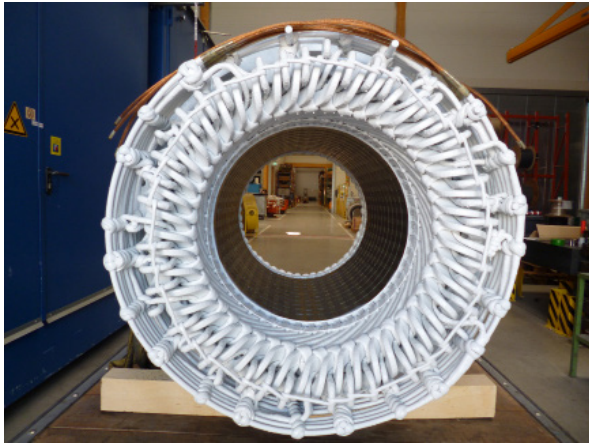


# Winding diagnoses on rotating electrical machines



## Added value through professional diagnosis

The condition of the winding system is determined and assessed by means of measurement and is evaluated, in order to allow a condition-oriented proposition of services to the customer.

### Winding-diagnosis

### Purpose of a diagnostic examination

Every winding insulation in a rotating electrical machine is subject to so-called aging, that means the insulation properties and thus the operating safety decrease with increasing operating time.

### Condition assessment

The winding diagnosis should provide information,

- whether the operational reliability is still sufficient (operational safety)
- whether there are hidden insulation defects (availability)
- which revision and maintenance work is necessary (revision planning)

### Scope of services Standard winding diagnoses

Measurements	Stator	Rotor	Exciter
Visual control	×	×	×
Insulation Resistance & Polarization Index	×	×	×
Charging current	×	×	×
Charge current discharge current	×		
Tan $\Delta$ / Capacity	×		
Partial discharge	×		
Voltage test	×	×	×

- Depending on the machine type and configuration, the scope of measurement may vary
- Visual check by accessibility
- Visual inspection: general condition and contamination of electrical components and active parts (stator, rotor, exciter, slip rings, etc.)
- Tan  $\Delta$  /Capacitance, partial discharge and voltage tests up to 12 kV AC
- Voltage tests > 12 kV AC or DC on request

For a meaningful winding diagnosis, it is necessary to look at the overall picture of the electrical machine. This includes visual inspection. For this reason, Birr Machines strongly recommends to allow/perpare access to the active parts to be able to perform a detailed visual inspection.

## Customer preparation tasks

- Securing of the machine against rotation
- Separation/grounding of phase and star point side (if possible) outgoing feeders close to machine
- Separation/grounding of resistance thermometers (e.g. iron core and winding)
- Scaffolding, provision of fencing, and other equipment for site security
- Existing fire extinguishing equipment shall be blocked
- Opening of housings and covers for visual inspection of active parts
- Power supply: 230 V AC / 16 A
- Electrician on site during the measurement day

The electrical machine should be as cool as possible (approx. 20 - 40°C) on the day of measurement. It is recommended not to clean the electrical machine before the visual inspection.

## Further measurements on request

In addition to standard winding diagnoses, we also offer the following measurements (excerpt):

- High voltage testing > 12kV AC
- Surge voltage testing of rotor and stator windings
- Impedance measurement on single poles
- Leakage current measurement (a.k.a. insulation fault current measurement)
- Ohmic resistance of windings
- Functional test of resistance thermometers
- Wedge test

## When should a diagnostic examination be performed?

The timing is essentially dependent on the importance of the machine to the operation, the operating time, the type of machine, the insulation system, etc. In general, inspection intervals of 3 to 5 years are recommended.

## Who performs diagnostic examinations?

Birr Machines as an experienced machine manufacturer, who knows the various products best and has the necessary basic knowledge from research and development for the evaluation. Birr Machines, formerly ABB, has been performing winding diagnoses on behalf of customers worldwide for over 30 years has therefore a lot of experience independent of the OEM of the electrical machine.

## How much time is required for a diagnoses examination?

Depending on the machine type, the time required ranges from a few hours to a maximum of 1 day per machine. Birr Machines provides the complete measuring equipment (special devices). The report is available within 10 working days.

## Are you interested in our diagnoses service?

Please contact us at the address below for further information. Our specialists will advise you individually and competently.

## **NEW** Winding diagnoses contract for several years

We offer Service Agreements (SA) and Lifetime Service Agreements (LSA) by arrangement for your rotating machine. This includes e.g.:

- Defined electrical measurements with report
- Annual visual inspections
- Timely condition-based assessment with recommendations