

Immersion Cooling Fluids Testing

UL Solutions evaluates and certifies the performance properties of immersion cooling fluids through a series of industry-recognized methods and analytical tests.

Immersion cooling is a method of cooling hardware by immersing it in an electrically nonconductive but thermally conductive fluid, keeping electronic components cool during operation.

Benefits of immersion cooling fluids testing

- Enhanced safety
- Performance verification
- Regulatory compliance

Although this technology has been used to cool high-voltage transformers since the 1940s, the recent increase in high-powered data centers for applications such as artificial intelligence (AI), cryptocurrency mining and electric vehicle (EV) charging has sparked rapid growth for the immersion cooling industry.





Discover our certification services for information and communication technology equipment

UL Solutions offers evaluation and certification services for information and communication technology equipment. This program is for immersion cooling fluids and evaluations are conducted in accordance with UL 2417, the Outline of Investigation for Immersion Cooling Fluids for Use with Information and Communication Technology Equipment.

As a critical component in the complete immersion cooling system, these fluids must be assessed for autoignition temperature, flash point and dielectric breakdown voltage. Additional characterization tests can be conducted to assist end users with fluid selection.

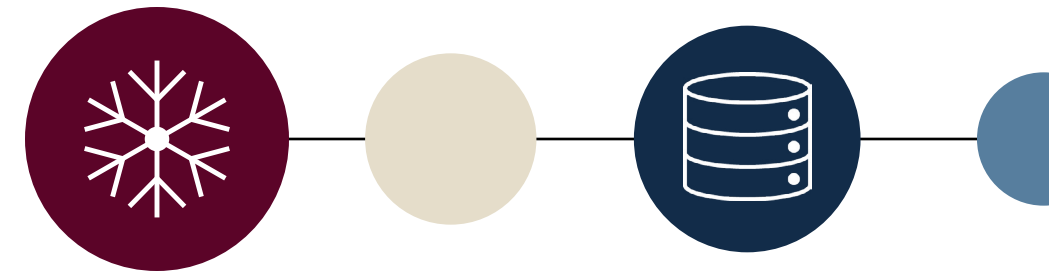
Required testing and ratings

- Autoignition temperature test (ASTM E659): 300°C or greater
- Flash point test (ASTM D93 (Procedure A)): 135°C or greater
- Dielectric breakdown test (ASTM D1816): 6 kV/mm or greater
- Qualitative infrared analysis (for fluid identification purposes)

Certification to this new Outline of Investigate helps demonstrate compliance with fluid safety requirements found in CSA/IEC/UL 62368-1, the Standard for Safety of Audio/Video, Information and Communication Technology Equipment — Part 1: Safety Requirements.

Deliverables for certification

Immersion cooling fluids that meet UL 2417 requirements use the UL Certification Mark and are published in the [UL Product iQ®](#) database under the Category Code Number (CCN) NCOZ. This enables cooling systems manufacturers to pre-select fluids that meet their needs and helps reduce time to market when certifying systems.





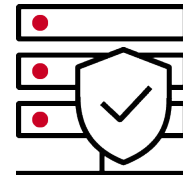
Evaluating performance

We can customize performance testing of immersion cooling fluids based on customer needs for specific end-product applications. Our experts can also help evaluate the critical attributes of your immersion cooling fluids, including autoignition temperature, flash point and viscosity. After testing, we issue a letter, report and datasheet documenting the results.

The most common attributes and testing methods include:

- Autoignition temperature (AIT) per ASTM E659-15
- Flash point testing per ASTM D93 (Pensky-Martens closed cup method)
- Flash/fire point testing per ASTM D92 (Cleveland open cup method)
- Dielectric strength per IEC 60156
- Dielectric breakdown per ASTM D1816
- Viscosity
- Specific gravity by pycnometer
- Qualitative infrared analysis

We also offer comprehensive services for audio/visual (AV) and information technology equipment (ITE) applications, including IEC/UL 62368-1 certification. Other types of testing are available. Please [contact us](#) if the tests you require are not listed.



Why choose UL Solutions?

As a leading global third-party certification and testing provider, UL Solutions is a trusted ally in navigating the complexities of modern cooling technologies. We stand committed to advancing the safety, quality and innovation of our immersion cooling fluid testing and evaluations.

Our experts use internationally accepted test methods established by ASTM International and the International Electrotechnical Commission (IEC) to establish relevant safety and performance standards are met.