



ASME CODE N E W S

by Thomas P. Pastor, Director, Engineering Technology Division

Questions and Answers

Q My company fabricates small Section VIII vessels that use a flat bolted cover for one of the closures. The cover contains a number of small nozzles and couplings that have a finished opening less than 2" in diameter. Are these openings exempt from reinforcement calculations regardless of their center-to-center spacing?

A The answer is no, since you have to satisfy both size and spacing requirements in UG-36(c)(3) to exempt an opening from reinforcement. When reinforcement calculations are required for the small openings because of spacing, you need to follow the rules for multiple openings in UG-39(b)(2) or UG-39(e). There are no Code rules when the spacing of the holes is less than 1¹/₄ times the average diameter of the adjacent openings. In this case, an engineering evaluation must be performed [e.g., proof test, finite element analysis] per U-2(g).

Q I am bidding a project that requires the use of SA-240 UNS 32950 duplex stainless steel, but I don't see this particular alloy listed in Table UHA-23 for SA-240 plate material. Yet this same alloy is listed under pipe and tube product forms [SA-789 and SA-790]. Can this plate material be used for Section VIII, Division 1 construction?

A Yes. This material can be used by applying the provisions of UG-15. This paragraph addresses the situation where a particular alloy is covered by the Code for one or more product forms (e.g., pipe, tube, forgings) but is not listed for some other product form such as a plate or bar. As long as the plate or bar specification is listed in Subsection C of Section VIII covering some other wrought product of that grade, the allowable stresses developed for the other product form may be used. Of course, you would need to verify that the chemical and physical properties, heat treating requirements, etc. conform to the approved specification. In addition, an adjustment to the allowable stress may be required when the covered specification is pipe or tube.

Final Word

■ NBIC Interpretation and Higher Allowable Stresses

by Robert V. Wielgoszinski, Engineering Services, Quality Assurance

The rule development committee of the National Board Inspection Code recently issued an interpretation regarding the repair and alteration of pressure retaining items using later editions or addenda of the original code of construction, which permit higher allowable stresses for the material. The timely issuance of this interpretation was due to

the recent ASME Code Cases [Cases 2278, 2284, 2290] for reduction of the design margin from 4.0 to 3.5.

The current NBIC rules for rerating or repair/alteration are rather simple. If an "R" Certificate Holder changes out, adds, or replaces material in an ASME vessel, like material should be used. However, the reduction in the design margin results in a higher allowable stress value to be used in design calculations. This results in either thinner replacement material or a higher maximum allowable working pressure (MAWP). For example, in a shell of a pressure vessel, built to the 1995 Code, with an MAWP of 100 psi, 72-inch diameter, and 0.413" thickness, the replacement material need only be 0.384" thick. That does not seem like very much of a reduction. In fact, it's only 7%. But if that same vessel were 300 psi with a minimum thickness of 1.25", the replacement material only needs to be 1.16". This now reduces the thickness below what is required for mandatory NDE and PWHT. Some jurisdictions may take a dim view of such repairs. Another example would be to increase the MAWP stamped on the unit by the same 7%. Vessel rerating of this type is more likely to occur. Again, jurisdictions will not look with favor on this activity without better controls.

To help jurisdictions and insurance companies with repairs/alterations using the latest material design parameters, the NBIC Committee published an interpretation that provides guidance to users, jurisdictions, and inspectors. In particular, questions 4 and 5 of the interpretation provide clear direction in the rerating of boilers and pressure vessels. Among other things, limits are placed on the age and operating experience of the unit. As usual, consultation with the local jurisdiction is advised before proceeding with use of this interpretation.

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Interpretation 98-14

Appendix 6, Examples of Repairs and Alterations, RC-1050 Replacement Parts, RC-3022 Re-rating, RC-3020 Design, 1998 Edition

Question 1: Does the example of an alteration given in Appendix 6, paragraph C.7, for replacement of a pressure retaining part with a material of different allowable stress from that used in the original design, apply to use of the same material when later editions/addenda of the original code of construction permit higher allowable stresses for that material?

Reply 1: Yes, when use of the higher allowable stress value results in a reduction in material thickness.

Question 2: Does the example of a repair given in Appendix 6, paragraph B.17, for replacement of a pressure retaining part with a material of different nominal composition and equal or greater allowable stress from that used in the original design,

apply to use of the same material when later editions/addenda of the original code of construction permit higher allowable stresses for that material?

Reply 2: Yes, provided there is no reduction in material thickness.

Question 3: When a replacement part is constructed using higher allowable stress values permitted by a later edition/addenda of the original code of construction and the replacement part is thinner than the part being replaced, is it required that an "R" Certificate Holder perform calculations and inspections to verify that the connecting welds and the affected portions of the pressure retaining items are in compliance with the original code of construction?

Reply 3: Yes.

Question 4: May a pressure retaining item be rerated using a later edition/addenda of the original code of construction which permits higher allowable stress values for the material than was used in the original construction?

Reply 4: Yes, in compliance with the following minimum criteria:

- a. The "R" Certificate Holder verifies (by calculations and other means) that the rerated item can be satisfactorily operated at the new service conditions (e.g., stiffness, buckling, external mechanical loadings, etc.),
- b. The pressure retaining item is not used for lethal service,
- c. The pressure retaining item is not in high-cycle operation or fatigue service (i.e., loadings other than primary membrane stress are controlling design considerations),
- d. The pressure retaining item was constructed to the 1968 Edition or later edition/addenda of the original code of construction,
- e. The pressure retaining item is shown to comply with all relevant requirements of the edition/addenda of the code of construction which permits the higher allowable stress values (e.g., reinforcement, toughness, examination, pressure testing, etc.),
- f. The pressure retaining item has a satisfactory operating history and current inspection of the pressure retaining item verifies that the item exhibits no unrepaired damage (e.g., cracks, corrosion, erosion, etc.),

- g. The rerating is acceptable to the Inspector and, where required, the jurisdiction,
- h. All other requirements of Part RC are met, and
- i. Use of this Interpretation is documented in the Remarks Section of Form R-2.

Question 5: May a new minimum required wall thickness be calculated for a pressure retaining item by using a later edition/addenda of the original code of construction which permits higher allowable stress values for the material than was used in the original construction?

Reply 5: Yes, in compliance with the following minimum criteria:

- a. The "R" Certificate Holder verifies (by calculations and other means) that the affected portions of the pressure retaining item can be satisfactorily operated (e.g., stiffness, buckling, external mechanical loadings, etc.),
- b. The pressure retaining item is not used for lethal service,
- c. The pressure retaining item is not in high-cycle operation or fatigue service (i.e., loadings other than primary membrane stress are controlling design considerations),
- d. The pressure retaining item was constructed to the 1968 Edition or later edition/addenda of the original code of construction,
- e. The pressure retaining item is shown to comply with all relevant requirements of the edition/addenda of the code of construction which permits the higher allowable stress values (e.g., reinforcement, toughness, examination, pressure testing, etc.),
- f. The pressure retaining item has a satisfactory operating history and current inspection of the pressure retaining item verifies that the item exhibits no unrepaired damage (e.g., cracks, etc.). Areas of corrosion or erosion may be left in place provided the remaining wall thickness is greater than the new minimum thickness,
- g. The design change is acceptable to the Inspector and, where required, the jurisdiction,
- h. All other requirements of Part RC are met, and
- i. Use of this Interpretation is documented in the Remarks Section of Form R-2.

A R O U N D THE WORLD

The European Directives and the Manufacturer

by Sandy Babka, Engineering Technology Division

"I'm bidding on a contract for several pressure vessels for a European customer and they require CE Marking as well as compliance to ASME Section VIII, Division 1. What is this 'CE Marking' and can Hartford Steam Boiler help me?"

As the interim period for the European Pressure Equipment Directive (PED) approaches, we are receiving more telephone calls asking some variant of this question. November 29, 1999, is the start date of the 30-month interim period for the PED. Many

customers in Europe want the products that they are purchasing to bear a CE Mark and to have a European Community (EC) Declaration of Conformity, thereby denoting presumption of conformity with the Directive 23/97/EC. At the end of the interim period, May 29, 2002, pressure equipment must be CE Marked and have the Declaration of Conformity to be accepted into a member state of the European Union (EU).

As you may already know, the EU has been in the process of providing unification in almost every part of their member states' activities. The new Directives are designed to provide free

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AROUND THE WORLD *Continued from previous page*

movement of finance (the Euro), people, goods, and services between member states of the EU.

If you have ever tried to export a product to Europe, the Directives may make the process a little easier with regard to pressure equipment. Instead of complying with the design codes of several different countries and the respective approval organizations, you can deal with one organization, a Notified Body (NB). The manufacturer is responsible for selecting a conformity assessment module after ascertaining the category of the equipment, as defined in the Directive. Depending on the module chosen, in most cases a NB will be required to perform services, such as design verification and quality assessment, in varying degrees and combinations. If all goes well, the NB will not prohibit the issuance of a Declaration of Conformity and CE Marking. Once the CE Marking is affixed and the Declaration is present, the unit is available for placing on the market or putting into service in any country within the EU.

This does not imply that the vessel will be able to go directly into use. Each country may still have installation and operational regulations that may have to be met, which would involve the local regulatory authority. But, legally, per the PED, they would have no reason to object to the conformity of the unit. The owner or user should be aware of the local jurisdictional requirements to determine what needs to be done to comply with installation regulations.

How can HSB help in this process?

HSB (U.S.) is currently associated with a number of organizations that will be able to provide NB services for the PED. Within the scope of these agreements, the Notified Bodies will perform the design verifications and any assessments required by the PED.

HSB's (U.S.) initial role under these terms is to provide the inspection services, so that, in the majority of situations, it will not be necessary for a European inspector to travel to the U.S.

The U.S. manufacturer should be forewarned that many parts of the Directives, especially the PED, are different from the ASME system. Will an ASME stamped vessel automatically comply with the PED? In most cases, the answer is no. (We'll talk more about this in our next issue.) The PED puts full responsibility for all aspects of the pressure equipment on the manufacturer. The manufacturer must not only comply with a recognized design code, but also consider such things as how the vessel will be used and account for any possible conditions that might result in a failure of the vessel. Since the Directives are not design codes, the purpose of the NB is to ensure that the design meets the essential safety requirements listed in each Directive. The manufacturer should also be aware that if there are other components besides the physical pressure vessel, they will probably need to comply with other Directives (e.g., Machinery, Medical Device, and Low Voltage).

Before getting involved in a project that includes CE Marking of a product, it is highly advisable to read through the applicable Directive. Several Directives, information on the background of the New Approach, and Harmonized Standards related to each Directive can be found at www.newapproach.org. The standards and reference documents can be obtained through an engineering document supply distributor in the U.S. or abroad.

For more information regarding the Pressure Equipment Directive and CE Marking, please contact Sandy Babka at 800-472-1866, ext. 5197 or via e-mail at sandy_babka@hsb.com, or Bryce Hart at 800-345-1122, ext. 8514, or via e-mail at bryce_hart@hsb.com.

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