

Tower Testing Station – General View

## **TOWER TESTING STATION - ELECTROMONTAJ S.A.**

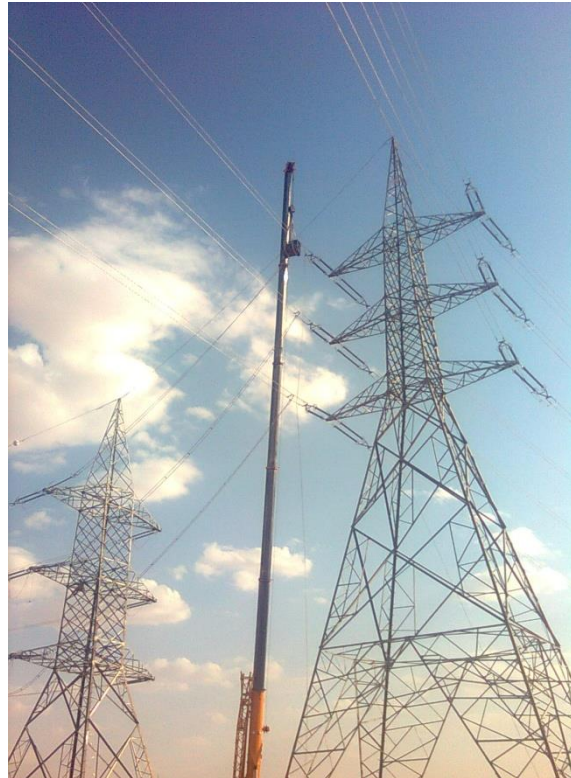
### **BUCHAREST – ROMANIA**

The supports and structures are essential elements on the universe of the Overhead Lines. Their importance can be understood by the functions they exert on the OVERHEAD TRANSMISSION LINES system.

Besides being responsible to support all the loads coming from conductors, they are also responsible of keeping the electrical clearances between the conductors and the ground and grounding parts as well as to maintain the phase – to – phase and phase – shield wire distances.

They also need to be strong enough to absorb the conductor tension in the anchorage/terminal towers guarantying, thus, the existence of the angles and/or the end of the lines.

From the reliability point of view, it is important to highlight the role played by the supports and structures on the reliability analysis of the Overhead Lines.



400 kV OHL Aspect



Tower Testing Station “ILIOARA” – BUCHAREST, ROMANIA  
ELECTROMONTAJ S.A.



ELECTROMONTAJ Testing Station is located in Bucharest in the very neighbourhood of ELECTROMONTAJ Tower Factory.

It is therefore possible to build the prototype and to modify or replace in a very short time any tower element which may have failed during the test.

The Tower Testing Station is suitable to perform DESIGN and SAMPLE tests for towers steel lattice type, self – support or anchored types. It is also possible to perform similar tests for tubular towers type.

There is no restriction on the type of material used in the fabrication of the supports to be tested.



Vertical, longitudinal, transversal and wind loads are applied by steel ropes, pulled by electrical winches at low constant speed. A maximum of 66 loads can be simultaneously exerted and measured.

The loads are applied to the tested tower independently, managed from control room by SCADA, where the Witness team can follow “on-line” the test.

Loads are measured by load cells.

#### Electrical Winches

The Testing Station is capable to do design tests for giant and multi-circuit towers with 80 m height, 35 x 35 m base, 800 t compression load and 730 t tension load.

The 66 winches units, produced by Pfaff – Germany, mounted in a structure with de-multiplication which can provide loads between 5 tf up to 80 tf.

The winches are located on 6 testing pads (2 testing pads for transversal loads, 3 testing pads for longitudinal loads and 1 testing pad for vertical loads).

The calibration of load cells is performed before and after each test in the TOWER TESTING STATION own Laboratory.

Testing Station is provided also with a modern tower crane, produced by Comansa – Spain (82.3 m height and 12 tons capacity).



Control Room

Transversal and longitudinal displacements are measured at each step, by survey instruments.

The DESIGN and SAMPLE tests are performed in accordance to IEC Standard 60652: 2002 LOADING TESTS ON OVERHEAD LINE STRUCTURES at FULL SCALE.



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Testing procedure is prepared by ELECTROMONTAJ, being subject of the CLIENT APROVAL.

The Testing Software Program and the SCADA system is made and implemented by TehnoEM Echipamente Industriale, a Romanian company, designer, manufacturer and provider of automation solutions and equipment.



ELECTROMONTAJ and TehnoEM companies are certified ISO 9001:2008.

The concept of the Station was defined by ROENG Transmission Electric & Consulting (former Fichtner Engineering) who has experience in tower tests, witnessing more than 100 towers in India Testing Stations (Mumbai, Jaipur, Jabalpur, Nagpur, Nasik, Cheney), China (Jiangsu, Beijing) and Romania (CELPI).

After test is complete, the tower is inspected before being dismantled.

Samples cut off from the steel members are prepared and tested to measure yield and tensile stress in the ELECTROMONTAJ Laboratory.

The Test Report summarising all the relevant aspects of the tests, shall be provided by Electromontaj, including VIDEO DOCUMENTATION as cross-reference.

The TESTING STATION keeps a record of all relevant information for a period of 10 (ten) years.

ELECTROMONTAJ has successfully tested up to now in other Testing Stations more than 50 towers, for Overhead Lines with nominal voltages up to 500 kV, using the testing procedures elaborated by Electromontaj.

The personnel of ELECTROMONTAJ Tower Testing Station has great experience in similar Testing Stations and is very well trained to

respect and follow the TESTING PROCEDURES, prepared by ELECTROMONTAJ OHL DESIGN DEPARTMENT.



115 tones  
Tower,

testing



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## Tower Testing Station Specifications

- Technical Data	Ilioara - Testing Station
Universal Foundation Dimensions	35m x 35m
Maximum Tower Height to be tested	82.3m (90m)
Maximum Compression / Uplift per Leg	830t / 700t (1000t)
Allowable Overturning Moment	50.000 t-m
Maximum Cross Arm Spread	70m
Maximum Transverse Wire Load	90t per point (100t)
Maximum Longitudinal Wire Load	60t per point (75t)
Maximum Vertical Wire Load	45t per point (50t)
Load Application System	66 Nos. 5t, 6t and 7,5t capacity Electrically Operated Winches (Pfapp type)
Longitudinal Gantry Force (H = 81.7m)	560t (20 points)
Transversal Gantry Force (H = 82.3m)	720t (26 points)
Maximum Capacity for Vertical Force	500t (20 points)
Load Measurement System	Strain Gauge Type Load Cell
Sample Material Testing and Equipment Calibration	- 60t; - 100t;
Crane for Tower Erection	COMANSA Tower Crane (82,3m height with 55m boom length and 12t/R = 25m capacity)
Deflection Measurement	Optical Theodolites
Load Application	Electrical Winches (made by Pfaff Germany) electronically controlled by variable Frequency Drivers and SCADA.

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