FAQ

1. **What are Min and Max tube (inner) diameters that can be inspected?**
   Diameter range: 0.45″ to 4 ″ ID.
   Special cases, outside above specifications, can be considered on a case by case basis

2. **What is Max tube length that can be inspected?**
   The answer depends on the sensitivity you are looking for.
   For example: 0.5mm hole can be detected at 20m but a full blockages can be detected at 50m (and even more).
   In general we say that since we can detect pitting with 20% wall-loss at 20m, then 20m is the maximal tube length.

3. **What is the accuracy in defect location?**
   +/- 5 cm accuracy in defect location reporting

4. **What is the system sensitivity? What is the smallest hole it can find? What is the smallest Pitting it can find?**
   A 0.5mm diameter hole can be detected at 20m.
   20% pitting can be detected at 20m.

5. **Does it have a dead-zone?**
   Only the 2 cm of the plastic adaptor that is inserted into the tube.

6. **What happens if you have several defects in a tube?**
   Nothing. Each defect has its own signature and each signature appears at a different location on the distance/time scale. Keep in mind, though, that the signatures of large holes or blockages can mask other defects in the following 1 meter.

7. **If you have a hole/Pitting covered with scale, can it be detected?**
   If the defect is covered in a way that no change in the cross-section is created then it won't be detected.

8. **Was the system compared to other technologies? If so, what were the results?**
   TBD

9. **Can it find OD defects?**

   OD defects that don't affect the ID can't be detected.
   Nevertheless, OD originated defects affecting also the ID, such as large dents, wall collapse and holes can be detected.

10. **Which materials can be inspected?**

    All types of materials can be inspected.
    The technology isn't dependent on wall material - since the sound wave travels in the air inside the tube and not in the tube wall.

11. **Which tube configurations can be inspected?**

    The technology isn't dependent on tube configuration - since the sound wave travels in the air inside the tube. This wave can propagate through U-bends, elbows, etc. with no difficulty.

12. **Do the tubes have to be cleaned? And if so to which degree?**

    The tubes have to be cleaned prior to inspection.
    Due to 2 reasons:
    1. To avoid having defects covered by scale, sediment, etc.
    2. Analysis of blocked tubes is complicated and misleading.

    Nevertheless, cleaning requirements are not as stringent as those for IRIS inspection (to the metal).
    In most cases, a jet of high pressure water (water jet) followed by compressed air (to blow the water out of the tubes) will be enough.

13. **Do the tubes have to be emptied prior to inspection?**

    Yes.
    Inspection of liquid filled tubes is still under development.

14. **How can we inspect a "T"/"Y" joint?**

    2 options:
    1. Inspection of each end of tube to the junction point.
    2. If a valve is applicable – using it to plug one branch and then scan the structure in 2 passes.

15. **Does it have any certification? Which code/standard does it follow?**

    The system complies with:

- The European Low Voltage Directive (LVD) 2006/95EC
- Electromagnetic Compatibility (EMC) Legislation: Directive 2004/108/EC
- EMC to EN 61326-1: 2003, CISPR 11:2003 Class A, IEC 61000-3-2: 2000 Class A, IEC 61000-3-3: 2002 IEC 61000-3-4: 2004 IEC 61000-3-5: 2001, IEC 61000-3-6: 2003 IEC 61000-3-8:1993 IEC 61000-3-11: 2004.

- MIL-STD-810F, Explosive atmosphere test.
- IEC 61010-1/EN 61010-1, Safety Requirements for Electrical Equipment for measurement, control and laboratory use.
- FCC Part 15, Sub-part B, Class A

ASNT/ASME qualifications are ongoing.

16. How do you save the raw data and can it be stored for a future use?

The raw data is automatically saved to the laptop Hard-drive and can easily be loaded for future reference.

17. How do you perform calibration?

Calibration can be performed by one of the following:

1. Choosing an intact tube as a reference.
2. Statistically – by selective averaging of all measured tubes (while neglecting defects and problematic signals) for the creation of a faultless reference tube. This can be performed automatically.

18. Advanced: How do you differentiate between pitting and erosion?

Bases on the signal amplitude – The amplitude of erosion will be much bigger.

Based on our experience – Erosion usually occurs at the tube edges while Pitting may occur along the tube entire length.

19. What is the required technician training level/certification to operate the equipment?

Participating in the AcousticEye 2 days training course is sufficient.

20. Are there any known issues with respect to maintenance?

No

21. Are there any spare parts that should be stocked?

No.

22. What is the expected life time?

1 million clicks till the probe buttons wear out at which time they can be quickly replaced at a service center

23. What power supply do we need?

Wall outlet – 220V **OR** 110V (This isn't a dual voltage system).

24. **Does the wall thickness affect measurements?**
    No. sensitivity doesn't depend on the wall thickness.

25. **What happens if my system breaks down and you can't get it working again by email/phone support?**
    Spare parts and servicing are available at a nearest available service center.

26. **How do we maintain the system?**
    As you maintain regular industrial electronic equipment – no special maintenance is required.

27. **What is the influence of external noise?**
    External noise adds to the total noise envelope and can cause a decrease in the signal SNR (and therefore in the system sensitivity).
    We apply special filtering algorithms to filter out external noise – so basically the system is highly immune to it.

28. **What is an acceptable SNR?**
    At lab conditions: >85 dB
    At field conditions: >65 dB
29. **Which point in the signature of a fault (or reflection from the end of the tube) represents its location, e.g.: the middle of the signature or its beginning?**
    The beginning of the signature.

30. **What about cracks, can they be detected/measured?**
    That depends on their type:
    A normally open crack – a crack that is open even when the system isn't pressurized – causes a change in the cross-section and therefore can be detected.
    A normally close crack – a crack that is opened only when the system is pressurized – Doesn't cause a change in the cross-section and therefore cannot be detected.

31. **Why is the shortest tube picked as the nominal length for the session?**
    In order to avoid end-of-tube erosions false alarms; since if tube length is defined as that of the longer tubes, end of tube reflections of the shorter tubes could be interpreted as erosions.

32. How do you analyze U-tube bundles?

Split the session into sub-sessions of tubes with similar lengths (within a range of up to 3% length difference), and analyze each session independently.

33. What is the minimal number of tubes that can be considered sufficient for statistical calibration?

At least 50 identical tubes.

34. How many tubes can be tested in an hour?

300 tubes (not dependent on the tube length since the inspection is done at the speed of sound).

35. What is the size and weight of the system?

Weight:

	Gross (In carrying case/trolley)	Net (Removed from carrying case)
Main Unit:	24 kg (53 lbs)	13kg
Probe:	18.5 kg (40.7 lb)	4.5 kg

Dimensions

Main Unit trolley: 21.68" x 16.62" x 10.56" (55 x42.21x26.82 cm)
Probe trolley: same as MCU trolley