PORTABLE TEMPORARY EARTHING EQUIPMENT FOR HV TRANSMISSION LINES

CONTENTS

PORTABLE TEMPORARY EARTHING EQUIPMENT FOR HV TRANSMISSION LINES

1. SUBJECT

The scope of this description is to determine the technical requirements, tests and packing instructions for the portable temporary grounding equipment for the HV transmission lines. This portable equipment is used by the technical crews prior to the performance of dead line works on HV & EHV equipment such as overhead phase conductors, for earthing purposes in order to assure the protection of the workers against unintentional dangerous situations (energizing of line, lightning etc).

2. KEY - WORDS

Portable equipment, earthing, clamp, insulating pole, overhead transmission line, 150 kV and 400 kV.

3. OPERATION CONDITIONS

3.1 Environment Conditions

The equipment shall be suitable for outdoor operation even under rain. The climatic conditions of operation and storage shall be the following:

- maximum ambient air temperature: 40 °C, with a mean value measured over a period of 24 hours which shall not exceed 35 °C.

- minimum ambient air temperature: -25 °C.

- humidity: 20% up to 96%.

3.2 Transmission System characteristics

The equipment is intended for use in 150 kV and 400 kV overhead transmission lines.

Nominal system voltage Ur	150 kV	400 kV
Highest system voltage Um	170 kV	420 kV
Frequency	50 Hz	50 Hz
Short circuit level	31 kA	40 kA
Rated impulse withstand voltage 1.2/50 μs	750 kV	1550 kV

4. STANDARDS AND SPECIFICATIONS – DEFINITIONS

4.1 Standards and specifications

4.1.1 The following standards and specifications have been taken into account in the present technical description:

- IEC Publication 1230: 1993 «Live working – Portable equipment for earthing or earthing and short-circuiting».
- IEC Publication 1235: 1993 «Live working – Insulating hollow tubes for electrical purposes».
- IEC Publication 855: 1985 «Insulating foam-filled tubes and solid rods for live working».
- IEC Publication 1138: 1994 «Cables for portable earthing and short-circuiting equipment» and its amendment 1: 1995.

4.1.2 The requirements given by the present technical description shall prevail when there is a contradiction between them and the requirements given by the standards referred in the paragraph 4.1.1. For characteristics and requirements where there is no reference in the present technical description, the characteristics and requirements of the standards referred in the paragraph 4.1.1 shall be effective.

4.2 Definitions

4.2.1 Portable temporary grounding equipment: Portable device which is connected, by means of an “insulating handling pole”, to conductive parts of electric installations for earthing purposes.

4.2.2 Earthing cable: Cable for connecting electrically the conductive parts of electric installations with the earthing system.

4.2.3 Earth clamp: Clamp which is permanently attached to the “earthing cable”, either directly or through connecting links such as cable lugs and is used for the temporary electrical connection of the “earthing cable” either with grounded components or with the earthing system of the electrical installations.

4.2.4 Line clamp: clamp which is permanently attached to the “earthing cable”, either directly or through connecting links such as cable lugs and is used for the temporary electrical connection of the “earthing cable” with conductive parts of electric installations.

4.2.5 Insulating handling pole: Insulating pole which is used for the handling of the portable temporary grounding equipment.

4.2.6 Hand-guard: Physical guard which separates the insulating handling pole in two sections. Its scope is to prevent the slipping of the hands of the operator to the section which is near the conductive parts of the electrical installation.

4.2.7 Rated current I_r και rated time t_r: Values assigned to the temporary grounding equipment or part of it in order to define the highest r.m.s. value of the current and the highest Joule-integral ($I_r^2 \cdot t_r$) that the equipment can resist without any unacceptable effects. These values apply only to those parts of the equipment designed to withstand short-circuiting current.

4.2.8 Peak current I_m: Peak value of the highest current during the transient period following the initial energizing of the electrical installation.

5. DESCRIPTION

5.1 Grounding equipment

The grounding equipment shall consist of the following components:

5.1.1 One (1) **line clamp** made of high strength Al or Bronze alloy, to be fitted on overhead conductors or cylindrical bus bars. It shall have the following clamping capacity:

- **Ø 15-35 mm** for overhead line conductors (transmission line)

The clamp shall be strong enough to resist without any permanent deformation to the action of tightening force applied by the operator during their installation on the conductors above specified.

The clamp shall be of screwed type suitable to be quickly and firmly secured on the line conductors as well as to be easily removed afterwards, without producing damages on them. It shall be provided with a trapezoidal threaded screw. An elastic system such as spring shall be interposed in the clamping system to improve efficiency and to insure a higher withstand in case of electrodynamic shock.

The lower end of the line clamps for overhead lines shall be provided with an eye configuration for the temporary adaptation to the insulating pole. The lower end of the line clamps for substation conductors/bus-bars shall be provided with a bayonet tang with flexible rubber guide-bell for the temporary adaptation to the insulating pole.

5.1.2 One (1) **earthing cable**, made of extra flexible multistrand copper conductor 120 mm^2 with transparent insulation according to IEC 1138: 1994 and its amendment 1: 1995 and the following lengths:

- 4m for 150 kV transmission line earthing
- 6m for 400 kV transmission line earthing

The earthing cable ends shall be permanently connected with the line clamp and the earth clamp trough suitable connecting links such as cable lugs.

5.1.3 One (1) **earth clamp** made of high strength Al or Bronze alloy, to be fitted on towers and angle bars.

The clamp shall be strong enough to resist without any permanent deformation to the action of tightening force applied by the operator during its installation on a tower or on a substation structure.

The clamp shall be of screwed type suitable to be quickly and firmly secured on galvanized steel angles as well as to be easily removed afterwards, without any permanent deformation. The thread system shall operate together with a spring system to prevent loosing and to absorb the electrodynamic shock in case of fault current.

5.2 Insulating handling pole

The pole for the handling of the temporary grounding equipment shall be a insulating foam filled pole according to IEC 855: 1985, with total length of 6m, divided in 3 pieces of 2m each with the following external diameter values:

- upper (head) insulating pole: 32mm (± 1mm)
- intermediate insulating pole : 39mm (± 1.1mm)
- lower (base) insulating pole : 39mm (± 1.1mm)

5.2.1 The upper endpiece of the head-insulating pole shall be a screw type metallic connector, suitable for connection with a hook end fitting for handling and tightening line clamp. The lower endpiece shall also be a screw type metallic connector, suitable for connection with the intermediate-insulating pole.

5.2.2 Both upper and lower endpieces of the intermediate-insulating pole shall be screw type metallic connectors, suitable for connection with the head-insulating pole and with the base-insulating pole respectively.

5.2.3 The upper endpiece of the base-insulating pole shall be a screw type metallic connector, suitable for connection with the head-insulating pole and also with the intermediate-insulating pole. The pole shall be provided with a safety hand-guard (flange disc) made of high resistant synthetic material at a distance of 1.5m from its lower end. An insulating cap made of resistant rubber shall be provided at the lower end for the protection of the pole against friction or shocks onto the ground.

5.3 End fitting for the handling and tightening the line clamp

The upper endpiece of the fitting shall be a hook shaped steel socket. The lower endpiece of the fitting shall be a screw type metallic connector, suitable for connection with the head-insulating pole.

5.4 The rated current I_r and the rated time t_r of the equipment shall be 40kA and 0.5s respectively.

5.5 The equipment shall belong to the normal climatic class (N) according to paragraph 5.1 of IEC 1230: 1993. Therefore it shall be suitable for working conditions with temperature values from –25 °C to +55 °C.

5.6 The total mass of one set of temporary grounding equipment including the insulating pole inside their cases shall not exceed 22kg.

5.7 All the components of the equipment shall be strong enough to resist to heavy conditions of outdoor use. Especially the materials used for the manufacture of the screwed parts of the pole or clamps shall provide excellent strength to strains during handling and tightening/untightening operations.

5.8 The electrical connections of the earthing cable with both line and earth clamps shall be in accordance with IEC 1230: 1993 par. 5.4 requirements. Therefore soldered connections shall not be allowed. If the primary attachment is made to intermediate parts such as cable lugs, the next connection shall be protected against unintentional loosening. Single screws or nuts, if used, shall always be combined with a device, for instance lock washers, that positively prevent slippage or rotation.

6. TESTS

6.1 Type tests

The type tests shall be carried out at the beginning of the execution of a contract and it is possible to be repeated whenever needed by ADMIE during the execution of the contract.

At ADMIE's discretion there is the possibility of acceptance of type test certificates concerning temporary grounding equipment of the same type, quality, rated current (I_r) and rated time (t_r) issued by PPC's own laboratories (KDEP) or by any other recognized laboratories. These certificates are to be necessarily submitted by the supplier together with his technical proposal. In any event ADMIE reserves the right to verify at its own laboratories by appropriate tests whichever or/and all test certificates.

The type tests are the following:

6.1.1 Fatigue tests on cable with end-fittings

The test shall be performed according to paragraph 6.2 του IEC 1230: 1993.

6.1.2 Humidity penetration test on devices with copper cables

The test shall be performed according to paragraph 6.3 του IEC 1230: 1993.

6.1.3 Pull test on cable with clamps

The test shall be performed according to paragraph 6.4 του IEC 1230: 1993.

6.1.4 Test on clamps and connections within devices with respect to ability to withstand connecting forces

The test shall be performed according to paragraph 6.5 του IEC 1230: 1993.

6.1.5 Short-circuit current test

The test shall be performed according to paragraph 6.6 του IEC 1230: 1993. The test shall be performed with the test current 40kA and test time 0.5s on conductors ACSR 954MCM (∅30.42mm) or equivalent diameter, for earthing equipment sample with 6m cable.

6.1.6 Testing durability of marking

The test shall be performed according to paragraph 6.7 of IEC 1230: 1993.

6.1.7 Visual inspection and dimensional check of insulating pole

The test shall be performed according to paragraph 6 of IEC 855: 1985 or paragraph 8 of IEC 1235: 1993.

6.1.8 Dielectric tests of insulating pole

The test shall be performed according to paragraphs 8.1 and 8.2 of IEC 855: 1985 or paragraphs 9.1 and 9.2 of IEC 1235: 1993.

6.1.9 Mechanical tests of insulating pole

The test shall be performed according to paragraphs 9.1 and 9.2 of IEC 855: 1985 or paragraphs 10.1 and 10.2 of IEC 1235: 1993.

6.1.10 Mechanical ageing test of insulating pole

The test shall be performed according to paragraph 10 του IEC 855: 1985 or paragraph 11 of IEC 1235: 1993.

6.1.11 Dye penetration test on insulating pole

The test shall be performed according to paragraph 7 of IEC 855: 1985.

6.1.12 Test on earthing cable

The test shall be performed according to IEC 1138: 1994 and its Amendment 1: 1995 according to insulation material used (Tables 3 or 4 of the above IEC).

6.2 **Sample tests**

A sample shall be taken in random from each lot ready for delivery and shall be subjected to the tests, which are reported bellow, in accordance with the paragraph 6.1.2 of IEC 1230: 1993 (unless is otherwise mentioned).

6.2.1 Check of technical features, marking and packing

The conformity or declination from the requirements of the technical description concerning the technical features, the marking and the packing are to be checked according to paragraphs 5, 7 and 8 of the present technical description.

6.2.2 Fatigue test on cable with end-fittings

The test shall be performed according to paragraph 6.1.1 of the present technical description.

6.2.3 Humidity penetration test on devices with copper cables

The test shall be performed according to paragraph 6.1.2 of the present technical description.

6.2.4 Pull test on cable with clamps

The test shall be performed according to paragraph 6.1.3 of the present technical description.

6.2.5 Testing durability of marking

The test shall be performed according to paragraph 6.1.6 of the present technical description.

6.2.6 Test on clamps and connections within devices with respect to ability to withstand connecting forces

The test shall be performed according to paragraph 6.1.4 of the present technical description.

6.2.7 Bending test of insulating pole

The test shall be performed according to paragraphs C1 και C2 of Annex C of IEC 1230: 1993.

6.2.8 Testing durability of marking of insulating pole

The test shall be performed according to paragraph C4 of Annex C of IEC 1230: 1993.

6.2.9 Metallographic tests

These tests shall be carried out on all metallic components (e.g. line clamps, earth clamps) of the specimens of the sample. No casting defect shall be accepted.

6.3 **Routine tests**

These tests shall be carried out at the manufacturer's works during production procedures of the earthing equipment, the results shall be analytically registered in protocols and shall be evaluated by ADMIE's inspector.

6.3.1 Routine tests on temporary grounding device

The tests numbered 1, 2, 3, 9, 11, 12, 13 and 15 of Table 3 of IEC 1230: 1993 shall be performed.

6.3.2 Routine tests on insulating pole

The tests of paragraph 11 of IEC 855: 1985 or paragraph 12 of IEC 1235: 1993 shall be performed.

7. NAMEPLATES – MARKING

The marking of the equipment (line and earth clamps, earthing cable, insulating pole) shall be in accordance with the requirements of paragraph 5.8 of IEC 1230: 1993.

8. PACKING

8.1 All the components of each equipment with the exception of the insulating pole shall be fully enclosed in a permanent metallic case.
The case shall bear a strong and adequate hand-grip for transportation purpose. It shall be of extremely high strength to resist to the heavy conditions of transportation and handling.
All the external and internal surfaces of the case shall be painted after an adequate treatment against corrosion.
On the external surface of the cover shall be indelibly and legibly marked the following data:

- surname or trade mark of the manufacturer/ year of manufacture/ contract number
- «ΣΥΣΚΕΥΗ ΤΕΧΝΗΤΗΣ ΓΕΙΩΣΗΣ ΕΝΑΕΡΙΩΝ Γ.Μ. 66/150kV» (in Greek language for 66/150kV transmission line earthing equipment) or
- «ΣΥΣΚΕΥΗ ΤΕΧΝΗΤΗΣ ΓΕΙΩΣΗΣ ΕΝΑΕΡΙΩΝ Γ.Μ. 400kV» (in Greek language for 400kV transmission line earthing equipment).

8.2 Each case shall have closed inside instructions for use and maintenance of the equipment placed inside as well as of the insulating pole which is packed in a separate case. It is preferable the instructions to be indelibly marked on a label glued on the internal surface of the case cover. Alternatively, the instructions should be in form of a leaflet inside of a waterproof envelope fixed on the internal surface of the case cover.
The instructions for use and maintenance shall be in accordance with the requirements of paragraph 5.9 of IEC 1230: 1993 and they shall be written in greek language.

8.3 The insulating pole together with the end fitting for line clamp handling shall be packed in an individual waterproof case made of extra resistant canvas. The case

shall bear a strong and adequate handgrip as well as a shoulder strap for transportation. Inside the case special sub-cases shall be provided. Each one section of the insulator pole shall be placed and secured in an individual sub-case.
On the external surface of the case shall be indelibly and legibly marked the following data:

- surname or trade mark of the manufacturer/ year of manufacture/ contract number
- «ΜΟΝΩΤΙΚΟ ΑΚΟΝΤΙΟ ΧΕΙΡΙΣΜΟΥ ΣΥΣΚΕΥΗΣ ΤΕΧΝΗΤΗΣ ΓΕΙΩΣΗΣ ΕΝΑΕΡΙΩΝ Γ.Μ.» (in Greek language for transmission line earthing equipment).

8.4 Upon receipt all the components of the temporary grounding equipment (earthing devices and insulating poles in their cases) shall be delivered in wooden frame-boxes of adequate strength and safety for transportation and stacking conditions up to 2.5m height.
On two opposite sides of each frame-box shall be indelibly and legibly marked the following data:

- surname or trade mark of the manufacturer/ year of manufacture/ contract number
- «ΣΥΣΚΕΥΗ ΤΕΧΝΗΤΗΣ ΓΕΙΩΣΗΣ ΕΝΑΕΡΙΩΝ Γ.Μ. 66/150kV» (in Greek language) or
- «ΣΥΣΚΕΥΗ ΤΕΧΝΗΤΗΣ ΓΕΙΩΣΗΣ ΕΝΑΕΡΙΩΝ Γ.Μ. 400kV» (in Greek language) or
- «ΜΟΝΩΤΙΚΟ ΑΚΟΝΤΙΟ ΧΕΙΡΙΣΜΟΥ ΣΥΣΚΕΥΗΣ ΤΕΧΝΗΤΗΣ ΓΕΙΩΣΗΣ ΕΝΑΕΡΙΩΝ Γ.Μ.» (in Greek language)
- gross mass of frame-box.

9. ANNEXES

9.1 ANNEX 1

List of data for data processing of the specification.

9.2 ANNEX 2

Data which shall be submitted together with the offer.

9.3 ANNEX 3

Questionnaire

9.4 ANNEX 4

Evaluation of Bidder regarding his qualitative reliability.

ANNEX 1
(paragr. 9.1of T.D. ΔΣΣΜ/ΑΣΦ-1/rev. NOE. 2003)

Computerized data catalog of Technical Description

1. Basic technical characteristics

1.1 Temporary earthing of HV Transmission Lines

1.2 Rated current I_r = 40 kA and rated time t_r = 0.5 s

1.3 Transmission system rated voltage and frequency: 150 & 400 kV, 50 Hz

1.4 Ambient air temperature: - 25 ^oC up to +55 ^oC

2. Main regulations

- IEC 1230: 1993
- IEC 855 : 1985
- IEC 1235: 1993
- IEC 1138: 1994 and its Annex 1: 1995

3. Tests List

3.1 Type tests

3.1.1 Fatigue tests on cable with end-fittings
3.1.2 Humidity penetration test on devices with copper cables
3.1.3 Pull test on cable with clamps
3.1.4 Test on clamps and connections within devices with respect to ability to withstand connecting forces
3.1.5 Short-circuit current test
3.1.6 Testing durability of marking
3.1.7 Visual inspection and dimensional check of insulating pole
3.1.8 Dielectric tests of insulating pole
3.1.9 Mechanical tests of insulating pole
3.1.10 Mechanical ageing test of insulating pole
3.1.11 Dye penetration test on insulating pole
3.1.12 Test on earthing cable

3.2 Sample tests

3.2.1 Check of technical features, marking and packing
3.2.2 Fatigue test on cable with end-fittings
3.2.3 Humidity penetration test on devices with copper cables
3.2.4 Pull test on cable with clamps
3.2.5 Testing durability of marking
3.2.6 Test on clamps and connections within devices with respect to ability to withstand connecting forces

3.2.7 Bending test of insulating pole
3.2.8 Testing durability of marking of insulating pole
3.2.9 Metallographic tests

3.3 Routine tests

3.3.1 Routine tests on temporary grounding device
3.3.2 Routine tests on insulating pole

ANNEX 2
(paragraph 9.2 of T.D. ΔΣΣΜ/ΑΣΦ-1/rev. NOE. 2003)

Data to be submit with the offer

The offers of the companies that participate in the call for tenders for the purchasing of temporary grounding equipment for HV Transmission Lines shall include the following data, otherwise they shall not be taken into account:

1. Declaration that the offered equipment meets the requirements of the present technical description and the requirements of the international standards of paragraph 4.1.1, as far as it concerns the equipment itself as well as its insulating handling pole.
   In case of discrepancies, these shall be accurately determined and justified.
   It is at ADMIE's discretion to accept these discrepancies after their evaluation.

2. Illustrated technical brochure of the offered equipment

3. Distinct, detailed drawings for each part of the offered equipment (e.g. line clamp, earth clamp, end fitting for line clamp handling, pole parts, transporting case etc) where its name, its material and its basic dimensions are written.

4. Instructions of use and maintenance of the offered equipment (as far as it concerns the equipment itself as well as its insulating handling pole) according to the requirements of IEC 1230: 1993, written in Greek or English language.

5. Annex 3 fully and explicitly fulfilled.

6. Sample of the offered equipment within its case.

ANNEX 3
(paragraph 9.3 of T.D ΔΣΣΜ/ΑΣΦ-1/rev.1 NOE 2003)

QUESTIONNAIRE

	Requested information	**Unit**	**Answer**
1.	**Type of equipment**		
	- Line clamp for Transmission Lines conductors		
	- Earth clamp		
	- Earth cable with terminals		
	- End fitting for handling line clamps		
	- Insulating handling pole		
2.	Is the equipment in accordance to IEC 1230: 1993	(Yes/No)	
3.	**Line clamps**:		
3.1.	Which is the alloy (Al or Bronze) of which clamps are made		
3.2	Clamping capacity for Transmission Lines conductors	mm	**-**
3.3.	The tightening of clamps to the conductors is achieved through screw system with trapezoidal threaded screw?	(Yes/No)	
	Is it provided with a spring system?	(Yes/No)	
3.4	The line clamps for Transmission Lines are provided with an eye configuration at their lower end for their temporary connection with the hook end fitting of the insulating pole?	(Yes/No)	
3.5	Required torque for tightening the line clamps for Transmission Lines	Nm	
4.	**Earth cables – Connecting fittings**:		
4.1	Are the cables of the offered equipment in accordance with IEC 1138: 1994 and its Annex 1: 1995?	(Yes/No)	
4.2	Kind of earth cables		
4.3	Length of earth cable:		
	- for grounding conductors of Transmission Lines 150kV	m	

	- for grounding conductors of Transmission Lines 400kV	m	
4.4	Cross section of earth cable	mm^2	
4.5	Is the cable sheath of cable transparent?	(Yes/No)	
4.6	Is the insulation's material in accordance with IEC 1138: 1994 and its Annex 1: 1995?	(Yes/No)	
4.7	Way of connection between cable and line and earth clamps (e.g. terminals, screws, nuts, nonslip washers)		
4.8	Material of the connecting fittings (terminals)		
4.9	Material of the insulating sleeves of the connecting fittings (terminals)		
5.	**Earth clamp**:		
5.1	Which is the alloy (Al or Bronze) of which clamp is made		
5.2	Required torque for tightening the earth cable clamp	Nm	
5.3	Is the earth clamp suitable for hot dip galvanized steel angles ?	(Yes/No)	
5.4	Is the tightening of the clamps to the galvanized steel angles achieved through a thread system?	(Yes/No)	
	Is the thread system provided with a spring system?	(Yes/No)	
5.5	Clamping capacity	mm	-
6.	**Insulating pole of earthing equipment:**		
6.1	Is the insulating pole manufactured in accordance with IEC 855: 1985?	(Yes/No)	
	Material of the insulating parts of the pole		
	Filling material of the insulating parts of the pole		
6.2	The insulating pole consists of:		
6.2.1	***One (1) head insulating pole:***	(Yes/No)	
6.2.1.1	Length of the head pole	mm	
6.2.1.2	Cross section of the head pole	mm	

6.2.1.3	Is the upper end of the head pole provided with screw type connector suitable for connection with a hook end fitting for handling and tightening line clamp?	(Yes/No)	
6.2.1.4	Is the upper end of the head pole provided with a screw type connector suitable for connection with the intermediate-insulating pole?	(Yes/No)	
6.2.2	***One (1) intermediate insulating pole***		
6.2.2.1	Length of intermediate pole	mm	
6.2.2.2	Cross section of the intermediate pole	mm	
6.2.2.3	Is the intermediate pole provided at both ends with screw type connectors suitable for connection at both head and base poles?	(Yes/No)	
6.2.3	***One (1) base insulating pole***		
6.2.3.1	Length of base pole	mm	
6.2.3.2	Cross section of the base pole	mm	
6.2.3.3	Is the upper end of the base pole provided with a screw type connector suitable for connection with the intermediate or head-insulating pole?	(Yes/No)	
6.2.3.4	Is the base pole provided with a safety hand-guard?	(Yes/No)	
6.2.3.5	Which material is the safety hand-guard made of?		
6.2.3.6	Is the lower end of the base pole provided with resistance rubber for the protection of the pole against friction or shocks onto the ground?	(Yes/No)	
6.2.3.7	Which material is the insulating cap made of?		
6.3	Which material are the screw connectors of the poles made of?		
7.	*End fitting for handling and tightening of the line clamp*		
7.1	Is the upper end of the fitting provided with a hook suitable for handling and tightening clamps for Transmission Lines conductors?	(Yes/No)	
	Which material is the hook made of?		
7.2	Is the lower end provided with screw type connector for connection with the head-insulating pole?	(Yes/No)	
	Which material is the connector made of?		
8.	Does the equipment belong to the normal climatic class (N) according to IEC 1230: 1993?	(Yes/No)	

9.	The equipment is suitable for the following ambient conditions: - Temperature - Humidity	 ^{O}C %	
10.	**Mass**		
10.1	Mass of line clamp for Transmission Lines conductors	kg	
10.2	Mass of earth clamp	kg	
10.3	Mass of fitting for handling and tightening the line clamp for Transmission Lines conductors	kg	
10.4	Mass of complete insulating pole	kg	
10.5	Mass of earth cable with the terminals	kg	
11.	*Marking*		
11.1	Which is the marking of line clamps for Transmission Lines conductors?		
11.2	Which is the marking of earth cable?		
11.3	Which is the marking of the fitting for handling and tightening line clamps for Transmission Lines conductors?		
11.4	Which is the marking of the insulating pole:		
11.4.1	Marking of head pole		
11.4.2	Marking of intermediate pole		
11.4.3	Marking of base pole		
12.	**Packing:**		
12.1	Are all the components of each equipment (except the insulating pole) fully enclosed in a permanent metallic case?	(Yes/No)	
12.2	Which material is the metallic case made of?		
12.3	Which is the mass of the metallic case?	kg	
12.4	Is the case provided with a strong and adequate hand-grip for transportation?	(Yes/No)	
12.5	Which material is the hand-grid made of?		
12.6	Which type of anticorrosion protection is applied to the surfaces of the metallic case?		
12.7	Is the marking of each metallic case indelible?	(Yes/No)	

12.8	Which is the marking of each metallic case: - for 66/150 kV transmission line earthing equipment? - for 400kV transmission line earthing equipment?		
12.9	Are the use and maintenance instructions in accordance with IEC 1230: 1993?	(Yes/No)	
12.10	Are the use and maintenance instructions indelibly marked on a label glued to the internal surface of the case cover?	(Yes/No)	
12.11	Are the use and maintenance instructions in form of a leaflet inside a waterproof envelope fixed on the internal surface of the case cover?	(Yes/No)	
12.12	Are the use and maintenance instructions, upon receipt, written in Greek language?	(Yes/No)	
12.13	Is the insulating pole together with line clamp handling fitting packed in an individual waterproof bag?	(Yes/No)	
12.14	Which material is the waterproof bag made of?		
12.15	Is the waterproof bag divided to sub-bags for each part of the insulating pole?	(Yes/No)	
12.16	Is the waterproof bag provided with: - hand-grip? - shoulder trap for transportation?	 (Yes/No) (Yes/No)	
12.17	Is the marking of each waterproof bag indelible?	(Yes/No)	
12.18	Which is the marking of each waterproof bag for insulating pole for transmission line earthing equipment?		
12.19	Are the equipment together with the insulating poles provided, upon receipt, packed in frame-boxes of adequate strength and safety for transportation and staking up to 2.5m height?	(Yes/No)	
12.20	Which is the marking of each packing frame-box?		

ANNEX 4

(paragraph 9.4 of T.D. ΔΣΣΜ/ΑΣΦ-1/rev. NOE. 2003)

Evaluation of the Bidder regarding his qualitative reliability

In order to assure the tender, the high experience of the Bidder in the manufacture of the offered equipment shall be definitely proved.

For this reason, the Bidder is obliged to submit, attached to this Bid, type tests certificates for equipment of the same type, quality, rated current and rated time (I_r, t_r) as the offered ones, issued by PPC laboratories (KDEP) or any other recognized laboratories. The Certificates shall concern the tests which are mentioned in paragraph 6.1 of the present description.

The high experience of the Bidder in the manufacture of the offered material shall be deemed that have been met if, additionally, one of the conditions mentioned below is satisfied:

1. The manufacturer firm has certification of Quality according to ISO 9001 or 9002 containing the offered equipment.
2. The manufacturer firm can provide from another user references of proved, long satisfactory operation for equipment of the same type and quality as the offered ones.