

GENERAL DYNAMICS
Electric Boat

SQ/08-07
February 15, 2008

- Subject: Non-Destructive Testing - Lessons Learned
- Enclosures: (1) Table I, Listing and Description of Deficiencies
(2) Distribution Chart of Noted NDT Deficiencies
- References: (a) Recommended Practice No. SNT-TC-1A
(b) MIL-STD-271F, REQUIREMENTS FOR NONDESTRUCTIVE TESTING METHODS
(c) T9074-AS-GIB-010/271, REQUIREMENTS FOR NONDESTRUCTIVE TESTING METHODS
(d) Electric Boat Standard Clause 60-67, "Nondestructive Test Procedure Approval"
(e) EB 2678/H, Quality Control Requirements For Procured Material

Dear Valued Supplier:

Continuing a practice Electric Boat started in 2005, we are publishing the results of our Non-Destructive Testing (NDT) Audit Program. The results contained in this, "Lessons Learned", letter describe the results of the audits performed by Electric Boat throughout our supplier base during calendar year 2007. The intent of this program is to assess the adequacy of the NDT programs and processes at our suppliers. In many cases we were able to identify weaknesses and when it was requested and appropriate we were able to offer assistance. The typical NDT audit would include:

Review of the qualifications of inspectors and test examiners in accordance with References (a), (b) and (c).

Review of NDT procedures, including Electric Boat approval in accordance with contract, specifically Reference (d).

Review of inspector performance.

Review of the equipment available and used during NDT inspections.

Based on this review format the deficiencies noted were grouped into the same categories.

Results:

Electric Boat performed 25 NDT audits throughout our supplier base in year 2007 and noted deficiencies at thirteen suppliers. Table I contains a complete list of the deficiencies. The table also notes the category of the deficiency, a brief description, the violation and notes the number of occurrences. Broken down by category the results are:

Procedure deficiencies or inadequacy – Total of 10 deficiencies noted at 6 suppliers.

Inspector/Level III qualification – Total of 6 deficiencies noted at 4 suppliers.

Inspector performance – Total of 18 deficiencies noted at 7 suppliers.

Equipment – Total of 4 deficiencies noted at 3 suppliers.

The methodology used to compile this data was that at each supplier where a deficiency was noted, this single deficiency, such as inspector performance may have been substantiated by multiple

75 Eastern Point Road
Groton, Connecticut 06340-4989
Phone (860) 433-3790
Fax (860) 433-3433

defects. For instance, while evaluating inspector performance, the auditor might have noted 2 or more defects, such as incorrect timing, inadequate cleaning, or evaluation of indications. In publishing this Lessons Learned Letter, we felt that a complete listing of all the individual deficiencies would be beneficial to our suppliers.

Summary:

During the out-brief session of each audit, a copy of the audit is given to the supplier and in cases where deficiencies have been noted, a Supplier Corrective Action Report (SCAR) is issued. A SCAR is a formal notification to the supplier that deficiencies were noted, and that Electric Boat expects a response containing root cause analysis, corrective action and preventive action. As noted and stated in past "Lessons Learned Letters", there is suggestive data that indicates an inherent weakness with NDT programs which contract an outside Level III Test Examiner to train and qualify inspectors. Suppliers should assure that contracted Level III Test Examiners are fulfilling all the requirements of Electric Boat contracts. Unfortunately, year 2007 NDT audits did not see a decline in deficiencies relative to inspector performance. Inspector performance can only be improved by training, auditing, re-inspection of completed work and supervision.

Recommendations:

Familiarize your Quality Assurance and NDT personnel with Electric Boat requirements such as Standard Clauses and EB2678/H.

Review your company's, "Written Practice", for compliance with References: (a), (b) and (c).

Include verification of Inspector performance in your internal audit program. NDT audits should be accomplished by a knowledgeable person, preferably a Level III Test Examiner.

Your inspectors should have a copy of the applicable NDT procedure on hand at all times during performance of NDT.

Your inspectors should be able to demonstrate their knowledge of the procedures and the applicable acceptance standards.

All equipment used for NDT acceptance, such as magnetic particle prod machines, pressure gages, thermometers, etc. must be calibrated.

When conflicts exist between SNT-TC-1A and MIL-STD-271/F or T9074-AS-GIB-010/271, the requirements of the military standards take precedent.

As new or revised NDT procedures are submitted to Electric Boat for approval, they should be in accordance with T9074-AS-GIB-010/271.

We encourage all of our suppliers to access and use our website for information. The NDT audit format that is used by our auditors is on this website and can be a useful tool for performing self-assessments.

When questions arise, remember that Electric Boat is a capable resource to help.

Very Truly Yours,

_____/S/
Nancy E. Beckwith
Manager of Supplier Quality
L6S Black Belt

75 Eastern Point Road
Groton, Connecticut 06340-4989
Phone (860) 433-3790
Fax (860) 433-3433

Table I

List Of Deficiencies

SQ/08-07
Enclosure 1
Sheet 1 of 2

DEFIENCY TYPE	NUMBER OF OCCURENCES	CLASSIFICATION
The Company's Work Practice requires evidence of inspector performance every 12 months to retain certification. This violates T9074-AS-GIB-010/271, paragraph 1.6.3 which limits duration to 9 months.	3	Procedure Inadequacy
The Company's Written Practice requires inspector's qualification records to be maintained for current qualification period only. T9074-AS-GIB-010/271, paragraph 1.6.6(d) requires maintenance of records for previous <u>and</u> current qualification period.	1	Procedure Inadequacy
The Company's Work Practice allows inspector re-certification by providing evidence of continuing performance. The requirement of T9074-AS-GIB-010/271 is that re-certification must be by examination.	3	Procedure Inadequacy
The Company's Liquid Penetrant procedure did not contain acceptance criteria in accordance with Standard Clause 60-67.	1	Procedure Inadequacy
The company's Liquid Penetrant procedure was not approved by Electric Boat in violation of Standard Clause 60-67.	1	Procedure Inadequacy
There was no evidence of Level III approval the NDT procedure as required by T9074-AS-GIB-010/271, paragraph 5.4.	1	Procedure Inadequacy
The inspector used a contaminated cloth to pre-clean the part under test during a Liquid Penetrant (LP) examination. T9074-AS-GIB-010/271, paragraph 5.6.2 requires a clean cloth to be used during this step	1	Inspector performance. (Liquid Penetrant)
The inspector did not dry wipe the part following pre-cleaning during LP examination, in violation of T9074-AS-GIB-010/271, paragraph 5.6.2.	1	Inspector performance (Liquid Penetrant)
The penetrant was not applied to ½ inch on each side of the weld under inspection, in violation of T9074-AS-GIB-010/271, paragraph 5.6.6.1.	1	Inspector performance (Liquid Penetrant)
The inspector dry wiped the part after removal of penetrant, violation of T9074-AS-GIB-010/271, paragraph 5.6.2.	2	Inspector performance (Liquid Penetrant)
Inadequate coverage with developer, of T9074-AS-GIB-010/271, paragraph 5.6.6.1. Developer applied in too thick a coating.	2	Inspector performance (Liquid Penetrant)
The inspector attempted to speed up the drying time of the developer by blowing on it in violation of T9074-AS-GIB-010/271, paragraph 5.6.7.1.	1	Inspector performance (Liquid Penetrant)
The inspector used a pre-cleaner that was not listed in their procedure. Violation T9074-AS-GIB-010/271, paragraph 5.4.2.1.	1	Inspector performance (Liquid Penetrant)
Inspector began evaluation of indications after waiting 6 minutes. T9074-AS-GIB-010/271, paragraph 5.6.7, requires a minimum of 7 minutes.	2	Inspector performance (Liquid Penetrant)

75 Eastern Point Road
Groton, Connecticut 06340-4989
Phone (860) 433-3790
Fax (860) 433-3433

Table I

List Of Deficiencies

SQ/08-07
Enclosure 1
Sheet 2 of 2

DEFIENCY TYPE	NUMBER OF OCCURENCES	CLASSIFICATION
Inspector was unable to properly evaluate and disposition indications found during LP inspection.	4	Inspector performance (Liquid Penetrant)
The inspector, "flushed the surface with water", during the penetrant removal process in violation of T9074-AS-GIB-010/271, paragraph 5.6.5.2.	1	Inspector performance (Liquid Penetrant)
The inspector performed Magnetic Particle (MT) inspection in a one directional field only. T9074-AS-GIB-010/271, paragraph 4.3.3.4.1 requires a 2 directional (minimum) field.	1	Inspector performance (Magnetic Particle)
The inspector did not use the, "continuous method", as required by T9074-AS-GIB-010/271, paragraph 4.3.3.4.3.	1	Inspector performance (Magnetic Particle)
The inspector did not observe the application and retention of the magnetic particles as required by T9074-AS-GIB-010/271, paragraph 4.4 and 4.5.	1	Inspector performance (Magnetic Particle)
Company administered Jaeger II eye examinations. T9074-AS-GIB-010/271, paragraph 1.6.6.1 requires Jaeger I test examinations as part of inspector qualification.	1	Inspector Qualification
The contracted Level III had not been administered a, "Company Specific Examination", as required by T9074-AS-GIB-010/271, paragraph 1.6.1.	2	Inspector Qualification
One inspector who was audited was noted as not being qualified throughout the entire year.	1	Inspector Qualification
The Level III annual eye examination had greater than a 12 month interval between test dates.	1	Inspector Qualification
No copies of written examinations as required by section 1.6.3 of T9074-AS-GIB-010/271.	1	Inspector Qualification
The inspector did not have weld gages available to perform Visual Inspection (VT) of welds.	1	Equipment
The inspector did not have a field direction indicator available during Magnetic Particle Inspection in violation of T9074-AS-GIB-010/271, paragraph 4.3.1.8.	1	Equipment
The pressure and temperature gages used for PT were not calibrated.	1	Equipment
The inspector did not have penetrant remover on hand during PT inspector.	1	Equipment

Totals:
 Procedure Deficiencies/Inadequacies: 10
 Inspector/Level III Qualifications: 6
 Inspector Performance: 7
 Equipment: 4

75 Eastern Point Road
 Groton, Connecticut 06340-4989
 Phone (860) 433-3790
 Fax (860) 433-3433

