



**HELLENIC ELECTRICITY DISTRIBUTION NETWORK OPERATOR S.A.**

NOTICE OF CALL FOR TENDERS No ND-207

**PROJECT: "Pilot Telemetry and Management System for the Electric Power Supply Demand by Residential and Small Commercial Consumers and Implementation of Smart Grids"**

**TECHNICAL SPECIFICATION**  
**AUTOMATIC SINGLE POLE AND THREE POLE**  
**CIRCUIT BREAKERS FOR LV SUPPLIES**

<p><b>SPECIFICATION PPC</b></p>	<p><b>AUTOMATIC SINGLE POLE AND THREE POLE CIRCUIT BREAKERS FOR LV SUPPLIES</b></p>	<p><b>GR-216AB/rev. 08.2009</b></p>
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<p><b>Issued by the Metering Systems Section</b></p>	<p><b>Network Department</b></p>	
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## **1. OBJECT**

The present specification defines the manufacture, testing, acceptance control and package for transportation and delivery at PPC warehouses of single pole and three pole miniature circuit breakers of rail type which shall be installed in the metering system of customers for LV supply protection.

## **2. KEYWORDS**

Miniature circuit breaker, overload current breaking, maximum short circuit current breaking, thermal element, magnetic element, 230/400V low voltage supply.

## **3. OPERATING CONDITIONS**

Below are given the operating and installation conditions of miniature circuit breakers.

### **3.1 ENVIRONMENTAL CONDITIONS**

The circuit Breakers shall operate successfully and continuously under the operating conditions specified in Appendix ~~9.2.1~~ **9.1**.

### **3.2 INSTALLATION**

The Circuit Breakers shall be placed inside polyester boxes for meters. The mounting of these shall be done in prescribed positions of the boxes, directly on a metallic rail installed inside the box.

### **3.3 L.V. SUPPLY**

They are installed in LV supplies of 230/400 V, at 50 Hz frequency for domestic and general use customers. The power supply can be three phase of four conductors with asymmetric load or single phase and the voltage shall range from -10% to +10%.

## **4. REGULATIONS - SPECIFICATIONS**

The circuit breakers shall be industrial products manufactured according to the International Standards EN/IEC and the Technical Specifications of PPC mentioned below and shall be valid on the day of tender submission.

EN/IEC 60898-1 Circuit breakers for a.c. operation.

EN/IEC 60898 Protection for domestic and similar installations.

EN/IEC 60695-2-1 Fire Hazard testing Part 2: Test methods. Glow wire test and guidance.

IEC 157-1 Low voltage switchgear and controlgear, Part 1: Circuit-breakers.

IEC 227 Polyvinyl chloride insulated cables of rated up and including 450/750 V.

IEC 364-4-41 Electrical insulation of buildings, Part 4: Protection for safety, Chapter 41 Protection against electric shock.

IEC 60410 Sampling plans and procedures for inspection by attributes

IEC 707 Methods of test for determination of the flammability of solid electrical insulating materials when exposed to an igniting source.

T.Π. PPC No TK 02.01/11.11.87 Sampling procedures and tables for the check of the percentage of defective items.

PPC specification Electrolic galvanization of items from iron, or steel  
X.K. 11.01/11.11.87

PPC specification Hot dip galvanization.  
X.K. 11.02/11.11.87

PPC specification Electrolytic tinning.  
X.K. 11.04/23.10.92

In case of dispute between the requirements of the present Specification and the above versions of International Standards, or any other equivalent, the present PPC specification shall prevail.

The miniature circuit breakers shall be in conformity with the European Standards markings, necessarily the mark of conformity "CE".

The manufacturer of circuit breakers shall implement a Quality Management System according to ISO 9001, for which a certificate issued by an accredited institution shall be submitted.

## **5. DESCRIPTION**

This specification covers the following items:

- a) Automatic miniature single pole circuit breaker 25A, 40A and 63A, characteristic curve C, 230/400 V, short-circuit breaking capacity  $I_{cn} \geq 4500$  A
- b) Automatic miniature three pole circuit breaker, 25A, 40 A and 63A, characteristic curve C, 230/400 V, short-circuit breaking capacity  $I_{cn} \geq 4500$  A.

### **5.1 GENERAL DESCRIPTION AND REQUIREMENTS**

#### **5.1.1 MATERIALS**

All the materials that shall be used for the manufacture of the offered items shall be of very high quality and proper for the purpose and the

operation conditions specified. They shall withstand the temperature and humidity variations as defined in the specification without any deformation, accuracy reduction, as well as with no impact on the mechanical and electrical properties outside the limits specified.

The terminals and contacts made of copper or bronze shall be properly tinned according to PPC specification XK11.04 or properly silver-plated. Correspondingly, the steel parts shall be stainless or galvanized according to PPC specification XK11.02 or XK11.01.

The non-metallic parts shall be made of non-hygroscopic material and shall ensure sufficient protection against flammability and flame spread.

## **5.1.2 MANUFACTURING DETAILS**

### **5.1.2.1 Morphological**

Their manufacture shall be proper in order to be placed and secured in plastic boxes (cases) of single-phase or three-phase meters.

Their mounting in the boxes shall be made directly on a metallic rail placed inside the meter boxes.

Moreover, the three pole miniature circuit breakers shall be delivered as a block and not as three single poles. Finally, they shall not have any interlocking mechanism on the upper side, so each phase shall be able to be tripped independently.

### **5.1.2.2 Terminals**

The terminals shall be covered locally and protected against incidental contacts.

The cross-section of the cables which shall be connected to the terminals for 25A and 40A circuit breakers shall be 10 mm<sup>2</sup> and correspondingly 16 mm<sup>2</sup> for 63A circuit breakers.

The shape of the cable connection holes for miniature circuit breakers shall be such so as to ensure the right rigidity and stability for cable connection (plug type rounded in its lower side for better tightness between cable and bolt).

### **5.1.2.3 Switch on/off device**

The switch operating push button of the circuit-breaker shall be lever type. It shall be placed on its front side and shall turn round its axis at approximately 60°. The height of the push button shall meet the requirements of drawing 9.2.

### **5.1.2.4 Circuit breaker mechanism**

The circuit breaker shall consist of thermal element for overcurrent protection and magnetic element of fast decoupling for short-circuit protection.

Details in paragraph 7.2.1 of the Standards EN 60898.

## 5.2 SPECIAL REQUIREMENTS

The circuit breaker shall have trip-free mechanism (eg in cases of short-circuit or thermal overload, it shall always open automatically even when the push button is turned) with the following characteristics:

- Rated voltage Ue 230/400V
- Rated frequency 50HZ
- Insulation level 500V
- Rated current In 25,40,63A
- Short-circuit breaking capacity  $I_{cn} \geq 4500$  a
- Characteristic performance curve type C.

Table of climatic and environmental conditions, for circuit breaker placed in the meter box, its terminals shall be with their casing:

- |  |        |
|--|--------|
| - Maximum altitude                           | 1500 m |
| - Minimum ambient air temperature            | -15° C |
| - Average ambient air temperature            | 20° C  |
| - Maximum temperature due to solar radiation | 75° C  |
| - Maximum relative humidity                  | 90%    |
| - Minimum relative humidity                  | 5%     |

## 5.3 SAMPLES SUBMISSION

Participants in the tendering procedure shall submit along with the tender at least two (2) complete samples of each offered item for material evaluation. ~~Tenders which shall not be accompanied by samples shall be rejected.~~

## 5.4 INFORMATION SUBMISSION

Participants in the tendering procedure shall submit obligatorily along with their tender the following:

- Manufacturing drawings with all necessary dimensions of circuit breakers.
- Detailed description of circuit breakers.

Manufacturing and testing regulations, as well as complete testing certificates in accordance with the latest version of EN/IEC 60898.

-Detailed description of circuit breakers.

Manufacturing and testing regulations, as well as complete testing certificates in accordance with the latest version of EN/IEC 60898.

-Alteration of the operating curve at temperature variations from 0° C to 40° C.

-Characteristic operating curves.

The manufacturer of circuit breakers shall comply with the Quality Management System according to ISO 9001, for which a certificate from an accredited agent shall be submitted.

## **6. TESTS**

All tests shall be performed as described in the latest version of the Standards EN / IEC 60898, in the same order as described in the present Specification.

### **6.1 DESIGN TESTS**

Design tests are not provided for.

### **6.2 TYPE TESTS**

Tenderers must submit complete type test certifications issued by accredited laboratories according to ISO 17025. PPC may at its own discretion confirm the above test certification before the series manufacture or during the execution of the relative Contract, by repeating all or part of these tests at an accredited laboratory or at KDEP.

### **6.3 SERIES TESTS**

As specified in the standard EN /IEC 60898.

### **6.4 SAMPLE TESTS (ACCEPTANCE TESTS)**

The sampling procedure for these tests shall comply with version 410 of the IEC standards based on the following criteria:

- Control level II table I IEC 401.
- Simple or double sampling plan (table II and HI IEC 410).
- Acceptable Quality Level A.Q.L. = 1 for each test separately.

For the abovementioned sample the test of paragraph 9.10 of EN 60898 shall be performed. If the above test is successful, the rest of the tests of Annex C of EN 60898 shall be performed, according to the sampling plan of Table C2. The samples for these tests are selected from the initial sample.

### **6.5 SPECIAL TESTS**

Special tests are provided for.

## **7. SIGNS AND MARKING**

On the cover of each circuit breaker, there shall be a proper marking in a visible and distinct position on the outer side of the box and the following shall be indelibly written in Greek:

- PPC S.A. logo
- Rated current, rated voltage and frequency.



- A.C. power supply marking.
- Type according to the characteristic curve.
- Maximum short circuit current.
- Trade name or mark of the manufacturer as well as the year of manufacture.

The switch of the circuit breaker shall bear the marking "I" for indoor and 'O" for outdoor.

## **8. PACKING**

The circuit breakers shall be placed in protective boxes made of cardboard or polystyrene.

Said boxes shall be indelibly marked with the Contract number, the item code and the Supplier's data.

Circuit breakers with the above mentioned packing shall be placed in boxes made of wood or other solid material, also suitable for outdoor storage without need for any additional protection against weather conditions (rain or humidity).

## **9. ANNEXES - DRAWINGS**

Moreover the circuit breakers shall meet the requirements set in the following annexes and drawings attached to the present specification.

### **9.1 TABLE OF CLIMATIC AND ENVIRONMENTAL CONDITIONS**

Maximum altitude	1,500 m
Minimum ambient air temperature	-15 °C
Average ambient air temperature	20 °C
Maximum temperature on the outer surfaces due to solar radiation	75 °C
Minimum relative humidity	5 %
Maximum relative humidity	90 %

### **9.2 Configuration of the MCB's switch.**

ΣΧΕΔΙΟ 9.2 ΚΟΜΒΙΟ ΟΠΛΙΣΜΟΥ

