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How ground level manway entry systems can reduce risk during water storage tank installation and maintenance

HEALTH AND SAFETY is paramount in an age of austerity, increased competition and tight margins. In the water storage industry, confined spaces can be an unwitting killer without proper training and equipment. Steven John Harry (BSC, MA, MRS) of Balmoral Tanks Ltd discusses the benefits of ground level manway access and how it can improve on-site health and safety as the role of the Health & Safety Executive (HSE) evolves.

According to HSE, there are three high risk sectors in the UK when it comes to industrial accidents. Balmoral Tanks supplies and installs products to two of those sectors – manufacturing and construction: please refer to Fig 1.

Every organisation and individual operating in those sectors has a direct responsibility and duty of care to go about their business in a manner that is fully cognisant of the potential risks and strive to maintain high standards of safety. Two pertinent and consistent risks relevant to the water tanks industry relate to working in confined spaces and working at height.

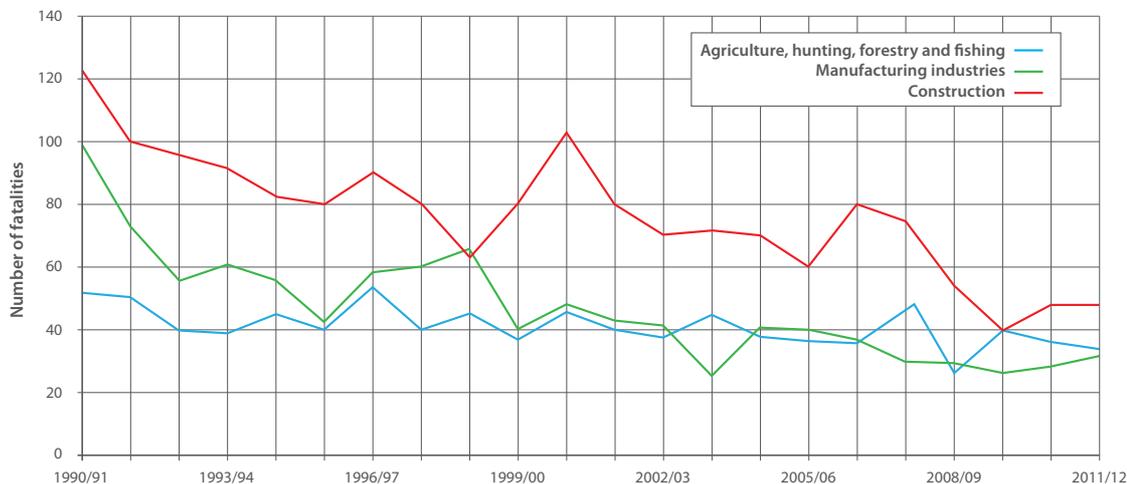


Figure 1: Number of fatalities in top three dangerous employment sectors, 1990-2011/12 (HSE 2011/12)

It is widely reported that the HSE's budget is expected to be cut by the UK Government in the region of £80-£85m per annumⁱ. This level of saving can't be solely achieved by administrative savings or offset against increased charging; it must ultimately be realised through cuts to the services provided by the HSE. This is a situation which should raise concerns for any business, especially those in the construction and manufacturing sectors.

Over the past two decades health and safety has improved significantly as the HSE collaborated with businesses to ensure the UK is the safest place to work across the EU. The government's decision to offer lighter-touch regulation could ultimately result in a decline of the positive trend seen in the past six years as shown by the rate of fatal injuries to workers. Since the mid-1990s the decline in fatal injuries has been sharp, halving from nearly 300-148 people per annum for 2013 (predicted)ⁱⁱ.

The recession and the reduced budget of the HSE could lead to companies specifying products which don't quite hit the mark from a health and safety perspective. They may be functional, but are they safe? The statistics suggest a flat-lining of the positive trend in fatal injuries to workers in the manufacturing and construction sectors as illustrated in Fig 2ⁱⁱⁱ.

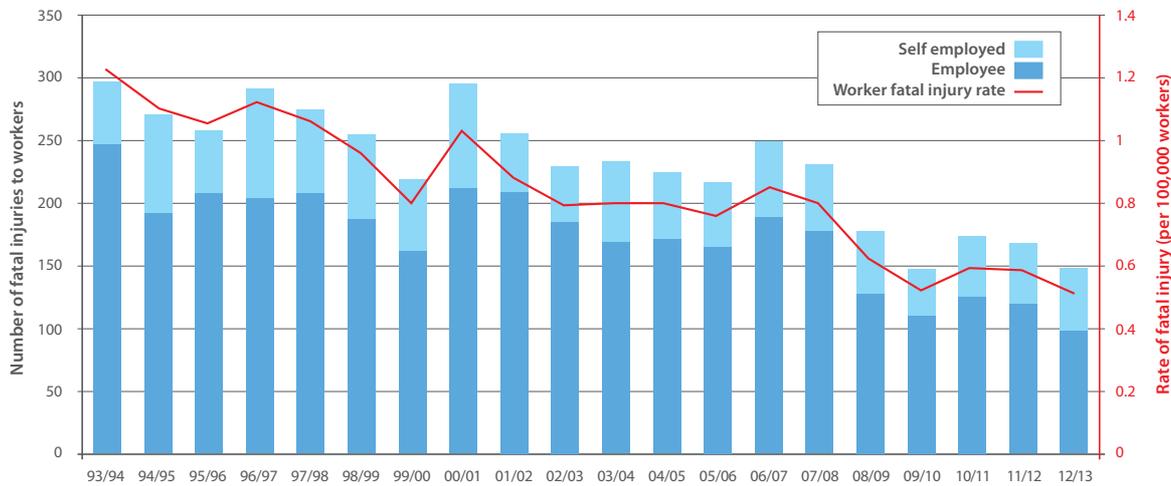


Figure 2: Number of fatalities, 1993-2012/13 predicted (HSE 2013)

Confined spaces and working at height

HSE's emphasis on preventing death, injury and ill-health in the UK workplace has been paramount in saving lives and reducing accidents. Maintaining high standards of safety is crucial as responsibility is placed on businesses more than ever. As a member of the British Safety Council, Balmoral has an obligation to ensure the health, safety and welfare of employees, contractors and site visitors, especially when working in confined spaces and at height during tank installation, as well as during end-user servicing and maintenance when the tank is in service.

The law regarding confined spaces and working at height is clear. Some of the key legislation is shown below^{iv}:

- The Confined Spaces Regulation 1997 - Other legislation may apply, depending on where the confined space is situated or on the task being carried out
- The Management of Health and Safety at Work Regulations 1999
- Equipment: The Personal Protection Equipment Regulations 2002 and Personal Protective Equipment (Health and Safety Regulations 1992)

Manufacturers and installers of tanks need to understand and incorporate the above into the supply, installation and use of their products. Contractors and specifiers should be aware of the above and only specify companies and products which comply.

The dangers of confined spaces and working at height are numerous including those shown below but this list is not exhaustive^v:

- Residues left in tanks, vessels, etc, or remaining on internal surfaces which can give off gas, fumes or vapours
- Corrosion within steel tanks and vessels
- Fire and explosions
- High concentrations of dust, eg, flour
- Falls either externally or internally during tank installation or maintenance

What is the answer?

Reputable manufacturers such as Balmoral Tanks are committed to supplying the correct specification of product, and place safety ahead of any commercial decisions at all times. All components of a tank are there for a reason with the majority being directly related to safety.

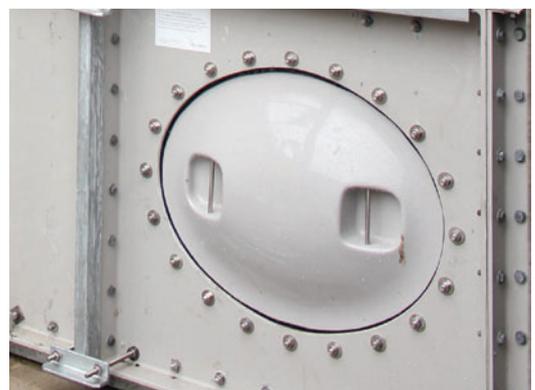
The low level access panel was introduced by Balmoral Tanks to address confined space issues. Essentially, when a tank is being constructed onsite, it will ultimately become a confined space as the installation team completes the build.

Technical specification: Ground level GRP manways

Balmoral's engineering research and development team considered various designs before deciding on the product currently in use. Balmoral's unique manway access is oval in shape which results in the outward water pressure supporting and improving the sealing of the access panel.

Balmoral's GRP oval manway panel comprises:

- Standard Balmoral 12mm thick hot press panel
- Hand laid GRP access plate
- EPDM gasket and standard nuts with encapsulated big heads
- Inbuilt handles for ease of positioning
- Fully manufactured and assembled by Balmoral Tanks



Are low level access points such a major issue?

In recent years the benefits of ground-level access manways have become notable as the HSE has brought prosecutions against companies that failed to provide adequate health and safety training for employees working in enclosed spaces. These prosecutions bring sharply into focus the drawbacks of 'top-down' tank access.

Examples in which ground level access could have helped include:

- o **March 2013** A boat repair firm landed a £43,000 penalty after it sent two employees to work inside a diesel fuel tank that could have led to an explosion and seen the pair overcome with fumes^{vi}
- o **February 2009** A company was fined £72,500 with £50,000 costs and the directors fined £10,000 each after a triple fatality inside a water tank^{vii}

Balmoral Tanks' in-house-designed 24" ground-level manway provides not only safety but reassurance. Available for sectional GRP, steel and cylindrical tanks, it provides the ability for operators and maintenance staff to install, inspect and maintain, as well ensuring ease of access for emergency staff to treat and evacuate individuals from a tank, silo or vessel at ground level.

The low-level manway maximises time and efficiency by reducing the use of harnesses and access steps and minimises any further injuries and falls if operations personnel are overcome by fumes within a tank. The manway also allows for stretcher access and extraction.

Working at height would appear even more dangerous in regards to safety issues. In January 2013 the HSE ran a campaign on the dangers of working at height which featured some excellent advice on how to avoid them. Although the statistics used are based on 2009 figures, it is still a chilling reminder of the dangers of working at height.

There is a best practice standard when it comes to specifying a sectional water storage tank. If a contractor and/or consultant uses the guidance below, and insists on this specification - although it may cost a little bit more - then two of the major causes of accidents in the construction industry, when considering water storage tanks, will be addressed.

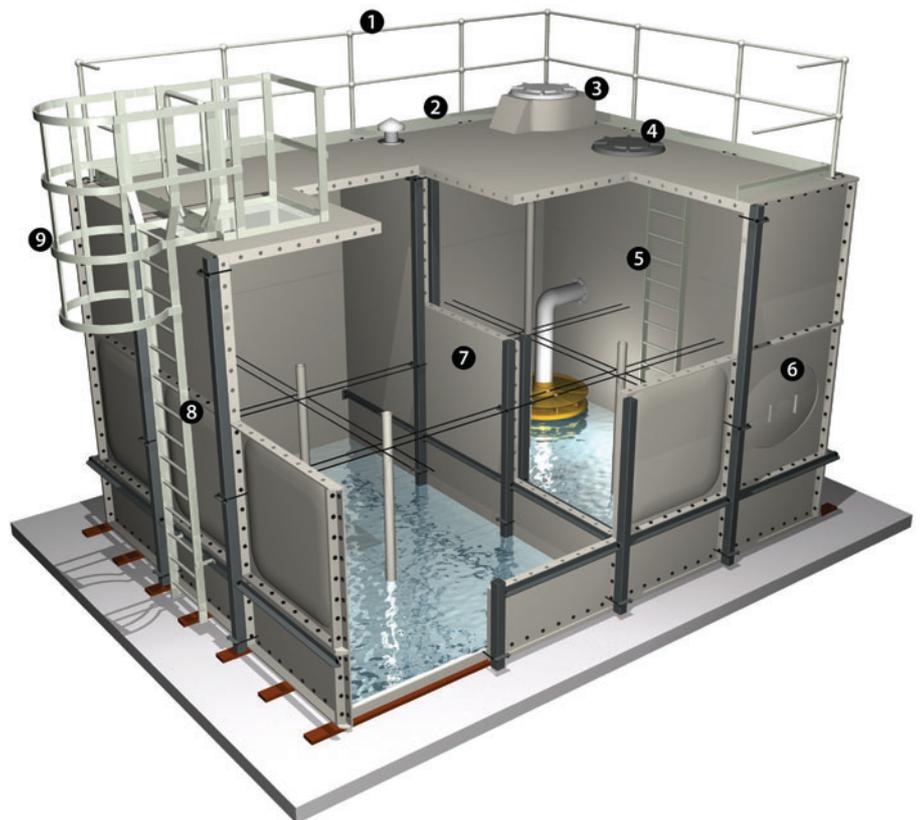
Always ask the tank manufacturer to confirm the exact specification of the product by creating a simple check list which may include the components listed below.

Tank components

- 1 Handrail
- 2 Handrail kick plate
- 3 Ball valve housing
- 4 Top access hatch
- 5 Internal ladder
- 6 Side access hatch
- 7 Divider
- 8 External ladder
- 9 Ladder safety cage

In summary, with regards to health and safety issues related to accessing a water storage tank at height, and working within a confined space to conduct tank installation, inspection and maintenance duties, each tank or tank compartment should have the following components:

- 1 One internal ladder per compartment on tanks 1.5m deep or greater
- 2 External ladder where top of tank is 1.5m or greater from finished floor level to BS 4211:2005
- 3 Ladder safety cage to be included where top of tank is 2m or greater from finished floor level to BS 4211:2005
- 4 Handrail cage enclosing all access points to tank roof where tank top is 2m or greater from finished floor level to BS 4211:2005
- 5 Lockable man access hatches of minimum size 600mm² or dia. on tanks of 1000 litre capacity or greater
- 6 Side access hatches to be installed where practical on each tank/compartment of 1000 litre capacity or greater situated at the lowest level



Finally, the standard and quality of the installation team attending any site should be verified. Balmoral Tanks uses its unique proprietary 'Authorised Installer Registration Scheme' (AIRS). Full details of the scheme are available by contacting Balmoral Tanks' installation manager Paul Taylor at p.taylor@balmoral.co.uk.

References

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- ii HSE Fatal injury statistics summary for 2012/13 <http://www.hse.gov.uk/statistics/fatals.htm>
- iii HSE Fatal injury statistics summary for 2012/13 <http://www.hse.gov.uk/statistics/fatals.htm>
- iv HSE Legislation and confined spaces a brief guide to working safely <http://www.hse.gov.uk/confinedspace/legislation.htm>
<http://www.hse.gov.uk/pubns/indg258.pdf>
- v Dangers of working in confined space <http://www.hse.gov.uk/pubns/indg258.pdf>
- vi Worried pair abandoned hazardous tank. A boat repair firm has landed a £43,000 penalty after it sent two employees to work inside a diesel fuel tank that could have led to an explosion and seen the pair overcome with fumes (March 2009).
<http://www.healthandsafetyatwork.com/hsw/confined-spaces/c-and-l-marine>
- vii A company was fined £72,500 with £50,000 costs and the Directors fined £10,000 each after a triple fatality inside a Water Tank. Bodycote HIP Ltd was fined £533,000 and ordered to pay costs of £200,000 on 24th July 2009 for breaching section 2(1) of the Health and Safety at Work etc Act 1974 following the deaths at its manufacturing plant in College Road, Hereford (February 2009)
<http://www.hse.gov.uk/press/2009/coiwm21209.htm>

Typical Balmoral Tanks' installations



Hot press steel bolted sectional tank



Bolted steel cylindrical tank



Hot press GRP bolted sectional tank

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