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Darlington Nuclear

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Title:
SUPPLEMENTARY TECHNICAL SPECIFICATION FOR NUCLEAR CLASS 3 TANKS FOR WEST ANNEX BUILDING

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ONTARIOPOWER GENERATION Darlington Nuclear

- [x] ACCEPTED.....
- [ ] ACCEPTED AS NOTED.....
- [ ] REVISE AND RESUBMIT.....

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Supplementary Technical Specification for Nuclear Class 3 Tanks for West Annex Building

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Foreword

This document, the associated Design Specifications NK38-DS-38500-10001, NK38-DS-38500-10002, NK38-DS-38410-10002, NK38-DS-38110-10003 and other referenced technical documents form part of design specifications that establish requirements for the design, manufacture, inspection, testing, cleaning, and packaging of nuclear class 3 D_2O storage tanks to be used within the new D_2O storage facility to be constructed at Darlington Nuclear Generating Station.

Revision Summary

Revision Number	Date	Comments
R00	2012-10-26	Initial Issue.

1.0 SCOPE

This document, the associated Design Specifications referenced in Section 2.0(a) and other referenced technical documents form part of design specifications that establish requirements for the design, manufacture, inspection, testing, cleaning, and packaging of the following nuclear class 3 D2O storage tanks to be used in the new D2O storage facility at Darlington Nuclear Generating Station:

- Nuclear Class 3, 50m3 Downgraded D2O Storage Tank of West Annex Building
- Nuclear Class 3, 25m3 Downgraded D2O Storage Tank of West Annex Building
- Nuclear Class 3, 25m3 Clean-up D2O Storage Tanks of West Annex Building
- Nuclear Class 3, 100m3 Moderator Grade & TRF Outgoing and Incoming D2O Storage Tank of West Annex Building

2.0 REFERENCE

This Engineering Specification was according to procedure N-PROC-MP-0059, "Preparation, Review and Approval of Engineering Specifications". The following documents are references in this specification. Unless otherwise stated in the technical specification, the latest issues, amendments and supplements of these referenced documents shall form part of this specification to the extent specified herein. Any conflict between the requirements of this document and the requirements of referenced documents shall be brought to the attention of RCM for resolution.

(a) Ontario Power generation

- NK38-DS-38500-10001 R000, Design Specifications for Class 3, 50m3 Downgraded D2O Storage Tank of West Annex Building
- NK38-DS-38500-10002 R000, Design Specifications for Class 3, 25m3 Downgraded D2O Storage Tank of West Annex Building
- NK38-DS-38410-10002 R000, Design Specifications for Class 3, 25m3 Clean-up D2O Storage Tanks of West Annex Building
- NK38-DS-38110-10003 R000, Design Specifications for Class 3, 100m3 Moderator Grade & TRF Outgoing and Incoming D2O Storage Tank of West Annex Building

(b) Canadian Standards Association (CSA)

- CSA N285.0-08 Update No.2

(c) American Society of Mechanical Engineers (ASME)

- ASME Section III, Division 1, Subsection ND, 2010 Edition with 2011a Addenda
- ASME Section III, Division 1, Subsection NF, 2010 Edition with 2011a Addenda
- ASME Boiler and Pressure Vessel Code, Section II, Part A, 2010 Edition with 2011a Addenda
- ASME Boiler and Pressure Vessel Code, Section II, Part D, 2010 Edition with 2011a Addenda
- ASME Boiler and Pressure Vessel Code, Section VIII, Division 1, 2010 Edition with 2011a Addenda

3.0 QUALITY ASSURANCE (VENDOR AND MANUFACTURER)

The manufacturer of the tanks as specified in this document shall maintain a quality program in accordance with the following standard:

- CAN3-Z299.3-85: Quality Assurance Program

The manufacturer shall review all subcontracted products or services to determine whether a QA program is required. Where a QA program is required, the Manufacturer shall select the appropriate program, evaluate and audit potential suppliers as applicable and select suppliers based on their ability to meet QA requirements.

4.0 GENERAL

The design and manufacture of the tanks as specified in this document shall be performed according to all applicable codes, standards and quality requirements as specified within this document in conjunction with the Nuclear Design Specifications referenced in Section 2.0(a) for Nuclear Class 3 D2O storage tanks.

The purpose of this document is to outline all additional details necessary to perform work in accordance with Ontario Power Generation Quality Assurance standards for the design and manufacture of tanks as specified in this document. This document identifies codes and standards to be followed, vendor interface requirements, inspection and shipping details, engineering specifications for manufacture and documents to be submitted in accordance with Ontario Power Generation Quality Assurance.

5.0 DESIGN AND FABRICATION REQUIREMENTS

The design, materials selection, fabrication, examination, pressure testing, and certification of nuclear class 3 tanks shall be in accordance with the Subsections ND and NF of Section III of the ASME Code, referenced Nuclear Design Specifications under Section 2.0(a), and the additional requirements of this document, provided the additional requirements do not violate the code requirements. Any conflicts between the requirements of this document and those of the code shall be brought to the attention of RCM.

5.1 Supplementary Specifications

5.1.1 Laws, Standards and Codes

See Section 2.0(b) and 2.0(c) above for all applicable codes and standards to adhere to regarding the design and manufacture of the tanks as specified in this document.

5.1.2 Interface Requirements

In the event the vendor subcontracts activities, the vendor's QA program must include provisions for the control of all activities of the subcontractor to ensure all design or fabrication by the subcontractor is in compliance with the vendor's QA program, or shall be performed under the vendors QA program.

5.1.3 Registration Requirements

Construction of the tanks shall be in accordance with requirements of ASME Section III, Division 1, Subsections ND and NF, 2010 Edition with 2011a Addenda. Tank design shall be registered with the Technical Standards and Safety Authority (TSSA).

5.1.4 Environmental Qualification Requirements

There are no environmental qualification requirements for these tanks.

5.1.5 Changes in Design and Substitution of Materials

Specific requirements, design and operating conditions are found on the Design Specifications referenced under Section 2.0(b). If there is any change in design, materials, etc. to what is specified, the vendor must receive approval of the changes before proceeding with manufacture. The vendor shall ensure contractual provisions and QA program requirements imposed on suppliers and sub-suppliers is such that the vendor shall be notified of any such changes that may occur within the supply chain. In the case of revisions to maintenance manuals, the vendor shall send copies to the buyer.

Alternatively, the vendor shall notify the buyer using the same forms if, for any reason, it is unable to provide assurance that there have been no such changes.

The buyer will forward all such notifications to the design authority. Although the design authority may solicit the vendor's input, the decision of the design authority shall be final on acceptability of changes and substitution.

For all quotations, the vendor is to provide the buyer with the following:

name, title, phone number, fax number, and E-mail address of the vendor's responsible engineer for use by RCM engineering department representatives.

5.1.6 Reliability and Maintainability Requirements

A reliability and maintainability (R&M) data report is required prior to manufacture and delivery.

The R&M data report shall include the following information:

1) A description of the company's (and sub-contractor's, where applicable), organization and procedures by which reliability and maintainability is incorporated in the design process and processing of data.

2) A reliability prediction including:

   (a) A list of failure modes. Ways in which a part or component can fail to perform its intended function.
   (b) Estimated failure rates for each mode (failures per hour) - Mean Time To Failure (MTTF).
   (c) Life expectancy of critical parts and component.
   (d) Method of detecting failed components.

3) A maintainability prediction including:

   (e) Estimated repair times for each failure mode (man-hours per occurrence) Mean Time To Repair (MTTR).
   (f) Routine maintenance schedule.
   (g) Estimated routine maintenance times in man-hours per year, assuming normal maintenance conditions and non-hazardous environment.
   (h) A list of special tools, training and skills required to meet MTTR.

4) Comparison of R&M values for the component originally supplied and the replacement.
5) A description of the service organization, including availability of service engineers, spare parts and stocking arrangements.
6) The vendor shall state the basis for his R&M prediction. Field data from similar equipment in similar applications is preferred.

Mean Time To Failure (MTTF) – The average operating time at which a component fails. An estimate of MTTF is given by the cumulative operating time divided by the total number of failures during that operating time.

Mean Time to Repair (MTTR) - The average time required to restore a component, to service from a failed condition, excluding logistic time, i.e. waiting for spare parts, preparation time.

5.1.7 Safety Requirements

Grounding connection shall be provided. There are no other safety requirements for these tanks.

5.1.8 Radiation Safety Requirements

There are no radiation safety requirements for these tanks.

5.1.9 Protective Coating Requirements

There are no protective coating requirements for these tanks.

5.1.10 Workmanship Requirements

No special workmanship requirements. Workmanship shall be in compliance with Quality Assurance and Quality Control procedures of the vendor and manufacturer.

5.1.11 Welding

Welding including the design, qualification and inspection of welded joints shall be in accordance with the requirements of ASME Section III Division 1, Subsection ND. Welding procedure and Welder performance qualification testing shall be in accordance with ASME Section IX.

All welding shall be performed in accordance with written procedures. The procedures shall be submitted to RCM for acceptance, and, if applicable, the Jurisdictional Authority for registration in accordance with the requirements CSA - N285.0-08 Update No.2 prior to the commencement of fabrication of the vessel.

5.1.12 Cleanliness

Shop conditions shall be appropriate for the production of nuclear power plant components and in accordance with the Quality Assurance requirements.

A clean area shall be provided in the Supplier's premises for storing the plates and for pack assembly. The room shall be so located that it is isolated from the normal flow of other materials or personnel. The adequacy of this clean area shall be subject to the approval of RCM.

Grease, oil, scale, sealing compound, grit, oxide, lead, weld spatter, NDT compounds, moisture, and other foreign materials shall be completely removed from all parts. All surfaces that cannot be cleaned and/or examined after assembly shall be cleaned prior to assembly.

Cleaning procedures and tests for determining cleanliness shall be subject to the acceptance of RCM. Any pickling and passivation procedures shall also be subject to the acceptance of RCM.

Processing and handling of parts shall be done so as to avoid contamination by material such as iron, grit, lead, mercury, halogens, or sulphur. Only clean silica sand or approved equivalent material shall be used for grit blasting. When liquid penetrant examination is to follow blasting, only sharp sand shall be used (i.e., shot blasting is not acceptable).

Only clean stainless-steel brushes and chip hammers and iron-free grinding wheels, not previously used on other material, shall be used on stainless-steel parts.

Precautions shall be taken to ensure that this state of cleanliness is maintained during manufacturing, testing, and through to completion of the work.

All parts shall be thoroughly cleaned prior to any heating operation.

The analysis for sulphur content shall be carried out in accordance with ASTM D129 or by acceptable equivalent methods.

5.1.13 Painting

All tank support exterior unfinished carbon steel surfaces shall be painted. Paints used are subject to acceptance by RCM. Inorganic zinc paint is preferred.

The Manufacturer shall thoroughly clean all surfaces of rust, scale, sand, grease, and other foreign material, remove burrs, and break sharp corners. The steel shall be blast cleaned to a good near-white surface conforming to SSPC-SP I0. Immediately after blast cleaning, the surface shall be blown, brushed or vacuumed free of dust and spent abrasive.

Priming shall immediately follow surface preparation. Surfaces to be primed shall be clean and dry. Priming shall be done by spray application of one coat of a commercially available Inorganic Zinc Primer, equivalent to one of those listed below, to a dry film thickness over all peaks of 40 to 50 µm;

- Dimetcote 9™ (Amercoat of Canada Ltd.)
- InterzinC™ (International Paints Ltd.)
- Carbozinc II (Corrosion Services Ltd.)

- Sherwin Williams ZINC CLAD II™ (B69V3 & B69D1)

From the beginning of metal preparation until the primer is dry to handle, all operations shall be done indoors with even temperature of not less than 10°C, humidity-control, and full protection against weather.

Preparation, application, and storage of primer materials shall be in accordance with the Manufacturer's instructions.

5.1.14 Special Tooling

The Supplier shall indicate whether special tooling is required for routine maintenance (including cleaning) of the tanks. If special tooling has been developed, the Supplier shall describe it. A power-operated pack-tightening mechanism shall be considered as a special tool.

The Supplier shall identify any other tooling that may be required for the routine maintenance of the tanks.

5.1.15 Non-Destructive Examination

The Manufacturer shall be responsible for and shall perform or have performed on his behalf all the non-destructive examination (NDE) required by CSA N285.0-08 Update No.2, ASME Section III along with the design specifications referenced in Section 2.0 (a).

All NDE shall be in accordance with written procedures. All written procedures shall be submitted to RCM for acceptance.

All personnel performing NDE to meet the requirements of this specification shall be qualified as follows, subject to acceptance by RCM:

- In Canada, personnel shall be qualified to CGSB qualifications as outlined in CSA N285.0-08 Update No.2
- In the United States of America, personnel shall be qualified to SNT-TC-1A.

Radiographic testing (RT) methods, Ultrasonic testing (UT) methods, Liquid Penetrant, Fluorescent Liquid Penetrant, and Magnetic Particle Testing and acceptance standards shall conform to the requirements of Section III.

5.1.16 Final Dimensional Inspection

The Supplier shall prepare an As-Built drawing/report listing overall dimensions, terminal point locations, thickness of the plate stack and other dimensions. This

inspection shall be carried out to a written procedure submitted to and accepted by RCM.

5.1.17 Testing Of Materials

The equipment supplied to the provisions of this specification shall be subject to the inspection and test requirements set forth below. Where functional or operating tests are performed, the product shall comply with all the provisions of this specification and with CSA CAN3-Z299.3.

Inspection and testing shall be conducted in a manner satisfactory to, and subject to the approval of RCM.

RCM or his authorized agent shall have access to the Supplier's premises at all reasonable times to the extent necessary for this specification.

In the event of failure of the product or any part thereof to meet fully an inspection or test requirement specified herein, the Supplier shall notify RCM, should he wish to repair and/or use such product or part.

At the discretion of RCM, suitable repairs and re-inspection and re-testing may be carried out, or concession granted.

If the repairs are likely to affect the results of tests or work previously completed, appropriate re-inspection or retesting shall be conducted.

The tanks shall be carefully examined to determine its conformity with this specification and the approved drawings, with respect to material, workmanship, finish, marking and dimensions, and to assess their conformity with other requirements stated, or reasonable implied, and not covered by specific tests.

At the conclusion of all inspection and test procedures described herein, the tanks shall be examined for signs of wear or cracks, distortion, or incipient damage of any sort.

5.1.18 Inspection or Test Failure

The Supplier shall obtain permission from RCM before repair or "use as is", of any part that fails to meet inspection or test requirements specified herein. If the repairs could affect the results of inspection tests, of work previously done, appropriate re-inspection and retesting shall be conducted.

6.0 PRODUCT FORM AND IDENTIFICATION

Marking shall satisfy the applicable requirements of CSA N285.0-08 Update No.2 and ASME Section III.

A nameplate(s) shall be attached to each tank. The attachment method shall not affect the integrity of the valve and shall be located in a conspicuous area where it is easy for inspection. The location shall be such that it will not be covered with insulation. Nameplates and attachments shall be of corrosion resistant materials. Marking on nameplates shall be stamped in characters not less than 2.3 - 2.5 mm high.

A metallic name plate shall be permanently attached to each tank and shall contain the information required by NCA-8211 and the following additional data:

(a) The name of the Supplier
(b) Supplier's part number
(c) Purchaser's P.O. Number
(d) Canadian Registration Number (CRN)
(e) Nominal volume Capasity;
(f) Cat ID
(g) Weight, lb
(h) Year built

7.0 SPECIAL PACKAGING AND SHIPPING, HANDLING AND STORAGE

Preparation for shipment shall be made in accordance with procedures prepared by the Supplier and accepted by RCM. The Supplier shall prepare detailed unloading, storage and installation procedures for acceptance by RCM.

All materials and parts shall be protected and covered so that no damage, corrosion or ingress of foreign material occurs during shipment.

All external unfinished carbon steel surfaces shall be coated with an epoxy based rust preventative primer and all external finished or machined surfaces shall be protected against corrosion with a coating of an easily removable compound.

All connections and machined surfaces shall be protected against mechanical damage.

The un-machined of all component supports shall be cleaned and scraped to provide a good commercial finish. A smooth coat of inorganic zinc coating (or equivalent protection) shall be applied over these surfaces in the shop before shipment. Unpainted machined surfaces shall be coated with a removable rust preventative and covered to prevent physical damage.

Adequate cushioning, blocking, bracing, skidding, hoisting and tie-down provisions shall be provided to ensure protection during transit.

Each component shall be packaged and supported for shipment so as to provide convenient lifting points and so as to prevent distortion or damage to the components. Lifting lugs, clearly marked and identified, suitable for off-loading and installation shall be provided.

Shipping containers shall be constructed to ensure acceptance and safe delivery. On the shipping container, in weatherproof lettering, the following minimum information shall be shown:

(a) Purchaser Requisition number
(b) Cat ID
(c) Purchaser's Purchase Order number
(d) Supplier's name
(e) Product name and size
(f) Quantity

8.0 MATERIAL SAFETY DATA SHEET (MSDS)

MSDS required:

☐ YES

☒ NO

9.0 DOCUMENTATION REQUIREMENTS

9.1 Design Documents

The Supplier shall submit the following reports for review and acceptance:

(a) Data Sheets;
(b) Design Report (including allowable loads on the nozzles);
(c) Spare Parts List with Part Numbers for 2 years of operation.

9.2 Drawings

The required drawings and data shall include, but not limited to, the following:

(a) General arrangement assembly drawing showing: overall dimensions and tolerances, clearance dimensions for maintenance and disassembly, all nozzles, torque required for all pressure retaining fasteners, mounting details, lifting lugs, dry and operating weights, liquid volumes for both the shell and the tube, and also drawings with the following information;
(b) Dimensions, types, orientation and ratings for all nozzles;
(c) 'As built' dimensions, orientation and location of the tank nozzles and its components;
(d) Name plate details;
(e) Complete bills of materials referenced to ASME/ASTM designations and Supplier's part numbers and part names;

As a minimum, each drawing and each document submitted to RCM shall bear the following data:

(a) System name;
(b) Purchase Order number;
(c) Registration numbers (CRN) assigned by the Jurisdictional Authority (TSSA);
(d) Cat ID number;
(e) Equipment tag number.

9.3 Procedures

The Supplier shall submit the following procedures for RCM's review and acceptance:

(a) Inspection Test Plan;
(b) Hydrostatic Test Procedures;
(c) Radiographic Examination Procedures;
(d) Magnetic Particle Examination Procedures;
(e) Liquid Penetrant Examination Procedures;
(f) Welding Procedures;
(g) Weld Repair Procedures;
(h) Stress Relieving Procedures;
(i) Painting/Protection Coating Procedures;
(j) Packing and Shipping Procedures;
(k) Unloading, Storage and Installation Procedures.

9.4 Manuals

The Supplier shall provide operating and maintenance manuals that shall include, but is not limited to, the following information:

(a) Descriptive data on the equipment;
(b) Detailed parts list for all equipment supplied including catalogue numbers and ASME/ASTM material designations;
(c) List of applicable drawings;
(d) Detailed instructions for handling, installation, operation and maintenance procedures including disassembly and reassembly of equipment and overhaul schedules.

9.5 Non Conformance Reporting

Non-conformances with a proposed disposition of use-as-is, repair, or equivalent item substitution shall be submitted to RCM for approval.

This applies to the circumstances where:

- Technical or material requirement is deviated;
- A requirement in a supplier documentation, which has previously been accepted by RCM, has been deviated;
- The non-conformance cannot be corrected by continuation of the original manufacturing process or by re-work.

The item does not conform to the original requirements, even though the item can be restored to a condition such that the capability of the item to the function is unimpaired.