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High-Gradient X-Band Structure Prototypes for CLIC: Lessons from a Decade of High-Power Tests

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For the last decade, the CLIC collaboration has developed and high-power tested a wide range of X-band accelerating structures. To meet the CLIC luminosity budget, these structures must satisfy stringent requirements, operating above 70 MV/m while maintaining ultra-low breakdown rates.

We present a review of the test results, describing the conditioning strategies, test stand configurations, and diagnostics used to study breakdown, field emission, and dark current behaviour. We analyse performance trends across successive generations of structures, and conclude with a summary of practical insights for future high-gradient linac operation.

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