	HELLENIC GAS TRANSMISSION SYSTEM OPERATOR	TECHNICAL JOB SPECIFICATION
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		REVISION 0
		DATE 05/04/2011

HIGH PRESSURE (HP) TRANSMISSION SYSTEMS

CATHODIC PROTECTION POLARIZATION PROBE AND REFERENCE ELECTRODE

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CHANGES LOG

REVISIONS LOG

0	05-04-2011	FIRST ISSUE	PQ DPT	VG
Rev. No	Rev. Date	REASON FOR CHANGE	Made By	Approved By

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1.0 SCOPE

This specification covers permanent installed polarization probes as well as reference electrodes for monitoring of the cathodic protection.

2.0 GENERAL

The polarization probe shall be with a 10 cm^2 bare steel plate and a built-in reference electrode

In the case of AC corrosion monitoring, electrical resistance ER probes shall be installed with a 1.0 cm^2 bare steel plate.

The polarization probe and/or ER probe shall be delivered with a calibration and quality assurance certificate, in accordance with **Section 3**.

The polarization probe and/or ER probe shall also be delivered with cable at least 6 m long, type J1VV-U (NYY-O) 4 x 1,5 mm^2 or of similar size.

The polarization probe and/or ER probe shall be checked by Supervision before installation.

The installation of the polarization probe shall be as per Manufacturer's recommendations.

3.0 INSTRUCTION FOR SUPERVISION OF POLARIZATION PROBE

This instruction defines the extent of test and inspection to be performed for the Cathodic Protection Systems Polarization Probes.

3.1 SCOPE OF WORK

3.1.1 GENERAL

The Inspector shall check each polarization probe according to the following test procedure, and calibrate the built-in calomel electrode with a standard laboratory reference electrode.

The Inspector shall label each polarization probe with the respective chainage in which it is to be placed.

The Inspector shall check the steel plate surface area for accordance with **Section 2**.

If one of the acceptance criteria given in the following can not be fulfilled the polarization probe shall be rejected.

Upon possible redress of faults the Inspector shall repeat the check and calibration procedure.

In case of ER probes the Inspector shall check each polarization probe according to the Manufacturer's testing procedures.

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3.1.2 CABLE TESTING

Cable connection testing to the reference electrode:

The blue and brown cable conductors shall be connected with the terminals on an ohmmeter.

- The resistance recorded shall be less than 1 ohm.

Cable connection testing to the steel plate:

Both the black conductors shall be connected to the terminals.

- The resistance recorded shall be less than 1 ohm.

Testing of the connection with the steel plate:

One of the black conductors which are connected to the terminals on the measuring instrument shall be disconnected. The free terminal shall now be connected directly with the polarization probe's steel surface.

- The resistance recorded shall be less than 1 ohm.

3.1.3 INSULATION TESTING

Testing of insulation between diaphragm and steel plate:

- The brown cable conductor shall be connected with the negative (-) terminal on a DC-voltmeter; one of the black cable conductors shall be connected with the positive (+) terminal.

- A voltage not more negative than -5 mV is allowed, corresponding to more than 100 Mohm for the insulating circle between diaphragm and steel surface. The insulating circle shall be in an absolutely dry and clean state.

3.1.3.1 COUNTER TEST

The diaphragm and the steel surface shall be simultaneously contacted with a moistured finger.

- A voltage of about -100 to -800 mV shall be found.

3.1.4 BUILT-IN REFERENCE ELECTRODE TESTING

Built-in reference electrode testing shall be executed according to Manufacturer's testing instructions.

3.2 **RESULTS**

The measured results shall be recorded on the form "Check and Calibration of Polarization Probes". A copy of this form is shown on **FIGURE 1** and an instruction for the filling-in is given in the subsequent clause.

3.3 **INSTRUCTION FOR COMPILING OF CHECK AND CALIBRATION OF POLARIZATION PROBES REPORT**

Reference is made to the numbering on **FIGURE 1**.

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Re. (1):
The polarization probe shall be labeled and identified by the chainage in which it shall be placed.

Re. (2):
The specified test results, in **para 3.1.2, 3.1.3, and 3.1.4,** shall be stated. Voltages shall be entered with polarity.

Re. (3):
If test results meet requirements, in **para 3.1.2, 3.1.3, and 3.1.4,** a "Yes" shall be entered.
Correspondingly "No" shall be entered if test results do not meet the above requirements.

Re. (4):
Receiver of document shall be marked with an "X" in the relevant square. Receivers not preprinted shall be added on the form.

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	CHECK AND CALIBRATION OF POLARIZATION PROBES

Main Project

Contract   Contract No.

Contractor   Report No.

CHAINAGE						
DATE						
CABLE TEST	TO CALOMEL ELECTRODE (Ω)					
	TO STEEL PLATE					
CABLE CONNECTION WITH STEEL PLATE (Ω)						
INSULATION TEST	INSULATING CIRCLE (mV)					
	COUNTER TEST (mV)					
REFERENCE ELECTRODE TEST (mV)						
DIAPHRAGM TEST (mV)						
DEVIATION						
REFERENCE ELECTRODE CALIBRATION (mV)						
APPROVAL YES/NO						

Remarks :

INSPECTOR :   SUPERVISOR :

DATE: DATE :

Distribution: Contractor Supervisor Superintd
                        File No.

FIG. 1

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4.0   STATIONARY REFERENCE ELECTRODE

Copper/copper sulphate electrodes, should be used in low chloride soils (<500ppm) while silver/silver chloride electrodes is recommended for high chloride content (>500ppm) environments. Each reference electrode shall be connected with 10 m cable type J1VV-U (NYY-O) 2 x 2,5 mm^2 or of similar size.

The reference electrodes shall have a minimum lifetime of 30 ~~40~~ years. The design lifetime of the electrode shall be extended at least by the specific nature and design of the membrane separating electrode element's electrolyte and soil environment as well as the electrolyte path length defined as the distance between the electrode's element and the membrane.

The reference electrode shall be engineered specifically for its intended use.

Within the specified lifetime the electrode potential must not change more than 30 mV.

The reference electrode must be effectively non-polarizing.

The reference electrode shall be located in a proprietary (appropriate special Manufacturer's) backfill mix to retain moisture and minimize migration of contaminants from the surrounding soil. The measuring cable corresponding to the reference electrode shall be connected in accordance with the relevant wiring diagrams. It shall be never directly connected to the pipeline or other metal structure.

The stability of the reference electrode must be in the order ±5mV. Its current drain must be 3µA for 1min. and 0.01 µA continuous.

The electrode shall be delivered with installation instructions and shall be approved by the Owner's Representative.

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FIGURE 2 STATIONARY REFERENCE ELECTRODE

(equivalent type of reference electrode is accepted)

Model UL – 30 year (nom.) life

Specify as EDI Model UL-xxx-yy
where xxx is element type and yy is termination type
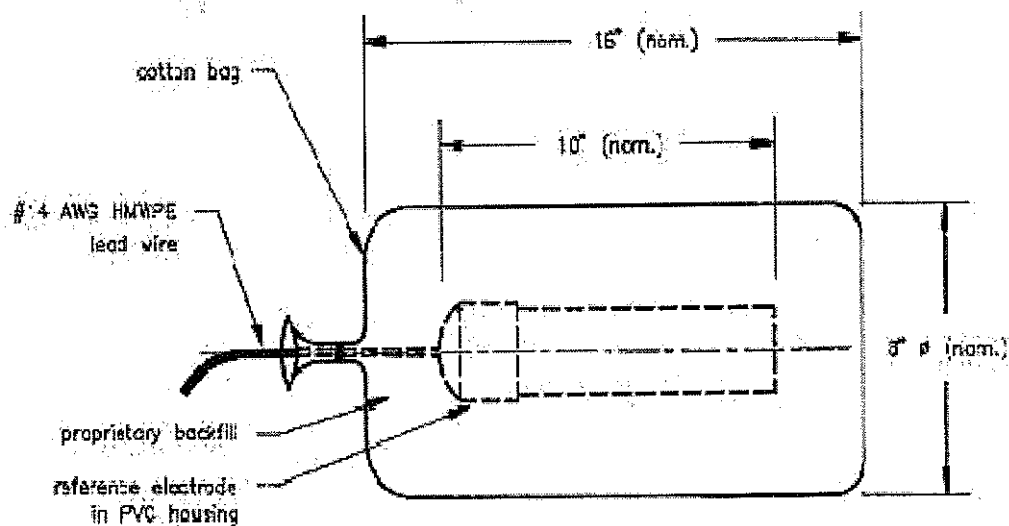
Element Types
AGG = Ag/AgCl (saturated, gelled)
CUG = Cu/CuSO4 (saturated, gelled)

Termination Types
SW = 50' #14 AWG HMWPE lead wire
LWnm = nm' #14 AWG HMWPE lead wire