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The Nuisance Fire Problem with Acetylene "B" Cylinders

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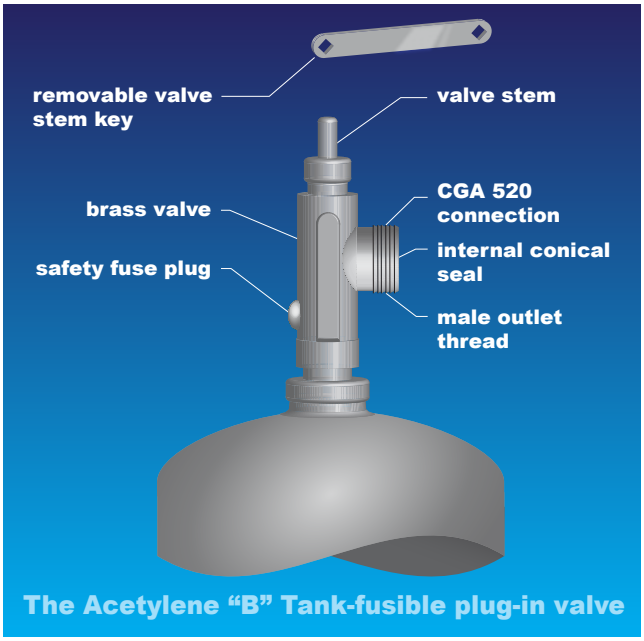
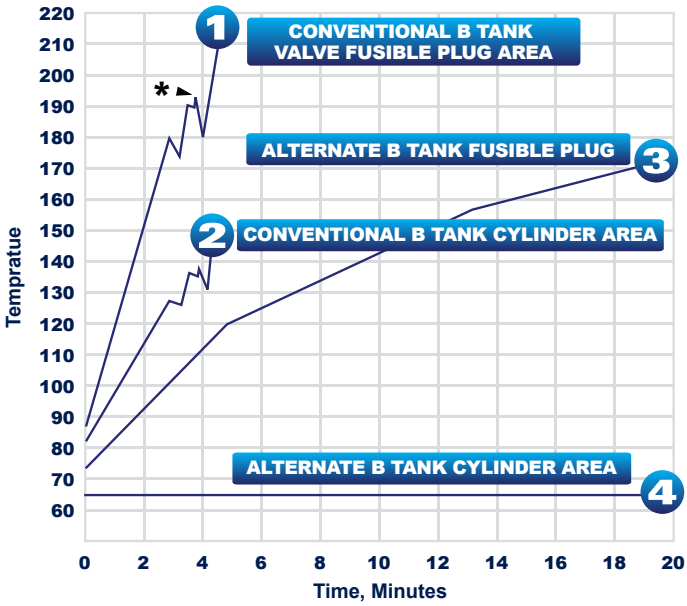


The Acetylene "B" Tank-fusible plug-in valve



Test Date for Fusible Plug and Alternate Design
* CONVENTIONAL B TANK PLUG ACTIVATION AT 3:40

Editors Note: The following is an excerpt of a published paper that originally appeared in the ***1996 International Mechanical Engineering Congress and Exposition: Safety Engineering and Risk Analysis.***

On November 19, 1992, a three-story, twenty-two unit condominium project in the Los Angeles area was consumed by fire. The structure, in the framing stages of construction, burnt to the ground. Several adjoining structures sustained varying degrees of fire damage. The fire was caused by a golf ball-sized fire emanating from the threaded connection in a plumber's air/acetylene piping system, caused by a leak at the threaded connection between the acetylene B tank and the regulator. Unfortunately, a small nuisance fire in this area can quickly become a dangerous and unmanageable fire upon operation on the (safety) fusible plug which is proximate to this connection.

Results of literature searches and reviews of appropriate industry standards indicate that this valve site is prone to these "nuisance" fires. Analysis of other sizes of acetylene tanks indicates a design philosophy significantly different from that used for the subject B tank. These design differences have profound safety implications. Results of analysis and testing of conventional acetylene B tanks have demonstrated inherent defects and identified existing designs that eliminate these defects. A complete analysis addressing human factors, standards, mechanical and thermal design issues is presented. Testing further supported and validated the analytical models where necessary.

The ultimate objective is to design an acetylene tank that can sustain human error, allow for a means to eliminate or control the nuisance fire, and demonstrate superior fire performance. An alternative design was identified that achieves this. Changes to DOT and CGA standards regarding such tanks are recommended.

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