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TECHNICAL SPECIFICATION

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HIGH PRESSURE (HP) TRANSMISSION SYSTEMS

MARKER AND MEASURING POSTS

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1. INTRODUCTION

The installation of the Cathodic Protection System will be following this specification, the Study of the Cathodic Protection System, which shall be carried out by EPC Contractor during the detail engineering phase, the Standard drawings for Cathodic Protection System, as well as the applicable codes and standards referred to in paragraph 3.2 here in.

2. SCOPE AND OBJECTIVES

This specification covers the minimum requirements for the design, fabrication, certification and supply of the Marker and Measuring posts. Marker posts shall be installed complete with text plate for marking the route of natural gas of pipelines. Also, Measuring posts for measuring and control of the cathodic protection of natural gas pipelines. Measuring posts are also used as Marker posts.

3. REFERENCES

3.1. Reference Documents

DSF-SPC-CPR-001: Cathodic Protection Anode Material.

DSF-SPC-CPR-002: Cathodic Protection Transformer Rectifier Cabinets at Anode Beds.

DSF-SPC-CPR-003: Cathodic Protection Polarization Probe, Reference Electrode and ER Coupon.

DSF-SPC-CPR-004: Electrical Resistance Welding "Pin Brazing".

DSF-SPC-CPR-005: Installation of Cathodic Protection System.

DSF-SPC-CPR-006: Cathodic Protection Commissioning and Start-up.

DSF-SPC-CPR-008: Precautions Against Proximity Effects during the Construction Phase.

STD-00-78-01: Cathodic Protection for Pipelines - Transformer Rectifier Cabinet.

STD-3-78-02: Cathodic Protection for Pipelines - Installation of Transformer / Rectifier Cabinet.

STD-00-78-04: Cathodic Protection for Pipelines - Location of Reference Electrode.

STD-00-78-05: Cathodic Protection for Pipelines - Anode Bed Installation for Impressed Current Horizontal Anodes.

STD-00-78-06: Cathodic Protection for Pipelines - Anode Bed Installation for Impressed Current Vertical Anodes.

STD-00-78-07: Cathodic Protection for Pipelines - Anode Bed Installation for Sacrificial Anodes.

STD-00-78-15: Cathodic Protection for Pipelines - Measuring Posts K3S.

STD-00-78-16: Cathodic Protection for Pipelines - Measuring Posts K3J, K3G / A & B.

STD-00-78-18: Cathodic Protection for Pipelines - Measuring Posts K4J, K4G / A & B.

STD-00-78-29: Cathodic Protection for Pipelines - Cable Laying in Casing Pipe.

3.2 Reference Codes and Standards

EN 12068: Cathodic Protection, External organic coatings for the corrosion protection of buried or immersed steel pipelines used in conjunction with cathodic protection, tapes and shrinkable materials

EN 12954: General principles of cathodic protection of buried or immersed onshore metallic structures.

ISO 15589-1: Petroleum, petrochemical and natural gas industries — Cathodic protection of pipeline systems — Part 1: On-land pipelines.

ELOT EN 13509: Cathodic Protection Measurements Techniques.

EN ISO 18086: Corrosion of metals and alloys - Determination of AC corrosion - Protection criteria.

ELOT EN 50122: Railway applications - Fixed installations - Electrical safety, earthing and bonding.

ISO 21857: Petroleum, petrochemical and natural gas industries — Prevention of corrosion on pipeline systems influenced by stray currents.

EN 50443: Effects of electromagnetic interference on pipelines caused by high voltage A.C. electric traction systems and / or high voltage A.C. power supply systems.

AfK Recommendation No. 3: Measures for the installation and operation of pipelines in the vicinity of three-phase high voltage systems and single line traction systems.

ISO 15589-1: Petroleum & Natural Gas Industries – Cathodic Protection of Pipeline Transportation Systems. On-land Pipelines.

IEC 60502-1: Power Cables with extruded insulation and their accessories – Cables for rated voltages of 1KV.

4. ACRONYMS

CP	Cathodic Protection.
EN	European Norms.
ELOT	Hellenic Organization for Standardization.
NG	Natural Gas
T/R	Transformer Rectifier

5. MARKER POSTS - SPECIFIC REQUIRENENTS

5.1 Material

The Marker post consists of a hot deep galvanized steel pole with an orange (RAL 2000) polycarbonate top to be used as an aerial marker as shown in figure 2.

Material shall maintain its properties being exposed to sun's radiation, frost, humidity, marine environment and temperature variations between -20ºC and +60ºC. Material shall be frost resistant and shall withstand crushing strength of the frozen soil.

5.2 Text Plate

The Marker posts shall be prepared for mounting of an orange (RAL 2000) background text plate, as shown in Figure 3.

The plate shall be permanently fixed to the post so that no unauthorized personnel can move or change the orientation of the plate in respect with the pipeline's direction.

Text plates shall have provisions for inserting Owner's Telephone Number, Km position indication on the field and position of cable/pipe connections also with distance of pipeline axis in accordance with DIN 4065.

Insertion method must secure durability and changeability in the future.

The top of the post (aerial marker) must also indicate a 40 m zone for safety purposes as it is shown in Figure 1.

For Marker Post the indication M shall be shown at the left side of the first row.

5.3 Dimensions

Total height of the post over the ground level shall be 1,60 m from the ground (see Figure 2).

Cross section of the post shall be sized so that the post can bear a horizontal load of 50 kg at its top.

The projected surface of the top head (aerial marker) of the post shall be sized so that the post can be identified from 1000 m away, from all directions (proposed approximately dimension 250 mm x 350 mm from each side) as it is shown in Figure 2.

Figure 1: Aerial Marker Sign

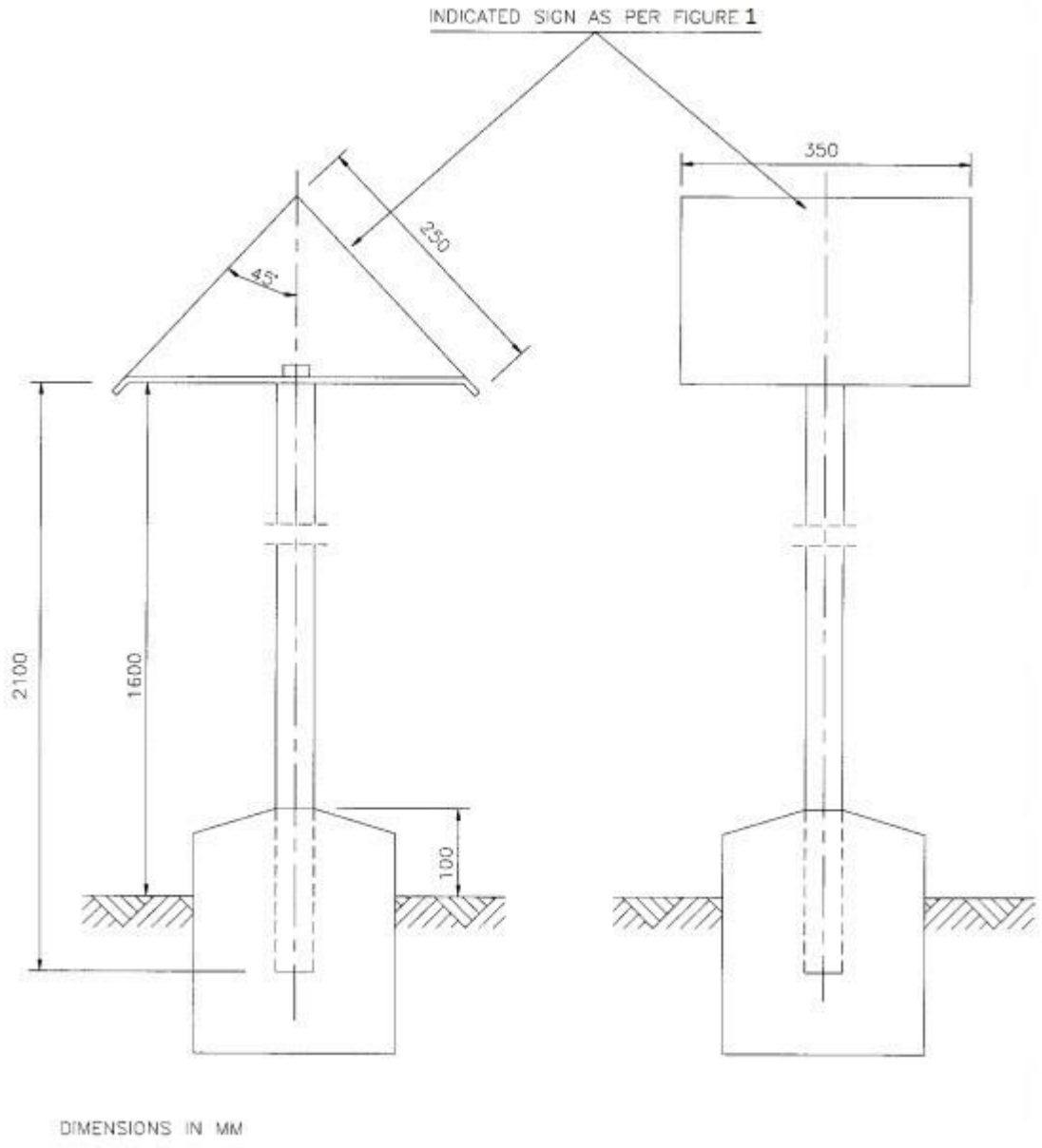


Figure 3: Text Plate for Marker Posts

6. MEASURING POSTS - SPECIFIC REQUIRENENTS

6.1 Material

The Measuring Posts consists of a hot deep galvanized steel pole with an orange (RAL 2000) polycarbonate top to be used as an aerial marker as shown in figure 2.

Material will maintain its properties being exposed to sun's radiation, frost, humidity, marine environment and temperature variations between -20ºC and +60ºC. Material shall be frost resistant and shall withstand crushing strength of the frozen soil.

Measuring posts will be equipped with polycarbonate, or Polyesteric, or Aluminum Alloy (color grey RAL 7035) box of protection grade IP 54, housing for the terminal board.

The post shall be sized in order to withstand a horizontal load of 50kg at the top.

An indication plate (text plate) with information about the pipeline, the Owner, emergency telephones and the location of the pipeline in accordance with the position of the post shall also be installed on the post.

The height of the pole shall be 1,60m of the ground.

Furthermore, for the K1G, K3G and K4G types of measuring posts a special plastic cabinet shall be mounted on the post. The cabinet shall be adequately sized in order an AC mitigation device to be installed and shall have the required openings for the correct ventilation of the equipment.

6.2 Terminal Board's Housing

Terminal boards housing shall have enough space for convenient measurements and easy maintenance. The housing must satisfy protection IP 54 against water, dust and impact energy.

Terminal board's housing shall be supplied with a triangular head lock screw common for all posts.

Also, the housing shall be equipped with support for terminal board predrilled and mounted with threaded plugs ready for mounting of terminal board.

The housing shall have provision for mounting of a surge arrester, cylindrical shape, approx.

Dimensions 1=120mm, d=50mm, weight=0,5 kg and flexible copper connections of 50 mm^2 to the terminal board.

6.3 Terminal Board

The board shall be 4mm clear polycarbonate, predrilled and suitable to fit to the post according to the above.

Each board shall be equipped with brass screws with washers and nuts, ready for mounting on the support, in the post.

Metering Jacks shall have color indication in accordance with the required types of measuring posts, in accordance with relevant Standard Drawings and Appendix 1.

The board shall be marked with the terminal numbers as it is also indicated in the relevant Standard Drawings and Appendix 1.

The terminals to be used in the metering jacks mounted on the terminal board with star lock washers, is shown in Figure 4.

Cable clamps shall be supplied with Ø4mm brass screws with star lock washers and nuts for connection to the terminal board.

6.4 Text Plate

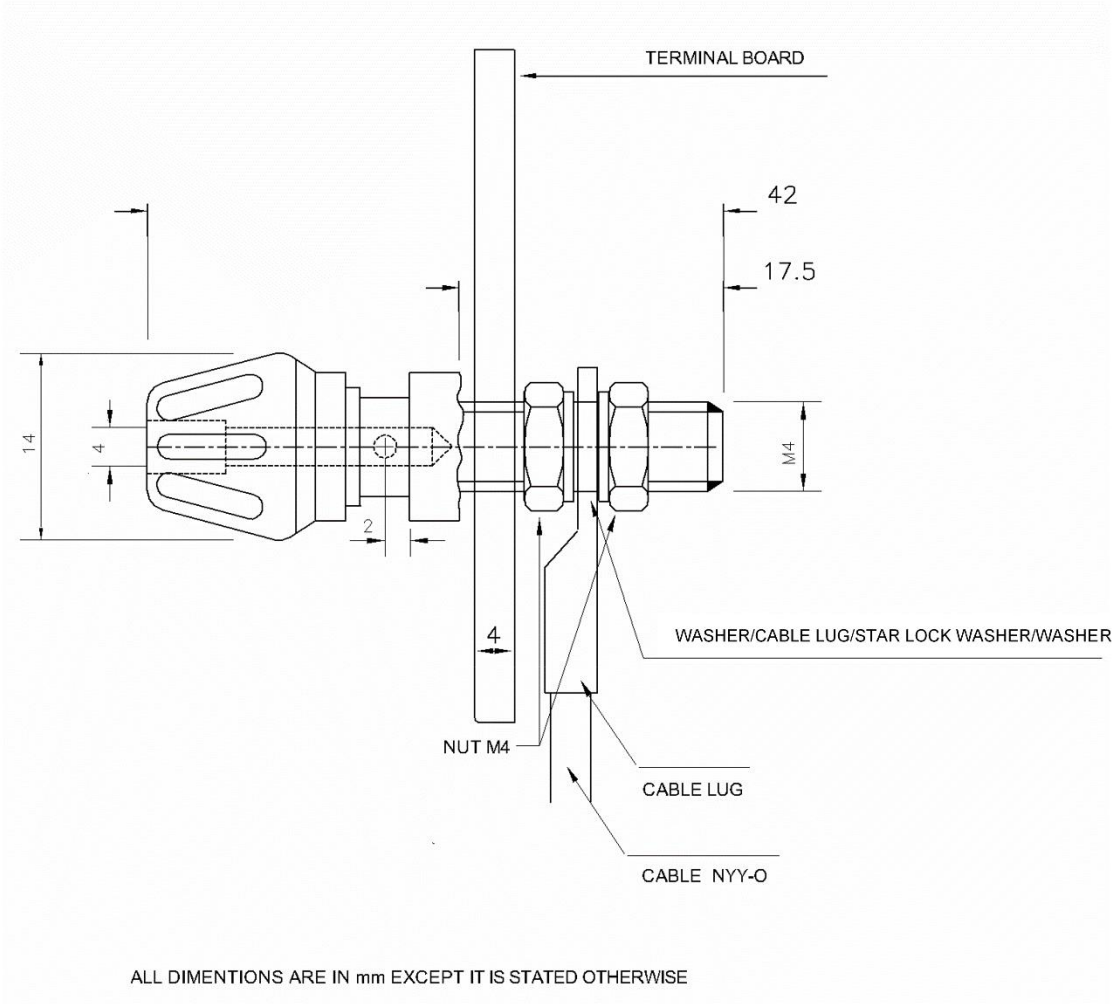
The Measuring posts shall be prepared for mounting of an orange (RAL 2000) background text plate, as shown in Figure 5.

The plate shall be permanently fixed to the post so that no unauthorized personnel can move or change the orientation of the plate in respect with the pipeline's direction.

Text plates shall have provisions for inserting Owner’s Telephone Number, Km position indication on the field and position of cable/pipe connections also with distance of pipeline axis in accordance with DIN 4065.

Insertion method must secure durability and changeability in the future.

For measuring posts the indication K with the number and digit defining the type of the measuring post shall be shown at the left side of the first row (i.e. K3G etc.) , as shown in Figure 5.



Colour according to standard CP drawings No: STD-00-78-14 ... 23

Max Current: 16A

Figure 4: Terminals for the Measuring Posts

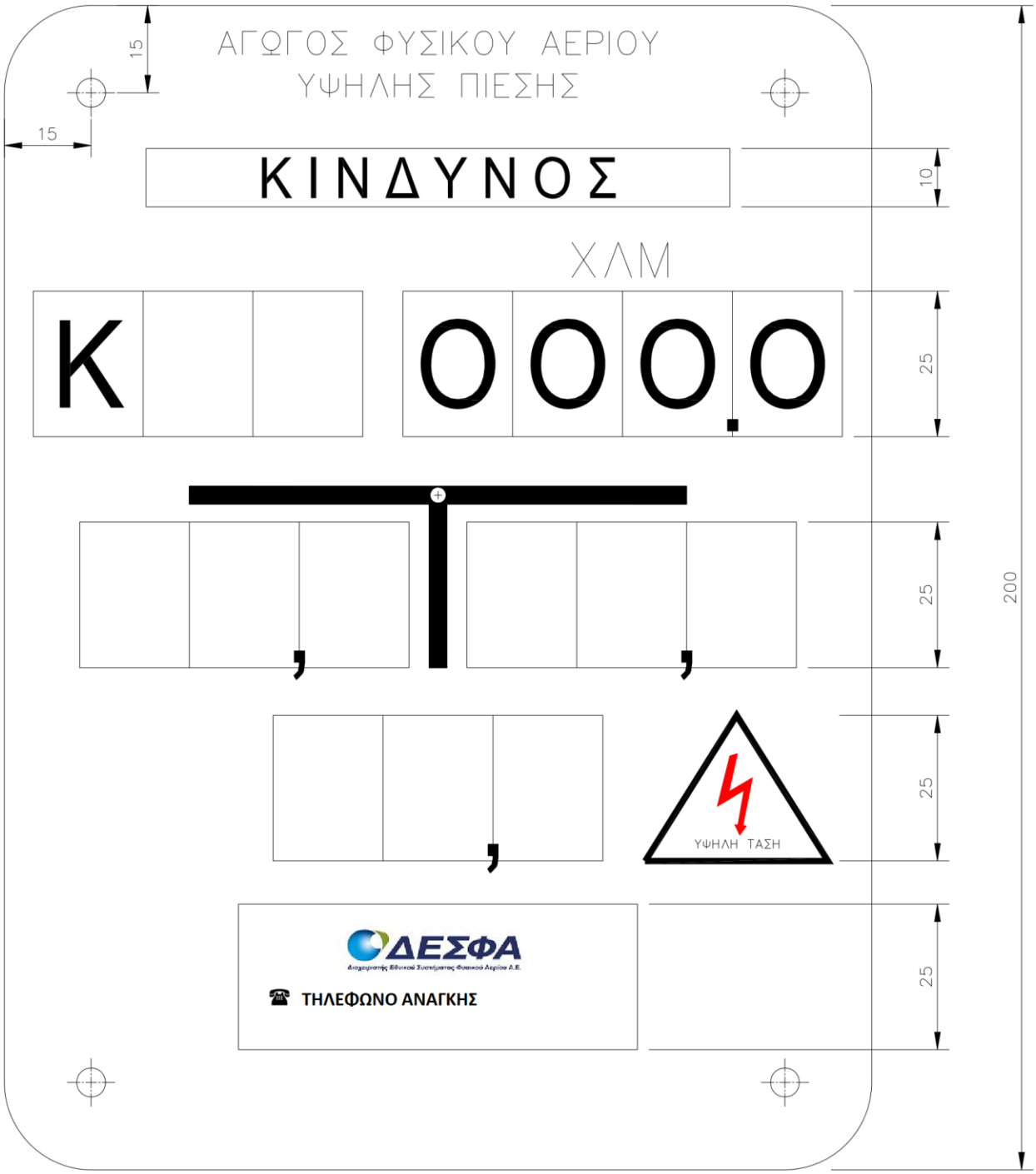


Figure 5: Text Plate for Measuring Posts

7. INSTALLATION

7.1 Footing

The lowest part of the post shall be embedded in a concrete (grade S220) footing.

The footing shall be sized so that the post can transfer the horizontal load of 50 kp kg to the footing, with a safety factor against footing over- turning V > 1,2.

7.2 Marking of Pipeline Route

In open country, posts will be installed with a spacing of max 1 km so that standing at one post the next one shall be visible. All changes of direction and other characteristic points along the route will also be marked with marker posts. Major crossings shall be marked with pipeline marker at both sides.

Marker posts shall also be installed at places where the pipeline crosses forest roads.

The exact position of marker posts shall be indicated on field by the Supervision. Generally, the posts will be founded vertically and at distance 1-2 meters at the right side of the pipeline (going from start to end). In case that this is not possible (e.g. when the pipeline is running under and parallel with a road), the post will be positioned at the closest convenient position and the text plate will indicate the exact position of the pipeline in respect to the post.

The posts shall be installed so that the text plate will be facing the pipeline and the aerial marker will be in perpendicular direction with the pipeline.

7.3 Selection of Measuring Posts

The type of measuring post to be used in each position shall be in accordance with DESFA Technical Specification DSF-SPC-CPR-005.

8. INSPECTION AND CERTIFICATION

Inspection will be performed by a third party independent inspection company to be appointed by Owner.

Inspection requirements are defined in the following documents.

a. Material requisition.

b. DESFA Technical Specification DSF-SPC-QAC-005 "Shop inspection of equipment and materials".

c. Relevant project specifications.

d. Inspection clauses of applicable Standards.

Inspection procedures to be followed are detailed in Owner's document "Inspection and Test Instructions".

APPENDIX 1

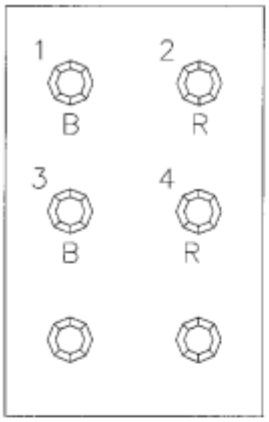
NUMBER CODING

1. Connection with pipeline at a point next to post or before an insulating coupling (for voltage apply).
2. Connection with pipeline at a point away from post (50m away on the pipeline, after an insulating coupling, or foreign structures - for voltage apply).
3. Connection with pipeline at a point next to post (for line current measurement).
4. Connection with pipeline at a point away from post (50m away on the pipeline, after an insulating coupling, or foreign structures for line current measurements).
5. Connection with pipeline at a point next to post for the earthing connection.
6. Connection with earthing wire
7. 1st connection with casing.
8. 2nd connection with casing.
9. Connection with sacrificial anodebed (first connection).
10. Connection with pipeline for sacrificial anodebed (first connection).
11. Connection with sacrificial anodebed (second connection).
12. Connection with pipeline for sacrificial anodebed (second connection).
14. To steel plate probe.
16. To steel plate probe.
18. To calomel electrode.

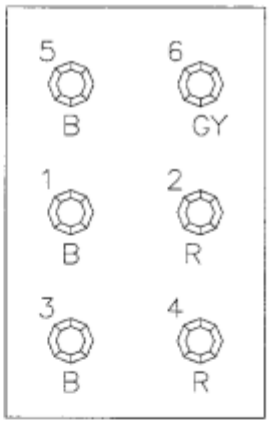
9. APPENDIX 1

COLOR CODING

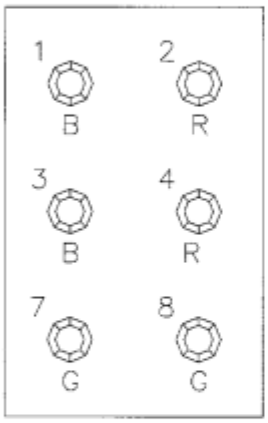
B	:	Black	Connection next to post for pipeline.
R	:	Red	Connection 50m away on the pipeline or other section (at insulating couplings).
GY	:	Green / Yellow	Connection with earthing electrode.
Y	:	Yellow	Connection with sacrificial, or calomel electrode of the polarization probe.
G	:	Green	Connection with casing.
BE	:	Blue	Connection to Foreign structures, steel plate of polarization probes.



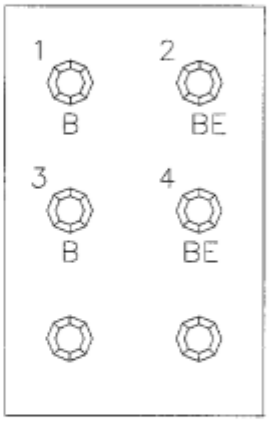
MEASURING POST TYPE K3



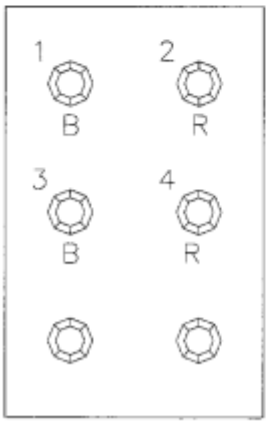
MEASURING POST TYPE K3G



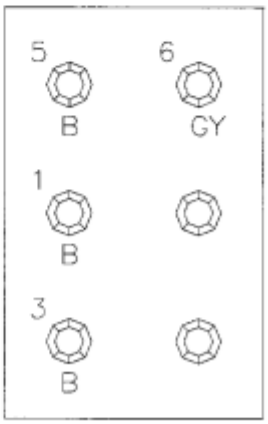
MEASURING POST TYPE K4



MEASURING POST TYPE K5

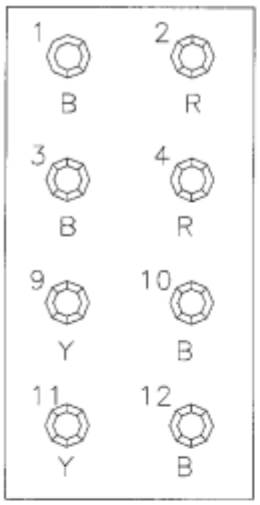


MEASURING POST TYPE K6

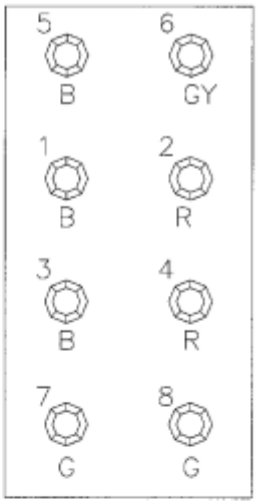


MEASURING POST TYPE K1G

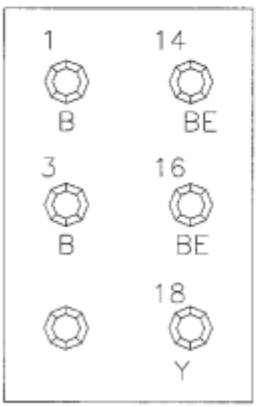
TERMINAL BOARD CODING



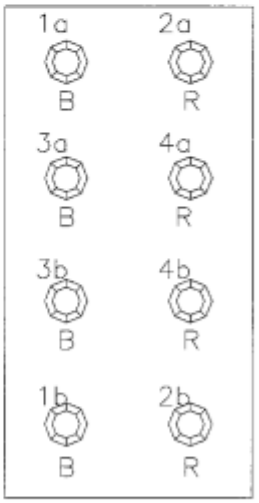
MEASURING POST TYPE K3S



MEASURING POST TYPE K4G



MEASURING POST TYPE K9



MEASURING POST TYPE K8

TERMINAL BOARD CODING