

ICS 25.160.40

CCS J 33



**NATIONAL STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA**

GB/T 29711-2013

**Non-destructive testing of welds -- Ultrasonic testing --
Characterization of indications in welds**

焊缝无损检测 超声检测 焊缝中的显示特征

(English Translation)

Issued on: September 18, 2013

Implemented on: June 1, 2014

**Issued by: General Administration of Quality Supervision, Inspection and
Quarantine**

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1 Scope

This standard specifies how to characterize internal displays, ie classify them as planar or non-planar.

This standard also applies to the display exposed on the surface of the weld after removal of the weld height.

2 Normative references

The following documents are indispensable for the application of this document. For dated references, only dated versions apply to this article.

Pieces. For undated references, the latest edition (including all amendments) applies to this document.

ISO 17640 weld non-destructive testing ultrasonic testing technology, inspection grade and assessment (Non-destructivetestingof welds-Ultrasonic testing-Techniques, testing levels, and assessment)

3 principles

Classify the display as flat or non-planar based on the following parameters.

- a) welding technology;
- b) the geometric position of the display;
- c) the maximum echo amplitude;
- d) directional reflection;
- e) static echo waveform (eg A-scan);
- f) Dynamic echo waveform.

Taking into account each of the above parameters, accurate classification results will be obtained.

As a guide, Figure A.1 gives a classification of the internal display of welds suitable for routine applications. Figure A.1 should incorporate the first two listed above.

The parameters are applied and cannot be examined separately.

The classification process specified in this standard is also suitable for removing the classification displayed on the surface of the weld after the weld height is removed (see Figure 1).

The unit is mm

Description.

A---flattened weld.

Figure 1 shows the position in the weld

4.1 Overview

The display is sorted in order by the following criteria.

- a) echo amplitude;
- b) directional reflection;
- c) static echo waveform (A-scan);
- d) Dynamic echo waveform.

The above criteria can be implemented through a flow chart (see Appendix A).

When judging and characterizing the display, it is recommended to use the same probe. The flow chart will show the classification system standardization. Pass and distance

Several thresholds (in decibels) compared to the amplitude curve (DAC) or compared to the maximum echo amplitude from different directions in discontinuities

Said).

The thresholds used in the different steps in the flow chart are shown in Table A.1.

The flow chart is divided into 5 steps.

- a) Step 1. Very low echo amplitude display, no classification;
- b) Step 2. High echo amplitude display, classified as flat;
- c) Step 3. The main classification is not fused;
- d) Step 4. Mainly classify inclusions;
- e) Step 5. Mainly classify cracks.

Note: According to the flow chart, the hybrid display that exists between the inclusions and the unfused contract is classified as a flat type. An example of this type of injury is shown in Figure A.2.

4.2.1 Low echo amplitude (step 1)

The echo amplitude is lower than the rating specified in ISO 11666 (defined as T1 in Figure A.1). The display is irrelevant and should not be performed.

The levy can be accepted.

For special applications, the T1 value can be reduced if specified in the technical agreement.

4.2.2 High echo amplitude (step 2)

The echo amplitude is not less than the display level of 6dB (defined as T2 in Figure A.1), and the classification is displayed.

4.3.1 Determination of applicability based on display length

Step 3 in the flowchart should only be used to display longer than.

- a) t , $8\text{mm} \leq \text{plate thickness } t \leq 15\text{mm}$;
- b) $t/2$ or 15mm , whichever is greater, when the thickness is $t > 15\text{mm}$.

If there is no display exceeding the above specified length, proceed as in step 4.

4.3.2 Application conditions

Perform the following application conditions.

- a) the echoes compared should be from the same reflector;

- b) The echo comparison should be made when the displayed echo reaches the highest position $H_{d,max}$;
- c) When using both straight and oblique probes, select the appropriate probe frequency so that the wavelengths of the shear and longitudinal waves are approximately equal (eg 4MHz longitudinal wave and 2MHz transverse wave);
- d) When using two or more oblique probes, the difference between the nominal refraction angles should be greater than or equal to 10° ;
- e) If the echo passing through the weld is compared to the echo only through the parent metal, the attenuation in the weld should be considered.

4.3.3 Guidelines

For the same display, compare the highest echo amplitude $H_{d,max}$ with the lowest echo amplitude $H_{d,min}$ obtained from other directions.

To meet directional reflection, the following conditions should be met.

- a) $H_{d,max} \geq T3$ (reference level -6dB);
- b) The difference between the displayed echo amplitudes obtained from 2 different directions $|H_{d,max} - H_{d,min}|$, at least.
 - 1) 9dB, only with a transverse wave oblique probe, or
 - 2) 15dB, with 1 transverse wave oblique probe and 1 longitudinal wave straight probe.

Directional reflection depends on the angle of refraction and the detection conditions (half span, full span).

For an example of different detection directions, see Figure B.1.

For an example of applying this guideline, see Figure B.2.

4.4 Static Echo Waveform Guidelines (Step 4)

In this step, the static echo waveform of the displayed static echo waveform (for example. A-scan) and the reference reflector (3 mm diameter transverse hole)

Compare.

If the static echo waveform is single and smooth, the display is classified as non-planar.

If the static echo waveform is neither single nor smooth, proceed as in step 5.

It should be tested in at least 2 directions to comply with this Code.