TRANSNET ENGINEERING

PRODUCT SYSTEMS DEVELOPMENT

WELDING COMPLIANCE

Non-Destructive Testing

Computed Radiographic Examination of Welds

Using phosphor imaging plate

Revision 00

Date of Release:

11 February 2024

SUMMARY OF REVISION

First issued – 12 February 2024

Document No. TBA

The following revisions have been made in this revision:

Change	Description
00	Preliminary Computed Radiographic Examination using Phospor imaging Plate : Specification

Table of contents

0.3 LIST OF TABLES

0.4 LIST OF FIGURES

Scope of Specification

1.0. Purpose

a) The purpose of this specification is to outline the computed radiography (CR) examination requirements and the method specific examination using phosphor imaging plate thereof employed by Transnet Engineering SOC.

2.0. Scope

a) This work instruction describes the personnel, method and standard of acceptance for the Gamma and X-Ray computed radiography using phosphor imaging plate of welds in plate, pipes and tubes and applies to material in the thickness range up to and including 508mm.

b) Radiography is used primarily for detecting the presence of volumetric sub-surface or internal discontinuities.

c) Material other than welding [e.g. casting, forging or corrosion measurements in pipes] shall be radiographed in accordance with a specific technique sheet as per referencing code section or client specification requirements.

3.0. Reference documents

The following documents are incorporated into this work instruction, unless otherwise specified when referenced; they form a part of this work instruction in their entirety. Where reference is made, the reference shall be taken to imply the latest edition and as agreed and specified in the relevant purchase order.

For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

Reference	Description
ISO 9001	Quality Systems –Requirements.
Doc xxxxxxx	Company Written Practice.
Doc xxxxxxx	Company Safety Requirements for Industrial Radiography
IRCP91-2	Code of practice for Industrial radiography (gamma radiography)
Government Gazette No.14596	Government Notice R.247.
OHS Act	Occupational Health & Safety Act No. 85 of 1993.
ASME V Art.1	General requirements.
ASME V Art. 2, mandatory appendix VIII	Radiography using phosphor imaging plate
ASTM E 2007	Standard Guide for Computed Radiography.
BS EN ISO 19232-1	Non-destructive testing. Image quality of radiographs. Determination of the image quality value using wire-type image quality indicators
BS EN ISO 19232-5	Non-destructive testing — Image quality of radiographs — Part 5: Determination of the image un-sharpness value using duplex wire-type image quality indicators.
BS EN 14784-2	Non-destructive testing - Industrial computed radiography with storage phosphor imaging plates - Part 2: General principles for testing of metallic materials using gamma rays.
ASTM E 2446	Standard Practice for Manufacturing Characterization of Computed Radiography Systems

4.0. Definitions and abbreviations

Abbreviation	Description
ASME	American Society for Mechanical Engineers.
ASTM	American Society for Testing and Materials.
EN	European Standard.
IQI	Image Quality Indicator.
IP	Phosphor imaging plate.
NDT	Non-Destructive Testing.
Pb	Lead.
RPO	Radiation Protection Officer.
S-IP-D	Source to IP Distance.
Ug	Geometric Unsharpness.

Contrast sensitivity: a measure of the minimum percentage change in an object which produces a perceptible brightness change in the image.

Digital image: an image composed of discrete pixels each of which is characterized by a digitally represented luminance level.

Digital: the representation of data or physical quantities in the form of discrete codes, such as numerical characters, rather than a continuous stream.

Digital image acquisition system: a system of electronic components which, by either directly detecting radiation or converting analog radiation detection information, creates an image of the spatial radiation intensity map comprised of an array of discrete digital intensity values (see pixel).

Digital image enhancement: any operation used for the purpose of enhancing some aspect of the original image.

Digital image processing system: a system which uses algorithms to process digital image data.

Display pixel size: the length and width dimensions of the smallest element of a displayed image.

Dynamic range: the range of operation of a device between its upper and lower limit; this range can be given as a ratio (e.g., 100:1) of the maximum signal level capability to its noise level, the number of measurable steps between the upper and lower limits, the number of bits needed to record this number of measurable steps, or the maximum and minimum measurable values.

Image processing system: a system that uses mathematical algorithms to manipulate digital image data.

Image storage system: a system that can store digital image data for future use.

Negative image: in which the lightest density areas of the radiographed subject appear darkest and the highest density area appear lightest.

Pixel intensity value: the numeric value of a pixel in a digital image (proportional to amount of radiation).

Pixel: the smallest addressable element in an electronic Image.

Pixel, display size: the dimensions of the smallest picture element comprising the displayed image, given in terms of the imaged object's dimensions being represented by the element.

Photostimulable luminescent phosphor: a phosphor capable of storing a latent radiological image which upon laser stimulation will generate luminescence proportional to the radiation intensity.

Pixel size: the length and width of a pixel.

Positive image: in which the highest density areas of the radiographed subject appear darkest and the lightest density areas appear lightest.

Spatial resolution: the size of the smallest detectable element of the digitized image.

Storage phosphor imaging plate: a flexible or rigid reusable detector that stores a radiological image as a result of exposure to penetrating radiation.

5.0. Responsibilities & authorities

a) Personnel shall be qualified, certified and authorized in accordance with the company written practice and as per referencing code section and/or client specification.
b) It is the responsibility of the Branch Manager and company NDT level III to ensure that only qualified and certified personnel are authorized.
c) A CR Level II/III is responsible for compiling a job specific Technique Sheet (if needed).
d) Only a CR Level II/III has the authority to evaluate the results of the inspection.
e) RT Level I personnel may provide assistance or work under supervision of a CR Level II/III Technician, provided they meet the requirements of the Department of Health with regards to working with radioactive equipment.
f) RPO candidates must have at least an approved Level II Industrial Radiography qualification with two years' experience.
g) The RPO must ensure that all persons performing industrial radiography or who act as radiographic operators and assistants have the necessary training and are familiar with the correct operating and safety procedures.

6.0. Personnel qualification

a) All CRT/RT technicians shall be in possession of a Department of Health authorization certificate.
b) Personnel carrying out the examination(s) detailed in this work instruction shall be certified to Level I, II or III.

7.0. Safety

All Radiography, radiographic equipment and facilities shall comply with the requirements of Equipment procedures, IRCP91-2 and Government Gazette No.14596. All Radiography shall be performed in such a manner that it restricts the exposure of personnel to ionizing radiation to as low as reasonable achievable (ALARA).

8.0. Technique sheets

a) This work instruction SHALL be used in conjunction with the technique sheet demonstrated to the item or items under examination with approval prior to any radiographic examination.
b) A demonstration shall be required at the minimum and maximum material thicknesses stated in the procedure.

c) Procedure demonstration details and demonstration block requirements are described in article 2, mandatory appendix VIII, Supplement A (See appendix 1).

9.0. Surface preparation

a) Welds and Material including casting.

The surface of the material under examination shall be prepared by the client in such manner to be free of any surface irregularities on the inside (where accessible) and outside so that the resulting radiographic image cannot mask or be confused with the image of any discontinuity.

b) Post Cleaning

After completion of radiography, the item examined shall be left in the same state as it was found i.e. all masking tape shall be removed.

10.0. Backscatter radiation

a) Backscatter from objects behind the IP can adversely affect the IP quality. Scatter radiation shall be reduced by suitable protection behind the IP in any suitable manner to reduce the backscatter to acceptable levels.

b) A lead (Pb) letter “B”, with a minimum dimension of 11 mm in height and 1.5 mm in thickness, shall be attached to the back of each cassette or IP holder during each exposure to determine if backscatter radiation is exposing the IP.

c) The lead letter “B” shall be placed in allocation so that it would appear within an area on the radiograph that meet the requirements of paragraph 15.3.

8.0. Technique sheets

a) This work instruction SHALL be used in conjunction with the technique sheet demonstrated to the item or items under examination with approval prior to any radiographic examination.

b) A demonstration shall be required at the minimum and maximum material thicknesses stated in the procedure. c) Procedure demonstration details and demonstration block requirements are described in article 2, mandatory appendix VIII, Supplement A (See appendix 1).

9.0. Surface preparation

a) Welds and Material including casting.

The surface of the material under examination shall be prepared by the client in such manner to be free of any surface irregularities on the inside (where accessible) and outside so that the resulting radiographic image cannot mask or be confused with the image of any discontinuity.

b) Post Cleaning

After completion of radiography, the item examined shall be left in the same state as it was found i.e. all masking tape shall be removed.

10.0. Back scatter radiation

a) Backscatter from objects behind the IP can adversely affect the IP quality. Scatter radiation shall be reduced by suitable protection behind the IP in any suitable manner to reduce the backscatter to acceptable levels.

b) A lead (Pb) letter “B”, with a minimum dimension of 11 mm in height and 1.5 mm in thickness, shall be attached to the back of each cassette or IP holder during each exposure to determine if backscatter radiation is exposing the IP.

c) The lead letter “B” shall be placed in allocation so that it would appear within an area on the radiograph that meet the requirements of paragraph 15.3.

11.0. System of identification

a) A system shall be used to produce permanent identification on the image traceable to the contract, component, weld or part numbers as appropriate.

b) Except for location marker(s), this identification does not necessarily require that the information appear as radiographic images, but shall not obscure the area of interest.

12.0. Extent of examination

The extent of examination shall be as stated by the referencing code section or client specification.

13.0. Equipment and material

13.1. Selection

Radiography shall be performed using an industrial phosphor imaging plate capable of demonstrating IQI image requirements.

13.2. Processing

The system used for processing a phosphor imaging plate shall be capable of acquiring, storing, and displaying the digital image.

13.3. Facilities for viewing images

Viewing facilities shall provide subdued background lighting of an intensity that will not cause reflections, shadows, or glare on the monitor that interfere with the interpretation process.

13.4. Densitometers

Densitometers are not applicable to phosphor imaging plate.

14.0. Examination

14.1. Techniques

A single-wall exposure technique shall be used whenever practical. When it is not practical to use a single wall-technique, double-wall technique shall be used. An adequate number of exposures shall be made to demonstrate that the required coverage has been achieved.

a) Single-Wall Technique

In the single-wall technique radiation passes through only one wall of the weld (material), the image is then viewed for acceptance. (Figures 1 & 2)

b) Double-Wall Technique

➢ Single-Wall Viewing – for welds, a technique may be used in which radiation passes through two walls and only the weld material on the IP side wall is viewed for acceptance. When complete coverage is required for circumferential welds, a minimum of three exposures taken 120 degree to each other shall be made. (Figure 3)

➢ Double-Wall Viewing – for welds in components 89 mm (3.5 inch.) or less in nominal outside diameter, a technique may be used in which the radiation passes through two walls and the weld in both walls is viewed for acceptance on the same image (see Figure 4).

➢ The radiation beam may be offset to separate the images and two exposures 90º to each other shall be made for each joint.

➢ Alternatively the weld may be radiographed with the radiation beam positioned that the images of the welds in both walls are superimposed. To ensure complete coverage three exposures taken at either 60º or 120º to each other shall be made for each welded joint.

14.2. Geometric unsharpness

a) The minimum source to IP distance should be such that the Geometric Unsharpness (Ug) recommendation of Table 4 are not exceeded.

b) Geometric Unsharpness shall be determined as follows:

Ug = Ft/D

Ug = Geometric Unsharpness.

F = Source Size – the maximum projected dimension of the radiating source.

t = Distance from the source side of object or weld being radiographed to the IP.

D = Distance from source of radiation to object or weld being radiographed.

Note: D and t shall be determined at the approximate center of the area of interest.

14.3. Location markers

a) Location markers, which are to appear as radiographic images on the IP, shall be placed on the component - not on the IP holder or cassette. Their locations shall be permanently marked on the surface of the part being radiographed when permitted, or on a map, in a manner permitting the area of interest on image to be accurately traceable to its location on the part, for the required retention period of the radiograph.

b) Evidence of complete coverage of the region being examined shall be obtained.

c) Location markers may be placed on either the source side or IP side as per Figure 6: location marker sketches.

14.4. Overlap of phosphor imaging plates

a) When radiographing an area with two or more separate phosphor imaging plates (IP), they shall have sufficient overlap to ensure that the complete region of interest is radiographed. This shall be verified by a high-density marker on the surface of the object that will appear on each image.

14.5. Image quality indicators – IQI’s

a) Wire type IQI’s complying with ASME V Article 2, or EN 462-1, shall be used as a measure of the quality of the image.

b) IQI’s shall be selected from the tables below and from the same alloy material group as the material being radiographed.

c) Radiography shall be performed using a technique that will reveal the required wire of the designated IQI in the image.

d) Welds with reinforcements:

The thickness on which the essential wire of IQI is based is the nominal single-wall thickness plus the estimated weld reinforcement not to exceed the maximum permitted by the referencing Code Section [the actual measurement of weld reinforcement is not required]. Backing rings or strips shall not be considered as part of the thickness in IQI selection.

e) Welds without reinforcement:

The thickness on which the essential wire of IQI is based on is the nominal single-wall thickness. Backing rings or strips shall not be considered as part of the thickness in IQI selection.

f) Placement of IQI’s

I. Source Side IQI’s – The IQI shall always be placed on the source side of the part being examined, except under the conditions mentioned in ii).

NOTE: When using separate blocks for IQI placement as described in I, the thickness of the blocks shall be such that the image brightness at the body of the IQI is judged to be equal to or greater than the image brightness at the area of interest for a negative image format. This image brightness requirement is reversed for a positive image format.

ii. IP Side IQI’s – Where inaccessibility prevents hand placing the IQI on the source side, the IQI shall be placed on the IP side in contact with the part being examined. A lead letter “F” shall be placed adjacent or on the IQI to indicate this arrangement, and the IQI sensitivity requirement adjusted as required in Table 2.

iii. IQI placement for welds – The IQI shall be placed on the weld so that the length of the wires is perpendicular to the length of the weld.

iv. IQI placement for other components – The IQI may be placed in the area of interest.

g) Number of IQI’s

I. Multiple IQIs. An IQI shall be used for each applicable thickness range in Table 2 spanned by the minimum-to-maximum thickness of the area of interest to be radiographed.

ii. As an alternative to (i) above, a minimum of two IQIs representing the minimum and maximum thicknesses of the area of interest may be used, provided the requirements of 15 are met.

15.0. Evaluation

15.1. System-induced artifacts

The digital image shall be free of system-induced artifacts in the area of interest that could mask or be confused with the image of any discontinuity.

15.2. Image brightness

a) The image brightness [grey value] adjacent to the designated wire of the wire-type IQI, shall be within 10% of the image brightness in the area of interest for a negative image format. This image brightness/grey value requirement is reversed for a positive image format. Additionally, comparators such as digitized film strips, gray scale cards, etc., may be used to aid in judging displayed image brightness. When comparators are used to judge areas within the image, they need not be calibrated. Pixel intensity values may also be used to quantify image brightness comparisons.

15.3. Sensitivity requirements

a) Radiography shall be performed with a technique of sufficient sensitivity to display the essential wire of a wire-type IQI. The image shall also display the IQI identifying numbers and letters.

b) Multiple IP technique is not applicable to phosphor imaging plate radiography.

c) The minimum visible wire shall be as per table 2.

15.4. Excessive backscatter

a) If a dark image of the “B,” appears on a lighter background of the image, protection from backscatter is insufficient and the image shall be considered unacceptable.

b) A light image of the “B” on a darker background is not cause for rejection.

15.5. Measuring scale

a) The measuring scale used for interpretation shall be capable of providing dimensions of the projected image.

b) The measurement scale tool shall be based on the following

➢ A known dimensional comparator that is placed in direct contact with the cassette prior to exposure.

➢ A known dimensional comparator that is inscribed on the imaging plate prior to processing.

➢ A known dimensional comparator scale placed on the imaging plate prior to processing.

15.6. Interpretation

Final image interpretation of the area of interest shall be performed within the identified IQI image contrast and brightness values or, if multiple IQIs are used, the overlapping portions of the identified contrast and brightness values for the intervening thickness ranges. The IQI and the area of interest shall be of the same image format (positive or negative).

a) The contrast and brightness range that demonstrates the required IQI sensitivity shall be used for interpretation. When more than one IQI is used to qualify multiple thicknesses, the overlapping portions of each IQI's determine contrast and brightness range shall be considered valid for interpretation of intervening thicknesses. Pixel intensity values may also be used to quantify image brightness comparisons.

b) The digital image may be viewed and evaluated in a negative or positive image format.

c) Independent areas of interest of the same image may be displayed and evaluated in differing image formats, provided the IQI and the area of interest are viewed and evaluated in the same image format.

d) ***The use of any filtration that eliminate retrieval of original image is prohibited.***

15.7. Evaluation by manufacturer, client and/or third party

The manufacturer, client and/or third party shall be responsible for the review, interpretation, evaluation, and acceptance of completed radiographs to assure compliance with referencing code section or job specification.

15.8. Acceptance standard

Acceptance and rejection shall be as per referencing code section or client specification and shall be stated on the job request and on the CRT report form.

16.0. Documentation

The results of the radiographic examinations shall be reported on a Computed Radiographic Report form, a complete report shall be submitted with the corresponding radiographs to the manufacturer, client and/or third party.

The report shall provide, as a minimum, the following details.

a) Comparator used.

b) Examination results.

c) Examination technique.

d) Component Identification.

e) Dimensional map [if used].

f) Single or double wall viewing.

g) Source size – F [see figure 5].

h) Single or double wall exposure.

i) Name of the examination body.

j) Actual comparator measurement.

k) Date of examination/interpretation.

l) X-Ray voltage or isotope type used.

m) Number of radiographs [exposures].

n) Procedure identification and revision.

o) Imaging software version and revision.

p) Acceptance criteria/reference code section.

q) Source to object distance - D [see figure 5].

r) Storage phosphor manufacturer and designation.

s) Disposition of component tested [e.g. Accept or Reject].

t) Distance from source side of object to IP - t [see figure 5].

u) Name and qualification level for personnel performing the examination.

v) Image acquisition (digitizing) equipment manufacturer, model, and serial number.

w) Base material type and thickness, weld thickness and weld reinforcement thickness if applicable.

x) Identification (name) of the Manufacturer’s representative who performed the final acceptance of the radiographs.

y) Numerical values of the final image processing parameters, i.e., filters, window (contrast), and level (brightness) for each view.

17.0. Tables

Table 1: ASTM IQI sizes and identity number

Set A		Set B	
Wire diameter (mm)	Wire identity	Wire diameter (mm)	Wire identity
0.08	1	0.25	6
0.1	2	0.33	7
0.13	3	0.4	8
0.16	4	0.51	9
0.2	5	0.64	10
0.25	6	0.81	11
Set C		**Set D**	
Wire diameter (mm)	Wire identity	Wire diameter (mm)	Wire identity
0.81	11	2.54	16
1.02	12	3.20	17
1.27	13	4.06	18
1.60	14	5.08	19
2.03	15	6.35	20
2.54	16	8.13	21

Table 2: IQI selection

Penetrated Thickness (mm) [e.g. parent metal + weld Reinforcement]			Source Side IQI	IP Side IQI
			ASTM Wire identity	ASTM Wire identity
-	to	6.4	5	4
6.4	to	9.5	6	5
9.5	to	12.7	7	6
12.7	to	19.0	8	7
19.0	to	25.4	9	8
25.4	to	38.1	10	9

38.1	to	50.8	11	10
50.8	to	63.5	12	11
63.5	to	101.6	13	12
101.6	to	152.4	14	13
152.4	to	203.2	16	14
203.2	to	254.0	17	16
254.0	to	304.8	18	17
304.8	to	406.4	20	18
406.4	to	508.0	21	20

Table 3: maximum ug values

Material Thickness (mm)	Ug Maximum (mm)
Under 50	0.51
50 through 75	0.76
over 75 through 100	1.02
Greater than 100	1.78
Note: Material thickness is the thickness on which the IQI is based.	

18.0. Figures

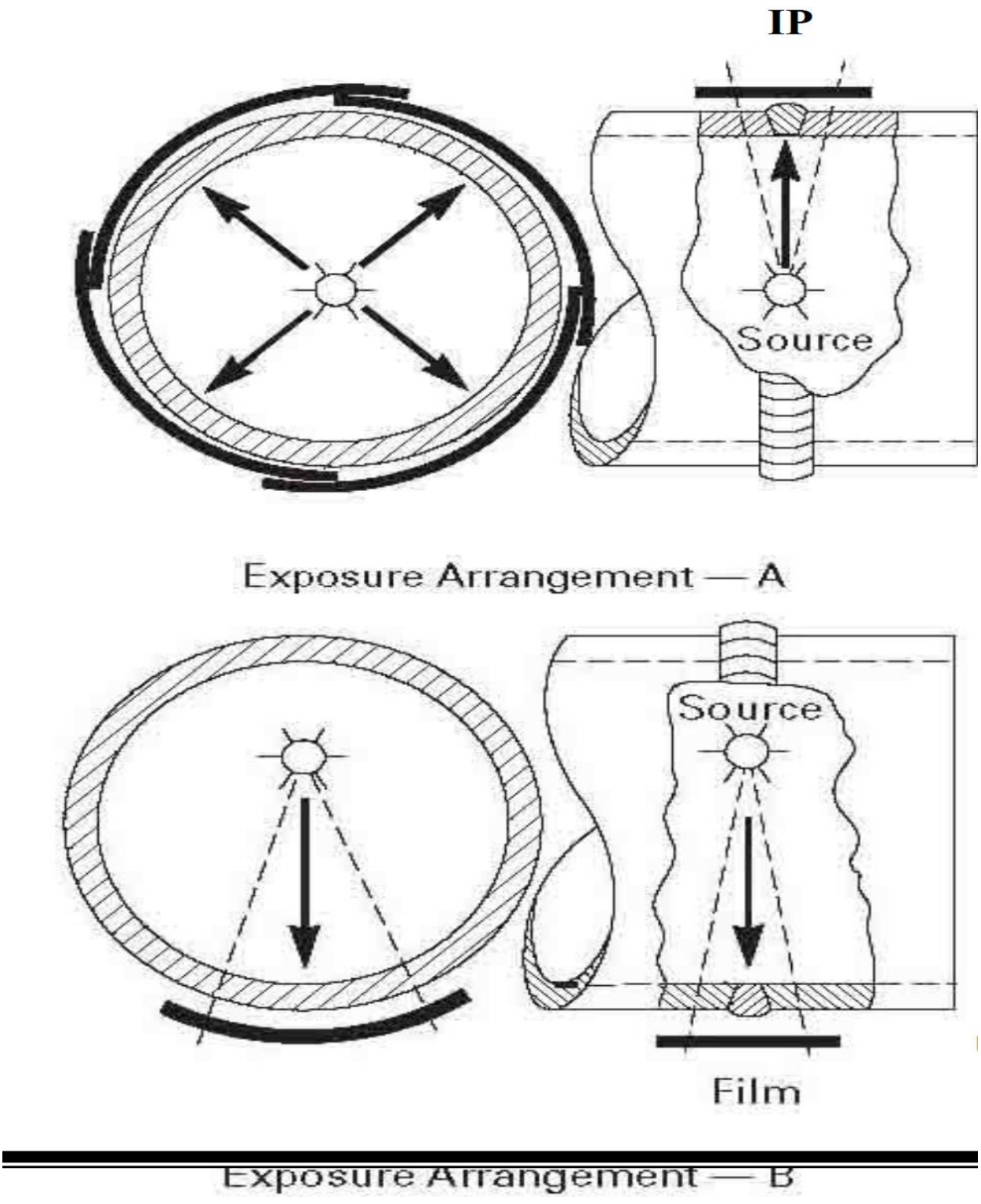


Figure 1: Single Wall Single Image – SWSI

Radiation source located centre or off-centre inside the object

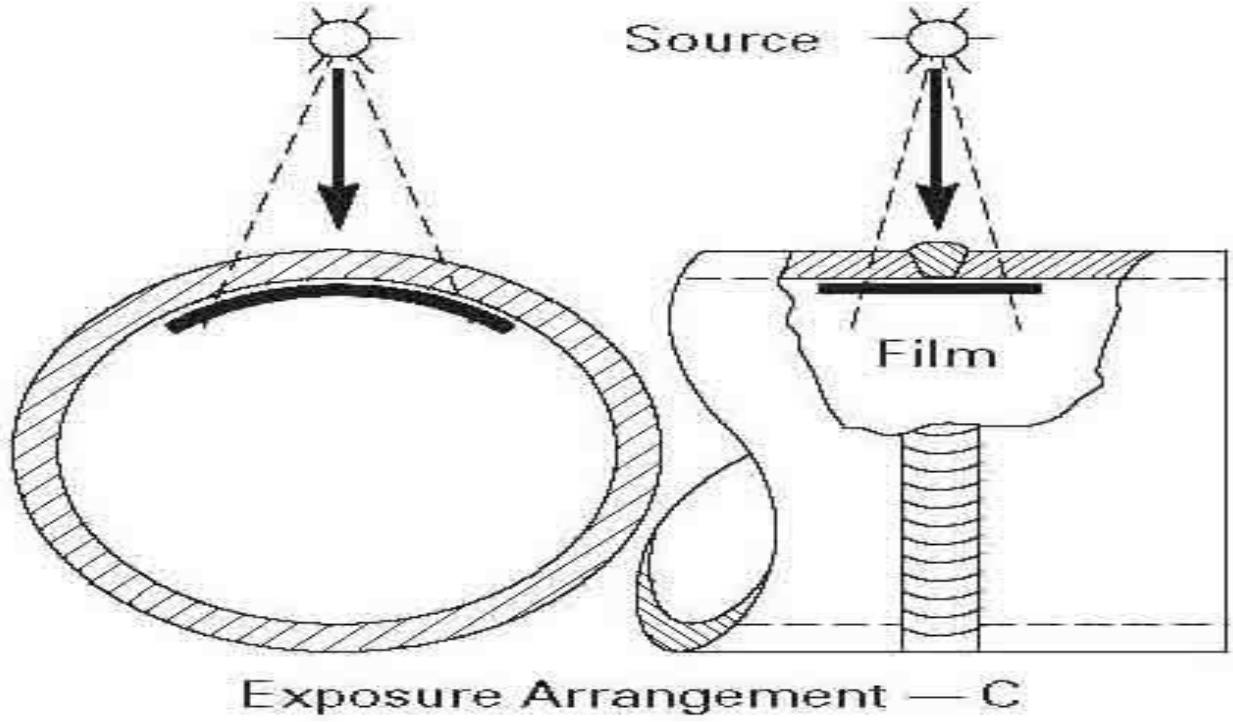


Figure 2: - Single Wall Single Image – SWSI

Radiation source located outside the object with IP inside.

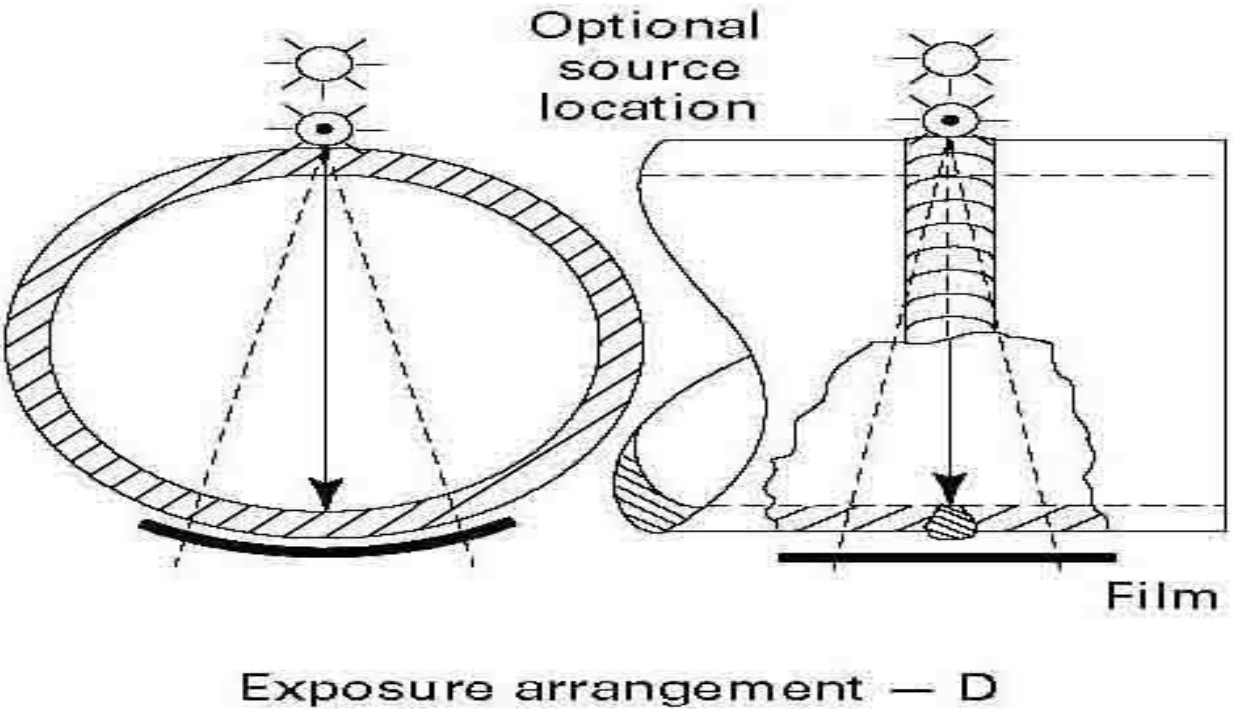


Figure 3: Double Wall Single Image – DWSI

Radiation source and IP located outside the object.

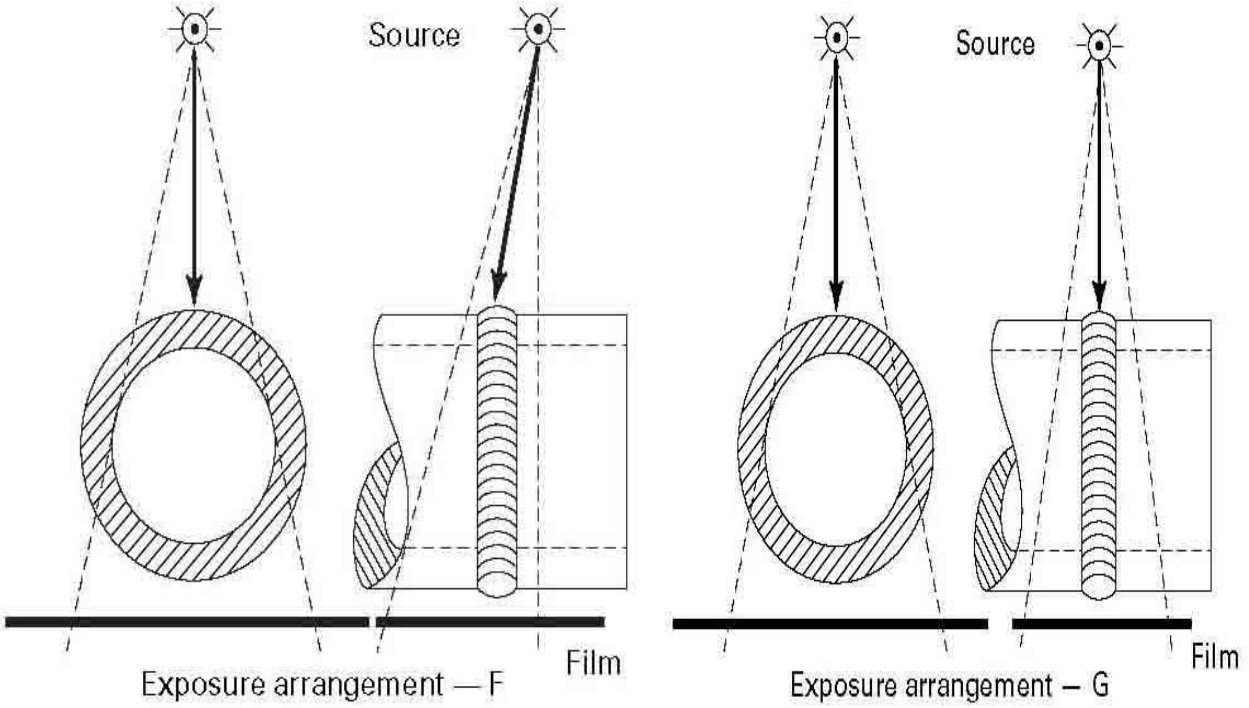


Figure 4: Double Wall Double Image – DWDI

Radiation source outside the object and the IP on the opposite side.

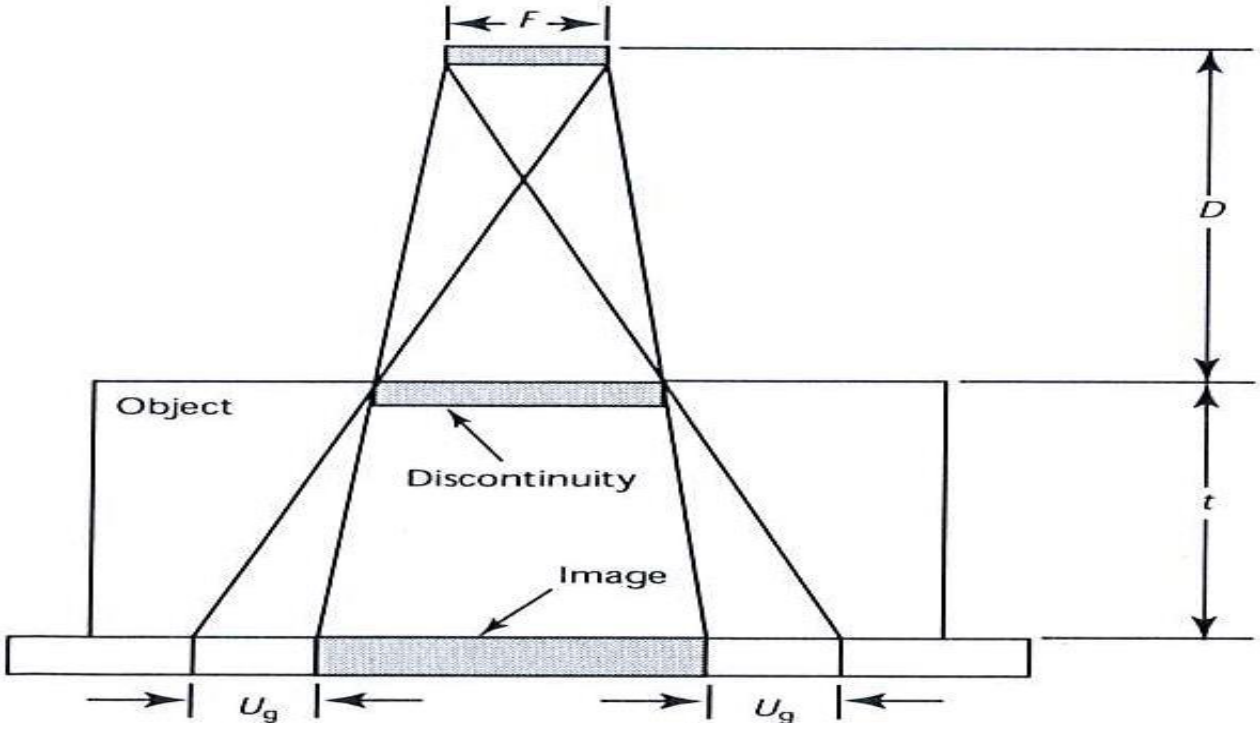


Figure 5: Geometric Un-sharpness.

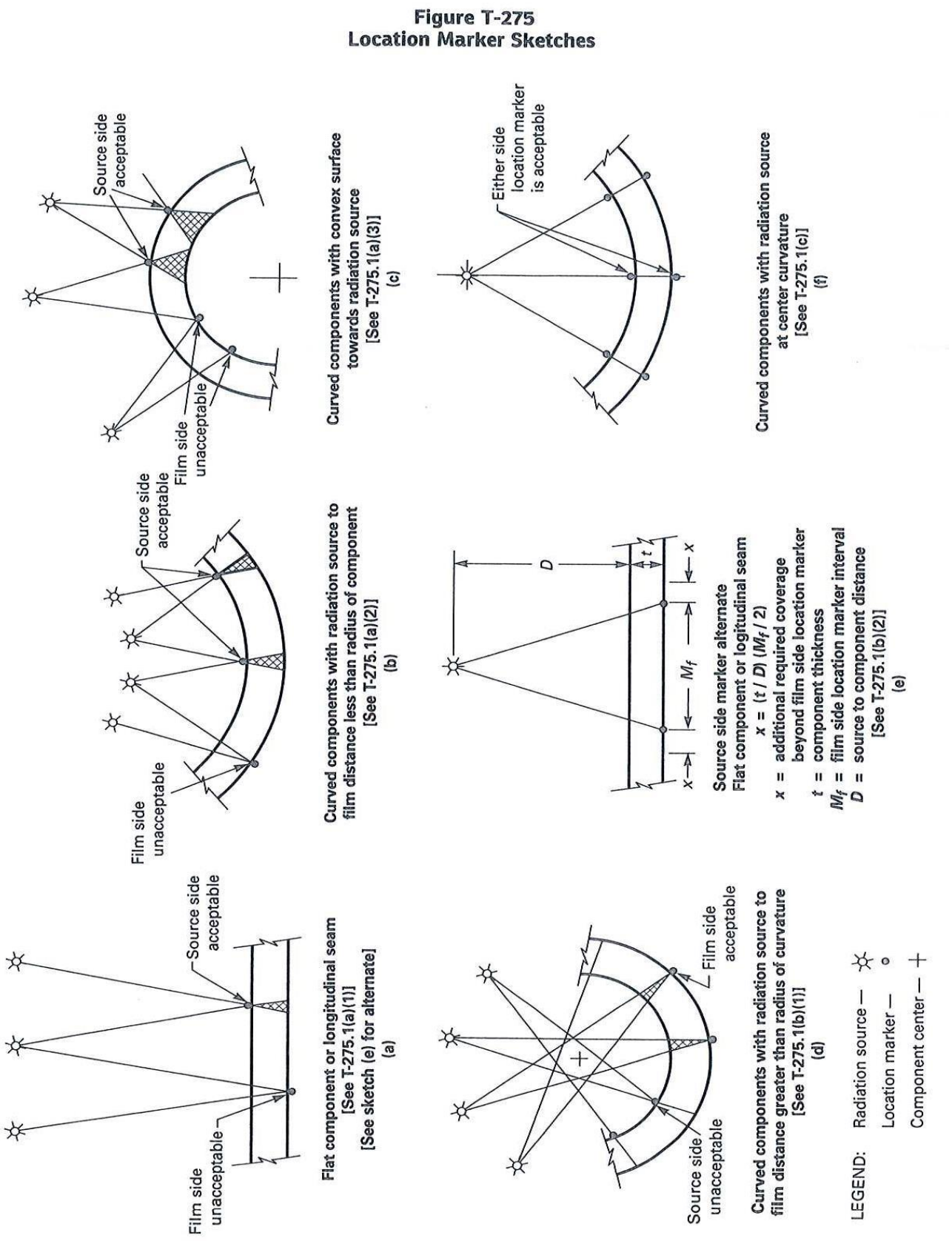


Figure 6: location marker sketches.

Appendix 1 – Procedure demonstration details

(ASME V, Article 2, mandatory appendix VIII, Supplement A)

(19)

MANDATORY APPENDIX VIII
SUPPLEMENT A

VIII-A-210 SCOPE

This Supplement provides the details and requirements for procedure demonstrations in accordance with Mandatory Appendix VIII, VIII-221.2. This Supplement shall be used to demonstrate the ability to produce an acceptable image in accordance with the requirements of the written procedure.

VIII-A-220 GENERAL

VIII-A-221 DEMONSTRATION BLOCK

The demonstration block shall meet the requirements of Figure VIII-A-221-1 and shall be of material that is radiographically similar to the material described in the procedure.

(a) A minimum of two demonstration blocks, representing the minimum and maximum thicknesses of the procedure thickness range, shall be required for procedure qualification.

(b) Additional blocks may be used to validate specific parameters at intermediate thicknesses throughout the total thickness range.

(c) As an alternative to (a) and (b), one demonstration block containing a series of embedded notches of different depths may be used with shim plates of appropriate thicknesses to provide demonstration of both the minimum and maximum thicknesses to be qualified for the procedure.

VIII-A-230 EQUIPMENT AND MATERIALS

VIII-A-231 SCAN PARAMETERS

The scanning parameters used to acquire the radiographic image shall be verifiable, embedded in the image data or associated header metadata information or recorded on the radiographic detail sheet.

VIII-A-232 GRAY SCALE VALUES

The pixel intensity values in the region of interest shall fall within the minimum/maximum values described in the procedure. These pixel intensity values shall be based on actual assigned image bitmap values, not digital drive levels.

VIII-A-233 IMAGE QUALITY INDICATORS

The designated image quality indicators (IQIs) used for the demonstration shall be selected from Table T-276. All IQIs used shall meet the requirements of T-233.

VIII-A-240 MISCELLANEOUS REQUIREMENTS

The radiographic image of the demonstration block shall be viewed and evaluated without the aid of post-processing filters. Image analysis shall be performed through window and level (brightness and contrast) variation only.

VIII-A-241 SENSITIVITY

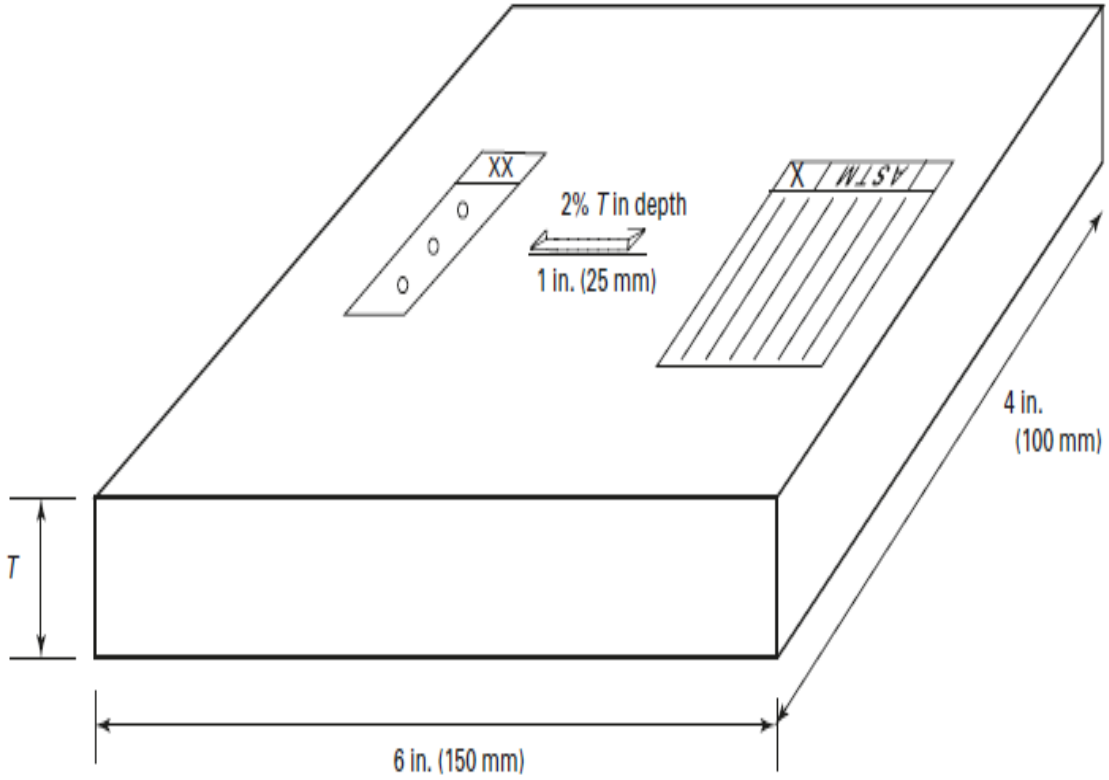
As a minimum, both IQIs (essential wire and designated hole) shall be visible while the embedded notch is discernable. This shall be accomplished in raw data, without the aid of processing algorithms or filters.

VIII-A-242 RECORDS

The raw, unfiltered images of the procedure demonstration shall be maintained and available for review. The images shall be clearly identified and traceable to the procedure for which they are used for qualification.

Appendix 1 – Procedure demonstration details (Continues)

Figure VIII-A-221-1
Procedure Demonstration Block



GENERAL NOTES:

(a) Hole-type and wire-type IQIs shall be selected as appropriate for *T* from Table T-276. Notch depth need not be less than 0.005 in. (0.13 mm).

(b) The 4-in. and 6-in. block dimensions are a minimum. The block dimensions may be increased appropriately as *T* increases.

(c) Notch dimensions shall be as follows:

depth = 1.6%*T* to 2.2%*T*

width = 0.5 in. (13 mm) and less, *T* shall be 2 times the notch depth; above 0.5 in. (13 mm) through 1 in. (25 mm), *T* shall be 1.5 times the notch depth; above 1 in. (25 mm), *T* shall be equal to notch depth

length = 1 in. (25 mm)

(d) Notch location shall be approximately center of the demonstration block.

Appendix 2 - example of computed radiography examination report

Reporting instruction: Fill (small letters), font (Times New Roman), Font Size (6), alignment (center), Bold (Non), Italic (Non), under line (Non), Date format (YYYY/MM/DD), time format (24H00)
color (Blue for any changes to original report)

Customer/Client and contacts information	De-Tect Unit contract/ job number	Component identification	Report no.	Test location	Date and time of test	
					Start	End

Test object details (information provided by the customer/Client)							
Request no.				Item/weld description		Weld/Manufacturing process	
Drawing no & rev.				Surface condition		Welder stamp	
Diameter/ thickness				Qty/ length tested		WPS	
Heat treatment				Material grade / no.			
Surface condition(s)				New/in-service			
Testing specification							
Procedure & rev.				Acc. Criteria			
Technique sheet & rev.				Specification			
Equipment							
X-ray machine		Focal spot size		Voltage used		Current used	
Radiation source / serial no.		Source size		Source strength		Container / serial no.	
Ip id		Ip type		Ip size		Lead screen	
Scanner model		Scan speed		Photo multiplier [pmt]		Laser power	
Bits allocated		Pixel depth		Scaned microns		Thermometer / serial no.	
Process control							

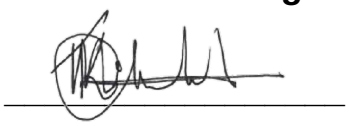
Technique		Number of image(s)		Single/double wall exposure		Single/double wall viewing	
[sid] Source to ip distance		*[d]* Source to object distance		*[d]* Object to ip distance		Exposure time	
Comparator *used*		Serial number comparator		Comparator dimention [actual]		Comparator position	
Back scatter control - yes/no		Filter Yes/no		Collimator Yes / no		Duplex IQI Yes/no	
Iqi type		Iqi position		Required IQI's wire		Image bright [grey value] [adjacent to the designated wire]	

Examination result / summary							
No	Weld no	Welder stamp	Image brightness [grey value] [min. – max.]	Min. Visible wire no.	Ip Position	Evaluation	Acc/rej

Limitation / comments

Technician		Reviewer		Manufacturer/client		Aia	
Name		Name		Name		Name	
Qual		Qual.		Qual.		Qual.	
Date		Date		Date		Date	
Sign.		Sign.		Sign.		Sign.	

DOCUMENT AUTHORITIES

Compiler	**Matukele Mashego**
Signature	
Designation	**NDT Superintendent**
Reviewer	**Donbie Mashabane**
Signature	
Designation	**NDT Superintendent**
Approver	
Signature	_____
Designation	**Senior Product Engineer**