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IMMERSION COOLING EQUIPMENT
CERTIFICATION APPROACH AND SAFETY COMPLIANCE

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Immersion Cooling Equipment
Certification Approach and Safety Compliance

Michael Sakamoto, Sr Business Development Manager, UL

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Certification Categories

Current approaches and considerations from industry safety certification and compliance in three areas

Liquid Immersion Hardware

Insulating Liquids

Installed Information Technology Equipment

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Liquid Immersion Hardware

Two Approaches

- Fully configured system including installed IT equipment
  Certification with **(CSA/UL) IEC 62368-1, Safety of Audio/Video,
  Information and Communication Technology Equipment**

- Customer configurable or unconfigured systems
  Certification with **UL 2416, Audio/Video, Information and
  Communication Technology Equipment Cabinet, Enclosure, and
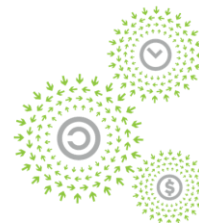 Rack Systems**

  → Separate category for Immersion Cooling Equipment

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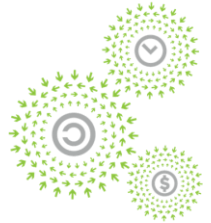OPEN POSSIBILITIES.

Liquid Immersion Hardware

What is UL 2416?

- UL/ANSI Standard used for current existing category that covers air-cooled racks & cabinets with power distribution, fans, etc. that are not complete systems

- New category created, specific to immersion cooling cabinets with insulating liquids referencing UL 2416

- Currently contains references to UL 62368-1 for many technical requirements

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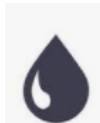
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Liquid Immersion Hardware

UL 2416 Testing

- Certification of the immersion cooling cabinet requires testing one representative system that includes immersion cooling cabinet system hardware, insulating liquid, and maximum electrical load that can be represented by servers, power supplies, cabling etc.
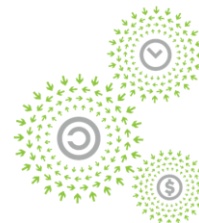
COOLING CABINET   INSULATING LIQUID   MAXIMUM LOAD

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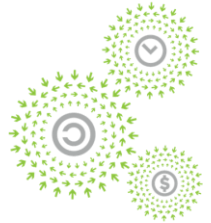
Liquid Immersion Hardware

UL 2416 Manufacturers Responsibility

- Providing instructions to customers on proper selection of safety certified equipment based on unique systems requirements of individual specific immersion cooling cabinets and the manufacturer's qualification (compatibility) testing of insulating liquid and approved installed hardware

- Conducting qualification testing of insulating liquid & recommended hardware

- Program compliance determined via checklist-like criteria with periodic predetermined audits

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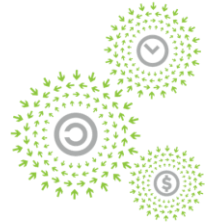
UL/IEC 62368-1 and Key Clauses

Audio/Video, Information and Communication Technology Equipment – Part 1: Safety Requirements
UL Standard for Safety for Audio/Video, Information and Communication Technology Equipment – Part 1:
Safety Requirements, UL 62368-1 (based on *IEC 62368-1:2018*), Third Edition, Dated December 13, 2019

- Clause 3.3.5.4   Insulating Liquid Terms and Definition
- Clause 4.1.8   Liquids and Liquid filled components
- Clause 4.4.4   Displacement of a safeguard by an insulating liquid
- Clause 5.4.12.1   General Requirements
- Clause 5.4.12.2   Electric strength of an insulating liquid
- Clause 5.4.12.3   Compatibility of an Insulating Liquid
- Clause 5.4.12.4   Container for insulating liquid
- Clause 6.4.9   Flammability of an insulating liquid
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Insulating Liquids

- Insulating liquid is considered a **critical component** of the overall immersion cooling system

- (CSA/UL) IEC 62368-1 Third Edition now includes requirements for insulating liquids used with information technology systems

- Key parameters specified for the insulating liquid
    - ◎ auto ignition temperature not less than 300°C
    - ◎ flashpoint higher than 135°C
    - ◎ 60-day aging for dielectric breakdown

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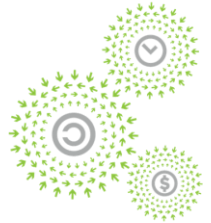NOVEMBER 9-10, 2021

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Insulating Liquids

Two Approaches

- **Unlisted component (proprietary)** -insulating liquid evaluated as a component used in a specific manufacturers' listed end product. The insulating liquid will not have formal certification but will be an acceptable component in the end product certification

- **Recognized component certification (with public record)-** insulating liquid as a certified component that is intended for use in manufacturer's listed end product.
  -currently under development

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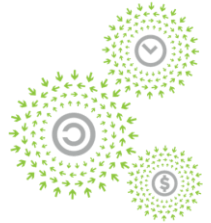OPEN POSSIBILITIES.

Installed IT Equipment

Two Approaches

- Manufacturers of installed IT equipment which are originally designed for use with immersion cooling can certify to (CSA/UL) IEC 62368-1

- Manufacturers of installed IT equipment which have current certification and are modifying for purposes of use with immersion cooling can retest the certified IT equipment for compatibility with specific insulating liquids and add the alternate construction to their existing safety certification file
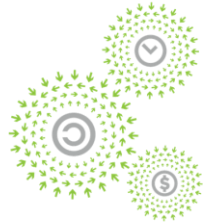
Standard Development and Regulatory Factors

- IEC 62368-1- Requirement of the standard and its development are a collaboration effort of a global network of technical committees and task groups. Technical subject matter experts are relied on for advancing the development of technical requirements

- Industry accredited voluntary consensus standards provides best standard development approach that will be recognized by regulatory agencies and Authorities Having Jurisdiction (AHJ)

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Call to Action

- Continued collaboration with project leads and community with standards and certification in identifying short term (existing schemes) and long-term goals (future schemes)

- Collaboration with project leads and community to finalize roadmap by Nov 2021

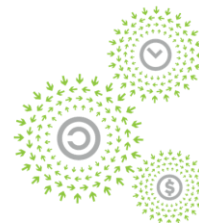- Where to find additional information (URL links)

Where to buy UL standards: https://standardscatalog.ul.com

Where to buy IEC standards: https://webstore.iec.ch

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Call to Action

- Industry standards technical committees seek technical subject matter experts input to further update and refine requirements in industry recognized standards

- Many OCP community members companies have representation in the technical committees. Coordination between OCP community member from a given company and the staff involved in the technical committees from the same company should be considered

- Consideration for OCP as its own entity to engage with standards technical committee

- Organization interested in joining technical committees can apply

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Thank you!