GJB

NATIONAL MILITARY STANDARD OF THE PEOPLE'S REPUBLIC OF CHINA

中华人民共和国国家军用标准

FL 0140

GJB 1187A-2001

Replace GJB 593.2-88
GJB 1187-91

Radiographic Inspection

射线检验

Issued on Nov 23, 2001 **Implemented on Mar 01, 2002**

Issued by the Commission of Science, Technology and Industry for National Defense (COSTIND)

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Radiographic Inspection

1 Scope

1.1 Subject content

This standard stipulates the requirements for radiographic inspection of metal, nonmetal materials and their parts and members, as well as quality control requirement for main factors that influence inspection results.

1.2. Scope of application

This standard is applicable to X-ray and γ-ray photographic inspection of metal, nonmetal materials and their parts and members used for manufacturing of military products and scientific research.

1.3 Classification

X-ray radiographic technologies are divided into:

a) Level-A (ordinary): meet general image quality requirement;

b) Level-B (advanced): meet superior image quality requirement.

2 Cited References

GB/T 3323-1987 Methods for radiographic inspection and classification of radiographs for fusion welded butt joints in steel
GB 4792-1984 Basic health standards for radiological protection
GB 8703-1988 Regulations for radiation protection
GB/T 12604.2-1990 Terminology for nondestructive testing Radiographic testing
GB 16357-1996 Radiological protection standards for industrial X-ray detection
GSB 02-1333-2000 Metal linear IQI (image quality indicator)
HB 7684-2000 Linear IQI for Radiographic testing
JB/T 7903-1995 Industrial radiographic illuminators

3 Definitions

3. 1 *T* nominal thickness

The thickness of materials or base metal in inspected area without considering the manufacturing deviation.

3.2 T_A penetrated thickness

Material thickness calculated according to nominal thickness in the direction of bundle of rays

(including multiple-wall penetrated technology).

3.3 *b* object-to-film distance

Distance between the lateral surface of inspected source object and the film along central bundle of rays.

3.4 *F* source - to - film distance

Measured distance between radiation source (or focus) and film along central bundle of rays.

3.5 *f* source - to- object distance

Measured distance between radiation source and lateral surface of inspected source object along central bundle of rays.

3.6 *d* source size

Effective size of source

3.7 *De* external diameter

Nominal outside diameter of tube

See GB/T 12604.2 for other terminologies used in this standard.

4 General requirements

4.1 Radiographic inspection personnel

4.1.1 Personnel engaged in radiographic inspection shall receive training, examination and obtain the qualification certificate of corresponding level in accordance with regulations for qualification and certification of non-destructive testing personnel prepared by relevant industrial departments.

4.1.2 The health condition of radiographic inspection personnel shall conform to regulations of Annex K (supplement) in GB8703.

4.2 Selection of level of radiographic technologies

4.2.1 Requirement

Level-A shall be selected, unless otherwise specified. Level-B shall be used when Level-A can’t meet the requirement for image quality.

4.2.2 Special situations

Due to technical reasons, in case one of conditions stipulated for Level-B (such as type of radiation source or distance between radiation source and object) can’t be met, conditions of Level-A can be used with the consent of entrusting and inspecting parties, the incurred sensitivity loss shall be compensated by raising the minimum density to 3.0 or using film with higher average

gradient.

4.3. Environment conditions

4.3.1 Inspection place

4.3.1.1 The radiographic health protection requirement for place of radiographic inspection (including ray machine room and field inspection site) shall comply with relevant regulations of GB 4792 and GB 16357.

4.3.1.2 The ray machine room generally shall not be less than $35m^2$, and shall not contain sundries irrelevant to inspection.

4.3.1.3 The ray machine room shall be equipped with ventilation equipment ventilating at least 5 times in an hour, and its ambient temperature and humidity shall be in accordance with the regulations of operating instruction of ray machine.

4.3.2 Darkroom

4.3.2.1 The darkroom shall be controlled within 18-25℃, and equipped with ventilation device to ventilate in the intervals of treatment to ensure fresh air indoors.

4.3.2.2 "Dry area" and "wet area" of darkroom shall be separated:

a) In the "dry area" for storage, unsealing, cutting and packaging of film, relative humidity shall be within 30% -60%, the workbench shall be clean and tidy;

b) As for "wet area" for the processing of film, the ground shall be paved with non-slip porcelain glaze bricks or water-stones, the sink shall be lined with tiles and the wall shall be coated with dark-colored paint.

4.3.3 Evaluation chamber

4.3.3.1 The evaluation chamber shall be clean and quiet, indoor temperature shall be within 18-28℃, and the relative humidity shall not be more than 75%.

4.3.3.2 Light in evaluation chamber shall be dark and soft, and the luminance where radiograph evaluator is shall be 25lx. If the evaluation chamber is equipped with multiple illuminators, the light of each illuminator shall not affect each other.

4.3.4 Negative drying chamber

When the film is processed in a manual way, special negative drying chamber shall be set. The drying chamber shall be well-ventilated without excessive dust.

4.3.5 Negative storage room

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