

## **The Complexities of Shipping Liquid Cooling AI Systems: A Deep Dive**

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### **ABSTRACT:**

Liquid-cooled hardware poses unique risks due to its freezing point, volume expansion properties, and material compatibility associated with coolant LC25. In particular, dealing with coolant in hardware products and addressing the challenges associated with shipping these systems and selecting reliable materials are frequently overlooked, leading to potential damage, downtime and in some cases affecting performance.

This paper explores the complexities of landing liquid-cooled hardware products, highlighting the need for careful planning and validation to ensure safe and efficient shipment. Meta has conducted Long Term Reliability (LTR) testing on liquid-cooled racks, identifying challenges related to material compatibility that can cause performance degradation. The study tracked detailed performance factors such as coolant flow rate, system pressure drop, and cooling capacity. Root cause and failure analysis revealed oxidation of metal and the presence of silicone as a threat when used in liquid-cooled hardware under higher coolant temperatures, leading to expedited corrosion (metal oxidation) around the GPU cold plates.

The findings emphasize the importance of considering media resistance and chemical compatibility in the design and development of liquid-cooled hardware.