ULC Subject C80.1
ULC G 5.2
ULC CCF

February 14, 2012

# INFORMATION BULLETIN 2012-01B

## Second Edition of ULC/ORD-C80.1

## NONMETALLIC TANKS FOR OIL-BURNER FUELS AND OTHER COMBUSTIBLE LIQUIDS

To: Subscribers to ULC's Listing Service and Others Interested - EFNI7, EFNIC

Underwriters Laboratories of Canada has prepared a draft 2nd edition of ULC/ORD-C80.1. This draft is being circulated for your review and comment.

ULC/ORD-C80.1 covers requirements for nonmetallic or composite primary, secondary and diked type atmospheric storage tanks from 227 to 2500 L (60 to 660 US gallons) intended primarily for the storage and supply of heating fuel for oil burning equipment, or alternately for the storage of diesel fuels for compression ignition engines and motor oils (new and used oil) for automotive service stations, in aboveground applications. The requirements cover the construction of tanks for use in stationary installations.

This draft of ULC/ORD-C80.1 is derived from UL SU2258 and once published will be proposed to be converted into a ULC Standard as CAN/ULC-S670

The Bulletin contains a supplemental questionnaire. Your comments are welcome by end of day, March 15, 2012.

Comments to the supplemental questions are to be completed on the Questionnaire Form and are to be submitted by e-mail to: Madeleine.Martin@ul.com.

If you require any additional information, please contact Rae Dulmage at 613-755-2729 ext. 61429 or by email at: rae.dulmage@.ul.com.

This Information Bulletin may be forwarded to others who may have an interest in this document.

**Underwriters Laboratories of Canada Inc.**

**Gunsimar Paintal**
Regional Quality Manager &
ULC Mark Program Owner

**To: EFNI7 or EFNIC Subscribers and interested manufacturers**

ULC is in the process of publishing the 2nd edition of ULC/ORD-C80.1 with revisions, and is specifically seeking manufacturer input on suggested revisions to the fire test. Below is a summary and test options with expected impact(s) that would affect both ULC and cUL Certifications. Please provide comments by March 15, 2012.

During development of the second edition of ULC/ORD-C80.1 (2012), we intended to update the basic requirements for consistency with the current edition of UL SU2258 (2010), since the majority of currently Certified products in Canada meet the newer requirement in the United States. This soft harmonization would achieve the highest level of safety in the shortest time, with the lowest impact on Listed manufacturers (no fire retest).

However, due to recent suggestions for changes in the fire test, we feel that it is important for manufacturers to understand the historical development of this test and rationale through the Standard and Code bodies over a decade ago. Please see the attached for details, which we hope will be technically informative in preparing your input and comments.

Therefore, we would like to have your opinion on keeping the oil pool fire test in its current form, or the following fire test alternatives to base our final decision on for the ULC/ORD-C80.1 next edition.

**Q1. Oil pool fire reduced test time – Keep the existing pool fire test, but reduce the test time from 30 to 20 minutes, based on "total loss" time for a residential home fire.**

☐ YES

☐ NO

**Q2. Oil pool fire reduced test time related to use ratings - Keep the existing pool fire test, but revise the test time based on use locations (30 minutes for indoor/outdoor ratings and 20 minutes for outdoor ratings.**

☐ YES

☐ NO

**Q3. Wood crib fire test as a replacement – Replace the existing oil pool fire test with the standard European wood crib fire test (such as NO 560 from TC266) at 30 minutes.**

☐ YES

☐ NO

**Q4. Both methods related to fire ratings – Allow a choice of the oil pool or wood crib, and identify the test in ratings. This would permit users/AHJs to decide on the appropriate fire risk for each installation. Current Listees will not require re-evaluation (*), but new rating marks would apply.**

☐ YES

☐ NO

(*) Based on our methodology assessment and knowledge of product performance for both fire tests, we believe the oil pool is more severe than the wood crib (if you disagree, please provide technical substantiation). However, any new designs will require re-testing with UL conducting or witnessing the test. Data from labs/organizations for which we do not have an acceptance agreement with, or self-certification data, will not be accepted.

**To: EFNI7 or EFNIC Subscribers and interested manufacturers**

## ULC/ORD-C801 and UL SU2258 Fire Test Development History

During the late 1990's, several European tank manufacturers requested UL Certification for small plastic & composite type heating oil tanks that were commonly used in Europe. At that time, the NFPA 31 Installation Code for Oil Burning Equipment only allowed burner fuel to be stored in steel tanks, and the UL80 Standard for Tanks for Oil Burner Fuel only covered steel constructions.

Therefore, a New & Unusual project was conducted by UL to investigate if non-metallic tanks could be included within the Code & Standard, and if such products would be accepted by AHJ's. The conclusion reached, was that it was possible, if properly coordinated through the Code & Standards processes of each organization in a collaborative effort by the various stakeholders.

The summary result was that draft requirements were developed by UL and submitted for review & comment to the Code & Standards technical committees, with comment resolution conducted to address specific concerns. After several development rounds were completed from 1998 to 1999, the requirements were published by UL as SU2258 and referenced in NFPA 31 Code. Shortly thereafter, ULC published ORD-C80.1 for the Canadian market, based on essentially the same requirements.

During collaborative development, the full scale fire test type and severity was greatly debated in both technical committees. Plastic tank manufacturers proposed a wood crib fire test that was widely used and accepted in Europe. Steel tank manufacturers proposed an oil pool fire test that was previously used to validate venting size reductions.

Since UL witnessed both tests as an independent observer, we were requested by all stakeholders to present the technical information to the NFPA 31 Code TC for final consideration. The following is a summary of the test intent with key differences/similarities identified, and conclusions of the majority of 31 TC members:

**Installation Simulation** – Both tests are intended to simulate a typical residential installation, however, deviations are related to European vs US constructions and fuel sources.

The wood crib test simulates a small wood frame room where combustible materials (walls, ceiling, furniture, paper, etc.) are in close proximity to the tank located in the center of a room. The setup does not simulate tank piping or accessories.

The oil pool test simulates an unconfined concrete basement where leaked/spilled oil from the system (tank, pipe, filter, burner, etc.) may collect under/around the tank located next to a wall. The setup includes typical tank piping and accessories.

**Fire Characteristics** – Both tests simulate a half filled tank exposed to a 30 minute fire, with temperatures monitored, but not controlled. However, the pool fire test tank is filled with #2 oil and uses #2 oil as a fuel source, vs the crib fire test tank is filled with water and uses stacked spruce as a fuel source.

The wood crib "test room" will transfer energy to the tank directly from the fire on one side (primarily via radiation), and indirectly from one side wall and the ceiling. The room openings will control both combustion air inlet and exhaust gas outlet, but will generally trap heat. The total heat flux is dependent upon the type/quantity of wood and room specifications. For the tests witnessed, the maximum temperatures were in the 1000F-1200F range with reductions in the beginning and end.

The oil pool "test rig" will transfer energy to the tank directly from the fire on all sides (and under the tank for supported designs) and one wall. There are no restrictions on both combustion air inlet and exhaust gas outlet. The total heat flux is dependent upon the type/quantity of #2 oil and floor surface dependent upon the tank "footprint". For the tests witnessed, the maximum temperatures were in the 1200-1400F range throughout the test except for the beginning.

**NFPA 31 TC Conclusions** – The 31 TC members preferred the oil pool test over the wood crib test, since it was considered more representative of typical installations in the USA, and more severe to address “worst case” fire scenarios.

It was felt that since oil was stored in the tank, it must be included in the test to determine if any tank wall distortions would result in a loss of containment and add fuel to the fire. Conversely, water would not simulate actual fire conditions to assess, for example, what happens if the oil stored in the tank became exposed to flames when the plastic top/sides melt around it, or was displaced when the plastic top/sides displace the liquid by slumping in it.

In addition, direct flame exposure on all sides (and bottom if applicable to the design) at a higher heat flux & temperature was more severe, and addressed the question of what effect the melting polymer(s) have on strength, containment, and addition to the fuel source.

The TC also provided input on pass/fail criteria, and considered different test times for different ratings. For AHJ acceptance, which was heavily weighted towards fire resistance to prove “equivalency” with the standard style steel tanks, the preferred test criteria was to contain the oil without contribution to/spread of the pool fire. Proposals to have a 20 min test for “outdoor” rated vs 30 min test for “indoor” rated tanks were rejected due to fears of “misuse”.

**Tank Design Fire Performance Results** – At the time of development, most European oil tank manufacturers had two design types in use. All plastic tanks were either primary or diked constructions. Hybrid tanks consisted of a plastic primary in a metal dike. Both designs did not have any significant fire protection components, and the primary polymers were polyethylene (PE). Note “dikes” provide secondary containment, but can’t be pressurized, and the equivalent Canadian term is “integrally contained” assembly.

Over the years, several fire tests were conducted or witnessed by UL for each design type, with all hybrid designs passing, and all plastic designs failing. We also know several manufacturers conducted their own R&D SU2258 fire tests on all plastic tanks w/wo fire protection ranging from fire resistant polymers & coatings to thermal shields & insulation. All were failures, except for a FRP design with proprietary construction features.

Although the SU2258 oil pool fire test was not designed to limit a design or material class, not all PE tanks have passed to date. In contrast, many primary PE tanks have passed the European wood crib fire test.