# Quality Control Manual

for

| | | |
|---|---|---|
| | **Manufacture,** | **[M]** |
| | **Modification,** | **[Mod]** |
| | **Repair,** | **[R]** |
| √ | **Assembly,** | **[A]** |
| √ | **Inspection, Test, and Retest** | **[IT]** |

of

**Highway Tanks and Portable Tanks**

for the

**Transportation of Dangerous Goods by Road**

in accordance with CSA B620-14 or the most current version
(based on Transport Canada TDG regulations)

**Facility Address:** 1467 Spitfire Place Port Coquitlam BC V3C 6L4

This manual is electronically controlled, if for any reason hard copies are produced they are:
"NOT CONTROLLED IF PRINTED"

This manual must not be reproduced, distributed, amended or loaned, in whole or in part, without prior written consent of the National Quality Systems Manager or the Quality Assurance Specialist

This manual is in accordance with CSA B620-14 or the most current version (based on Transport Canada TDG regulations) and is for the following facility of National Energy Equipment Inc..

| Facility Address | Registration No. | Activities: |
|---|---|---|
| 1467 Spitfire Place Port Coquitlam<br>BC V3C 6L4 | 25-0587 | Assembly<br>Inspection, Test, & Retest |

National Energy Equipment Inc.'s National Quality System Manager ensures the quality system meets the requirements of the CSA B620-14 or the most current version.

In this manual anywhere mentioned CSA B620, it means CSA B620-14 or the most current version - (based on Transport Canada TDG regulations)

| **National Energy Equipment Inc. Authorization** | |
|---|---|
| **Approved by:** | |
| **Name:** | Zanyar Farhadi |
| **Title:** | National Quality Systems Manager |
| **Phone:** | (778) 588 7739 |
| **Email address:** | zfarhadi@nee.ca |
| **Signature:** | |
| **Date:** | |

## TABLE OF CONTENT

## TABLE OF CONTENT

## TABLE OF CONTENT

## TABLE OF CONTENT

## SECTION - 1 Scope

This manual applies to the National Energy Equipment Inc. (NEEI) facility with the registration number of 25-0587, located at 1467 Spitfire Place Port Coquitlam BC V3C 6L4, only to those Highway Transport tanks manufactured in accordance with the specifications contained in the CSA B620.

Work is including all or some of the followings: assembly, inspection, test and retest of highway tanks.

| | INSPECTIONS | | TESTS | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| TANK SPECIFICATION | EXT-ERNAL | INT-ERNAL | HYDRO-STATIC | PNEU-MATIC | LEAK | REPAIR | MANU-FACTURE | ASSEM-BLY | MODIFY | MOBILE |
| TC 406 | ☑ | ☑ | ☑ | ☑ | ☑ | ☐ | ☐ | ☑ | ☐ | ☑ |
| TC 306 | ☑ | ☑ | ☑ | ☑ | ☑ | ☐ | | | ☐ | ☑ |

| | LINING INSPECTION | UPPER COUPLER INSPECTION | FLUORESCENT MAG. PARTICLE INSPECTION | THICKNESS TEST |
|---|---|---|---|---|
| ANY TANK TYPE | ☐ | ☑ | ☐ | ☐ |

## SECTION - 2 Glossary of Abbreviations and Definitions

| | |
|---|---|
| ASME | American Society of Mechanical Engineers (generally refers to boiler and pressure vessel codes) |
| AWS | American Welding Society |
| CODE | The code or specification that the tank is built to (eg. MC 306, TC 406) |
| CSA | Canadian Standards Association |
| CSA B620 | The Canadian Standard that includes highway tank specifications and inspection and testing requirements (Revision 14 or most current version) |
| DOT | United States Department of Transportation |
| Field welding | any welding performed at locations other than the facility address |
| FRP | Fibre-reinforced plastic. |
| HAWP | Hose assembly working pressure (the anticipated working pressure of the hose assembly, which does not exceed the maximum working pressure of the hose assembly's lowest-rated component.) |
| Hot work | any work involving welding, cutting, grinding, drilling, or exposure to open flame. |
| "I" | The cargo tank marking that indicates an INTERNAL visual inspection |
| ISC | Internal Self Closing (valve) |
| "K" | The cargo tank marking that indicates a LEAK test |
| MAWP | The maximum allowable working pressure of a cargo tank as indicated on the data plate |
| MDIN | Manufactures Design Identification Number |
| MC | Motor Carrier as used in code designations (eg. MC 306) |
| NEEI | National Energy Equipment Inc. |
| "P" | lining the cargo tank marking that indicates a PRESSURE test |
| Process owner | Scott Osen, Field supervisor.<br>He is responsible for all requires documentations and the assigned activities of all inspectors, testers, and welders. |
| PSI | Pounds per square inch |
| Remount | mounting a previously certified highway tank onto a different vehicle chassis or vehicle suspension component, or a change to the original means of securement or tank mounting system. A remount is a modification. |
| Repair | returning a tank to its original design and specification by welding on the tank wall, on integral structural components of the tank such as the rollover dam, tank sill, or baffles, and on any components that contain lading. This term does not include:<br>(a) changes to motor vehicle equipment, such as lights, truck or tractor power train components, steering and brake systems, and suspension parts; |

(b) changes to appurtenances, such as fender attachments, lighting brackets, and ladder brackets;
(c) replacement of components, such as valves, vents, or fittings, with components of a similar design and of the same size and capacity; and
(d) replacement of an attachment other than an integral structural component of the tank by welding to a mounting pad.

| | |
|---|---|
| Retrofit | a change to a previously certified highway or portable tank that brings the tank into compliance with the latest revision of the specification to which the tank was originally constructed. Depending on the scope of the change, the retrofit can involve a modification of the highway or portable tank (see Modification). |
| SRV | Safety Relief Valve |
| “T” | The cargo tank marking that indicates a THICKNESS test |
| TC | Transport Canada |
| TDG | Transportation of dangerous goods |
| TCRN | Transport Canada Registration Number |
| UC | Upper Coupler |
| “V” | The cargo tank marking that indicates an EXTERNAL visual inspection |
| WPS | Weld Procedure Specification |

## SECTION - 3 Statement of Authority

This manual outlines the requirements for the activities, as detailed in Section 1. In addition, this program addresses the National Quality System Manager's responsibility, which details the support of the management of National Energy Equipment Inc. (NEEI), for administrating the quality control program and the various related standards to be used for the activities.

### 3-1 Responsibilities:

All involved personnel are totally committed to meeting the requirements of CSA B620, NEEI policies, and the quality control system outlined in this manual.

The National Quality System Manager (NQSM) is responsible for the preparation, revision, approval and issuance of the quality control manual. The NQSM and Quality Assurance Specialist (QAS) are responsible for the administration and implementation of the quality control program in the shops. Each NEEI branch's Process Owner, shall help them in accordance with the quality control program. The NQSM has the responsibility and authority to control production, and the organizational freedom to:

- Identify quality control problems;
- Initiate action, which results in solutions to those problems;
- Verify implementation of solutions to those problems; and
- Control further processing, delivery or unsatisfactory condition until proper disposition has been made.

Process Owners will be responsible for their assigned activities. They may delegate the performance of their assigned duties to qualified individuals but they shall retain the responsibility for those assigned activities.

In the event of a disagreement between the responsible person and the Process Owner, the problem shall be brought to the NQSM for resolution. Any resolution shall not negate the requirements of CSA B620, or this Manual.

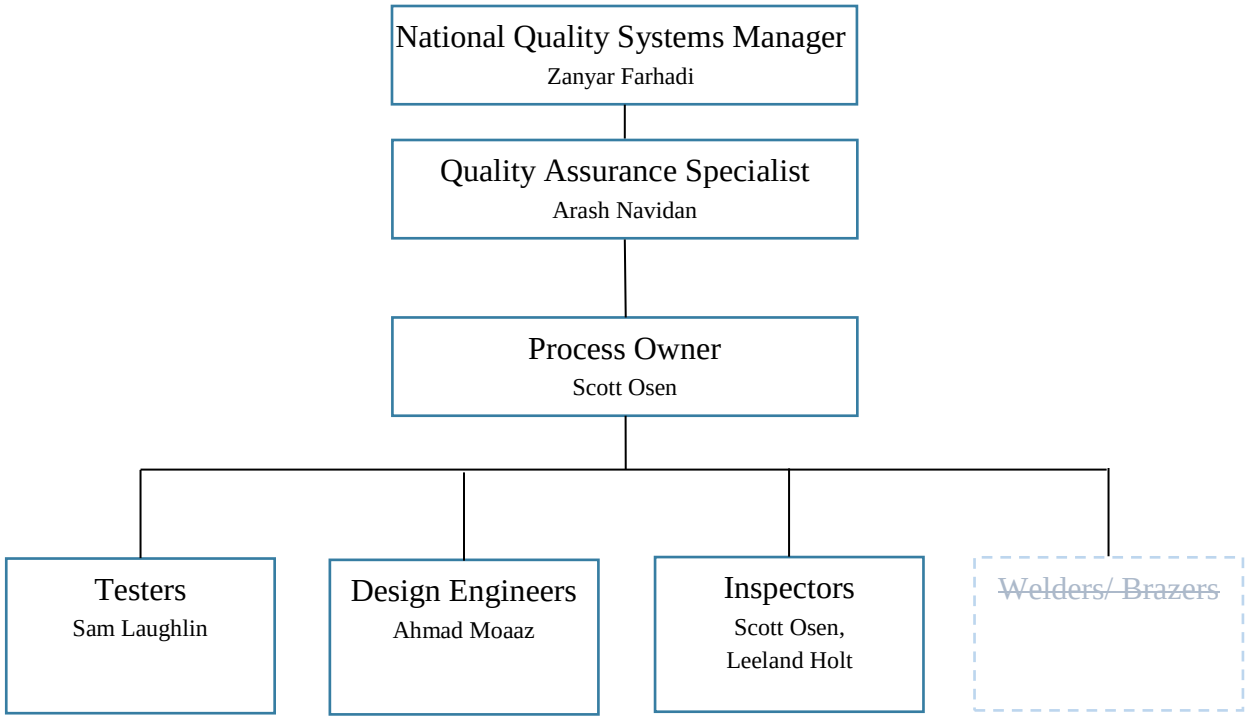
### 3-2 Codes and standards

The latest edition of codes and standards of Canadian Standards Association (CSA) which are specified in Transportation of Dangerous Goods of Transport Canada shall be applied for B620 program. Any other standards which are mentioned in Transport Canada website, also shall be used.

### 3-3 Signature

Signed: _____ Title: _____ Date: _____

## SECTION - 4 Organization Chart




## SECTION - 5 Manual Control

This Manual and its revisions shall be prepared, issued, maintained, and approved by the National Quality System Manager. The approval and acceptance of the National Quality System Manager are shown on each page of the manual.

This Manual shall be reviewed at least once a year at the management review meeting to ensure all procedures are current and in conformance with CSA B620 or most current version and be revised at that time if required.

If revisions are required to this Manual they shall be implemented at the date the changes in regulation take effect. The only controlled copy of the latest revision of Manual is placed in NEEI's intranet.

Revision shall be described in the revision control sheet (section22) and noted on the Table of Contents and each page of the Quality Control Manual.

The National Quality System Manager shall issue, distribute and maintain copies of this Quality Control Manual and its revisions. The same person is responsible for removal of superseded versions from circulation.

## SECTION - 6 Drawing and design control

Drawings, where required, shall be provided either by the equipment supplier, original equipment manufacturer, outside engineering sources or the Process Owner.

Approval of designs, design changes and where drawings effect a change in design shall be approved by a Registered Design Engineer.

Design of a new tank or modification to a tank, the issuance of an MDIN and/or TCRN, and the application process for a TCRN shall be reviewed and approved by the Process Owner.

The latest revision of all designs, drawings, and changes shall be used and the older revisions shall be superseded.

The calculations and drawings illustrating the design shall be signed by the Design Engineer to indicate that the design has been reviewed and approved; and one of the following shall apply:

- the calculations and drawings shall also be marked with the printed name of the Design Engineer, his or her registration number, and the MDIN; or
- a record shall be maintained listing all calculations, applicable drawings, and revision numbers used in a design. This record shall include the printed name of the Design Engineer, his or her signature, his or her registration number, and the MDIN.

For all specification tanks, NEEI shall retain the calculations and drawings for not less than 20 years after the date of assembly, or modification of the last tank of that design.

The process owner has to ensure that currently authorized drawings or designs are performed by the appropriate personnel and are in line with the requirements of CSA-B620. He is responsible for the proper approval of designs , design changes, and for reviewing the design of a new tank or a modification to a tank, the issuance of an MDIN and/or TCRN, and the application process for a TCRN, if applicable.

All drawings, calculations and design packages shall be kept in the facility based on the document control system of the facility. Electronic copy of Design packages shall be saved in NEEI online storage. In the document control system, documents process owner ensures that all designs, changes, and revisions are authorized and that only the currently authorized drawings or designs are used.

## SECTION - 7 Manufacture NA

Manufacture is the fabrication of any components that contain lading such as piping and welding on integral structural components of the tank, i.e. the tank sill. This does not include Assembly, which is covered in Section 8 of this Manual.

All highway tanks purchased for Manufacture shall only be purchased from a facility registered with Transport Canada to perform the manufacturing function.

The person performing the process shall ensure that all precautions are taken to ensure that there is no hazard to the personnel performing it or to persons in the general vicinity. In this regard please follow NEEI's hazard assessment documents including but not limited to Confined space entry permit, program and procedures.

### 7-1 Scope of work and authorizations

The tank manufacturer must follow CSA standards, TDG Regulations and Certificate of Authorization which are held by each facility (ASME, provincial pressure vessel jurisdiction, National Board of Boiler and Pressure Vessel Inspectors).

### 7-2 Design review

All preparation, revision, and distribution control of drawing, designs, documents and records shall comply with the requirements of Drawing and Design Controls Section 6.

### 7-3 Inspection and testing

The Process Owner is responsible for the inspection and testing required on completion of the manufacturer. All applicable type of inspections and tests shall be performed prior to certification and delivery of a highway or portable tank in the facility.

On product-retaining components pneumatic retesting and inspection shall be required prior to further use of the tank. For the process, the Test and inspection travel sheet (Form No. NEE-FRM-011) shall be used. The inspection and testing will be carried out in the facility where the manufacture has been performed.

The inspection and testing program for manufacture shall be the same as described in the Inspection and Testing Control Procedure in Section 12.

### 7-4 ID plate and other required markings

Any tank wholly, or partially, manufactured by NEEI must be accompanied by a specification plate information sheet (Form No. NEE-FRM-003) and a Certificate of Compliance for New or Assembled Tanks (Form No. NEE-FRM-004) that is in a format authorized by the Transport Canada Dangerous Goods Directorate. This will be completed by NEEI as far as the work has been completed.

The Process Owner shall ensure that a metal identification plate is permanently affixed to the tank or its supporting structure either by brazing or welding around its perimeter, or with tamper resistant fasteners on the left side of the tank, near the front, in a place readily accessible for inspection. The plate may also be attached to a mounting pad welded directly to the tank, but not to the bodywork or skirting.

~~The final assembler has marked the TC specification and completion and certification date on the plate.~~

## ~~7-5 Tank Certification~~

~~The Process Owner shall ensure that NEEI has fulfilled the responsibility of issuing a Certificate of Compliance for New or Assembled Tanks (Form No. NEE-FRM-004) to the Owner for all manufactured and/or modified highway tanks in accordance to CSA B620 at or before the time of delivery.~~

~~The requirements of the specification that has yet to be met must be indicated on the Certificate of Compliance for New or Assembled Tanks (Form No. NEE-FRM-004) and the Metal Identification Plate (Form No. NEE-FRM-004) may be affixed without the TC specification mark and the completion and certification date. The TC specification mark and completion and certification date shall not be applied until the tank is complete and all requirements of the CSA B620 standard have been met.~~

~~If NEEI does not complete the construction of a tank, the certification must be completed in accordance with the requirements of Clause 8 of CSA B620 for all construction that has been completed.~~

~~If further construction of the tank is to be performed, NEEI shall identify the items of further construction on the Certificate of Compliance for New or Assembled Tanks (Form No. NEE-FRM-004).~~

~~NEEI as a final assembler shall be responsible for ensuring that all certification have been completed in compliance with CSA B620.~~

## ~~7-6 References~~

- ~~Confined space entry permit, program and procedures (See 21.1)~~
- ~~NEE-FRM-001 Metal identification plate stamping (See 21.1)~~
- ~~NEE-FRM-003 Specification plate information sheet for recertified tanks (See 21.1)~~
- ~~NEE-FRM-004 Certificate of compliance for new & assembled tanks (See 21.1)~~
- ~~NEE-FRM-011 Test and inspection travel sheet (See 21.1)~~

## SECTION - 8 Assembly

Assembly is the portion of the fabrication process of a highway tank that does not involve welding on the tank wall, welding on integral structural components of the tank (rollover dam, tank sill, baffles), and welding on any components that contain lading such as piping.

Assembly includes any of the following functions that are necessary to meet the specification requirements prior to the certification of a highway tank:

A) The fabrication and installation of component parts of a highway tank.

B) The mounting of one or more tanks onto a vehicle chassis or onto a vehicle suspension component.

All highway tanks purchased for assembly shall only be purchased from a facility registered with Transport Canada to perform the manufacturing function.

The person performing the process shall ensure that all precautions are taken to ensure that there is no hazard to the personnel performing it or to persons in the general vicinity. In this regard please follow NEEI's hazard assessment documents including but not limited to Confined space entry permit, program and procedures.

### 8-1 Scope of work and authorizations

The assembly of tanks is done in accordance with an approved design provided by the manufacturer; and the design of a portion of the assembly of a highway or portable tank.

All required assembly processes including but not limited to mounting tanks and installing fittings are done in accordance with the version of CSA B620 that is in force under the TDG Regulations and with the version of the ASME Code that is referenced in CSA B620. Assembly design drawings, calculations, and specifications, as applicable shall be prepared by NEEI if not provided by the manufacturer.

### 8-2 Design review

All preparation, revision, and distribution control of drawing, designs, documents and records shall comply with the requirements of Drawing and Design Controls Section 6.

### 8-3 Inspection and testing

The Process Owner is responsible for the inspection and testing required on completion of the assembly. All applicable type of inspections including but not limited to visual test, leakage test (if applicable), and pressure test (if applicable) are performed prior to certification and delivery of a highway or portable tank in the facility. On product-retaining components pneumatic retesting and inspection shall be required prior to further use of the tank. For the process, the Test and inspection travel sheet (Form No. NEE-FRM-011) shall be used. The inspection and testing will be carried out in the facility where the assembly has been performed.

## 8-4 T ID plate and other required markings

Any tank wholly, or partially, assembled by NEEI must be accompanied by a Specification plate information sheet (Form No. NEE-FRM-003) and a Certificate of Compliance for New or Assembled Tanks (Form No. NEE-FRM-004) that is in a format authorized by the Transport Canada Dangerous Goods Directorate. This will be completed by NEEI as far as the work has been completed. Assembled tanks shall not be marked unless satisfactory pass mentioned inspections and tests.

The Process Owner shall ensure that a metal identification plate (Form No. NEE-FRM-001) is permanently affixed to the tank or its supporting structure either by brazing or welding around its perimeter, or with tamper resistant fasteners on the left side of the tank, near the front, in a place readily accessible for inspection. The plate may also be attached to a mounting pad welded directly to the tank, but not to the bodywork or skirting. The Process Owner also shall ensure that other required markings and decals has been done properly in accordance with CSA B620.

The final assembler has the responsibility to inscribe and mark the TC specification, and completion or/and certification date on the plate.

## 8-5 Tank Certification

The Process Owner shall ensure that NEEI has fulfilled the responsibility of issuing a Certificate of Compliance for New or Assembled Tanks (Form No. NEE-FRM-004) to the Owner for all manufactured and/or modified highway tanks in accordance to CSA B620 at or before the time of delivery

The requirements of the specification that has yet to be met must be indicated on the Certificate of Compliance for New or Assembled Tanks (Form No. NEE-FRM-004) and the metal identification plate may be affixed without the TC specification mark and the completion and certification date. The TC specification mark and completion and certification date shall not be applied until the tank is complete and all requirements of the CSA B620 standard have been met.

If NEEI does not complete the construction of a tank, the certification must be completed in accordance with the requirements of Clause 8 of CSA B620 for all construction that has been completed

NEEI as a final assembler shall be responsible for ensuring that all certification have been completed in compliance with CSA B620

## 8-6 References

- Confined space entry permit, program and procedures (See 21.1)
- NEE-FRM-001 Metal identification plate stamping (See 21.1)
- NEE-FRM-003 Specification plate information sheet for recertified tanks (See 21.1)
- NEE-FRM-004 Certificate of compliance for new & assembled tanks (See 21.1)
- NEE-FRM-011 Test and inspection travel sheet (See 21.1)

## SECTION - 9 Modification NA

Modification is a change to the original design of a previously certified highway tank that affects its structural integrity or lading retention capability including, but not restricted to remounts, tank re-barreling, and tank stretching. Also is change to the design of the rear-end protection or accident damage protection or change to the size or ratings of piping, fittings and closures.

### 9-1 Scope of work and authorizations

All required modification processes are done in accordance with the version of CSA B620 that is in force under the TDG Regulations and with the version of the ASME Code that is referenced in CSA B620. Modifications which performed are including but not limited to: remounts, tank rebarrelling, tank stretching, a change to the design of the rear-end protection or accident damage protection, and a change to the size or ratings of piping, fittings, and closures. Assembly design drawings, calculations, and specifications, as applicable shall be prepared by NEEI if not provided by the manufacturer.

For all tanks that require modification, the person performing the process shall ensure that all precautions are taken to ensure that there is no hazard to the personnel performing it or to persons in the general vicinity. In this regard please follow NEEI's hazard assessment documents including but not limited to Confined space entry permit, program and procedures.

### 9-2 Design review

All preparation, revision, and distribution control of drawing, designs, documents and records shall comply with the requirements of Drawing and Design Controls Section 6.

### 9-3 Inspection and testing

The Process Owner is responsible for the inspection and testing required on completion of the modification. All applicable type of inspections and tests shall be performed prior to certification and delivery of a highway or portable tank in the same facility location which modification is performed.

On product-retaining components, pneumatic retesting and inspection shall be required prior to further use of the tank. If product-retaining components of piping have been modified or repaired, a leak test shall also be required. For the process, the Test and inspection travel sheet (Form No. NEE-FRM-011) shall be used.

The inspection and testing program for modification shall be the same as described in the Inspection and Testing Control Procedure in Section 12.

### 9-4 ID plate and other required markings

Any tank wholly, or partially, modified by NEEI must be accompanied by a Specification plate information sheet (Form No. NEE-FRM-003) and a Modification certificate of compliance (Form No. NEE-FRM-005) that is in a format authorized by the Transport Canada Dangerous Goods Directorate. This will be completed by NEEI as far as the work has been completed.

A modified tank shall be marked with an additional identification plate, titled "Modification Plate" only after successful testing. The Process Owner shall ensure that a Modification plate stamping (Form No. NEE-FRM-002) is permanently affixed to the tank or its supporting structure either by brazing or welding around its

perimeter, or with tamper resistant fasteners on the left side of the tank, near the front, in a place readily accessible for inspection. The plate may also be attached to a mounting pad welded directly to the tank, but not to the bodywork or skirting.

The final assembler has marked the TC specification and completion and certification date on the plate.

### 9-5 Tank Certification

The Process Owner shall ensure that NEEI has fulfilled the responsibility of issuing a Modification certificate of compliance (Form No. NEE-FRM-005) to the Owner for all modified tanks in accordance to CSA B620 at or before the time of delivery

The requirements of the specification that has yet to be met must be indicated on the Modification certificate of compliance (Form No. NEE-FRM-005) and the metal identification plate may be affixed without the TC specification mark and the completion and certification date. The TC specification mark and completion and certification date shall not be applied until the tank is complete and all requirements of the CSA B620 standard have been met.

The following requirements for a Certificate of Compliance shall apply:

(a) On delivery of a tank, the registered facility shall issue a Certificate of Compliance to the tank purchaser or owner.

(b) A Certificate of Compliance shall be filled (Form No. NEE-FRM-005);

(c) A copy of the Certificate shall be retained for a minimum of 20 years from the date of delivery.

(d) The Certificate shall be retained by the owner or the owner's designate throughout the ownership of the tank, and a copy shall be retained for at least one year thereafter.

### 9-6 References

- Confined space entry permit, program and procedures (See 21.1)
- NEE-FRM-002 Modification plate stamping (See 21.1)
- NEE-FRM-003 Specification plate information sheet for recertified tanks (See 21.1)
- NEE-FRM-005 Modification certificate of compliance (See 21.1)
- NEE-FRM-011 Test and inspection travel sheet (See 21.1)

## SECTION - 10 Repairs NA

### 10-1 Scope of work and authorizations

Repair to tank is any activity include welding/ brazing to a tank wall or lading retention and integral structural component (rollover dam, tank sill, baffles), or any other activity which returns a tank to its original design and specification, or retrofits a tank to the latest revision of the specification to which the tank was originally constructed. (Not all retrofits can be considered as repair, some may be modifications)

For all tanks that require repairs, the person performing repairs shall ensure that all precautions are taken to ensure that there is no hazard to the personnel performing the repairs or to persons in the general vicinity. In this regard please follow NEEI's hazard assessment documents including but not limited to Confined space entry permit, program and procedures.

A repair may not be work that is foreseen. The occurrence and the need for repair may be required during periodic inspections, modifications, or assembly. As such, these unforeseen occurrences of repair work shall be reviewed on a per case basis by the process owner.

Before starting work, the process owner shall ensure that warranty by the original manufacturer is not in effect. If it is, approval from the original manufacturer must be obtained.

All repairs shall be in accordance with the requirements of CSA B620 and the current edition of ASME Section VIII Division 1 at the time of the repair, with the exception of the following:

- Tanks will not be repaired or altered in a way that may cause an increase in the probability of leakage or cracks by areas of stress concentration due to shrinkage of cooling metal, and shall not be repaired with overlay-type patches.

Repairs of TC 406 Crude and any FRP Highway tanks (including piping) are not authorized.

All materials used in the repair of tank shell and heads shall be purchased and controlled in accordance with Section 11 of this Manual.

Materials used to repair tank shell or heads shall be identical to the material on the Identification Plate of the tank being repaired, unless specifically authorized by the Engineering Manager and with approval of a Registered Design Engineer. Where this results in a modification to the tank it shall be performed in accordance with Section 9 of this Manual.

Any welding/ brazing performed during the repair process shall be performed in accordance with Section 15 of this Manual.

Any Manhole Cover, Vent or valve directly attached to the tank or manhole cover shall be replaced with the identical components unless specifically authorized by the Service Manager. Where replacement effects a change in design they shall be approved by a Registered Design Engineer. Where this results in a modification of the tank it shall be performed only at a facility registered with Transport Canada for this scope.

When repair is complete it shall be recorded on the Repir Report (NEE-FRM-006)

## 10-2 Inspection and testing

Upon completion of repairs, the Process Owner shall ensure the tank is inspected and tested for repair in the facility. On product-retaining components, pneumatic retesting and inspection in the facility shall be required prior to further use of the tank. If product-retaining components of piping have been modified or repaired, a leak test shall also be required in the facility. The inspection process shall be the same as described in the Inspection and Testing Control Procedure in Section 12.

For inspection of repairs, the nature and severity of defects found should be stated, if any, and by what method the damage or defect was discovered. In particular, information shall be furnished to indicate the location of defects detected. If no defect or damage was discovered, that fact shall be reported.

Required markings are to be installed only after successful tests in accordance with Section 13 of this Manual.

Upon completion of any repairs, the facility shall prepare a repair report included in 'Test and inspection report' or 'welding inspection report'.

## 10-3 References

- Confined space entry permit, program and procedures (See 21.1)
- NEE-FRM-006 Repair Report (See 21.1)
- NEE-FRM-013 Welding Inspection Report (See 21.1)

## SECTION - 11 Material Control

This section describes the requirements for provision of materials to be used in manufacture, modification, repair, or assembly of TC highway tanks and portable tanks, and outlines the system for purchase, receipt, identification and maintaining traceability of Code material to ensure compliance with the CSA B620 and the ASME Codes and design specifications.

All material receiving, identification and Code requirements defined in this section apply to Owner-supplied material as well. When the Owner supplies material, it shall be checked by the Process Owner upon receipt against the Owner's material list.

Material that is defective, damaged or otherwise not in compliance with the code of construction shall be considered non-conforming and handled in accordance with Section 14 of this Manual.

Any material substitutions shall be referred back to the Design Engineer for approval. For TC331 tank, approval from a Design Review Agency may be required.

Material will be stored in a location designated for controlled material only.

Upon receipt of materials, Process Owner shall:

1) Verify that materials are in conformance with requirements of purchase order,

2) Ensure that the Mill Test Report (MTR) matches the material and the Purchase Order, and is in compliance with the design specifications, drawings, and ASME. Section II for Chemical and Mechanical Properties. The Process Owner shall indicate this by initialing the MTR.

3) Ensure that all specified tests were performed and the material specification, grade, heat number, and slab numbers are legible and coincide with that of the MTR,

4) Ensure that the MTR or copies of, are placed in the Job File.

5) Ensure that mill test results conform to ASME Section II requirements and indicate acceptance by signature and date on the Mill Test Reports.

## SECTION - 12 Inspection and testing – Examination

For each tank design, all drawings, design calculations, and specifications shall be in accordance with CSA B620, and selected by B621 or B622 Standards (the most current version),

As applicable, NEEI plans and carries out production and service provisions under controlled conditions. Controlled conditions include:

1) the availability of information that describes the characteristics of the product,

2) the availability of work instructions, as necessary,

3) the use of suitable equipment,

4) the availability and use of monitoring and measuring devices,

5) the implementation of monitoring and measurement activities, and

6) the implementation of product release, delivery and post-delivery activities.

The Inspector shall have free access to such parts of all plants involved in the repair/modification. These shall include, but shall not be limited to the following:

a) Shop (Plant)

b) Quality Control Manual

c) Warehousing

The Process Owner shall be responsible for:

1) Ensuring that all required examinations and inspections are performed in compliance with the current edition of CSA B620 and TDG regulations and shall ensure that these examinations and inspections are done in accordance with approved procedures,

2) Collecting all related documentation such as design changes, calculations, specifications, repairs, examination and test reports, travel sheets into the Job File for each Highway Tank being recertified,

3) Maintaining the Job File (by job number and/or serial number).

4) Inspection prior to assembly of a new Tank, or reassembly of a modified tank,

5) Collecting the Manufacturer’s Partial Certificate of Compliance, plus any test reports generated during manufacture or modification, and verify that all functions have been completed.

6) Maintenance of reports and certificates to be kept in the Job File and final copies issued to tank owner.

For all tanks that are to be inspected or tested, the inspector or tester shall ensure that all precautions are taken to ensure that there is no hazard to personnel performing the inspection and test.

Prior to any examination or inspection being performed, each tank shall be cleaned and decontaminated.

## 12.1 Inspection Program

All tanks shall be inspected and tested in accordance with CSA-B620 subject to the annotations to the tables. (Section 21.1)

The inspection reports shall be documented on the Test and Inspection Report (Form No. NEE-FRM-007).

### 12.1.1 Periodic and obligatory inspection and testing.

Periodic inspection and test intervals are based on tables 7.1 and 7.2 of CSA-B620. (Section 21.1)

If more than one test or inspection interval is prescribed for a given tank in a particular service, then the shortest interval shall apply. The due dates for the first periodic retest and inspection are measured from the original test and inspection date marked on the tank, or if no test date is marked, the certification date.

In addition to the periodic retesting or inspection requirements, hydrostatic or pneumatic retesting and inspection shall be required prior to further use if:

1) a tank shows evidence of bad dents, corroded or abraded areas, leakage, or any other condition that might render the tank unsafe for transportation service;

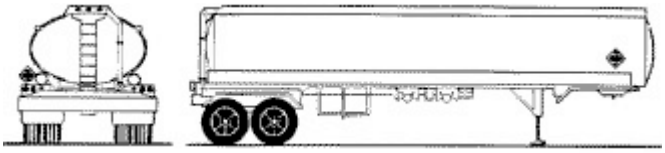
2) the tank has been involved in an accident in which it may have been dented, torn, or otherwise damaged so as to affect its lading retention capability;

3) the tank has not been used for transporting dangerous goods for 1 year or more; or

4) the tank is new or modified from its original design, and the modification involves work on product-retaining components.

## 12.2 External Visual Inspection (V) - Typical interval is every year (annually)

### 12.2.1 Highway tanks for the transportation of dangerous goods other than liquefied compressed gases TC406, Older version:TC306



Highway tank for flammable liquids and low hazard chemicals (e.g. gasoline, diesel);
Steel or aluminum shell or reinforced plastic (FRP tanks is not in the scope);
MAWP between 18 and 28 kPa (2.65 and 4 psi);
If transporting crude, MAWP between 18 and 100 kPa (2.65 and 14.7 psi);

1) Inspect all tank markings for legibility. Markings must not be faded, defaced or torn.
2) Inspect to ensure that all information on the tank data plate are concise and legible. If data plate or on the tank is illegible or information is incomplete, note on the Inspection Report and reject tank. For complete list of the required information, refer to 'Required information on the Identification Plate checklist'.
3) Inspect to ensure each manhole cover is permanently marked with
    a. the manufacturer's name;
    b. the test pressure — XXX kPa (psi); and
    c. a statement certifying that the manhole cover meets the testing requirements of
        i. clause 5.6.6 of CSA B620; or
        ii. §178.345-5 of 49 CFR
4) Inspect entire exterior surface area including heads for signs of corrosion, abrasion, gouges, dents or repairs made using overlay patches. Inspect surfaces of all welds for signs of defects or cracks visually by checking with hand and using flashlight if needed, especially in areas around tank nozzles.
5) Corroded or abraded areas of the tank shell will be thickness tested.
   Measure with the thickness tester: 1. Remove rubber cap from probe; 2. Single drop of couplant (Gel) must be applied to the surface to be tested; 3. Zero the probe according to the manufacturer instructions; 4. Place the probe flat on the surface and use moderate pressure to press against the top of the probe with the thumb or index finger and read the result on the display, which shall be indicated on, or attached to the report.
6) Ensure manhole tightening devices are operative, and the covers are leak-tight, with no signs of product stains.
7) Ensuring proper functioning of all valves, vents, and emergency devices, including pressure relief valves, self-closing stop-valves, excess-flow valves, and remote closure devices, and connections are properly identified (emergency closure, liquid and vapour, etc.) ensuring that they are free of corrosion, distortion, or any other damage that would prevent their normal operation.

8) All reclosing pressure relief valves (PRV):
   - Shall be externally inspected for any corrosion or damage that might prevent their safe operation.
   - On tanks that carry lading corrosive to the valves, either replace or test to ensure that they open at the required set to discharge pressure for the tank's MAWP and reseat them to a leak-tight condition at not less than 90% of that pressure, or to the re-seat pressure prescribed for the tank specification.

9) Ensuring that all bolts or nuts on any flanged connection or blank flange are in place and properly tightened by checking with a proper wrench.

10) Ensuring that all major appurtenances, piping, attachments, connecting structures, and those elements of the upper coupler assembly (if applicable) that can be inspected without dismantling the assembly are not damaged or corroded so as to affect safe operation of the vehicle.

11) If upper coupler is due for removal, drop upper coupler and inspect areas covered by upper coupler for corrosion, abrasion dents, distortion, weld defects or any other condition that might render the tank unsafe. Inspect upper coupler area for cracks or distortions.

12) Ensure that hose assemblies mounted on or accompanying the tank do not display any defects, have legible markings, and where required, have been pressure tested, indicating that they were pressure tested.

13) Ensure any void drains are unplugged and inspect for signs of product residue or leakage.

14) Ensure that all bolts used to secure tank to the frame are present. Use a proper wrench to confirm bolts are tight.

15) Rollover protection facilities are properly installed on the tank. The welding of any appurtenance to the shell or head must be made by attachment of a mounting pad.

16) Bumpers of the cargo tank is properly installed to the specified dimensions, and it will successfully absorb the impact of the vehicle with rated payload. The clearance between the effective bottom of the bumpers or devices and the ground is less than 76cm (30in) when the vehicle is empty;

17) The original metal identification plate in any condition shall not be removed.

18) When the metal ID plate is illegible or missing, a replacement metal ID plate shall be installed as per the following procedure in accordance with clauses 7.7.2, 7.7.3, and 7.7.4 of CSA-B620-14:

18-1) Supporting document: The original or replacement Certificate of Compliance shall be obtained prior to installation of the replacement plate. If no documentation can be obtained, a replacement plate shall not be applied. The facility who is installing the replacement plate is responsible for verifying that the tank in its present condition meets the specification to which it was originally certified and is indeed the tank listed in the supporting document obtained.

18-2) Installation: The re-stamping of the plate shall be done by the tank's original manufacturer or assembler, or his/her representative. When the original tank manufacturer or assembler is no longer able to provide the replacement plate, it shall be stamped and installed by this facility in accordance with clauses 5.1.6.1.1, 5.1.6.1.3, and 5.1.6.1.4 of CSA-B620-14.

The replacement plate shall be marked "Replacement" and contain all of the information that appeared on the original plate or as a minimum the items originally specified in the version of CSA-B620 standard in effect at the time of the tank fabrication (See section 21.1.27 'Required information on the ID plate checklist'). It shall also include the name and registration number of the facility installing the plate and the date of the installation. It shall be installed as near as possible to the original metal ID plate. The requirements of 18-3 apply to these procedures and are continued on the next item.

18-3) Form: Metal identification plate replacement form, NEE-FRM-008, (See Section 21.1.8) shall be completed and signed by the compliance officer at the facility and by the tank owner. This form and a copy of the metal ID plate image shall be kept by the owner or the owner's designate throughout the ownership of the tank. A copy of that shall be retained for at least 1 year thereafter. Copies shall be retained by the facility installing the plate for a minimum of 20 years from the date of delivery.

19) Ensure that the tank is equipped with one or more dry chemical fire extinguishers accessible from the ground, with a combined total effective rating of not less than 40BC. Each of them shall be recharged immediately after each use.

20) Ensure that the tank is equipped with an automatic engine air intake shut off device that prevent engine runaway in case of exposure to flammable vapours. The device shall activate automatically if engine runaway is detected and remain activated until manually reset.

21) In addition to the rejection criteria (as stated in Clause 7.2.1.8 of CSA B620), reject the tanks when the following defects are found during an external inspection:

- When the thickness remaining under a cut, dig, or gouge is either below the minimum thickness specified on the nameplate; or
- Any dent with a depth of more than 12.7 mm (0.5 in) where it includes a weld;
- Any dent with a depth of greater than 10% of the length of the dent,
- Any weld defect, including a crack, pinhole, or incomplete fusion of the weld;
- Any structural defect; and
- Any source of leakage, or
- Repairs made to liquid-retaining components using overlay patches.
- When any noted CSA B620 design requirements are not met such as impact protection or rear bumper restrictions, etc.

22) Ensure all outlets, valves, closures, piping, or any devices that if damaged in an accident could result in a loss of lading, are protected by accident damage protection.

**This page in intentionally left blank**

**This page in intentionally left blank**

**This page in intentionally left blank**

**This page in intentionally left blank**

**This page in intentionally left blank**

**This page in intentionally left blank**

**This page in intentionally left blank**

**This page in intentionally left blank**

**This page in intentionally left blank**

**This page in intentionally left blank**

**This page in intentionally left blank**

**This page in intentionally left blank**

**This page in intentionally left blank**

**This page in intentionally left blank**

**This page in intentionally left blank**

**This page in intentionally left blank**

**This page in intentionally left blank**

**This page in intentionally left blank**

**This page in intentionally left blank**

## 12.3 Internal Visual Inspection (I) - Typical interval is every five years

Only trained personnel familiar with NEEI confined space code of practice will enter the tank to perform the Internal Visual Inspection.

1) Inspect entire interior surface area including tank shell, heads, and baffles for signs of corrosion or pitting, gouges, cracks, dents, distortion, or repairs made using overlay patches. Corroded or abraded areas of the tank shell will be thickness tested and the results of the thickness test shall be indicated on, or attached to the report.
Measure with the thickness tester: 1. Remove rubber cap from probe; 2. Single drop of couplant (Gel) must be applied to the surface to be tested; 3. Zero the probe according to the manufacturer instructions; 4. Place the probe flat on the surface and use moderate pressure to press against the top of the probe with the thumb or index finger; and read the result on the display, which shall be indicated on, or attached to the report.

2) Inspect area above upper coupler, landing gear legs and running gear sub frame for indications of distortion or cracks.

3) Inspect surfaces of welds for signs of defects or cracks, particularly around tank nozzles, such as sumps and manholes.

4) Inspect welds for signs of cracking, especially on previous repair welds.

5) In tanks with baffles, check baffle to shell welds, paying close attention to areas above tank. Inspect areas around all baffle openings for signs of distortion or cracks.

6) Inspect internal supports and attachments where installed, for indications of distortion or cracking and any attachment fasteners for tightness.

7) If mechanically operated venting is installed, inspect connecting rods and attachments. Inspect internal valves, internal piping and operable vents for proper function.

8) Inspect valves, seats, gaskets and mating surfaces for corrosion or damage (including valve, where installed), and for any foreign matter in valves and sumps.

9) If tank has lining, note on inspection report “Lining to be inspected by a facility registered with Transport Canada for this scope”.

10) Indicate all defects found and methods used to repair on the Test and Inspection Report (Form No.: NEE-FRM-007) in accordance with clause 7.3 of CSA B620.

The criteria for rejections of tank condition:

- When the thickness remaining under a cut, dig, or gouge is below:
  - the minimum thickness specified on the nameplate;
  - for MC/TC306, MC/TC307 and MC/TC312 tanks, with no thickness specified on the nameplate, the “in service minimum thickness” specified in Table 7.4 or 7.5 of CSA B620.
  - for other tanks, with no minimum thickness specified on the nameplate, 10% less than the nominal thickness

- Any dent with a depth of more than 12.7 mm (0.5 in) where it includes a weld,
- Any dent with a depth of greater than 10% of the length of the dent,
- Any weld defect, including a crack, pinhole, or incomplete fusion of the weld,
- Any use of overlay patches
- Any structural defect; and
- Any source of leakage.

### 12.4 Upper Coupler Area Inspection (UC) - Typical interval is every five years

Areas covered by the upper coupler (fifth wheel) or turn table assembly shall be inspected for corroded or abraded areas, cracks, dents, distortions, defects in welds, and any other condition that might render the tank unsafe for use in transportation.

The upper coupler assembly shall be removed for the upper coupler area inspection. The turntable assembly does not need to be removed if the areas of the tank where it is attached are clearly visible for inspection.

A written Test and Inspection Report (Form No.: NEE-FRM-007) in accordance with clause 7.3 of CSA B620.

### 12.5 Leakage Test (K) - Typical interval is every year (annually)

The tank shall successfully pass an External Visual Inspection prior to performing this test and if this test is being conducted at the frequency a pressure re-test is due, the pressure re-test shall be conducted first.

All product piping valves and accessories shall be in place with the exception of any normal breathing vents (vents set to release at less than test pressure), which shall be rendered inoperative.

Test pressure shall be not less than 80% of the tank design test pressure or MAWP, whichever is less, and marked on the certification plate, except if a tank with a MAWP of 690 kPa (100 psig) or more is used in dedicated service or services, the test pressure shall be the maximum normal operating pressure of the tank.

1) Put in place a Pressure Safety Relief valve and set at MAWP.

2) Test each valve and closure in sequence, with the tank laden under normal operating conditions

3) Close internal valve and open manifold valve (if equipped) and all other valves in discharge line, including external valve.

4) Ensure any adjacent compartments and void spaces are empty and open to atmosphere i.e. double walled tanks.

5) Fill compartment with enough test medium to cover the valve sump and fill the piping. Close all remaining openings.

- One of the following shall be used as the test medium:

  (i) the normal lading of the tank;

  (ii) a less hazardous lading of equal or less viscosity;

  (iii) water;

  (iv) inert gas;

  (v) air; or

  (vi) vacuum.

  Note: When using air as a test medium, the tester should be aware of the need for proper purging and ensure that there is no possibility of creating a mixture of product and air within the explosive limits of the product.

6) Pressurize the tank to the correct pressure with regulated air. Once the test pressure is reached shut off the supply. Hold the tank pressurized for 5 minutes. Test pressure must hold with a 0 psig pressure drop. If a tank is in dedicated service and over 100 psi the normally lading of the product will be used at the maximum of the normal operating pressure. MC 330, MC 331 or TC 331 in LPG or NH3 service shall be tested at no less than 60 PSI.

7) With tank under pressure, check all weld seams with soap and water mix. check for signs of any leakage. Inspect gaskets at internal valves and manhole covers, and venting devices.

8) Close first valve or closure in discharge system and open internal valve, leaving all other valves in discharge line open including external valve. Adjust pressure to the correct pressure for the tank being tested and shut off the supply. The piping and the first valve in discharge system will now be pressurized in addition to the tank shell; test pressure must hold with a 0 psig drop. Hold the pressure for 5 minutes.

9) Repeat the above procedure (8) for each valve and closure in discharge line, until all valves and closures have been tested. If piping includes pumps and meters these should be tested at the tank leak test pressure in sequence with the immediate downstream valve or closure closed and all upstream valves and closures open. Carefully inspect all joints in pumps and meter for signs of leakage. If piping system includes hose reel, unreel the hose to its full length and carefully inspect hose connections for leakage.

10) Relieve pressure in tank and ensure normal breathing vent is returned to operative status.

11) Indicate all defects found and methods used to repair on the Test and Inspection Report (Form No.: NEE-FRM-007) in accordance with clause 7.3 of CSA B620.

12) All leaks to be repaired prior to marking tank.

13) During the test, precautions shall be taken to prevent overpressurization of the tank as follows:

- Using manometer for testing in the shop or using air dryer/ filter for mobile testing between the source of supply and the gauge.

## 12.6 Thickness Test (T) NA

## 12.7 Pressure Tests (P) - Typical interval is every five years

1) Prior to a pressure test, the tank shall have successfully passed the External and Internal visual inspection.

2) Tank shall have sign that reads “TANK UNDER PRESSURE” hanging at both ends of vessel.

3) Level and adequately support the tank. If tank is equipped with upper coupler, remove the coupler.

4) In a multi-compartment tank configuration ensure all adjacent compartments and void spaces are empty and open to atmosphere. All compartments are to be tested individually.

5) Verify that the calibration of all pressure gauges being utilized is current by checking the calibration decal.

6) If the indicating gauge is not readily visible to the operator controlling the pressure applied, an additional indicating gauge shall be provided where it will be visible to the operator throughout the duration of the test.

7) Replace all reclosing pressure-relief devices or test them to ensure that they open at the required set-to-discharge pressure for the tank′s MAWP and reseat at not less than 90% of that pressure or at the reseat pressure prescribed for the tank specification.

8) Clamped, plugged, or otherwise rendered inoperative all other relief devices and close internal valve.

9) The tank insulation, if any, and its jacket, need not be removed from isolated tanks, unless it is found to be impossible to reach test pressure or maintain a condition of pressure equilibrium after the test pressure is reached.

10) Ensure all remaining closures rated at or above the test pressure are in place and adequately secured.

Hydrostatic test (12.7.1) and pneumatic test (12.7.2) are included in pressure tests.

### 12.7.1 Hydrostatic Test

Hang signs that reads “TANK UNDER PRESSURE” at both ends of vessel. Precautions shall be taken to prevent over pressurization of the tank.

1) Level and adequately support the tank.

2) Fill tank completely with water.

3) Install pressurization line with regulator set no greater than 110% of test pressure (pressure regulator on remote test gauge cart) and two pressure gauges, one at top of tank and one at the remote test gauge cart.

4) Slowly increase pressure in tank to the proper test pressure for that tank type, indicated in the Table 7.3 of CSA B620 located in section 21.1.

5) Upon reaching test pressure shut off source of supply and hold test pressure for a minimum of 10 minutes. The source of supply shell be disconnected from tank and gauging

6) With tank under pressure, visually inspect exterior of tank for signs of leak, defects or distortion.

7) Relieve pressure in tank.

8) Close first valve in discharge system and open internal valve, leaving all other valves in discharge line open. Adjust pressure to 80% of the test pressure for the tank being tested and shut off the supply. The piping and the first valve in discharge system will now be pressurized in addition to the tank shell; test pressure must hold with no psig drop. Hold pressure for 10 minutes.

9) Repeat above-mentioned item for each valve in discharge line, until all valves have been tested.

10) Relieve pressure in tank and drain tank.

11) All piping and accessories shall be pressure tested at not more than 80% of MAWP.

12) Reinstall or return to working condition all relief devices.

13) A written Test and Inspection Report (Form No.: NEE-FRM-007) in accordance with clause 7.3 of CSA B620

### 12.7.2 Pneumatic Test

Pneumatic test to be performed only when there is no suspicion of weakness in the tank, and the presence of water in the tank would react with the lading, tank or lading retention components, or result in ice forming, adversely affecting the functioning of the tank.

During the pressurization and test pressure hold periods, the tank tester shall read the pressure from a protected location or from a safe distance.

All piping and accessories shall be pressure tested at not more than 80% of MAWP.

During the test, follow the current test procedure to:

- not over pressurize of the tank;
- protect persons in the vicinity of the test or control their access to the tank during pressurization and test pressure hold periods.
- advise all personnel in shop that a pneumatic pressure test is to be performed and they must stay clear of tank being tested. No personal shall be on the top of the vessel, and must remain in a safe distance away from the vessel.

1) Tank shall have sign that reads “TANK UNDER PRESSURE” hanging at both ends of vessel.

2) Install pressurization line and manometer gauge at the top of tank from remote test location.

3) Slowly increase pressure in the tank to the proper test pressure for that tank type which is indicated in table 7.3 of CSA B620 (see section 21.1.23).

4) Upon reaching test pressure, shut off source of supply and disconnect from tank and gauging device.

5) After test pressure has held for a minimum of 60 minutes, reduce pressure to MAWP and visually inspect exterior of tank for indications of leak, defects or distortion; or

6) As an alternative to above mentioned item, when conditions permit, after the pressure has held for a minimum of 10 minutes, reduce test pressure to MAWP than check all weld seams with soap and water mix.

7) Relieve pressure in tank.

8) Close first valve in discharge system and open internal valve, leaving all other valves in discharge line open. Adjust the pressure to 80% of the test pressure for the tank being tested and shut off the supply. The piping and the first valve in discharge system will now be pressurized in addition to the tank shell; test pressure must hold with no psig drop. Hold pressure for 10 minutes.

9) Repeat above-mentioned item for each valve in discharge line, until all valves have been tested.

10) Relieve pressure in tank.

11) Reinstall or return to working condition all relief devices.

12) A written Test and Inspection Report (Form No.: NEE-FRM-007) in accordance with clause 7.3 of CSA B620

## 12.8 Product hose testing procedure

12.8.1 Scope

This procedure covers hose testing requirements in accordance to B620, Clause 7.2.10., and applies to hose assemblies connected to the tank or any tank-mounted accessory during loading or off-loading, but do not apply to hose assemblies less than 1.5 m (5 ft) in length that are part of the piping system and are pressure tested in accordance with Clause 7.2.7.

Hoses may be tested annually on or off the vehicle.

Hoses may be tested by other qualified hose testing organizations.

12.8.2 Frequency

All hoses shall be tested once per year

12.8.3 Safety

Hose testing shall be performed in a manner that ensures provisions will be made to protect personnel during testing in the event of a hose failure.

12.8.4 Training

All employees involved in hose testing shall be trained in testing procedures and rejection criteria. Records of training shall be kept in the related employment files.

12.8.5 Procedure

(a) A hose assembly having any damage identified in Clause 7.2.10.4 shall be taken out of service and not be pressure tested until repaired.

(b) The test pressure shall be

(i) for CSA-certified hose assemblies, not less than 2400 kPa (350 psi);
(ii) for gravity off-load hose assemblies (drop hoses), not less than 69 kPa (10 psi);
(iii) for vapour recovery hose assemblies on TC 406 tanks and the equivalent and substitute tanks identified in CSA B621, not less than 69 kPa (10 psi);
(iv) for vacuum hose assemblies on tanks loaded by vacuum, used exclusively for vacuum loading, and marked “vacuum only” in place of HAWP as specified in Clause 7.2.10.6, not be less than 69 kPa (10 psi); and
(v) not applicable to vacuum hoses that are
  (1) an integral part of a boom assembly or vacuum system on tanks loaded by vacuum;
  (2) used exclusively for vacuum loading; and
(vi) for all other hose assemblies, the greater of 120% of the marked HAWP of the hose assembly and 518 kPa (75 psi).

(c) The following shall not be used to pressurize the hose assembly:

(i) compressed gas;
(ii) compressed air;
(iii) flammable liquid; or
(iv) corrosive liquid.

Note: Water is the recommended test fluid.

(d) The requirements of Item (c) shall not apply to

(i) hose assemblies used to handle aircraft fuel;
(ii) CSA-certified hose assemblies; or
(iii) hose assemblies used in refrigerated liquefied gas service that are manufactured and documented as conforming to CSA B51 or ASME B31.3 and marked “CSA B51” or “ASME B31.3” by the hose assembly manufacturer.

(e) Provisions shall be made to protect personnel during testing should failure occur.

(f) To pass the pressure test, the hose assembly shall hold the pressure without bulging, distortion, or leaks for at least 5 min when isolated from the pressure supply.

12.8.6 Hose Markings — Upon successful completion of the Hose Inspection and Testing hose assemblies shall be either tagged with a metal tag or stamped on the coupling, in such a way not to affect the integrity of the hose, with letters/numbers of not less that 5mm high, with the month and year of the test. The HAWP for a hose assembly that is not already marked may be determined by referring to documentation provided by the hose and coupling manufacturer or supplier or by inspecting the hose and couplings for markings applied during manufacturing that indicate the maximum working pressure for the component. A HAWP shall be marked on a hose that is successfully tested. Hose assemblies for which ratings cannot be determined shall not be marked. If not already marked on the hose assembly, markings shall also be applied to indicate the serial number or identification number of the hose assembly.

12.8.7 Test Report — A test report shall be completed indicating name of the facility conducting the test, the hose assembly serial or identification number, the HAWP, the date and nature of inspection or test. The report shall be maintained for a minimum of 2 years. These records may be maintained electronically.

## 12.9 Internal inspection by wet fluorescent magnetic particle inspection

For TC 331, or applicable equivalent or substitute tank referred to in CSA B622 with the following conditions shall be internally inspected by the wet fluorescent magnetic particle method immediately prior to and in conjunction with the performance of the pressure test:

1) constructed of quenched and tempered steel, or
2) constructed of other than quenched and tempered steel but without postweld heat treatment,
3) used for the transportation of anhydrous ammonia, liquefied petroleum gas, or any other material that can cause stress corrosion cracking.

Refer to Magnetic Particle Inspection Procedure (Document No.: NEE-MPI-WF-001).

## 12.10 References

| | | |
|---|---|---|
| Confined space entry permit, program and procedures | | (See 21.1) |
| NEE-FRM-001 | Metal identification plate stamping | (See 21.1) |
| NEE-FRM-007 | Test and Inspection Report | (See 21.1) |
| NEE-FRM-008 | Metal identification plate Replacement | (See 21.1) |
| NEE-FRM-010 | TC331 Tank 1-year Inspection Check List | (See 21.1) |

| | | |
|---|---|---|
| NEE-FRM-012 | Hose Assembly Test and Inspection Report | (See 21.1) |
| Table 7.1 of CSA B620 | Periodic inspection and test intervals | (See 21.1) |
| Table 7.2 of CSA B620 | Additional periodic inspection and test intervals | (See 21.1) |
| Table 7.3 of CSA B620 | Pressures for periodic retesting | (See 21.1) |
| Table 7.4 of CSA B620 | Minimum thickness for TC and MC 306, 307, and 312 specification tanks manufactured with steel and steel alloys. | (See 21.1) |
| Table 7.5 of CSA B620 | Minimum thickness for TC and MC306,307, and 312 specification tanks manufactured with aluminum and aluminum alloys. | (See 21.1) |
| NEE-MPI-WF-001 | Magnetic Particle Inspection Procedure | (See 21.1) |
| Required information on the Identification Plate checklist | | (See 21.1) |

## SECTION - 13 Test and inspection marking

Upon successful completion of a test or registered activities in compliance with CSA B620, the tank inspector shall mark the tank in accordance with this section.

The markings shall be a minimum of 32mm high and clearly contrast with the background and shall be located on the tank front head or jacketing or above the identification plate, or anywhere on the front head where it is clearly visible from the ground. The markings shall be printed on durable labels and affixed to tanks firmly.

The markings shall consist of:

- The month and year of the inspection or test
- The letter indicating the type of inspection or test performed (in accordance with Clause 7.4 of CSA B620)
- The last four digits of the Facility Registration Number, as shown on the TC Certificate of Registration for the facility

The letters indicating the types of test of inspection shall be as follows:

"V" - External Visual Inspection

"I" - Internal Visual Inspection

"K" - Leakage Test

"P" - Pressure Test

~~"T" - Thickness Test~~

"U/C" - Upper Coupler Inspection

Typical Marking: 02/18 VK 0587

where: 02/18 indicates Inspection and Test performed February 2018; VK indicates External Visual and Leakage Tests were successfully completed; 0587 indicates the last digits of the Transport Canada Facility Registration number

## SECTION - 14 Nonconformities – Corrective action

A non-conformity is any condition in process, equipment, material, fabrication or attachment that does not meet all the requirements of the specifications the Highway Tank is constructed to, or the requirements of this Quality Control Manual.

When a nonconformity or a quality control problem happens or is probable to happen, it will be reported to the national quality system manager, who makes sure the specified root cause analysis and the related corrective / preventive action(s) are taken to avoid repetition of the nonconformity.

### 14.1 Identification of Nonconformities

It is the duty of all employees to report non-conformities to their supervisors. Non-conforming condition shall be notified to the national quality system manager. All corrective actions start with an investigation to determine the root cause(s) of the problem. A thorough analysis of all related processes, operations, quality records, and specifications, which may have contributed to the deficiency, is conducted by the responsible function(s). All potential corrective actions are identified and the action(s) most likely to eliminate the problem and to prevent recurrence is selected. The investigation and analysis of the root cause and preventive measures shall be documented in Non Conformance Corrective and Preventative Action Report form (Form No. NEE-FRM-017). The analysis shall include review of all applicable data to determine the extent and cause of the problem and analysis of trends in processes or performance of work to prevent nonconformities.

All problems are evaluated in terms of potential impact on quality, performance, reliability, safety, and customer satisfaction. Resolutions to all corrective and preventive actions are to a degree appropriate to the magnitude and the risk of the problem. Resolutions are reviewed and approved by the national quality system manager **or** his designated representative.

### 14.2 Examples of Tank Nonconformities

- Routine maintenance Items when the non-conformity is of a routine maintenance nature (eg. leaking gasket seized remote release, etc.)
- Repair or rework when the non-conformity requires repair work (eg. severe corrosion between dis-similar materials, distortion in the tank shell or abrasions, etc.), the procedures for repair will be discussed with the Process Owner. No repairs or rework shall be performed on non-metallic tanks.
- Repairs of the tank liquid retention components by welding/ brazing where defects are found that require welding/ brazing it will be written on a Welding Inspection Report, which include details of area welded, welding/ brazing procedure and welder/ brazer identification.
- All repairs shall be performed in compliance with the specification of the original design of the tank, in a facility registered with Transport Canada to perform that scope of work.
- All repairs shall be such that there will be no increase in the probability of cracking due to areas of increased stress due to shrinkage of cooling weldments.
- All welding/ brazing of lading retention components shall only be performed on tanks with design pressures less than 103 kpa (15 psig). Upon completion a welding/ brazing inspection shall be completed.

- Any non-conformance that becomes recurring shall be brought to the attention of the Process Owner who shall bring it to the attention of a Registered Design Engineer where appropriate.

- Any non-conformance that is discovered related to Test and Inspection activities shall be brought to the attention of the Process Owner. The non-conformance shall be reviewed.

### 14.3 Retest

Upon correction of any tank non-conformity, the tank shall be re-tested in accordance with the requirements for the new construction of a tank of the same specification or by pressure testing of repaired lading retention components.

### 14.4 Calibrated Equipment

Any non-conformity discovered in the Calibrated Equipment shall be resolved in accordance with Section 16 (Calibration) of this Manual.

### 14.5 Reference

- NEE-FRM-017 Nonconformance corrective and preventative action report form (See 21.1)

## SECTION - 15 Welding control NA

### 15.1 General

The Process Owner or his designate shall ensure that all welding/ brazing on highway tanks and portable tanks shall be performed using appropriate Welding/ brazing Procedure, and is responsible for the followings:

- personnel meet the requirements for the work performed
- ensuring that welders/ brazers are properly qualified for each weld
- maintaining a record of the qualification of each welder/ brazer on a Welder Continuity Log (Form No.: NEE-FRM-016)
- ensuring that Welding inspection reports (Form No.: NEE-FRM-013) are properly filled

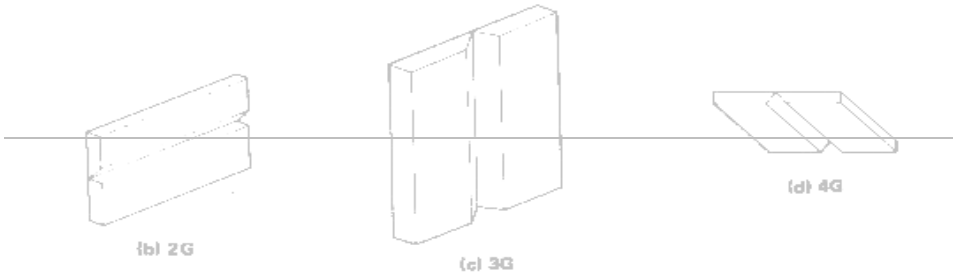
The Process Owner or his designate shall inspect all welding/ brazing materials at time of receipt to ensure that each spool or container is marked with the manufacturer's name, diameter, AWS classification, SFA number and heat, lot or control number.

All welding electrodes and wires are stored under proper environmental conditions and protected from damage. Welding/ brazing material received in damaged containers or later damaged shall be thoroughly examined. Defective material shall not be used.

### 15.2 Welder/ brazer qualification procedure

| | |
|---|---|
| Scope | This procedure covers the requirements of welders/ brazers qualification to weld, in accordance with a qualified weld procedure specification, except for tanks mentioned in clause 5.1.1.2 of CSA B620, which should be certified in accordance with the ASME code or the provincial pressure vessel jurisdiction. |
| Procedure | Welders must qualify to each weld procedure they are to perform. All welding/ brazing must be performed to the qualified weld procedures consisting of a Weld Procedure Specification (WPS) and a Procedure Qualification Record (PQR). The purpose of qualifying the person who will use a welding process is to demonstrate that person's ability to produce an acceptable joint when using a procedure specification. In order to get the qualification, each welder need to send 3 different plates for each WPS in different positions to be tested. |
| Test Coupon | The test coupon's material shall be in the same P number group with the same thickness as the base metal on the procedure is. Material shall be taken from a plate that can clearly be identified with the mill test report for that plate. Test coupon should comprise of two pieces 3" x 6" with one 6" edge of each piece prepared for welding/ brazing in accordance with the Procedure Qualification Record. Test specimens shall be marked with the unique welder/ brazer identifier. |
| Weld | The weld should be performed for following positions using the parameters for welding/ brazing the Procedure Qualification Record. |

Positions — Welders/ brazers who are going to perform welding on tanks, should be qualified for all positions weldments. To qualify for all position the coupons must be welded/ brazed in 2G, 3G, and 4G positions.




Identification — Each welder/ brazer shall be assigned a unique identifier, which shall be used to identify the work of that welder/ brazer.

Records — The result of welder/ brazer performance qualification tests with the related coupons shall be kept in the shop.

Continuity — Each welder/ brazer shall be listed on a Welders Continuity Log, which contains a record of each occasion that the welder/ brazer has welded/ brazed to each procedure. This log shall be used to determine if the qualifications have expired.

Requalification — If welders/ brazers have not welded/ brazed with a process during a period of 6 months or more, or if there is specific reason to question their ability that meet the specification, their qualification for that process shall expire. Renewal of an expired qualification can be done according to the aforementioned qualification procedure.

## 15.3 Welding/ brazing Procedure Specification

The Welding Procedure Specification (WPS) states all the allowable variable parameters for the weld/ braze, which includes base material, usually identified as a "P" number, filler material, shielding gasses and or "slag" material, number of passes, thickness qualified, weld speed/ braze speed, pre-heat and inter pass temperature requirements and voltage amperage settings of welding/ brazing machine. These are generally stated in a range on the WPS allowing for some fluctuations based on the actual weldment being performed. It is important to understand that qualifying a WPS does not mean that welding/ brazing can be performed using any mix of these ranges.

Welders/ brazers should have the knowledge and experience to determine that the weld they are making is sound and free of defects such as incomplete penetration, inclusions, undercut or any other defect that would render a weld defective.

## 15.4 References

- GMAW-AL-01 — WPS, PQR and its related tests (See 21.1)
- NEE-FRM-013 — Welding inspection report (See 21.1)
- NEE-FRM-016 — Welder Continuity Log (See 21.1)

**This page in intentionally left blank**

## SECTION - 16 Calibration

### 16.1 General

All test and inspection equipment used in Inspection and Testing procedures of this Manual shall be calibrated in accordance with this section.

The Process Owner is responsible for maintaining all equipment in calibration.

Calibration may be performed by the Process Owner, or a qualified individual who has been assigned to the task and trained,

Pressure gauges or Digital Manometer used for pressure tests are calibrated to a certified calibrated master gauge weekly, or when there is reason to question their accuracy. The master gauge shall also be re-calibrated annually and the certificate keep on file. All gauge calibrations shall be documented on the Gauge Calibration Log (Form No. NEE-FRM-014). All equipment calibrations shall be documented on the Equipment Calibration Log (Form No. NEE-FRM-015)

The frequency of calibration for other equipment is as recommended by the equipment manufacturer or from experience with the equipment.

Material thickness shall be gauged using a micrometer, or ultrasonic thickness tester. The micrometer shall be calibrated prior to each use against a coupon or step block of known thickness. The ultrasonic thickness tester shall be calibrated against a step block of known thickness and compared against the micrometer. The step block shall be verified every 5 years or at any indication of damage or wear by a qualified inspection service.

When equipment requiring calibration is found to be out of calibration it shall be removed from the work area, repaired, re-calibrated or replaced.

All items checked without calibration equipment shall be considered as non-conforming until the Process Owner verifies that they meet all Specification requirements or, the items have been re-checked with appropriately calibrated equipment.

### 16.2 Procedure

Connect the gauge to be calibrated to the master gauge and pressure source.

Apply the pressure to the gauge to be calibrated in increments over the full range of the gauge.

Compare the value of pressure indicated by the master gauge with the corresponding value of the pressure indicated by the gauge being calibrated for each pressure increment. The values should be same with accuracy class of 1.6. limits of permissible error of this class is ±1.6% of gauge's full scale.

If necessary, adjust the gauge and repeat the above paragraph until the values are same in accuracy class 1.6.

After three trials, if the values are not same, the gauge is rejected and shall be removed from the work area.

### 16.3 References

- NEE-FRM-014 Gauge Calibration Log (See 21.1)
- NEE-FRM-015 Equipment Calibration Log (See 21.1)

## SECTION - 17 Quality Audits

### 17.1 General

National quality system manager is responsible for coordinating with Process Owners of facilities to plan a regular quality audit and closure corrective actions required to eliminate the recorded nonconformities based on the internal audits and the Non Conformance Corrective and Preventative Action Report form (From No.: NEE-FRM-017).

Certificates, forms and related documents which are listed in 'Mandatory document list' (see section 17.2).shall be completed in accordance with the related process.

Where these audits indicate that tanks may be out of compliance, those tanks shall be recalled and brought into conformance.

Where repair or re-work is required, the effectiveness of the repair or re-work shall be verified by performing the appropriate tests and inspections after work is completed.

Where these audits reveal repeated non-conformance, the relevant procedures in this manual shall be reviewed and where required, training initiated to eliminate non-conformance.

The national quality system manager shall annually review the complete process to ensure it is in conformance with this Quality Control Manual in the management review meeting. This Management Review Meetings shall include, but is not limited to:

- Results of audits
- Facility Registration documents
- Inspector/Tester/Welder (or brazer) qualifications
- Material procurement and control
- Quality Control process performance
- Identification plate stamping and tank marking
- Status of non conformities, preventive and corrective actions
- Follow-up actions from previous management review meeting
- Recommendations for improvement

### 17.2 References

- NEE-FRM-017 Nonconformance corrective and preventative action report (See 21.1)
- Mandatory Document List (See 21.1)

## SECTION - 18 Registration – Facilities and Personnel

### 18.1 Facility Registration

Facility registration is the responsibility of the National quality system manager (NQSM).

NQSM is responsible for ensuring the certificates of registration is current and covers all functions performed at the facility with the registration number of 25-0587, located at 1467 Spitfire Place, Port Coquitlam, BC V3C 6L4.

The scope of the registered NEEI Facility is located in section one (1) of this quality control manual.

### 18.2 Personnel Registration

It is the responsibility of the Process Owner to ensure that Design Engineer is registered with TDG list of registered authorized personnel. All personnel are qualified by NEEI after a proper training and get the certificate of qualification for only those functions, which they have been qualified (see section 18.3). Employee qualification records must be retained throughout the duration of employment and for five (5) years after employment. The minimum qualification requirements of CSA B620 Clause 8 as follows:

Design Engineers

Every Design Engineer shall

(a) be an engineer and shall hold a current license by the appropriate authorities of his or her residence in Canada or the United States to practise engineering; and

(b) have at least one year of experience in the design of highway tanks in accordance with CSA B620 or 49 CFR.

National Energy Equipment Inc. may use (but are not limited to) the following firms (See the registered personnel in the end of this section) when engineering duties are required.

Tank Inspector

Tank inspector shall have

(a) the knowledge and ability to determine if a tank conforms to a particular specification; and

(b) education and experience in the construction, inspection, testing, or retesting of tanks of that specification, as follows:

(i) an engineering degree or professional engineer status in a province of Canada, and one year of experience;

(ii) a technical diploma and two years of experience;

(iii) a high-school diploma and three years of experience; or

(iv) five years of experience or more.

Tester

Every tester shall

(a) be familiar with the specification tank on which the test is performed;

(b) be familiar with the test procedure and pass/fail criteria;

(c) have at least one year of experience performing the test; and

(d) be trained and experienced in the use of the testing equipment.

Welders/ brazers

Every welder/ brazer shall:

• Qualified by this Facility authority in accordance with B620

Hose Testers and Inspectors

Every hose testers and inspector shall:

• Have training in product and hose safety, inspection and test procedures, and rejection criteria.

### 18.3 References

- List of registered design engineers (See 21.1)
- List of tank inspectors and testers (See 21.1)
- Certificate of qualification (See 21.1)

## SECTION - 19 Mobile Units

### 19.1 General

The process owner shall control service vehicles and related equipment at the registered facility 25-0587 25-0587, located at 1467 Spitfire Place, Port Coquitlam, BC V3C 6L4.

One service vehicle is available for mobile service.

All records of mobile Inspections and Testing shall be maintained at the registered facility (25-0587) where the mobile equipment is located.

### 19.2 Mobile Equipment

The tank inspector shall gather the following required equipment and documents from the shop and transfer them to the service vehicle. He should make sure that all of the following equipment are available on the service vehicle for mobile service:

- Controlled copy of this Quality Control Manual and CSA-B620 standard currently in place,
- Laptop, used to record inspection
- Inspection checklist
- Camera
- Explosion-proof Flash Light
- Hose Inspection tags
- Tanks Inspection stickers
- TANK UNDER PRESSURE Sign x 2
- Zip Ties
- Regulator
- Test fittings and Adaptors
- Air Compressor
  - Gas Powered
  - Electric
  - Customer supplied
- Air Lines
- Soapy Water
- Wire Brush
- 10 Fill Betts Test Lid
- Hose Tester
  - Aviation
  - Gasoline/Diesel
- Calibrated Gauges

## SECTION - 20 Records Retention

### 20.1 General

Records referred to in this manual may be maintained and stored electronically.

The Process Owner shall review all records referred to in this manual for completeness prior to filing.

All following records shall be retained on NEEI property for a period of at least 20 years. They shall be circulated as described in the documents, where applicable.

1) Copy of the identification plate by the facility installing the plate
2) Copy of the certificate by the manufacturer, assembler or modifier
3) Calculations, drawings plus all superseded ones by the modifier
4) Inspection and test reports by the inspector or tester facility
5) Pressure test reports,
6) Hose test reports,
7) Calibration records,
8) Certificates of compliance from NEEI as well as those from other manufacturers
9) Repair reports

The national quality system manager is responsible for ensuring that above mentioned records, quality control manual, certificates and other related documents required by CSA B620 and applicable codes are properly circulated and retained for the required periods.

In the event of a change in ownership, retention by the prior Owner of non-fading copies of the records shall be deemed to satisfy the requirements of the above mentioned items.

For tanks that have been manufactured, assembled, or repaired by NEEI, non-fading copies of the entire Job File, including the Certificate of Compliance, will be kept for a period of 20 years upon delivery of a manufactured or assembled tank to a tank Owner or purchaser, NEEI will issue a Certificate of Compliance for New & Assembled Tanks (Form No. NEE-FRM-004).

For tanks that have been modified by NEEI, non-fading copies of the entire Job File, including the Certificate of Compliance, will be kept for a period of 20 years. Upon delivery of a modified tank to a tank Owner or purchaser, NEEI will issue a Modification Certificate of Compliance (Form No. NEE-FRM-005).

These Certificates of Compliance shall be retained by the Owner throughout the ownership of the tank and for at least one year thereafter.

The Job File, with all contents, shall be delivered at the time of sale by the seller of a tank to the purchaser, with non-fading copies of the contents being retained by the seller.

The Owner and the motor carrier, if they are not the Owner must each retain a copy of the test and inspection reports until the next major inspection.

On delivery of a tank, a copy of the test and inspection report (Form No.: NEE-FRM-007), Hose assembly test and inspection report (Form No.: NEE-FRM-012) shall be provided to the Owner or Owner's designate, who shall retain them throughout the ownership of the tank and for at least one year thereafter.

## 20.2 References

- NEE-FRM-004 Certificate of compliance for new & assembled tanks (See 21.1)
- NEE-FRM-005 Modification certificate of compliance (See 21.1)
- NEE-FRM-007 Test and inspection report (See 21.1)
- NEE-FRM-012 Hose assembly test and inspection report (See 21.1)

## SECTION - 21 Exhibits

### 21.1 Reference forms and documents

**21.1.1**

| NATIONAL ENERGY EQUIPMENT INC. | Metal identification plate stamping |
|---|---|
| Form Number:NEE-FR-L-001 | Revision: 0 |

NOTE* - All characters are to be a minimum 5mm (3/16") high and be stamped or embossed.

| | |
|---|---|
| Tank Manufacturer: _____ | Date of Manufacture: _____ |
| Specification TC: _____ | MDIN: _____ |
| Assembler: _____ | Date of Assembly: _____ |
| TCRN: _____ | Serial No.: _____ |
| VIN: _____ | Certification Date: _____ |
| Org. Test Date: _____ | |
| Design Temp. Range: _____ to _____ °C | Max. Lading Density: _____kg/L |
| MAWP: _____kPa | Test Pressure: _____kPa |
| Lining Material: _____ | Shell Material: _____ |
| Head Material: _____ | Weld Material: _____ |
| Min. Shell Thickness: Top _____ | Sides _____ Bottom _____ |
| Min. Head Thickness: Top _____ | Sides _____ Bottom _____ |
| Compartment: 1 2 | 3 4 5 |
| Volume Cap (L) _____ _____ | _____ _____ _____ |
| Exposed Surface Area (sq. meters) _____ _____ | _____ _____ _____ |
| Max. Payload: _____kg | Max. Load Rate: _____L/min@ _____kPa |
| Max. Unload Rate: _____L/min@ _____kPa | |
| Mfd. Shell Thickness: _____ mm | Mfd. Head Thickness: _____ mm |
| Heating System Pressure: _____kPa | Heating System Temperature: _____°C |

**21.1.2**

| NATIONAL ENERGY EQUIPMENT INC. | Modification Plate Stamping |
|---|---|
| Form Number:NEE-FRM-002 | Revision: 1 |

**Note*- All characters to be a minimum 5mm (3/16") high.**

**Indicate ALL items modified from original Specification**

MODIFIED BY

NATIONAL ENERGY EQUIPMENT INC.

25 - _____

**Manufacturer** _____ **Serial No.** _____

**Modification Date** _____ **Re-certification Date** _____

**Re-test Date** _____

**Items Modified** _____

_____

**TCRN** (If applicable) _____ **Remount —Design change** ☐

**MDIN** (If applicable) _____ **Remount —No Design change** ☐

**Plate as per CSA B620, Clause 7.6.9**

**21.1.3**

| NATIONAL ENERGY EQUIPMENT INC. | Specification plate information sheet for recertified tanks |
|---|---|
| Form Number:NEE-FRM-003 | Revision: 0 |

**Owner:** _____ **Unit #:** _____

Record all required information from the Specification Plate below. If the Spec Plate is illegible, a rubbing may be made and the information may be used for the test and inspection purposes.

**Required Information:**

| | | | |
|---|---|---|---|
| TC Specification | | Vessel Material Spec # Shell | |
| Tank Manufacturer | | Manufactured Shell Thickness | |
| Tank Vehicle Serial Number | | Vessel Material Spec # Head | |
| Tank Vehicle Assembler | | Manufactured Head Thickness | |
| Completion/Manufacture Date | | Weld Material | |
| Certificate Date | | Volumetric Capacity (Litres) | |
| Original Test Date | | Max Pay/Product Load (kilograms)/(lbs) | |
| Tank Test Pressure (kpa) | | Max Loading Limit/Rate (lpm@kpa) | |
| MAWP/Design Pressure | | Max Unloading Limit/Rate (lpm@kpa) | |
| Lining Material (when applicable) | | | |

MC 406 SPEC TANKS ONLY

| | | | |
|---|---|---|---|
| Manufacturer Design ID # | | Max Lading Density | |
| Tank Design Temp Range (degrees C) | | Min Allowable Shell Thickness | |
| Min Allowable Head Thickness | | Exposed Surface Shell Thickness | |
| Heating System Design (kpa) | | Heating System Design Temp (C ) | |

MC/TC 330/331 SPEC TANKS TC 331 SPEC TANKS

| | | | |
|---|---|---|---|
| TCRN/CRN Number | | Mark QT or NQT at/near ID Plate | |
| Single Plate _____ | Duplicate Plate _____ | | |

**Technician (print):** _____ **Signature:** _____

**21.1.4**

| NATIONAL ENERGY EQUIPMENT INC. | Certificate of Compliance for New or Assembled Tanks |
|---|---|
| Form Number:NEE-FRM-004 | Revision: 1 |

**(page 1 of 2)**

Registration No 25-_____

Highway Tank Serial No. _____ Specification TC _____

VIN No. _____ TCRN _____

Tank Manufacturer _____ MDIN _____

Manufacturer Address _____

Tank Assembler _____ Assembler Address _____

***We certify that the tank, fittings, valves, piping and protective devices comply with the applicable specifications of CSA B620 to the extent of the work performed.***

**Full Spec** _____ **Short Spec** _____ **TCRN** _____ **MDIN** _____

**Date of Manufacture:** Month: _____ Year: _____ **Certification Date:** Month: _____ Year: _____

**Original Test Date:** Month: _____ Year: _____

**MAWP:** _____kPa **Test P:** _____kPa **Design Temperature Range:** _____ to _____ degrees C

**Tank Material:** Shell: _____ Heads: _____

**Manufacturer Thickness:** Shell: _____ Heads: _____

**Minimum Thickness:** Shell: _____ Heads: _____

Top: _____ Sides: _____ Bottom: _____

**Weld Material:** _____

**Heating System Pressure**: _____ kPa **Heating System Temperature**: _____ °C

| **Compartment Number** | **1** | **2** | **3** | **4** | **5** | **6** | **Total** |
|---|---|---|---|---|---|---|---|
| Volumetric Cap. (Liters) | | | | | | | |
| Exposed Surface | | | | | | | |

Pressure Relief Device Set Pressure: _____ Rating: _____Scfh at_____

Quantity: Per compt _____

Max. Lading: Density _____Kg/L Max. Payload: _____

Max. Load Rate: _____L/min at _____kPa Max. Unload Rate: _____L/min at _____kPa

Lining Material: _____

This Certification Includes:

- Tank - Chassis ☐
- Assembly ☐
- Piping & Valves ☐
- Bumper ☐
- Damage Protection ☐
- Valve Operating Devices ☐
- Relief Devices ☐

| NATIONAL ENERGY EQUIPMENT INC. | Certificate of Compliance for New or Assembled Tanks |
|---|---|
| Form Number:NEE-FRM-004 | Revision: 1 |

(page 2 of 2)

This Certification Excludes:

| | | | |
|---|---|---|---|
| Tank - Chassis | ☐ | Damage Protection | ☐ |
| Assembly | ☐ | Valve Operating Devices | ☐ |
| Piping & Valves | ☐ | Relief Devices | ☐ |
| Bumper | ☐ | | |

**Tank Tester (Print):** _____ **Signature:** _____

**Date:** _____

**Certified By (Print):** _____ **Signature:** _____

**Date:** _____

**21.1.5**

| NATIONAL ENERGY EQUIPMENT INC. | Modification Certificate of Compliance |
|---|---|
| Form Number:NEE-FRM-005 | Revision: 0 |

**Modified by:** NATIONAL ENERGY EQUIPMENT INC. **Address:**
**Facility No: 25-_____**

Specification TC: Modification Date:

Manufactured by: Tank Manufacture Date:

Highway Tank Serial No.: Unit No.:

Original Cert. Date: TCRN: MDIN:

Test Pressure: MAWP:

Tank Material - Shell Top: Sides: Bottom:

Min. Thickness: Shell: Heads:

Original Thickness: Shell: Heads:

Weld Shell / Heads:

Weld Material:

| Compartment No.: | 1 | 2 | 3 | 4 | 5 | 6 | Total |
|---|---|---|---|---|---|---|---|
| Nominal Capacity: | | | | | | | |
| Vent No.: | 1 | 2 | 3 | 4 | 5 | 6 | |
| Ratings of Vent: | | | | | | | |

Max. Lading Payload:

Max. Load Rate: LPM Max. Unload Rate: LPM

Modifications Description:

Notes:

☐ Remount —Design change ☐ Remount —No Design change

**All modifications have been performed in compliance with the requirements of CSA-B620**

Certified by: Date:

Signature:

**21.1.6**

| NATIONAL ENERGY EQUIPMENT INC. | Repair report |
|---|---|
| Form Number:NEE-FRM-006 | Revision: 0 |

**Registration #:** 25-_____

**Facility Address:** _____

**Owner's Name:** _____ **Owner's Tel. No.:** _____

**Owner's Address:** _____

**Manufacture:** _____ **Serial #:** _____

**MFR Date:** _____ **Material:** _____ **Tank Spec:** _____

**Date of Repair:** _____

**Description of Repair (Provide sketch if required)**

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

**Weld Procedures used:** _____

**Authorized Welder Name:** _____ **Signature:** _____

**Date:** _____

**21.1.7**

| NATIONAL ENERGY EQUIPMENT INC. | | Test and Inspection Report | |
|---|---|---|---|
| Form Number:NEE-FRM-007 | | Revision: 4 | (Page 1of 4) |
| Facility Name: | National Energy Equipment Inc. | Test Date: | |
| Address: | | | |
| Telephone | | Facility Registration No.: | |
| Tank Owner | | | |
| Address: | | | |
| Telephone | | Work Order Location: | |
| OWNERS UNIT No.: | | SERIAL No.: | |
| MANUFACTURER: | | MAWP: | |
| CERT. DATE: | MATERIAL: | | TANK SPEC: |

| For TC/MC331 & TC51 Stress relievedafter repair: | QT Complete | NQT Local | PWHT N/A |
|---|---|---|---|
| COMP. CAPACITY (IG/L): | 1<br>2<br>3<br>4<br>5<br>6 | | |
| **TESTS PERFORMED** | "V"<br>"P" | "K"<br>"T" | "I"<br>"UC" |

| EXTERNAL VISUAL INSPECTION "V" | QC Man. Reference: | 12.2 |
|---|---|---|
| Data plate and other markings, present and legible | Complies | Retest complies |
| Shell & heads corrosion, abrasion, dents, overlay patches, leaks, loose bolts and nuts on any flanged/blank connection,defect welds, etc. | Complies | Retest complies |
| Structural members, outriggers, cross members etc. | Complies | Retest complies |
| Piping and valves for leakage, damage, corrosion | Complies | Retest complies |
| Remote closures, thermal devices | Complies | Retest complies |
| Hoses for defects, identification and test dates | Complies | Retest complies |
| Tank attachments to frame or running gear, elements of the UC assembly that can be inspected without dismantling | Complies | Retest complies |
| Ladders, walkways, etc. | Complies | Retest complies |
| Fill covers, manways and closure devices | Complies | Retest complies |
| Relief valves and vents (replace or test if tank in service where lading corrosive to relief device) | Complies | Retest complies |
| Accident damage protection | Complies | Retest complies |
| Engine air intake shut off device and dry chemical fire extinguishers (Transport Canada's requirement) | Complies | (It is not a rejection) |

**Note: Rejection Criteria for Visual Inspections**
Less than minimum material thickness under any cut, dig or gouge
Any dent with a depth greater than ½" where it includes a weld
Any dent with a depth greater than 10% of the length of the dent
Any weld defect including a crack, pinhole, or incomplete fusion of the weld
Any structural defect or any source of leakage
Any repairs made using overlay patches
Defective, unidentified or out of test Hose Assemblies

| Inspector Name: | Signature: | After Retest Signature: |
|---|---|---|
| Tank Tester Name (If applicable): | Date: | Date: |

| NATIONAL ENERGY EQUIPMENT INC. | Test and Inspection Report | |
|---|---|---|
| **Form Number:NEE-FRM-007** | **Revision: 4** | **(Page 2of 4)** |
| Facility Name: **National Energy Equipment Inc.** | Test Date: | |
| Address: | | |
| Telephone | Facility Registration No.: | |
| Tank Owner | | |
| Address: | | |
| Telephone | Work Order Location: | |
| OWNERS UNIT No.: | SERIAL No.: | |
| MANUFACTURER: | MAWP: | |
| CERT. DATE: MATERIAL: | | TANK SPEC: |
| **INTERNAL VISUAL INSPECTION "I"** | QC Man. Reference: | 12.3 |
| Interior surface, corrosion, distortion overlay patches, cracking etc. | Complies | Retest complies |
| Interior welds for defects, cracking etc. | Complies | Retest complies |
| Internal supports and attachments | Complies | Retest complies |
| Internal valves, piping and vents for leakage, damage, etc. | Complies | Retest complies |
| **Note: Rejection Criteria for Visual Inspections**<br>Less than minimum material thickness under any cut, dig or gouge<br>Any dent with a depth greater than ½" where it includes a weld<br>Any dent with a depth greater than 10% of the length of the dent<br>Any weld defect including a crack, pinhole, or incomplete fusion of the weld<br>Any structural defect or any source of leakage<br>Any repairs made using overlay patches<br>Defective, unidentified or out of test Hose Assemblies | | |
| Inspector Name: Signature: | After Retest Signature: | |
| Tank Tester Name (If applicable): Date: | | Date: |
| **UPPER COUPLER AREA INSPECTION "UC"** | QC Man. Reference: | 12.4 |
| Upper coupler removed from tank and inspected incl. tank areas above | Complies | Retest complies |
| Turn table assembly inspected in place | Complies | Retest complies |
| Inspected elements: | | |
| Inspector Name: Signature: | After Retest Signature: | |
| Tank Tester Name (If applicable): Date: | | Date: |
| **LEAKAGE TEST "K"** | QC Man. Reference: | 12.5 |
| TEST PRESSURE (80% of MAWP MIN): | TEST MEDIUM: | |
| Compartment No. 1 Leakage Tested | Passes | Retest complies |
| Compartment No. 2 Leakage Tested | Passes | Retest complies |
| Compartment No. 3 Leakage Tested | Passes | Retest complies |
| Compartment No. 4 Leakage Tested | Passes | Retest complies |
| Compartment No. 5 Leakage Tested | Passes | Retest complies |
| Compartment No. 6 Leakage Tested | Passes | Retest complies |
| Compartment No. 1 Piping Leakage Tested | Passes | Retest complies |
| Compartment No. 2 Piping Leakage Tested | Passes | Retest complies |
| Compartment No. 3 Piping Leakage Tested | Passes | Retest complies |
| Compartment No. 4 Piping Leakage Tested | Passes | Retest complies |
| Compartment No. 5 Piping Leakage Tested | Passes | Retest complies |
| Compartment No. 6 Piping Leakage Tested | Passes | Retest complies |
| Tester Name: Signature: | After Retest Signature: | |
| Date: | | Date: |

NATIONAL ENERGY EQUIPMENT INC.

## Test and Inspection Report

**Form Number:NEE-FRM-007** | **Revision: 4** | **(Page 3of 4)**

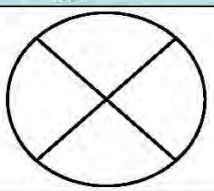
| | | | |
|---|---|---|---|
| Facility Name: | **National Energy Equipment Inc.** | Test Date: | |
| Address: | | | |
| Telephone | | Facility Registration No.: | |
| Tank Owner | | | |
| Address: | | | |
| Telephone | | Work Order Location: | |
| OWNERS UNIT No.: | | SERIAL No.: | |
| MANUFACTURER: | | MAWP: | |
| CERT. DATE: | MATERIAL: | | TANK SPEC: |

**THICKNESS TEST "T"** | QC Man. Reference: 12.6

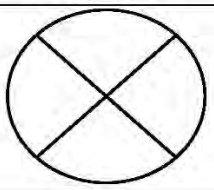
Thickness tester calibrated?

| Front of the tank | 12:00 | 3:00 | 6:00 | 9:00 |
|---|---|---|---|---|
| Shell's position number 1 | | | | |
| Shell's position number 2 | | | | |
| Shell's position number 3 | | | | |
| Shell's position number 4 | | | | |
| Shell's position number 5 | | | | |
| Shell's position number 6 | | | | |
| Shell's position number 7 | | | | |
| Shell's position number 8 | | | | |
| Shell's position number 9 | | | | |
| Shell's position number 10 | | | | |
| Shell's position number 11 | | | | |
| Shell's position number 12 | | | | |
| Shell's position number 13 | | | | |
| Shell's position number 14 | | | | |
| Shell's position number 15 | | | | |
| Shell's position number 16 | | | | |
| Shell's position number 17 | | | | |
| Shell's position number 18 | | | | |
| Shell's position number 19 | | | | |
| Shell's position number 20 | | | | |
| Shell's position number 21 | | | | |
| Shell's position number 22 | | | | |
| Shell's position number 23 | | | | |
| Shell's position number 24 | | | | |
| Shell's position number 25 | | | | |
| Shell's position number 26 | | | | |
| Shell's position number 27 | | | | |
| Shell's position number 28 | | | | |
| Shell's position number 29 | | | | |
| Shell's position number 30 | | | | |
| Rear of the tank | 12:00 | 3:00 | 6:00 | 9:00 |

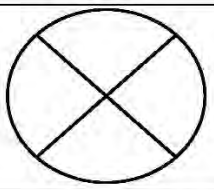
Front Head



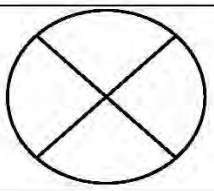
Rear Head



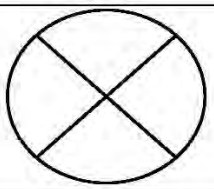
Manway



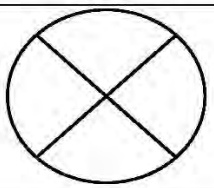
Sump



Nozzle 1



Nozzle 2



Complies | Redo complies

Tester Name: | Signature: | Date: | After Retest Signature: | Date:

NATIONAL ENERGY EQUIPMENT INC.

## Test and Inspection Report

| | | | |
|---|---|---|---|
| **Form Number:NEE-FRM-007** | | **Revision: 4** | **(Page 4of 4)** |
| Facility Name: | **National Energy Equipment Inc.** | Test Date: | |
| Address: | | | |
| Telephone | | Facility Registration No.: | |
| Tank Owner | | | |
| Address: | | | |
| Telephone | | Work Order Location: | |
| OWNERS UNIT No.: | | SERIAL No.: | |
| MANUFACTURER: | | MAWP: | |
| CERT. DATE: | MATERIAL: | | TANK SPEC: |
| **PRESSURE TEST "P"** | | QC Man. Reference: | 12.7 |
| Test Pressure (Tank) | (Refer to Table 7.3 of CSA B620 for appropriate test pressure) | | |
| TEST PRESSURE (80% of MAWP MIN): | | TEST MEDIUM: | |
| Compartment No. 1 Leakage Tested | | Passes | Retest complies |
| Compartment No. 2 Leakage Tested | | Passes | Retest complies |
| Compartment No. 3 Leakage Tested | | Passes | Retest complies |
| Compartment No. 4 Leakage Tested | | Passes | Retest complies |
| Compartment No. 5 Leakage Tested | | Passes | Retest complies |
| Compartment No. 6 Leakage Tested | | Passes | Retest complies |
| Compartment No. 1 Piping Leakage Tested | | Passes | Retest complies |
| Compartment No. 2 Piping Leakage Tested | | Passes | Retest complies |
| Compartment No. 3 Piping Leakage Tested | | Passes | Retest complies |
| Compartment No. 4 Piping Leakage Tested | | Passes | Retest complies |
| Compartment No. 5 Piping Leakage Tested | | Passes | Retest complies |
| Compartment No. 6 Piping Leakage Tested | | Passes | Retest complies |
| Tester Name: | Signature: | After Retest Signature: | |
| | Date: | | Date: |

| | | | |
|---|---|---|---|
| **CONCLUSION** | | | |
| Any defect or damage discovered on tank? | | Yes or No | |
| Description of the location, nature, and severity of damage or defects found, how they were discovered, and the nature of any repair or replacement, and the results of any subsequent test or inspection: | | | |
| Tank successfully retested after repair | | Yes or No | Not Applicable |
| Written repair weld inspection report attached | | Yes or No | Not Applicable |
| Expired Inspection Markings removed | | Yes or No | |
| TANK DISPOSITION | Removed from Service | | Yes or No |
| | Safety Mark (Specification Indication) removed | | Yes or No |
| | Returned to Service | | Yes or No |
| PWHTafter repair of a TC/MC331 & TC51 | | Yes or No | Not Applicable |
| Wet Florescent Markings applied and report attached | | Yes or No | Not Applicable |
| Inspection Markings applied | | Yes or No | |
| FAILED INSPECTION | | PASSED INSPECTION | |
| Inspector Name: | Signature: | After Retest Signature: | |
| | Date: | | Date: |

**21.1.8**

| NATIONAL ENERGY EQUIPMENT INC. | Metal identification plate replacement |
|---|---|
| Form Number:NEE-FRM-008 | Revision: 0 |

☐ **Obtained tank's original or replacement Certificate of Compliance**

☐ **The present condition of the tank meets the specification to which it was originally certified and is indeed the tank listed in the above supporting documentation.**

**Tank Specification:** _____

**Notes:**

- Replacement metal ID plate shall be permanently affixed to the tank or its supporting structure by brazing or welding around its perimeter or by means of tamper-resistant fasteners.
- NEEI's current scope does not include manufacture, assembly, modify, or repair functions for the following tanks: TC407/TC307, TC412/TC312, TC338, and TC341. Therefore, we cannot stamp or install a replacement metal ID plate for these type of tanks.
- For TC331 tank specifications, the replacement of a metal ID plate must be done in accordance with the requirements of the Manitoba pressure vessel authority.
- NEEI Winnipeg's Certificate of Registration for TC331 tanks is limited to Assembly, a plate shall not be installed if the installation involves welding to the tank wall. The replacement metal ID plate could be installed by means of tamper-resistant fasteners as per page 33, item 17 of QC manual, pertaining to TC331tanks.

**Original Tank Manufacturer:** _____ **Original Date of Manufacture:** _____

**Original Tank Vehicle Assembler:** _____ **Date of Assembly:** _____

**Tank Serial No.:** _____ **Vehicle Identification Number:** _____

**Owner's Name:** _____

**Owner's address:** _____

**Owner's Signature:** _____

**Registered Facility Installing Replacement Plate Name:** _____

**Installing Plate Facility Number:** _____

**Registered Facility address:** _____

**Name of Compliance Officer at Registered Facility:** _____

**Signature of Compliance Officer at Registered Facility:** _____

**Date of Installment of the Plate:** _____

☐ **Attach a copy of the supporting documentation (tank's original or replacement Certificate of Compliance)**

☐ **Attach a full copy of a facsimile or rubbing of the replacement plate. (Full image of the plate)**

**Note:** This form and a copy of the information on the replacement metal ID plate shall be kept by the owner or his/her designate throughout the ownership of the tank, and a copy shall be retained for at least 1 year, thereafter. Copies shall also be retained by the facility installing the plate for a minimum of 20 years from the date of delivery.

## 21.1.9

**QW-482 suggested format for welding procedure specifications (WPS)**
**(see QW-200.1, Section IX, ASME Boiler and Pressure Vessel Code)**

| | | | |
|---|---|---|---|
| Company Name: | National Energy Equipment Inc. | By | SKC ENGINEERING |
| Welding Procedure Specification No.: | GMAW-AL-01 | Revision: | 0 |
| Supporting PQR No.(s): | GMAW-AL-01 | Issue Date: | 4-Feb-19 |
| Welding Process(es) | GMAW | WO: | W13939-D2 |
| Type(s): | Semi-Automatic | | |

**JOINTS (QW-402)**

| | | | |
|---|---|---|---|
| Joint design: | Refer Details | Root Spacing* | 1/32 in - 1/8 in |
| Backing: | With or Without | Retainers (+/-) | No Retainers |
| Backing Material: | P no. 22 | | |

☐ Metal ☐ Nonfusing Metal
☐ Non-metallic ☐ Other

Details
All ASME VIII Div 1 & B31.3 Standard
Groove Weld Joint Design & Fillets

All CJP welded from both sides with back gouge to sound metal or welded from one side with backing.

* For welds with backing use Root Spacing = 1/8 in - 3/16 in.
Sketches, production drawings, weld symbols or written description should show the general arrangement of the parts to be welded. Where applicable, the root spacing and the details of weld groove may be specified.

**BASE METALS (QW-403)**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| P no. | 22 | Group no. | N/A | to P no. | 22 | Group no. | N/A |
| or | | | | | | | |
| Specification type and grade | | | | | | | |
| to Specification type and grade | | | | | | | |
| or | | | | | | | |
| Chem. Analysis and Mech. Properties | | | | | | | |
| to Chem. Analysis and Mech. Properties | | | | | | | |

Thickness Range

| | | | |
|---|---|---|---|
| Base Metal Groove | 1/16 in (1.5 mm) to 0.5 in (12.7 mm) | Fillet | All thicknesses |
| Pipe Diameter Groove | All | Fillet | All |
| T Limits Impact | N/A | | |
| Pass > 1/2 in (13 mm) | None | | |
| T Limits (S. cir. arc) | N/A | | |

**FILLER METALS (QW-404)**

| | |
|---|---|
| Welding Process | GMAW |
| Filler Metal F No. | F22 |
| Filler Weld metal analysis A No. | ER5356 |
| SFA Specification | 5.10 |
| Filler Metal Classification | ER5356 |
| Filler Metal Size | 0.035 in (0.9 mm) |
| Consumable Inserts | None |
| Filler Metal Product Form | Solid wire |
| Deposit Weld Metal thickness (t) | |
| Groove | 0.5 in (12.7 mm) max. |
| Fillet | All sizes |
| Supplemental Filler Metal | None |
| Alloy Element | None |
| t Limits (S. cir. arc) | N/A |

QW-482 Page 1 of 2 (front)

## QW-482 (BACK)

WPS no. GMAW-AL-01 Rev. 0

| POSITIONS (QW-405) | |
|---|---|
| Position(s) of Groove | All |
| Welding Progression | Up |
| Position(s) of Fillet | All |

| POSTWELD HEAT TREATMENT (QW-407) | | | |
|---|---|---|---|
| PWHT | None | | |
| Temperature | N/A | Time | N/A |
| T Limits | N/A | | |

| PREHEAT (QW-406) | |
|---|---|
| Preheat Temp Min | 65°F (18°C) |
| Interpass Temp Max | 180°F (82°C) |
| Preheat Maintenance (continuous or special heating where applicable should be recorded) | As Above / N/A |

| GAS (QW-408) | | | |
|---|---|---|---|
| GMAW | Gas(es) | Percent Composition (Mixture) | Flow rate(cfph) |
| Shielding | Argon | 100% Argon | 20-30 |
| Trailing | None | | |
| Backing | None | | |

| ELECTRICAL CHARACTERISTICS (QW-409) | | | |
|---|---|---|---|
| Max Heat Input (KJ/in) | As per welding parameters | | |
| Current AC or DC | DC | Polarity | RP (EP) |
| Amps (range) | See below | Volts (range) | See below |
| Mode of Transfer | Global, Spray or Pulsed | | |
| Tungsten Electrode | N/A | | |
| Other | | | |

| TECHNIQUE (QW-410) | |
|---|---|
| Welding Process | GMAW |
| String or weave bead | Stringer / slight weave |
| Orifice or gas cup size | 9/16 in (14 mm) |
| Method cleaning | Brushing, grinding |
| Method of back gouging | Grinding, Plasma Arc or Mechanical Gouging |
| Oscillation | None |
| Multiple to single pass (per side) | Single / Multipass, as required |
| Single to multi electrode | Single |
| Contract tube to work distance | 0.75 in - 1 in (19 mm - 25 mm) |
| Electrode spacing | N/A |
| Manual or automatic | Semi-Automatic |
| Peening | None |
| Use of thermal processes | None |
| Other | |

| Layers /Passes | Process | Filler Metal Classification | Filler Metal Diameter in | Type Polarity | Amps | Volts | Wire Feed Speed (ipm) | ATS (ipm) |
|---|---|---|---|---|---|---|---|---|
| Root / Hot | GMAW | ER5356 | 0.035 in | DC RP (EP) | 180-240 | 21-25 | 473-577 | 10-20 |
| Fill & Cap | GMAW | ER5356 | 0.035 in | DC RP (EP) | 180-240 | 21-25 | 473-577 | 10-20 |
| | | | | | | | | |

**Welding Notes:**

Base metal shall be clean, dry & without water stain. Prepare weld joints by mechanical means (cutting, sawing, shearing etc), plasma arc cutting, laser cutting or water jet cutting. It is recommended to use acetone as a cleaning agent prior to welding (before removal of the oxide layer) and between passes. Immediately prior to welding remove oxide using either a stainless steel brush or a non-resin bonded grinding disk (resin bonded disks may be used for post weld operations only). Remove smut between passes with a stainless steel wire brush. Ideally aluminum welding operations will be kept separate from welding on other materials. Do not use equipment for the welding of Aluminum that has been previously used for the welding or cleaning of other materials.

Manufacturer: National Energy Equipment Inc.

PROFESSIONAL ENGINEER — PROVINCE OF BRITISH COLUMBIA — Dr. M. J. SMITH # 43744

Certified by Manufacturer: Zanyar Farhadi, National Quality Systems Manager

Date: 2019-02-13

2019-02-06

Authorized By: Mathew Smith, P. Eng.

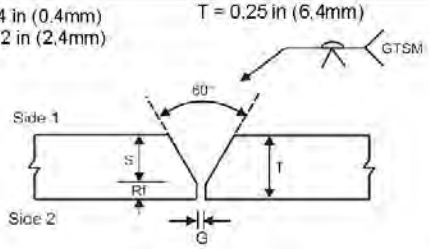
SKC ENGINEERING
WELDING • MATERIALS • MECHANICAL • INSPECTION • TESTING

## QW-483 suggested format for procedure qualification records (PQR)
## (see QW-200.2, Section IX, ASME Boiler and Pressure Vessel Code)
## Record Actual Conditions Used to Weld Test Coupons

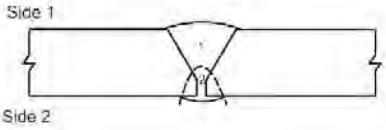
| | | | |
|---|---|---|---|
| Company Name | National Energy Equipment Inc. | By: | SKC ENGINEERING |
| Procedure Qualification Record (PQR) No.: | GMAW-AL-01 | Revision: | 0 |
| Welding Procedure Specification (WPS) No.: | GMAW-AL-01 | Issue Date: | 4-Feb-2019 |
| Welding Process(es): | GMAW | WO: | W13939-D2 |
| Type(s) ( Manual, Automatic, Semi-automatic): | Semi-automatic | | |

JOINTS (QW-402)

G = 1/64 in (0.4mm)
Rf = 3/32 in (2.4mm)
T = 0.25 in (6.4mm)




Typical for T = 0.25 in
2 Layers, 2 Passes




*Groove Design of Test Coupon*

(For combination qualifications, the deposited weld metal thickness shall be recorded for each filler metal or process used)

| BASE METALS (QW-403) | | |
|---|---|---|
| Material Spec | ASTM B209 | ASTM B209 |
| Type or Grade | 5052 | 5052 |
| P no. | P22 | P22 |
| Group no. | N/A | N/A |
| Thickness of test coupon | 0.25 in (6.4 mm) | |
| T Qualified | N/A | |
| T- Limits Impact | N/A | |
| t Pass > 1/2 in (13 mm) | None | |
| T- Limits (S. cir. arc.) | N/A | |

| FILLER METALS (QW-404) | |
|---|---|
| | All Passes |
| SFA Specification | 5.10 |
| Filler Metal Classification | ER5356 |
| Filler Metal F- no. | F22 |
| Weld Metal Analysis A No. | ER5356 |
| Size of Filler Metal | 0.035 in (0.9 mm) |
| Filler Metal Product Form | Solid Wire |
| Consumable Insert | None |
| Weld Metal Thickness (t) | 0.25 in (6.4 mm) |
| Supplemental Filler Metal | None |
| Alloy Element | None |
| t Limits (S. cir. arc.) | N/A |
| Other/Brand name | Linde ER5356 |

| POSITION (QW-405) | |
|---|---|
| Welding Process | GMAW |
| Position of groove | 1G (Flat) |
| Weld Progression | N/A |
| Other | |

| PREHEAT (QW-406) | |
|---|---|
| Preheat Temperature | 65°F (18°C) |
| Min. Interpass Temperature | 65°F (18°C) |
| Max. Interpass Temperature | 80°F (27°C) |
| Other | |

| POST WELD HEAT TREATMENT (QW-407) | | | |
|---|---|---|---|
| PWHT | None | | |
| Temperature | N/A | Time | N/A |

| GAS (QW-408) | | | |
|---|---|---|---|
| | Gases | Percent Composition (Mixture) | Flow Rate (cfph) |
| Shielding Gas (GTAW) | Argon | 100% Ar | 25 |
| Backing Gas | N/A | N/A | N/A |
| Trailing Gas | N/A | N/A | N/A |

| ELECTRICAL CARACTERISTICS (QW-409) | |
|---|---|
| | All Passes |
| Heat Input (KJ/in) , Max | 21.8 |
| Current | DC |
| Polarity | RP (EP) |
| Amperes | 210 |
| Volts | 23 |
| Mode of Transfer | Spray |
| Tungsten electrode | N/A |
| Wire Feed Speed (ipm) | 525 |
| Other ATS (ipm) | 13.3-17.1 |

| Technique (QW-410) | |
|---|---|
| String or Weave Bead | Stringer |
| Orifice, cup, or Nozzle Size | 9/16 in (14 mm) |
| Cleaning Method | Grinding, brushing |
| Back Gouge Method | Grinding |
| Oscillation | None |
| Multipass or Single Pass/side | Single |
| Single or Multiple electrodes | Single |
| Contact Tube to Work Distance | 1 in (25 mm) |
| Electrode spacing | N/A |
| Manual or automatic | Semi-automatic |
| Peening | None |
| Use of thermal processes | None |

## QW-483 (BACK)

PQR No. **GMAW-AL-01**

TENSILE TEST (QW-150)

| Specimen No | Thickness mm | Width mm | Area mm2 | Ultimate Force kN | Ultimate Stress Mpa | Type of Failure & Location |
|---|---|---|---|---|---|---|
| 5T1 | 6.15 | 18.9 | 116 | 22.5 | 194 | Base Metal - Ductile |
| 5T2 | 6.15 | 18.9 | 116 | 22.8 | 196 | Base Metal - Ductile |
| Comments: | Specified UTS: 170 Mpa min. SKC Report No. W13939-P1901301125T, dated 29/01/2019 | | | | | |

GUIDE BEND TEST (QW-160)

| Specimen No | Type of Test | Figure Number | Bending Angle | Results | Comments |
|---|---|---|---|---|---|
| 5F1 | Transverse, Face | QW-462.3(a) | 180° | Acceptable | Discontinuities within limit |
| 5F2 | Transverse, Face | QW-462.3(a) | 180° | Acceptable | Discontinuities within limit |
| 5R1 | Transverse, Root | QW-462.3(a) | 180° | Acceptable | Discontinuities within limit |
| 5R2 | Transverse, Root | QW-462.3(a) | 180° | Acceptable | Discontinuities within limit |
| Comments: | SKC Report No. W13939-P1901301156B, dated 30/01/2019 | | | | |

TOUGHNESS TEST (QW-170)

| Specimen No | Notch Location | Test Temperature °C | Impact Energies J | Average Energy J | Shear Fracture % | Lateral Expansion mils |
|---|---|---|---|---|---|---|
| N/A | | | | | | |
| Comments: | | | | | | |

Hardness Test

| Traverse | Base Metal (HV10) | Heat affected zone (HV10) | | | Weld Metal (HV10) | | Heat affected zone (HV10) | | | Base Metal (HV10) |
|---|---|---|---|---|---|---|---|---|---|---|
| N/A | | | | | | | | | | |
| Comments: | | | | | | | | | | |

WELDING EQUIPMENT AND SETTINGS DETAILS

| | | | |
|---|---|---|---|
| Process: | GMAW | | |
| Power Source: | CV | | |
| Wire Feed: | N/A | | |
| Program Number: | N/A | | |
| Trim Value: | N/A | | |
| Welder's Name: | Michael Critchlow | Welder's ID: | BCSA Reg. # 384846 |
| Test coupon No.: | 1G MC 13939 | Date test coupon welded: | 18-Jan-2019 |
| Mechanical test conducted by: | SKC Engineering Ltd. | Laboratory Tests No: | W13939-P1901301125T & W13939-P1901301156B |
| Welding Supervised by: | Christopher Ross, Applus RTD | | |

Notes:

We certify that the statements in this record are correct and that the test welds were prepared, welded, and tested in accordance with the requirements of ASME IX .

Manufacturer: **National Energy Equipment Inc.**

Zanyar Farhadi, National Quality Systems Manager

Approval

Date: 2019-02-13

PROFESSIONAL ENGINEER PROVINCE OF BRITISH COLUMBIA Dr. M. J. SMITH # 43744

2019-02-06

Authorized by: **Mathew Smith, P. Eng.**

SKC ENGINEERING
WELDING • MATERIALS • MECHANICAL • INSPECTION • TESTING

SKC ENGINEERING 19165 94th AVENUE, SURREY, BC, V4N 3S4
P (604) 862 1869 • F (604) 862 1811 • www.skcsiu.com

**This page in intentionally left blank**

**This page in intentionally left blank**

**This page in intentionally left blank**

**This page in intentionally left blank**

## 21.1.10

| NATIONAL ENERGY EQUIPMENT INC. | TC 331 tank 1-year inspection checklist |
|---|---|
| Form Number:NEE-FR-L-010 | Revision: 0 |

Date: _____ Inspected by: _____ Page 1 of 2
Tank Owner: _____ Phone #: _____
Address: _____ Unit #: _____
_____ Tank Manufacturer: _____
Serial #: _____ Tank Spec: _____ MFG Date: _____
Shell Material: _____ Comp. Sizes: _____
Original Test Date: _____ M.A.W.P.: _____ Test Pressure: _____
Tests Performed: V K Hose Test Next 5-year inspection: _____

****Tank and attachments must be clean prior to inspection****

****Working from Heights policies are in effect****

### External Visual "V"

**-Inspect data plate [12.2]** (legible, permanently affixed, has all information required in 12.2)
Pass___ Fail___ N/A___

**-Inspect tank inspection decals [12.2]** (verify what tests are required, 1 year or 5 year)
Pass___ Fail___ N/A___

**-Inspect tank bulk heads and shell [12.2]** (Check for corrosion, dents, distortions, defects in welds, leakage, damage indicating weakness in the tank that could render it unsafe for transport, voids on bottom of tank are not capped and show no signs of leakage.) Pass___ Fail___ N/A___

**-Inspect fenders and attachments [12.2]** (Ladder/drop hose compartments latch, cracks, damage to fenders or mounting) Pass___ Fail___ N/A___

**-Inspect bumper / rear end protection [12.2]** (Securely mounted, welds, damage, correct dimensions, distance between widest part of rear of vehicle and outward edge of bumper does not exceed 18" distance between bottom of bumper and ground is less than 30" when empty,) Pass___ Fail___ N/A___

**-Inspect rear tank sills/frame [12.2]** (damage, welds) Pass___ Fail___ N/A___

**-Inspect placards** (correct product, legible, all 4 present) Pass___ Fail___ N/A___

**-Inspect tank mounts [12.2]** (unable to loosen with wrench, welds on brackets, condition of sill fil material [wood/rubber etc.]) Pass___ Fail___ N/A___

**-Inspect underslung boxes [12.2]** (hydraulic leaks, fitting/flange leaks, gaskets, pump/meters securely mounted, all valves/air switches work correctly, grasshopper springs) Pass___ Fail___ N/A___
**-Inspect slam latches/door safety latches [12.2]** (all latch correctly) Pass___ Fail___ N/A___
**-Inspect cabinet doors** (damage, seal properly when closed) Pass___ Fail___ N/A___
**-Inspect all air switches** (make sure all switches work) Pass___ Fail___ N/A___
**-Inspect emergency switches** (verify operation of all) Pass___ Fail___ N/A___
**-Inspect underneath tank [12.2]** (dents, corrosion, leaks,ISC vics, cracks on outriggers/cross members, make sure voids are not capped, pipes for dents/rubbing, hydraulics, excessive play in PTO shaft) Check or shear section on Outlet valve) Pass___ Fail___ N/A___

**-Inspect on top of tank [12.2]** (dents, corrosion, fall protection functions (if equipped), anti-slip grating insecure or wearing tank, obvious signs of leakage, Pass___ Fail___ N/A___

### Leakage Test "K" Test Pressure _____

Dedicated service, the test pressure shall be the maximum normal operating pressure of the tank,

MC 330, MC 331 or TC 331 in LPG or NH3 service shall be tested at no less than 60 PSI.

- Pressure test compartment and all associated,

- Spray with soapy water all welds pipe connections, meter and pump equipment for signs and observe for signs of leaks.

**TANK [12.5]** Pass___ Fail___ N/A___ **PIPING [12.5]** Pass___ Fail___ N/A___

**PUMP [12.5]** Pass___ Fail___ N/A___ **METER [12.5]** Pass___ Fail___ N/A___

| NATIONAL ENERGY EQUIPMENT INC. | TC 331 tank 1-year inspection checklist |
|---|---|
| Form Number:NEE-FR-L-010 | Revision: 0 |

**Emergency Discharge Control [12.2]** **Pass___ Fail___ N/A___** Page 2 of 2

-TC 331 tanks that transport liquefied compressed gas (LPG) are required to have Emergency discharge controls, except designed to transport Class 2.2, non-flammable and non-toxic gases.

-Tanks that are 13,250L or less, equipped for metered Service, need an off-truck emergency shutdown system.

-Tanks that are 13,250L or more, equipped for metered service, will need either a monitoring feature or a passive emergency shutdown system in addition to an off-truck emergency shut down system.

-The system will be tested at the time of inspection,

-With product running at normal flow rate throughout the metering system, activate the off-truck Emergency shutdown system (normally this would be a BASE Engineering product). Observe the meter to determine how long it takes to stop the product flow. The meter should stop the flow and close the ISC within 30

seconds or sooner. No meter creep after 5 seconds.

-The same process for testing the Emergency Discharge Controls shall be used on both ON and OFF truck applications.

-The emergency shut down system shall function reliably at a distance of 46 m (150ft) and

-When the Emergency shutdown has been activated, the ISC can't be reactivated remotely.

-Indicate results on *Test and Inspection Report* (Form No: NEE-FR-L-007).

-For non-metered tanks, all ISC valves shall be open. Each emergency discharge control remote actuator (on- truck and off truck) shall be operated to ensure each ISC valve indicator has moved to the closed position. Once all ISC valves are closed, all of the material in the downstream piping shall be evacuated, and the piping shall be returned to atmospheric temperature and pressure. The outlet shall then be monitored for 30 seconds to ensure that there is no detectable leakage.

## Hose Test [12.2 & 12.9]

**-Perform visual inspection of all hoses** (look for kinks, exposed re-enforcement, damaged ends, gaskets) **Pass___ Fail___ N/A___**

**-Pressure test all hoses** (hold pressure for 5 minutes) **Pass___ Fail___ N/A___**

| | | | | | |
|---|---|---|---|---|---|
| **Hose I.D.** | : _____ | _____ | _____ | _____ | _____ |
| **Test Press.** (Test/MAWP) | : _____ | _____ | _____ | _____ | _____ |
| **Test Medium** | : _____ | | | | |

| **Fail Items** | **Failure Corrected** |
|---|---|
| _____ | Y____ N____ |
| _____ | Y____ N____ |
| _____ | Y____ N____ |
| _____ | Y____ N____ |
| _____ | Y____ N____ |
| _____ | Y____ N____ |
| _____ | Y____ N____ |
| _____ | Y____ N____ |
| _____ | Y____ N____ |
| _____ | Y____ N____ |
| _____ | Y____ N____ |
| _____ | Y____ N____ |

**ONLY AFTER SUCCUSSFEUL TEST WILL MARKINGS BE APPLIED**

**Has inspection sticker been applied to tank?** Y____ N____

(Sticker must be affixed Driver-side front of the barrel and clearly visible)

**Has B620 test and inspection report been filled out?** Y____ N____

**** Take picture of Data Plate and attach to NEEI copy of Inspection Report***

## 21.1.11

| NATIONAL ENERGY EQUIPMENT INC. | Test and inspection travel sheet |
|---|---|
| Form Number:NEE-FRM-011 | Revision: 1 |

**COMPANY:** _____

**ADDRESS:** _____

DATE: _____ UNIT No.: _____

TC SPEC.: _____ DESIGN PRESSURE: _____ MANUFACTURER: _____

YEAR OF MANUFACTURE: _____ TANK SERIAL No.: _____

CAPACITY BY COMPARTMENT:

| 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|

LAST SERVICE ON:

Inspection Conducted by: _____ Certified by: _____

| No. | INSPECTION ACTIVITY | COMPLIES | REPAIR | HOLD POINT |
|---|---|---|---|---|
| 1 | Drawings | | | |
| 2 | Materials | | | |
| 3 | Welding | | | |
| 4 | External Visual Inspection | | | |
| 5 | Internal Visual Inspection | | | |
| 6 | Rollover Protection | | | |
| 7 | Emergency Flow Control & Piping | | | |
| 8 | Safety Relief Valves | | | |
| 9 | Vapour Tightness Test | | | |
| 10 | Lining Inspection | | | |
| 11 | Leakage Test | | | |
| 12 | Ultrasonic Thickness Test | | | |
| 13 | Wet Fluorescent Test | | | |
| 14 | Hose Assembly | | | |
| 15 | Hydrostatic Retest | | | |
| 16 | Cold Vacuum Retention Test | | | |
| 17 | Helium Detection Test | | | |
| 18 | Manhole Covers | | | |
| 19 | Manufacture / Repair / Recertification Plate | | | |
| 20 | Other (detail) | | | |

Process Owner: _____ Date: _____

The Inspector shall be presented with the Travel Sheet prior to construction so that he can designate additional inspection points and/or Hold Points. Any revisions shall be marked with a delta symbol with revision number and described at the bottom of this page.
**Hold points will be denoted as: H=HOLD, I=INSPECTION, R=REVIEW, W=WITNESS**

## 21.1.12

| NATIONAL ENERGY EQUIPMENT INC. | Hose assembly test and inspection report |
|---|---|
| Form Number:NEE-FR-L-012 | Revision: 0 |

FACILITY NAME:
ADDRESS:

TEST DATE:

FACILITY REG. NO.:

HOSE OWNER:
UNIT #
ADDRESS:

| VISUAL INSPECTION | HOSE SERIAL # | | |
|---|---|---|---|
| | COMPLIES | COMPLIES | COMPLIES |
| EXPOSED REINFORCEMENT | ☐ YES ☐ NO | ☐ YES ☐ NO | ☐ YES ☐ NO |
| KINKED, FLATTENED OR PERMANENTLY DEFORMED WIRE BRAID | ☐ YES ☐ NO | ☐ YES ☐ NO | ☐ YES ☐ NO |
| SOFT SPOTS WHEN NOT UNDER PRESSURE, BULGING UNDER PRESSURE OR LOOSE OUTER COVERING | ☐ YES ☐ NO | ☐ YES ☐ NO | ☐ YES ☐ NO |
| DAMAGED, SLIPPING OR EXCESSIVELY WORN HOSE COUPLINGS | ☐ YES ☐ NO | ☐ YES ☐ NO | ☐ YES ☐ NO |
| LOOSE OR MISSING BOLTS OR FASTENINGS ON BOLTED HOSE COUPLING ASSEMBLIES | ☐ YES ☐ NO | ☐ YES ☐ NO | ☐ YES ☐ NO |
| DETERIORATED LEGIBILITY OR ABSENCE OF SERIAL OR ID NUMBER OR HAWP | ☐ YES ☐ NO | ☐ YES ☐ NO | ☐ YES ☐ NO |

**HOSE PRESSURE TEST**

| HOSE SERIAL # | HAWP (PSI) | TEST PRESSURE (PSI) | TEST MEDIUM | PASS | FAIL |
|---|---|---|---|---|---|
| | | | | | |
| | | | | | |
| | | | | | |

DESCRIPTION OF DEFECTS FOUND AND METHODS USED TO REPAIR:

TESTER NAME:
SIGNATURE:
DATE:

**21.1.13**

| NATIONAL ENERGY EQUIPMENT INC. | Welding inspection report |
|---|---|
| Form Number:NEE-FR-L-013 | Revision: 0 |

**Facility Address:**

**Registration #:**

**Owner's Serial #:** _____

**Manufacture:** _____ **Serial #:** _____

**MFR Date:** _____ **Material:** _____ **Tank Spec:** _____

**Location of welds to be inspected (Provide sketch if required)**

_____

_____

_____

_____

_____

**Welding Process(es):** _____ **WPS:** _____

**Welder Qualification Verified YES** _____ **NO** _____

| ITEM | ACCEPT | REJECT |
|---|---|---|
| Porosity and/or Inclusions | | |
| Complete Fusion | | |
| Start and End Complete | | |
| Full Penetration | | |
| Welder Identification | | |

**Inspector Name (print):** _____ **Signature** _____

**Date:** _____

***This report must be attached to the Test and Inspection Report for this unit.***

## 21.1.14

| NATIONAL ENERGY EQUIPMENT INC. | Gauge Calibration Log |
|---|---|
| Form Number:NEE-FR-L-014 | Revision: 0 |

Mobile gauges for B620

| Gauge # | Date | Method | Pass | Fail | Next Due Date | Job |
|---|---|---|---|---|---|---|
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |

1-15 PSI gauges are to be used.

**21.1.15**

| NATIONAL ENERGY EQUIPMENT INC. | Equipment Calibration Log |
|---|---|
| Form Number:NEE-FR-L-015 | Revision: 0 |

| I.D. Number | Description | Calibration Date | Due Date | Calibrated By | Result |
|---|---|---|---|---|---|
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

**21.1.16**

| NATIONAL ENERGY EQUIPMENT INC. | Welder Continuity Log |
|---|---|
| Form Number:NEE-FR-L-016 | Revision: 0 |

**Welder:** _____

**Identification #:** _____

| Date | Customer | Process | Date Qualified | Repair description |
|---|---|---|---|---|
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

The Welder must use a Process once every 6 months, if not the Welders Qualification has expired.

**21.1.17**

| NATIONAL ENERGY EQUIPMENT INC. | Nonconformance corrective and preventative action report form |
|---|---|
| Form Number:NEE-FR-L-017 | Revision: 0 |

| Type of action/Status | |
|---|---|
| Corrective Action ☐ | Preventive Action ☐ |

| | |
|---|---|
| Job # | |
| Issued To | |
| Reference Highway Tank/ Portable Tank | |
| Reference Area/Process | |
| Documents | |

| Name of Initiator: | Signature: | Date: |
|---|---|---|
| | | |

| Nonconformity |
|---|
| Description of Nonconformity: |

| Root Cause | |
|---|---|
| Corrective Action ☐ | Preventive Action ☐ |
| Determination of Root Cause: | |
| Description of Implemented Action: | |

| Signature: | Position/Title: | Date: |
|---|---|---|
| | | |

| Evidence Reviewed and Conclusions | |
|---|---|
| Follow up ☐ | And Close ☐ |
| Is the action implemented? | |
| Is the Action Effective? | |

## 21.1.18 Mandatory Document List

- NEE-FRM-001 — Metal identification plate stamping
  Related Sections: 7 Manufacture, 8 Assembly
- NEE-FRM-002 — Modification plate stamping
  Related Section: 9 Modification
- NEE-FRM-003 — Specification plate information sheet for recertified tanks
  Related Sections: 7 Manufacture, 8 Assembly, 9 Modification
- NEE-FRM-004 — Certificate of compliance for new & assembled tanks
  Related Sections: 7 Manufacture, 8 Assembly
- NEE-FRM-005 — Modification certificate of compliance
  Related Section: 9 Modification
- NEE-FRM-006 — Repair report
  Related Section: 10 Repairs
- NEE-FRM-007 — Test and Inspection Report
  Related Section:12 Inspection and testing – examination
- NEE-FRM-008 — Metal identification plate replacement
  Related Section:12 Inspection and testing – examination
- NEE-FRM-010 — TC331 Tank 1-year Inspection Check List
  Related Section:12 Inspection and testing - examination
- NEE-FRM-011 — Test and inspection travel sheet
  Related Sections: 7 Manufacture, 8 Assembly, 9 Modification
- NEE-FRM-012 — Hose Assembly Test and Inspection Report
  Related Section:12 Inspection and testing - examination
- NEE-FRM-013 — Welding inspection report
  Related Sections:10 Repairs, 15 Welding / brazing control
- NEE-FRM-014 — Gauge Calibration Log
  Related Section:16 Calibration
- NEE-FRM-015 — Equipment Calibration Log
  Related Section:16 Calibration
- NEE-FRM-016 — Welder Continuity Log
  Related Section: 15 Welding control
- NEE-FRM-017 — Nonconformance corrective and preventative action report
  Related Section: 14 Nonconformities-Corrective action, 17 Quality audits

## 21.1.19 List of registered design engineers

| | |
|---|---|
| **Name:** | Ahmad Moaaz |
| **Address:** | 1004 600 Setter St<br>Winnipeg MB R2Y 2H7 |
| **Registration No.:** | 35-0188 |
| **Date of Expiry:** | 01-February-2021 |
| **Telephone:** | 204-698-0657 |

Transport Canada Transports Canada

# Certificate of Registration

This is to certify that

Ahmad Moaaz

residing at:

1004 600 Setter St
Winnipeg, MB
R2Y 2H7

is registered as a

## Design Engineer

pursuant to the requirements of Clause 8.1.5 of CSA Standard B620-09.

**EXPIRY DATE OF THIS REGISTRATION:**
Unless otherwise notified this registration is valid until the date of expiry indicated below. A new application must be submitted where there is any substantive change in the information given on the application form filed with Transport Canada. Application for renewal must be made by email at least three months before expiry.

**DATE OF ISSUE: 08-January-2016**
**DATE OF EXPIRY: 01-February-2021**

**REGISTRATION #: 35-0188**

## 21.1.20 List of B620 personnel and their qualifications

| | |
|---|---|
| **Name:** | Scott Osen |
| **Position:** | Tank inspector |
| **Date of qualification:** | October 2011 |
| **Qualification Process:** | He came to NEEI in 2000. After that he had a proper training for more than 1 year under supervision of the qualified B620 inspector, Mr. Saverio Masi from 2001 in the facility 25-0587. Then he was qualified as a tank tester in 2006, then he was qualified as a tank inspector in 2011. |
| **Name:** | Leeland Holt |
| **Position:** | Tank Inspector |
| **Date of qualification:** | January 2019 |
| **Qualification Process:** | He came to NEEI in December 2015. After that, he had a proper training under supervision of the qualified B620 inspector and tester, Mr. Scott Osen in the facility 25-0587. Then he was qualified as a hose tester in Dec. 2016, then after gaining more experience and knowledge, he was qualified as a tank inspector in Jan 2019. |
| **Name:** | Sam Laughlin |
| **Position:** | Hose Tester |
| **Qualification Date:** | September 2019 |
| **Qualification Process:** | He came to NEEI in June 2019 after his graduation from BCIT. Then, he had a proper training under supervision of the qualified B620 inspector and tester, Mr. Scott Osen in the facility 25-0587. Then he was qualified as a hose tester in September 2019. |
| **Name:** | |
| **Position:** | |
| **Qualification Date:** | |
| **Qualification Process:** | |
| **Name:** | |
| **Position:** | |
| **Qualification Date:** | |
| **Qualification Process:** | |

**21.1.21**


NATIONAL ENERGY EQUIPMENT INC.
CERTIFICATE of QUALIFICATION
THIS ACKNOWLEDGES THAT
XXXXXXX
HAS QUALIFAIED AS
☑Tester ☑Tank Inspector ☑Welder (ID No.: xxxx )
Uunder Quality Control Manual for Highway and TC
Portable Tanks for The TDG (B620 Program)
C
ustomer Is #1
A
ccountable & Motivated People
N
ever Compromise Service
D
o It Now! Do it Right! Do it Safe!
O
ur Energy is Everything
MM YYYY
SIGNED, Zanyar Farhadi, National Quality Systems Manager

**21.1.22**

**Table 7.1 of CSA B620 Periodic inspection and test intervals**

*(See Clauses 7.1.1, C.1, C.2, and C.6 of CSA-B620.)*

| Description of tank | Clause 7.2.1 External inspection | Clause 7.2.2 Internal inspection[1] | Clause 7.2.3 Lining inspection | Clause 7.2.5 Leakage test | Clause 7.2.7 Pressure test, hydrostatic or pneumatic | Clause 7.2.11 Structural inspection |
|---|---|---|---|---|---|---|
| TC 306 or TC 406 tanks | 1 year | 5 years[2] | — | 1 year | 5 years[3] | — |
| TC 306 Crude or TC 406 Crude tanks | 2.5 years | 5 years | — | 2.5 years | 5 years[3] | |
| TC 307 or TC 407 tanks | 1 year | 5 years | — | 1 year | 5 years | — |
| TC 312 or TC 412 tanks | 1 year | 5 years | — | 1 year | 5 years[3] | — |
| TC 423 tanks | 1 year | 1 year | — | 1 year | 5 years | 5 years |
| TC 350 tanks | 6 months | 1 year | — | 1 year | 2 years | — |
| TC 350 Crude tanks | 1 year | 1 year | — | 1 year | 2 years | — |
| TC 331 tanks | 1 year | 5 years | — | 1 year[4] | 5 years[4] | — |
| TC 338 tanks | 1 year | — | — | — | 5 years | — |
| TC 341 tanks[5] | 1 year | 10 years | — | — | 10 years | — |
| TC 11 portable tanks | 1 year | 10 years[6] | — | 1 year | 5 years | — |
| TC 44 portable tanks | 1 year | 5 years | — | 1 year | 5 years | — |
| TC 51 portable tanks[9] | 2.5 years[7] | 5 years | 5 years | — | 5 years | — |
| TC 56 and 57 portable tanks[8] | 2.5 years | — | — | — | 2.5 years | — |
| TC 60 portable tanks | 2 years | Initial: 4 years<br>Next 8 years: every 2 years<br>After 12 years: annually | Initial: 4 years<br>Next 8 years: every 2 years<br>After 12 years: annually | | Initial: 4 years<br>Next 8 years: every 2 years<br>After 12 years: annually | — |

***Notes:***

(1) Where a tank, other than a TC 341 tank, is not equipped with a manhole or inspection ports, a hydrostatic or pneumatic pressure test shall be performed at the interval for internal inspections. See also Note 5.

(2) Highway tanks used only to refuel aircraft and that operate only on airport property shall be exempt from internal inspection, provided that they are clearly marked “Restricted to Use on Airport Property” in letters not less than *25 mm* (1 in) high in a contrasting colour on each side of the tank where they will be clearly visible from the ground.

(3) For TC 306, TC 406, TC 306 Crude, TC 406 Crude, TC 312, or TC 412 tanks, the pressure tests specified in Clause 7.2.7 shall not be required for uninsulated lined tank trucks and trailers with a design pressure or MAWP of *103 kPa* (15 psi) or less, if an external inspection and a lining inspection have been performed annually.

(4) TC 331 tanks in chlorine service shall be leak tested as specified in Clause 7.2.5 and pressure tested as specified in Clause 7.2.7 every two years. Pressure tests shall not be required on TC 331 tanks when in sodium metal service.

(5) As an alternative to the inspection and test requirements of this Table for TC 341 tanks, owners may perform the tests and inspections described in Annex C.

(6) The internal inspections specified in Clause 7.2.2 do not apply to TC 11 tanks that are less than 2350 L (620 US gal) and that do not have inspection openings.

(7) The external inspection period may be extended to 3 years following a pressure test for tanks described in CSA B622, Clause 6.3, Specific Requirement 55.

(8) TC 56 and TC 57 tanks shall be inspected and retested in accordance with Section 7 of CAN/CGSB-43.146.

(9) A TC 51 portable tank that is loaded and off-loaded without being removed from the vehicle shall be inspected and tested according to the requirements for TC 331 tanks specified in this Table.

(10) The pressure test period for tanks described in CSA B622, Clause 6.3, Specific Requirement 54 and Specific Requirement 55, is three years

(11) TC 331 and TC 51 tanks shall be subjected to an internal inspection by the wet fluorescent magnetic particle method in accordance with Clause 7.2.8 when the conditions of Clause 7.2.8(a) are met.

## Table 7.2 of CSA B620 Additional periodic inspection and test intervals

(See Clauses 7.1.1 and C.6.)

| Description of tank | Clause 7.2.1 External inspection | Clause 7.2.2 Internal inspection[1] | Clause 7.2.3 Lining inspection | Clause 7.2.5 Leakage test | Clause 7.2.7 Pressure test, hydrostatic or pneumatic | Clause 7.2.6 Thickness test[6] | Clause 7.2.4 Upper coupler inspection |
|---|---|---|---|---|---|---|---|
| All tanks designed to be loaded by vacuum, with full opening rear heads | 6 months[5] | — | — | — | 2 years | — | — |
| All lined tank trucks and tank trailers in corrosive service | — | 1 year | 1 year | — | — | — | — |
| All lined tank trucks and tank trailers not in corrosive service[7] | — | — | 5 years | — | — | — | — |
| All unlined tank trucks and tank trailers in corrosive service[2] | — | 1 year | — | — | — | 2 years[4] | — |
| All insulated tank trucks and tank trailers[3] | — | 1 year | — | — | — | — | — |
| All insulated highway and portable tanks, lined or without manholes[2] | — | — | — | — | 1 year | — | — |

## Table 7.2 (Concluded)

| Description of tank | Clause 7.2.1 External inspection | Clause 7.2.2 Internal inspection(1) | Clause 7.2.3 Lining inspection | Clause 7.2.5 Leakage test | Clause 7.2.7 Pressure test, hydrostatic or pneumatic | Clause 7.2.6 Thickness test(6) | Clause 7.2.4 Upper coupler inspection |
|---|---|---|---|---|---|---|---|
| All tank trailers Not in corrosive service equipped with an upper coupler | — | — | — | — | — | — | 5 years |
| All tank trailers in corrosive service equipped with an upper coupler | | | | | | | 2 years |

**Notes:**

**(1)** *Where the tank is not equipped with a manhole or inspection ports, a hydrostatic or pneumatic test shall be performed at the interval for internal inspections.*

**(2)** *Except TC 338 and 341 tanks.*

**(3)** *Except TC 331, 338, and 341 tanks.*

**(4)** *If the thickness is such that less than 20% of the corrosion allowance remains, a thickness test shall be performed annually.*

**(5)** *Except TC 350 crude tanks.*

**(6)** *The thickness test does not apply to FRP tanks.*

**(7)** *Lined tanks not in corrosive service shall have their lining visually inspected but the marking requirements of Clause 7.4.3(e) shall not apply.*

**21.1.23**

**Table 7.3 of CSA B620 Test pressures**

(See Clauses 5.2.5, 5.5.2.4, 7.2.7.7, and 7.2.7.8.)

| Tank specification | Pressure, kPa (psi) |
|---|---|
| TC 306 or MC | 21 kPa (3 psi) or design pressure, whichever is greater |
| TC 307 or MC 307 | 275 kPa (40 psi) or 1.5 × design pressure, whichever is greater |
| TC 312 or MC 312 | 21 kPa (3 psi) or 1.5 × design pressure, whichever is greater |
| TC 331, MC 330, or MC 331 | 1.5 × design pressure |
| TC 406 | 34.5 kPa (5 psi) or 1.5 × MAWP, whichever is greater |
| TC 407 | 275.8 kPa (40 psi) or 1.5 × MAWP, whichever is greater |
| TC 412 | 1.5 × MAWP |
| TC 423 | 1.5 × MAWP |
| TC 338 | According to calculation in Clause 5.2.5 |
| TC 341 | According to calculation in Clause 5.5.2.4 |
| TC 350 | 155 kPa (22.5 psi) or 1.5 × MAWP, whichever is greater |
| TC 11 | According to calculation in Clause 6.4.11(c) |
| TC 44 | 27 kPa (4 psi) or 1.5 × MAWP, whichever is greater |
| TC 51 or DOT 51 | 1.5 × design pressure |
| TC 60 or DOT 60 | 415 kPa (60 psi) |
| TC Type 1, 2, and 3 | 1.5 × MAWP |

**21.1.24**

**Table 7.4 of CSA B620 Minimum thickness for TC and MC 306, 307, and 312 specification tanks manufactured with steel and steel alloys.**

(See Clause 7.2.6.2.)

| Minimum nominal thickness required in Tables 5.2 or 5.3, 5.4 or 5.5, and 5.6 or 5.7, as applicable, for the specification, US gauge or mm (in) | Nominal decimal equivalent for reference, mm (in) | In-service minimum thickness, mm (in) |
|---|---|---|
| 19 | 1.06 (0.0418) | 0.97 (0.038) |
| 18 | 1.21 (0.0478) | 1.09 (0.043) |
| 17 | 1.37 (0.0538) | 1.22 (0.048) |
| 16 | 1.52 (0.0598) | 1.37 (0.054) |
| 15 | 1.71 (0.0673) | 1.55 (0.061) |
| 14 | 1.90 (0.0747) | 1.70 (0.067) |
| 13 | 2.28 (0.0897) | 2.06 (0.081) |
| 12 | 2.66 (0.1046) | 2.39 (0.094) |
| 11 | 3.04 (0.1196) | 2.74 (0.108) |
| 10 | 3.42 (0.1345) | 3.07 (0.121) |
| 9 | 3.80 (0.1495) | 3.43 (0.135) |
| 8 | 4.18 (0.1644) | 3.76 (0.148) |
| 7 | 4.55 (0.1793) | 4.09 (0.161) |
| 4.76 (3/16) | 4.76 (0.1875) | 4.29 (0.169) |
| 6.35 (1/4) | 6.35 (0.2500) | 5.72 (0.225) |
| 7.94 (5/16) | 7.94 (0.3125) | 7.14 (0.281) |
| 9.53 (3/8) | 9.53 (0.3750) | 8.59 (0.338) |

**21.1.25**

**Table 7.5 of CSA B620 Minimum thickness for TC and MC 306, 307, and 312 specification tanks manufactured with aluminum and aluminum alloys.**

(See Clause 7.2.6.2.)

| Minimum nominal thickness required in Tables 5.2 or 5.3, 5.4 or 5.5, and 5.6 or 5.7, as applicable, for the specification, US gauge or mm (in) | In-service minimum thickness, mm (in) |
|---|---|
| 1.98 (0.078) | 1.78 (0.070) |
| 2.21 (0.087) | 1.98 (0.078) |
| 2.44 (0.096) | 2.18 (0.086) |
| 2.77 (0.109) | 2.49 (0.098) |
| 3.30 (0.130) | 2.97 (0.117) |
| 3.58 (0.141) | 3.23 (0.127) |
| 3.84 (0.151) | 3.54 (0.136) |
| 4.37 (0.172) | 3.94 (0.155) |
| 4.39 (0.173) | 3.96 (0.156) |
| 4.93 (0.194) | 4.45 (0.175) |
| 5.49 (0.216) | 4.93 (0.194) |
| 6.02 (0.237) | 5.41 (0.213) |
| 6.86 (0.270) | 6.17 (0.243) |
| 9.14 (0.360) | 8.23 (0.324) |
| 11.43 (0.450) | 10.29 (0.405) |
| 13.72 (0.540) | 12.34 (0.486) |

**21.1.26**

| NATIONAL ENERGY EQUIPMENT INC. | Confined Spaces Entry Permit |
|---|---|
| Form Number:NEE-FR-L-102-(REV3) Page 1 of 1 | Revision: 3 |

| | |
|---|---|
| Date of Issue: | Time Of Issue: |
| Time Of Entry: | Anticipated Time Out: |
| Entrant: | Product Last Contained: |
| Standby Person: | Entry Supervisor: |

Type of Work: ☐Hot Work ☐Cold Work ☐Welding ☐Repairs ☐Inspection/Cleaning

Type of Work **NOT TO BE PERFORMED**

| Y | N | NA | | Y | N | NA | |
|---|---|---|---|---|---|---|---|
| ☐ | ☐ | ☐ | Job Planning Complete | ☐ | ☐ | ☐ | Safety Harness / Life line Required |
| ☐ | ☐ | ☐ | Lockout Procedure Followed | ☐ | ☐ | ☐ | Fire Fighting Equipment on Hand |
| ☐ | ☐ | ☐ | C.S. Product / MSDS/SDS Reviewed | ☐ | ☐ | ☐ | Liquid Present |
| ☐ | ☐ | ☐ | Reviewed materials MSDS/SDS Sheets | ☐ | ☐ | ☐ | Electrical Tools Grounded Type |
| ☐ | ☐ | ☐ | Safe Access to Confined Space | ☐ | ☐ | ☐ | GFI & Sealed Extension Cords |
| ☐ | ☐ | ☐ | Area Cleared of Hazards | ☐ | ☐ | ☐ | Hearing Protection Required |
| ☐ | ☐ | ☐ | Lines Isolated and Blocked | ☐ | ☐ | ☐ | Face Shield/Glasses Required |
| ☐ | ☐ | ☐ | Respiratory Protection Required | ☐ | ☐ | ☐ | Head Protection Required |
| ☐ | ☐ | ☐ | Space Ventilated Prior to Entry | ☐ | ☐ | ☐ | Protective FR clothing |
| ☐ | ☐ | ☐ | Natural Ventilation | ☐ | ☐ | ☐ | Emergency Eye Wash/Shower |
| ☐ | ☐ | ☐ | Mechanical Ventilation | ☐ | ☐ | ☐ | Emergency Extraction Kit |
| ☐ | ☐ | ☐ | Ventilation Required During Entry | ☐ | ☐ | ☐ | Workers Aware of Conditions |

**RESULTS OF ATMOSPHERIC/EXPLOSIMETER TESTING**

**Acceptable Atmospheric/Explosimeter Readings**

**O2% 20.9%** **LEL 0%** **CO < 5 ppm** **$H_2S$ 0 ppm** **TVOC 0 ppm or similar to background**

Instrument #: Calibration Date: Daily Bump Test Completed By

| Oxygen % | LEL % | CO | $H_2S$ | TVOC | Date/Time | Time Out |
|---|---|---|---|---|---|---|
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |

**ENTRANT AND SAFETY WATCH SIGNATURES**

| Entrants | Safety Watch | Time In | Expected Time out | Time Out |
|---|---|---|---|---|
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

Permit Approved By:

***Permit Valid Until Midnight on Issue Date***
***Or Beginning of next shift (whichever comes first)***

**21.1.27**

# Confined Space Entry Program

| NATIONAL ENERGY EQUIPMENT INC. | Document Number: NEE-CSEP-MB-001 | | |
|---|---|---|---|
| | Prepared by: | Arash Navidan | |
| | Approved by: | Zanyar Farhadi | |
| | Date of Issue: 2017/06/30 | Rev. No.: 3 | Sheet: 1 of 7 |

## TABLE OF CONTENT

## SECTION - 1 Scope

This program governs the entry into Confined Spaces at National Energy Equipment Inc. (NEEI) facilities. It shall be followed by all NEEI employees or employees of any sub-contractors while on mentioned NEEI property.

This program is meant to satisfy the requirements of the Work Safe BC, Occupational Health & Safety Regulation (OHSR), and all provincial legislation related to Confined Space Entry.

## SECTION - 2 Definitions and Glossary of Abbreviations

*"adjacent piping"* means a device such as a pipe, line, duct or conduit which is connected to a confined space or is so located as to allow a substance from within the device to enter the confined space;

*"blank"* means a solid plate installed through the cross-section of a pipe, usually at a flanged connection;

*"blanking or blinding"* means the absolute closure of adjacent piping, by fastening across its bore a solid plate or cap that completely covers the bore and that is capable of withstanding the maximum pressure of the adjacent piping;

*"blind"* means a solid plate installed at the end of a pipe which has at that point been physically disconnected from a piping system;

*"clean respirable air"* when used to describe the atmosphere inside a confined space, means an atmosphere which is equivalent to clean, outdoor air and which contains

(a) about 20.9% oxygen by volume,

(b) no measurable flammable gas or vapour as determined using a combustible gas measuring instrument, and

(c) no air contaminant in concentrations exceeding either 10% of its applicable exposure limit in section 4.6, or an acceptable ambient air quality standard established by an authority having jurisdiction over environmental air standards, whichever is greater;

*"confined space"* means an area, other than an underground working, that

(a) is enclosed or partially enclosed,

(b) is not designed or intended for continuous human occupancy,

(c) has limited or restricted means for entry or exit that may complicate the provision of first aid, evacuation, rescue or other emergency response service, and

(d) is large enough and so configured that a worker could enter to perform assigned work;

*"disconnecting"* means physically disconnecting adjacent piping from a confined space to prevent its contents from entering the space in the event of discharge;

*"double block and bleed"* means the closure of adjacent piping by locking out a drain or vent in the open position in the line between 2 locked out valves in the closed position;

*"harmful substance"* means a WHMIS hazardous product, a substance referred to under section 4.6, or a substance which may have a harmful effect on a worker in a confined space;

*"high hazard atmosphere"* means an atmosphere that may expose a worker to risk of death, incapacitation, injury, acute illness or otherwise impair the ability of the worker to escape unaided from a confined space, in the event of a failure of the ventilation system or respirator;

*"inerting"* means intentionally flooding the atmosphere inside a confined space with an inert gas such as nitrogen to eliminate the hazard of ignition of flammable vapours inside the confined space but thereby creating an oxygen deficient atmosphere;

*"low hazard confined space"* means a confined space which is shown by pre-entry testing or otherwise known to contain clean respirable air immediately prior to entry to a confined space and which is not likely to change during the work activity, as determined by a qualified person after consideration of the design, construction and use of the confined space, the work activities to be performed, and all engineering controls required. For example, all brand new B620 tanks and water tanks.

*"moderate hazard confined space"* means a confined space that is not clean respirable air but is not likely to impair the ability of the worker to escape unaided from a confined space, in the event of a failure of the ventilation system or respirator.

## SECTION - 3 Responsibilities

The people who are involved in the process of confined space entry are as follows:

- Entry Supervisor
- Standby Person
- Entrants

Please refer to the section 7 (responsibilities) of the related confined space entry and rescue procedures (NEE-CSP-001, NEE-CSP-002, NEE-CSP-003 or NEE-CSP-004) that accompanies this program for the specific responsibilities details.

## SECTION- 4 Procedures

### 4.1 Confined Space Entry Program

This program provides:

- A method for identifying each confined space at NEEI projects and facilities.
- A review of every confined space to determine the Hazard ratings of each related confined space.
- A method for identifying and evaluating the hazards to which workers may be exposed in confined spaces before allowing entry.
- The development of confined space entry procedures.
- General and plan-specific training of workers.
- The duties of the various workplace parties in the confined space program.
- A hazards assessment that sets out measures, procedures and practices to be followed for safe entry operations when work is to be performed in a confined space.
- Monitoring to test the confined space atmosphere for hazards, such as Oxygen, Combustible gases/vapours, Toxic gases/vapours, total volatile organic compounds (TVOC).
- The means for ensuring unprotected workers are not exposed to hazardous atmospheres.
- A rescue plan and rescue procedures in place before entry into a Confined Space occurs.
- An accountability system, such as a log of authorized entrants into a Confined Space.

### 4.2 Confined Space Entry, Rescue and Ventilation Procedure

A confined space entry permit must be completed prior to entry. A confined space warning sign must be posted at the entrance to the space. Entry, Rescue and Ventilation procedures of the delivery highway tanks are conducted by the mentioned persons in the section 3 of this document for the following purposes:

- Confined Space Procedure– Propane tanks inspection and grinding only. (NEE-CSP-NA-001)
- Confined Space Procedure – Petroleum tanks inspection only. (NEE-CSP-NA-002)
- Confined Space Procedure – Petroleum tanks repairs including hot work. (NEE-CSP-NA-003)
- Confined Space Procedure – Chemical tanks inspection only. (NEE-CSP-NA-004)

### 4.3 Confined Space Hazard Assessment

The confined space hazards assessments for the aforementioned confined space entry and rescue procedures are prepared and reported as following Confined space hazard assessment (CSHA) documents:

- Confined Space Hazards Assessment – Propane tanks inspection and grinding only (NEE-CSHA-NA-001)
- Confined Space Hazards Assessment – Petroleum tanks inspection only (NEE- CSHA- NA-002)
- Confined Space Hazards Assessment – Petroleum tanks repairs including hot work (NEE-CSHA-NA-003)
- Confined Space Hazards Assessment – Chemical tanks inspection only (NEE- CSHA- NA-004)

### 4.4 Records

A copy of the signed confined space entry permits, and any other related information will be kept on file at the NEEI facilityfor a period of no less than three years after completion of the project if no incident or unplanned event occurred during the entry. For any instance where an incident or unplanned event occurred during entry, a record of the permit, test results, and any related information will be kept on file and available for inspection for a period of no less than five years after completion of the project.

## SECTION-5 Training Requirements

Prior to permitting workers to work in or around confined spaces, the employer shall ensure that workers are trained in the requirements outlined within in this program.

Training shall be given by a qualified individual or agency.

When there is reason to believe that any worker who has been previously trained does not have the understanding or skill required by this procedure, the employer shall consider re-training.

Every contractor or 3rd party worker having the potential to work in confined spaces shall be made aware of the requirements of the program through initial orientation training and periodic reviews during weekly safety meetings, through the use of bulletins and other communication strategies, etc.

Training certificates will be kept and updated as required.

List of trainings are as follows:

- Safety trainings including:
  - WHMIS 2015 or the most current version,
  - Confined Spaces,
  - LOTO,
  - Transport of Dangerous Goods,
  - FALL ARREST,

  - POST Certified,
  - First Aid.
- Confined space entry program (this document) training.
- Gas monitor instructions.
- B620 Quality manual training.
- Respiratory protection training.
- Respirator fit testing.
- Equipment manufacturing training.

**21.1.28**

**Required information on the Identification Plate checklist**

The following information shall appear on the plate(s) (parenthetical abbreviations are authorized):

**Note:** *This information may be provided and marked in accordance with the ASME* Code.

(a) tank manufacturer (Tank mfr.);
(b) date of tank manufacture — month and year (Date of mfr.);
(c) assembler;
(d) completion and certification date — month and year (Cert. date);
(e) original test date — month and year (Orig. Test Date);
(f) TC Specification (TC Spec.);
(g) Transport Canada Registration Number (TCRN);(1)
(h) Manufacturer's Design Identification Number (MDIN);(2)
(i) tank serial number (Ser. No. or S/N);
(j) vehicle identification number (VIN);
(k) tank maximum allowable working pressure in kPa (MAWP);
(l) tank test pressure in kPa (Test P);
(m) tank design temperature range — ___oC to ___oC (Design temp. range);
(n) maximum design density of lading — in kilograms per litre (Max. lading density);
(o) vessel material specification number(3) — all numbers to be marked where the material for the shell is different from the material for the heads (Shell & Head Matl. yyy zzz or Shell Matl. yyy zzz and Head Matl. yyy zzz, where "yyy" is replaced by the alloy designation and "zzz" by the alloy type);
(p) weld material (Weld Matl.);(3)
(q) minimum allowable thickness of shell — in millimetres (Min. shell thick.). When minimum shell thicknesses are not the same for different areas, mark variances (Top ..... Side..... Bottom.....);
(r) minimum allowable thickness of heads — in millimetres (Min. head thick.);
(s) manufactured thickness of shell — in millimetres (Mfd. shell thick.);(4)
(t) manufactured thickness of heads — in millimetres (Mfd. head thick.);(4)
(u) exposed surface area — in square metres;
(v) volumetric capacity — in litres (Cap. Litres);
(w) maximum product load — in kilograms (Max. payload);
(x) maximum loading rate — in litres per minute and optionally in US gallons per minute [Max load. rate, L/min (US GPM) at maximum loading pressure XX kPa (psi)];(5)
(y) maximum unloading rate — in litres per minute and optionally in US gallons per minute [Max. unload. rate, L/min (US GPM) at maximum unloading pressure XX kPa (psi)];(5)

**Annotations**:

(1)Required for all tanks including: (a) TC 331; (b) TC 407 with a MAWP greater than 240 kPa (35 psi) or designed to be loaded by vacuum,
(2)Required for all tanks other than those outlined in above.
(3)For FRP tanks, "NA" shall be marked.
(4)Required when additional material is provided for corrosion allowance
(5)Does not apply to TC 331 highway tanks.

**21.1.29**

# Magnetic Particle Inspection Procedure

# With

# Wet Fluorescent Magnetic Particles

# In Accordance With ASME Section V

NATIONAL ENERGY EQUIPMENT INC.

| | | |
|---|---|---|
| **Document Number:** NEE-MPI-WF-001 | | |
| **Prepared by:** Qualimet "Your source of Quality Materials Engineering" 8055 CORONET ROAD EDMONTON, AB T6E 4N7 PHONE: (780) 469-5870 FAX: (780) 465-5828 | | |
| **Approved by:** NEEI | | |
| **Date of Issue:** 2018/05 | **Rev. No.:** 01 | **Sheet:** 1 of 13 |

## TABLE OF CONTENT

## TABLE OF CONTENT

| NATIONAL ENERGY EQUIPMENT INC. | Magnetic Particle Inspection Procedure With Wet Fluorescent Magnetic Particles |
|---|---|
| **Document Number:** NEE-MPI-WF-001 | **Date of Issue:** 2018/05 |
| **Prepared by:** Qualimet | **Revision Number:** 01 |
| **Approved by:** NEEI | **Sheet Number:** 4 of 13 |

## 1.0 SCOPE

This procedure defines the requirements to carry out magnetic particle examination on welded joints and weld bevels of ferromagnetic materials in order to detect discontinuities open to the surface through the use of the yoke technique with wet fluorescent magnetic particles.

## 2.0 RESPONSIBILITIES

The NDE inspector shall be responsible for conducting and reporting the results in accordance with this procedure.

## 3.0 RESOURCES

3.1 Qualification of Personnel

All personnel involved with performing tests and signing reports under this magnetic particle inspection shall be certified in accordance with SNT-TC-1A or ASNT CP-189 or equivalent certification meeting ISO 9712.

Inspectors carrying out magnetic particle examinations shall not only meet the qualifications as per CSA B620 8.1.6, but meet the requirements of ASME Section VIII Division 1, Appendix 6, 6-2 as well.

3.2 Equipment

The following equipment shall typically be used in performing magnetic particle examinations

1) AC electromagnetic yokes,
2) Suitable container and vehicle for wet magnetic particle (black) contrast paint application.
3) Blacklight
4) Field Indicator

## 4.0 CALIBRATION

4.1 Calibration Blocks

Calibration blocks shall be verified by weight using a certified scale. The weight of each calibration block shall be stenciled with the applicable actual weight and identification numbers prior to first use.

4.2 Electromagnetic Yoke

4.2.1 Each Electromagnetic Yoke (AC) will be given an Individual Serial Number. This Serial number will be recorded in the equipment log.

4.2.2 The lifting power of each yoke will be checked prior to use each day the yoke is used. This information will be recorded and records maintained on file.

4.2.3 A calibration tag shall be affixed to the yoke with the calibration date, due date for recalibration and the initials of the person carrying out the check.

4.2.4 New yokes will be calibrated for lifting power prior to use.

4.2.5 Any yoke that fails calibration will be removed from service until a repair is completed and the yoke recalibrated to an acceptable standard.

4.3 AC Yoke Calibration

4.3.1 Each Yoke that operates on alternating current will have its lifting power determined as specified in ASME Section V, Article & Paragraph T-762

4.3.2 The yoke poles (legs) will be set at 6" (150mm) spacing with the legs straight and having the contact ends in maximum possible surface contact with the 10 lb (4.5 kg) AC Calibration Block.

4.3.3 This calibration will be carried out using National Energy Equipment Inc.'s Yoke calibration block. The calibration results will be recorded and kept on file.

4.4 Black Light Meter Calibration

4.4.1 National Energy Equipment Ltd.'s Black Light calibration meters will be verified to equipment that is traceable to a national standard.

4.4.2 This calibration will be carried out annually by an independent supplier. A calibration certificate will be affixed to the meter with the calibration date and due date for recalibration.

4.4.3 Results of the calibration will be recorded and kept on file along with the supplier's calibration form and results.

4.5 Black Light Calibration

4.5.1 The initial checks that are carried out on each Black Light are:

1) A check for integrity;
2) A check that the correct bulb is being used according to specifications.

4.5.2 The black light will be allowed to warm up for a minimum of five minutes prior to the use, or measurement of the intensity of the ultraviolet light emitted.

4.5.3 During continuous use, the intensity of the Black Light will be checked every 8 hours, or if the workstation is changed, or whenever the bulb is changed.

4.5.4 The black light intensity at the examination surface shall not be less that 1000 $\mu W/cm^2$

4.5.5 The black light intensity will be calibrated after maintenance or a repair procedure, and at a minimum every year or as required by the applicable code.

4.5.6 New black lights will be calibrated prior to use.

4.5.7 Any black light, which fails calibration, will be removed from service until a repair procedure is carried out and the item is recalibrated to the required standard.

4.5.8 The calibration information shall be recorded and records maintained, showing:

1) Equipment serial number and manufacturer
2) Date of calibration and date next calibration is due

4.5.9 National Energy Equipment Inc.'s black light calibration meters will be independently verified by equipment traceable to a national standard.

4.5.10 When a bulb is changed, the reflectors and filters shall be cleaned and checked for integrity.

4.5.11 Cracked or broken UV filters should be replaced immediately. Defective bulbs shall also be replaced prior to use.

4.6 Stationary/Portable Unit Calibration

The Portable Unit calibration will be carried out in accordance with the procedures as specified in ASME Section V, Article 25, SE-709 Section 20.2.

4.7 Wet Particle Assessment

4.7.1 A Certificate of Compliance to applicable specification shall accompany each batch of Wet Powder particles purchased. Each Batch shall meet the applicable requirements for Quality, content and size of particle in the following codes:

1) AMS 3041 (AMS 3043 for Aerosol Cans)
2) ASME Section V, Article &, Section T-731
3) ASTM E-709
4) ASTM E-1444
5) MILStd. – 2132

4.7.2 Any batch for which compliance certification is not available shall be tested on a representative test piece.

4.7.3 The bath concentration and particle suspension test will be checked in accordance with ASME V, Article 25, SE-709, Section 20.6

4.7.4 Test results obtained shall be as follows:

- Fluorescent particles 0.1 – 0.4 mL per 100 mL;

4.7.5 The test piece will be examined with a yoke and fluorescent particles as detailed in this procedure

4.7.6 If resultant indication(s) match the standard test piece report for the applicable test piece, the results shall be recorded and retained on file.

4.7.7 If the standard is not met, the test will be repeated. If the test fails once more, then the entire batch of wet particles will be removed from service and returned to the supplier.

## 5.0 TEST PREPARATION

5.1 Magnetizing Current

The magnetizing current shall be in accordance with the applicable specification. Where this is not given, the power shall be as follows:

- Pole spacing of 75-150 mm (3 – 6 inches) and 4.5 kg (10 lbs) lifting power for AC hand yokes.

5.2 Magnetizing Direction

The direction of magnetizing shall be as given in the applicable specification. Where no direction is specified, two examinations shall be made of the same surface such that the lines of magnetic force will be at right angles to each other for each examination.

5.3 Magnetizing Medium

5.3.1 Wet Particles

The magnetizing current shall be turned on after the particles have been applied. Flow of particles shall stop with the application of current. Wet particles applied from aerosol spray cans may be applied before and/or after magnetizing current is applied. Wet particles may be applied during the application of magnetizing

current if they are not applied directly to the examination area and are allowed to flow over the examination area with low velocities insufficient to remove accumulated particles.

5.3.2 Fluorescent Particles

If fluorescent particles are being used, then the black light will be allowed to warm up for a period of at least five minutes. The examination area should be sufficiently darkened before attempting to evaluate any examination results. The technician will allow sufficient time (approximately three minutes) for the eyes to become accustomed to the darkened room. The flow of the magnetizing current will be initiated prior to the application of the fluorescent particles. No indicating medium will be sprayed after the removal of the magnetizing force. The part will be examined with the use of a calibrated black light.

## 6.0 SURFACE PREPARATION

6.1 Procedure

1) All adjacent areas within 1 - 2 in. (25 - 50 mm) of the surface to be examined shall be dry and free of all dirt, grease, lint, scale, welding flux and spatter, oil, or other extraneous contaminants which may mask defects or unnecessarily reduce particle movement and inspection sensitivity.
2) Cleaning of the surface may be accomplished by using detergents, organic solvents, descaling solutions, paint removers, vapor degreasing, sand or grit blasting, or ultrasonic cleaning methods.
   - For heavy grease, mineral spirits may be used. If light oil remains, isopropyl alcohol may be used.
3) Thin, non-conductive coatings such as paint, in the order of 0.02 to 0.05 mm (1 to 2 mil), should not normally interfere with the formation of indications.
4) If a non-conductive coating/paint is left on the surface to be examined that has a thickness greater than 0.05mm (2 mil), then it must be demonstrated that discontinuities can be detected through the maximum coating thickness applied to that surface.
5) The part to be examined will be cleaned to achieve these standards prior to starting the examination process.
6) Surface requirements are as detailed in ASME Section V, Article 25, *(Magnetic Particle Standards)*, SE 709, Paragraph 9, *"Part Preparation"*.
7) For conductive coatings, because of their ability to mask discontinuities, it must be demonstrated that the unacceptable discontinuities can be detected through the maximum thickness applied on the part.
8) For the AC Yoke technique, the demonstration shall be in accordance with Clause I-741 of Mandatory Appendix I in ASME Section V Article 7.

6.2 Examination at Elevated Temperatures

6.2.1 If the temperature of the item under examination is outside the recommended temperature range as determined by the manufacturer, or as previously qualified, then the technician will inform the client that time must be given for the item to cool down in order for wet particle MPI to be performed. If necessary, (LPI Developer may be used as a contrast to aid interpretation).

6.2.2 When the item is cooled sufficiently, the initially requested method will be used to examine the entire item.

## 7.0 MAGNETIC PARTICLE EXAMINATION PROCEDURE

7.1 AC Continuous Magnetic Particle Examination Method

1) The wet fluorescent magnetic particle inspection shall include
   a. All welds in or on the interior surface of the tank, and the adjacent base plate extending 2 in (50mm) from either side of such welds;
   b. The entire interior surface of tank heads; and
   c. All interior surfaces at least 2 in (50mm) in all directions from exterior welds that are visibly discernible on the interior of the tank.
   d. If disturbances such as grinding, or other repairs are found through a visual inspection of the entire interior surface, a wet fluorescent magnetic particle inspection shall be used to inspect these disturbances. If cracks are found, the entire interior surface shall also be inspected.
2) The black light will be allowed to warm up for a period at least five minutes. Before attempting to evaluate any examination results, the technician will allow sufficient times (approximately three minutes) for the eyes to become accustomed to the darkened room.
3) Before the magnetic particle examination is conducted, a check of the examination surface shall be conducted to locate any discontinuity surface openings which may not attract and hold magnetic particles because of their width.
4) The flow of the magnetizing current will be initiated prior to the application of any indicating medium.
5) If necessary, the adequacy or direction of the magnetizing field shall be demonstrated as per T-764 of ASME Section V, Article 7.
6) The indicating medium will be applied so that a light uniform coating or spray settles on the surface of the part while it is being magnetized.
7) After application, and before removing the magnetizing force, all excessive liquid will be removed by means of a dry air current. This should be of sufficient force to remove excess particles without disturbing any of the particles attracted to a relevant indication or a discontinuity by flux leakage (blowing air is sufficient for this purpose)
8) No indicating medium will be sprayed after the removal of the magnetizing force.
9) The part will be examined with the use of a calibrated black light to ensure adequate lighting at the surface of the part. The intensity requirement of the white light will be a minimum of 1000 µW/cm2 on the surface of the part being examined throughout the examination.
10) The examination area should be sufficiently darkened.
11) The examination will be performed twice, the second examination with the yoke pole positions at approximate right angles to the first, to ensure that discontinuities orientation, at any angle to the poles, will be detected.
12) Overlapping of at least 1" (25mm) of the magnetized areas will be carried out to ensure 100% coverage at the required sensitivity.
13) The interpretation shall identify an indication as false, non-relevant, or relevant. False or non-relevant indications shall be proven as false or non-relevant. Interpretations shall be carried out to identify the locations of indications and the character of the indications.
14) All indications shall be evaluated in terms of the acceptance standards of the referencing code sections.
15) When residual magnetizing in the part could interfere with subsequent processing or usage, the part shall be demagnetized any time after completion of the examination.
16) When post examination cleaning is required, it should be conducted as soon as practical as per 7.4.

7.2 Indication Interpretation

7.2.1 Ultraviolet Light Intensity at the Examination Surface

A minimum light intensity of 1000 $\mu W/cm^2$ is required on the surface to be examined so that adequate sensitivity will be ensured during the examination and evaluation of indications. The distance from the work surface, which provides that minimum light intensity, will be maintained throughout the examination process.

7.2.2 Procedure

1) The indication detected will either be relevant, non-relevant, or false.
2) False and non-relevant indications have to be determined as either false or non-relevant by the technician.
3) Relevant indications will be evaluated with regard to acceptance standards agreed upon with the client prior to commencement of work.
4) The DC sub-surface indications can look very much like at non-relevant indication, being broad and fuzzy. Great care will be exercised in watching the formation of the indications during the application of the particles and removal of the excess.
5) Confirmation of suspect sub-surface indications shall be carried out by a Level II Ultrasonic Technician using Shear Wave angle beam methods.
6) Light blowing during AC magnetic field application is an acceptable practice, as the particles will not readily be blown out of a surface breaking discontinuity.
7) Light blowing during magnetization will normally blow away non-relevant indications but DC type sub-surface indications will retain the particles in the area of interest.
8) It must be reiterated that the Magnetizing Force will be continuously applied during any blowing action.

7.3 Demagnetization

7.3.1 If demagnetization is required to remove any or all of the residual magnetism, the following method will be followed:

1) Use a Y5 or Y6 yoke or a coil if part size permits.
2) Use a field indicator to check if the demagnetization was successful.

7.3.2 The amount of residual magnetism in the part should not exceed 3G (240m-1) anywhere in the piece examined.

7.3.3 Any removal of residual magnetism will be recorded on the final report.

7.3.4 Demagnetization Using a Yoke

1) Demagnetization using a yoke will be carried out utilizing only AC current in accordance with the procedure specified in ASME Section V, Article 25, SE 709 Section 18.2.3.
2) The amount of residual magnetism in the part will be checked with a field indicator.

7.4 Post Examination Cleaning

7.4.1 After demagnetization, post examination cleaning shall be conducted when magnetic particle material(s) could interfere with subsequent processing or servicing requirements.

7.4.2 Post examination cleaning shall be conducted using one of the techniques below:

1) Drying off wet particles and then brushing or using compressed air to blow the dried wet particles off the surface.
2) Flushing the wet particles away with a solvent, or
3) Another suitable post examination cleaning technique may be used if it does not interfere with subsequent requirements nor adversely affect the part.

## 8.0 REPORT AND RECORDING

For each examination, the following information shall be recorded, and attached to the Test and Inspection Report:

1) Date of examination
2) Procedure identification and revision
3) Magnetic Particle equipment and type of current
4) Magnetic Particles (Visible or fluorescent, wet or dry) Batch #
5) Examination personnel identity and if required by referencing code Section qualification level
6) Map or record of indications
7) Indication type, location, and extent
8) Material and Thickness
9) Lighting equipment
10) Date & Location of examination
11) Report #, Owner, and Job #
12) Identification of object under examination, including A#, Serial # etc.
13) Surface condition of the item under examination
14) National Energy Equipment procedure number
15) Acceptance standard code
16) Examination surface temperature
17) Demagnetization techniques – if required
18) Post examination cleaning – if required

8.1 The results of the examination will be recorded on a Magnetic Particle Examination Report and kept on file for future reference. Copies are distributed as required. Reports may be distributed electronically.

8.2 The report will include interpretation of all relevant defects and discontinuities and will also state acceptance or rejection of each weld or item examined. If defects are detected during the examination, then a drawing sketch of all defects located will be included in the report.

8.3 For TC 331 tanks, the following information shall also be included:

- A statement indicating whether the tank is constructed of quenched and tempered steel (QT) or other than quenched and tempered steel (NQT);
- A statement indicating whether the tank was stress relieved after manufacture; and
- A statement indicating whether the tank was stress relieved after repair, and if so, whether complete or local stress relieving was performed,

8.4 Digital Photographs may also be included in the Electronic Report

| NATIONAL ENERGY EQUIPMENT INC. | **Magnetic Particle Inspection Procedure With Wet Fluorescent Magnetic Particles** |
|---|---|
| **Document Number:** NEE-MPI-WF-001 | **Date of Issue:** 2018/05 |
| **Prepared by:** Qualimet | **Revision Number:** 01 |
| **Approved by:** NEEI | **Sheet Number:** 11 of 13 |

# MAGNETIC PARTICLE EXAMINATION REPORT

Examination Date: Page of

| | | | |
|---|---|---|---|
| **Owner:** | | **Project No.:** | |
| **Report No.:** | | **Request No.:** | |
| **Order/Dwg No.:** | | **Mark/Item No:** | |
| **Reference Procedure Specification:** | | | |
| **Reference Standard:** | | | |
| **Location:** | | | |
| **Material:** | | | |
| **Thickness** | | | |
| **Surface Condition:** | | | |
| **Surface Temp.:** | | | |

| **Method Description** | | |
|---|---|---|
| **Examination Method:** | ☐ Wet | ☐ Fluorescent |
| **Magnetizing Method:** | ☐ Continuous | ☐ Residual |
| **Magnetizing Field Direction:** | ☐ Longitudinal | ☐ Circular |
| **Current Type:** | ☐ AC | ☐ DC |
| **Lighting:** | | |
| **Demagnetization:** | | |
| **Post Cleaning:** | | |

| **Equipment** | | | |
|---|---|---|---|
| **Type:** | | **Manufacturer / Serial Number:** | |
| **Particles:** | | **Manufacturer:** | |
| **Contrast Medium:** | | **Manufacturer:** | |

| Joint No. | Welder No. | Tested Length | Evaluation | Result | Rejectable Indications (if any) | | |
|---|---|---|---|---|---|---|---|
| | | | | | Type (Linear or rounded) | Location | Extent (length/diameter/aligned) |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |

Additional Comments/Notes:

**Evaluation Notes:**
P – Porosity C – Crack CP: Clustered Porosity S – Slag IP – Incomplete Penetration
LF – Lack of Fusion UC – Under Cut

NDE Inspector: _____ _____ Date: (mm/dd/yyyy) _____

Approved by: _____ _____ Date: (mm/dd/yyyy) _____

Witnessed by: _____ _____ Date: (mm/dd/yyyy) _____

Printed Name & Signature Certification Level

| NATIONAL ENERGY EQUIPMENT INC. | Magnetic Particle Inspection Procedure With Wet Fluorescent Magnetic Particles |
|---|---|
| **Document Number:** NEE-MPI-WF-001 | **Date of Issue:** 2018/05 |
| **Prepared by:** Qualimet | **Revision Number:** 01 |
| **Approved by:** NEEI | **Sheet Number:** 12 of 13 |

## MAGNETIC PARTICLE EXAMINATION REPORT

Page __ of __

**Weld Joint Sketch:**

## 9.0 APPENDIX

9.1 Types of Magnetic Particle Application Procedures

9.1.1 Continuous Magnetization

1) The magnetizing current is applied and sustained throughout both the application of the medium and examination of the part when using portable equipment.
2) When using the stationary equipment, the magnetizing current will be applied only momentarily while the examination medium is applied.

9.1.2 Residual Magnetization

The examination medium is applied after the magnetizing force has been discontinued. This method can be used only if the material being tested has relatively high retention so that the residual leakage field will be of sufficient strength to attract and hold the particles and preserve any detected indications.

9.2 Types of Magnetic Current

9.2.1 AC (Alternating Current)

The inductance associated with alternating current results in a "Skin Effect" which confines the magnetic field to the surface of the part. This method has limited magnetic field penetration into the part, but provides great mobility of magnetic particles during the application and is very sensitive to surface defects. (e.g. fatigue cracking).

9.2.2 DC (Direct Current)

1) This method has good magnetic field penetration into the item being examined and is more effective on non-surface breaking defects than AC current magnetism.
2) Unless experiments with different parts indicate that the residual field has sufficient strength to produce satisfactory indications, it shall not be used.

## 21.1.30 Testing in-service cargo tank manway covers procedure

21.1.30.1 Purpose

The purpose of this test procedure is to qualify, by means of a pressure test, the structural integrity of in-service manways and fill openings.

21.1.30.2 Qualifying Test

- In-service manways and/or fill opening covers not marked as certified by the manufacturer shall be tested using the equipment described in 21.1.30.3 and the procedure described in 21.1.30.4.

- Manway and/or fill opening covers successfully meeting this test per 21.1.30.5 and prior to reinstallation on the cargo tank may be permanently marked by stamping or other means. The name of the tester and date of the test should be recorded and retained.

- Any device, such as a pressure relief valve, which becomes a part of the manway cover assembly, shall be evaluated separately for compliance.

21.1.30.3 Test Equipment (See Figure 1)

- The test fixture for the test consists of 16” diameter, 20” diameter, or 12”x 16” elliptical collars with a suitable material welded to the bottom. The test fixture collar shall be the same size, thickness, and material as that collar on the tank to which the manway cover assembly is to be installed.

- Gauges:

  One (1) applicable pressure gauge, which should be more than the required tank’s test pressure regarding table 7.3 of CSA B620 (see section 21.1.23) for leakage test of other tanks.

- Pipe fittings:

  One (1) ½” NPT globe valve

  One (1) ½” ball valve

  One (1) ½” cross

  Five (5) ½” pipe nipples

- Rubber membranes of 1/8” thickness to fit outside diameter of manway collar.

- Steel plate with guides to block fill opening only if fill opening cover acts as a pressure relief valve. Please note that some old manway covers have fill covers that do not provide pressure relief and those fill covers should not be blocked closed.

- Vent plugs, flanges, or other devices to block holes in manway cover.

- Manway gaskets - One (1) for each size manway assembly to be tested.
- Gasket for the 10-inch diameter pressure relief valves.

21.1.30.4 Manway Cover Test Procedures

21.1.30.4.1 Remove manhole cover assembly and clamping ring assembly to be tested from the cargo tank.

21.1.30.4.2 Remove any normal pressure/Vacuum vents, sensors, high capacity vents or any other appurtenance that protrudes below the manhole cover.

21.1.30.4.3 Block the openings in the manhole cover with the devices listed in 21.1.30.3.

21.1.30.4.4 Fill test fixture base with air or water.

21.1.30.4.5 Lay rubber membrane on test base.

21.1.30.4.6 Open 10” diameter pressure relief valve. Install steel plate with guides to underside of 10” diameter opening. Use vice grips to hold this plate in position while placing manhole cover assembly on rubber membrane.

21.1.30.4.7 Install 1 0-30 psig gauge in test base.

21.1.30.4.8 Attach manhole cover assembly with its clamping ring assembly to the test fixture. While tightening clamping ring bolt, tap the ring at various points to ensure equal clamping.

21.1.30.4.9 Slowly increase pressure in tank to the proper test pressure for that tank type, indicated in the Table 7.3 of CSA B620 (see section 21.1.23) for a period of at least 5 minutes:
CAUTION: WATCH PRESSURE. DO NOT OVER-PRESSURIZE.

21.1.30.5 Inspection

21.1.30.5.1 Any leakage will be considered a failure of this cover and others of its type and condition.

21.1.30.5.2 If the cover does not pass this test in its original condition, but the manhole cover assembly manufacturer has components available that will enable the cover to pass the test, covers using such components are considered satisfactory.

21.1.30.5.3 Before reinstalling the manhole cover to the cargo tank, the collar and gasket shall be inspected. If damage, distortion, corroded areas or other conditions exist that could impair its product retention capability, the collar and/or gasket shall be replaced.

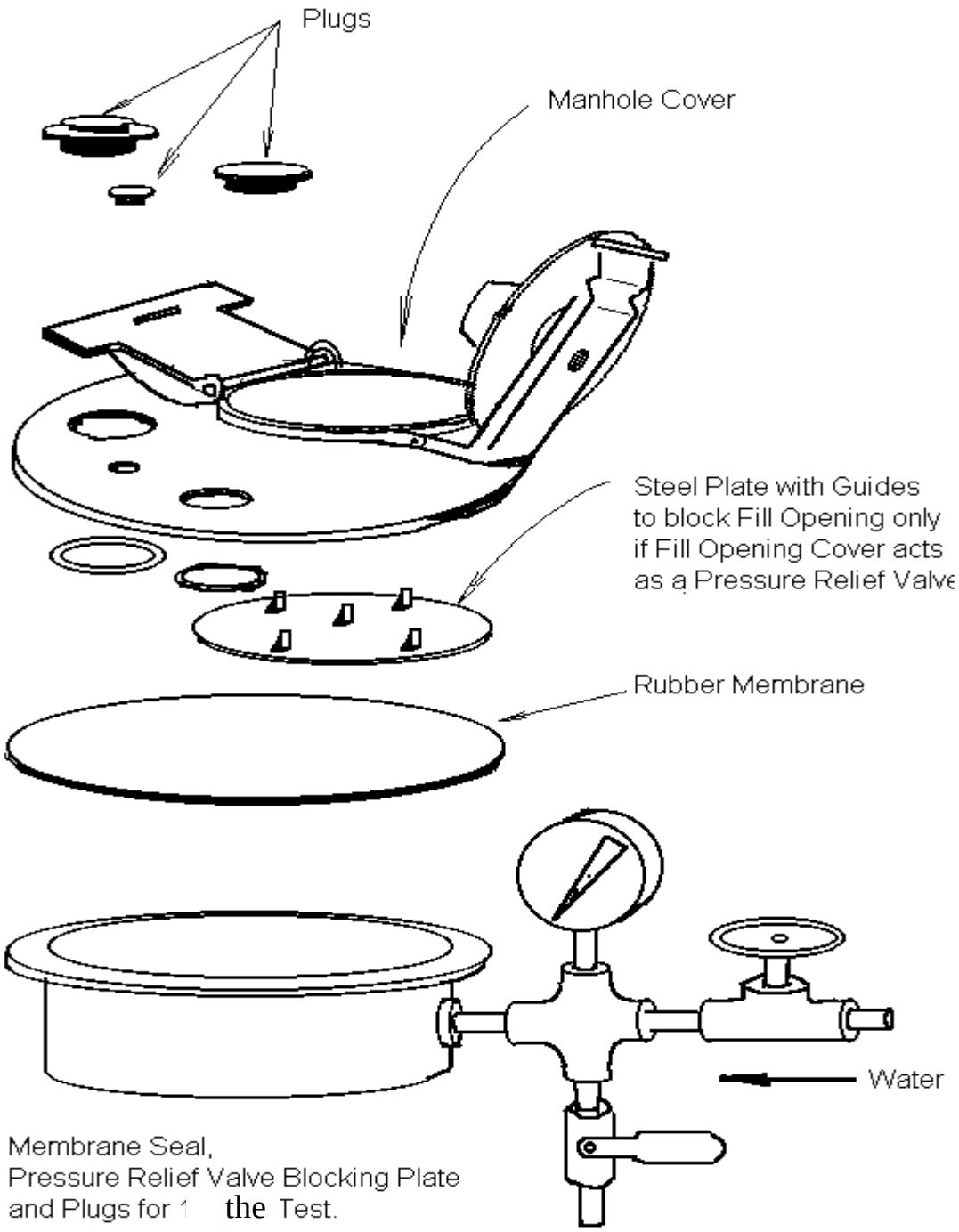



Figure 1 Fixture used in the test.

**This page in intentionally left blank**

**This page in intentionally left blank**

**This page in intentionally left blank**

**This page in intentionally left blank**

## 21.2 Equipment, signs and decals

Equipment:

Test Gauge Calibration Devices:

- 15# Gauge
- 300# Gauge
- Air Pressure Regulator
- Hose Testing Test Tee

10” Fill Test Fixture

16” and 20” Manway Bench Test Fixture

12”x16” Elliptical Manhole Bench Test Adapter
r

Hydrostatic Test Pump

0-5 PSI Manometer

Assorted Hose Test Adapters

Air Compressor


Multigas Detector

Tank Under Pressure Signs


Test and Inspection Decals


Calibration Decal

# CALIBRATION

Date: _____

Technician: _____

Due: _____

## 21.3 Samples of actual completed documents

The following documents are SAMPLES only. Latest quality control manual must be followed to complete the forms. Please refer to facilities' completed records for more samples.

**Test and Inspection Report in Accordance with CSA B620** *Page 1 of 3*

Facility Name: National Energy Equipment Inc
Address: XXXXXXX,
TEST DATE: XXXXXXX,
Telephone XXXX
Facility Registration No. : XX-XXX
Tank Ow John Doe
Address: XXXXXXXXX, XXXX
Owners Signature
Telephor 111111
Date:

OWNERS UNIT I : XXX
MANUFACTURE XXX
SERIAL No : XXX-XXX-XXX 35
MFG DATE: 11/89 MATERIAL: 5454 TANK SPEC: TC 306

MC/TC331 & TC51 QT ☐ NQT ☐ PWHT ☐

COMP. CAPACITY 1 2000 L IG/L 2 3600 L IG/L 3 5500 L IG/L
4 4500 L IG/L 5 2400 L IG/L 6 IG/L

**TESTS PERFORMED** "V" ☒ "I" ☒ "K" ☒ "P" ☒ "T" ☐ "U/C" ☐

EXTERNAL VISUAL INSPECTION "V"

| Item inspected | QC Man Ref. | Complies | Reject | Retest Complies |
|---|---|---|---|---|
| Data plate, present and legible | 8.1.3 | ☒ | ☐ | ☐ |
| Shell & Heads, corrosion abrasion dents overlay patches leaks etc | 8.1.4 | ☒ | ☐ | ☐ |
| Structural members, outriggers, crossmembers etc | 8.1.5 | ☐ | ☒ | ☒ |
| Piping and valves for leakage, damage, corrosion | 8.1.7 | ☒ | ☐ | ☐ |
| Remote closures, thermal devices | 8.1.7 | ☐ | ☒ | ☒ |
| Hoses for defects, identification and test dates | 8.1.8 | ☐ | ☒ | ☒ |
| Tank attachments to frame or running gear | 8.1.9 | ☒ | ☐ | ☐ |
| Ladders, walkways etc | 8.1.10 | ☒ | ☐ | ☐ |
| Fill covers, manways and closure devices | 8.1.11 | ☐ | ☒ | ☒ |
| Relief valves and vents (replace or test if tank in service where lading corrosive to relief device) | 8.1.12 | ☐ | ☒ | ☒ |
| Accident damage protection | 8.1.13 | ☒ | ☐ | ☐ |

Inspector- Tom T Signature Date- Nov 30 2015

INTERNAL VISUAL INSPECTION "I"

| Item inspected | QC Man Ref. | Complies | Reject | Retest Complies |
|---|---|---|---|---|
| Interior surface, corrosion, distortion overlay patches, cracking etc | 8.2.2 | ☒ | ☐ | ☐ |
| Interior welds for defects, cracking etc | 8.2.3 | ☒ | ☐ | ☐ |
| Internal supports and attachments | 8.2.4 | ☒ | ☐ | ☐ |
| Internal valves, piping and vents for leakage, damage, etc | 8.2.4 | ☐ | ☒ | ☒ |

Inspector- Tom T Signature Date- Nov 30 2015

**Note: Rejection Criteria for Visual Inspections**

Any of the following conditions shall cause the tank to be rejected

Less than minimum material thickness under any cut, dig or gouge
Any dent with a depth greater than ½" where it includes a weld
Any dent with a depth greater than 10% of the length of the dent
Any weld defect including a crack, pinhole, or incomplete fusion of the weld
Any structural defect or any source of leakage
Any repairs made using overlay patches
Defective, unidentified or out of test Hose Assemblies

## Test and Inspection Report in Accordance with CSA B620



*UPPER COUPLER INSPECTION "U/C" (QC Manual Reference 8.1.5 and 8.1.6)*

| | Complies | Reject | Retest Complies |
|---|---|---|---|
| Upper coupler removed from tank and inspected (including tank areas above) | ☐ | ☐ | ☐ |
| Upper coupler inspected in place | ☐ | ☐ | ☐ |

Inspector- Signature_____ Date-

LEAKAGE TEST "K" (*QC Manual Reference 8.3*)

TEST PRESSURE 2.4 PSI (80% of MAWP MIN) TEST MEDIUM AIR

| Item Tested | Pass | Fail | Retest Complies | Item Tested | Pass | Fail | Retest Complies |
|---|---|---|---|---|---|---|---|
| Compartment No. 1 | ☒ | ☐ | ☐ | Compartment No. 1 piping | ☒ | ☐ | ☐ |
| Compartment No. 2 | ☐ | ☒ | ☒ | Compartment No. 2 piping | ☒ | ☐ | ☐ |
| Compartment No. 3 | ☐ | ☐ | ☐ | Compartment No. 3 piping | ☒ | ☐ | ☐ |
| Compartment No. 4 | ☒ | ☐ | ☐ | Compartment No. 4 piping | ☒ | ☐ | ☐ |
| Compartment No. 5 | ☒ | ☐ | ☐ | Compartment No. 5 piping | ☒ | ☐ | ☐ |
| Compartment No. 6 | ☐ | ☐ | ☐ | Compartment No. 6 piping | ☐ | ☐ | ☐ |

Tank Tester- Tom T Signature_____ Date- Nov 30 2015

THICKNESS TEST "T" (QC Manual Reference 8.5)

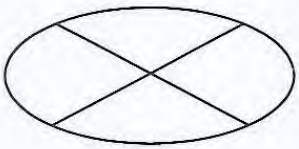
Thickness Tester Calibrated in accordance with instructions provided by the manufacturer of the testing device *YES* ☐ *NO* ☐

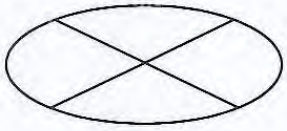
FRONT

| | 12:00 | 3:00 | 6:00 | 9:00 | |
|---|---|---|---|---|---|
| | | | | | HEAD |
| 1 | | | | | 1 |
| 2 | | | | | 2 |
| 3 | | | | | 3 |
| 4 | | | | | 4 |
| 5 | | | | | 5 |
| 6 | | | | | 6 |
| 7 | | | | | 7 |
| 8 | | | | | 8 |
| 9 | | | | | 9 |
| 10 | | | | | 10 |
| 11 | | | | | 11 |
| | | | | | HEAD |
| | 12:00 | 3:00 | 6:00 | 9:00 | |

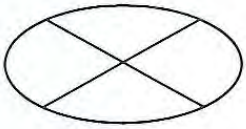
REAR

FRONT HEAD

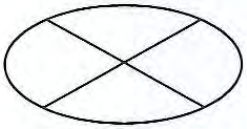




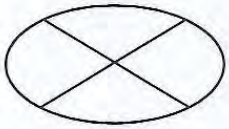
REAR HEAD



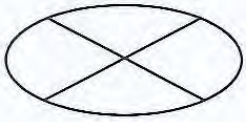
MANWAY



SUMP



NOZZLE



NOZZLE

Tank Tester- Signature_____ Date-

## Test and Inspection Report in Accordance with CSA B620

*Page 3 of 3*

PRESSURE TEST "P" (*QC Manual Reference 8.4)*

Test Pressure (Tank) 3 PSI
(Refer to Table 7.3 of CSA B620-2003 for appropriate test pressure)

Test Pressure (Piping) 2.4 PSI (80% Tank Test) Test Medium AIR

| Item Tested | Pass | Fail | Retest Complies | Item Tested | Pass | Fail | Retest Complies |
|---|---|---|---|---|---|---|---|
| Compartment No. 1 | ☒ | ☐ | ☐ | Compartment No. 1 piping | ☒ | ☐ | ☐ |
| Compartment No. 2 | ☐ | ☒ | ☒ | Compartment No. 2 piping | ☒ | ☐ | ☐ |
| Compartment No. 3 | ☒ | ☐ | ☐ | Compartment No. 3 piping | ☒ | ☐ | ☐ |
| Compartment No. 4 | ☒ | ☐ | ☐ | Compartment No. 4 piping | ☒ | ☐ | ☐ |
| Compartment No. 5 | ☒ | ☐ | ☐ | Compartment No. 5 piping | ☒ | ☐ | ☐ |

Tank Tester- Tom T Signature _____ Date- Nov 30 2015

| Description of defects found and methods used to repair |
|---|
| Hose out of date, retested good |
| Replace vents in all lids |
| Replace lids for out of spec |
| Weld cracks on left rear frame over rear ends |
| Repair emergency releace for internal valves |
| Repair roll over rail on right side for dents and cracks |
| |
| |
| |
| |
| |
| |

Tank successfully retested after repair YES ☒ NO ☐ N/A ☐

Written repair weld inspection report attached YES ☒ NO ☐ N/A ☐

TANK DISPOSITION Removed from Service ☐

Safety Mark (Specification Indication) removed YES ☐ NO ☒

Returned to Service ☒

TC/MC330/331 & TC 51 ONLY PWHT AFTER REPAIRS YES ☐ NO ☐ N/A ☒

IF YES FULL ☐ LOCAL ☐

Tank markings applied (QC Manual Reference Section 15) YES ☒ NO ☐

# WELD INSPECTION REPORT

**Facility Address**
XXXXXXXXXXX

Registration Num XX-XXX

OWNERS SERIA XXX
MANUFAC John Doe
MFG DATI XXX XXX
XXX0XXX1XXX
L NUMBER: 2AE XXX
)7 MATERIAL: 5454 H-32 TANK SPEC: 400

Location of welds to be inspected (Provide sketch if required)

| |
|---|
| Weld cracks on both frame rails at front slide mounts |
| All positions |
| |
| |
| |
| |

John Doe XXX

Welding Process(es): GMAW WPS: NEEP 22-01

| | Accept | Reject |
|---|---|---|
| Welder Qualification Verified | ☒ | ☐ |
| Porosity and/or inclusions | ☒ | ☐ |
| Complete Fusion | ☒ | ☐ |
| Start and End Complete | ☒ | ☐ |
| Full Penetration | ☒ | ☐ |
| Welder Ident XXX | ☒ | ☐ |

Welder Name: XXX XXX

Inspector Name: Tom T Signature: Date: Nov 18 2015

This Report must be attached to the Test and Inspection Report for this unit

**This page in intentionally left blank**

**This page in intentionally left blank**

**This page in intentionally left blank**

**This page in intentionally left blank**

## SECTION - 22 Revision Control Sheet

| Page ↓ | Revision Number and Latest Issue Date | | | | | | | Page ↓ | Revision Number and Latest Issue Date | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| | May 2017 | Aug 2017 | Jan 2018 | Oct 2018 | Jan 2019 | Aug2019 | | | May 2017 | Aug 2017 | Jan 2018 | Oct 2018 | Jan 2019 | Aug2019 | |
| 1 | X | X | X | X | X | X | | 51 | | | X | X | X | X | |
| 2 | X | X | X | X | X | X | | 52 | | | X | X | X | X | |
| 3 | X | X | X | X | X | X | | 53 | | | X | X | X | X | |
| 4 | X | X | X | X | X | X | | 54 | | | X | X | X | X | |
| 5 | X | X | X | X | X | X | | 55 | | | X | X | X | X | |
| 6 | X | X | X | X | X | X | | 56 | | | X | X | X | X | |
| 7 | X | X | X | X | X | X | | 57 | | | X | X | X | X | |
| 8 | X | X | X | X | X | X | | 58 | | | X | X | X | X | |
| 9 | X | X | X | X | X | X | | 59 | | | X | X | X | X | |
| 10 | X | X | X | X | X | X | | 60 | | | X | X | X | X | |
| 11 | X | X | X | X | X | X | | 61 | | | X | X | X | X | |
| 12 | X | X | X | X | X | X | | 62 | | | X | X | X | X | |
| 13 | X | X | X | X | X | X | | 63 | | | X | X | X | X | |
| 14 | X | X | X | X | X | X | | 64 | | | X | X | X | X | |
| 15 | X | X | X | X | X | X | | 65 | | | X | X | X | X | |
| 16 | X | X | X | X | X | X | | 66 | | | X | X | X | X | |
| 17 | X | X | X | X | X | X | | 67 | | | X | X | X | X | |
| 18 | X | X | X | X | X | X | | 68 | | | X | X | X | X | |
| 19 | X | X | X | X | X | X | | 69 | | | X | X | X | X | |
| 20 | X | X | X | X | X | X | | 70 | | | X | X | X | X | |
| 21 | X | X | X | X | X | X | | 71 | | | X | X | X | X | |
| 22 | X | X | X | X | X | X | | 72 | | | X | X | X | X | |
| 23 | X | X | X | X | X | X | | 73 | | | X | X | X | X | |
| 24 | X | X | X | X | X | X | | 74 | | | X | X | X | X | |
| 25 | X | X | X | X | X | X | | 75 | | | X | X | X | X | |
| 26 | X | X | X | X | X | X | | 76 | | | X | X | X | X | |
| 27 | X | X | X | X | X | X | | 77 | | | X | X | X | X | |
| 28 | X | X | X | X | X | X | | 78 | | | X | X | X | X | |
| 29 | X | X | X | X | X | X | | 79 | | | X | X | X | X | |
| 30 | X | X | X | X | X | X | | 80 | | | X | X | X | X | |
| 31 | X | X | X | X | X | X | | 81 | | | X | X | X | X | |
| 32 | X | X | X | X | X | X | | 82 | | | X | X | X | X | |
| 33 | X | X | X | X | X | X | | 83 | | | X | X | X | X | |
| 34 | X | X | X | X | X | X | | 84 | | | X | X | X | X | |
| 35 | X | X | X | X | X | X | | 85 | | | X | X | X | X | |
| 36 | X | X | X | X | X | X | | 86 | | | X | X | X | X | |
| 37 | X | X | X | X | X | X | | 87 | | | X | X | X | X | |
| 38 | 37 pages of manual with 50 pages of exhibits | X | X | X | X | X | | 88 | | | X | X | X | X | |
| 39 | | X | X | X | X | X | | 89 | | | X | X | X | X | |
| 40 | | X | X | X | X | X | | 90 | | | X | X | X | X | |
| 41 | | X | X | X | X | X | | 91 | | | | X | X | X | |
| 42 | | X | X | X | X | X | | 92 | | | | X | X | X | |
| 43 | | X | X | X | X | X | | 93 | | | | X | X | X | |
| 44 | | X | X | X | X | X | | 94 | | | | | X | X | |
| 45 | | X | X | X | X | X | | 95 | | | | | X | X | |
| 46 | | X | X | X | X | X | | 96 | | | | | | X | |
| 47 | | X | X | X | X | X | | 97 | | | | | | X | |
| 48 | | X | X | X | X | X | X | 98 | | | | | | X | |
| 49 | | X | X | X | X | X | X | 99 | | | | | | X | |
| 50 | | X | X | X | X | X | X | 100 | | | | | | X | |

| Page ↓ | Revision Number and Latest Issue Date | | | | | | | Page ↓ | Revision Number and Latest Issue Date | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| | May 2017 | Aug 2017 | Jan 2018 | Oct 2018 | Jan 2019 | Aug2019 | | | May 2017 | Aug 2017 | Jan 2018 | Oct 2018 | Jan 2019 | Aug2019 | |
| 101 | | | | | | X | | 151 | | | | | | | |
| 102 | | | | | | X | | 152 | | | | | | | |
| 103 | | | | | | X | | 153 | | | | | | | |
| 104 | | | | | | X | | 154 | | | | | | | |
| 105 | | | | | | X | | 155 | | | | | | | |
| 106 | | | | | | X | | 156 | | | | | | | |
| 107 | | | | | | X | | 157 | | | | | | | |
| 108 | | | | | | X | | 158 | | | | | | | |
| 109 | | | | | | X | | 159 | | | | | | | |
| 110 | | | | | | X | | 160 | | | | | | | |
| 111 | | | | | | X | | 161 | | | | | | | |
| 112 | | | | | | X | | 162 | | | | | | | |
| 113 | | | | | | X | | 163 | | | | | | | |
| 114 | | | | | | X | | 164 | | | | | | | |
| 115 | | | | | | X | | 165 | | | | | | | |
| 116 | | | | | | X | | 166 | | | | | | | |
| 117 | | | | | | X | | 167 | | | | | | | |
| 118 | | | | | | X | | 168 | | | | | | | |
| 119 | | | | | | X | | 169 | | | | | | | |
| 120 | | | | | | X | | 170 | | | | | | | |
| 121 | | | | | | X | | 171 | | | | | | | |
| 122 | | | | | | X | | 172 | | | | | | | |
| 123 | | | | | | X | | 173 | | | | | | | |
| 124 | | | | | | X | | 174 | | | | | | | |
| 125 | | | | | | X | | 175 | | | | | | | |
| 126 | | | | | | X | | 176 | | | | | | | |
| 127 | | | | | | X | | 177 | | | | | | | |
| 128 | | | | | | X | | 178 | | | | | | | |
| 129 | | | | | | X | | 179 | | | | | | | |
| 130 | | | | | | X | | 180 | | | | | | | |
| 131 | | | | | | X | | | | | | | | | |
| 132 | | | | | | X | | | | | | | | | |
| 133 | | | | | | X | | | | | | | | | |
| 134 | | | | | | X | | | | | | | | | |
| 135 | | | | | | X | | | | | | | | | |
| 136 | | | | | | X | | | | | | | | | |
| 137 | | | | | | X | | | | | | | | | |
| 138 | | | | | | X | | | | | | | | | |
| 139 | | | | | | X | | | | | | | | | |
| 140 | | | | | | X | | | | | | | | | |
| 141 | | | | | | X | | | | | | | | | |
| 142 | | | | | | X | | | | | | | | | |
| 143 | | | | | | X | | | | | | | | | |
| 144 | | | | | | X | | | | | | | | | |
| 145 | | | | | | X | | | | | | | | | |
| 146 | | | | | | X | | | | | | | | | |
| 147 | | | | | | X | | | | | | | | | |
| 148 | | | | | | X | | | | | | | | | |
| 149 | | | | | | X | | | | | | | | | |
| 150 | | | | | | X | | | | | | | | | |

Signature:

Date: