



## ASME CODE NEWS

by Thomas P. Pastor, Director, Engineering Technology Division

### Questions and Answers

**Q** My company periodically has a need for large diameter (> 24") slip-on flanges to fabricate manway assemblies. Is it possible to use large slip-on flanges purchased as a standard pressure part per UG-11(a) in Section VIII construction?

**A** For starters, ASME B16.5 only covers flanges up to and including 24" diameter. Large diameter flanges are covered by ASME B16.47; however, this standard does not include slip-on flanges. Thus, the only UG-11 alternative is to purchase the large diameter slip-on flange per a Manufacturer's Standard. The manufacturer's literature shall define the pressure-temperature rating for the flange and the vessel. Also, the vessel Manufacturer shall satisfy himself that the flange is suitable for the design condition of the completed vessel in accordance with the rules of Section VIII-1. If you are not able to buy a large diameter flange as a standard part, you will need to design the flange per Appendix 2 of Section VIII-1.

**Q** Several paragraphs in Section VIII, Division 1 make reference to *general primary membrane stress* [UG-23(c), UCS-66(b)(1)(b), Fig. UCS-66.1, UHA-51(g)]. What is it and how do I calculate it?

**A** The official Code definition of general primary membrane stress comes from 4-112 of Section VIII, Division 2:

*A membrane stress is the component of normal stress which is uniformly distributed and equal to the average value of stress across the thickness of the section under consideration.*

*A primary stress is a normal stress or shear stress developed by the imposed loading which is necessary to satisfy the simple laws of equilibrium or external and internal forces and moments.*

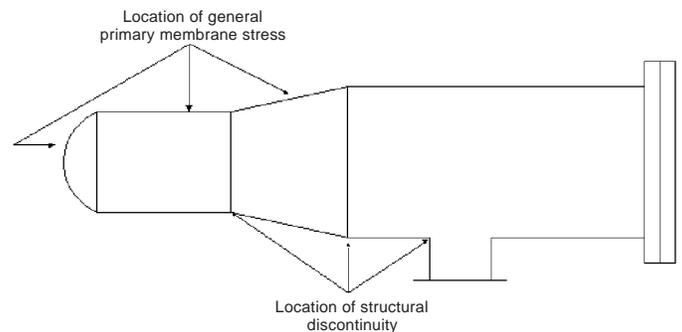
*A general primary membrane stress is one which is so distributed in the structure that no redistribution of load occurs as a result of yielding.*

Restated in plain English, general primary membrane stress is the average stress through the thickness in a cylinder, head, or cone away from structural discontinuities due to mechanical loads such as internal pressure, dead weight, or wind loads. When you calculate the required thickness of a cylinder or dished head using Code rules, you are in essence limiting the general primary membrane stress in the component to the allowable tensile stress limit. If you transpose the equation to solve for stress, you would be

calculating the general primary membrane stress. For example, transposing the thickness equation for hoop stress in a cylinder, SE represents the general primary membrane stress.

$$t = \frac{PR}{SE - 0.6P} \quad SE = \frac{PR}{t} + 0.6P$$

When we say *away from discontinuities* we are talking about areas of high local stresses such as nozzle-to-shell or cone-to-cylinder junctions [see sketch below]. It is recognized in Section VIII-1 that high localized discontinuity stresses may exist in vessels constructed to this standard. These stresses are not directly calculated but are controlled to a safe level consistent with experience through design rules and mandatory fabrication details [e.g., opening reinforcement calculations, minimum 3:1 transition taper at head-to-shell joints, minimum weld sizes for nozzle attachments].



### Final Word

#### ■ Post Construction Standards

by Evangelos Michalopoulos, P.E., Senior Consulting Engineer

In 1995, ASME formed a new Post Construction Main Committee to develop and maintain standards addressing issues and technologies related to post construction or in-service activities. This committee is working with other consensus committees to develop separate, product specific codes and standards addressing issues encountered after initial construction of equipment and piping. The post construction term is an all-inclusive term, comprising materials, design, fabrication, examination, inspection, testing, certification, and pressure relief. Three subcommittees, each with a number of subgroups and task groups, have been formed:

- The Subcommittee on Inspection Planning,
- The Subcommittee on Flaw Evaluation, and
- The Subcommittee on Repair and Testing.

**The Subcommittee on Inspection Planning** is developing a standard on inspection programs and will address issues such as inspection intervals, type of examination, analysis, service conditions and modes of failure. It will use both experience-based and probabilistic (risk-based) approaches.

**The Subcommittee on Flaw Evaluation** is developing a standard to address the mechanical integrity of pressure vessels, piping components, and other pressurized equipment in which flaws have been located. The types of flaws to be addressed are crack-like flaws, local thin areas (corrosion or ground), blisters, bulges, geometric distortions, etc. Flow growth mechanisms will include fatigue crack growth, environmental crack growth, creep crack growth, creep/fatigue interaction, and general, local and pitting corrosion rates.

**The Subcommittee on Repair of Pressure Equipment and Piping**, which was recently formed, will develop a standard that will contain methodologies for repairs of components when a repair is deemed necessary based on flaw assessment results. It will cover only technical requirements; administrative and policy requirements are not included. This standard and the other standards developed by ASME may be referenced in whole or in part by post construction codes such as NB-23, API-510, and API-570. The ASME standards are being developed in close cooperation with API and API's soon-to-be-published standards API-579, API-580, and API-581 that cover the inspection and flaw evaluation areas for the petrochemical industry.

The anticipated benefits to the industry from these *post construction standards* are improved safety and more economical operation of equipment and facilities. A key feature of the inspection standard will be prioritizing inspection on the most risk-significant equipment. The inspection techniques chosen will be a function of the likely failure events and root cause, which will improve safety (by addressing risk) and at the same time reduce cost (by prioritizing inspection and reducing downtime). The flaw evaluation standard will make available the latest best industry practice for evaluating flaws and making repair and continued operation decisions. In many instances, unnecessary repairs and down-grading of equipment will be avoided. The new standard on repair will provide industry with the latest repair techniques in codified form.

It is anticipated that it will take some time before these standards become available to the public. However, significant progress has been made. Various industries are aware and taking advantage of these developments that are rooted in a number of ASME and other industry research projects. We will keep you informed on the progress of these standards. Interested persons are encouraged to attend and participate in these committees, which meet during the ASME B&PV Code Weeks. For further information contact me at 860-722-5496 or [evangelos\\_michalopoulos@hsb.com](mailto:evangelos_michalopoulos@hsb.com).

## AROUND THE WORLD

### HSB International to Offer Notified Body Services for Pressure Equipment Directive (PED)

*by Alex Garbolevsky, Manager, International Business Development*

The advent of the phase-in period of the European Pressure Vessel Directive (PED) (97/23/EC) on November 29, 1999 has resulted in an increasing number of requests for information by manufacturers intending to export pressure equipment to this directive.

Applying the PED, especially in the absence of critical "harmonized standards," brings uncertainty, regardless of where the manufacturers are located and to which codes or standards they currently work.

Particular areas of concern include:

- determining the hazard classification of pressure equipment,
- choosing the correct Conformity Assessment Module,
- the choice and duties of the Notified Body,
- design review to Essential Safety Requirements (ESRs),
- material acceptability,
- welding procedure and personnel certification,
- NDE personnel certification,
- final inspection,
- documentation, and
- CE-Marking requirements.

Hartford Steam Boiler International GmbH (HSB International), founded in 1982 as a wholly owned subsidiary of The Hartford

Steam Boiler Inspection and Insurance Company, has been designated as a Certification Body within the scope of the PED, by ZLS (the Central Office for Safety Technology of the German Federal States), in accordance with the German Equipment Safety Law (Paragraph 9.2).

In keeping with ZLS's practice, all successful candidates were simultaneously nominated to the European Union authorities in Brussels to await their final designation and listing in the *Official Journal of the European Communities*.

#### HSB a Single Source for PED

With HSB International's status as a Notified Body, Hartford Steam Boiler is able to offer PED assistance and compliance services to pressure vessel manufacturers from a single source. Using designated local inspection and audit personnel employed by HSB International, HSB can provide services worldwide. This eliminates the need to coordinate activities around time zone and language barriers.

Local personnel will be able to perform necessary quality program evaluations, review design documents, review submissions for particular material approvals and witness tests for

# EDUCATIONAL SERVICES

## January 2000 - March 2000 Training Schedule

For more information, call Linda Williams at 800-472-1866, x5492, or visit the HSB Web site at <http://www.hsb.com>.

Code Title	Location	Date	Fee
<b>January 2000</b>			
201 ASME Section VIII, Division 1: Introduction to Pressure Vessel Code	New Orleans, Louisiana	January 17-18	\$ 585
206 NBIC: Repairs and Alterations to Boilers and Pressure Vessels	New Orleans, Louisiana	January 19	\$ 275
401 ASME Section IX: Welding Qualifications	New Orleans, Louisiana	January 20-21	\$ 585
<b>901 Full-week discount: 201, 206 and 401</b>	<b>New Orleans, Louisiana</b>	<b>January 17-21</b>	<b>\$ 1,275</b>
301 ASME B31.3 and API 570: Process Piping Fabrication, Inspection and Repair	New Orleans, Louisiana	January 17-19	\$ 715
501 Basic NDE Methods	New Orleans, Louisiana	January 20-21	\$ 585
<b>902 Full-week discount: 301 and 501</b>	<b>New Orleans, Louisiana</b>	<b>January 17-21</b>	<b>\$ 1,170</b>
<b>February 2000</b>			
301 ASME B31.3 and API 570: Process Piping Fabrication, Inspection and Repair	Houston, Texas	February 14-16	\$ 715
501 Basic NDE Methods	Houston, Texas	February 17-18	\$ 585
<b>902 Full-week discount: 301 and 501</b>	<b>Houston, Texas</b>	<b>February 14-18</b>	<b>\$ 1,170</b>
702 HSB Certified Quality Systems Manager	Houston, Texas	February 14-18	\$ 1,450
801 National Board Examination Preparation	San Diego, California	February 8-25	\$ 3,495
<b>March 2000</b>			
201 ASME Section VIII, Division 1: Introduction to Pressure Vessel Code	Columbus, Ohio	March 6-7	\$ 585
206 NBIC: Repairs and Alterations to Boilers and Pressure Vessels	Columbus, Ohio	March 8	\$ 275
401 ASME Section IX: Welding Qualifications	Columbus, Ohio	March 9-10	\$ 585
<b>901 Full-week discount: 201, 206 and 401</b>	<b>Columbus, Ohio</b>	<b>March 6-10</b>	<b>\$ 1,275</b>
111 Project Leadership	Hartford, Connecticut	March 11-14	\$ 600
804 API 653: Aboveground Storage Tank Inspector Examination Preparation	Hartford, Connecticut	March 20-24	\$ 1,095

## AROUND THE WORLD *Continued from previous page*

adherence to the ESRs. Documents would be forwarded to HSB International in Germany for final approval and issue of Certificates of Conformity as required by the Directive.

For more information regarding the Pressure Equipment Directive and CE Marking, please contact me at 800-472-1866 ext. 5139 (Outside of North America: 1-860-722-5139) or via email at [alex\\_garbolevsky@hsb.com](mailto:alex_garbolevsky@hsb.com); or, Sandy Babka at 800-472-1866 ext. 5197 (Outside of North America: 1-860-722-5197) or via email at [sandy\\_babka@hsb.com](mailto:sandy_babka@hsb.com).

## Simplifying Exporting

It is often assumed that international legal requirements will be the same as domestic ones. People think the same of subsidiary regulations and requirements, standards, approval or certification schemes and other practices. The fact is, however, that there's a good chance that the requirements and practices in export markets will be different.

There are various obstacles that can be present when exporting to other countries, such as legislation, standards, language require-

ments, and product certification systems. Fortunately, there are companies that can help you navigate the diverse waters of international trade.

One such company with whom HSB is associated is British Standards Institution (BSI) of the United Kingdom. Their Technical Information Group offers publications compiled by experts in their field and provides an invaluable source of export/import information and advice. They also can provide specific country research (legislation, standards, approval procedures and certification/markings) or consultancy (on products based on CE marking, health and safety requirements and standards) for any country worldwide.

In addition, HSB has partnered with BSI to provide training seminars on ASME Boiler, Pressure Vessel, and Piping standards.

For more information on BSI's services, contact Charles Barker at +44 (0) 20 89996 7474 or e-mail him at [Charles\\_Barker@bsi.org.uk](mailto:Charles_Barker@bsi.org.uk).

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Engineering Services provides the following services to clients around the world:

■ **ASME Codes and Standards Services** provides authorized inspection services to boilers, pressure vessels, nuclear components, and process and power plants. Services also include pressure vessel and piping design, finite element analysis, and quality assurance program development.

Contact Tom DiMartino, 303-838-5323, or via e-mail at [thomas\\_dimartino@hsb.com](mailto:thomas_dimartino@hsb.com).

■ **Educational Services** develops and delivers educational programs, both custom in-house or public seminars, in such areas as inspection, operation, maintenance and repair; design, fabrication and inspection; examination preparation courses for API 510, API 563 and the National Board; and self-study courses for Code Prep R, ASME Section IX, and NDE Workbooks. Contact Linda Williams, 860-722-5523, or via e-mail at [linda\\_williams@hsb.com](mailto:linda_williams@hsb.com).

■ **HSB Registration Services** provides document reviews, pre-audits, certification audits, and registration to ISO 9000 quality system management standards, QS-9000 requirements (automotive focus), AS-9000 requirements (aerospace focus) and ISO 14000 environmental management systems standards (through a partnership with AWM, US). Contact Dennis Palmer, 610-962-8488, or via e-mail at [dennis\\_palmer@hsb.com](mailto:dennis_palmer@hsb.com), or visit our Web site at [www.hsbiso.com](http://www.hsbiso.com).

■ **HSB Thermography Services** provides fully detailed surveys and recommendations to help clients detect problems in electrical and mechanical equipment to help avert losses. Contact Sandy Sanor at 800-231-0907, extension 1120, or via e-mail at [sandy\\_sanor@hsb.com](mailto:sandy_sanor@hsb.com).

■ **Mechanical and Materials Engineering** helps utility, pulp and paper, chemical and other clients avoid industrial equipment failures and improve equipment reliability by providing services including accident investigations - failure analysis, materials selection - design review/modifications, corrosion engineering, weld repair consulting, risk assessment, rotating equipment troubleshooting, and boiler water chemistry audits and improvement programs. M&M Engineering has a full lab and field metallurgical analysis capability. Contact Doug Sherman, 800-421-9185, [douglas\\_sherman@mmengineering.com](mailto:douglas_sherman@mmengineering.com).

■ **Pressure Equipment Technologies** provides comprehensive engineering surveys of critical plant equipment designed for pressure service such as boilers, deaerators, paper machine dryers, general service pressure vessels, and piping systems. Contact Bob Trombley, 925-602-515, or via e-mail at [robert\\_trombley@hsb.com](mailto:robert_trombley@hsb.com).

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For more information on Engineering Services, contact:

- Jill Smolnik at 800-472-1866 extension 5294
- Or visit our Web site, [www.hsb.com](http://www.hsb.com), and click on the Engineering icon.

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# P R E S S U R E P O I N T S

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