

Title	FABIG Technical Note 5: Design Guide for Stainless Steel Blast Walls
Publisher/Author	The Steel Construction Institute
Publication Date	1999
Scope	<p>INTRODUCTION</p> <p>Stainless steel blast walls</p> <p>Stainless steel blast walls made from profiled sheeting are commonly used on offshore process platforms where there is a risk of accidental gas explosions. They are usually required to survive the explosion in order to protect personnel and safety critical equipment and to prevent the spread of possible subsequent fire. They can also be used in onshore process plant and in other situations where protection from explosions is a requirement. As well as providing the excellent corrosion resistance required in such environments, stainless steel displays good mechanical properties, energy absorption and ductility characteristics, making it an ideal material for blast wall construction. In particular, the shape of the stress-strain curve in the plastic range ensures higher plastic moment resistance than carbon steel of equivalent strength. The mechanical properties of stainless steel at high temperatures ($> 500^{\circ}\text{C}$) are superior to those of typical structural carbon steels, thus offering intrinsically greater fire resistance.</p> <p>It is often beneficial to use high strength materials to resist explosions. In the thickness range commonly used for blast walls (2 - 6 mm), high strength carbon steels are not readily available in the widths required. Additionally, local thinning due to corrosion is a risk with thin carbon steel and it is not always possible to ensure painting access to all surfaces once a walling system is erected. A final but nonetheless important aspect is aesthetics: stainless steel blast walls from profiled sheeting require no additional architectural finishes to produce a pleasing, permanent internal or external appearance. These factors have led to the widespread use of stainless steel for explosion resisting walls offshore.</p> <p>Scope of this document</p> <p>This document gives guidance on the design of stainless steel blast walls made from profiled sheeting, including guidance on material behaviour and selection, response to blast loading, design for longitudinal and transverse bending effects, evaluation of plastic deformation capacity and recommendations on construction details. The document specifically addresses walls constructed of panels with simple trapezoidal corrugations with or without longitudinal flange stiffeners (Figure 1) manufactured from the grades of wrought stainless steel which are widely used in offshore structural applications. Longitudinal web stiffeners are not specifically covered, since they rarely prove economic because local effects tend to govern profile design. The guidance is also generally applicable to the more complex proprietary profile shapes.</p> <div data-bbox="475 1675 1362 1877" style="text-align: center;"> <p>The figure shows three trapezoidal profiles under a downward arrow labeled 'Explosion pressure'. Type 1: Unstiffened profile. The top flange is flat. Type 2: Stiffened profile (bent). The top flange has a small downward dent. Type 3: Stiffened profile (welded). The top flange has a larger, deeper downward dent.</p> </div> <p style="text-align: center;">Figure 1: Profile geometries</p>

Typical arrangement of blast wall

Figure 2 shows an elevation of a typical blast wall with service penetrations.

The details in this guide refer specifically to vertically spanning walls, however, walls can be installed spanning horizontally between vertical columns. In this case, the attachment details to the columns must be able to accommodate span shortening arising from out of plane deflections in the explosion. Note that the design guidance in this document only applies to cross-sections made up of elements complying with the dimensional limits given in Section 5.2.

Guidance for specifiers of blast walls

Based on the guidance and recommendations in this document, a checklist of information required in enquiry packages for stainless steel blast wall systems has been drawn up and is given in Appendix A.

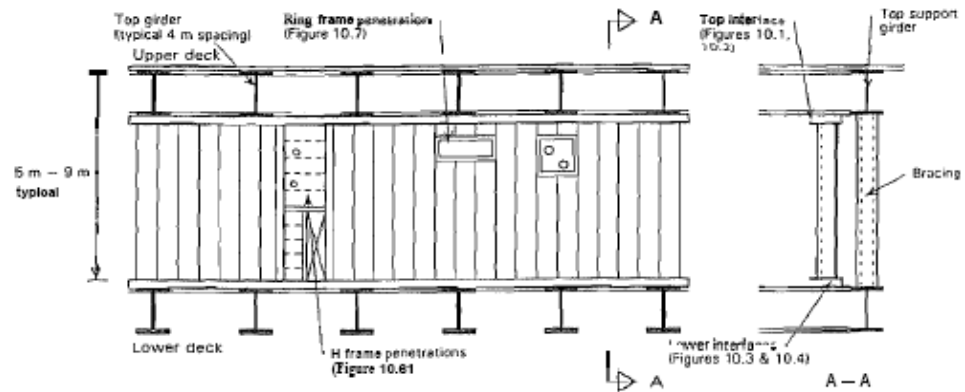


Figure 2: Typical blast wall with service penetrations

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