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Test Method for Artificial Defect Sizes of Zirconium Tube Flaw Detection Comparison Samples

锆管探伤对比试样人工缺陷尺寸测量方法

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1 Scope

This Standard specifies the replication and microscopic measurement method of the sizes of artificial defects (artificial grooves / through holes) of comparison specimens for the flaw detection of zirconium tubes.

This Standard is applicable to the measurement of the sizes of artificial grooves / through holes on the comparison specimens for the non-destructive testing of zirconium tube ultrasound and eddy current, etc. The measurement of the sizes of similar artificial defects on other metal comparison specimens may take this as a reference.

2 Normative References

The following documents are indispensable to the application of this document. In terms of references with a specified date, only versions with a specified date are applicable to this document. In terms of references without a specified date, the latest version (including all the modifications) is applicable to this document.

GB/T 8170 Rules of Rounding off for Numerical Values & Expression and Judgement of Limiting Values

YB/T 145 Die Casting and Size Measurement Method of Artificial Defects on the Reference Sample Pipes

3 Principle

3.1 Replication Measurement Method

Replication measurement method is an indirection measurement method. By filling the plastic material in the artificial defect and taking it out after solidification forming, the three-dimensional appearance of the artificial defect is intuitively, vividly and realistically reproduced. Take points, lines and sections; adopt measuring tools of corresponding precisions to measure the length, width and depth of the artificial defect; obtain the size data of the artificial defect.

3.2 Microscopic Measurement Method

a high magnification to focus on the specimen. Adjust the stage and the specimen, so that the artificial defect is in the center of the field of view. Adjust the measurement equipment, so that the plane of measurement can clearly focus; select the measurement point.

6.3.1.4 The magnification for the measurement of the length and width of the artificial groove is not lower than 100 ×; the magnification for the measurement of the depth is not lower than 200 ×; the magnification for the measurement of the through hole is not lower than 100 ×.

6.3.2 Measurement of artificial groove

6.3.2.1 Measurement of length and width: on the length or width boundary of the artificial groove, determine the measurement point and perform the aiming reading. In accordance with the relative displacement of the *X* or *Y* coordinates between the points on the two boundaries in the length or width direction, calculate the length or width value. The length measurement of transverse flaw shall be corrected in accordance with the measured chord length.

6.3.2.2 Measurement of depth: on the surface and the bottom of the opening of the artificial groove, respectively perform focus reading. In accordance with the relative displacement of the *Z* coordinate during two focusing, calculate the depth value.

6.3.3 Measurement of through hole

On the circumference of the through hole, randomly choose three points. Through the coordinates of the three points, calculate the diameter of the circle.

7 Data Processing

7.1 Replication Measurement Method

For the depth and width of each artificial defect, the maximum value of the cross-sectional dissection measurement results taken from three points in the length direction of the replication sample is taken as the measurement result; the length is measured with a Vernier caliper. The measurement data shall be rounded off in accordance with the stipulations of GB/T 8170.

7.2 Microscopic Measurement Method

For the measurement of the artificial grooves, the measurement of the sizes of each artificial defect shall at least measure three points. The principle of point selection is: respectively one point near the two ends and the middle position; repeat the measurement for 3 times at each point and take the average value; the maximum value of the three points is used as the measurement result. For the measurement of through holes, each through hole shall be measured for 3 times on the circumference (the

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