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## TEST PROTOCOL № TR2022-33/2

<b>The test was conducted by.....:</b> <b>Checked.....:</b> <b>Approved by.....:</b> <b>Date of protocol approval.....:</b> <b>Number of pages.....:</b>	Debugging and testing engineer: <b>Y.I. ROMANENKO</b> The head of the laboratory: <b>I.H. KOZHUSHKO</b> Director of VC "VYPROBUVACH" LLC: <b>S.V. Voytko</b> 09.12.2022 2 4 p.
<b>Name of the testing laboratory:</b> <b>Address, telephone .....</b> <b>Certificate number .....</b> <b>∴ _</b>	"VYPROBUVACH" LLC 08300, c. Boryspil, str. 17 Panasa Myrnoho , phone/fax (044) 457-69-22 20408
<b>Basis .....</b> <b>Address.....:</b>	<b>Agreement No. 31-22 dated October 24 , 2022,</b> <b>Application letter No. 2507-1 dated July 25, 2022</b> <b>PE "VKF "Soznaniie"</b> <b>08720, Ukraine, Kyiv Region, Ukrainka, Dniprovskiy Ave. 20</b> <b>office 55</b>
<b>Standards .....</b> <b>Non-standardized test methods.....:</b>	<b>DSTU EN 61442:2016 (EN 61442:2005, IDT);</b> <b>DSTU IEC 60055-1:2017 (IEC 60055-1:1997+AMD1:2005, IDT);</b> <b>DSTU IEC 60060-1:2010 (IES 60060-1:1989, IDT);</b> <b>DSTU EN 61140:2015 (EN 61140:2002, IDT).</b> Not held
<b>The name of the test product...:</b> <b>Trademark .....</b> <b>Model and/or type .....</b> <b>Serial number(s) of the sample(s):</b> <b>Producer.....:</b> <b>Product description.....:</b>	Coupling cable terminal external installation THP-N-10-CF3 (S) SOZNANIIE, mass -produced by the company "RADPOL" SA (Poland). RADPOL SA (Poland) THP-N-10-CF3 150-240 (S) SOZNANIIE, which is a sample representative of serial production of the company "RADPOL" SA (Poland). RADPOL SA; St. Batorego 14, 77-300 Chluchów, Poland THP-N-10-CF3 150-240 (S) SOZNANIIE - cable end coupling for external installation for voltage up to 10 kV inclusive, equipped with 2 bolt terminals, soldered, non-soldered or combined grounding system.

<b>Abbreviations used in the text of the protocol:</b> <b>The requirement does not apply to the manufactured sample(s).....:</b> <b>Positive test result:</b> <b>Negative test result:</b>	V/N P N
<b>Sampling</b> .....:	The samples were provided by the applicant, including Completion list (Passport) for the installation kit of one end coupling for external installation THP-N-10-CF3 (S) SOZNANIIE, mass-produced by the company "RADPOL" SA (Poland). Technical drawing of the clutch assembly .
<b>Sample identification .....</b> :	
<b>Date of receiving the sample(s).....:</b>	25.10.2022
<b>Date(s) of testing...:</b>	10/28/2022 - 12/09/2022
<b>Place of testing .....</b> :	08300, c. Boryspil, str. 17 Panas Myrny
<b>Test methods .....</b> :	establishing compliance of sample characteristics with requirements: <b>DSTU EN 61442:2016</b> (EN 61442:2005, IDT); <b>DSTU IEC 60055-1:2017</b> (IEC 60055-1:1997+AMD1:2005, IDT); <b>DSTU IEC 60060-1:2010</b> (IES 60060-1:1989, IDT); <b>DSTU EN 61140:2015</b> (EN 61140:2002, IDT).
<b>Test conditions .....</b> :	Temperature (18...23) °C; Relative air humidity (55...67) %. Electromagnetic disturbances in the external environment are normal
<b>Test results .....</b> :	positive
<b>Results of tests for compliance with safety requirements ..:</b>	given on p. 10 of this protocol
<b>Results of tests for compliance with EMC requirements.....:</b>	
<b>Measurement uncertainty data...:</b>	given on p. 4 of this protocol

**NOTES: The values of the test results refer only to the product sample that was tested.  
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NATIONAL AUTHORITY OF UKRAINE FOR ACCREDITATION

**CERTIFICATE OF ACCREDITATION**



Registered in the Register  
November 19, 2019  
For № 20408  
valid until November 18, 2024

Date of initial accreditation: November 19, 2014

NATIONAL ACCREDITATION AGENCY OF UKRAINE HEREBY CERTIFIES  
COMPETENCE

**LIMITED LIABILITY COMPANY testing laboratory  
RESPONSIBILITY "EXAMINATION CENTER "EXAMINATION CH"**

**Location of the legal entity:  
08300, Boryspil, str. 17, Panasa Myrny,**

**Location of the LLC: 08300, Boryspil, str. 17, Panasa Myrny,  
93067, Kyiv; St. Vyborzka 103, y  
03164, Kyiv, str. Generala Naumov, 17**

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code (EDRPOU)

**ACCORDING TO THE REQUIREMENTS OF DSTU ISO/IEC 1 7025:2017 (ISO/IEC 17025:2017) IN THE FIELD:**

**testing of electrical household and similar equipment and component products, electrical installation component parts, manual electromechanical machines, technological equipment for enterprises, regulating equipment for low voltage, cable conductor products, lamps, chemical current sources, means computer equipment, radio equipment, radio electronic equipment household appliances, radio equipment, toys according to safety and quality indicators.**

The scope of accreditation is defined in the appendix to this certificate.  
The appendix is an integral part of this certificate and consists of 26 sheets.

**Acting Chairman**

**Kyiv, 01133, Generala Almazva street, 18/7**

Registered in the accounting journal under № 1134 A

NALU is a signatory of: 1) EA VIA Agreements in the areas of "Testing", "Calibration", "Product Certification", "Certification of personnel", "Certification of management systems" and "Inspection"; 2) ILAC MRA agreements in the fields "Testing", "Calibration" and "Inspection"; 3) IAE MLA Agreements in the areas of "Product Certification", "Certification of personnel", "Certification of management systems".

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### Measurement uncertainty data

Measured values during tests	Uncertainty of measurements within
Active transient resistance	$\pm 10\%$
Resistance	$\pm 20\%$
Leakage current	$\pm 5\%$
Capacity	$\pm 20\%$
Test voltage	$\pm 3\%$
Charge	$\pm 20\%$
Discharge energy	$\pm 20\%$
Applied effort	$\pm 20\%$
Temperature	$\pm 2\%$
Angle of inclination	$\pm 1\%$
Mass	$\pm 10\%$
Pressure	$\pm 20\%$

**Coupling cable terminal external installation THP-N-10-CF3 (S) SOZNANIE**



**AABI cable 3x240-10kV.**



## Testing equipment and measuring tools

Name	Marking (type)	Factory and/or inventory number	Range of measurements, price of division, uncertainty
1 Hygrometer	VIT-1	b/n	20 - 90% error $\pm 7\%$
2 Hygrometer	M-34	No. 2173	10 - 100%, $\pm 1.5\%$ resolution not determined #1117- $t^{\circ} - 15^{\circ} \pm 0.29$ 20.0 $^{\circ} \pm 0.29$ 50.0 $^{\circ} \pm 0.27$ #1095- $t^{\circ} - 15^{\circ} \pm 0.32$ 20.0 $\pm 0.27$
3 Stopwatch	STC-1	No. 5890183	0 - 999.999 s error $\pm 0.001$ s
4 The ruler is metal	LM-1000	20	0 - 1000 mm, $\pm 1$ mm uncertainty, mm 0-1 - 0.01 0-100 - 0.1 0-500 - 0.1 0-1000 - 0.1
5 Calipers	SHTS-III-500	No. 44514	0 h 500 mm, c.d $\pm 0,1$ mm Uncertainty of measurements u= 0.1 mm
6 Digital meter	A565-003-01	No. 090595	-50 - 800 $^{\circ}\text{C}$ , class 0.15/0.05
7 Micrometer	MK-25,	No. U117606	0- 25 mm cl. 2
8 Measuring current transformer	T-0.66	No. 32001	The current on the primary winding is from 20-2000A. Accuracy class 1, 0.5s, 0.5, 0.2. The current on the secondary winding is 5 A
9 Autotransformer voltage regulator	LATR SUNTEK 1000VA		Voltage 0...300V 50/60Hz, load up to 30 A
10 Millivoltmeter	B7-38	No. 008482	10 $^{-5}$ - 2 $\cdot 10^{-4}$ mA, 10 $\mu\text{V}$ - 1000 V, uncertainty 0.2 k $\Omega$ - 0.0016 2 k $\Omega$ - 0.0018 200k $\Omega$ - 0.35 20000 k $\Omega$ - 3.5
11 Millivolt ammeter	M2038	No. 10402	30 mV - 600 V, 0.75 mA - 30 A, class 0.5
12 Logometer	M-64	No. 4034851	Digital temperature controller, connected to the TC Accuracy class - 1.5. 0 - 600 $^{\circ}\text{C}$ . Resistance - 5 Ohm; 288 Ohm
thirt een thermocouple - thermoelectric converter - 003-001	thermocouple XA, instrument A565-003-001	No. 111299	0 - 1300 $^{\circ}\text{C}$ , class 0.1/0.06
14 Electronic timer-stopwatch	TSE-1	No. 3300123	Digital, programmable, for counting time (0.0 sec-99 hours, 59 sec), power supply 220V/50Hz
15 Load transformer	UBKT		The largest load is 10 kA; for 30 seconds 220/380 V
16 Cycle counter	SI-8	No. 3300122	
17 Climatic camera	KTK-3000	No. 236644	t from 5 to +100 $^{\circ}\text{C}$ error $\pm 1.5^{\circ}\text{C}$ , humidity from 20 to 95% error $\pm 3\%$
18 Salt fog camera	KST-04	No. 45	wateriness of salt fog from 2 to 3 g/m $^3$ , Dispersion from 1 to 3 $\mu\text{m}$
19 Climatic camera	KRK-630	No. 148	temperature from 5 to -70 $^{\circ}\text{C}$ , error $\pm 1.5^{\circ}\text{C}$
20 Measuring set with transformer block	K50	No. 4502	The final values of the measurement ranges of the device measuring set K50:

I508M I508M			<p>- voltmeter - 150V, 300V, 450V, 600V;  - ammeter - 1A, 2A, 5.5A, 10A, 25A, 50A;  Active resistance of the series circuit - 1 Ohm, 0.2 Ohm, 0.06 Ohm, 0.02 Ohm, 0.01 Ohm, 0.006 Ohm;  The inductance of the serial circuit of the device measuring set K50 - 0.35mH, 0.07mH, 0.02mH, 0.006mH, 0.002mH, 0.001mH;  Nominal currents with the inclusion of the I508M current transformer - 100A, 250A, 500A, 600A;  The nominal current of the parallel circuit is 10.5mA;  Nominal resistance of the parallel circuit of the device measuring kit K50 (between the phase and zero clamp):  - at a nominal voltage of 150V - 14286 Ohms;  - at a nominal voltage of 300V - 28571 ohms;  - at a nominal voltage of 450V - 42857 Ohms;  - at a nominal voltage of 500V - 57143 Ohms;</p>
21 Impact resistance stand	ST-800	No. 39/81	beat frequency up to 3 Hz, acceleration up to 800 q, mass of products to 400 кг
22 Installation of a/in breakthrough	UPU-1M	No. 1301	0 - 10 kV class 4.0
23 Non-contact thermometer	HPI	No. U2082002001	-100 °C to +500 °C
24 Vibrostand	ST-5000/300/1	No. 28/81	dia. frequencies (0 - 1000) Hz, max. Amplitude $\pm 3$ мм,
25 Kilovoltmeter	C196	No. 0720	7.5, 15 and 30 kV, absol. uncertain 2000V – 0.081621423 15000V - .065810388 30000 is 0.065482301
26 Dynamometer	DPU-0.02-2	No. 2695	0.02-0.2kN class 2.0
27 Dynamometer	DPU-0.2-2	No. 1045	0.20-2.0kN, class 2.0
28 Test stand for cables 4903.270	4903.270.00 PM	No. 8964	AC voltage 30V Direct current 50 A
29 Stands for testing the electrical strength of insulation	U503.00.PM U461.00.PM	b/n	0-30 kV, class 1.0; 0 - 3 kV, class 1.0; 0 - 10 min Uncertainty $\pm 0.015$ min
30 Megaohmmeters	M4100/1 M4100/3	No. 459145, No. 52120	(0-200), (0-1000) kΩ (0 - 20), (0 - 100), (0 - 200) MΩ, class 1.0 100, 500, 1000 V
31 High-voltage stationary test stand type AII-70 Kenotron Kilovoltmeter Microammeter M 24	AII-70 KRM-150 M 24	No. 12199  No. 1097 No. 10419 #710	AC voltage 50 kV Direct current voltage 70 kV Certification certificate No. RY 0051/15, issued on 09.06.15, valid until 09.06.20,
32 High-voltage pulse testing device of the HYN-500 type	SMR-10/770/MULT7 Wavesurfer 424  HYN-500	No. 851887 No. 893181 No. LCRY030111650 3 No. 899974/852356	Lightning pulse 5-220kV (uncertainty $\pm 0.21\%$ ) Pulse duration 0.5-4000ms (uncertainty 0.01÷0.29%)

## 1.1 Test objects:



THP-N-10-CF3 150-240 (S) SOZNANIIE cable end couplings for external installation were tested, which are representative samples of couplings mass-produced by RADPOL SA (Poland).

### **Description of the preparation and installation of samples for testing**

**Test samples No. 1, No. 2, No. 3, No. 4** and control samples **No. 5, No. 6, No. 7** (to determine the heating temperature of the test sample) were mounted for testing.

**No. 1.** The tested sample consists of a segment of a three-core cable of the AABI brand 3x240-10kV in length 7 m, on which two tested final couplings of the external installation type THP-N-10-CF3 150-240 (S) SOZNANIIE are mounted, which is a representative sample of serial production of the company "RADPOL" SA (Poland). The distance between end couplings is not less than 5 m.

**No. 2.** The tested sample consists of a segment of a three-core cable of the AABI brand 3x240-10kV in length 7 m, on which two tested final couplings of the external installation type THP-N-10-CF3 150-240 (S) SOZNANIIE are mounted, which is a representative sample of serial production of the company "RADPOL" SA (Poland). The distance between end couplings is not less than 5 m.

**No. 3.** The tested sample consists of a segment of a three-core cable of the AABI brand 3x240-10kV in length 7 m, on which two tested final couplings of the external installation type THP-N-10-CF3 150-240 (S) SOZNANIIE are mounted, which is a representative sample of serial production of the company "RADPOL" SA (Poland). The distance between end couplings is not less than 5 m.

**No. 4.** The tested sample consists of a segment of a three-core cable of the AABI brand 3x240-10kV in length 4 m, on which two tested final couplings of the external installation type THP-N-10-CF3 150-240 (S) SOZNANIIE are mounted, which is a representative sample of serial production of the company "RADPOL" SA (Poland). The distance between end couplings is not less than 2 m.

**No. 5.** The control sample (to determine the heating temperature of the test sample) consists of a segment of a three-core cable of the AABI brand 3x240 -10 kV with a length of 7 m, on which two end couplings of the external installation type THP-N-10-CF3 150-240 (S) SOZNANIIE are mounted, which is a representative - sample of serial production of the company "RADPOL" SA (Poland). The distance between end couplings is not less than 5 m.

**No. 6.** The control sample (to determine the heating temperature of the test sample) consists of a segment of a three-core cable of the AABI brand 3x240 -10 kV with a length of 7 m, on which two end couplings of the external installation type THP-N-10-CF3 150-240 (S) SOZNANIIE are mounted, which is a representative - sample of serial production of the company "RADPOL" SA (Poland). The distance between end couplings is not less than 5 m.

**#7.** The control sample (to determine the heating temperature of the test sample) consists of a segment of a three-core cable of the AABI brand 3x240 -10 kV with a length of 7 m, on which two end couplings of the external installation type THP-N-10-CF3 150-240 (S) SOZNANIIE are mounted, which is a representative - sample of serial production of the company "RADPOL" SA (Poland). The distance between end couplings is not less than 5 m.

Assembly of couplings was performed by representatives of PE "VKF "Soznaniie".

### **1.2 Purpose, program and test methodology:**

The purpose of the tests is to check compliance with the requirements of paragraph 1, 2, 3, 4, 6, 7, 9 table. 2 **DSTU IEC 60055-1:2017** (IEC 60055-1:1997+AMD1:2005, IDT), **DSTU EN 61140:2015** (EN 61140:2002, IDT) presented THP-N-10-CF3 150-240 (S) SOZNANIIE cable terminal couplings for external installation, which is a representative sample of couplings mass-produced by RADPOL SA (Poland) for 3-core power cables with paper oil-impregnated insulation with with armor or without armor, for a voltage up to 10 kV inclusive.

Test method: the tests were carried out in accordance with **DSTU EN 61442:2016** (EN 61442:2005, IDT) (clauses 4.1, 4.2, 5, 6, 9, 11, 13), **DSTU IEC 60060-1** (IES 60060-1:1989, IDT).

**1.3 Sampling:** The samples are selected and provided for testing by the customer, therefore, the procedure for selecting samples provided for testing in relation to the assessment of product conformity to the requirements of technical regulations is not provided for by the relevant regulatory documents.

**1.4 Identification of samples:** Identification of samples provided for testing was carried out by the customer, therefore, the procedure for identification of samples provided for testing in relation to the

assessment of product conformity to the requirements of technical regulations is not provided for by the relevant normative documents.

### Technical characteristics and parameters of test objects:

**THP-N-10-CF3 150-240 (S) SOZNANIIE** - cable terminal coupling for external installation on a 3-wire cable with paper insulation with armor or without armor, for a voltage up to 10 kV inclusive, equipped with 2 bolt terminals, soldered, non-soldered or combined grounding system.

#### Technical characteristics of the cable **AABI 3x240-10kV** on which couplings are installed

**AABI cable** is a paper-insulated aluminum three-core conductor with a steel-aluminum protective cover and mylar tape.

The working temperature of **AABI** varies in the range from -50°C to +50°C

The permissible temperature of long-term heating of the core is no more than 60°C, in case of overload it is allowed up to 80°C.

Flexibility class - 1.

Outer diameter, 60 mm

#### Application of **AABI 3x 240 10 kV**.

**AABI cable** is used for conducting electric lines in the open air, as well as in the ground with low and medium corrosion activity, it is used for stationary laying. Thanks to the steel-aluminum armoring, it is laid with a high probability of mechanical damage. Suitable for use in regions with cold and temperate climates.

<b>Construction AABI 3x240-10kV</b>	
Current conducting wire	Aluminum
Insulation	Oil-soaked
Screen	Conductive paper
Shell	Aluminum
Pillow	Bitumen, crepe paper, mylar tape, PVC film
Armor	Two steel plates overlapping each other's seams
Outer shell	Glass yarn is a dense fibrous material
Scroll	Twisted insulated wires

#### Structure of **AABI 3x 240 10 kV**.

Single-wire aluminum current-conducting cores are sectoral in cross section. Each core is insulated with a special paper made of sulfated unbleached cellulose impregnated with a viscous solution. Cable paper bundles are added to the core as filler. An additional protective element is a paper screen. An electrically conductive screen is located on top of the belt insulation. The inner protective cover is aluminum. A cushion is placed on the aluminum armor to absorb mechanical impacts, including crushing. It contains a mylar tape that protects **the AABI brand cable** from the effects of corrosion. External booking is made of two steel strips, which are laid without gaps and covered with a layer of dense polymer composition.

## Results of compliance tests :

For THP-N-10-CF3 150-240 (S) SOZNANIIE cable coupling samples, which are representative sample couplings mass-produced by RADPOL SA (Poland).

No n/p	Technical requirement	Test method	Test parameters	Conclusion on compliance of the samples with the requirements of regulatory documentation
1	item 1 of table 2 DSTU 60055-1	r.5 DSTU EN 61442 DSTU IEC 60060-1	Constant voltage test for 15 minutes at $6 U_0$ 60 kV	P
2	item 1 of table 2 DSTU IEC 60055-1	p. 4.1 DSTU EN 61442 DSTU IEC 60060-1	AC test for 5 minutes at $4.5 U_0$ 45 kV	P
3	item 1 of table 2 DSTU IEC 60055-1	p. 4.2 DSTU EN 61442 DSTU IEC 60060-1	AC voltage test under rain for 1 minute at $4.0 U_0$ 40 kV	P
4	item 2 of table 2 DSTU IEC 60055-1	p. 6 DSTU EN 61442	Testing with 10 pulses of different polarity $U$ 80 kV	P
5	item 3 of table 2 DSTU IEC 60055-1	p. 9 DSTU EN 61442	Testing with heating cycles in air 63 cycles at $1.5 U_0$ 15 kV,	P
6	item 4 of table 2 DSTU IEC 60055-1	p. 11 DSTU EN 61442	Short circuit test (conductor) 2 short circuits within 5 s	P
7	item 6 of the table . 2 DSTU IEC 60055-1	p. 6 DSTU EN 61442	Testing with 10 pulses of different polarity $U$ 80 kV	P
8	item 7 of table 2 DSTU IEC 60055-1	p. 4.1 DSTU EN 61442 DSTU IEC 60060-1	AC test for 15 minutes at $2.5 U_0$ 25 kV	P
9	item 9 of table 2 DSTU IEC 60055-1	p. 13 DSTU EN 61442	Salt fog test 1000 h ( $1600 \pm 200$ ) ms/m at $1.25 U_0$ 12.5 kV	P
10	DSTU EN 61140	DSTU EN 13018	Visual control. General requirements	P

## RESULTS

Based on the results of the tests, the presented samples of cable end couplings for external installation, brand THP-N-10-CF3 150-240 (S) SOZNANIIE, which are representative samples of couplings mass-produced by RADPOL SA (Poland), meet the requirements of: **DSTU IEC 60055-1:2017** (IEC 60055-1:1997+AMD1:2005, IDT) , **DSTU EN 61140:2015** (EN 61140:2002, IDT) , (in the conducted volume).

Commissioning and testing engineer: Yu.I. ROMANENKO

The head of the laboratory

I.H. KOZHUSHKO

## APPENDIX № 1

**Test № 1.**

Constant voltage test, in accordance with clause 1 of table 2 of **DSTU IEC 60055-1** (IEC 60055-1:1997+AMD1:2005, IDT) according to the method of section 5, **DSTU EN 61442** (EN 61442:2005, IDT), **DSTU IEC 60060-1** (IEC 60060-1:1989, IDT).

Start date: 07.11.2022  
End date: 07.11.2022

Relative humidity 54%  
The temperature is 18°C  
Atmospheric pressure 980 mbar

**Test description.**

The constant voltage test was carried out in accordance with item 1 of the table. 2 **IEC 60055-1** (IEC 60055-1:1997+AMD1:2005, IDT) according to the method of section 5 of **EN 61442** (EN 61442:2005, IDT), **DSTU IEC 60060-1** (IEC 60060-1:1989, IDT) on samples **#1, #2, #3**. The samples were tested with a constant voltage of 60 kV for 15 minutes. The test voltage was applied in phases between one of the cores and the grounded other cores and the metal screen.

Samples **No. 1, No. 2, No. 3** passed the test without breakdown of insulation and overlap.

The test is considered passed.

No	Phase	High-voltage	Duration of exposure	Test result
1	AND	60 kV	15 min.	There was no breakdown
1	IN	60 kV	15 min.	There was no breakdown
1	WITH	60 kV	15 min.	There was no breakdown
2	AND	60 kV	15 min.	There was no breakdown
2	IN	60 kV	15 min.	There was no breakdown
2	WITH	60 kV	15 min.	There was no breakdown
3	AND	60 kV	15 min.	There was no breakdown
3	IN	60 kV	15 min.	There was no breakdown
3	WITH	60 kV	15 min.	There was no breakdown

The result of the electrical strength test: **Positive.**

## APPENDIX № 2

**Test № 2.**

AC voltage testing in accordance with clause 1 of table 2 of **DSTU IEC 60055-1** (IEC 60055-1:1997+AMD1:2005, IDT) according to the method of section 4.1 of **DSTU EN 61442** (EN 61442:2005, IDT), **DSTU IEC 60060-1** (IEC 60060-1:1989, IDT).

Start date: 08.11.2022

End date: 08.11.2022

Relative humidity 54%

The temperature is 22°C

Atmospheric pressure 980 mbar

**Test description.**

After test No. 1, we conduct an alternating voltage test in accordance with item 1 of the table. 2 **IEC 60055-1** (IEC 60055-1:1997+AMD1:2005, IDT) according to the method of section 4 of **EN 61442** (EN 61442:2005, IDT), **DSTU IEC 60060-1** (IEC 60060-1:1989, IDT) on samples **#1, #2, #3**.

The samples were tested with an alternating voltage of 45 kV of industrial frequency. Each trial lasted 5 minutes. The test voltage was applied in phases between one of the cores and the grounded other cores and the metal screen. The voltage was continuously increased to the specified value and then held constant for the specified duration of the test.

Samples **No. 1, No. 2, No. 3** passed the test without breakdown of insulation and overlap.

No	Phase	High-voltage	Duration of exposure	Test result
1	AND	45 kV	5 min.	There was no breakdown
1	IN	45 kV	5 min.	There was no breakdown
1	WITH	45 kV	5 min.	There was no breakdown
2	AND	45 kV	5 min.	There was no breakdown
2	IN	45 kV	5 min.	There was no breakdown
2	WITH	45 kV	5 min.	There was no breakdown
3	AND	45 kV	5 min.	There was no breakdown
3	IN	45 kV	5 min.	There was no breakdown
3	WITH	45 kV	5 min.	There was no breakdown

The result of the electrical strength test: **Positive.**

**Test № 3.**

AC voltage test in the rain in accordance with clause 1 of table 2 of **DSTU IEC 60055-1** (IEC 60055-1:1997+AMD1:2005, IDT) according to the method of section 4.2 of **DSTU EN 61442** (EN 61442:2005, IDT), **DSTU IEC 60060-1** (IEC 60060-1:1989, IDT).

Start date: 09.11.2022  
End date: 09.11.2022

relative humidity 57%  
Temperature 19°C  
Atmospheric pressure 980 mbar

Conditions: Average rain rate: 3 mm/min  
The water temperature is 17 °C  
The specific resistance of water at t 20°C is 100 Ω xm

**Test description.**

We conduct alternating voltage tests in the rain in accordance with item 1 of the table. 2 **IEC 60055-1** (IEC 60055-1:1997+AMD1:2005, IDT) according to the method of section 4.2 **EN 61442** (EN 61442:2005, IDT), **DSTU IEC 60060-1** (IEC 60060-1:1989, IDT) on samples **#1, #2** . Before applying the voltage, the samples, installed in the working position, were kept for 15 minutes under the uniform rain of droplet structure falling on them at an angle of 45° to the horizontal at ambient temperature. The voltage was continuously increased to the specified value of 40 kV for 10 seconds and then held constant for the specified duration of the test. Each trial lasted 1 minute. The test voltage was applied in phases between one of the cores and the grounded other cores and the metal screen.

Voltage changes are no more than 3%.

Samples **No. 1, No. 2** passed the test without insulation breakdown and overlap.

No	Phase	High-voltage	Duration of exposure	Test result
1	AND	40 kV	1 min.	There was no breakdown
1	IN	40 kV	1 min.	There was no breakdown
1	WITH	40 kV	1 min.	There was no breakdown
2	AND	40 kV	1 min.	There was no breakdown
2	IN	40 kV	1 min.	There was no breakdown
2	WITH	40 kV	1 min.	There was no breakdown

The result of the electrical strength test: **Positive.**

**Test № 4.**

Impulse voltage test, in accordance with clause 2 of table 2 of **DSTU IEC 60055-1** (IEC 60055-1:1997+AMD1:2005, IDT), according to the methodology of Chapter 6 of **DSTU EN 61442** (EN 61442:2005, IDT).

Start date: 10.11.2022  
End date: 10.11.2022

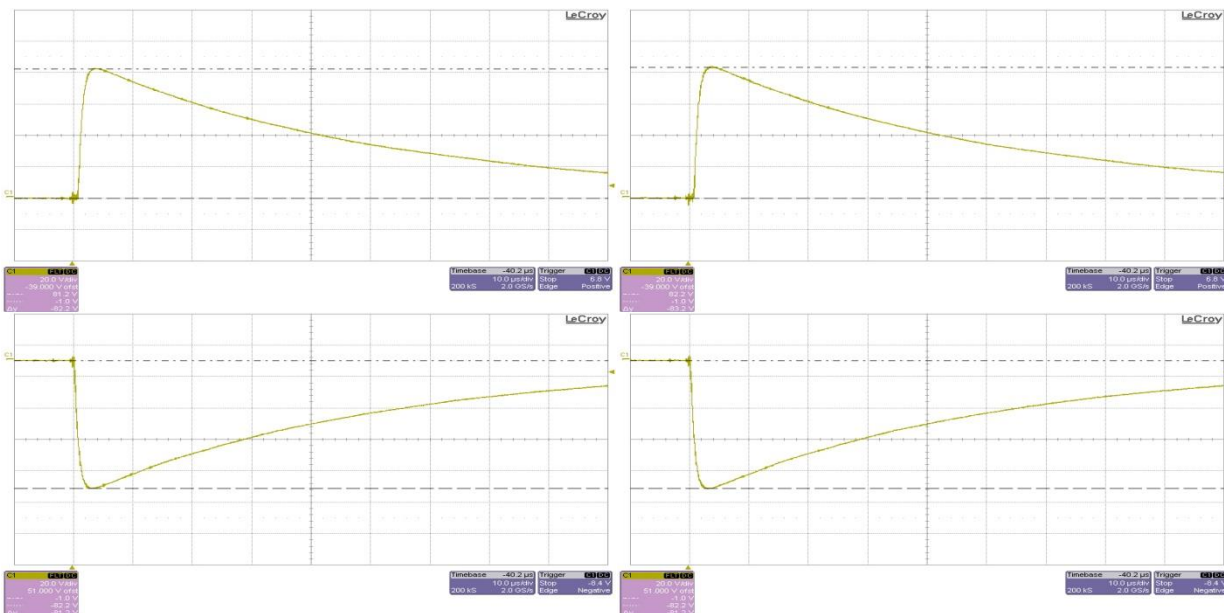
Relative humidity 57%  
The temperature is 19 °C  
Atmospheric pressure 990 mbar

**Test description.**

After the alternating voltage test, we perform the impulse voltage test in accordance with item 2 of the table. 2 **IEC 60055-1** (IEC 60055-1:1997+AMD1:2005, IDT) according to the method of section 6 of **EN 61442** (EN 61442:2005, IDT) on samples **#1, #2** with the use of samples **#5, #6** (for control of temperature indicators). The test was carried out with normalized pulses of lightning voltage of 1.3/51  $\mu$ s, 10 pulses of positive and negative polarity. Prior to the impulse voltage tests, the samples were heated using a current source to a core temperature of 60-65° C and kept for 2 hours. The value of the test impulse voltage was 80 kV. The test voltage was applied in phases between one of the cores and the grounded other cores and the metal screen.

Samples **No. 1, No. 2** passed the test without insulation breakdown and overlap.

Oscillograms of positive and negative 1 and 10 pulses



Test result: **Positive.**

**Test № 5.**

Testing by heating cycles in air according to clause 3 of table 2 of **DSTU IEC 60055-1** (IEC 60055-1:1997+AMD1:2005, IDT), according to the method of **DSTU EN 61442** (EN 61442:2005, IDT) chapter 9.

Start date:	11.11.2022
End date:	02.12.2022
Relative humidity	48-57 %
The temperature is	20°C
Atmospheric pressure	995-1100 mbar

**Test description.**

After the impulse voltage test, we conduct the test with heating cycles in air in accordance with item 3 of the table. 2 **IEC 60055-1** (IEC 60055-1:1997+AMD1:2005, IDT) according to the method of section 9 of **EN 61442** (EN 61442:2005, IDT) on samples **#1, #2** with the use of samples **#5, #6** (for control of temperature indicators). The samples were heated using a current source and subjected to 63 heating-cooling cycles in air with a constant application of a test voltage of 15 kV. The cable with mounted couplings was connected in a ring. The temperature was monitored on the control sections of the cable. The load was carried out using a current transformer. The current was monitored using a measuring transformer. Each heating cycle consisted of a heating period lasting 2 hours. to a temperature of 60-65° C, exposure time 3 hours. and a cooling period of 3 hours. to the core temperature, which does not exceed the ambient temperature by more than 5° C. At the end of the heating period in the first test cycle, the current was corrected and remained constant during the next test cycle. The ambient temperature during the heating cycle was 20° C.

Voltage changes no more than 3%

Samples **No. 1, No. 2** passed the test without insulation breakdown and overlap.

Test result: **Positive.**

All samples passed the test. There was no breakdown



**Test №. 6.**

Thermal short circuit of the conductor in accordance with clause 4 of table 2 of **DSTU IEC 60055-1** (IEC 60055-1:1997+AMD1:2005, IDT) of section 11, **DSTU EN 61442** (EN 61442:2005, IDT)

Start date: 05.12.2022  
End date: 05.12.2022

Relative humidity 57%  
The temperature is 19°C  
Atmospheric pressure 1060 mbar

**Test description.**

We conduct short-circuit current tests in accordance with item 5 of the table. 2 **IEC 60055-1** (IEC 60055-1:1997+AMD1:2005, IDT) according to the method of chapter 11 of **EN 61442** (EN 61442:2005, IDT) on sample #3 using sample #7 (for temperature control). The maximum permissible temperature in the event of a short-circuit of the cable conductor according to the technical specifications of the cable manufacturers AAB1 3x240-10 kV should be at least 200 °C. 12.9 kA, therefore the required value of the short-circuit current should be 12.9 kA. The cores of the cable were connected in series and connected to a current source. The short-circuit load was applied twice after cooling the conductor to a temperature of 5-10° C above the initial temperature (room temperature 19 °C). The time of each test was 5 seconds. Sample No. 3 passed the test without insulation breakdown and overlap.

**Test result : Positive.**

Visual inspection revealed no damage in both test trials.

**Test № 7.**

Impulse voltage test, in accordance with clause 6 of table 2 of **DSTU IEC 60055-1** (IEC 60055-1:1997+AMD1:2005, IDT), according to the methodology of Chapter 6 of **DSTU EN 61442** (EN 61442:2005, IDT)

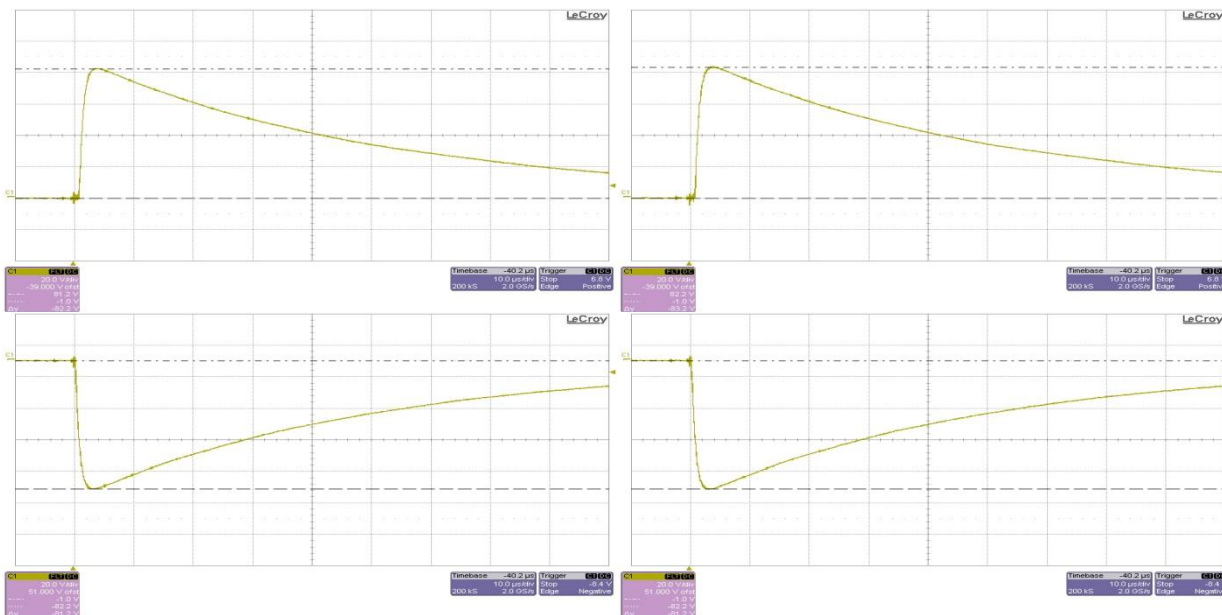
Start date: 06.12.2022  
End date: 06.12.2022

Relative humidity 67%  
The temperature is 20°C  
Atmospheric pressure 1020 mbar

**Test description.**

We conduct impulse voltage tests in accordance with item 6 of the table. 2 **IEC 60055-1** (IEC 60055-1:1997+AMD1:2005, IDT) according to the method of section 6 of **EN 61442** (EN 61442:2005, IDT) on samples **No. 1, No. 2, No. 3** with the use of samples **No. 5, No. 6, No. 7** (for temperature control). The test was carried out with normalized pulses of lightning voltage of 1.3/51  $\mu$ s, 10 pulses of positive and negative polarity. Prior to the impulse voltage tests, the samples were heated with the help of a current source to a core temperature of 60- 65 °C and kept for 2 hours. The value of the test impulse voltage was 80 kV. The test voltage was applied in phases between one of the cores and the grounded other cores and the metal screen.

Samples **No. 1, No. 2, No. 3** passed the test without breakdown of insulation and overlap.  
Oscillograms of positive and negative 1 and 10 pulses



Test result: **Positive.**  
There was no breakdown.

**Test № 8.**

AC voltage testing in accordance with clause 7 of table 2 of **DSTU IEC 60055-1** (IEC 60055-1:1997+AMD1:2005, IDT), according to the method of **DSTU EN 61442** (EN 61442:2005, IDT) section 4 clause 4.1, **DSTU IEC 60060-1** (IEC 60060-1:1989, IDT).

Start date: 07.12.2022  
End date: 07.12.2022

Relative humidity 52%  
The temperature is 21°C  
Atmospheric pressure 950 mbar

**Test description.**

After test No. 7, we conduct tests with alternating voltage, according to item 7 of the table. 2 **IEC 60055-1** (IEC 60055-1:1997+AMD1:2005, IDT) according to the methodology of section 4 **EN 61442** (EN 61442:2005, IDT) , **DSTU IEC 60060-1** (IEC 60060-1:1989, IDT) on samples **#1, #2, #3** . The test voltage was applied in phases between one of the cores and the grounded other cores and the metal screen. The samples were tested with an alternating voltage of 25 kV of industrial frequency for 15 minutes. The voltage was continuously increased to the specified value and then held constant for the specified duration of the test.

Voltage changes are no more than 3%.

Samples **No. 1, No. 2, No. 3** passed the test without breakdown of insulation and overlap.

No	Phase	High-voltage	Duration of exposure	Test result
1	AND	25 kV	15 min.	There was no breakdown
1	IN	25 kV	15 min.	There was no breakdown
1	WITH	25 kV	15 min.	There was no breakdown
2	AND	25 kV	15 min.	There was no breakdown
2	IN	25 kV	15 min.	There was no breakdown
2	WITH	25 kV	15 min.	There was no breakdown
3	AND	25 kV	15 min.	There was no breakdown
3	IN	25 kV	15 min.	There was no breakdown
3	WITH	25 kV	15 min.	There was no breakdown

Test result: **Positive.**

All samples passed the test, no breakdown occurred.

### Test № 9.

Test for salt fog in accordance with clause 9 of table 2 of **DSTU IEC 60055-1** (IEC 60055-1:1997+AMD1:2005, IDT) according to the methodology of **DSTU EN 61442** (EN 61442:2005, IDT) chapter 13

Start date:	10/28/2022
End date:	09.12.2022
Atmospheric pressure	950-1040 mbar
Average temperature in the room:	20°C
Amount of sprayed water:	$0.4 \pm 0.1 \frac{l}{m^3 h}$
Conductivity of sprayed water:	1600±200 mSm/m at t 20°C
Test voltage:	12.5 kV at a frequency of 50 Hz
Test time	1000 hours

### Test description.

The salt fog test is carried out in accordance with item 9 of the table. 2 **IEC 60055-1** (IEC 60055-1:1997+AMD1:2005, IDT) according to the method of section 13 of **EN 61442** (EN 61442:2005, IDT) on sample #4 . Test sample #4 was placed in a transparent salt fog test chamber at ambient temperature. The tested sample was exposed to salt fog with an industrial frequency alternating voltage of 12.5 kV for 1000 hours. The voltage test was carried out according to a three-phase scheme.

Specimen #4 passed the salt fog test with simultaneous AC voltage application, without insulation and tracking failure and with no damage.

**Test requirements** : no breakdown or tracking, no fundamental damage .

Test result: **Positive.**

Test sample shows salt stains on cable lugs and end sleeves, no tracking

Photo of external mounting coupling THP-N-10-CF3 (S) SOZNANIJE.

Before the beginning of the tests.



After the tests are over.



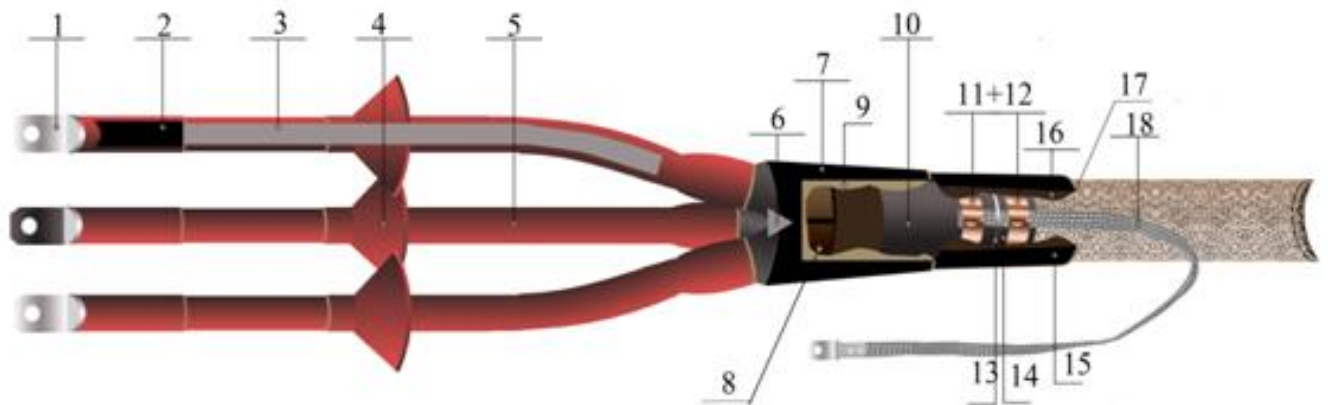
**COMPLETE INFORMATION (PASSPORT)**  
**on a kit for mounting one end coupling for external installation THP-N-10 CF3 (S) SOZNANIE,**  
**serial produced by the company "RADPOL" SA (Poland).**

Name details and installation materials	Unit ex.	Number on one clutch		
		THP-N-10-CF3 16-50(S) SOZNANIE	THP-N-10-CF3 70-120(S) SOZNANIE	THP-N-10- CF3 150- 240(S) SOZNANIE
1. Glove heat shrinkable with adhesive under layer what isolates <b>AK3 25-120</b>	piec e	1	-	-
	<b>AK3 95-300</b>	piec e	-	1
	<b>AK3 95-300</b>	piec e	-	-
2. Tube heat shrinkable oil resistant No 1 RC for wire insulation cable	19/9.5x800mm	piec e	3	-
	25.4/12.7x800mm	piec e	-	3
	38/19x800mm	piec e	-	-
3. Heat-shrink tube #2 <b>RPAT</b> with adhesive under layer	35/12x800mm	piec e	3	-
	40/16x800mm	piec e	-	3
	50/20x800mm	piec e	-	-
4. Cuff bandage with adhesive under layer <b>RPKH 1</b>	50/20x200mm	piec e	1	-
	63/19x200mm	piec e	-	1
	80/35x200mm	piec e	-	-
5. Wire grounding copper tinned with tip, ( <b>Plecionka miedziana</b> ) length 800 mm	cross section 16 mm <sup>2</sup>	piec e	1	1
	cross section 25 mm <sup>2</sup>	piec e	-	-
6. Grounding wire tip <b>Ks (Końcówka kablowa)</b>	16/8	piec e	1	1
	25/8	piec e	-	-
7. *Solder POS - 30	kg	0.05	0.05	0.05
8. *Solder brands AND	kg	0.03	0.03	0.03
9. Wire galvanized 1.2 mm	m	1.25	1.25	1.25
10. *Fat soldering iron	piec e	1	1	1
11. *Contact plate (grater)	piec e	2	2	2
12. *Spring PPT	<b>S2( Zacisk springy)</b>	piec e	2	-
	<b>S3 ( Zacisk springy)</b>	piec e	-	2
	<b>S4 ( Zacisk springy)</b>	piec e	-	-
thirt	Napkin alcohol ( <b>Chusteczka czyszcząca</b> )	piec e	2	2

een.		e			
14.	Napkin silicone ( <b>Chusteczka silicone</b> )	piec e	1	1	1
15.	Threads linen ( <b>Sznurek przewiazkowy</b> )	m	1.5	1.5	1.5
16.	Placeholder root parts ( <b>Masa sealer (MU star)</b> ) 25/1.5x100mm	piec e	1	-	-
	25/1.5x150mm	piece	-	1	-
	25/1.5x200mm	piece	-	-	1
17.	Tape PVC	piec e	1	1	1
18.	Insulator ( <b>Klosz termokurczliwy</b> ) <b>CES-1</b>	piec e	3	3	-
	<b>CES-2</b>	piec e	-	-	3
19.	* Tip screw, m m <sup>2</sup> 16-50	piec e	3	-	-
	70-120	piec e	-	3	-
	150-240	piec e	-	-	3

20.	Sealant tape for sealing the grounding node on the shell (for armor ) ( <b>Masa pancierz</b> ) 25x1.5x250 mm	piece	2	-	-
	25x1.5x 350 mm	piece	-	2	2
21.	Sealant under the glove ( <b>Masa zaćelająca podpalczatke</b> ) 40/1x100mm	piece	1	-	-
	40/1x150 mm	piece	-	1	1
22.	Sealant on tip ( <b>Masa sealer MU Koncowka</b> ) 25/0.7x250 mm	piece	3	-	-
	25/0.7x350 mm	piece	-	3	-
	25/0.7x450 mm	piece	-	-	3
23.	Instruction with installation	piece	1	1	1
24.	Gloves b/p	couple	1	1	1
25.	Cardboard box	piece	1	1	1
Notes: * - delivered by by order					

Technical drawing of the clutch assembly THP-N-10-CF3 150-240 (S) SOZNANIE



1. Screw tip. 2. Sealant for the tip (**Masa uszczelniająca MU końcówka**). 3. Heat-shrinkable oil-resistant tube № 1 RC for insulating cable cores. 4. Insulator (**Kłosz termokurczliwy**). 5. Shrink tube No. № 2 RPAT with an adhesive layer. 6. Filler of the root part (**Masa szczelniająca (MU gwiazda)**). 7. Heat-shrinkable glove with an adhesive underlayer. 8. A screen made of conductive paper. 9. Sealant under the glove (**Masa uszczelniająca pod palczatkę**). 10. Metal sheath of the cable. 11. PPT spring. 12. Contact plate (grater). 13. The wire is galvanized. 14. Cable armor. 15. Bandaging cuff with an adhesive sublayer RRKN 1. 16. Sealant tape for sealing the grounding node on the shell (on the armor) (**Masa uszczelniająca (pancerz)**). 17. Glue-melt. 18. Tinned copper earthing wire with a tip, (**Plecionka miedziana**).