



CHEM-NUCLEAR SYSTEMS INC.

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P.O. Box 1866 • Bellevue, Washington 98009 • (206) 827-0711

April 14, 1980

Charles E. MacDonald, Chief
Transportation Branch
Division of Fuel Cycle
& Material Safety
U. S. Nuclear Regulatory Commission
Washington, D.C. 20555

Reference: Docket No. 71-9096

Dear Mr. MacDonald:

We are submitting herewith a consolidation of the application and Safety Analysis Report for the CNSI Model No. 21-300 shipping cask. This submittal supersedes in their entirety all references listed in Certificate of Compliance No. 9096, Rev. 2 dated April 6, 1979.

With this submittal we are including eight (8) copies of Revision J to Drawing No. 1-298-101, which supersedes Revision H. Appendix 1 to this letter identifies significant drawing changes, none of which affect the safety of the package.

As noted in Zones F-3 and F-5 of Drawing No. 1-298-101, Rev. J, we propose to change the primary and secondary lid gasket materials and dimensions as called out in items 16 and 14 respectively. These gasket arrangements have been fully tested at our Barnwell facility and they provide a far better seal than the original design.

Also with this submittal we are including eight (8) copies Revision A to Drawing No. 1-298-101A which calls out the dimensional change of the pallet slots from two (2) inches to six (6) inches. This change is required to accommodate the larger lifting lugs and the rigging for the liners. This change does not reduce the effectiveness of the load distribution pallet.

Section 2.6.3 of the enclosed consolidated Safety Analysis Report addresses the proposed change in the torque value for the primary and secondary lid bolts. You will note that since the pressure load is significantly below the preload, gasket preload will remain intact.

16071

In Section 2.3 of the Safety Analysis Report and as noted in the enclosed Drawing No. 1-298-101, Rev. J, we propose to use ASTM A516 Grade 70 steel in the fabrication of all future model 21-300. This steel will be normalized and tested using a Charpy Impact Test to meet impact requirements of ASTM Class 1 specification.

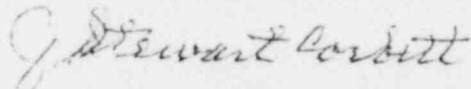
ASTM A516 Grade 70 is a better quality material construction with improved ductility at ambient temperatures to - 40⁰ F and will surpass the existing specifications for approved packages fabricated from other materials. A copy of the specifications for this steel is enclosed.

In accordance with the provisions of Section 170.31 (11)(c) of 10CFR 170 we are enclosing our check in the amount of \$690.00 as payment for a minor amendment.

Your cooperation in expediting your approval of this request would be greatly appreciated. Please contact this office if you have any questions.

Sincerely,

CHEM-NUCLEAR SYSTEMS, INC.



J. Stewart Corbett
Manager, Licensing & Safety

JSC/cm

Enclosures (11)

cc: Lou Reynolds - Regulatory Affairs
Karl Kinkade - Engineering
Bill Mayes - Transportation

APPENDIX 1

A summary of revisions to Drawing No. 1-298-101 Rev. H to Rev. J are as follows:

1. Section views B-B and C-C have been relocated.
2. In Zone G-4 and $76 \frac{7}{8} \pm \frac{1}{16}$ dimension was removed and the $\frac{1}{8}$ " gap call-out was added for clarification.
3. In Zone E-8 the note was revised to require that mounting holes be located using a template. This change facilitates the securing of any cask on any trailer.
4. In Zones B-4, G-4 and B-6 weld size is noted.
5. In Zones G-2, F-2, B-5, G-3 and B-4 weld call-outs are changed for ease of fabrication and to upgrade welds.
6. In Zone A-4 flag notes 3 and 4 are removed eliminating confusion with notes 6 and 7.
7. In Zone B-4 detail 16 is removed and detail 29 is added due to change of gasket design.
8. Parts List items are revised as follows:
 - A. Item 22 - dimensions changed to match body shell.
 - B. Item 34 - finalized as-built dimensions.
 - C. Item 29 - dimensions changed for ease of lid installation.
 - D. Item 12 and 19 - added ASTM Equivalent Spec.
 - E. Item 3 - eliminated option of $\frac{1}{8}$ " thick.
 - F. Items 39 and 40 added for clarity.
 - G. Item 14 and 16 - revised gasket dimensions and material.

SPECIFICATION FOR CARBON STEEL PLATES FOR PRESSURE VESSELS
FOR MODERATE AND LOWER TEMPERATURE SERVICE



SA-516



(Identical with ASTM Specification A 516-77)

S78

1. Scope

1.1 This specification covers carbon steel plates intended primarily for service in welded pressure vessels where improved notch toughness is important.

1.2 Plates under this specification are available in four grades having different strength levels as follows:

Grade	Tensile Strength, ksi (MPa)
55	55-75 (380-515)
60	60-80 (415-550)
65	65-85 (450-585)
70	70-90 (485-620)

1.3 The maximum thickness of plates is limited only by the capacity of the composition to meet the specified mechanical property requirements; however, current practice normally limits the maximum thickness of plates furnished under this specification as follows:

Grade	Maximum Thickness, in. (mm)
55	12 (305)
60	8 (203)
65	8 (203)
70	8 (203)

NOTE—The values stated in U.S. customary units are to be regarded as the standard.

2. Applicable Documents

2.1 ASTM Standards:

A 20 Specification for General Requirement for Delivery of Steel Plates for Pressure Vessels

3. General Requirements and Basis of Purchase

3.1 Material supplied to this method specification shall conform to the current issue of Specification A 20. These requirements outline the testing and retesting methods and procedures, permissible variations in dimensions, and mass, quality and repair of defects, marking, loading, etc.

3.2 Specification A 20 also establishes the rules for the basis of purchase that should be complied with when purchasing material to this specification.

3.3 In addition to the basic requirements of this specification, certain supplementary requirements are available when additional control, testing, or examination is required to meet end use requirements. These include:

- 3.3.1 Vacuum treatment,
- 3.3.2 Additional or special tension testing,
- 3.3.3 Impact testing, and
- 3.3.4 Nondestructive examination.

3.4 The purchaser is referred to the listed supplementary requirements in this specification and to the detailed requirements in Specification A 20.

3.5 If the requirements of this specification are in conflict with the requirements of Specification A 20, the requirements of this specification shall prevail.

4. Manufacture

4.1 *Steelmaking Practice*—The steel shall be made to a fine-grain practice.

5. Heat Treatment

5.1 Plates 1.50 in. (38 mm) and under in thickness are normally supplied in the as-rolled condition. The plates may be ordered normalized or stress relieved, or both.

5.2 Plates over 1.50 in. in thickness shall be normalized.

5.3 When notch-toughness tests are required on plates to this specification, the plates shall be normalized.

5.4 If approved by the purchaser, cooling rates faster than those obtained by cooling in air are permissible for improvement of the toughness provided the plates are subsequently tempered in the range 1100 to 1300°F (590 to 700°C).

6. Chemical Requirements

6.1 The steel shall conform to the chemical

S77

requirements shown in Table 1 except as in 6.2.

S78

6.2 Grade 60 plates 0.50 in. (13 mm) and under in thickness may be specified to have 0.85-1.20% manganese on heat analysis, and 0.77-1.30% manganese on product analysis.

7. Metallurgical Structure

7.1 All steel shall have a fine austenitic grain size.

7.2 The requirements of 7.1 above need not apply when notch toughness tests are performed to meet the requirements of A20. The provisions of 4.1 shall still apply.

8. Mechanical Requirements

8.1 *Tension Test Requirements*—The material as represented by the tension-test specimens shall conform to the requirements shown in Table 2.

SUPPLEMENTARY REQUIREMENTS

Supplementary requirements shall not apply unless specified in the order.

A list of standardized supplementary requirements for use at the option of the purchaser are included in ASTM Specification A 20. Those which are considered suitable for use with this specification are listed below by title.

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|--|--|
| S1. Vacuum Treatment, | S5. Charpy V-Notch Impact Test, |
| S2. Product Analysis, | S6. Drop Weight Test, |
| S3. Simulated Post-Weld Heat Treatment of Mechanical Test Coupons, | S7. High-Temperature Tension Test, |
| S4.1 Additional Tension Test, | S8. Ultrasonic Examination, |
| | S9. Magnetic Particle Examination, and |
| | S14. Bend Test. |

S78

TABLE 1 Chemical Requirements

Elements	Composition, %			
	Grade 55	Grade 60	Grade 65	Grade 70
Carbon, max ^b :				
½ in. (13 mm) and under	0.18	0.21	0.24	0.27
Over ½ in. to 2 in. (50 mm), incl	0.20	0.23	0.26	0.28
Over 2 in. to 4 in. (100 mm), incl	0.22	0.25	0.28	0.30
Over 4 to 8 in. (203 mm), incl	0.24	0.27	0.29	0.31
Over 8 in.	0.26	0.27	0.29	0.31
Manganese:				
½ in. (13 mm) and under:				
Heat analysis	0.60-0.90	0.60-0.90 ^a	0.85-1.20	0.85-1.20
Product analysis	0.54-0.98	0.54-0.98 ^a	0.79-1.30	0.79-1.30
Over ½ in.:				
Heat analysis	0.60-1.20	0.85-1.20	0.85-1.20	0.85-1.20
Product analysis	0.52-1.30	0.77-1.30	0.77-1.30	0.77-1.30
Phosphorus, max ^b	0.035	0.035	0.035	0.035
Sulfur, max ^b	0.04	0.04	0.04	0.04
Silicon:				
Heat analysis	0.15-0.30	0.15-0.30	0.15-0.30	0.15-0.30
Product analysis	0.13-0.33	0.13-0.33	0.13-0.33	0.13-0.33

^a See 6.2

^b Applies to both heat and product analyses.

TABLE 2 Tensile Requirements

	Grade 55	Grade 60	Grade 65	Grade 70
Tensile strength, ksi (MPa)	55-75(380-515)	60-80(415-550)	65-85(450-585)	70-90(485-620)
Yield strength min ^b , ksi (MPa)	30.0 (207)	32.0 (221)	35.0 (241)	38.0 (262)
Elongation in 8 in. or 200 mm, min, percent ^a	23	21	19	17
Elongation in 2 in. or 50 mm, min, percent ^a	27	25	23	21

^a See Specification A 20

^b Determined by either the 0.2 percent offset method or the 0.5 percent extension-underload method.

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