EDMS 18-301-1

SPECIFICATION

FOR

Low voltage insulation fittings

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توجد بنود اختيارية (Option items) يجب تحديدها بواسطة شركة التوزيع قبل الطرح.

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3) Dead End Clamps" Anchoring Device"



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5) Service dead – end clamps (clamp comprises.



Technical specifications
For
Low voltage insulation fittings

I) SCOPE :-

- This specification is applicable to the different insulation fittings designed for low voltage insulated conductors (up to 1 KV/AC) for main and branch distribution networks.
- This standard specification specifies the main characteristics of the insulating fittings and the tests they shall comply with according to NFC-33.
- The insulating fittings comprise the following :
  - Suspension clamps.
  - Insulated piercing clamps.
  - Dead end clamps "Anchoring Device".
  - Pre-insulated junction sleeves.
  - Service dead – end clamps (clamp comprises)…….. (**option**).
- Unless Otherwise specified, it should be according to IEC60998/NFC-33.

II) Reference Standards:-

1. NFC 33-020 Insulation Piercing Conductors
2. NFC 33-040 Suspension Equipment's
3. NFC 33-041 Anchoring Device
4. NFC 33-021 Pre-insulated Compression Connector.
5. Service dead – end clamps (clamp comprises)…….. (**option**).

III) Technical specifications :-

1) Suspension clamps:

- These suspension clamps are used for overhead lines of rated voltages (0.6/1KVAC) with insulated conductors stretched on facades, supports or installed facades.
- The suspension clamps must fulfill the following specifications:-

- The body should be made of high mechanical and weather resistant insulating material and anti-ultra violet (UV) stabilized such as black thermoplastic fiberglass reinforced.
- Locking and clamping the conductors by a robust notched knee.
- Minimum breaking tension load should be 1200 kg.

2) **Insulated Piercing Clamps**

These types of clamps are designed for the electrical connection of the low voltage overhead branch conductors to the insulated main conductors .

The insulated piercing clamps must fulfill the following :-

- The housing shall be made entirely of mechanical and weather resistant plastic insulation material and anti ultra violet (UV) stabilized such as reinforced black thermoplastic fiberglass, whereas no metallic part outside the housing is accepted except for the tightening bolt.
- The clamp must be design to connect the insulated copper and aluminum conductors without any modification so the teeth should be made of brass.
- It must provide a high quality material contact complied with NFC-33.
- It must not cause any damage of the conductor strands.
- It must provide a simultaneous insulation piercing on both main and branch conductors.
- Piercing the insulation of the conductor by tightening bolt and nut.
- Unless otherwise specified by the manufacturer, terminals shall accept both rigid and flexible conductors as indicated in NFC-33.
- Tightening screw fitted with a shear head to ensure correct tightening torque.

N.B :- The Piercing removal should remain possible even if the head is broken, according to NFC-33.

- The bolt, nut and washer must be made of galvanized steel material.
- The bolts and nuts must be provided with an insulated cover to protect them against environmental conditions.
- The installation must be easy and save in use.

- The cross section area of the main and branch conductors must be engraved at each side of clamp.
- Mechanical Tightening and Electrical Continuity
- Connectors shall be tightened up to 70% of the minimum torque indicated by the manufacturer. At this torque electrical contact should have occurred between conductors to be joined. Then connectors shall be tightened up to the breakdown of the shear heads and lastly, up to 1.5 times the maximum torque indicated by the manufacturer.
- At 1.5 times the maximum torque indicated by the manufacturer, there shall be no breakdown of any part of the connector or the core conductor.
- Maximum rated torque shall not exceed 20 N.m for conductor <95 mm2 and 30 for ≥95 up to 150 mm2.
- Tightening screws shall have hex. Heads of 10 mm, 13 mm or 17 mm only.
- The connector shall be fitted approx. at the center of the main core, which is secure between two anchoring points 0.5 meters To 1.5 meters apart. At the time of fitting the connectors, the main core shall be under longitudinal tension at 20% of the load indicated in Table-1 :

Table – 1 (Single core)	
Nominal Cross – section (sq.mm.)	**Tensile Strength (Newton)**
16	**6000**
25	
35	
50	
70	
95	
120:150	**15000**

Table – 2 (bundle core)	
Nominal Cross – section (sq.mm.)	**Tensile Strength (Newton)**
4x(16:35)	**6000**
4x50	
4x70	
3x95+(50:70)	**15000**
4x(120:150)	

- **Tensile strain shall be increased to the full value indicated in the Table 1 and held minute. There should be no breakdown of the core conductor.**

- **Range of use:**
  - Cross section area of the main line 35 mm^2 to 150 mm^2
  - Cross section area of the tap-off line 16 mm^2 to 150 mm^2

  Option: (Cross section area shall be specified by the …EDC).

3) **Dead End Clamps" Anchoring Device**

- A device which may firmly attach an overhead low voltage insulated conductor to a support and is designed to transmit the specified mechanical tension in the conductor to the supporting structure.

The dead end clamps must fulfill the following Specifications:

- The housing shall be made entirely of mechanical and weather resistant plastic insulation material and anti ultra violet (UV) stabilized such as reinforced black thermoplastic fiberglass, whereas no metallic part outside the housing is accepted except for the tightening bolt.

- It consists of robust parts.
- It must be provided with un-losable stainless steel flexible bail equipped with a movable insulating wear resistant saddle.
- The minimum breaking tension load of the clamp shall be as indicated in Table-1&2.

4) **Pre-insulated junction Sleeves:**

- It should be designed to connect the low voltage insulated conductors for the overhead distribution lines and insulated main conductors, together or to an apparatus.
- The pre-insulated junction sleeve must fulfill the following specifications:
- The housing shall be made entirely of mechanical and weather resistant plastic insulation material and anti ultra violet (UV) stabilized such as reinforced black thermoplastic fiberglass, whereas no metallic part outside the housing is accepted.
- It must be designed to connect the insulated copper and aluminum conductors without any modification.
- It must achieve a high quality material connection.
- The cross section area of the main and branch conductors must be printed at each side of sleeve.

5) Service dead – end clamps (clamp comprises).

1- An open body.
2- An unlosable wedge ensuring a positive and pressure reparted grip on conductors.

3- An anchoring rigid bail made of stainless steel.

4- Range of use (6-16 mm^2).

5- Failing load 25 kg.

IV) SERVICE CONDITIONS

1. The fittings of the insulated conductors shall be designed to meet the following environmental conditions:

TABLE "3" ENVIRONMENTAL CONDITIONS

ENVIRONMENTAL CONDITIONS	EGYPT LIST
TEMPERATURE: **1) Maximum ˚C** **2) 24 hour average** **3) Yearly average**	 **does not exceed 50˚C** **does not exceed 40˚C** **does not exceed 30˚C**
Relative humidity:	**up to 100%**
Other Condition :	**Exposed to** - **Rains / Dust** - **Occasional sand storms** - **Salty air**

2. The design and construction of the fittings shall secure and comply with the following values corresponding to the connected insulated conductors as in the latest edition of IEC60998/NFC-33:
   - Maximum electrical strength.
   - Maximum mechanical strength.
   - Maximum insulation strength.
   - Maximum thermal strength.
   - Minimum electrical losses.
   - High resistance against water penetration, sun, and ultra violet rays and chemical effects.
3. The insulated material must withstand maximum temperature 90°C at continuous operation and 130°C maximum emergency temperature and 250 °C short circuit temperature.
4. MARKING according to IEC60998/NFC-33.
5. The fittings shall be water proof and the water tightness shall be ensured by appropriate elastomeric materials and not by grease, gel or paste alone.

V) Inspection and Testing

- The fittings of insulated conductors must satisfy the following tests:

A. Routine Tests/ Acceptance Tests

1. Checks :
   - ❖ Visual
   - ❖ Dimensional

- ❖ Materials

2. Mechanical Tests
3. Voltage Tests
4. Installation Tests at Low Temperature.
5. Water Penetration Tests

- The entire assembly shall be immersed at a depth of approximately 30 cm for 30 minute with the free ends of main and branch cable of the water.
- An AC voltage of 6 KV shall be applied between the water bath and each of the cores in turn of 1 minute. There shall be no flashover or electrical tripping with a trip setting of 10mA±0.5mA.

• N.B:

- Test No.(4) Applied for insulated piercing clamps only.
- Test No.(5) Applied for suspension clamps and pre-insulated junction sleeves only.
- Acceptance Tests are accomplished by … EDC representatives on random sample of minimum 1% of each package " not less than 20 sample".

B. **Type Tests: as shown in the following Table 3.**

- **N. B:**
  - The Electricity Company reserves its right to earn/out inspection during fabrication stages and witness the testing of fittings. All tests shall be carried out at any authorized laboratory. Certificates of type tests shall be delivered with the offer.
  - Procedure and number of samples required for tests are described in the French standard reference.

VI) Tender Documents

- The tenderer shall submit with his offer all necessary catalogues containing full technical data, he shall also submit sample of each item of the tender.
- The tenderer shall submit the procedure for installation and maintenance.

I) The Tenderer shall fill in the attached guarantee table

Table 4

No	Type test	Suspension clamps IEC60998/NFC-33-042	Insulated Piercing Clamps IEC60998/NFC-33- 020	Dead end clamps IEC60998/NFC-33-041	Pre insulation junction sleeves IEC60998/NFC-33-021
1	Mechanical Tightening Test	√	√	√	√
2	Effect of Tightening on main Core	×	√	×	×
3	Effect of Tightening on Branch core	×	√	×	×
4	Over-current Test	×	√	×	×
5	Climatic Test	√	×	√	√
6	Corrosion Test	√	×	√	√
7	Voltage Test	√	×	√	√
8	Dielectric And Water Tightness Test	×	√	×	√
9	Installation At Low Temperature Test	×	×	×	×
10	Electrical Ageing Test	×	√	×	√
11	Temperature Rise And Over Current Test	×	×	×	×
12	Endurance Test Under Thermal And Mechanical Stresses	√	×	√	√
Total No. Of Required Tests		5	6	5	7

√ = Applicable ×= Not Applicable

GUARANTEE TABLE

OF

INSULATED CONDUCTORS Fittings

*يجب تسجيل البيانات الفنية للأتى :-

- Maker's name	.....
- Type of fitting	.....
- Cross section area of main conductor	.....
- Cross section area of branch conductor	.....
- Model	.....
- Type of insulating material	.....
- Ambient temperature at point of use	.....
- Relative humidity	.....
- Maximum temperature at continuous condition	.....
- Maximum temperature at S.C condition	.....
- Withstand voltage . (According to the attached specification)	.....
- The minimum breaking load	.....