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**Non-destructive Testing –
Test Method for Scanning Ultrasonic Microscopy**
无损检测 超声显微检测方法

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Non-destructive Testing – Test Method for Scanning Ultrasonic Microscopy

1 Application Scope

This Standard specifies the method for non-destructive testing of materials or components using ultrasonic microscopy.

This Standard applies to the testing of nano- and micron-scale defects inside all kinds of metals and non-metallic solid materials and electronic packaging materials.

2 Normative References

The following referenced documents are indispensable for the application of this document. For dated references, only the edition dated applies to this document. For undated references, the latest edition of the referenced documents (including all amendments) applies to This Standard.

GB/T 9445, *Non-destructive Testing – Qualification and Certification of NDT Personnel*

GB/T 12604.1, *Non-destructive Testing – Terminology – Terms Used in Ultrasonic Testing*

GB/T 20737, *Non-destructive Testing – General Terms and Definitions*

GB 23912, *Non-destructive Testing – Practice for Immersed Ultrasonic Testing by the Reflection Method Using Pulsed Longitudinal Waves*

3 Terms and Definitions

For the purposes of this document, the terms and definitions defined in GB/T 12604.1 and GB/T 20737 apply.

4 Personnel Qualification

The personnel who conduct testing in accordance with this Standard, shall be appraised and certified for their qualification as specified in GB/T 9445 or a system agreed to by all parties to contract, and they shall be trained for their jobs and authorized for the operation by the employer or its agent.

Under a certain fixed distance, adjust the angle between the transducer and the surface of the test block to make sure the amplitude of the reflection echoes on the surface of the samples is the maximum and the axis of the acoustic beam of the transducer is perpendicular to the surface of the samples.

Under the A scanning display mode, make the acoustic beam focus on the test surface for imaging by adjusting the height of the transducer, i.e. moving the Z-axis of the coordinate system of the scanning device.

7.2 Placement of test pieces

Place the test piece in the coupling agent to make the surface of the test piece parallel to the plane of the scanning movement of the microscope, and remove the bubbles on the surface of the test piece and the surface of the transducer.

7.3 Scanning parameter setting

7.3.1 Setting of scanning origin and scanning range

Maintain the height of the transducer, move the transducer along the negative direction of the scanning axis and set the position where the echo signals of the upper surface of the test piece have just disappeared as the scanning origin. Then move the transducer along the positive axis of the scanning axis (the echo signals will first augments to the maximum and then disappear gradually), and set the position where the echo signals have just disappeared as the scanning end. The distance from the scanning origin to the scanning end is the scanning length. Use the same method to set the scanning origin and scanning length of the stepping axis.

7.3.2 Setting of interval of scanning points

The lateral resolution of the scanning image is subjected to the focusing characteristics of the acoustic beam of the transducer and the interval of the sampling points during scanning. Consideration shall be given to the diameter of the acoustic beam focus of the transducer (the diameter of the acoustic beam refers to the minimum width of the acoustic beam measured by the transducer at the effective testing distance using the - 6 dB method) for the interval of scanning points. The interval of the sampling points of the scanning axis and the stepping interval of the stepping axis shall be set in accordance with the principle that the interval between two adjacent scanning points shall not be greater than $\frac{1}{2}$ of the diameter of the focus of the acoustic beam of the transducer.

7.3.3 Setting of scanning speed

In order for the ultraspeed data acquisition unit to record the echo signals completely, the scanning movement time within the interval of the sampling points shall be greater than the transmission time of the echoes of the test plane. During the actual setting of scanning speed, make appropriate allowances and consider the factors such as the additional time of the data processing of the ultraspeed data acquisition unit.

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