



## Type Test Report Electrical Accessories and Hardware Reference Laboratory

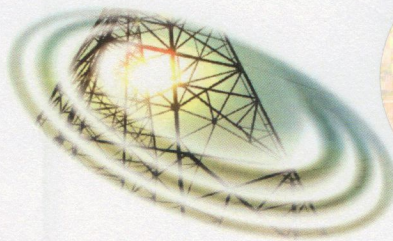
### Multi-tap Insulation Piercing Connector IPC1005

**Client:** Council for Assessment and Compliance with Electrical Industry Equipment  
Production Standards, Power Generation, Transmission & Distribution Company

**Manufacturer:** Electro Niroo Taban Control Company (NETCO).

**Test Standard:** EN 50483-4, EN 50483-5, EN 50483-6 (2009)

**NRI**  
Niroo Research Institute



Address: Niroo Research Institute, End of Shahid Dadman Blvd., Shahrak Ghods, Tehran, Iran.

Tel: (+98-21) 8807 9400, Fax: (+98-21) 8807 8296, Email: reflab@nri.ac.ir, Website: <http://www.nri.ac.ir>



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IPC1005**

Serial number: -

Reference Standards: EN 50483-4, EN 50483-5, EN 50483-6 (2009)

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Reviewed by: H. Mostafavi



Approved by: F. Naghdi

A blue ink signature of F. Naghdi is written next to the 'Approved by' text.



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IPC1005**

Serial number: -

Reference Standards: EN 50483-4, EN 50483-5, EN 50483-6

Tested by: M. Soltanloo

Approved by: A. Bajgholi

Tests witnessed by:

Date of issue: 2016/10/29

Laboratory: Electrical Accessories and Hardware Reference Laboratory

Address: Niroo Research Institute, End of Shahid Dadman Blvd., Shahrak Ghods, Tehran, Iran

Tel / Fax: (+98-21) 88079400 / (+98-21) 88078296

Website: www.nri.ac.ir

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Manufacturer: Electro Niroo Taban Control Company (NETCO)

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## 1. Summary of test results

Test	Test Type	Standard/Clause	Result
Visual examination	Type test	EN 50483-1	Passed
Branch cable pull-out test	Type test	EN 50483-4 8.1.2.2	Passed
Low temperature impact test	Type test	EN 50483-4 8.1.2.5	Passed
Low temperature assembly test	Type test	EN 50483-4 8.1.4	Passed
Dielectrical voltage test in air	Type test	EN 50483-4 8.1.3.1	Passed
Corrosion test	Type test	EN 50483-4 8.1.5.1 EN 50483-6	Passed
Climatic aging test	Type test	EN 50483-4 8.1.5.2 EN 50483-6	Passed
Electrical ageing test	Type test	EN 50483-4 8.1.6 EN 50483-5	Passed
Test for permanent marking	Type test	EN 50483-1	Passed

Multi-tap Insulation Piercing Connector IPC1005 of Electro Niroo Taban Control Company (NETCO) is approved according to EN 50483 standard.

Note: Since the connector under review was designed without teeth, the conductor must be stripped prior to installation.



## 2. Product Specifications

Name: Multi-tap Insulation Piercing Connector

Model: IPC1005



## 3. Technical Specifications

Branch Conductor Range (mm<sup>2</sup>): Al 10-35, Cu 1.5-25

Weight:

Installation Torque: 15 N.m

Markings: NETCO, 10-35 Al, 1.5-25 Cu, 15 N.m

## 4. General Considerations

The customer has the right to officially announce their written objection to the test results or procedure within one month after the test report is issued. The tested samples will be stored at the laboratory for up to 6 months after testing.

Sampling was conducted by representatives of the Niroo Research Institute.

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## 5. Test Methods and Results

### 5.1. Visual examination

The test was performed according to EN 50483-1, Annex A.

The connector was visually inspected for the grease, teeth coating, etc.

#### Acceptance Criteria:

The connector shall fulfill the manufacturer specification data and standard requirements.

#### Results:

The connector fulfilled the manufacturer specification data and standard requirements.

It should be noted the connector was designed without teeth and the conductor must be stripped prior to installation.

#### Conclusion:

The connector passed the test.

### 5.2. Mechanical tests

#### 5.2.1. Branch cable pull-out test

The test was performed according to EN 50483-4, clause 8.1.2.2. Two samples were tested in each of the following conductor combinations:

Main Conductor (mm <sup>2</sup> )	Branch Conductor (mm <sup>2</sup> )
70 Al (Max.)	1.5 Cu (Min.)
70 Al (Max.)	25 Cu (Max.)
70 Al (Max.)	10 Al (Min.)
70 Al (Max.)	35 Al (Max.)

#### Acceptance Criteria:

Core slippage shall not exceed 3 mm.

The cores shall maintain the test load for 60 s without breaking or any damage that would prevent the correct function of the cable.

#### Results:

No slippage or damage was observed in the branch conductor under the test condition.

#### Conclusion:

The connector passed the test.



### 5.2.2. Low temperature impact test

The test was performed according to EN 50483-4, clause 8.1.2.5. Two samples were tested in each of the following conductor combinations:

Main Conductor (mm <sup>2</sup> )	Branch Conductor (mm <sup>2</sup> )
70 Al (Max.)	1.5 Cu (Min.)
70 Al (Max.)	25 Cu (Max.)
70 Al (Max.)	10 Al (Min.)
70 Al (Max.)	35 Al (Max.)

The connectors were installed in accordance with the manufacturer's instructions and in the manner for which they were designed.

#### Acceptance Criteria:

No damage shall occur which would affect the correct function of the connector.

#### Results:

No damage was observed in the samples after the test.

All samples fulfilled standard requirements.

#### Conclusion:

The connector passed the test.

### 5.3. Low temperature assembly test

The test was performed according to according to EN 50483-4, clause 8.1.4. Two connectors were tested in each of the following conductor combinations:

Main Conductor (mm <sup>2</sup> )	Branch Conductor (mm <sup>2</sup> )
70 Al (Max.)	1.5 Cu (Min.)
70 Al (Max.)	25 Cu (Max.)
70 Al (Max.)	10 Al (Min.)
70 Al (Max.)	35 Al (Max.)

#### Acceptance Criteria:

Electrical continuity shall be achieved at a torque value less than, or equal to 70 % of the manufacturer's specified minimum installation torque.

#### Results:

Electrical continuity was achieved at a torque value less than manufacturer's specified minimum installation torque in all conductor combinations.

All samples fulfilled standard requirements.



**Conclusion:**

The connector passed the test.

**5.4. Dielectrical voltage test in air**

The test was performed according to EN 50483-4, clause 8.1.3.1. Two connectors were tested in each of the conductor combinations shown in the following table.

**Acceptance Criteria:**

No flashover or breakdown shall occur.

The maximum leakage current shall be 10 mA.

**Results:**

Samples withstood the test voltage for 60 s without any flashover or breakout.

The measured leakage current in all samples was less than 10 mA.

All samples fulfilled standard requirements.

Cross Section (mm <sup>2</sup> )		Voltage test applied to	Earthing through	Rated voltage (kV)	Voltage application time (s)	Measured leakage current (mA)
Main Conductor	Branch Conductor					
70 Al (Max.)	1.5 Cu (Min.)	Main Conductor	Aluminum foil	4	60	0.1
70 Al (Max.)	25 Cu (Max.)	Main Conductor	Aluminum foil	4	60	0.2
70 Al (Max.)	10 Al (Min.)	Main Conductor	Aluminum foil	4	60	0.1
70 Al (Max.)	35 Al (Max.)	Main Conductor	Aluminum foil	4	60	0.2

**Conclusion:**

The connector passed the test.

**5.5. Environmental tests**

**5.5.1. Corrosion test**

The test was performed according to EN 50483-4, clause 8.1.5.1.3.2. A connector installed on Cu conductor of 25 mm<sup>2</sup> cross section area was tested. The sample was exposed to 500 cycles of 2 h in the test environment. After the test, the sample was subjected to visual inspection.

**Acceptance Criteria:**

Visual inspection shall be carried out and there shall be no significant trace of red rust. The amount of corroded area should not be more than 10 % of the exposed surface area of the metallic parts.

The sample's identification marking shall be legible when examined with normal or corrected vision, without magnification.

No deterioration of the connector shall occur which would impair their normal function.



For a connector designed without a shear-head it shall be able to be removed with a torque below or equal to 1,1 times the manufacturer's specified nominal torque.

**Results:**

No trace of red rust was observed.

The connector's identification marking was legible when examined with normal vision.

The connector was removed with a torque 5 N.m.

The sample fulfilled standard requirements.

**Conclusion:**

The connector passed the test.

**5.5.2. Climatic aging test**

The test was performed according to EN 50483-4, clause 8.1.5.2.3.1. A connector installed on Cu conductor of 6 mm<sup>2</sup> cross section area and Al conductor of 25 mm<sup>2</sup> cross section area was tested. The sample was exposed to UV chamber for 6 cycles of 1 week. After completion of the test, the sample was removed from the chamber and subjected to visual inspection after 48 h.

**Acceptance Criteria:**

After the climatic ageing cycles and after a period of at least 24 h but not exceeding 72 h at the laboratory atmosphere:

Visual inspection shall be carried out to determine that there has been no degradation of the organic parts which could affect the normal function of the sample.

The sample's identification marking shall be legible when examined with normal or corrected vision, without magnification.

The connector shall meet the requirements of the dielectrical voltage test in air.

**Results:**

No degradation of the organic parts was observed.

The connector's identification marking was legible when examined with normal vision.

The connector met the requirements of the dielectrical voltage test in air.

The sample fulfilled standard requirements.

**Conclusion:**

The connector passed the test.



## 5.6. Electrical ageing test

The test was performed according to EN 50483-4, clause 8.1.6. To prepare the test loop, the connectors were installed according to manufacturer's instructions on the following conductor combination:

Main Conductor (mm <sup>2</sup> )	Branch Conductor (mm <sup>2</sup> )
70 Al (Max.)	25 Cu (Max.)

### Acceptance Criteria:

Maximum standard values for the test parameters are shown in the following table.

Parameter	Maximum value
Initial scatter, $\delta$	0.3
Mean scatter, $\beta$	0.3
Assessment of resistance stability	15 %
Resistance factor ratio, $\lambda$	2.0
Temperature stability $\Delta\theta_j$	$\Delta\theta_j - 10 \leq \Delta\theta_j \leq \Delta\theta_j + 10$
Maximum temperature $\theta_j$ of each connector	$\theta_R$

### Results:

Results are shown in the following table.

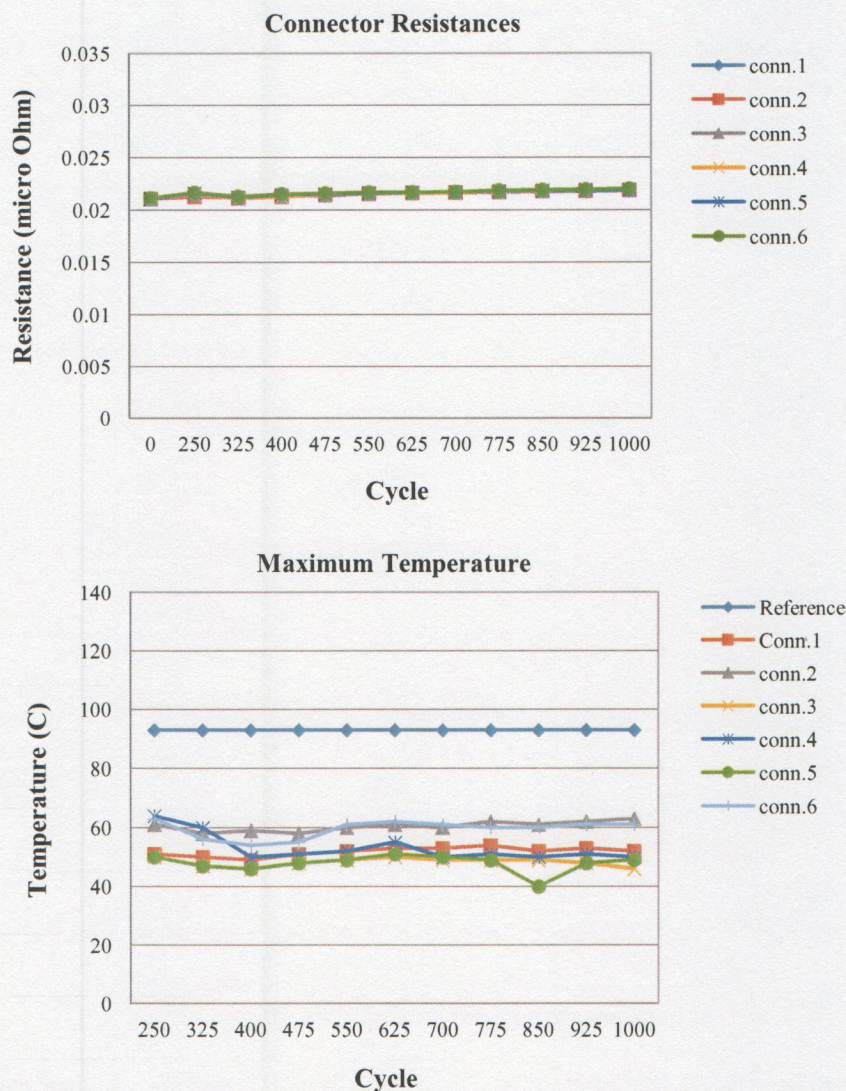
All samples fulfilled standard requirements.

Parameter	Maximum Standard Value	Connector 1	Connector 2	Connector 3	Connector 4	Connector 5	Connector 6
Initial scatter, $\delta$	0.3	0.01					
Mean scatter, $\beta$	0.3	0.08					
Assessment of resistance stability	0.15	0.069	0.084	0.084	0.077	0.060	0.050
Maximum temperature $\theta_j$ of each connector (°C)	90	63	50	64	50	63	54
Resistance factor ratio, $\lambda$	2	1.06	1.08	1.09	1.08	0.96	1.08
Bolt opening torque (N.m)	13.5	3.4 - 4.0	4.1 - 4.3	3.6 - 3.9	4.2 - 4.0	4.1 - 3.5	4.2 - 4.8

### Conclusion:

The connector passed the test.





### 5.7. Test for permanent marking

The test was performed according to EN 50483-1, clause 9.2.

#### Acceptance Criteria:

The marking shall remain clear and allow the accessory to be easily identified.

#### Results:

The marking remained clear and legible after the test.

The sample fulfilled standard requirements.

#### Conclusion:

The connector passed the test.