

УДК 620.179.16

PHASED ARRAY ULTRASONIC TESTING
IN NON-DESTRUCTIVE INSPECTION

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Ultrasonic Testing (UT) uses high frequency sound energy to carry out testing and make measurements. A typical UT system consists of several functional units: a pulser, a transmitter, a receiver, a transducer, and display devices.

The phased array ultrasonic testing system consists of a number of probes, which allows controlling a larger area with a better quality. Classic phased array systems summarize signals that are received from a single probe and then make a complete picture of the scan.

Every industrial area has its own acceptance criteria and non-destructive testing regulations. That means that sizes of defects can be different for two identical plates with identical defects when they are used in different areas. A phased array ultrasonic device is calibrated with a calibration sample for a specified industrial area.

Therefore, every ultrasonic testing laboratory has more than 20 samples to calibrate a device. Calibrating a device is a time-consuming process, because dozens of measurements must be made every day.

New calibration samples must be produced in compliance with European Regulations. European Regulations set standards for calibration of UT system by using calibration samples with side drilled holes of a 3 mm diameter.

To find an optimal solution for this problem, three plates with thickness of 10, 20 and 40 mm were made. On the basis of the parameters of these plates a graph was made, on which the sizes of the notch (a typical flat corner reflector) and the cylindrical side drilled hole were compared.

At the next stage of the experiment the obtained data were reinterpreted. The signal received from the defect was chosen according to the regulations of the industrial area and then a correction factor (a difference between signal levels of the calibration plate and the experimental plate) was taken into consideration.

This reinterpretation can be used in future regulations and codes for phased array ultrasonic testing systems (nowadays regulations are made only for conventional ultrasonic testing systems). Moreover, the findings of this research can be used by international companies that must take into account both domestic and foreign regulations.