*	32*
<ul style="list-style-type: none"> • Training includes both theory and practical courses about the method for the pre-service and in-service test of equipment, plants and structures. • Direct access to Level 2 requires the sum of training hours expected for Level 1 and Level 2. • Direct access to Level 3 requires the sum of training hours expected for each single level, 1, 2 and 3. 		

- * Upgrading from Level 1 to Level 2, sector: 16 training hours in the classroom in addition to those required for Level 1.
- * Upgrading from Level 1 to Level 2, multisector: 32 training hours in the classroom in addition to those required for Level 1.
- * Extension to one sector: 12 training hours for each sector to be integrated.

Industrial experience

Level 1 (months)	Level 2 (months)	Level 3 (months)
6	12	36
<ul style="list-style-type: none"> Industrial experience in months is based on a nominal 40 h working week or the legal week of work. When an individual is working in excess of 40 hours/week, he/she may be credited with experience based on the total hours, but he/she may be required to produce evidence of this experience. 		

Conduction of Level 1 and 2 examinations

General examination

Level 1	Level 2
40 questions	40 questions

Specific examination

Level 1	Level 2
30 questions (for more than one sector)	30 questions (for more than one sector)
20 questions (for only one sector)	20 questions (for only one sector)

Practical examination:

The practical examination shall involve performing the test on prescribed specimens, recording (and for Level 2 candidates, interpreting) the resulting information to the degree required and reporting the results in the required format.

Furthermore, Level 2 candidates shall draft a written instruction suitable for Level 1 candidates.

Practical test for Level 1 candidates:

3 different specimens selected among the sectors.

Practical test for Level 2 candidates:

2 different specimens selected among the sectors + spectral analysis, FFT (fast fourier transform), DTS (data time series) + an operating instruction suitable for Level 1 candidates.

Conduction of Level 3 examinations

Basic examination:

Before accessing the method examination, a candidate must pass the basic examination in accordance with the ISO 9712 standard. The basic examination is not required for candidates with a level 3 ISO 9712 valid certificate in one NDT method.

Main-method examination:

30 questions	Level 3 knowledge for the Airborne Ultrasound method (physical principles, equipment, control techniques)
20 questions	Application of the method, codes, standards, specific test applications, applicable specifications and procedures
Drafting of an Airborne Ultrasound control procedure	Drafting of a specific procedure. Standards and codes are available to the candidates

The practical test for Level 2 candidates shall be conducted only in case of direct access to Level 3 qualification.

For any information not provided above reference shall be made to the guide line for the conduction of examinations contained in the UNI EN ISO 9712:2012 and ISO 18436-8 standards.

Contents of the training course

Subject	Level 1 Hours	Level 2 Hours	Level 3 Hours
1. Principles of ultrasounds	3	2	1
2. General information about the instruments	1.5	1	1
3. Data acquisition	2.5	2.5	1
4. Data and signal processing	1	2	2
5. Condition monitoring	1.5	1	1
6. Applications	14.5	15	15.5
7. Failure analysis and determination of failure extent	2	4	6
8. Condition monitoring strategies	1.5	1	1
9. Implementation program	1	0.5	1
10. Reports, documentation and corrective actions	1	0.5	0.5
11. Personal safety	0.5	0.5	0
12. Examination	2	2	2
Total number of hours for each level	32	32	32

Detailed requirements of the training course

Subject	Level 1 Hours	Level 2 Hours	Level 3 Hours
1. Principles of ultrasounds	3	2	1
a. Fundamentals of sound	*		
b. Conversion modalities	*	*	
c. Propagation and attenuation	*	*	*
2. General information about the instruments	1.5	1	1
a. Characteristics of the instruments	*	*	*
b. Sensors	*	*	*
c. Sensitivity validation	*	*	
3. Data acquisition	2.5	2.5	1
a. Principles of data acquisition	*	*	*
b. Sensor positioning	*	*	*
c. Noise	*	*	*
d. Stimuli	*	*	*
e. Measurements	*	*	
f. Other methods	*	*	
4. Data and signal processing	1	2	2
a. Data saving and structuring	*	*	*
b. Data and database management	*	*	*
c. Elements of transformation		*	*
d. Output		*	*
5. Condition monitoring	1.5	1	1
a. Principles of CM	*	*	*
b. Other technologies		*	*
c. Writing procedure		*	*
6. Applications	14.5	15	15.5
a. Machines (general information about the	*all	*all	*all

Subject	Level 1 Hours	Level 2 Hours	Level 3 Hours
systems) b. Bearings and electrical switchboards c. Leak detection d. Valves e. Condensate dischargers f. Mechanical inspections g. Electrical inspections h. Other machines			
7. Failure analysis and determination of failure extent	2	4	6
a. Time domain analysis b. Alarms c. Trends d. Case studies e. Diagnostics and prognostics	*	*	*
8. Condition monitoring strategies	1.5	1	1
a. Acceptance tests b. Comparative analysis c. Demonstration d. Test system e. Failure detection	*	*	*
9. Implementation program	1	0.5	1
a. Path selection b. Acceptance standards	*	*	*
10. Reports, documentation and corrective actions	1	0.5	0.5
a. Report structures b. Requested information c. Corrective actions	*	*	*
11. Personal safety	0.5	0.5	0
12. Examination	2	2	2
Total number of hours	32	32	32

NOTE 1 Level 2 includes Level 1 knowledge

NOTE 2 Level 3 includes Level 1 and Level 2 knowledge

NOTE 3 * subjects dealt with for each Level