

## List of equipment available in ETD TRANSFORMÁTORÝ a.s.

(State to 05/2016)

### Winding department

- Vertical and horizontal winding machines for transformers and chokes incl. winding mandrels, de-reelers, braking systems and pressing plates
- Welding pliers and welding machines for conductors (resistance and induction machines)
- Hydraulic press device for pressing of coil onto winding machine
- Hydraulic and hand shaping device for making lead of conductors and transitions of conductors
- Ventilation chamber oven
- Hydraulic press device for pressing of coil
- Taping machine for shield rings
- Cutting equipment for the production of insulating paper collars

### Impregnation department

- Ventilation chamber ovens (drying of winding)
- Vacuum chamber ovens (drying of winding)
- Deep vacuum oven (drying of winding and transformers in solvent vapour, oil filling of transformers under vacuum)
- Drying chamber /box/ (drying of transformers in solvent vapour under vacuum in the own transformer tank)
- Oil transformer filtration (purification) equipment (stationary and mobile)
- Closed oil system (tanks included)
- Oil washing machine (rinse of active parts, loco transformers for revision, etc.)
- Impregnation kettles (impregnation of the winding and chokes by varnish of insulation class B and F)
- Impregnation vessel for oil impregnation of windings

### Assembly department

- Lifting platform for rotating the winding from horizontal to vertical position
- Lifting platforms for stacking of magnetic core (tightening system components included)
- Vertical taping machine for magnetic core
- Hydraulic crimping pliers for crimping leads (cable lugs and connectors / cables and conductors)
- Hydraulic pumps and jacks (presses of winding and magnetic core)
- Pneumatic wrenches of rods
- Welding machine and welding pliers (resistance and induction machines)

### Wood department

- Band and circular saws, power drills, grinders, milling machines and horizontal boring machine
- Lathe for manufacturing of shield rings
- Cylinder rolling machine
- Board cylinder cohesion machine
- Mechanical presses for minting spacers of winding

### Department of insulation and cooper parts

- Welding machines
- Belt and circular saws, power drills, grinders
- Mechanical and manual shears and circular shears
- Hydraulic pressing device for connections Al parts to Cu parts (cold way)
- Ventilation chamber oven
- Device for perforation of paperboard
- Device for making of insulation parts (ironing of rods, cylinders, angle insulations, etc.)
- Device for hydraulic shaping of outlet strips with punching of holes

### Test department

- Equipment for **routine** and **type** tests according to ČSN, IEC, GOST and other standards
  - Measurement of winding resistance
  - Measurement of voltage ratio and check of phase displacement
  - Dielectric tests
  - Measurement of no-load loss and current
  - Measurement of short-circuit impedance and load loss
  - Tests on on-load tap-changers
  - Leak testing with pressure
  - Check of the ratio and polarity on build-in current transformer
  - Measurement of d.c. insulation resistance windings
  - Measurement of dissipation factor ( $\tan \delta$ ) of the insulation system
  - Measurement of dissolved gasses in oil
  - Temperature-rise type test
  - Determination of sound level
  - Measurement of zero-sequence impedance
  - Measurement of frequency response (Frequency Response Analysis or FRA)
- Impulse generator 2000 kV
- One phase transformer for AC voltage test up to 1200 kV
- Generator for induced voltage testing and other smaller sources of test performance

### Other equipment

- Lathes
- Outdoor storage
- Cranes, articulated assembly platform and other handling technology (forklift, railway pusher of wagons, hydraulic system for moving and lifting of transformers)
- Equipment for drying of transformer outside the production site (method of oil – spray)

Manufacturing plant and outdoor warehouses are equipped with transport equipment and rail network for transport of machines on their own or workshop chassis. The plant is equipped with its own electrical substation.