

SwRI Tests UL 142 Double Wall AST

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On May 12, 1999, Southwest Research Institute (SwRI) successfully conducted a fire performance evaluation of a double-walled aboveground storage tank (AST), manufactured for the Steel Tank Institute. The AST was identified as an F921® cylindrical tank with a 360° wrap, UL #786046. The purpose of the test was to determine if the AST would maintain its structural integrity following the high intensity fire exposure and hose stream test. Evaluation of the tank was conducted for fire exposure, leakage, and hose stream tests which were performed in accordance with SwRI Test Procedure 9704, *Testing Requirements for Fire Resistant Aboveground Flammable Liquid/Fuel Storage Tanks in Accordance with Section 2-4.5 of NFPA 30A (1996)*.

The fire test required the tank to be placed in a 2000°F oven for two hours. This test exposed the aboveground storage tank to heat flux and temperature conditions representative of total engulfment in the luminous flame regime of a large, free-burning, liquid-hydrocarbon fueled, pool fire. At the end of the test, the tank was immediately removed from the oven and subjected to the cooling, erosive and impact forces of the hose stream test (as outlined in UBC Standard 7-1, Section 7-108). After a cooling period, the primary tank was air pressure tested at five psi. This pressure was maintained for one hour. The primary and secondary containment tanks remained airtight for the entire test period.

SwRI reported, "The structural integrity of the primary tank and its supports were maintained during and after all testing. Also, the emergency venting remained operational during and after all testing."

STI also opted to equip the tank with 12-inch high saddles. After the test, the saddles were thoroughly examined and were found to be in excellent condition. The assembly was not deformed, did not sag, did not collapse or suffer other significant damage as a result of the fire exposure.

History

NFPA created the definition of "fire resistant tank" in the 1993 Edition of NFPA 30A. Section 2-4.5(a) states (in part):

"The construction that provides the required fire-resistance protection shall prevent release of liquid, failure of the primary tank, failure of the supporting structure, and impairment of venting for a period of not less than 2 hours when tested using a fire exposure that simulates a high intensity pool fire..."

Around the same time, Underwriters Laboratories issued UL 2085 which at that time covered both Protected and Fire Resistant type tanks. The 2nd edition of UL 2085, published December 1997, removed fire resistant type tanks, leaving only fire protected tanks. UL has since proposed a new standard, UL 2080, which consists of the prior UL 2085 requirements for fire resistant tanks.

SwRI 93-01 was issued in 1993 to provide a Listing program for tanks tested according to UFC 79-7. SwRI 97-04 was in 1997 for tanks tested according to NFPA 30A, 2-4.5.0.

Comparison of AST Standards Used with Motor Vehicle Fueling¹

Standard	Fire Test Performed	Pass/Fail Criteria	Other Requirements ²
UL 2085 Protected Tank	2 hour, 2000° fire	Temperature limit: 260° avg., 400° max. at any one thermocouple	Secondary containment Optional: vehicle impact resistance, ballistics resistance
SwRI 93-01 Protected Tank	2 hour, 2000° fire	Temperature limit: 260° avg., 400° max. at any one thermocouple	Vehicle impact resistance, ballistics resistance. Optional: secondary containment
UL 2080 Fire Resistant Tank	2 hour, 2000° fire	Temperature limit: 800° avg., 1000° max. at any one thermocouple	Optional: secondary containment, vehicle impact resistance, ballistics resistance
SwRI 97-04 Fire Tested Tank	2 hour, 2000° fire	Primary tank must pass 5 psi air pressure test for one hour. No temperature limits.	Optional: secondary containment, vehicle impact resistance, ballistics resistance
UL 142 Aboveground Storage Tank	No fire test required	Tests do not address fire issues	UL 142 is a construction standard for steel tanks

¹Typically, products complying with a given standard would also comply with all the standards listed below. As an example, protected tanks would generally meet the requirements for both fire resistant and UL 142 tanks.

²All of the standards require emergency venting of both the primary tank and secondary containment to assure safe operation of the tank system in the event of a fire.