



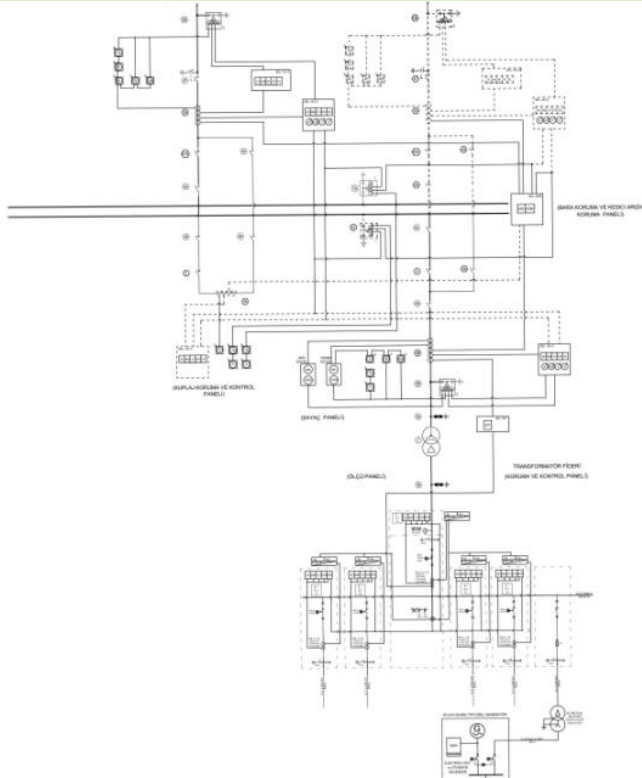
# PLAN-TEST ENERGY SYSTEMS

ENGINEERING DESIGN INSTALLATION  
AND COMMISSIONING

- ▶ We are providing several services in energy sector which are compatible with legal regulations, standards and technical specifications to create reliable, sustainable and EHS sensitive investments from the PLANning stage to the TEST & commissioning stage of power generation plants.

- ▶ Renewable Energy Consulting
- ▶ Engineering (Project + Calculations)
- ▶ Site Supervising
- ▶ Cabling / Wiring
- ▶ Test and Commissioning
- ▶ Maintenance

## ➤ DESIGN AND APPROVAL STAGE OF RENEWABLE POWER PLANTS



- ✓ Project preparation for 380-154-34,5-22 kV S/S, Collector Systems, Primary-Secondary systems and approval of them.
- ✓ Project File (General layout, single line, road projects etc.) and calculation file (load flow analysis, 3Ph-1Ph short circuit analysis, voltage drops, grounding etc.) preparation according to regulation of Ministry of Energy namely «Project Regulation for Electrical Infrastructures».
- ✓ Project Site Control and Organization of Temporary Acceptances: Continuous site control and reporting of site activities to check to compatibility of work according to approved project, national and international standards, H&S and Environmental regulations, temporary acceptance organization according to regulation of Ministry of Energy namely Acceptance Regulation for Electrical Infrastructures.
- ✓ Performing all necessary testing and commissioning activities by the support of own team.

## ➤ INSTALLATION STAGE



- ✓ MV UNDERGROUND LINE CABLING AND TERMINATIONS
- ✓ LV ENERGY CABLE INSTALLATION
- ✓ GROUNDING CABLES
- ✓ CONTROL CABLES
- ✓ MEASUREMENT AND PROTECTION CABLES
- ✓ COMMUNICATION CABLES
- ✓ CABLE REGULATION
- ✓ JOINTING AND TERMINATIONS

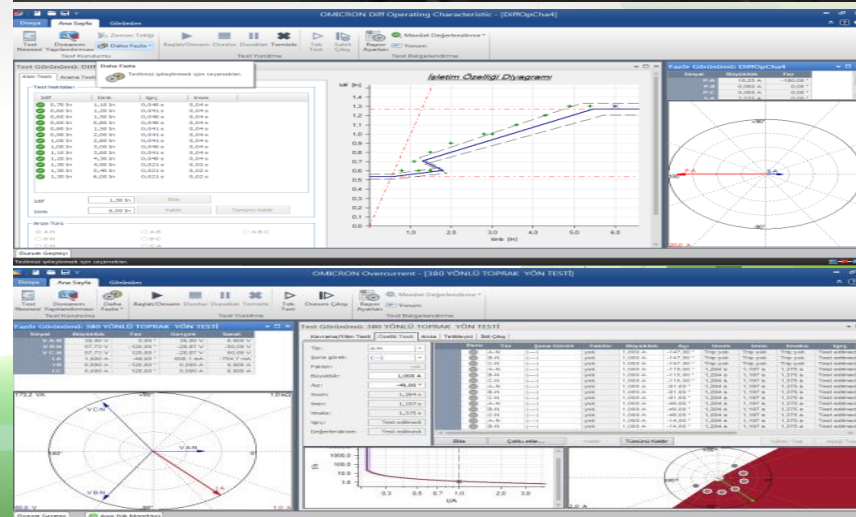
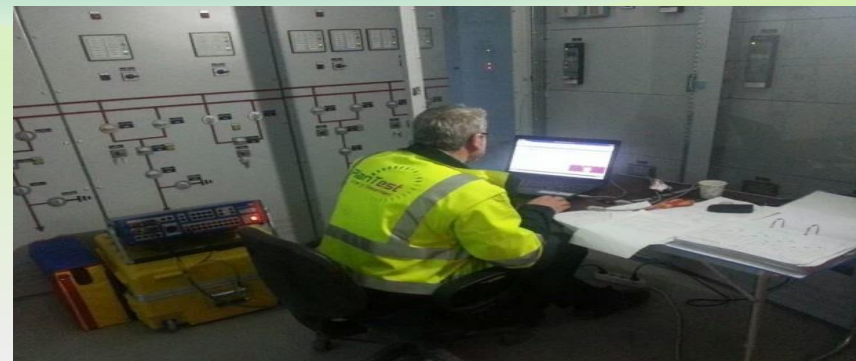
## Commissioning and Function Tests for HV Systems:

- Locking and Function tests for circuit breaker, disconnecting switch
- Transformer Own Protection Tests
- Buchholz Protection
- Thermal Protection
- Oil Level / Gas Leakage Protection
- Pressure Protection
- Forced Cooling System Control
- Insulation Tests
- Cable Hi-Pot Test
- Cable VLF test



## Measurement and Protection Device Tests:

- Distance Protection Relay Tests
- Over Current and Earth Fault Relay Tests
- Directional Overcurrent and Directional Earth Fault Relay Tests
- :Undervoltage and Overvoltage Relay Tests
- Under and Over frequency Tests
- Differential Relay Tests
- Bus bar Protection and Circuit Breaker Failure Relay Tests
- Measurement Devices and Energy Analyzer Tests
- Energy Metering Panel Tests
- Synchro-Check Relay Tests
- Relay Coordination and Short circuit calculation for transformer stations
- Transformer Simulation Tests
- Circuit Breaker Tests



## ➤ OPERATION & MAINTENANCE ACTIVITIES FOR HV SYSTEMS IN POWER PLANTS

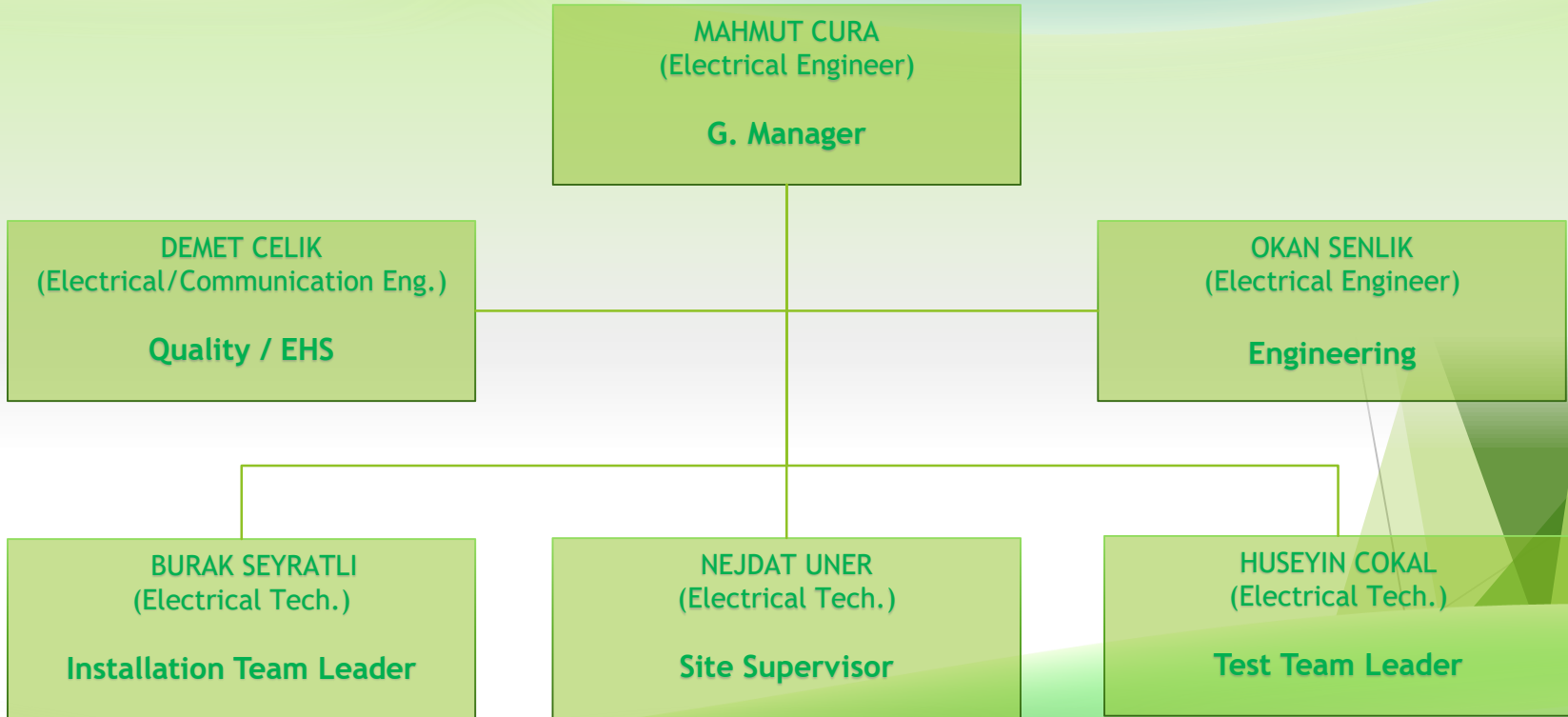
In the scope of 7/24 unlimited amendatory maintenance services, failures and breakdowns are covered along with Assessment-Analysis-Reporting services; operating of the substation is guaranteed by periodic contracts. All the test procedure of the electrical devices, included in Periodic (Preventive) Maintenance Services, are done according to Employer's requirements and IEC Standards. Supervising and Consulting works for Predictive Maintenance services include installing monitoring systems and planning the maintenance.

- Final Control-Commissioning,
- Practical training for operation team,
- Preparation of operational procedures,
- H&S Risk Analysis
- Management of spare parts,
- 7/24 continuous corrective maintenance service,
- Preventive maintenance service,
- Consulting and supervision service for predictive maintenance activities,





- ▶ All activities, which are performing under our company responsibility, is acting by our own test equipment and teams. Testing method and reporting are compatible with Turkish Electrical Transmission System Operator (TEİAŞ) Electrical Distribution Company (TEDAŞ) regulations, and IEC & IEEE standards.
- ▶ Our Company is located in Bursa which is very closed to the power plants that located in İzmir, İstanbul, Manisa, Çanakkale, Balıkesir, Yalova and Bilecik provinces so we can warrant fastest service in this region.
- ▶ We can provide fast and flexible solutions without compromising from Health and Safety & Environmental rules and international standards.



# Qualifications of the Team Members

## Mahmut CURA

(Electrical Engineer)

Official EHS Expert ( C Type)

10 Years experience in TEIAS

7 years experience in Polat Energy Renewables

4 years experience in Plan-Test Energy

## DEMET ÇELİK

(Electrical/Communication Eng.)

Official HSE Expert ( C Type)

8 years experience in Polat Energy Renewables

3 years experience in Plan-Test Energy

## BURAK SEYRATLI

(Electrical Tech.)

3 years experience in ELDIS Electric

4 years experience in Plan-Test Energy

## NEJDAT ÜNER

(Electrical Tech.)

28 years experience in TEIAS

4 years experience in Plan-Test Energy

## OKAN SENLİK

(Electrical Eng.)

1 years experience in Plan-Test Energy

## Hüseyin ÇOKAL

(Electrical Tech.)

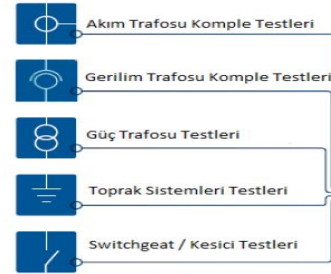
5 years experience in KESİR

3 years experience in Plan-Test Energy

## TEST EQUIPMENTS

- Omicron CPC 100
- Omicron CP CB2 Current Booster
- Omicron CP TD1 Tandelta measurement transformer
- Omicron CP CU1, current booster for grounding measurement
- Omicron CMC256 Plus Metering, Protection, Power Quality tests equipment
- Omicron CIBANO 500 Circuit Breaker Timing test equipment
- Hipotronics DC Hipot test equipment
- Hipotronics XWave cable fault location detection test equipment
- Metrel Megaohm Insulation resistance measurement test equipment
- B2 High Voltage HVA60 AC VLF Hi-Pot test equipment
- Thermal Camera ( NEC AVIO)
- FRA for power transformers (Frequency Response Analyzer)

### Omicron CPC 100



#### Current Transformer

Load, No Load Ratio Tests  
Saturation Tests  
Polarity Tests  
Winding Resistance Tests  
PF and Insulation Tests  
Excitation Current Test

#### Voltage Transformer

Load, No Load Ratio Tests  
Polarity Tests  
PF and Insulation Tests  
Excitation Current Test

#### Power Transformer

DC Winding Resistance Tests  
Bushing Insulation Tests  
TTR (Transformers Turn Ratio) Tests  
Excitation Current Test  
PF and Insulation Tests  
Transformer Insulation Oil Measurement

#### Grounding Systems

Grounding Impedance Tests for  
Transformer Stations  
Step and Touch Voltage Tests

#### Switchgear-Circuit Breaker

Switch Transresistance Tests  
PF and Insulation Tests

## TEST EQUIPMENTS

CPCC 100 Accessories: Voltage Transformer TD1, Power Transformer Insulation Oil Pot



- CP TD1 Capacitance and voltage transformer which is used together with CPC during PF tests
- Output up to 12kV
- Easy movable



- Measurement cover which is used for power transformer insulation oil capacitance and dissipation factor measurement



**NEC AVIO Thermal Camera**  
Thermal monitoring services are given by our high definition thermal cameras. These measurements which are essentials should be repeated once a year according to TEİAŞ standards. This measurement is in the scope of Electrical Maintenance activities.

## TEST EQUIPMENTS

### Hipotronics 800 PL DCDC Insulation Test Equipment



### Mertel TeraOhm 10 kV Insulation Resistance Test Equipment



- This Hipot equipment can inject voltage up to 80 kV and it is used for cable tests. It injects high voltage to cable insulations and detects leakage current.

- Insulation resistance for current transformer, voltage transformer, power transformer and cables can be measured up to 10 Tera Ohm.

### Omicron CMC 256+ Protection and Metering System Test Device



## TEST EQUIPMENTS

### Cable Fault Location Detection Device

If a failure occurs in underground cables, location of the failure can be detected by the Hipotronics XWave test equipment and our teams makes cable junction if it is needed. Xwave is the most efficient equipment to detect the fault location.



### B2 HVA 60 AC VLF Hi-pot test for XLPE Cables

It is used for cable test until 36 kV insulated underground cables and it decreases the damage possibility on the cable. During the implementation of sinus wave, it can reach to 60 kV peak. It can be reached to IEEE standard voltages.



### Medium and High Voltage Circuit Breaker Test Equipment

By using Cibano 500 both circuit breaker tests and switch trans resistance tests can be done, so it is more efficient. Test is performed computer based, so it cancels the margin of error because of user error.



## Cabling, Test and Commissioning Works for Transformer Substations:

Kargı HEPP 154 kV S/S Test and Commissioning	02.2014
Goynuk TPP 380 kV S/S Test and Commissioning	04.2014
Dursunbey 154 kV S/S Line Feeder Cabling, Test and Comm.	05.2015
Poyrazgolu WEPP 154 kV S/S Cabling, Test and Commissioning	09.2015
NM Enerji Poyraz WEPP 154 kV SS Test and Com.	04.2016
Gokdag WEPP 34,5 kV S/S Cabling, Test and Com.	03.2017
TEIAS BOLU 154/34,5 kV S/S Test and Com.	09.2017
TEIAS USAK 380/154/34,5 kV S/S Cabling, Test and Com.	12.2017
Asagi Kalekoy HEPP 380/34,5 kV S/S Test and Com.	05.2018

## Maintenance Works

Burgaz WEPP 154/34,5 kV S/S Maintenance	10.2014
Sayalar WEPP 154/34,5 kV S/S Maintenance	11.2014
Devecikonagi HEPP 154/34,5 kV S/S Maintenance	10.2017
Demircili WEPP 34,5 kV S/S Maintenance	12.2017
Kintrishi WEPP 34,5 kV S/S Maintenance	01.2018
Cataltepe WEPP 34,5 kV Step-Up Tr. Maintenance	01.2018
Sarpincik WEPP 34,5 kV S/S Maintenance	02.2018
Bandirma-3 WEPP 154/34,5 kV S/S Maintenance	05.2018



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## KALİTE YÖNETİM SİSTEMİ SERTİFİKASI

Universal GmbH  
Certification Services

Bu sertifika,

**PLAN-TEST ENERJİ SİSTEMLERİ ELEKTRİK  
MÜHENDİSLİK MEKANİK İNŞAAT SAN. TİC. LTD. ŞTİ.**

Alaaddinbey Mh. Çiftlik Cd. No:5/L Nilüfer/BURSA/TÜRKİYE  
kuruluşunun,

ENERJİ PROJELERİNE YÖNELİK MÜHENDİSLİK VE DANIŞMANLIK  
FAALİYETLERİ, KÖMÜR, PETROL VE GAZ GİBİ ENERJİ YAKITLARI  
KULLANANLAR İLE NÜKLEER, SU, GÜNEŞ, RÜZGAR VE DİĞER ENERJİ İÇİN  
SANTRALLERİ VE ENERJİ DAĞITIM HATLARINA YÖNELİK HİZMETLER  
EA Kod: 19- 34/2

kapsamında, IA2.005043 sayılı rapordaki inceleme ile

**DIN EN ISO 9001:2015**

standartının şartlarına uyan bir kalite yönetim sistemi  
kurduğunu ve uyguladığını onaylamak üzere verilmiştir.

Sertifika No : QMS 1217 005536

İlk Yayın Tarihi : 2017-12-29

Yayın / Revizyon Tarihi : 2017-12-29

Geçerlilik Tarihi : 2018-12-28

Belge Periyodu : 3 yıl (1 yıl)



*Jmbsuay*

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EA Kod: 19- 34/2

kapsamında, IA2.005043 sayılı rapordaki inceleme ile

**DIN EN ISO 14001:2015**

standartının şartlarına uyan bir çevre yönetim sistemi  
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## İŞ SAĞLIĞI VE GÜVENLİĞİ YÖNETİM SİSTEMİ SERTİFİKASI

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EA Kod: 19- 34/2

kapsamında, IA2.005043 sayılı rapordaki inceleme ile

**BS OHSAS 18001:2007**

standartının şartlarına uyan bir iş sağlığı ve güvenliği yönetim sistemi  
kurduğunu ve uyguladığını onaylamak üzere verilmiştir.

Sertifika No : HSMS 1217 005536

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Belge Periyodu : 3 yıl (1 yıl)



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**We will be happy  
to help you.**



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