

Quality Requirement

NDT General Requirements

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1 scope

1.1 Purpose

This Quality Requirements specifies the general requirements for the application of nondestructive examination (NDE) methods as well as the development and qualification procedures used in the manufacturing, servicing, and/or service of equipment for NOV.

1.2 Applicability

This is applicable to suppliers providing NDE services to NOV. The requirements of this document apply to all methods of NDE.

Service suppliers approved to provide NDE services require NOV written approval prior to outsourcing NDE services to another NDE service provider.

2 References

ASNT SNT-TC-1A
ISO 9712
ASME BPVC SEC V

3 Responsibilities and Duties

The NDE service supplier shall ensure that it:

- NDE shall be carried out according to purchase order requirements, industry standards (API, ASNT, etc.) or rules for the actual classification body (ABS, DNV, GOST, CCS, etc.) as applicable.
- performs only examinations for which it is equipped and staffed;
- performs only examinations for which its employees are qualified;
- personnel are certified in accordance with service supplier's written procedure;
- ensures that equipment is calibrated;
- ensures that all equipment is maintained in accordance with service supplier's written procedure;
- informs the purchaser of any discrepancy or limitation imposed on the testing accuracy by such factors as surface finish, form, shape, or procedure;
- calls to the attention of the purchaser any irregularity or deficiency noted in the documents;
- submits promptly to the purchaser formal reports of all examinations that indicate compliance or noncompliance of the material.
- NDE shall not be conducted on quench and temper steels less than 48 hours after welding.

Note: Relevant API product specifications shall be taken into consideration when specified by the engineering documentation

4 Personnel Requirements

Personnel performing NDE shall be certified in accordance with the manufacturer's documented training program that is based on the requirements specified in ISO 9712, ASNT ACCP-CP-1, or ASNT SNT-TC-1A. When ASNT SNT-TC-1A is used as the basis for qualification and certification, the content of the document shall be considered requirements and not considered a recommended practice as the title implies.

All NDE inspection personnel shall be at least ASNT level II. ISO 9712 level II or equivalent.

Eye Exams:

Inspection personnel conducting visual examinations on final product, including welded product, shall have an eye exam every twelve (12) months according to ASNT and/or ISO 9712 or equivalent recognized national standard.

5 Written Procedure Requirements

The NDE service supplier shall perform all examinations in accordance with the NDE procedure stated in the purchase order.

The NDE service supplier shall have a system of written procedures for each NDE service performed.

The NDE service suppliers' NDE procedures shall be qualified and certified by a Level III.

The NDE service suppliers' NDE procedures shall be approved by NOV prior to use.

The NDE service supplier shall include the NDE approval letter with all submitted documentation.

6 NDE Equipment and Calibration

6.1 Inventory

The NDE service supplier shall have an inventory listing of all available equipment with the following information noted:

- name of the manufacturer;
- equipment model and serial number;
- characteristics subject to calibration;
- range of operation and range of calibration;
- reference to nationally or internationally recognized standards used for calibration;
- frequency of calibration;
- allowable tolerances or maximum sensitivity.

6.2 Calibration

Equipment used to inspect, test, or examine material or other equipment shall be identified, controlled, calibrated, and adjusted at specified intervals in accordance with documented manufacturer instructions, and consistent with nationally or internationally recognized standards specified by the manufacturer, to maintain the accuracy required by this standard. Records of calibration shall be maintained per the suppliers QMS.

7 Quality Control Records Requirements

7.1 General

The NDE service supplier shall have an established and documented procedure for the control of documents and records.

Records shall be maintained to substantiate that all services provided met the requirements of the purchase order.

Records to be maintained include:

- NDE process records;
- NDE procedure;
- NDE procedure qualification record;
- NDE personnel certification records; and
- NDE calibration records.

7.2 NDE Reports

All final NDE shall be reported in a manner which ensures traceability and reproducibility. In addition to the classification body's requirements, the NDE report shall reference Welder ID, weld number (if applicable), drawing number and revision, part number and NOV work order/PO number (project number), and NDE procedure used, location and project.

Records required shall be maintained for 10 years after the date a procedure or qualification record is no longer used. Documents and data may be in any type of media (hard copy or electronic) and shall be:

- signed and dated;
- maintained to demonstrate conformance to specified requirements;
- legible;
- retained and readily retrievable;
- stored in an environment to prevent damage, deterioration, or loss; and
- available and auditable by the user/purchaser.

7.3 NDE Traceability

Critical welds require 100% NDE and shall be traceable to the individual part/serial number on the report and drawings.

Examined parts of welds where less than 100% extent is required, shall be marked as to where NDE is carried out.

7.4 Extent of NDE required

The extent of NDE shall include 100% of critical welds as identified in the drawings. Extent shall be in accordance with table 1 below unless otherwise specified in the drawings.

The applicable NDE procedures shall be available to inspectors in the area where the work is performed.

Table 1: Inspection Categories

NOV- US/Canada/Asia	NOV- Europe	DNV	ABS	NORSOK
Primary	Essential	Essential	Primary	Category A
Secondary	Primary	Primary	Non-Primary	Category B
Miscellaneous	Secondary	Secondary	Secondary/Miscellaneous	Category D

Inspection Category – US	Type of Weld Joints	Test Method			
		VE	MT 4)	UT	RT
Primary	Butt Welds	100%	100%	100% (See Note 1)	See Note 2
	Joints and Full Penetration Welds	100%	100%	100% (See Note 1)	See Note 2
	Partial Penetration and Fillet Welds	100%	100%	----	----
Secondary	Butt Welds	100%	20%	20%	
	Joints and Full Penetration Welds	100%	20%	----	20%
	Partial Penetration and Fillet Welds	100%	20%	---	----
Miscellaneous	Butt Welds	100%	2-5%	2-5%	
	Joints and Full Penetration Welds	100%	2-5%	----	2-5%
	Partial Penetration and Fillet Welds	100%	2-5%	----	----
VE = Visual Examination		UT = Ultrasonic Test			
MT = Magnetic Particle Test		RT = Radiographic Test			
Notes:					
1. Full or partial penetration welds loaded in tension to 70% or greater of their allowable stress, as determined by design shall be volumetrically examined as per AWS D1.1, Section 6.					
2. Percentage of NDE shall include 100% of all connections and lugs as applicable.					
3. Engineering shall be contacted for clarification on extent of classification if required.					
4. Liquid penetrant testing to be adopted for ferromagnetic materials					

Notes:

Ultrasonic inspection of all full and partial penetration welds shall include Non-Destructive Examination (NDE) Procedure for Identification of Transverse Indications.

100% RT and weld maps are required for all high-pressure piping (over 500 psi rating).

All Lugs and Pad-eyes and Handling Pad-eyes require 100% NDE. All NDE records shall reference the unique number assigned to the lug and/or pad-eye as defined in the drawings.

7.5 NDE general acceptance criteria

Acceptance criteria shall be according to specified requirements ref. Drawings and rules for the actual classification society (see P/O). If there are any doubt or mismatch between the specifications, the most severe criteria shall apply.

For visual examination, the weld quality shall comply with EN ISO 5817 - level C if not specified otherwise in the drawings.

If nothing is specified on drawings, specifications or in other ways specified from buyer the following shall apply:

Structural and Piping Non-Destructive Testing Acceptance:

Test Method	Acceptance Criteria
VE: AWS D.1.1- Latest Edition	AWS D.1.1 Sect. 6 statically loaded
MT: ASTM-E709- Latest Edition	AWS D.1.1 Sect. 6 statically loaded
UT: AWS D.1.1- Latest Edition	AWS D.1.1 Sect. 6 statically loaded
ANSI B31.3 – Latest Edition	Table K341.3.2
ASTM-A578- Latest Edition	Level II
ASTM-A898- Latest Edition	Level II

Structural and Piping Non-Destructive Testing Acceptance - PSL 2
(API 4F PSL: Product Specified Quality Level)

PSL 2: The acceptance criteria of AWS D1.1 for cyclically loaded structures applied to critical welds of masts, substructures, derricks, and crowns when specified.

8 NDE Process Requirements

The NDE service providers' NDE processes and equipment shall be documented and qualified in accordance with the criteria defined for each method in their procedures.