

Level I Acoustic Emission Testing Course Outline

I. Basic AE Physics Course

1. Principles of AE Testing
 - a. Characteristics of AE
 - b. Sources of AE
 - c. Wave propagation – Introduction
 - d. Repeated loadings: Kaiser and felicity effects, and felicity ratio
 - e. Terminology (ASTM E1316)
 2. Sensing the AE Wave
 - a. Sensors
 - b. Sensor Attachment
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II. Basic AE Technique Course

1. Instrumentation and Signal Processing
 - a. Cables
 - b. Signal conditioning
 - c. Signal detection
 - d. Signal processing
 - e. Source location techniques
 - f. AE test systems
 - g. Accessory techniques
2. AE Test Techniques
 - a. Equipment calibration and setup for test
 - b. Loading procedures
 - c. Data display
 - d. Noise sources and pre-test identification techniques
 - e. Precautions against noise
 - f. Data interpretation and evaluation – Introduction
 - g. Reports
3. Codes, Standards and Procedures
 - a. Guide-type standards (glossaries, calibration, etc)
 - b. Standardized/codified AE test procedures
 - c. User-developed test procedures

4. Applications of AE Testing
 - a. Laboratory Studies (Material Characterization) – At least 3 categories
 - i. Crack growth and fracture mechanics
 - ii. Environmentally assisted cracking
 - iii. Dislocation movement (metals)
 - iv. Clarifying deformation mechanisms (composites)
 - v. Phase transformations and phase stability
 - vi. Creep
 - vii. Residual stress
 - viii. Corrosion
 - ix. Fatigue
 - x. Rupture
 - xi. Ductile/brittle transition
 - b. Structural Applications – At least 4 categories
 - i. Pressure vessels (metal)
 - ii. Storage tanks (metal)
 - iii. Composite pressure vessels/storage tanks
 - iv. Piping and pipelines
 - v. Bucket trucks
 - vi. Aircraft
 - vii. Bridges
 - viii. Mines
 - ix. Dams, earthen slopes
 - x. Pumps, valves, etc.
 - xi. Rotating plant
 - xii. In-process weld monitoring
 - xiii. Leak detection and monitoring