

THE ISRAEL ELECTRIC CORPORATION LTD.
GENERATION DIVISION

SPECIFICATION GD1/26

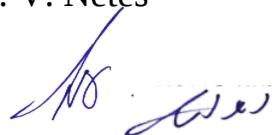
POWER STATION HIGH-VOLTAGE MOTOR REPAIR

Standard specification:

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Particular specification:

Prepared by:
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Handwritten signatures in blue ink, likely representing the 'Prepared by' and 'Checked by' fields for the Particular specification.

June 2026

1. Purchaser

The Israel Electric Corporation Ltd. (IECo) - Israel.

2. Name Of Item / Project

Repairing of Induced Draft Fan (IDF), high-voltage induction motor with squirrel-cage rotor.

3. Location Of Item / Project

The motor covered by this specification is mounted in Purchaser's Rutenberg power station or storage.

4. Scope

4.1. Project Description

The motor nameplate and other relevant data for specific motor to be repaired (dimensions, service ambient conditions, special required performance) are attached.

4.1.1. *Phases:3*

4.1.2. *Frequency: 50 Hz*

4.1.3. *Rated voltage: 13200 V*

4.1.4. *Rated speed: 746 rpm*

4.1.5. *Insulation Class: F*

4.1.6. *Rating:6115 kW*

4.1.7. *Rated current:316 A*

4.1.8. *Power factor:0.87*

4.1.9. *Service factor:1.15*

4.1.10. *Original manufacturer: ABB*

4.1.11. *Serial number: HM100_____*

4.1.12. *Protection: IP: W24*

4.1.13. *Efficiency:96%*

4.2. Scope of Work

The scope of work covered by this specification shall be in detail defined between Purchaser and Contractor, based on results of tests from Item 11.1 and the motor history.

For instance, the scope of work should include the following:

4.2.1. Motor disassembly, preliminary inspections and tests according to 11.1

4.2.2. Cleaning inside of stator by dry ice blasting, if required.

4.2.3. Full stator rewinding.

4.2.4. Stator VPI impregnation

4.2.5. End-winding supports hardware repair.

4.2.6. Rotor cleaning by dry ice blasting.

4.2.7. Replacement of motor main terminals and support isolators.

4.2.8. External cleaning of motor frame, leads box and cooler by sand blasting or other way, if required (stator interior shall be covered to prevent any damage).

- 4.2.9. Surface preparation and painting of motor frame and leads box. First layer epoxy anti-corrosive primer and second layer polyurethane RAL5010.
- 4.2.10. Replacement of motor heaters.
- 4.2.11. Replacement of ball bearings.

4.2.12. Acceptance Tests according to item 11.3

4.3. Optional Scope of work

- 4.3.1. Loop Test of Stator Core before repair item 11.1.7
- 4.3.2. Stator Core:
 - 4.3.2.1. Repair of stator core.
 - 4.3.2.2. Full stator Replacement
- 4.3.3. Rotor machining and repair of rotor squirrel cage and core.
- 4.3.4. Rotor shaft repair:
 - 4.3.4.1. Shaft run-out measurement,
 - 4.3.4.2. Shaft build-up.
 - 4.3.4.3. Repair of rotor core.
 - 4.3.4.4. Repair of rotor squirrel cage.
 - 4.3.4.5. Shaft machining and finishing.
- 4.3.5. Treatment of the motor winding neutral point (if there is an external neutral point), including: separation of phases at the neutral point, corrosion treatment, insulation treatment, re-wiring and tightening of all connections.
- 4.3.6. Heat exchanger (air box) refurbishment including required metal works, repair or replacement of filter supports, seals replacement.
- 4.3.7. Replacement of air filters with stainless steel filters.
- 4.3.8. Motor silencer refurbishment, including: structural/frame repairs, replacement of sealing elements, noise-absorbing materials, surface preparation and painting.
- 4.3.9. Friction (sleeve) bearing inspection:
 - 4.3.9.1. Bearing repair.
 - 4.3.9.2. Bearing replacement with new bearing.
- 4.3.10. Replacement of the RTD's.
- 4.3.11. End-winding support hardware replacement.
- 4.3.12. Corona test for end-winding at 0.66 Un and 1.15 Un according to IEEE 1799

5. Terminal Points & Terminal Connections

N/A

6. Cyber & Information Security

N/A

7. Quality Assurance & Quality Control

7.1. General Quality Requirements

The manufacturing and all components shall confirm quality requirements and shall ensure high reliability. The Bidder shall submit with his proposal copies of quality assurance and quality control procedures.

7.2. Interchangeability

The repaired motor shall provide full compatibility and the same or better parameters, characteristics and performance, from all points of view (electrical, mechanical, physical layout, etc.), as the motor before repairing.

8. Standards & Codes

The required tests procedure shall conform to IEC, ANSI, IEEE, NEMA, VDE standards, or the normal Purchaser internal practice.

9. Technical Documentation

9.1. Technical Documentation Attached to Proposal

The Bidder shall supply to Purchaser the guaranteed values of motor relevant data that will be achieved after the repair.

The tolerances for guaranteed values shall be according to IEC 60034-1.

9.2. Technical Documentation to Deliver after Award Notification

The Contractor shall provide with the repaired motor all data and drawings showing the details of performed work (i.e. active core dimensions, slot details, insulation material type, cross section of coils, rated power if changed, losses if influenced by repair, etc.).

If applicable, these data shall be presented comparatively with the motor condition before repair.

In addition, the Contractor shall provide operation and maintenance manual (if relevant).

9.3. Test reports

9.3.1. The Contractor shall submit Test and Inspection reports up to five (5) working days after tests completion.

9.3.2. The Contractor shall send to Purchaser an initial detailed report of a motor condition, following the tests detailed in Item 11.1.

9.3.3. The Contractor shall issue an acceptance test report, before shipment.

9.3.4. The Contractor shall issue a final report, within seven (7) working days after completion of the scope of work. A final report shall include: initial test report, findings, list of performed tests and acceptance test report with conclusions.

9.3.5. All documentation shall be issued in English or Hebrew.

10. Technical Requirements

10.1. Environmental Considerations & Service Conditions

- The altitude of the power station does not exceed 1000 m above sea level.
- The motor shall be outdoor mounted.
- The expected ambient air temperatures are:
 - Maximum momentary.....+45°C
 - Minimum momentary.....-10°C
 - Monthly average of the hottest month.+30°C
 - Yearly average.....+20°C

- The motor is expected to be exposed to long dry periods without rain, sometimes with very fine sand dust, changing suddenly to periods of high humidity and rain.
- The motor might also be exposed to a moderate combination of conductive or abrasive dust (such as coal dust, fly ash, etc.), sulfur smokes ,moisture, etc., as encountered in usual power plant applications.
- The motor at seashore location is expected to be additionally exposed to coastal conditions with salt laden spray and storms.
- The motor might be exposed during summer days to very intensive solar radiation.

10.2. Reliability, Availability, Maintainability (RAM)

The repair performed shall be intended to improve the reliability, availability and maintainability of the motor.

10.3. Functional Requirements

- 10.3.1. The stator winding insulation shall be Class F or Class H, but the temperature rise shall correspond to Class B conditions.
- 10.3.2. If applicable for repairing work, the insulation system of stator winding shall be Vacuum Pressure Impregnated (VPI) or Resin Rich insulation system.
- 10.3.3. No gradual thinner insulation is accepted towards the star point.
- 10.3.4. The insulation system shall include dedicated turn insulation.
- 10.3.5. Semiconductor layer shall be used for high voltage motors, according to standards and manufacturer practice.
- 10.3.6. The Contractor shall use wires with at least the same cross section as the existing one in the motor.
- 10.3.7. If applicable for repair work, the rotor squirrel cage shall be made of copper or copper-alloy bars.
- 10.3.8. The minimum monitoring devices (RTD's, Thermo-couples, etc.) shall be of the same type and quantity as in the motor before the repair.
- 10.3.9. Bearings replacement.
 - 10.3.9.1. The bearings supply shall be agreed between IECo and contractor.
 - 10.3.9.2. The bearing type shall be according to motor manufacturer.
 - 10.3.9.3. The bearings installation shall be according to bearing manufacturer.

- 10.3.9.4. The Contractor is responsible for bearings installation, also in the case IEC Co supplies the bearings.
- 10.3.9.5. The Contractor shall perform the tests that will ensure the proper installation of the bearings: at least tests 11.2.13, 11.2.14, 11.2.20.
- 10.3.9.6. The Contractor shall provide appropriate reports, including test results of item 10.3.9.5, according to IEC Co requirements (item 11).
- 10.3.9.7. In the case, the Contractor supplies the bearings, he shall submit a CoC (Certificate of Compliance) form at the tender stage.
- 10.3.9.8. In the case, the Contractor supplies the bearings, they shall be purchased directly from the manufacturer, located in OECD countries or in the United States. The date of production of the bearings shall not exceed 12 months.
- 10.3.9.9. The list of bearing types will be supplied by IEC Co.
- 10.3.9.10. After replacement, lubricate the bearings with grease type according to IEC Co requirements.
- 10.3.9.11. The old bearings shall be returned to the power station.

11. Tests & Inspections

11.1. Motor Test before Repair

- 11.1.1. The motor shall be dismantled and tested in presence of Purchaser's representative.
- 11.1.2. Hold point: after tests item 11.1, the Contractor will issue to IEC Co an initial test report including findings and recommendations for content of the repair. The scope of work shall be in detail defined between Purchaser and Contractor.
- 11.1.3. Visual inspection of stator and rotor.
- 11.1.4. Air gap clearance measurement.
- 11.1.5. Measurement of insulation resistance of stator winding, at 5000 V DC for 6.6 kV or 13.2 kV motors.
- 11.1.6. Measurement of stator winding resistance.
- 11.1.7. Loop test for stator core (optional).

11.2. Acceptance Tests

11.2.1. The acceptance tests shall be performed in the factory, in presence of Purchaser's Quality Control representative.

The contractor shall announce the time schedule immediately after receiving the order and shall update it if necessary. The Purchaser has the right to witness any process or tests performed in the Contractor's facilities without any additional price. The witnessing will be performed in such way to avoid any impact on the contractual repair schedule/delivery time.

11.2.2. The following required tests and acceptance conditions are usually suitable for extensive repairs or modifications (like full stator rewinding cases). In other repairing cases, different tests or different acceptance conditions can be agreed between Purchaser and Contractor. Additional tests and additional/changed acceptance values can be agreed between Purchaser and Contractor.

11.2.3. Air gap clearance measurement.

As acceptance condition, the difference between the measurements at diametrical opposite air gap points shall be less than 5% from air gap average clearance.

11.2.4. Measurement of stator winding resistance, each phase separately (if the winding neutral point is accessible) or phase-to-phase (if the winding neutral point is not accessible).

For acceptance, each measurement shall not differ from each other by more than 2%.

11.2.5. Measurement of stator insulation resistance and polarization index, each phase separately (if the winding neutral point is accessible) or all phases together (if the winding neutral point is not accessible) at 5000 V DC for 6.6 kV or 13.2 kV motors. The minimum acceptance value of insulation resistance at 40°C shall be 100 M Ω . The minimum acceptance value of polarization index shall be 2.0.

11.2.6. Measurement of insulation resistance of heaters, thermometers, thermocouples, thermistors, thermostats, etc. used for windings, bearings or cooling circuits at 500V DC, 1 min. The minimum acceptance value of insulation resistance shall be 10 M Ω (IEEE 56, 9.3.13).

11.2.7. Measurement of dielectric dissipation factor ($\tan\delta$) with different applied voltages, up to phase voltage, each phase separately (if the winding neutral point is accessible) or all phases together (if the winding neutral point is not accessible), per IEC 60034-27-3.

The Purchaser's specific acceptance criteria (additional to the referenced standard) - maximum acceptance value of $\tan\delta$ shall be:

- $\tan \delta \leq 3.0\%$ for new winding
- $\delta \tan \delta \leq 0.5\%$.

- 11.2.8. Partial discharge (PD) measurement up to phase voltage, each phase separately (if the winding neutral point is accessible) or all phases together (if the winding neutral point is not accessible), per IEC 60034-27-1.
The Purchaser's specific acceptance criteria (additional to the referenced standard) - maximum acceptance value of PD shall be:
- $PD \leq 2500 \text{ pC}$
- 11.2.9. On motors supplied with insulation bearings, measurement of bearing insulation resistance at 500V DC, 1 min. and measurement of shaft voltage.
The acceptable value of bearing insulation resistance shall be greater than $1M\Omega$ (IEC60034-23:2019, 7.10).
- 11.2.10. Measurement of no-load current (including current symmetry) and losses at rated voltage and frequency.
The no-load running shall be performed for 1-3 hours, until thermal balance is achieved, including record of bearings temperature and vibrations.
The no-load currents unbalance shall not exceed 20%.
Check bearings temperature during motor no-load running.
- 11.2.11. Check the direction of rotation versus phase sequence and mark it on the wires and the motor. The phase sequence in the connection box shall be kept as it was before starting the work.
- 11.2.12. Stator core flux test (loop test) after removing the old coils and after installing the new coils (if full rewinding preformed).
- 11.2.13. Measurement of mechanical vibrations for housing and bearings.
Maximum acceptable vibrations value shall be according to ISO 10816-3 or IEC 60034-14.
- 11.2.14. Behavior of bearings (lubricant level, temperature, noise, vibrations).
- 11.2.15. Measurement of locked-rotor torque and current (including current symmetry) at rated current times service factor, rated frequency and reduced voltage.
Acceptable locked rotor current is until +20% of contractor declared value. The short-circuit currents unbalance shall not exceed 5%.
- 11.2.16. Motors with completely new sealed stator winding shall be capable of passing a water immersion or spray test according to NEMA MG1 or ANSI C50.14. It is acceptable the Contractor will submit a test certificate of an identical test performed during the last 3 years on identical insulation system.
- 11.2.17. Stator winding dielectric withstand tests:
- 11.2.17.1. Power frequency withstand test of the stator winding with voltage $(2U_N + 1) \text{ kV}$ for 1 min, each phase separately (if the winding neutral point

is accessible) or all phases together (if the winding neutral point is not accessible).

11.2.17.2. Impulse withstand test of main insulation of 2 individual sample coils with peak voltage of $4UN + 5 \text{ kV}$ ($1.2/50\mu\text{s}$).

11.2.17.3. Impulse withstand test of inter-turn insulation for 2 sample coils with peak voltage of $0.65 \times (4UN + 5) \text{ kV}$ having a front time of $0.2 \mu\text{s}$.

11.2.18. Rotor tests:

11.2.18.1. Visual inspection of joining/brazing areas between Cage bars and rings (for: pitting, shape changing, etc.). Before visual test, the paint/grease (if present) shall be removed by suitable method.

11.2.18.2. Dye / Fluorescent inspection for joining/brazing areas between bars and rings (for: cracks, tears etc.)

11.2.18.3. Analyses of stator Current Harmonics by Motor Monitoring or similar method.

11.2.19. Over-speed test for rotor if repaired, shall be performed at 110% rated speed for 1 min.

11.2.20. Rotor dynamic balancing test.

11.2.21. Inspection, test and adjustment of accessories (e.g. cable entries, earthing bolts, terminal boxes, terminal marking, enclosure, nameplate labels, lubrication, fans, thermal monitors, coolers etc.).

11.2.22. Direct rated voltage starting test, including measurement of starting currents and starting time and successive starts test according to motor design. This test can be performed also in Contractor or Purchaser's facilities under Contractor responsibility.

11.3. Field Tests

11.3.1. The Purchaser shall have the right to perform all or a part of the following field tests, on motor mounted in power station, before the first operation following the repair:

11.3.2. Check the direction of rotation versus phase sequence.

11.3.3. Measurement of no-load current and losses (with the load uncoupled).

11.3.4. Measurement of mechanical vibration.

- 11.3.5. Measurement of insulation resistance and polarization index at the same DC voltage as in Items 11.2.
- 11.3.6. Measurement of partial discharge up to rated phase voltage.
- 11.3.7. Measurement of $\text{tg}\delta$ up to rated phase voltage.
- 11.3.8. Power frequency withstand test of stator winding at $0.80 \times (2U_N + 1)$ kV for 1 min.
- 11.3.9. Measurement of bearing insulation resistance on motors supplied with insulated bearings.
- 11.3.10. Rotor tests – analyses of stator current harmonics by Motor Monitoring.
- 11.3.11. Check the accessories.
- 11.3.12. Direct rated voltage starting test, including measurement of starting currents and starting time.

12. Packaging & Delivery

- 12.1. The transportation to and from the Contractor's factory, including the insurance, shall be the Contractor's responsibility (as an integral part of the contractual repair schedule/delivery time) unless otherwise agreed.
- 12.2. The motor should be prepared for long term storage and transported to Israel in a protected wood box with written dimensions and weight.

13. Storage & Handling

The Contractor shall submit instructions for long term motor storage.

14. Nameplate & Marking

- 14.1. The contractor shall renew the nameplate, including IECo motor number.
- 14.2. The contractor shall mark the motor phases.

15. Notes

- 15.1. The repairs shall be performed in Contractor's factory.
- 15.2. IECo keeps its rights to qualify or disqualify any Bidder following the fulfilling of any specification requirement.

15.3. All deviations from this specification shall be separately listed. In the absence of such list, it will be presumed that the provision of the specification is complied with by the Bidder.

16. Special Requirements

16.1. Warranty

The warranty period of the repaired motor shall be 12 months from commissioning or 18 months from delivery, which comes first.

16.2. Duration

The works detailed above (scope of work and tests) shall be performed during maximum 90 working days after receiving the motor in Contractor facilities.