KEMA Labs Services for HVDC Tests

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KEMA Labs presents the state of the art for tests and certifications on HVDC switchgear, cables and accessories.

- KEMA LABS operates one of the largest HVDC laboratories worldwide, where development tests, type tests and prequalification tests can be carried out on a HVDC cable systems and switchgear for power transmission networks up to 600 kV DC.
- Our customers will be supported by the best experts and technicians, who have a deep knowledge of the standards and latest test techniques and can offer the opportunity to shorten the time to market and improve the quality of the products. Customized solutions can be defined to cover International and National Standards or Specifications to reduce the amount of work needed for testing and certification processes.
- The laboratory is equipped with cutting edge testing equipment, offices with high-speed internet access, up to 3 independent testing halls; high importance is given to the confidentiality of the equipment and products of the customers.

TESTING SERVICES

HVDC Laboratory
Loc. Mannheim (DE)

- 3 HVDC generators 800 kV, 1,200 kV and 1,600 kV; 20 mA
- 3,000 kVpk 300 kJ impulse generator
- 600 kV AC Source
- Invensys heating/cooling control system for wireless measuring systems of cable temperature
- Hall size 60 x 26 x 21 (L x W x H) meters up to 3 independent areas (26 x 20 m each) separated by movable walls
- Cable loop setup according to customer specification, including special laying conditions indoor (up to 32,000 m^3) and outdoor (6,000 m^2) to simulate salt water, low or high temperature, can be applied on request
- Cable ducts for cable installation in the outdoor areas (PQ test).
- Electromagnetic shielding for PD measurement
- Customers' offices with high-speed internet access close to the laboratory
- Commodities for customer's personnel
- 2 cranes for cable and accessories handling, 10 tons each
- On request: Handling and storage of the cable drums within KEMA LABS area, cable termination scaffolding and excavation works
- Workshop for mechanical interventions
- Non-electrical type test according to customer's request or main IEC Standards

Products to be tested

- HVDC Cable (extruded or mass impregnated/oil insulated) systems and their accessories, e.g. Fig. 1.

Applicable standards and norms

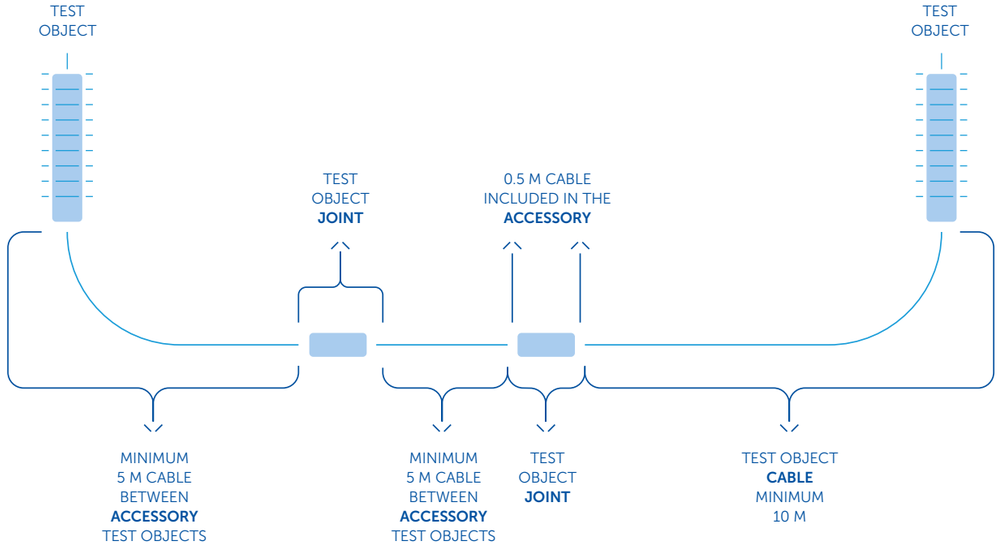
- Relevant IEC standards
- The most updated CIGRE Technical Recommendations e.g. CIGRE TB 496 – 2012 or CIGRE SC B1DOC 11/21
- based on specific tailor made solutions.

The range of tests to be performed is, but not limited to:

- load cycle tests and superimposed impulse voltage test (both LCC & VSC systems), long duration voltage tests and superimposed switching impulse voltage tests
- mechanical tests (inspection services at customer's premises), short-circuit tests and internal arc tests. The latter tests are increasingly requested by utilities for safety reasons

HVDC LABORATORY – MANNHEIM (DE)

FIG. 1: EXAMPLE OF CONFIGURATION OF TEST OBJECTS WITHIN A TEST LOOP



HIGH-POWER LABORATORIES – LOC. ARNHEM (NL)

KEMA Labs is worldwide leader in testing and certification of electromechanical components; test certificates and reports by KEMA Labs are internationally recognized by utilities and l manufacturers. KEMA Labs is a well-recognized Certification Body according to ISO/IEC 17065, all its laboratories are accredited in compliance with ISO/IEC 17025, finally our inspection services of type A are accredited according to the ISO/IEC 17020 Standard.

Our high-power laboratory located in Arnhem has the facilities to produce high-power pseudo HVDC conditions, e.g. for testing HVDC circuit breakers and HVDC transfer switches up to 525 kV DC rating with AC short-circuit generators running in low-frequency mode.
Experience goes up to 350 kV hybrid HVDC circuit breakers.
Applicable standards: IEC 62271-5, IEC TS 62271-313 and IEC TS 62271-315 (available in draft version).

A hybrid power-electronics/mechanical HVDC circuit breaker is tested regarding its capability to interrupt fault current in future offshore HVDC VSC operated meshed grids. Power is supplied by low-frequency generators and recovery voltage is supplied by HVDC sources.
In these tests it is essential that the test-object can absorb the energy from the faulted HVDC system.

An HVDC GIS under long-duration test with 110% rated voltage and full daily thermal load cycles. During the long-duration period, superimposed lightning and switching impulse tests were carried out at regular intervals.
Tests are based on IEC 62271-203 and CIGRE JWG D1/B3.57

KEMA LABS's Business Areas:

- **Testing**, **Inspection** and **Certification** services for HV, MV and LV electrical components;
- **Engineering** and **Consulting** services for power systems and markets, transmission and distribution grids, generation plants, renewable and hydro plants;
- **Environmental** Consulting and **Structural Engineering** services for Energy, T&D, Industry and Transport sectors;
- Production of **Solar Cells** for Space and Terrestrial (CPV) applications.

CESI

Shaping a Better Energy Future

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