

HELPIK POWER ENGINEERING

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Your Ref.	Your Letter	In Charge / Ext / E-Mail	Our Ref.	Date
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Subject

**Tsankov Kamak HPP
REFERENCE for Good Performance of "Helpik" Ltd.**

Dear Sirs,

The current reference confirms that "Helpik" Ltd., as our subcontractor, has performed electrical installation works at TSANKOV KAMAK HYDRO POWER PROJECT, including HPP, Dam, Intake and Auxiliary Unit for the period of 2008-2010.

The following works has been executed:

1. Electrical equipment

- Generators – mounting of cabling of the following systems:
 - Generator excitation systems
 - Excitation transformers
 - Electrical breaking transformers
 - Instrumentation terminal boxes and heater terminal boxes of the generators.
- Power transformers 110/10,5 kV
 - Mounting of two power transformers 50 MVA, 110/10,5 kV, on the 110 kV outdoor switchgear site, under supervisor's control
 - Mounting, cabling and checking of instrumentation terminal boxes of the main transformers – 2 pcs.
- Segregated phase bus
 - Mounting of two sets of 10,5 kV segregated phase bus from generators to main transformers under supervisor's control
- Turbines and Inlet valve – mounting, cabling and checking of:
 - Instrumentation terminal boxes of the turbines.
 - Instrumentation terminal boxes of the Inlet valve.
- MV distribution switchgears – mounting, cabling and checking of:
 - 10,5 kV Switchgear for Generator Unit 1 and Generator Unit 2 –10 fields in total
 - 20 kV Switchgear in HPP, Auxiliary HPP at the Dam Crest and in the Maintenance Building of the Intake – 14 fields in total

- MV power transformers in HPP, Auxiliary HPP at the Dam Crest and in the Maintenance Building of the Intake – 5 fields in total
- Integrated hydro power automation of the HPP – mounting and cabling of the following systems:
 - Transformer bay unit control and line bay control in 110 kV outdoor switchgear
 - Turbine hydraulic governor control system
 - Main inlet valve hydraulic control system
 - Cooling water control system
 - Drainage & dewatering system control of HPP and Dam system
 - Oil storage system control of HPP system
 - Unit control system and common control boards in HPP
 - Generator protections and common protection board
 - Control of the Intake structure
 - Spillway Gates and Bottom outlet control systems
 - Protection, Control & Excitation systems of the Auxiliary Unit at the Dam
- Mounting, cabling and checking of the communication systems between HPP, Intake structure, Auxiliary Unit and Dam, based on fiber optic lines
- AC/DC distribution switchgears
 - Mounting and cabling of auxiliary boards and consumers distribution system for AC and DC at HPP, Auxiliary Unit, Dam and Auxiliary Building
- Emergency Diesel Generator Set – Generator Unit
 - Mounting and cabling of emergency power supply from Diesel Generator Set in HPP
- Battery & battery charger
 - Mounting and cabling of battery systems, set with battery chargers and battery fuse boxes in HPP and Auxiliary unit.

2. 110 kV outdoor switchgear

- Erection of electrical equipment in 110 kV outdoor switchgear, including circuit breakers, disconnecter switches, current transformers and capacitive voltage transformers, surge arresters, supporting insulators and insulator chains, busbars.
- Erection of gantries (lattice type) and gantries OHL (lattice type), pre – fabricated steel structures etc.
- Production, delivery and mounting of steel structure for seismic reinforcement of power transformers 50 MVA, 110/10,5 kV.

3. Cables

Laying of cables, including two - side connection, marking, testing and making of cable traces:

- MV power cables – total over 4 300 m
 - LV power cables – total over 28 100 m
 - Control and instrumentation cables – total over 23 800 m
 - Special cables – Fire Fighting Cables, Fiber Optic Cables, LAN Cables etc. – total over 13 000 m
 - Delivery and mounting of cable supporting systems – over 4 600 m
- Making of cable clutches for MV cables

4. Fire Extinguishing equipment

Assembly and participation in the tests for:

- Fire extinguishing system with CO₂ for two synchronous generators, including: pipeworks and pipe fittings, CO₂ tanks and equipment for control and monitoring of fire extinguishing system and fire detection. Functional tests.
- Fire extinguishing system with H₂O of two power transformers, including: pipeworks, pipe fittings and equipment for control and monitoring of fire extinguishing system and fire detection. Functional tests.

5. Lighting installations

Mounting of lighting installations – indoor and outdoor – in HPP powerhouse, at the Dam Crest and in Dam galleries, in Auxiliary Unit, in Maintenance Building at the Intake, in the 110 kV outdoor switchgear and other.

- Mounting of lighting luminaries – over 480 pcs.
- Mounting of lighting cables – over 22 700 m
- Mounting of accessories for the lighting installations – plugs, lighting switches, terminal boxes, Photo Electric Switches etc. –over 820 pcs. in total
- Mounting, cabling and checking of lighting boards
- Mounting of outdoor lighting installation, including steel poles and lighting luminaries PHILIPS IRIDIUM SGS253 1x150W type

6. Earthing and lightning installations

Mounting of earthing and lightning installations of all units of HPP.

- Mounting of 150mm² plain copper conductor– over 12 500 m
- Mounting of 70 mm² and 35 mm² yellow/green copper conductor– over 3 200 m
- Preparation of earthing CADWELD thermal weld connections
- Connection of all steel structures to the earthing installation

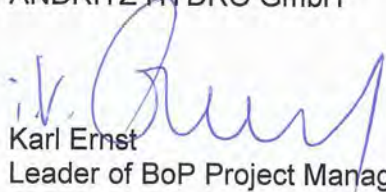
The above mentioned works have been performed competently by qualified personnel of the company. The works have been carried out in a good quality and in accordance of the terms defined by the approved schedule of the project terms.

Considering the above said, I recommend "Helpik" Ltd. as a correct and reliable partner for the realization of electrical installation works of energy projects.

The current reference for good performance is given to "Helpik" Ltd., to be used where needed.

Yours sincerely

ANDRITZ HYDRO GmbH



Karl Ernst
Leader of BoP Project Management



Georg Forstner
System Engineer of BoP