



Premium High Voltage Coils Made in Germany

Fast International Deliveries

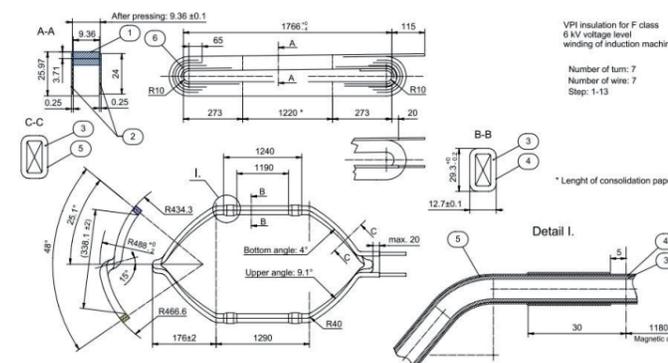


General Presentation of Company Capabilities



HELMKE is a well established manufacturer and supplier of specialist high voltage coils for the global industry. With over 90 years of manufacturing and repair experience, we offer single source capabilities and solutions for high voltage diamond coils as well as for auxiliary and low voltage winding kits, including:

- ▶ **Product engineering:**
Reverse engineering and performance upgrade based on computer aided design and optimization of the insulation system, including the evaluation of electromagnetic, mechanical and thermal performances. Each Helmke design comes with dedicated references to our internal technological process and quality control policy, accredited to ISO 9001 and ISO 14001.
- ▶ **In-house coil manufacturing:**
We offer a comprehensive range of automated winding shaping and taping machines, delivering precision and repeatability according to the highest industrial standards.
- ▶ **In-house management and control of the insulation system application:**
We deliver a full range of technologies, including un-pressed Resin Rich, hot-pressed Resin Rich and Vacuum Pressure Impregnation (VPI) systems. For this reason, we constantly invest in a broad business network, aiming to the maximum flexibility and quality control of the offered solutions and services.
- ▶ **In house testing for full quality assurance:**
We exceed standard requirements by testing each and every coil we produce, both under fully flexible and cured condition.
- ▶ **A specialist team of winding technicians:**
Installing rigid HV coils in stator slots without jeopardizing the integrity of the various layers of the insulation system is a job for specialists. Helmke success record in machine overhauling and rewinding projects is the practical guarantee to your application.
- ▶ **On site rewinding support and training as an option:** Our experienced international staff can provide full on site guidance and support to your rewinding projects.



Product Presentation

Product ranges

- ▶ Voltage: up to 13,8KV
- ▶ Coil size:
 - 5.6m max. length knuckle to knuckle (fish length)
 - 3.5m max. slot pressing capability (straight part length)
 - 1.2m max. chord length
 - Spread angle from 0 to 140° for stator inner diameters up to 300mm.
 - max. cross section of 400 mm² for straight core part
- ▶ VPI tank size: we can accommodate packages with maximum diameter of 3.5m and a maximum impregnation depth of 6m.
- ▶ Thermal class: Our standard range of conductor and main insulation materials can accommodate F and H thermal classes. We can also deliver coil insulation up to thermal class C, through the application of silicon-based VPI resins.

A wide inventory of premium materials

Our customers can select between a wide range of materials vendors. Our list of business partners includes world wide renowned companies as VonRoll, Krempel, Isovolta and more.

- ▶ Enameled copper wires: Full range of round and rectangular profiled wires, featuring: copper grade C101, overcoat W200 grade 2, up to 3 separate enamel layers, for high frequency converter drives
- ▶ Conductor insulation: Mica/Film, Mica/Glass, Mica/Kapton, Enamel/Dacron, Enamel/Mica, Enamel/Glass, Nomex, Duglas
- ▶ Main insulation: Mica/Film, Mica/Glass, Mica/Glass/Film, VPI resins for F, H as well as special C class applications
- ▶ Corona discharge protection: Conductive tape for corona shielding of the inside core part and semi conductive tape for stress grading between the core and the overhang region

Premium coil manufacturing technologies

Our winding workshop uses fully automated shaping machines. Taping for coils with min. cord length of 200mm is also fully automated. Accuracy and repeat ability of our manufacturing process is constantly under control and monitoring, by means of:

- ▶ Electronically controlled layering, overlap and tension throughout the taping process.
- ▶ Safe data storage, for precise coil reproduction.

Premium insulation system technologies

- ▶ **Resin Rich:** We use only the finest resin rich products available in our B-stage insulation technology. Electrically heated hydraulic presses, realize our H-Seal multistage pressing and curing process, under temperature and pressure electronic control. Years of experience have rendered a delicate manufacturing sequence which enables optimum resin flows under low mechanical stress. As a result, we can deliver rigid coils, with homogeneous cross sections and accurate outline dimensions.
- ▶ **VPI:** Our H-Vac automated VPI sequence, renders practically void-free implementations as proven by our leading tan (δ) figures. Premium endurance against moisture and heat as well as mechanical loading and chemical degradation is the result of Helmke H-Vac technology.

State of the art testing capabilities

HELMKE in-house quality policy exceeds all standard requirements: We test every coil, after each step of the manufacturing process, through the use of premium Baker-SKF as well as Omicron instrumentation. Specifically, we perform:

- ▶ High voltage surge (surge comparison): Turn to turn and coil to lamination insulation testing. Steep-fronted transients with rise times in the range of hundreds of nanoseconds are likely to be encountered in normal service of industrial drives. By testing our flexible coils under worst case conditions, we can guarantee for the integrity and longevity of the inter-turn and ground-wall insulation.
- ▶ High pot, Tan (δ) tip-up and Partial Discharge (PD): Control and verification of the curing process, by measurement of the AC leakage current and its capacitive content over a wide voltage range, as well as of the winding PD activity. This enables accurate quantification of the residual void and airgap content as well as detection of any moisture or dust contamination in the fully cured HV coil and/or wound stator assembly (depending on the application).

In conjunction to special electrical testing, various dimensional checks run during each step of the manufacturing process, in order to verify fit and clearances.

Secure labeling, marking and packaging for worldwide delivery

We use custom spacers on standard pallets in order to firmly fix the preformed H-Seal coils. Labeling, marking and packaging in accordance with national legislation for overseas markets.



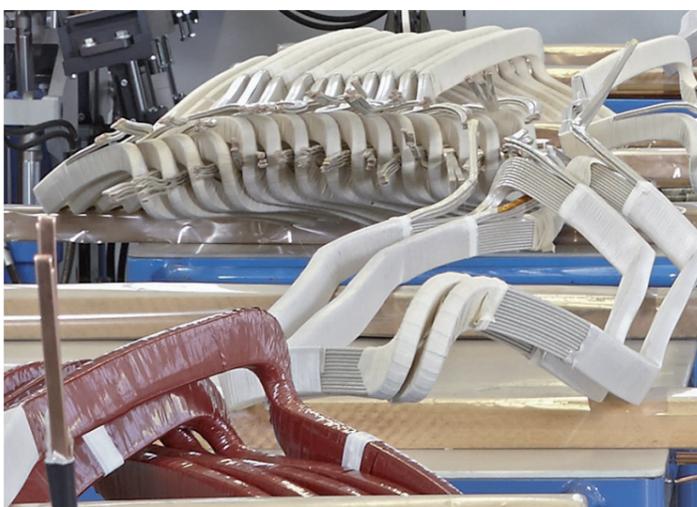
Reference Projects



Coil set manufacture

Helmke can deliver full sets of preformed coils to OEMs and industrial partners. Reference project: Preformed coil set for stators of 4.8MW wound rotor induction motors

- ▶ Manufacturing of 90 premium HV coils
 - Coil nominal voltage: 6KV
 - Insulation system thermal class F
 - Coil outline dimensions: 1676 mm length knuckle to knuckle (fish length), 120 mm straight part length, 381 mm chord length
- ▶ Class F resin rich insulation



Class F, 10KV stator

Helmke can be your single source provider for complete (re)winding and performance upgrade projects of HV magnetic cores. Reference project: Manufacture of 5500KW, 10KV stator for an induction motor drive, delivered in 2015 to Thomas Kurze GmbH.

- ▶ Manufacturing of 48 premium HV coils
 - Coil nominal voltage: 6.6KV
 - Insulation system thermal class F
 - Coil outline dimensions: 2232 mm length knuckle to knuckle (fish length), 1320 mm straight part length, 643 mm chord length
- ▶ Winding of the stator core
 - Core inner bore: 660 mm
 - Core length: 1200 mm
- ▶ Class F epoxy VPI insulation



Headquarters

J. HELMKE & Co.

Ludwig-Erhard-Ring 7-9
31157 Sarstedt
Postfach 13 64
31153 Sarstedt
Tel.: +49 (0) 50 66 903 33-0
Fax: +49 (0) 50 66 903 33-291
E-Mail: helmke@helmke.de
www.helmke.de

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