PRESSURE POINTS

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AUGUST 2006

ASME CODE NEWS

By Thomas P. Pastor, P.E., Vice President
Codes and Standards Group

Questions & Answers

Q My company periodically will install stud pads (studded outlets) on low-pressure vessels made of carbon and low alloy steel. We sometimes fabricate our own pads from excess material we have in the shop, and in some cases would like to use SA-36 material. Is there anything within Section VIII, Division 1 that would prohibit the use of this material for stud pads?

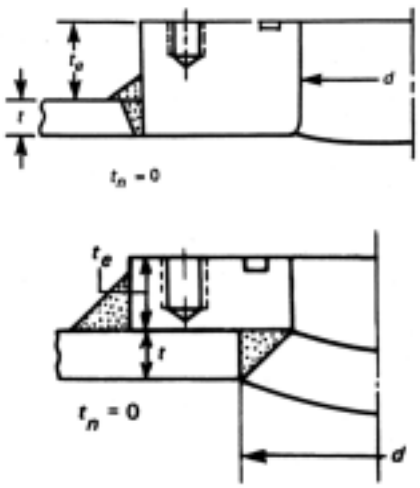


Fig. UG-40
Typical Stud Pads

A Paragraph UCS-6 contains rules for carbon and low alloy steel plates. It permits the use of SA-36, SA/CSA-G40.21 38W, and SA-283 Grades A, B, C, and D plate material for pressure parts provided all the following requirements are met:

(1) The vessels are not in lethal service.
(2) The material is not used in the construction of unfired steam boilers.
(3) With the exception of flanges, flat bolted covers, and stiffening rings, the thickness of plates on which strength welding is applied does not exceed 5/8".

Since your vessel is not an unfired steam boiler nor in lethal service, then the only restriction on using SA-36 material would be if thickness of your pad exceeded 5/8", since ASME does not consider a stud pad to be a flange, flat bolted cover, or stiffening ring. Also please note that the attachment welds as shown above for the stud pad to the vessel are considered strength welds.

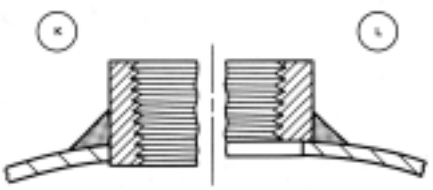
The ASME Subcommittee on Pressure Vessels recently approved the following Interpretation:

Question: Is it permitted by paragraph UCS-6(b)(3) of Section VIII, Division 1 to use SA-36 material for stud pad (studded outlet) with the thickness greater than 5/8" and attached to the shell in accordance with the requirements of Fig. UG-40 (1-2) or (a-2)?

Reply: No.

People often ask if Section VIII, Division 1 contains specific rules for the design of stud pads, such as depicted in Fig. UG-40 above. The answer is yes and no. As a minimum the stud pad is treated in the same manner as a reinforcement pad when the opening in the vessel is evaluated for reinforcement. Note when performing the reinforcement calculations, the plane being investigated should be taken through the tapped holes in the stud pad. If there are external loads placed on the pad, then U-2(g) applies and the designer would need to evaluate the additional stresses in the pad, the attachment welds, and the local stresses imposed on the vessel.

Q Paragraph UW-16(f)(3)(a) provides rules for attaching fittings and bolting pads that do not exceed NPS 3 to vessels with a single fillet weld from the outside. There are several limitations when attaching fittings in this manner, such as the maximum size of the opening in the vessel is limited to the outside diameter of the attached pipe plus 3/4", but not greater than one-half of the vessel inside diameter. So, what this means is that if I use an NPS 3 fitting, then the maximum size of the opening in the vessel would be 4.25 inches (pipe O. D. of 3.5 inches plus 0.75 inches). Does this mean that I need to now perform reinforcement calculations for this opening, since the exemption from reinforcement calculations given in UG-36(c)(3) is limited to a maximum finished opening of 3 ½ in.?



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A This question was recently considered by the ASME Subcommittee on Pressure Vessels, and the following Interpretation was approved.

Question: May fittings and bolting pads, in accordance with the UW-16(f)(3)(a), have an opening in the shell equal to or less than 4.25 in. (pipe O. D. of 3.5 in. + 0 .75 in.), if that is less than one-half the vessel inside diameter, without requiring reinforcement per UG 37?

Reply: Yes, see UW-16(f)(3)(a)(2) and UW-16(f)(3)(b)

A revision will be forthcoming in Section VIII, Division 1 clarifying for code users that fittings attached as permitted by UW-16(f)(3)(a)(2) are exempt from opening reinforcement calculations.

A Sample of Recently Approved or Revised Code Cases

Revision to Code Cases 2179 and 2180 – 9Cr-2W and 12Cr-2W Material
These code cases for Grades 92 and 122 material have been modified to reduce the existing maximum allowable stress values in the time-dependent regime (i.e., 1050° F and above) on the order of 5-27%. In addition for code case 2179, the allowable stresses for product form pipe have been moved to the second column resulting in a further reduction in the time-dependent allowable stress values. A very premature field failure and subsequent extensive international laboratory testing was the background for these revisions. These revisions to these code cases are in the last stages of approval at ASME. Advanced copies of the revised cases can be acquired at: http://cstools.asme.org/CodeCases.cfm

Case 2534 - Use of SA-240 – S43932 in Thickness Less Than ¼" for Section IV Hot Water Borders
This case permits the use of SA-240S43932 ferritic stainless steel material in thickness less than 1/4" in hot water heating systems with a maximum pressure of 80 psi and constructed to Section IV.

Case 2547
Section VIII, Division 1 introduced mandatory flange rigidity rules in the 2005 addenda. This code case provides an alternative to the mandatory flange rigidity rules for a period of 18 months (until approximately 4/08) based on successful service experience with a specific design or by analysis per U-2(g).

Case 2544
This case allows for the elimination of the out of roundness tolerance specified in UG-81(b) for formed heads. When the required thickness for a formed head is governed by internal design pressure and this thickness is much thicker than would be required for the design external pressure, the tolerances in UG-81(b) or AF-135 (b) for heads designed for external pressure are too restrictive. Analysis shows that when the external design pressure is less than or equal to 1/5 the internal design pressure and the thickness to radius ratio of the spherical portion of the head is equal to or greater than 0.01, the tolerance of the head for the external pressure condition need not exceed the tolerance rules for the internal pressure design. This Code Case could significantly reduce fabrication costs in terms of not having to satisfy the more stringent tolerance requirements that would normally be applied to formed heads subject to external pressure.

RESTRICTIONS ON THE USE OF ROD AND BAR FOR PRESSURE VESSEL COMPONENTS

By Jay Cameron, P.E., Senior Consulting Engineer
Codes and Standards Group

A revision to ASME BPVC Section VIII, Division 1 in the 2005 Addenda regarding this topic was briefly highlighted in the March 2006 issue of *Pressure Points*. This article is intended to provide some further details to that revision.

Background

Prior to the 2005 Addenda, UG-14 only implicitly permitted the use of rod or bar for components with primarily axial tension or bending stresses parallel to the axis of the bar ("flange rings, stiffening rings, frames for reinforced openings, stays and staybolts"). Conversely, rod and bar could not be used for shells and nozzles, as supported by Interpretation VIII-1-92-95:

Interpretation VIII-1-92-95
Subject: Section VIII, Division 1 (1992 Edition); UG-14
Date Issued: October 19, 1992
File: BC87-296

Question: In accordance with UG-14 of Section VIII, Division 1, may shells of pressure vessels be machined from rod or bar material?

Reply: No.

The concerns with the use of rod or bar for nozzles, fittings, heads or shells are center segregation or porosity, axial defects such as stringers or laminations, and lower transverse mechanical properties oriented in the direction of the highest primary membrane stress (such as hoop stress of a cylinder) or primary bending stress (such as with a flat head). Code Cases 2148, 2155, and 2156 were published on December 6, 1993 and provide requirements that must be met when rod or bar is used for shells, heads, and nozzles.

The addition of UG-14(b) in the 2005 Addenda clarified when rod and bar material may be used for hollow cylindrically shaped parts. UG-6 was also revised to avoid the semantics argument as to whether the rod or bar is certified to a forging specification or to a bar specification, especially since some bar specifications permit hot-rolled bar to be certified to a forging specification. Exemptions were provided consistent with the ASTM/ASME material specifications for forgings and fittings. These revisions to UG-6 and UG-14 became mandatory on January 1, 2006.

Code Cases 2155 and 2156 continue to provide an alternative for using rod and bar for shells (cylinders) and heads greater than NPS 4.

Current and Future ASME Committee Actions

The following Interpretation has recently passed the Code Committee voting:

Question: Is it permissible to use both Code Cases 2155 and 2156 for a vessel that has a flat head machined from rod/bar stock and is integral to a shell body as an alternative to UG-14?

Reply: Yes.

Incorporation of Code Case 2148 was accomplished by the revisions to UG-14 and UG-6, and is in the process of being annulled.

Code Case 2156, originally for "shells" is being expanded for other hollow cylindrical shapes (such as nozzles) that exceed the NPS 4 provision of UG-14(b). The required UT and transverse tension testing will address the technical concerns of imposing stresses in other than the bar axis orientation. Code Cases 2155 and 2156 are in the process of being incorporated, possibly for the 2007 Edition.

HOW TO OBTAIN AN ASME NUCLEAR CERTIFICATE OF ACCREDITATION/AUTHORIZATION

By Michael Lockwood, Manager
Code Services

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The following is a general guide on how to obtain on ASME Nuclear Certificate of Accreditation/Authorization. The normal process to obtain an ASME Nuclear Certificate of Accreditation/Authorization takes approximately 6 months. This time will vary based on individual situations.

1. Preliminary Meeting With AIA

Authorized Nuclear Inspector Supervisor meets with designated representatives to discuss desired scope of work in addition to manufacturer's inspection needs and contractual requirements. AIA provides:

- Guidance to the QA Program requirements
- Insight to ASME Survey Team expectations relative to the documented QA program, hardware required for demonstration, participation by manufacturer's representative, and logistics required to support the Survey Team.

2. Submit Application And Fees To ASME

Certificate fees cover a three (3) year period.
(Please refer to www.asme.org for specific details on application submittal)

3. Obtain Code Books

As a minimum, Section III General Requirements (NCA), NQA-1 Quality Assurance Requirements for Nuclear Facility Applications and one subsection applicable to the class of product to be fabricated should be obtained. Additional Sections may need to be purchased depending on the scope of work:

- Section II Parts A, C and D
- Section V
- Section IX
- SNT-TC-1A

4. Schedule ASME Survey

An ASME survey is scheduled after the application is accepted. ASME will provide survey dates, however the applicant can provide requested dates at the time of the application submittal. In this case ASME will try to accommodate that request.

5. Pre-Survey - Inspection Agency

An Inspection Agency audit prior to actual Survey is optional but highly recommended. The AIA assists manufacturer in identifying areas that need improvement in advance of the actual Survey.

6. ASME Survey At applicant's Facility

The survey team includes as a minimum, ASME representatives and the Authorized Inspection Agency. The ASME survey typically takes three days to complete. For surveys outside of the USA and Canada surveys typically take four to five days to complete.

7. ASME Certificate And Applicable Code Symbol Stamp

Issued if Survey is successful.

It is highly recommended that the applicant selects and consults with an Authorized Inspection Agency that has working knowledge of the ASME Code and the ASME Nuclear Survey process. HSB Global Standards has extensive experience and provides services to the majority of ASME Nuclear Certificate Holders worldwide. Contact HSB Global Standards today to get your program started.

SERVICES

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HSB Global Standards provides inspection, certification, auditing, and engineering consulting services for a range of international codes and standards on a global scale, including:

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- **ASME Code Services** provides authorized inspection services and quality program development to manufacturers of boilers, pressure vessels, and both new and inservice nuclear components. For non-nuclear equipment contact Keith Burns, 512-407-3776, e-mail: *keith_burns@hsbct.com.* For nuclear equipment contact Barry Bobo, 770-392-6236, e-mail: *barry_bobo@hsbct.com.*

- **Technical Resource Support** provides independent and objective analyses of equipment, processes, and systems to local and international codes and standards including the European Pressure Equipment Directive (PED) through the following services: vendor surveillance, third party inspection, expediting, auditing, project management, and consulting. Contact Joann Onimus, 800-417-3421 x 61504, e-mail: *joann_onimus@hsbct.com.*

- **ASME Codes and Standards Group** offers technical consulting and design review services to both manufacturers and users of boilers and pressure vessels. Contact Tom Pastor, 860-722-5615, or via e-mail at *thomas_pastor@hsbct.com.*

- **HSB Registration Services** provides document reviews, pre-audits, certification audits, and registration to ISO 9001:2000 and ISO 13485 (medical devices focus) quality system management standards, AS9100 requirements (aerospace focus), ISO 14000 environmental management systems standards (through a partnership with HSB Korea), and PED material manufacturer approvals (through a partnership with HSB International, GmbH). Contact Janet Kowalski, 484-582-1419, e-mail: *janet_kowalski@hsbct.com*, or visit www.hsbiso.com.

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