

Welcome to the second of our occasional newsletters raising inspection issues

## **Fabrication of Pressure Vessels**

We saw in the last newsletter how pressure vessels store huge amounts of energy which is why they must be inspected periodically to minimize the risk of catastrophic failure. Now we consider the requirements when making (and repairing) pressure vessels to ensure we start with a unit which is fit for service.

### **Design Codes or Standards:**

All pressure vessels must be designed by a qualified engineer using an established standard such ASME VIII or BS5500. These standards specify requirements for the design, fabrication, inspection and testing of pressure vessels.

These requirements are similar in all codes and are as follows:

- Specification of material of construction
- Verification that this material is used; this requires an inspector to confirm materials against mill certificates and to stamp the parts accordingly before they are cut out of the sheet or plate material
- Agreement and approval of the welding procedures; these must be approved by an authority such as the South African Welding Institute. These procedures will specify welding process, weld preparation, filler material, number of runs, pre or post weld heat treatment, inspection requirements, etc
- Use of Coded Welders. NOTE: coding means that the welder has been assessed and tested for the material, configuration, thickness and weld method to be used. Coding must be up to date which may mean testing and certification every 6 months. 'Coded Welder' does NOT mean any qualified or experienced welder however good they are and it must apply to the welder who does the work—he cannot supervise somebody else.
- Forming materials to make component parts eg dishing or rolling to shape must follow agreed procedures and be carried out on correctly maintained equipment.
- Independent inspection will be required at various points in the fabrication process, eg after 'loose' assembly of the components, after each weld run, on completion of the welds. Specialist inspection techniques such as crack testing, dimensional checks including ultrasonic thickness, alignment checks, radiography, pressure testing will be applied as required. Final hydraulic pressure testing will apply a pressure of 1.3–1.5x design pressure or even higher for critical duties.
- The finished vessel must be fitted with a plate which specifies the fabricator, design code, date of manufacture, operational parameters (design pressure, working pressure, test pressure, design temperature, etc)

## **Vessel Repair**

Similarly when pressure vessel repairs are required they must follow appropriate steps particularly with regard to welding procedures, coding of welders and inspection.

**What can happen?** Follow these links for case histories of accidents which resulted in fatality through incorrect repair and fabrication.

<http://www.p2pays.org/ref/05/04389.pdf>

[http://yosemite.epa.gov/R10/CLEANUP.NSF/1887fc8b0c8f2aee8825648f00528583/3d26b3bd998b77208825704d006ec092/\\$FILE/CAA-112r-Newsletter-MAR-APR-08.pdf](http://yosemite.epa.gov/R10/CLEANUP.NSF/1887fc8b0c8f2aee8825648f00528583/3d26b3bd998b77208825704d006ec092/$FILE/CAA-112r-Newsletter-MAR-APR-08.pdf)

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