

Title	Interim Guidance Notes for the Design and Protection of Topside Structures against Explosion and Fire
Publisher/Author	The Steel Construction Institute
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Scope	<p>Background</p> <p>The Piper Alpha disaster drew attention to the damage likely to arise from explosion and fire on an offshore platform and the inadequacies of previous practices to minimise and protect against these hazards. In advance of any response from the regulatory authorities and the report of the Cullen Inquiry, the offshore industry responded to the challenges presented by this disaster by, amongst other initiatives, establishing the Joint Industry Project on Blast and Fire Engineering for Topside Structures [I-26]. A principal change advocated by industry in evidence to the Cullen Inquiry was to move from a prescriptive, mechanistic approach to safety requirements, to one of considering goal setting scenarios, and ensuring adequate response. The Cullen Report [27] strongly endorses these principles. Inter alia, it requires the operator of an installation to demonstrate:</p> <ul style="list-style-type: none"> • "that, so far as is reasonably practical, the exposure of personnel on the platform to accidental events and their consequences has been minimised" (Recommendation 4.ii) • "by quantified risk assessment of major hazards that the acceptance standards have been met in respect of risk to the integrity of the TSR, escape routes, embarkation points and lifeboats from design accidental events, and that all reasonably practicable steps have been taken to ensure the safety of persons in the TSR and those using escape routes and embarkation points" (Recommendation 4.iii). <p>This document adopts these principles and offers guidance on how to meet the requirements on the design and protection of topside structures to resist explosion and fire. It is therefore primarily concerned with the safety of personnel. Its adoption will also reduce the environmental consequences of any future accidents and limit damage to installations.</p> <p>This guidance should assist in both the conceptual and detailed development of new topside designs, and in the assessment of existing installations.</p> <p>The guidance offers the engineer a range of options whenever possible and should therefore assist the industry in its progression away from a prescriptive design approach to one of assessing hazards within the context of the Safety Case.</p> <p>Scope and limitations of this document</p> <p>It is emphasised that these guidelines cover only a small, but very important part of the overall effort that is required to ensure the adequate safety of offshore installations. The overall context of the Safety Management System is explained in Section 2.2. In essence, this document presents a philosophy and framework of design to ensure that critical parts of the structure survive extreme events of explosion and/or fire.</p> <p>The technique of Quantified Risk Assessment (QRA) and the definition of design accidental events are important aspects of an integrated design approach. They are introduced in this document in Sections 1 and 2 only to put its detailed treatment of blast and fire-resistance in proper context; they are not dealt with in detail. This document is based on the assumption that an accidental hydrocarbon release of a predetermined volume has occurred and that an ignition source is present.</p>

	<p>Within Section 2, the document also covers the philosophical and conceptual factors that should be addressed during the initial design of the facilities to limit the significance of explosion and fire effects on the overall design.</p> <p>Section 3 provides more detailed guidance for the design engineer on the methods of calculation that should be adopted when quantifying both the severity of an explosion and its effect on the structure. Section 4 provides similar guidance for fire scenarios and the ensuing structural response. Both these sections also provide information for the engineer assessing the combined effects of explosion and fire, i.e., the explosion response of a structure weakened by fire and the fire response of a structure previously deformed by explosion. However Section 5 specifically addresses the conflicting design criteria inherent in an integrated approach to explosion and fire resistance.</p> <p>The document considers almost exclusively hydrocarbon fuel sources originating within hazardous modules. It does not consider internal fire protection for platform accommodation, utility areas etc., which primarily contain cellulosic material. The protection of such areas is adequately covered by onshore building codes and standards.</p> <p>Finally, and most importantly, this document draws on the report from the Phase I Blast and Fire Engineering Project for Topside Structures [I-26] which established the state-of-the-art in 1990. That project identified numerous critical gaps in our knowledge and understanding. This document is therefore, by definition, interim and will become outdated in some respects as these gaps are closed during Phase II of the above project.</p>
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