

Storage Tank Overfill Protection in Compliance with Functional Safety Standard: IEC 61511

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Abstract : Tank overfill accidents are major concerns for industries handling large volumes of hydrocarbons. Buncefield, Jaipur, Puerto Rico, and West Virginia are just a few accidents with catastrophic consequences. Thus, it is very important for any industry to take the right safety measures for overfill prevention. Moreover, one of the main causative factors in the overfill accidents was inadequate risk analysis and, subsequently, inadequate design. This study aims to provide a full assessment in accordance with the Functional safety standard: "IEC 615 11 - Safety instrumented systems for the process industry" to the tank overfill scenario according to the standard's Safety Life Cycle (SLC), which includes: the analysis phase, the implementation phase, and the operation phase. The paper discusses in depth the tank overfills Independent Protection Layers (IPLs) with systematic analysis to avoid the safety risks of under-design and the financial risk of facility overdesign. The result shows a clear and systematic assessment in compliance with the standards that can help to assist existing tank overfilling setup or a guide to support designing new storage facilities overfill protection.

Keywords : IEC 61511, PHA, LOPA, process safety, safety, health, environment, safety instrumented systems, safety instrumented function, functional safety, safety life cycle

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