

Corrosion Performance and Coating Strategies for Steel Cooling Plates in Battery Electric Vehicles

Elliott Asare (elliott.asare@arcelormittal.com), Tarek Krim

ArcelorMittal

This presentation assesses steel cooling plates for BEV battery systems versus aluminum. Testing indicates that zinc-based coatings are incompatible with glycol based coolants, as evidenced by corrosion product formation and deposit buildup. In contrast, aluminum-based coatings demonstrate stable performance across all tested coolants, exhibiting minimal mass change and no detrimental deposits. These results underscore the critical importance of appropriate coating selection. Aluminum-based coated steel exhibits excellent corrosion resistance, with no red rust observed following extended cyclic corrosion testing. The coating maintains its protective properties after severe forming operations, including ØT bending, and provides effective cut edge protection. Results show that with appropriate aluminum-based

coatings, steel provides equivalent thermal performance, strong corrosion resistance, and full compatibility with glycol based coolants, while offering clear cost, investment, and sustainability benefits.