

1.0 Scope

1.1 This procedure covers the technique, acceptance standard for radiographic testing of castings and welding

2.0 Applicable Standard

2.1 ASME Section-V Article 2

2.2 QAP as per Customer

2.3 ASME Section VIII DIV 1 & 2.

2.4 ASTM E-9, E-155, E-186, E-446, E-689, E-1030, E-1648, E-1742

3.0 Equipment & Accessories

3.1 X-Ray / Gamma Ray - Source of radiation

3.2 Industrial X-Ray Film. Type 1 or 2 ASTM E-1815

3.3 Film Holders and cassettes

3.4 X-ray Film Viewer

3.5 IQI as per ASME Section V article 2 table 276

3.6 Processing - Developer, Fixer & wetting agent

3.7 Exposure charts / scale

4.0 Operation Qualification

4.1 The Radiographic examiner should be qualified and certified confirming to recommended practice as per SNT - TC-IA

5.0 Terminology

5.1 For definitions of terms used in the test method is as per ASTM E1316

6.0 Procedure

6.1 Time of Examination ~ Radiography may be performed prior or after heat treatment and in rough, machined or finished conditions

6.2 Surface preparation ~ The surface shall be prepared as necessary to remove any conditions that could mask or be confused with the image of any discontinuity

6.3 Source to film distance ~ Source to film distance should be taken care of the geometric un-sharpness. Geometric un-sharpness should not be greater than one percent of the maximum part thickness being interpreted on radiograph, or 0.0070", whichever is less

6.4 Direction of Radiation ~ The direction of radiation shall be governed by the geometry of the material and the radiographic coverage and quality requirements stipulated by the applicable job. Wherever Practicable, place the central beam of the radiation perpendicular to the surface of the film

6.5 Back scattered radiation protection ~ Radiation emanating from surfaces behind the film i.e. walls, floors, etc. serves to reduce radiographic contrast and may produce undesirable effects is on radiographic quality. A lead sheet placed behind the film generally furnish adequate protection against back scattered radiation

6.6 Location Markers ~ The radiographic image of the location markers shall appear on the film without interfering the interpretation. These marker positions shall be marked on the material and the position of the markers shall be maintained on the part during the radiographic cycle

7.0 Penetrameter (I.Q.I)

7.1 One penetrameter shall represent an area within which radiographic densities do not vary more than +30% to -15% from the density measured through the body of the penetrameter

7.2 Additional penetrameter should be used if variation in density is by more than -15% or +30% ranges

7.3 The penetrameter should be kept on the source side of the casting being radiographed. If it is not possible penetrameter of next lower designation can be placed on film side with prefix F on the penetrameter

7.4 IQI as per ASME Section V article 2 table 276

8.0 Geometric Un-sharpness (Ug)

8.1 Ug Shall be maintained as per Section V article 2 table T – 285R

9.0 Radiographic Testing

9.1 Single wall technique -- Radiography shall be performed using this Technique in which radiation passes through only one wall

9.2 Double wall technique --- This technique in which the radiation passes through both walls and both the walls are viewed for acceptance on the same film

10.0 Processing

10.1 Processing per the ASTM E 94

11.0 Radiographic Evaluation

11.1 Film Quality-The Radiograph Quality requirement as per ASTM E 746, E 1735

11.2 Film Evaluation-The acceptance or rejection of the material is by comparing the radiographic image to the agreed upon acceptance criteria

12.0 Acceptance Criteria

12.1 As per ASTM E 446 and ASME Section VIII D 1 & 2

12.1.1 Butt welded joints surfaces shall be sufficiently free from coarse ripples, grooves, overlaps and abrupt ridges and valleys to permit proper interpretation of radiographic and the required non-destructive examinations, if there is a question regarding the surface condition of the weld when interpreting a radiographic film, the film shall be compared to the actual weld surface for determination of acceptability

12.1.2 Indications shown on the radiographies of welds and characterized as imperfections are unacceptable under the following condition:

12.1.2.1 Any indications characterized as a crack or zone of incomplete fusion or penetration

12.1.2.2 Any other elongated indication at radiography, which has length greater than

(a) 1/4 in. (6mm) for t up to 3/4 in. (19mm)

(b) 1/3 t for t from 3/4 in. (19mm) to 2 1/4 in. (57mm)

(c) 3/4 t (19mm) for t over 2 1/4 in. (57mm)

Where: t= thickness of weld excluding any allowable reinforcement.

12.1.2.3 Any group of aligned indications that have an aggregate length greater than t in a length of $12t$, except when the distance between the successive imperfections exceed $6L$ where L is the length of the longest imperfection in the group

12.1.2.4 Rounded indications more than that specified by the acceptance standards given in ASME sec. VIII, DIV I, appendix 4 fig. 4-2 to 4-8

Note: spot RT shall be done as per ASME Sec. VIII, Div. 1 UW-52; however, the acceptance criteria shall be per UW-51 (as specification)

13.0 Defect Removal

Repair area shall be located on the weld line after evaluation & interpretation of radiograph. defects shall be removed by suitable method such as grinding, chipping or gouging (if permitted). welding of the repair area shall meet the requirement of related WPS, PQR

14.0 Certification & Personnel Qualification in Radiographic Testing

Personnel performing radiography examination to this procedure shall be qualified and certified by “OGIS” also shall meet the requirements of ASNT-SNT-TC-1A-2016 EDITION at least level II and on ASNT-SNT-TC-IA for code section I and sec VII div 2. Film interpreter shall have level II as a minimum