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The underwater acoustic testing of modest sized panel materials using a multi-element array technique in a laboratory test vessel

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The underwater acoustic properties of materials can be assessed in panel form via a simple single hydrophone measurement technique which is ideally conducted on large test panels in open water. Alternatively measurements may be conducted in a laboratory test vessel which is capable of simulating ocean conditions. However, physical limitations imposed by the constraints of the vessel, including a reduction in test panel dimensions, require modification of the traditional technique to allow measurements to be made down to low kilohertz frequencies. This can be achieved by, in addition to a directional source, the use of a directional receiver in the form of a planar multi-hydrophone array. The technique is described and illustrated with measurements of reflection loss and insertion loss between 1 kHz and 7 kHz performed on a test panel in a pressure vessel through changing hydrostatic pressure from ambient to 2.8 MPa. The efficacy of this technique is considered with simulated multi-hydrophone array measurements on a scaled panel in an open tank.