

(ii) The specimen, exclusive of grip ends, may not be flattened. Grip ends may be flattened to within 1 inch of each end of the reduced section.

(iii) When size of cylinder does not permit securing straight specimens, the specimens may be taken in any location or direction and may be straightened or flattened cold, by pressure only, not by blows; when specimens are so taken and prepared, the inspector's report must show in connection with record of physical test detailed information in regard to such specimens.

(iv) Heating of a specimen for any purpose is not authorized.

(3) The yield strength in tension must be the stress corresponding to a permanent strain of 0.2 percent of the gauge length. The following conditions apply:

(i) The yield strength must be determined by the "offset" method as prescribed in ASTM E 8 (IBR, see §171.7 of this subchapter).

(ii) Cross-head speed of the testing machine may not exceed  $\frac{1}{8}$  inch per minute during yield strength determination.

(k) *Acceptable results for physical tests.* An acceptable result of the physical test requires an elongation to at least 7 percent and yield strength not over 80 percent of tensile strength.

(l) *Weld tests.* Welds of the cylinder are required to successfully pass the following tests:

(1) *Reduced section tensile test.* A specimen must be cut from the cylinder used for the physical tests specified in paragraph (j) of this section. The specimen must be taken from across the seam, edges must be parallel for a distance of approximately 2 inches on either side of the weld. The specimen must be fractured in tension. The apparent breaking stress calculated on the minimum wall thickness must be at least equal to 2 times the stress calculated under paragraph (f)(2) of this section, and in addition must have an actual breaking stress of at least 30,000 psi. Should this specimen fail to meet the requirements, specimens may be taken from 2 additional cylinders from the same lot and tested. If either of the latter specimens fails to meet require-

ments, the entire lot represented must be rejected.

(2) *Guided bend test.* A bend test specimen must be cut from the cylinder used for the physical tests specified in paragraph (j) of this section. Specimen must be taken across the seam, must be  $1\frac{1}{2}$  inches wide, edges must be parallel and rounded with a file, and backup strip, if used, must be removed by machining. The specimen must be bent to refusal in the guided bend test jig illustrated in paragraph 6.10 of CGA Pamphlet C-3 (IBR, see §171.7 of this subchapter). The root of the weld (inside surface of the cylinder) must be located away from the ram of the jig. No specimen must show a crack or other open defect exceeding  $\frac{1}{8}$  inch in any direction upon completion of the test. Should this specimen fail to meet the requirements, specimens may be taken from each of 2 additional cylinders from the same lot and tested. If either of the latter specimens fail to meet requirements, the entire lot represented must be rejected.

(m) *Rejected cylinders.* Repair of welded seams is authorized. Acceptable cylinders must pass all prescribed tests.

(n) *Inspector's report.* In addition to the information required by §178.35, the record of chemical analyses must also include applicable information on iron, titanium, zinc, and magnesium used in the construction of the cylinder.

[Amdt. 178-114, 61 FR 25942, May 23, 1996, as amended at 62 FR 51561, Oct. 1, 1997; 66 FR 45386, Aug. 28, 2001; 67 FR 51654, Aug. 8, 2002; 68 FR 75748, Dec. 31, 2003; 69 FR 54046, Sept. 7, 2004]

**§ 178.69 Responsibilities and requirements for manufacturers of UN pressure receptacles.**

(a) Each manufacturer of a UN pressure receptacle marked with "USA" as a country of approval must comply with the requirements in this section. The manufacturer must maintain a quality system, obtain an approval for each initial pressure receptacle design type, and ensure that all production of UN pressure receptacles meets the applicable requirements.

(1) *Quality system.* The manufacturer of a UN pressure receptacle must have

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its quality system approved by the Associate Administrator. The quality system will initially be assessed through an audit by the Associate Administrator or his or her representative to determine whether it meets the requirements of this section. The Associate Administrator will notify the manufacturer in writing of the results of the audit. The notification will contain the conclusions of the audit and any corrective action required. The Associate Administrator may perform periodic audits to ensure that the manufacturer operates in accordance with the quality system. Reports of periodic audits will be provided to the manufacturer. The manufacturer must bear the cost of audits.

(2) *Quality system documentation.* The manufacturer must be able to demonstrate a documented quality system. Management must review the adequacy of the quality system to assure that it is effective and conforms to the requirements in § 178.70. The quality system records must be in English and must include detailed descriptions of the following:

- (i) The organizational structure and responsibilities of personnel with regard to design and product quality;
- (ii) The design control and design verification techniques, processes, and procedures used when designing the pressure receptacles;
- (iii) The relevant procedures for pressure receptacle manufacturing, quality control, quality assurance, and process operation instructions;
- (iv) Inspection and testing methodologies, measuring and testing equipment, and calibration data;
- (v) The process for meeting customer requirements;
- (vi) The process for document control and document revision;
- (vii) The system for controlling non-conforming material and records, including procedures for identification, segregation, and disposition;
- (viii) Production, processing and fabrication, including purchased components, in-process and final materials; and
- (ix) Training programs for relevant personnel.

(3) *Maintenance of quality system.* The manufacturer must maintain the qual-

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ity system as approved by the Associate Administrator. The manufacturer shall notify the Associate Administrator of any intended changes to the approved quality system prior to making the change. The Associate Administrator will evaluate the proposed change to determine whether the amended quality system will satisfy the requirements. The Associate Administrator will notify the manufacturer of the findings.

(b) *Design type approvals.* The manufacturer must have each pressure receptacle design type reviewed by an IIA and approved by the Associate Administrator in accordance with § 178.70. A cylinder is considered to be of a new design, compared with an existing approved design, as stated in the applicable ISO design, construction and testing standard.

(c) *Production inspection and certification.* The manufacturer must ensure that each UN pressure receptacle is inspected and certified in accordance with § 178.71.

[71 FR 33885, June 12, 2006]

### § 178.70 Approval of UN pressure receptacles.

(a) *Initial design-type approval.* The manufacturer of a UN pressure receptacle must obtain an initial design type approval from the Associate Administrator. The initial design type approval must be of the pressure receptacle design as it is intended to be produced. The manufacturer must arrange for an IIA, approved by the Associate Administrator in accordance with subpart I of part 107 of this chapter, to perform a pre-audit of its pressure receptacle manufacturing operation prior to having an audit conducted by the Associate Administrator or his designee.

(b) *IIA pre-audit.* The manufacturer must submit an application for initial design type approval to the IIA for review. The IIA will examine the manufacturer's application for initial design type approval for completeness. An incomplete application will be returned to the manufacturer with an explanation. If an application is complete, the IIA will review all technical documentation, including drawings and calculations, to verify that the design