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WP 13-QA1002

Revision 6

Visual Inspection

Technical Procedure

EFFECTIVE DATE: 02/16/10

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APPROVED FOR USE

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NDE LEVEL III

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INTRODUCTION

This procedure provides guidance for performance of Visual Inspection (VT), which is a method of Nondestructive Inspection (NDE), by qualified Quality Assurance Inspection Services (QAIS) personnel. Performance of this procedure is limited to using the VT method for inspection of materials for the presence of discontinuities open to the surface. This procedure applies, but is not limited, to the visual inspection of nonporous ferrous and non-ferrous welds, base metals, castings, or forgings.

Drawings, engineering specifications, or other parent documentation will specify the extent of the visual inspection, acceptance standards, and any other applicable test requirements.

This procedure is performed in conjunction with general inspection/test requirements contained in WP 13-QA1006.

Performance of this procedure generates the following records, as applicable:

- EA13QA1006-1-0, Quality Assurance Inspection Report
- EA13QA1006-2-0, Quality Assurance Inspection Report Log

Record copies of the completed EA13QA1006-1-0 will be kept with the parent document (documentation which requires the examination, e.g., work order). QAIS will retain the record copy of EA13QA1006-1-0 not initiated by a parent document.

All records generated by the implementation of this procedure will be handled, stored, and dispositioned in accordance with the department/section's Records Inventory and Disposition Schedule.

WTS recognizes that the terms examination, testing and inspection are terms commonly used as synonyms in nondestructive testing. For uniformity and consistency the term inspection will be used when describing the application of nondestructive test methods.

REFERENCES

BASELINE DOCUMENTS

- ASME B31.1, Power Piping
- ASME B31.3, Process Piping
- ASME Section III, Rules for Construction of Nuclear Facility Components
- ASME Section V, Nondestructive Testing
- ASME Section VIII, Boiler and Pressure Vessel Code
- ASTM E 1316, Standard Terminology for Nondestructive Examinations

- AWS Structural Welding Codes (AWS D1.1, AWS D1.3, AWS D1.6, etc.)
- WP 13-1, Washington TRU Solutions LLC Quality Assurance Program Description
- WP 13-QA1007, Dimensional Inspection
- WP 15-RM, WIPP Records Management Program

REFERENCED DOCUMENTS

- WP 04-IM1000, Issues Management Processing of WIPP Forms
- WP 13-QA.06, Quality Assurance Department Qualification and Certification of Nondestructive Examination Personnel
- WP 13-QA1006, Quality Assurance Plant Inspections
- WP 13-QA3004, Nonconformance Report
- WP 15-PM3526, Receipt Discrepancies
- EA13QA1006-1-0, Quality Assurance Inspection Report

EQUIPMENT

NOTE

A calibrated light meter is only required for the one-time light verification. A change in light source or technique will require reverification and demonstration.

- Calibrated light meter for the one-time light level verification noted in Section 1.0.
- Light source capable of producing a minimum of 100 foot candles

PRECAUTIONS AND LIMITATIONS

- Any cleaning solutions for austenitic stainless steel, nickel-based alloys, and titanium shall contain less than 1 percent halogens (chlorine and fluorine) and less than 1 percent sulphur. When using mechanical means, such as wire wheel or brush, use only like materials (e.g., stainless steel with stainless steel).
- The clean area for VT shall be at least 1 inch either side of the area of interest or the entire part as applicable.

- All safety, environmental, and radiological requirements of the area where the inspection is to be performed shall be complied with.
- Personnel Qualifications – All personnel conducting VT to this procedure shall be qualified as an American Welding Society (AWS) Senior Certified Welding Inspector (SCWI)/Certified Welding Inspector (CWI) or, at a minimum, as a NDE Level II inspector, or a qualified NDE Level I inspector working directly with a qualified Level II or Level III, in accordance with WP 13-QA.06.

PERFORMANCE

1.0 PREPARATION

NOTE

The surface under inspection shall have sufficient lighting (natural or artificial white light). Sufficient lighting is defined by the ability to detect a 1/32 inch (0.8 mm) black line on an 18 percent neutral gray card or a 1/32 inch increment on a Starrett machinist's scale or equivalent under the conditions of inspection. The minimum light intensity at the surface being inspected shall be 100 foot candles.

- 1.1 Demonstrate sufficient lighting, one time, for each light source and technique used for that light source.
 - 1.1.1 Verify light level using a calibrated light meter.
 - 1.1.2 Document the demonstration on EA13QA1006-1-0 and maintain on file.
 - 1.1.3 If light source or technique is changed, reverify and demonstrate sufficient lighting.
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NOTE

Surface Condition – material may be inspected in the as-welded, as-rolled, as-cast, or as-forged condition if the surface condition will not mask the indication of an unacceptable discontinuity. Surfaces must be free of scale, grease, oil, weld splatter, or any condition that will interfere with the visual inspection. Grinding wheels and wire brushes used for surface cleaning shall be in accordance with engineering specifications. When the surface to be inspected requires grinding, care should be taken to avoid reducing the thickness of the weld or base material below the required minimum dimensions.

- 1.2 Ensure that the surface is free of welding slag, paint, grease, dirt or other foreign material that may interfere with the inspection.
- 1.3 Ensure that as-welded surfaces are in accordance with applicable specified acceptance criteria. This includes removing coarse ripples,

grooves and/or valleys that interfere with inspection and interpretation of the weld.

2.0 INSPECTION

NOTE

Visual inspection may be performed immediately after cooling except:

- A514, A517, and A709 Grades 100 and 100W steels require not less than 48 hours to pass after completion of all welding, prior to visual inspection.
 - Final VT shall be performed in the final surface and heat-treated condition.
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- 2.1 Perform visual weld inspections after surface preparation.
- 2.2 Use appropriate inspection equipment (such as fillet gages, high/low gages, scales, magnifiers, etc.). Discard and replace damaged or deteriorated inspection equipment.
- 2.3 When access is sufficient to place the eye within 24 inches of the surface being inspected, and, at an angle of not less than 30 degrees to the surface being inspected, use direct VT.
- 2.4 When necessary, use mirrors to improve the angle of vision, and use aids such as a magnifying lens (maximum 10x magnification) to assist in inspections.
- 2.5 When necessary, substitute remote VT for direct VT.
 - 2.5.1 Obtain the NDE Level III's approval of the equipment/technique used to perform the remote visual inspection prior to performing the inspection, and document on EA13QA1006-1-0.
 - 2.5.2 When necessary, use visual aids such as mirrors, telescopes, borescopes, fiber optics cameras or other suitable equipment for remote visual inspections.
 - 2.5.3 Ensure that remote VT equipment has a resolution capability at least equivalent to that obtainable by direct VT.
- 2.6 Inspect and/or verify the following, as applicable and when required:
 - Prior to welding and/or during fit-up inspection:
 - The weld procedure specification (WPS) used in production is approved and released.

- The welder(s) performing the work are currently qualified to the specified WPS.
- The base material is in accordance with the engineering drawing and WPS requirements.
- The weld filler material used is in accordance with specified WPS requirements.
- Unacceptable base metal discontinuities have been removed and/or repaired in accordance with approved procedures.

NOTE

When pre-heat measurements are taken with temperature indicating crayons, the crayon measurement marks shall be no less than 1/2 inch from the weld preparation area.

- Pre-heat requirements are in accordance with specified WPS requirements.
- Weld joint geometry, alignment, and root opening are in accordance specified WPS requirements.
- Weld preparation cleanliness is in accordance with specified WPS requirements.
- Purging gas and dams are in accordance with specified WPS requirements.
- Tack welds meet specified acceptance criteria.
- In-process inspection:
 - Root pass or first layer is in accordance with specified acceptance criteria.
 - Interpass temperatures are in accordance with specified WPS requirements.
 - Interpass cleanliness is in accordance with specified WPS requirements.
 - Fixturing or temporary restraints are adequate to reduce or prevent weld shrinkage/distortion that may exceed given tolerances specified by the engineering drawing or other specified criteria.

- Final weld inspection:
 - Completed welds are in accordance with the acceptance criteria specified in Sections 3.1 and 3.2.

3.0 EVALUATION

- 3.1 Use acceptance criteria as specified in the drawing, parent document, applicable specification, or code, etc.
- 3.2 When required by the engineering specification or other parent documentation, use specific acceptance as written in an addendum to this procedure (i.e., Quality Assurance Inspection Plan [QAIP]).
- 3.3 Record the results of the Visual Inspections on Form EA13QA1006-1-0.

NOTE

Discrepant material identified during the initial receipt and/or receipt inspection processes at the warehouse will be documented and resolved through the use of a Receipt Discrepancy Report (RDR) in accordance with WP 15-PM3526. A Nonconformance Report (NCR) will be required only for discrepant items to be retained and disposition for use by Washington TRU Solutions LLC (WTS) and subcontractors obligated to our program.

- 3.4 If deficiencies are identified during inspection/test, perform the following, as applicable:
 - 3.4.1 Issue ONE of the following:
 - RDR in accordance with WP 15-PM3526
 - WIPP Form (EA04IM1000-1-0) in accordance with WP 04-IM1000
 - NCR (EA13QA3004-1-0) in accordance with WP 13-QA3004
 - 3.4.2 Record the RDR, WIPP Form, or NCR number, as applicable, on EA13QA1006-1-0.
 - 3.4.3 Initiate and hang hold tags in accordance with WP 13-QA3004.

4.0 MEASURING AND TEST EQUIPMENT USAGE LOG

- 4.1 Designated Quality Engineer, perform the following:
 - 4.1.1 Maintain a Measuring and Test Equipment (M&TE) Usage Log on the QA database (\\Gallina\QRA\QAIS).

- 4.1.2 As applicable, compile any M&TE data from the completed EA13QA1006-1-0.
- 4.1.3 Enter compiled data on the M&TE Usage Log.
- 4.1.4 Generate and complete an EA13QA1006-1-0 each month in accordance with WP 13-QA1006, documenting the M&TE usage.
- 4.1.5 Forward a copy of the monthly Quality Assurance M&TE Usage Log to the Metrology Office.