

retesting of cylinders by the hydrostatic test as they are not only unclear to requalifiers, but also missing necessary information rendering the regulations unenforceable. Although the petition proposed the Tenth Edition, currently there is an Eleventh Edition (2016) available. In the NPRM, PHMSA proposed to incorporate by reference this most current version and requested comment regarding this action. We received no adverse comments related to adoption of the newest edition (*i.e.*, CGA C–1–2016 (11th Ed.)) of the standard versus the Tenth Edition. However, we did receive numerous comments regarding the incorporation by reference of CGA C–1–2016 (11th Ed.) (“CGA C–1”) and associated revisions, which we will discuss in depth as follows.

In this final rule, PHMSA is adopting clarifying language and incorporating by reference the CGA C–1 standard, as proposed in P–1626. CGA C–1 provides more detailed instructions and illustrations for use by cylinder requalifiers and manufacturers than what is possible in the HMR and addresses the deficiencies detailed in the petition. This incorporation by reference applies to the following sections: §§ 178.36, 178.37, 178.38, 178.39, 178.42, 178.44, 178.45, 178.46, 178.47, 178.50, 178.51, 178.53, 178.55, 178.56, 178.57, 178.58, 178.59, 178.60, 178.61, 178.65, 178.68, 180.205, and 180.209. The incorporation of CGA C–1 supports the goal of increasing compliance and improving overall safety as its reference increases clarity and provides enhanced guidance compared to the current language in the HMR. Cylinder requalifiers and manufacturers must comply with CGA C–1 requirements for pressure testing cylinders, as well as equipment accuracy and calibration. Specific clarifications include instructions for performing volumetric expansion tests using both the water-jacket and direct expansion methods, as well as a provision for retesting in case of equipment failure or operator error and re-naming the “hydrostatic test” paragraph to “pressure test” to align more with industry accepted nomenclature. PHMSA believes that CGA C–1’s inclusion of “operator error” as a condition allowing a repeated test at a higher pressure will prevent the condemnation of cylinders that are safe for continued use. Revising the HMR to incorporate by reference CGA C–1 will provide the desired clarification without imposing requirements that are potentially costly or unnecessarily difficult.

#### (1) Response to Hydro-Test Products

We received numerous comments regarding incorporation by reference of CGA C–1, and about interpretation of CGA C–1 requirements. Hydro-Test Products<sup>6</sup> submitted a comment requesting clarification of CGA C–1 requalification requirements compared to the current requalification requirements in part 180, subpart C, of the HMR. Hydro-Test Products states,

The authors of the CGA C–1 pamphlet have included definitions and examples of calibration and accuracy for Expansion Indicating Devices (EID) and Pressure Indicating Devices (PID) that will restrict most all current licensed cylinder requalifiers from performing cylinder requalification. Furthermore, there are statements in the C–1 that discriminate against procedures and equipment components that have been utilized in a safe, consistent and accurate manner for many years.

*PHMSA response.* We disagree with Hydro-Test Products and address the issues they raise below.

##### (a) Expansion Indicating Device Accuracy

Hydro-Test Products describes a burette arrangement with 4 burettes with full scales of 0–25, 0–50, 0–125 and 0–360 cubic centimeters (cc) and explains their belief that incorporation by reference of CGA C–1 will significantly restrict the usable range of the burettes to half of the burette’s scale, instead of the much broader range that they believe are authorized under the current HMR.

*PHMSA response.* Hydro-Test Products understanding of the HMR’s current requirements is not correct. The HMR currently require use of burettes in the same manner prescribed in CGA C–1. Hydro-Test Products misunderstanding appears to be grounded in the final rule published on May 28, 1996, known as HM–220A, (61 FR 26750). HM–220A created the requirement that expansion indicating devices (EID), such as burettes or scales, must be certified as having an accuracy of  $\pm 0.5$  percent, of its full range, and must be accurate to  $\pm 1.0$  percent of the total expansion of any cylinder tested or 0.1 cubic centimeter, whichever is larger. These accuracy requirements, as discussed in the HM–220A final rule (61 FR 26751), are separate and distinct

<sup>6</sup> PHMSA notes that Jeff Elliot, Noble Gas Solutions, Anthony King, W Andrews, and Scuba Do submitted comments supporting the Hydro-Test Products comment and opposing the incorporation of CGA C–1. While the discussion below focuses on the specific comments from Hydro-Test Products, it also addresses the subject matter raised by these other comments supporting the Hydro-Test Products comment.

from the requirement that the EID permit reading to  $\pm 1$  percent of the total expansion. The reading requirements are intended to address the resolution of the EID, which is not the same as the accuracy of the EID. In the example of the burette with a full scale of 50 cc, with an accuracy grade of  $\pm 0.5$  percent and increments of 0.1 cc (mid-point interpolation allowed to 0.05), the resolution would permit reading down to 5 cc (*i.e.*, interpolation to 0.05 is 1 percent of 5 cc), but the accuracy of the device would not. A burette with a full scale of 50 cc and full-scale accuracy of  $\pm 0.5$  percent has an expected deviation of  $\pm 0.25$  cc. The device may only be used to measure total expansion greater than 25 cc, because at total expansions lower than 25 cc, the expected deviation will be greater than  $\pm 1$  percent of the total expansion. Using the 5 cc example, a 0.25 cc deviation (*i.e.*, the expected deviation for a 50 cc burette with an accuracy grade of  $\pm 0.5$  percent) at a total expansion of 5 cc would be a 5% deviation, and would not meet the requirement that the EID is accurate to  $\pm 1\%$  of the total expansion.

Moreover, we do not agree that incorporation by reference of CGA C–1 will impose new cost burdens upon cylinder requalifiers because the current regulatory standard has been in place since 1996, and the requirements will not change with incorporation by reference of CGA C–1. Hydro-Test Products states that a similar issue exists for requalifiers using a scale as their EID. Our response is the same: The current regulatory standard has been in place since 1996, and the requirements will not change with incorporation by reference of CGA C–1.

##### (b) Total and Permanent Expansion Accuracy

Hydro-Test Products asks how EIDs can be used to measure permanent expansion when that permanent expansion is a much lower value than the total expansion, *i.e.* the permanent expansion is out of the range allowed for the total expansion.

*PHMSA response.* Hydro-Test Products is correct that permanent expansion values are much lower than total expansion values. The HMR has always accepted a greater accuracy deviation for permanent expansion, and this does not change in CGA C–1. Accuracy requirements for EIDs continue to be expressed in terms of the total expansion value.

##### (c) Foreknowledge of Total Expansion

Hydro-Test Products asks, “[s]ince there is no indication of the total expansion value on DOT specification