HVD

ISO 9001:2001; ISO 14001:2004; OHSAS 18001:2004

ЕЛЕКТРОГЕЦ ООД

Производство на МКТП, МТТ, ел. табла, ел. монтаж и оборудване на трафопостове
Производствена база и офис: гр. София, п.к.1271, НПЗ "Илиянци–Запад", ул. "Джерман" № 10 А,
тел. (02) 838 12 20, факс. (02) 813 08 71, e-mail: elgec@omega.bg, www.electrogetz.com,
Магазин и офис – гр. Банско, п.к. 2770, ул. "Стефан Караджа" № 48, тел./факс. 0749 885 49

TECHNICAL SPECIFICATION № 285

ELECTROGETZ Ltd. PREFABRICATED CONCRETE COMPLEX TRANSFORMER SUBSTATION, WALK-IN TYPE

* Ring Main Unit (RMU) – 20kV

- Voltage (Ur) – 24kV
- Rated current (Ir) – 630A
- Insulation level:
  - Voltage at 50Hz/1min (Ud) – 50kV
  - Impulse voltage 1.2/50μs (Up) – 125kV
- Short-time withstand current (Ik) – 21kA
- Peak withstand current (Ip) – 52.5kA
- Frequency – 50Hz
- Fuse feeder – 200A

* LV switchboard 1250/12/400:

- Voltage (Ur) – 0.69/0.4/0.23 kV
- Rated current (Ir) – 1250A

* MV and LV connection:

- MV connection – cable type NA2XSY 20kV, 3x1x50 mm², cable cold shrink MV terminations 20kV
  - Rated current (Ir) – 185A
  - Insulation level:
    - Voltage at 50Hz/1min (Ud) – 50kV
    - Impulse voltage (Up) – 125kV
- LV connection – copper busbar 4x{2x[8x(60x1mm)]}
  - Rated current (Ir) – 1250A
  - Insulation level:
    - Impulse voltage (Up) – 6kV

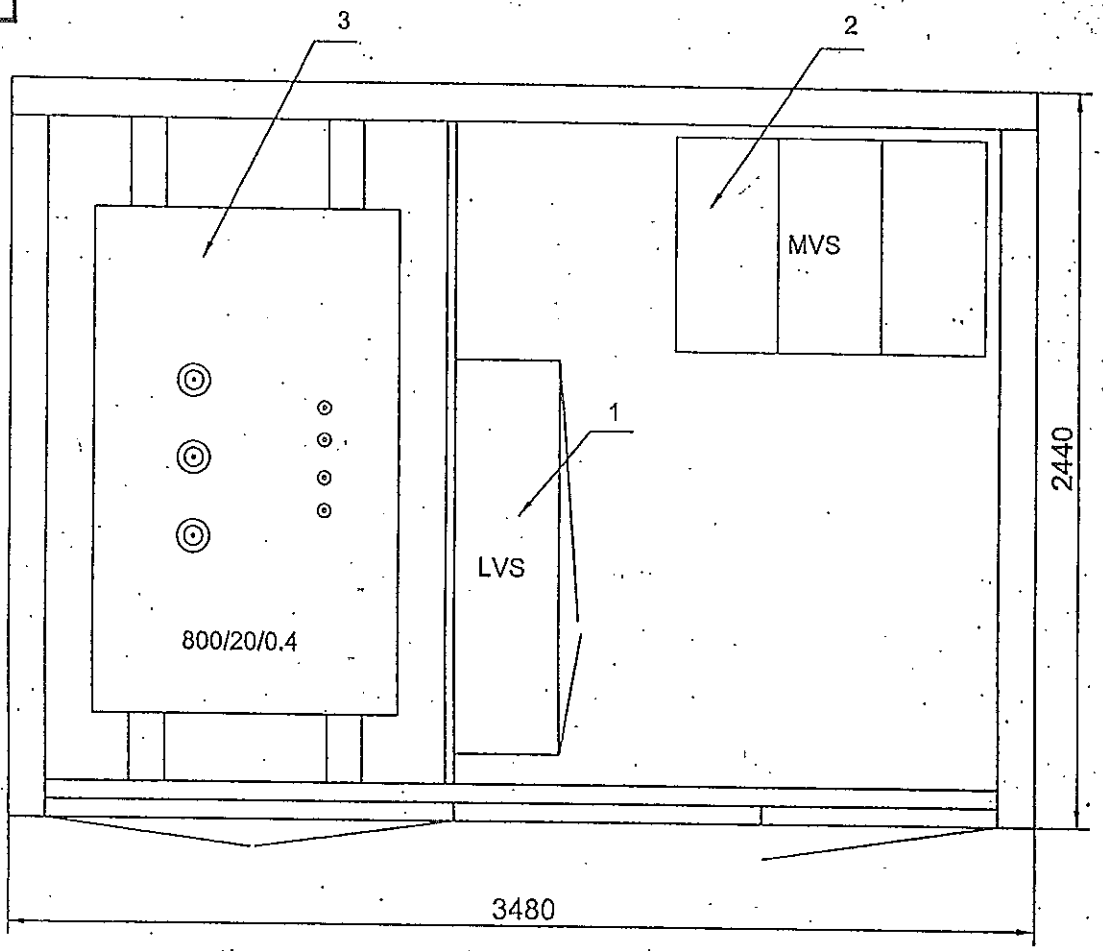
* Transformer 800 kVA/20kV/0.4kV:

- Voltage (Ur) – 20±2% /0.4 kV
- Rated current (Ir) – 23.09/1154.7A
- Frequency (Fr) – 50Hz
- Winding connection group – Dyn5
- Type of cooling– ONAN
- Insulation level:
  - Voltage 50Hz/1min (Ud) MV winding – 50kV
  - Voltage 50Hz/1min (Ud) LV winding – 3kV

ВЯРНО С ОРИГИНАЛА

ЕЛЕКТРОГЕЦ ООД СОФИЯ

HVD



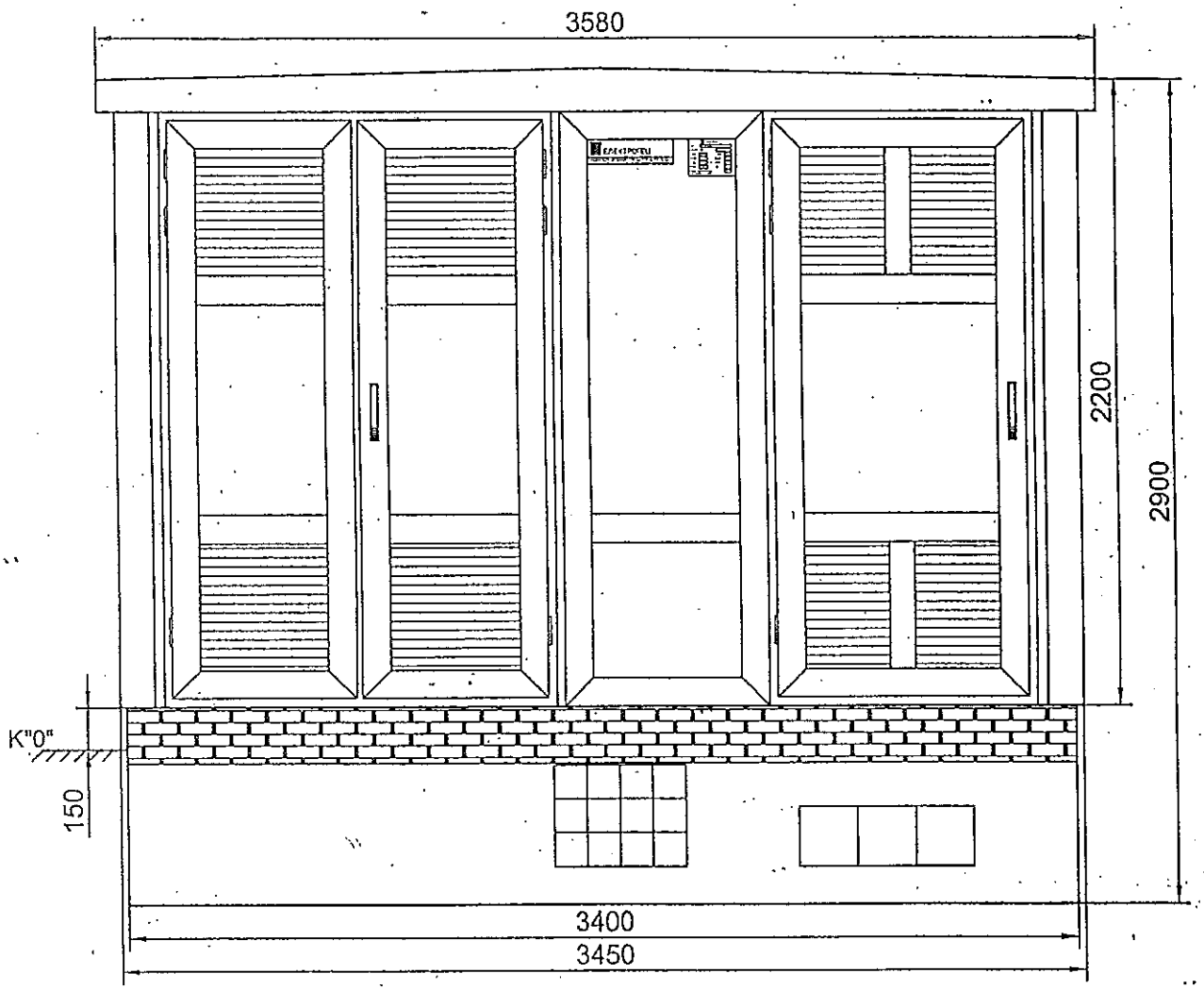
№	Name	Pcs.
1.	Main distibution low voltage board type: "ГТРТ 1250/12/400"	1
2	Medium voltage switchgear 20 kV 630A	1
3	Power tansformer, oil type 800 kVA 20/0.4 kV	1

ВЕРНО С ОРИГИНАЛА

ЕЛЕКТРОГЕЦ София ООД

					CCTS 800/20/0.4	Scale
		Articcle No	Signature	Date	Situation	1:25
Created by		dipl.eng. Kyosev		09.08		Sheet 1 / 5 Sh.
Designed by		dipl.eng. Kyosev		09.08	Object:	
Checked by		dipl. eng.Lazarov		09.08		"ELEKTROGETZ" lt
Manager		dipl. eng.Georgiev		09.08		

HVD



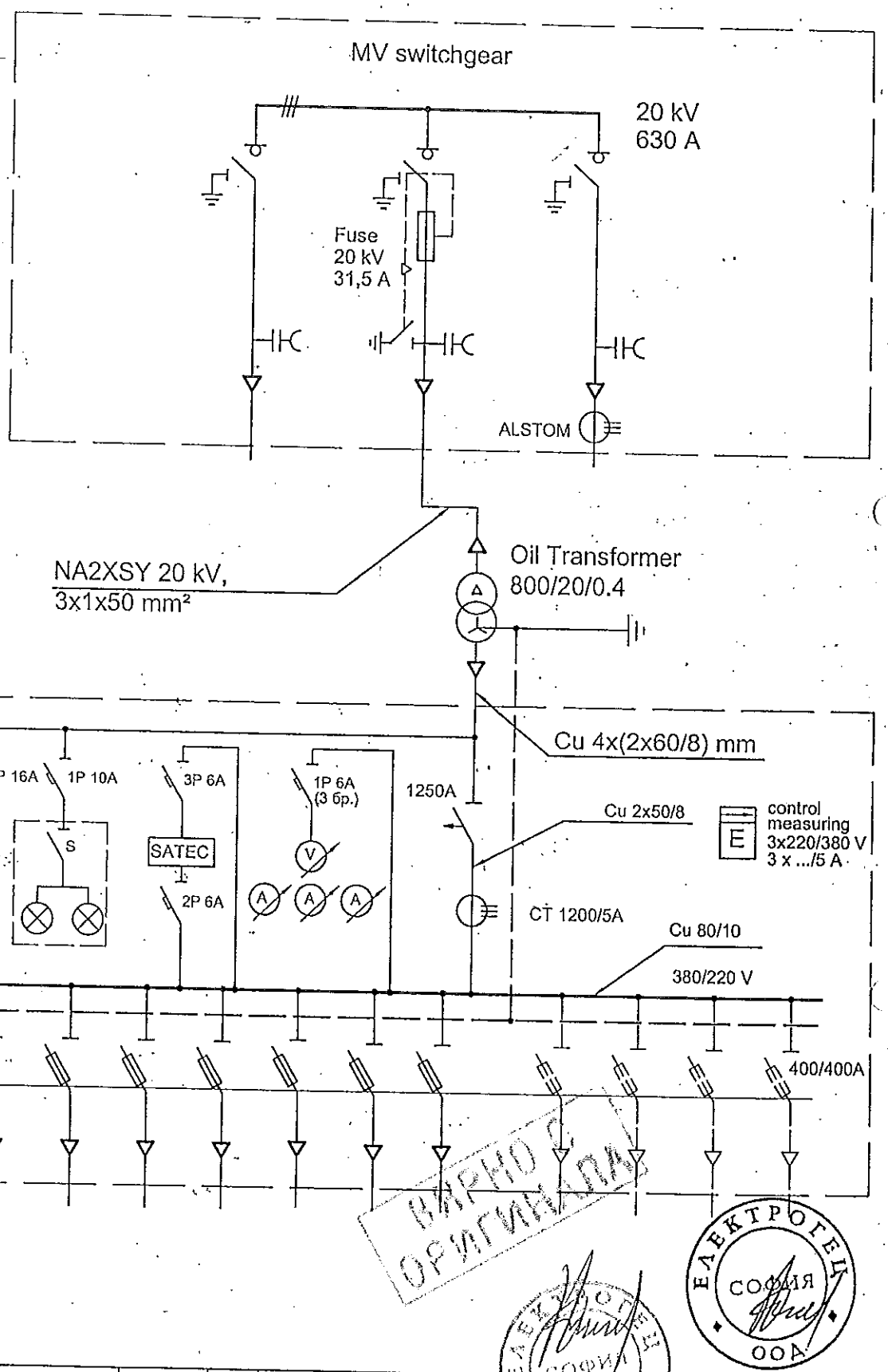
ВЯРНО С ОРИГИНАЛА

ЕЛЕКТРОГЕН СОФИЯ ООД

ЕЛЕКТРОГЕН СОФИЯ ООД

					CCTS 800/20/0.4		Scale
							1:25
		Articcle No	Signature	Date	View 'A'		
	Created by	dipl.eng. Kyosev		09.08		Sheet 2	5 Sh.
	Designed by	dipl.eng. Kyosev		09.08	Object:		
	Checked by	dipl. eng.Lazarov		09.08		"ELEKTROGETZ" lt	
	Manager	dipl. eng.Georgiev		09.08			

HVD



	Articcle No	Signature	Date
Created by	dipl.eng.Kyosev		09.08
Designed by	dipl.eng.Kyosev		09.08
Checked by	dipl. eng.Lazarov		09.08
Manager	dipl. eng.Georgiev		09.08

CCTU 800 kVA 20/0.4 kV
Single line diagram

Object:

Scale

Sheet 1 | 1 Sh.

"ELEKTROGETZ" ltd.

RESEARCH, DEVELOPMENT AND TESTING
NATIONAL INSTITUTE FOR
ELECTRICAL ENGINEERING
I C M E T CRAIOVA

LABORATORIES DEPARTMENT
HIGH VOLTAGE DIVISION - HVD
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nr. LI 529 / 2007

Address: Calea Bucuresti No.144, 200515 Craiova, ROMANIA
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Phone: + 40 0351 402425, 404888; Fax: + 40 0251 415482, 0351 404890
www.icmet.ro, e-mail: testing_services@icmet.ro, ljt@icmet.ro

TEST REPORT
No. 20023 / 17.10.2008

1.	**CUSTOMER:**	**ELECTROGETZ LTD**
2.	**CUSTOMER'S ADDRESS:**	Str. Jerman no.10A, kv. Iliyantzi, 1271 Sofia, BULGARIA
3.	**MANUFACTURER:**	**ELECTROGETZ LTD**
4.	**MANUFACTURER'S ADDRESS:**	Str. Jerman no.10A, kv. Iliyantzi, 1271 Sofia, BULGARIA
5.	**TESTED PRODUCT:**	**800 kVA, 20/0.4 kV Prefabricated Concrete Transformer Substation, type BKTP, serial no. 08-1029/2008**
6.	**REFERENCE STANDARD:**	IEC 62271-202:2006
7.	**TESTS PERFORMED:**	I. Dielectric tests on the low-voltage interconnection II. Verification of withstand of the enclosure against mechanical impacts
8.	**TEST DATE:**	14.10.2008

This report contains 6 pages and it is edited in 4 copies from which 3 copies for customer.

Head of High Voltage Division,
Eng. Dorin POPA

Head of Laboratory,
Eng. Aurelia SCORNEA

WARNINGS:

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c. Accreditation of the laboratory or any of its test reports issued under accreditation regime do not constitute or do not imply themselves an approval of the product by the accreditation body.
d. All signatures from the present report are originals.
e. The product was presented to be tested by the customer.

CONTENT:

Identification of the tested product (serial no, type)..... Page 3
Technical characteristics (established by manufacturer) ..... Page 3
Tests program ..... Page 3
Responsible for tests..... Page 3
Dielectric tests on the low-voltage interconnection ..... Page 4
Verification of withstand of the enclosure against mechanical impacts ..... Page 5

IDENTIFICATION OF THE TESTED PRODUCT:

Type: ВКТР (БКТП)
Serial number / year: 08-1029/2008
Technical specification/drawing: No.285 / Single line diagram
Photo of the product: presented in Figure 1
Contract No.:2212/10.10.2008
Product receiving date: 14.10.2008
Product condition at receiving: New

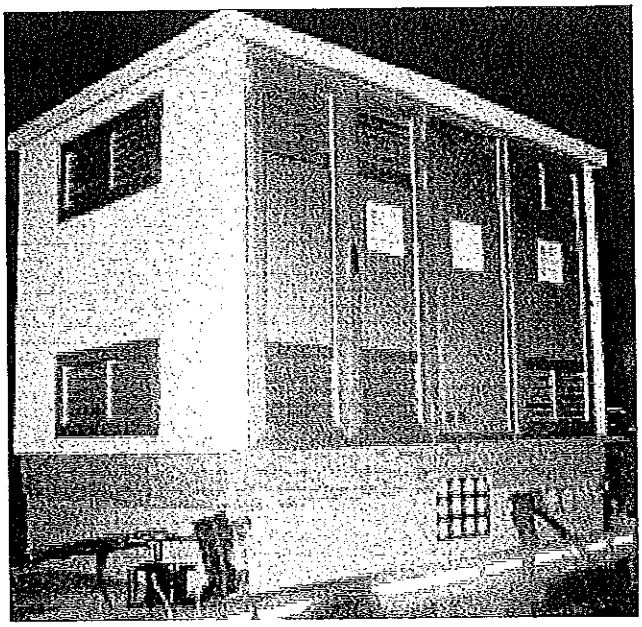

Figure 1: Tested product

TECHNICAL CHARACTERISTICS ESTABLISHED BY MANUFACTURER:

Rated power: 800 kVA
Voltage: 20 kV / 0.4 kV
Frequency: 50 Hz
LV connection rated impulse voltage: 6 kV

TESTS PROGRAM:

I. Dielectric tests on the low-voltage interconnection

II. Verification of withstand of the enclosure against mechanical impacts

RESPONSIBLE FOR TESTS: Eng. Ion DINU

ВЯРНО С ОРИГИНАЛА

ЕЛЕКТРОГЕЙ ООД СОФИЯ

I. DIELECTRIC TESTS ON THE LOW-VOLTAGE INTERCONNECTION

1. **Product receiving date:** 14.10.2008
2. **Test date:** 14.10.2008
3. **Reference standard:** IEC 62271-202:2006
4. **Atmospheric conditions:** t = 18.4 ^{0}C, u.r. = 62.5 %
5. **Equipment used:**
   - Generator for impulse voltage, negative polarity and alternative voltage type SIP010, serial no. 620091, manufactured by RFT Germany, CE no. 0088/26.10.2006, expanded uncertainty U=2,3% for coverage factor k=2
   - Generator for impulse voltage, positive polarity, type SIP010, serial no. 620090, manufactured by RFT Germany, CE no. 0089/26.10.2006, expanded uncertainty U=2,2% for coverage factor k=2
   - Thermohygrometer type HD 100, serial no. 06102404, manufactured by KIMO, France, CE no.4.8-11-06-025/13.11.2006, expanded uncertainty U=0,3°C for temperature measurement and U=2% for relative humidity for coverage factor k=2
6. **Working procedure**

The lightning impulse voltage tests on the low voltage interconnection between transformer and the low-voltage circuit breaker was performed according to IEC 62271-202:2006, clause 6.2.2.2

The lightning impulse test voltage was chosen according to Table 5 of IEC 60664-1, taking into account the rated impulse voltage of 6 kV, declared by the manufacturer in the technical specification. The impulse voltage at the sea level, with the waveform 1,2/50μs and the peak value of 7,3 kV was applied three times for each polarity at intervals of 1s minimum.

During these tests, the low-voltage circuit breaker is taken out from the circuit.

The lightning impulse voltage was applied between each active part and the others active parts of the low voltage interconnection connected together and to the earth.

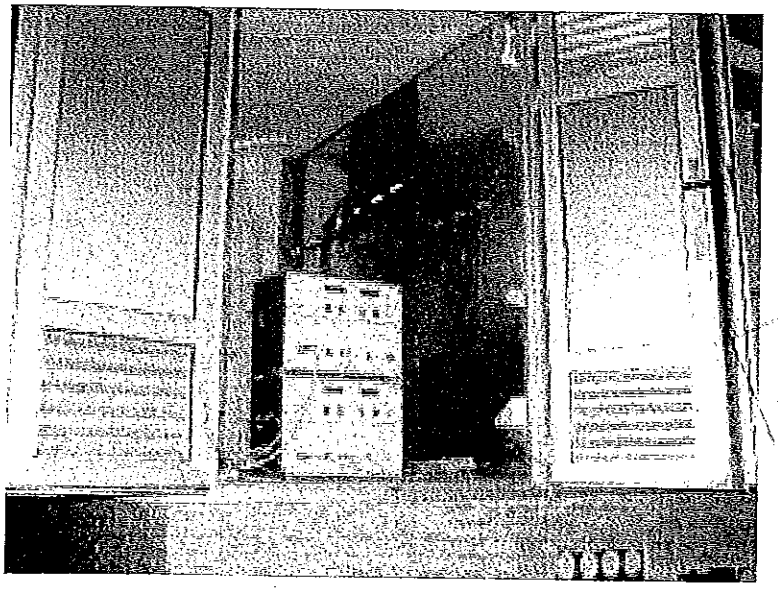

Figure 2: Dielectric tests on the low-voltage interconnection

7. **Responsible for tests:** Eng. Ion DINU

8. **Test result**

The product withstood the test.
During the tests above, there were not disruptive discharges.

II. VERIFICATION OF WITHSTAND OF THE ENCLOSURE AGAINST MECHANICAL IMPACTS

1. **Product receiving date:** 14.10.2008
2. **Test date:** 14.10.2008
3. **Reference standard:** IEC 62271-202:2006
4. **Atmospheric conditions:** t = 18.4 ^{0}C, u.r. = 62.5 %
5. **Equipment used:** - Pendulum hammer, manufacturer ICMET according IEC 60068-2-75:1997, serial no.3, CE no. Dj 06-3061545/2006, expanded uncertainty U=0.75% for coverage factor k=2;
   - Thermohygrometer type HD 100, serial no. 06102404, manufactured by KIMO, France, CE no.4.8-11-06-025/13.11.2006, expanded uncertainty U=0,3°C for temperature measurement and U=2% for relative humidity for coverage factor k=2.

6. **Working procedure**

The verification of the enclosure withstand to mechanical impacts was performed according to IEC 62271-202:2006, subclause 6.7.3.

The product was visually examined before the tests.

The impact energy of 20 J was produced using a pendulum hammer with an equivalent mass of 5kg±5 %, with the height of fall 400mm ± 10%.

In order to check the enclosure withstand to mechanical impacts, there were applied blows with the pendulum hammer on each access door and ventilation openings, in the points assumed to be the weakest of the enclosure.

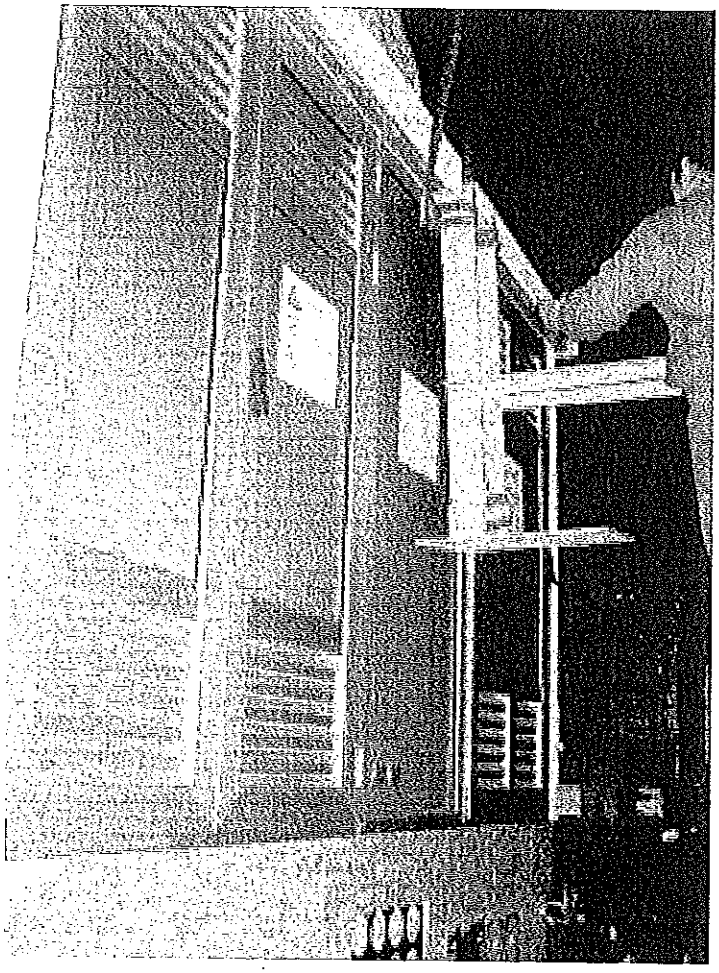

Figure 3: Mechanical impact test

7. **Responsible for tests:** Eng. Ion DINU

8. **Test result:**

The product withstood to the mechanical impact test.

After the tests, the enclosure did not present any breaks or deformations which could affect the dielectric properties and the normal operation of the equipment inside the substation.

- End of the Test Report -

RESEARCH-DEVELOPMENT AND TESTING NATIONAL
INSTITUTE FOR ELECTRICAL ENGINEERING

ICMET CRAIOVA
HIGH POWER DIVISION

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DAT-P-266/07-20

ÎNCERCARE

SR EN ISO / CEI 17025: 2005
CERTIFICAT DE ACREDITARE
nr. LI 004 / 2007

TEST REPORT
No. 10313

CUSTOMER:	**ELECTROGETZ LTD** 1271 Sofia, BULGARIA, kv. Iliyantzi, 10 A Jerman Str
MANUFACTURER:	**ELECTROGETZ LTD** 1271 Sofia, BULGARIA, kv. Iliyantzi, 10 A Jerman Str
TESTED PRODUCT	20/0.4 kV, 800 KVA Prefabricated concrete complex transformer Substation
REFERENCE STANDARD:	IEC 62271-202 / 2006 clause 6.3
TEST PERFORMED:	Temperature-rise test and determination of thermal class
TEST DATE:	16.10.2008
TEST RESULT:	Passed the tests

Report has 14 pages and it is edited in 4 copies from which 3 copies for customer.

HEAD OF HIGH POWER DIVISION:
Dr. Eng. George Curcanet

DATE OF ISSUE: 29.10.2008

ICMET LABORATORUL DE MARE PUTERE "OVIDIU RARINCA" CRAIOVA

HEAD OF LABORATORY:
Eng. Constantin Iancu

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ЕЛЕКТРОГЕТЦ СОФИЯ ООД

Content

1.	Identification of the test product	3
2.	Technical characteristics established by manufacturer	3
3.	Tests program	3
4.	Responsible for tests	3
5.	Present at the tests	3
6.	Test report documentation	3
7.	Temperature – rise test	4
8.	Thermal class determination	7
9.	Remarks	7
10.	Annexes	
	- - Photo	8
	- Technical characteristics	9
	- Drawing	10

1. IDENTIFICATION OF TEST PRODUCT

	Substation	MV Switchboard (Ormazabal)	Transformer
Type	BKTII	CGMCOSMOS-2LP	TM 800/20/0.4
Serial number/year	08-1029	30021701/2008	
Technical specification /Drawing	See page 9 / See pages 10 to 13		
Contract no.:	2212 / 10.10.2008		
Product receiving date:	16.10.2008		
Product condition at receiving:	New		

2. TECHNICAL CHARACTERISTICS ESTABLISHED BY MANUFACTURER

	Substation	MV Switchboard	LV Switchboard	Transformer
Rated power	800 kVA		-	800 kVA
Rated voltage	20/0.4 kV	20kV	0.4 kV	20/0.4 kV
Rated current	-	185A	1250A	23.1/1154.7
Rated frequency	50Hz	50Hz	50Hz	50Hz
Short-circuit voltage	-	-	-	6%
Connection	-	-	-	Dyn 5
Total loses				12111W

3. TESTS PROGRAM

3.1 One test to check the temperature-rise test of the transformers and the low voltage apparatuses from the substation.

The temperature rise test was performed at total losses of 12111 W up to the oil temperature stabilisation, followed by the heating at rated current In =1154.7A for an hour.

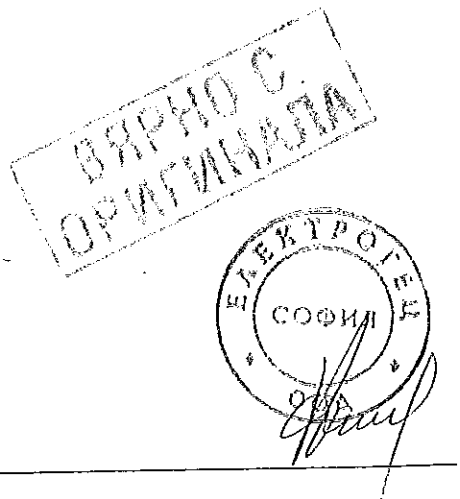
Supply was made by copper flexible cables with S = 3x(4x240 mm^2)in low voltage panel on general bars with high voltage windings short-circuited.

3.2 Determination of thermal class of the substation.

4. RESPONSIBLE FOR TESTS: Eng. Catalin Boltasu

5. PRESENT AT THE TESTS:. Dipl. Eng. George Georgiev from "ELECTROGETZ" LTD

6. TEST REPORT DOCUMENTATION Diagrams - ; Tables 6 ;
Photos 1 ; Drawings 4 .



7. TEMPERATURE-RISE TEST

7.1 Three-phase supply circuit for temperature rise test

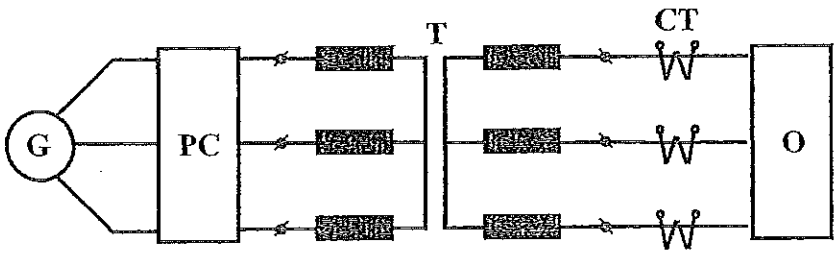


Fig. 1 – Test diagram for current paths temperature-rise test

G - Generator type GSAM – 390 kVA, 400 V, 50 Hz
PC - Connections panel
T - Adapting transformer made of 3 single-phase transformers of 400 / 25V, 10 kA, 50 Hz
CT - Current transformers type CIT- – 2000 / 5 A
O - Object to be tested

7.2 TEST CONDITIONS AND CALCULATION RELATIONS OF TEMPERATURE-RISE

Table 1

Test stage	I	II
Load type	Loss (W)	Current / period (A / minutes)
	12111	1154.2/60

Calculation relations (IEC 60076-2:1993, clause 5.4):

$\theta_2 = (R_2 / R_1)*(235 + \theta_1) - 235$ - for cooper winding
$\Delta\theta = \theta_2 - \theta_a$
$\Delta\theta_u = \theta_u - \theta_a$

where:

θ - windings average temperature
R_1 - windings resistance measured in cold condition
R_2 - windings resistance measured at shutdown
θ_1 - environment temperature in cold condition
θ_a - environment temperature at the end of temperature-rise test
$\Delta\theta$ - windings temperature-rise
θ_u - oil average temperature at the upper part
$\Delta\theta_u$ – oil temperature-rise

7.3 RESULTS OBTAINED AT TEST

7.3.1 Transformer's temperature-rise test inside the substation

Table 2

Windings	Determined values					
	R_1 (Ω)	θ_1 (°C)	R_2 (Ω)	θ_a (°C)	$\Delta\theta$ (°C)	$\Delta\theta_u$ (°C)
HV	5.726	16.7	7.310	21.94	64.38	69.92
LV	0.172		0.2233		69.83	

Measurements were performed with uncertainty of: 3 % for voltages; 3% for currents; 2.5% for time and the confidence level P = 95%.

where:

HV - high voltage winding

LV - low voltage winding

Remarks: Values of the measured resistances, calculated temperatures are presented in pages 4,5, 6,

7.3.2 Measured values of currents, losses and temperatures

Table 3

Time		Hour	14:05	14:35	15:05	15:35	16:05	16:35	17:05	17:35	17:38	18:08	18:38
Current on phases	I_1	A	1200	1198	1194	1185	1180	1181	1177	1177	1157	1157	1152
	I_2	A	1200	1199	1194	1188	1185	1190	1184	1188	1154	1156	1152
	I_3	A	1194	1192	1189	1184	1192	1189	1175	1176	1154	1154	1150
Average current	I_m	A	1198	1196	1192	1185	1186	1186	1178	1180	1155	1155	1155
Measured loss	P_1	W	3944	3972	3975	3936	3916	3936	3925	3926	3796	3800	3816
	P_2	W	4200	4216	4206	4206	4182	4226	4205	4206	4004	4020	3990
	P_3	W	3950	3962	3965	3974	4022	4012	3930	3930	3790	3800	3782
Total loss	P_m	W	12094	12150	12146	12116	12120	12174	12060	12062	11590	11620	11588
Environment temperature	θ_{a1}	°C	20.13	20.61	20.89	21.14	21.46	21.53	21.77	21.74	21.75	22.01	22.04
	θ_{a2}	°C	20.22	20.53	20.81	21.12	21.42	21.55	21.70	21.82	21.92	22.70	21.84
	θ_{a3}	°C	20.37	20.41	20.74	21.09	21.38	21.59	21.64	21.92	21.74	21.88	21.93
	θ_a	°C	20.24	20.51	20.81	21.11	21.40	21.66	21.75	21.83	21.8	21.87	21.94
Oil temperature	θ_u	°C	86.75	88.15	89.7	90.4	90.89	91.35	91.53	91.77	91.8	91.85	91.86
Oil temperature-rise	$\Delta\theta_u$	°C	66.51	67.64	68.89	69.29	69.49	69.69	69.78	69.94	70	69.98	69.92

Measurements were performed with uncertainty of: 5 % for powers; 3% for currents; 2.5% for time and the confidence level P = 95%.

7.3.2.1 Symbols used in tables 3:

θ_{a1} ; θ_{a2} ; θ_{a3} - environment temperature in 3 measuring points

θ_a - environment average temperature: $\theta_a = (\theta_{a1} + \theta_{a2} + \theta_{a3})/3$

7.3.3 Values of the high and low voltage windings resistance measured after shutdown

The resistances of high and low voltage windings were measured in direct current for 10 minutes (one reading at each minute) using the ammeter-voltmeter method. The windings resistances determination at the time of shutdown (t_0)

Table 4

Time	High voltage winding			Low voltage winding		
t [min]	U_{HV} [V]	I_{HV} [A]	R_{HV} [Ω]	U_{LV} [mV]	I_{LV} [A]	R_{LV} [mΩ]
1	1.900	0.26	7.307	190.2	8.53	0.2230
2	1.896	0.26	7.292	189.8	8.53	0.2225
3	1.892	0.26	7.276	189.6	8.52	0.2223
4	1.888	0.26	7.261	189.1	8.52	0.2219
5	1.885	0.26	7.250	188.6	8.51	0.2216
6	1.881	0.26	7.234	188.3	8.51	0.2212
7	1.878	0.26	7.223	187.9	8.50	0.2210
8	1.875	0.26	7.211	187.6	8.50	0.2207
9	1.872	0.26	7.200	187.2	8.50	0.2202
10	1.869	0.26	7.188	186.6	8.49	0.2197

Measurements were performed with uncertainty of: 2.5 % for resistances and the confidence level P = 95%.

Remark: Currents and loss values were measured using class 0.2 apparatus

7.3.4. Temperature-rise of low voltage equipment

Table 5

No.	Elements and temperature measuring points denomination in fig. 1	Temperature-rise [°C]			
		Measured			Admitted
		R	S	T	
1	General bars	34.97	38.29	35.71	70
2	Circuit breaker terminals				
	- Input	63.13	63.49	63.13	
	- Output	67.57	68.12	68.98	
3	Fuse handler	24.12			25
4	Circuit breaker manual operating lever	23.18			
	Power transformer compartment environment	47.7			-
5	Low voltge compartment environment	53.15			-
7	Environment temperature	21.94			-

ВЯРНО С ОРИГИНАЛА

8 THERMAL CLASS DETERMINATION

To assess the thermal class the following relations (IEC 62271-202:2006, clause 6.3) will be applied:

$$\Delta t_1 = t_{t1} - t_{a1},$$
$$\Delta t_2 = t_{t2} - t_{a2},$$
$$\Delta t = \Delta t_2 - \Delta t_1$$

where:

t_{t1} - temperature of the transformer windings outside the substation,

t_{a1} - environment temperature at the end of transformer temperature-rise test outside the substation,

Δt_1 - temperature-rise test of the transformer outside the substation,

t_{t2} - temperature of the transformer windings inside the substation

t_{a2} - environment temperature at the end of transformer temperature-rise test inside the substation

Δt_2 - temperature-rise test of the transformer windings inside the substation.

8.1 Thermal class determination

Table 6

	Δt_1 [^{0}C]	Δt_2 [^{0}C]	t_{t2} [^{0}C]	t_{a2} [^{0}C]	Δt [^{0}C]
HV winding	47.7	64.22	86.16	21.94	16.52
LV winding	52.9	69.76	91.7		16.86
Oil	54.6	69.92	91.86		15.32
Remarks:	These data are according to technical records made by LTD TEST LABORATORY on 04.02.2008		These data are according to table 2 of this Test Report		

Thermal class: because 10 K < Δt < 20 K $\Rightarrow$ **Class 20**

9. REMARK

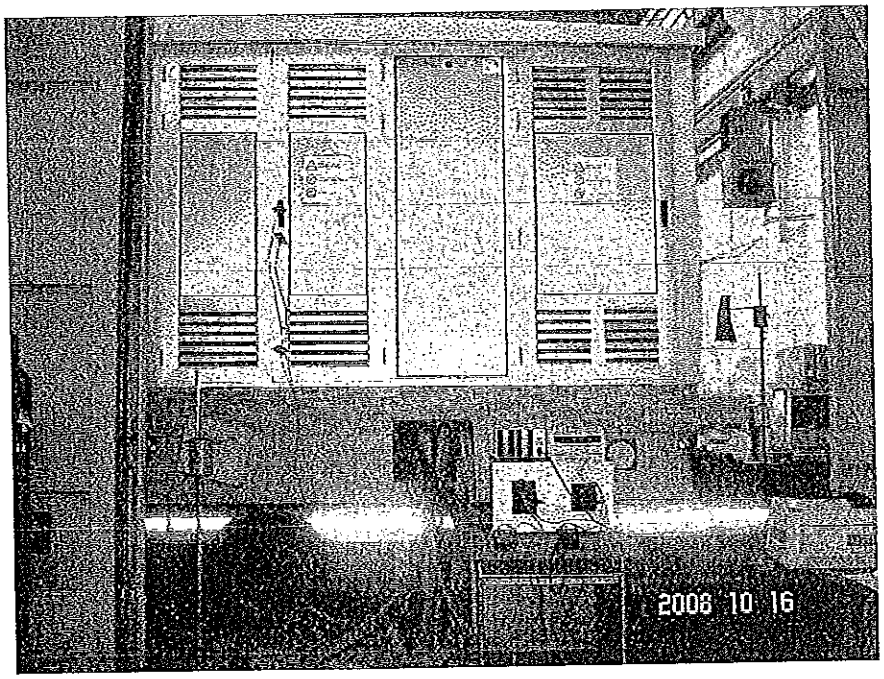
Aspect of the substation in the test circuit is presented in photo 1.

10. TEST RESULT: Temperature-rise of the low voltage equipment did not exceed the specified limits (see tables 5) and thermal class is 20 (see tables 6).

ВЯРНО С ОРИГИНАЛА

ЕЛЕКТРОТЕЕ СОФИЯ ООД

10.1 Photo



Aspect of the Prefabricated transformer substation in the test circuit

ВЯРНО С ОРИГИНАЛА

ЕЛЕКТРОГЕ... СОФИЯ ООД

LIST OF DECLARED VALUES

ELECTROGETZ Ltd. PREFABRICATED CONCRETE COMPLEX TRANSFORMER SUBSTATION, WALK-IN TYPE

* Ring Main Unit (RMU) – 20kV

- Voltage (Ur) – 24kV
- Rated current (Ir) – 630A
- Insulation level:
  - Voltage at 50Hz/1min (Ud) – 50kV
  - Impulse voltage 1.2/50μs (Up) – 125kV
- Short-time withstand current (Ik) – 21kA
- Peak withstand current (Ip) – 52.5kA
- Frequency – 50Hz
- Fuse feeder – 200A

* LV switchboard 1250/12/400:
- Voltage (Ur) – 0.69/0.4/0.23 kV
- Rated current (Ir) – 1250A

* MV and LV connection:
- MV connection – cable type NA2XSY 20kV, 3x1x50 mm², cable cold shrink MV terminations 20kV
  - Rated current (Ir) – 185A
  - Insulation level:
    - Voltage at 50Hz/1min (Ud) – 50kV
    - Impulse voltage (Up) – 125kV

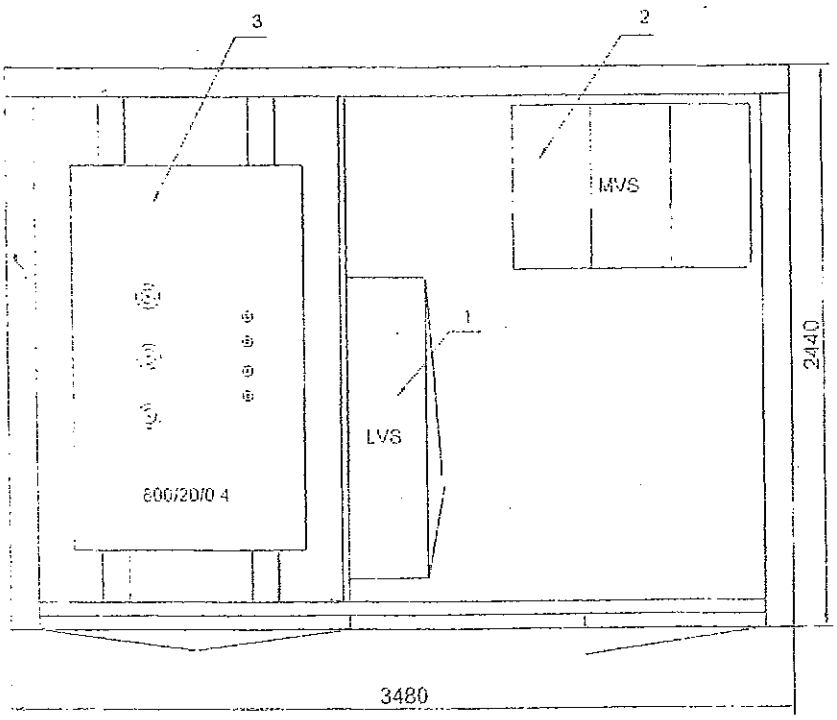
- LV connection – copper busbar 4x{2x[8x(60x1mm)]}
  - Rated current (Ir) – 1250A
  - Insulation level:
    - Impulse voltage (Up) – 6kV

* Transformer 800 kVA/20kV/0.4kV:
- Voltage (Ur) – 20±2% /0.4 kV
- Rated current (Ir) – 23.09/1154.7A
- Frequency (Fr) – 50Hz
- Winding connection group – Dyn5
- Type of cooling– ONAN
- Insulation level:
  - Voltage 50Hz/1min (Ud) MV winding – 50kV
  - Voltage 50Hz/1min (Ud) LV winding – 3kV

ВЯРНО С ОРИГИНАЛА

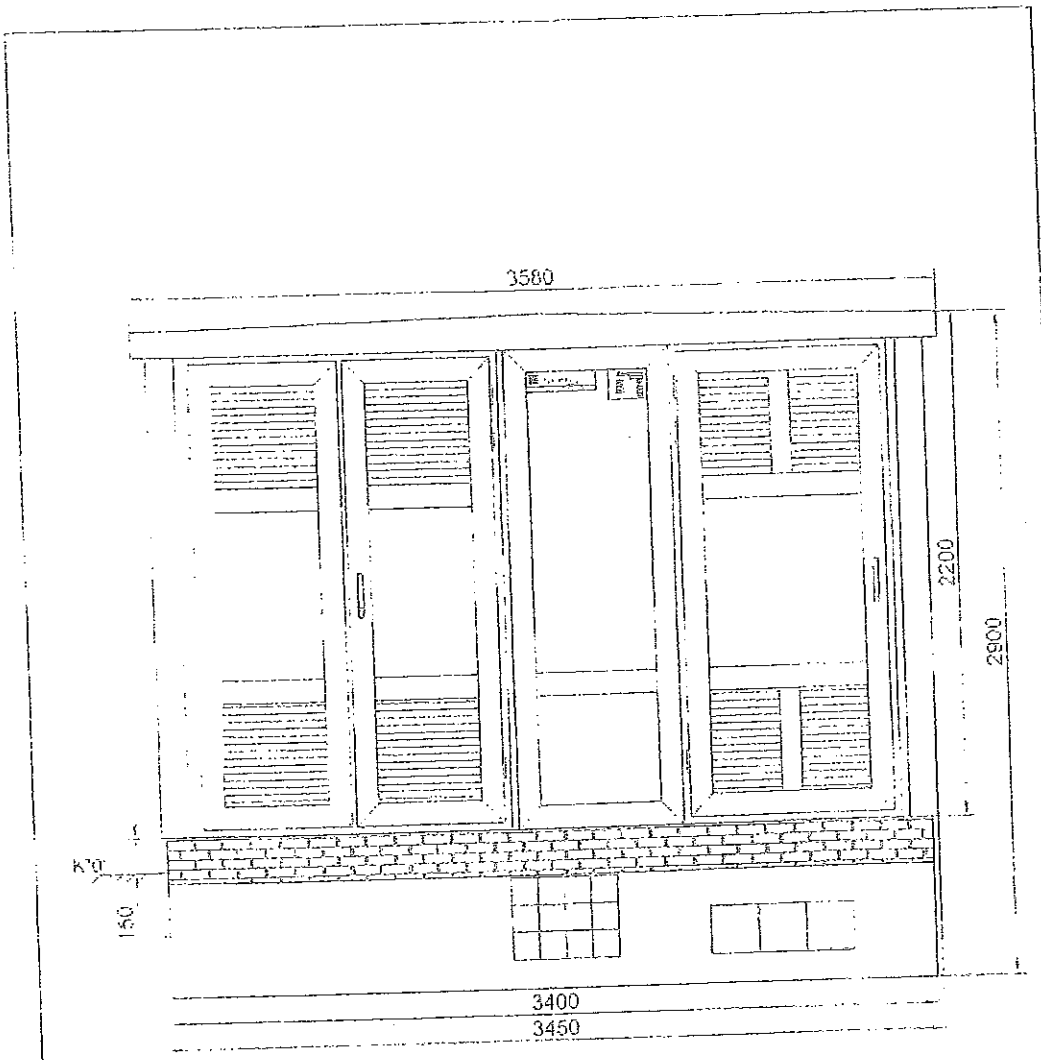
ЕЛЕКТРОГЕТЦ ООД СОФИЯ

ЕЛЕКТРОГЕТЦ ООД СОФИЯ



№	Name	Pcs.
1	Main distribution low voltage board type: "ГТРТ 1250/12/400"	1
2	Medium voltage switchgear 20 kV 630A	1
3	Power tansformer, oil type 800 kVA 20/0.4 kV	1

					CCTS 800/20/0.4		Scale
							1:25
		Article No	Signature	Date	Situation	Sheet №	5 Sh.
Created by		dipl. eng. Kyosev		09.08			
Designed by		dipl. eng. Kyosev		09.08	Object:	"ELEKTROGETZ" ltd.	
Checked by		dipl. eng.Lazarov		09.08			
Manager		dipl. eng Georgiev		09.08			



					CCTS 800/20/0.4		Scale 1:25
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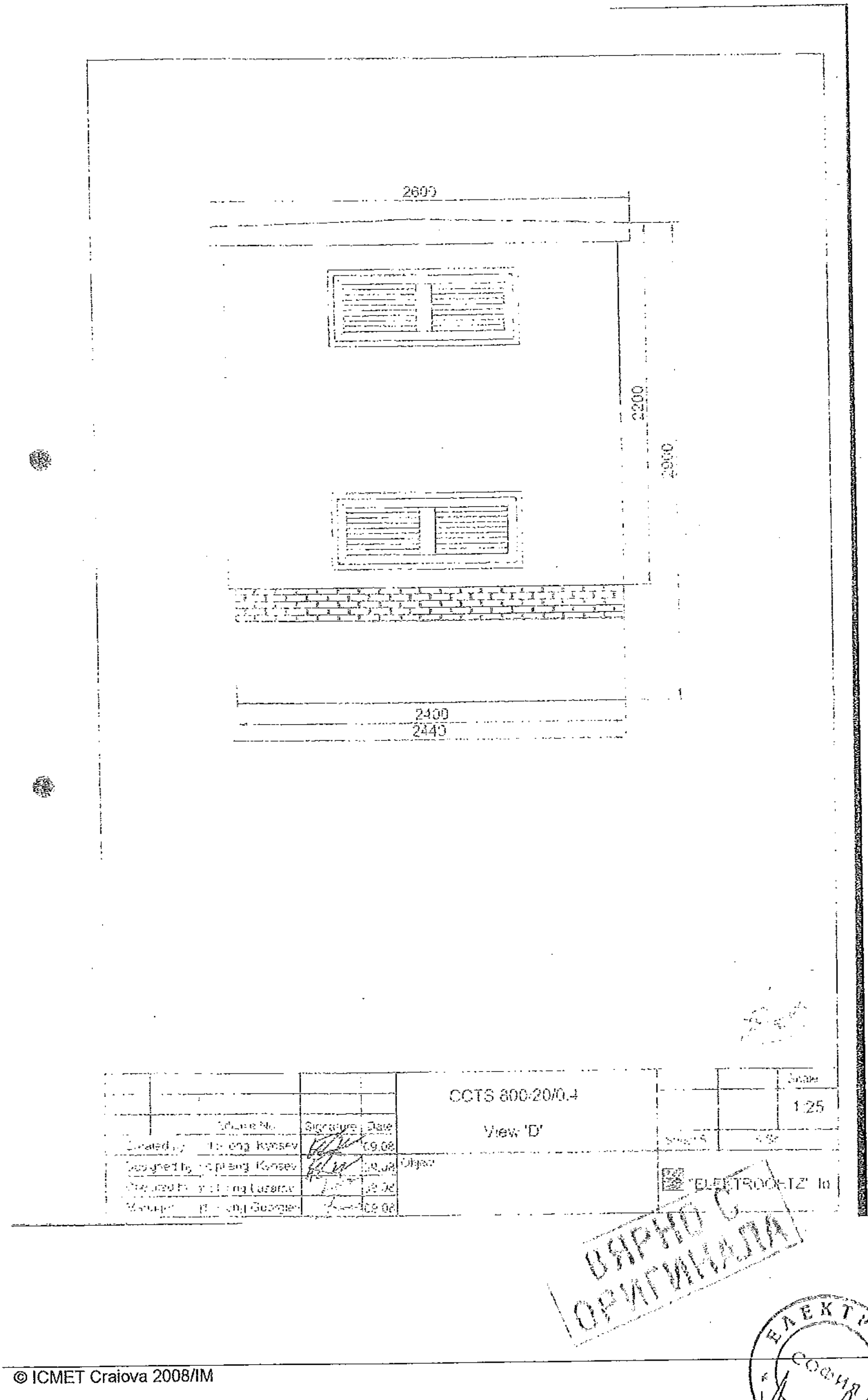
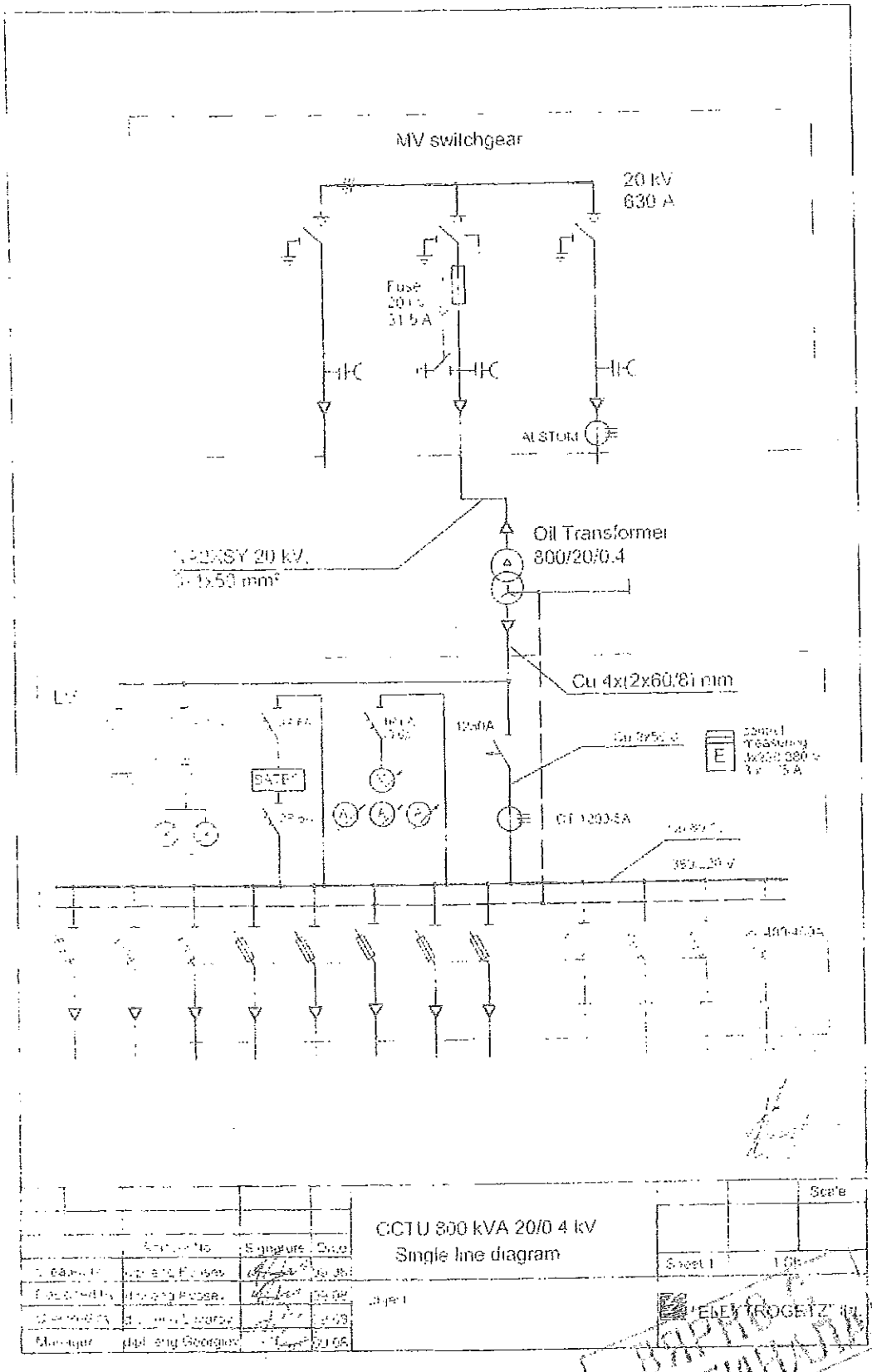
Created by		Dip. eng. Kyosev		09.08			
Designed by		Dip. eng. Kyosev		09.08	Object		
Checked by		prof. eng. Lazarov		09.08		"ELEKTROGETZ" ltd.	
Manager		Dip. eng. Georgiev		09.08			

ВЕРНО С ОРИГИНАЛА

ЕЛЕКТРОГЕЦ СОФИЯ ООД


2600
2200
2600
2400
2440
CCTS 800/20/0.4
View 'D'
Scale
1:25
"ELECTROOHTZ"
ВЯРНО С ОРИГИНАЛА
ЕЛЕКТРОГЕЦ
СОФИЯ



RESEARCH-DEVELOPMENT AND TESTING NATIONAL
INSTITUTE FOR ELECTRICAL ENGINEERING

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DAR
DAT-P-266/07-20

ÎNCERCARE
RELAR
SR EN ISO / CEI 17025: 2005
CERTIFICAT DE ACREDITARE
nr. LI 004 / 2007

TEST REPORT
No. 10314

CUSTOMER: **"ELEKTROGETZ" LTD**
1271 Sofia, BULGARIA, kv. Iliyantzi, 10 A Jerman Str.

MANUFACTURER: **"ELEKTROGETZ" LTD**
1271 Sofia, BULGARIA, kv. Iliyantzi, 10 A Jerman Str.

TESTED PRODUCT: 20/0.4 kV, 800 KVA Prefabricated concrete complex transformer substation

REFERENCE STANDARD: IEC 62271-202/2006, clause 6.4

TEST PERFORMED: Short-time and peak withstand current tests on:
- LV interconnections
- Earthing conductor system

TEST DATE: 17.10.2008

TEST RESULT: Passed the test

Report has 14 pages and it is edited in 4 copies from which 3 copy for customer.

HEAD OF HIGH POWER DIVISION:
Dr. Eng. George Curcanu

ICMET LABORATORUL DE MARE PUTERE "OVIDIU RARINCA" CRAIOVA

HEAD OF LABORATORY:
Eng. Constantin Iancu

DATE OF ISSUE: 21.11.2008

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Content

1.	Identification of the test product	3
2.	Technical characteristics established by producer	3
3.	Tests program	3
4.	Responsible for tests	3
5.	Present at the tests	3
6.	Test report documentation	3
7.	Data of testing and measuring circuit	4
8	Values obtained on test	6
9.	Test results	6
10.	Annexes	7
	Photos	
	Drawings	
	Oscillograms	

1. IDENTIFICATION OF APPARATUS

	Substation
Type	БКТП
Serial number/year	08-1029
Technical specification /Drawing	See page 8 / See pages 9 to12
Contract No.:	2212/10.10.2008
Product receiving date:	13.10.2008
Product condition at receiving:	New

2. TECHNICAL CHARACTERISTICS ESTABLISHED BY MANUFACTURER

	Substation
Rated power	800 KVA
Rated voltage	20/0.4 kV
Rated current	23.1/1154.7 A
Rated frequency	50 Hz
Rated short - time withstand current:	
- peak value	40 kA
- r.m.s. value	16 kA
Rated duration of short-circuit (t_k)	1 s

3. TESTS PROGRAM

3.1 One three phase short-time and peak withstand current test on interconnections between LV Panel and LV terminals of Power Transformer at parameters: I_{pk}=84 kA, I_{cw}=40 kA, t=1 s. The supply was made on general bars of LV Panel by means of 3x2x240 mm^2 copper cables and the short-circuit was made on interconnections ends from LV terminals of Power Transformer by means of copper cables of 2x240 mm^2.

3.2 One single phase short-time and peak withstand current test on earthing conductor system at parameters: I_p=40 kA, I_k=16 kA, t=1 s. The supply was made between 2 earthing point provided of the Substation by means of 180 mm^2 copper cables.

4. RESPONSIBLE FOR TESTS: Eng. Florin Alin Dincă

5. PRESENT AT THE TESTS: Dipl. Eng. George Georgiev from "ELEKTROGETZ" LTD.

6. TEST REPORT DOCUMENTATION Oscillograms 2; Tables 5; Photos 1; Drawings 4

ВЯРНО С ОРИГИНАЛА

ЕЛЕКТРОГЕЦ СОФИЯ ООД

7. DATA OF TESTING AND MEASURING CIRCUIT

7.1 Tests on LV interconnections

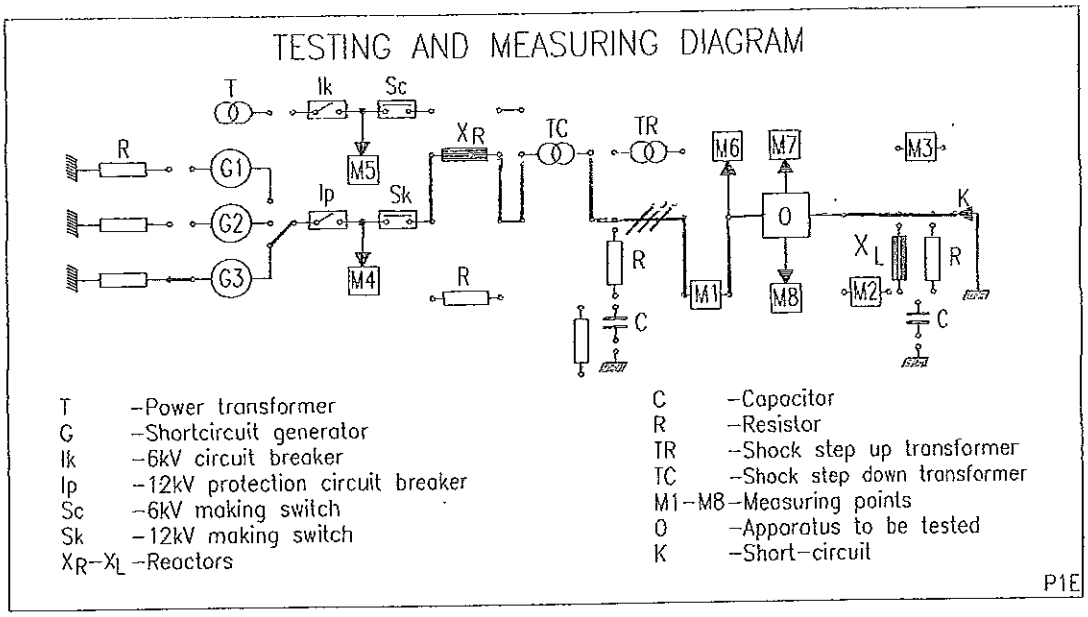
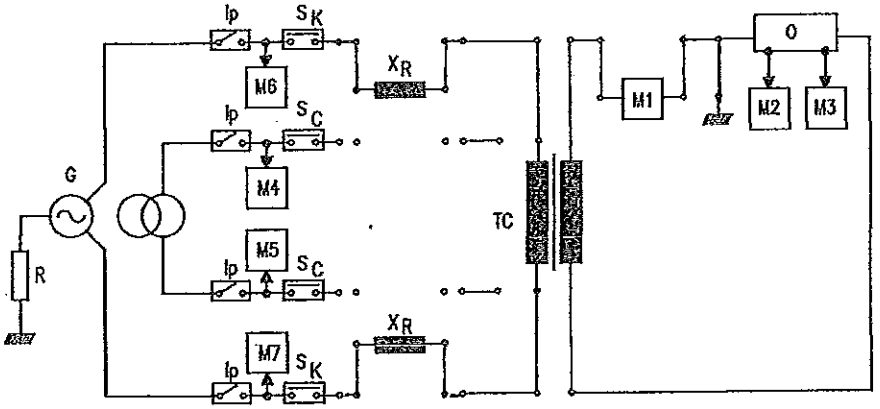


Table 1

Test		Short-time withstand current and peak withstand current test
Phases number		3
Source/ connection		G3 /Y
Transformer/Rate		TC 7, 8, 9 / 20
Earthing	Source	600 Ω
	Apparatus	Net earthing connection
Reactor [Ω]		0.9
Power factor		<0.15
M1 - Apparatus current – Shunt 70 kA / 1.75 V		
M4- Supply source voltage - Voltage transformer 15000 V/100 V		
Data acquisition system SAPMD : 12 bit, 16 channels		

7.2 Test on earthing conductor system

TESTING AND MEASURING DIAGRAM



T –Power transformer
G –shortcircuit generator
Ik –6kV circuit breaker
Ip –12kV protection circuit breaker
Sc –6kV making switch
Sk –12kV making switch
XR –Reactor
TC –Shock step down transformer
M1–M7 –Measuring points
O –Apparatus to be tested

P2E

Table 2

Test		Short-time and peak withstand current
Phases number		2
Source / connection		G3 /Y
Transformer /Rate		TC 8 / 20
Earthing	Source	600 Ω
	Apparatus	Net earthing connection
Reactor [Ω]		0
Power factor		< 0.15
M6 - Source voltage - Voltage transformer 15000/100V		
M1 - Apparatus current - Shunt 70 kA/1.75 V		
Data acquisition system SAPMD : 12 bit, 16 channels		

ВЯРНО С ОРИГИНАЛА

ЕЛЕКТРОГЕЙ СОФИЯ ООД

8. VALUES OBTAINED ON TESTS

8.1 Short-time and peak withstand current tests on LV interconnections

The values obtained on test are presented in table 3.

Table 3

Oscillogram No.	I_{pR} I_{pS} I_{pT} [kA]	I_{tR} I_{tS} I_{tT} [kA]	t_t [sec.]	I_t med [kA]	$I_{t\ equiv.\ tk}$ [kA]	Remarks
73930/2008	- - 84.4	36.6 36.9 36.7	1.2	36.73	40.24	

Measurements were performed with uncertainty of: 1% for voltage; 1% for current; 0.5% for time and the confidence level P = 95 %.

8.2 Short-time and peak withstand current test on earthing conductor system

The results are presented in table 4.

Table 4

Oscillogram No.	I_p [kA]	I_t [kA]	t_t [s]	$I_{t\ echiv\ t}$ [kA]	Remarks
73934/2008	40.2	16.1	1	16.1	

Measurements were performed with uncertainty of: 1% for voltage; 1% for current; 0.5% for time and the confidence level P = 95 %.

Symbols used in tables and oscillograms

I_R I_S I_T = Short-circuit current

I_{pR} I_{pS} I_{pT} = Peak values of short-time withstand currents on the phases R, S, T.

I_{tR} I_{tS} I_{tT} = R.m.s. values of short - time withstand currents on the phases R, S, T.

t_t = The duration of short – circuit

I_t med = Effective current mean value

$I_{t.equiv.tk.}$ = Equivalent value of short-time withstand current on $t_k = 1$ s calculated as follows:

$$I_{t\ equiv.t_k} = I_t\ med\ * \sqrt{\frac{t_t}{t_k}}$$

8.3 Remarks:

1. After tests no deformations on current paths were observed.
2. Aspect of the Prefabricated concrete complex transformer substation in the test circuit is presented in photo from page 7.

8.4 Assessement of the test results

Table 5

Requirements	Result
After the test, no deformation or damage of components and conductors within enclosure, which may impair good operation of the main circuits, shall have been sustained.	Fulfilled

9. TEST RESULT: PASSED THE TEST

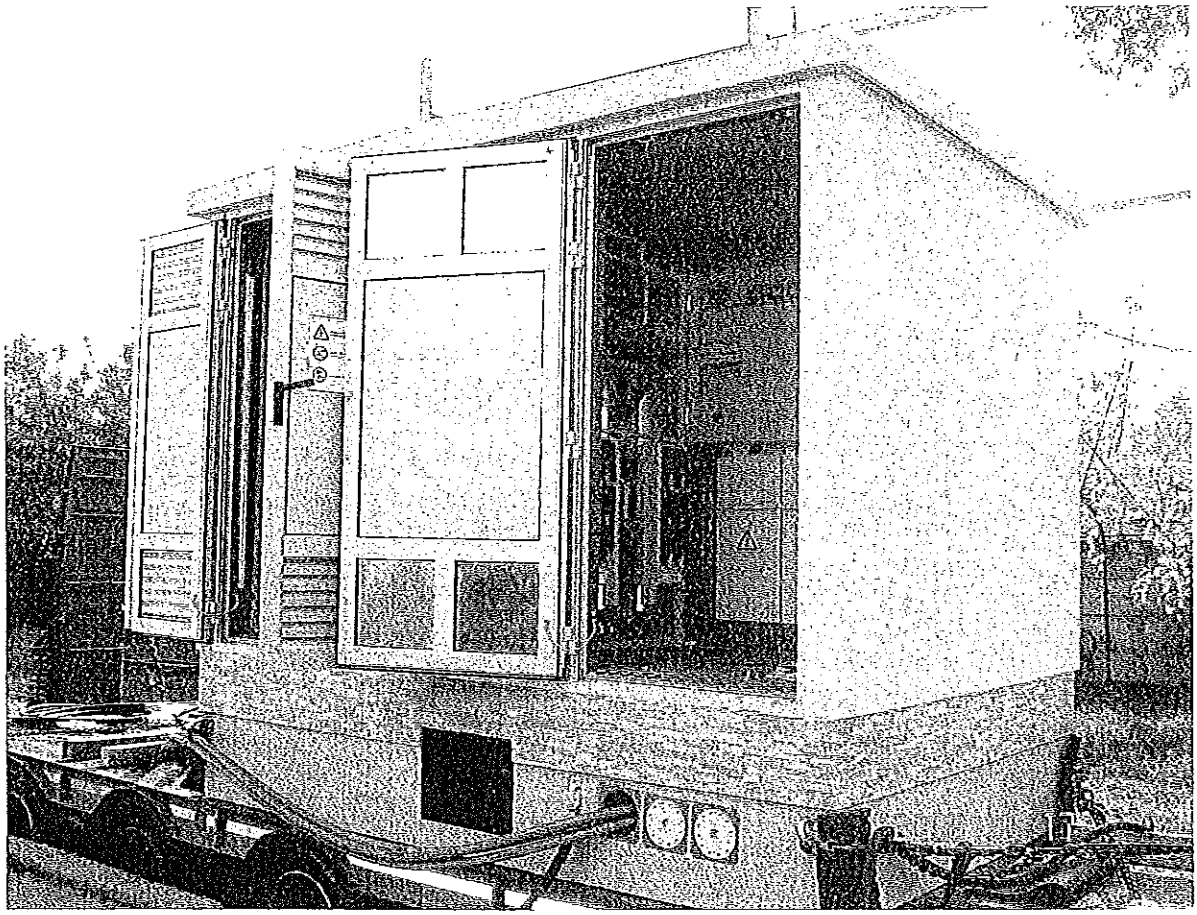


Photo – Aspect of 20/0.4 kV, 800 KVA Prefabricated concrete complex transformer substation in test circuit

LIST OF DECLARED VALUES

ELECTROGETZ Ltd. PREFABRICATED CONCRETE COMPLEX TRANSFORMER SUBSTATION, WALK-IN TYPE

* Ring Main Unit (RMU) – 20kV

- Voltage (Ur) – 24kV
- Rated current (Ir) – 630A
- Insulation level:
  - Voltage at 50Hz/1min (Ud) – 50kV
  - Impulse voltage 1.2/50μs (Up) – 125kV
- Short-time withstand current (Ik) – 21kA
- Peak withstand current (Ip) – 52.5kA
- Frequency – 50Hz
- Fuse feeder – 200A

* LV switchboard 1250/12/400:

- Voltage (Ur) – 0.69/0.4/0.23 kV
- Rated current (Ir) – 1250A

* MV and LV connection:

- MV connection – cable type NA2XSY 20kV, 3x1x50 mm², cable cold shrink MV terminations 20kV
  - Rated current (Ir) – 185A
  - Insulation level:
    - Voltage at 50Hz/1min (Ud) – 50kV
    - Impulse voltage (Up) – 125kV

- LV connection – copper busbar 4x{2x[8x(60x1mm)]}
  - Rated current (Ir) – 1250A
  - Insulation level:
    - Impulse voltage (Up) – 6kV

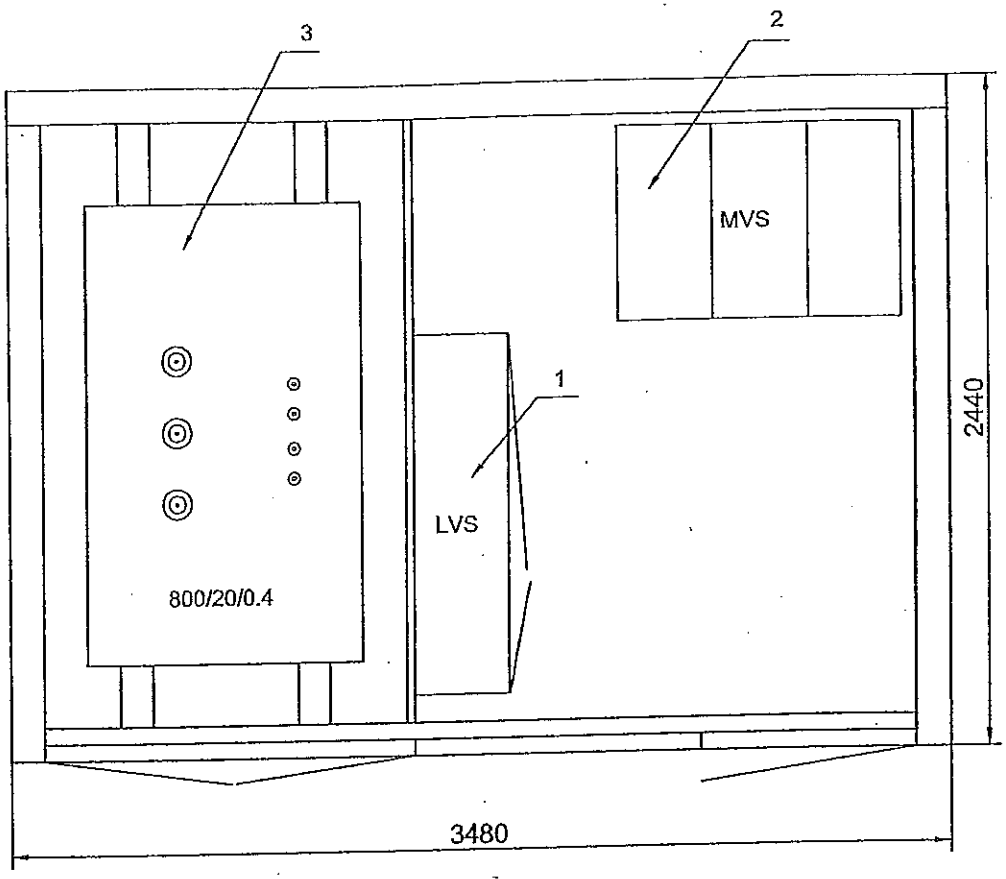
* Transformer 800 kVA/20kV/0.4kV:

- Voltage (Ur) – 20±2% /0.4 kV
- Rated current (Ir) – 23.09/1154.7A
- Frequency (Fr) – 50Hz
- Winding connection group – Dyn5
- Type of cooling– ONAN
- Insulation level:
  - Voltage 50Hz/1min (Ud) MV winding – 50kV
  - Voltage 50Hz/1min (Ud) LV winding – 3kV

ВЕРНО С ОРИГИНАЛА

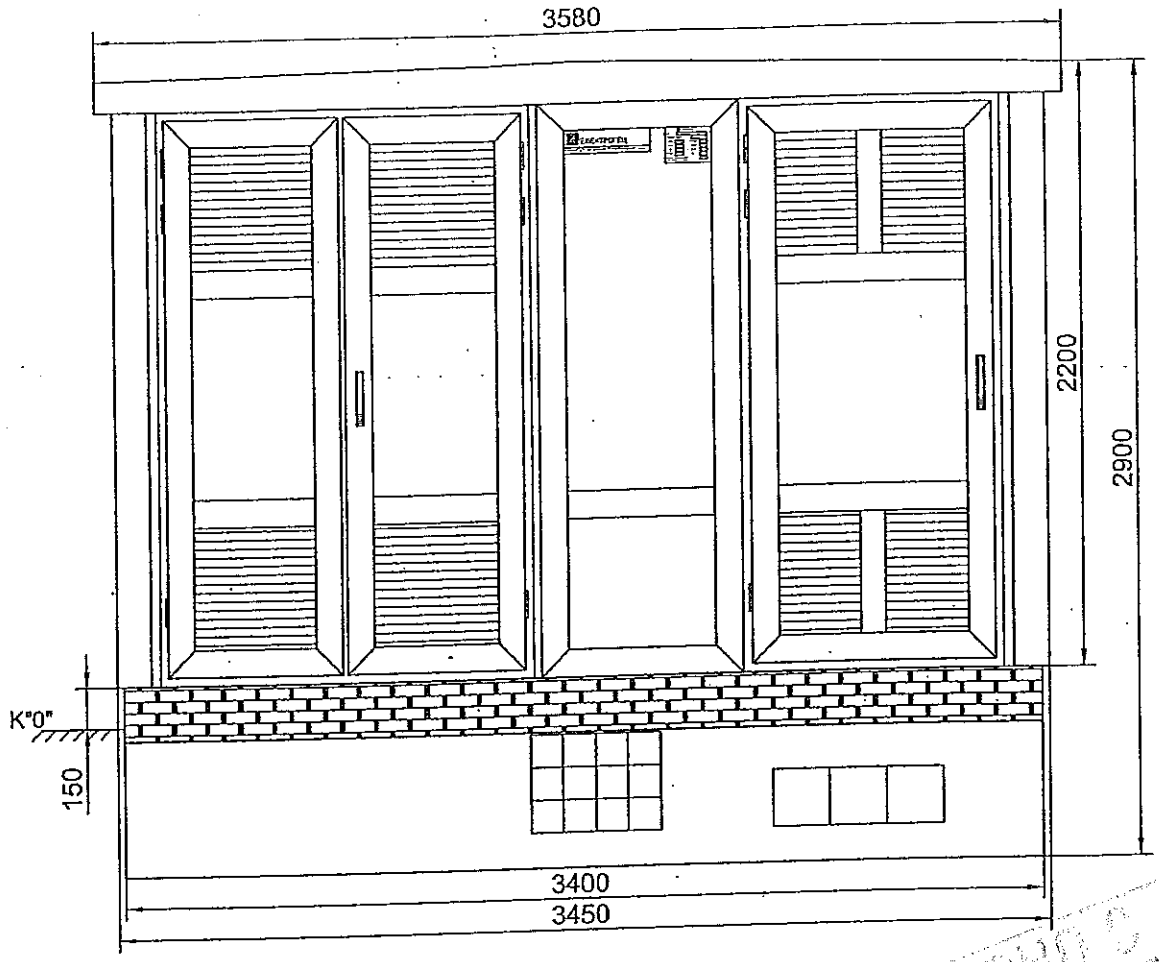
ЕЛЕКТРОГЕЦ СОФИЯ ООД

ЕЛЕКТРОГЕЦ СОФИЯ ООД



№	Name	Pcs.
1	Main distibution low voltage board type: "ГТРТ 1250/12/400"	1
2	Medium voltage switchgear 20 kV 630A	1
3	Power tansformer, oil type 800 kVA 20/0.4 kV	1

						Scale
				CCTS 800/20/0.4		1:25
		Articcle No	Signature	Date	Situation	Sheet 1 / 5 Sh.
Created by		dipl.eng. Kyosev		09.08		
Designed by		dipl.eng. Kyosev		09.08	Object:	"ELEKTROGETZ" ltd.
Checked by		dipl. eng.Lazarov		09.08		
Manager		dipl. eng.Georgiev		09.08		



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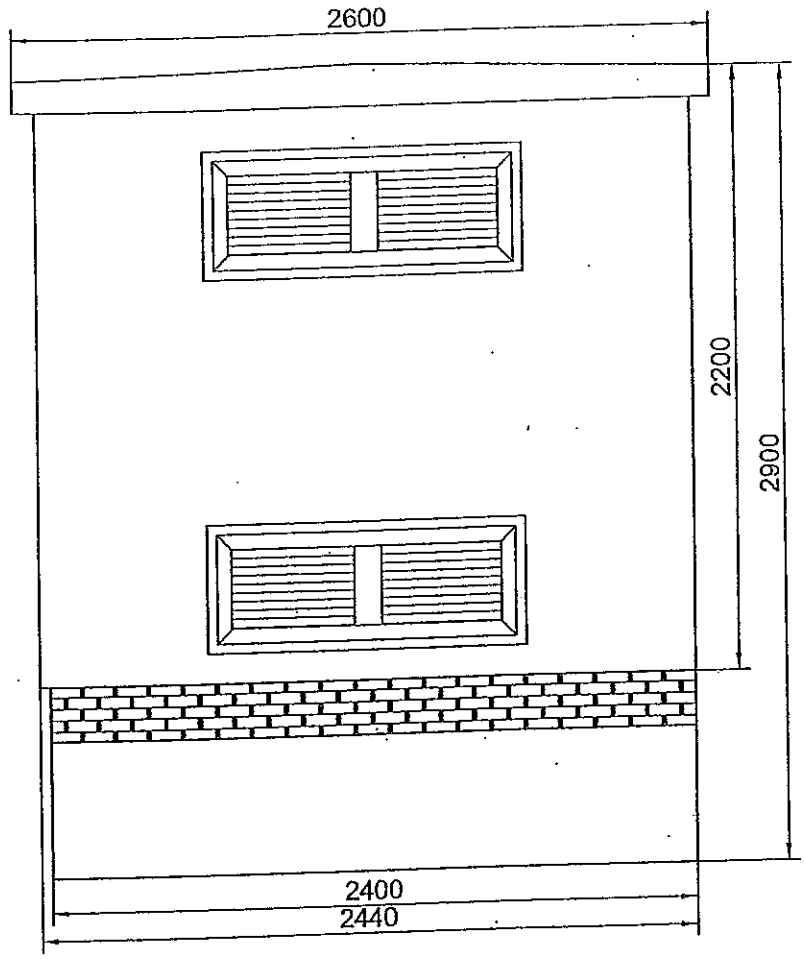
Checked by		dipl. eng.Lazarov		09.08			
Manager		dipl. eng.Georgiev		09.08			



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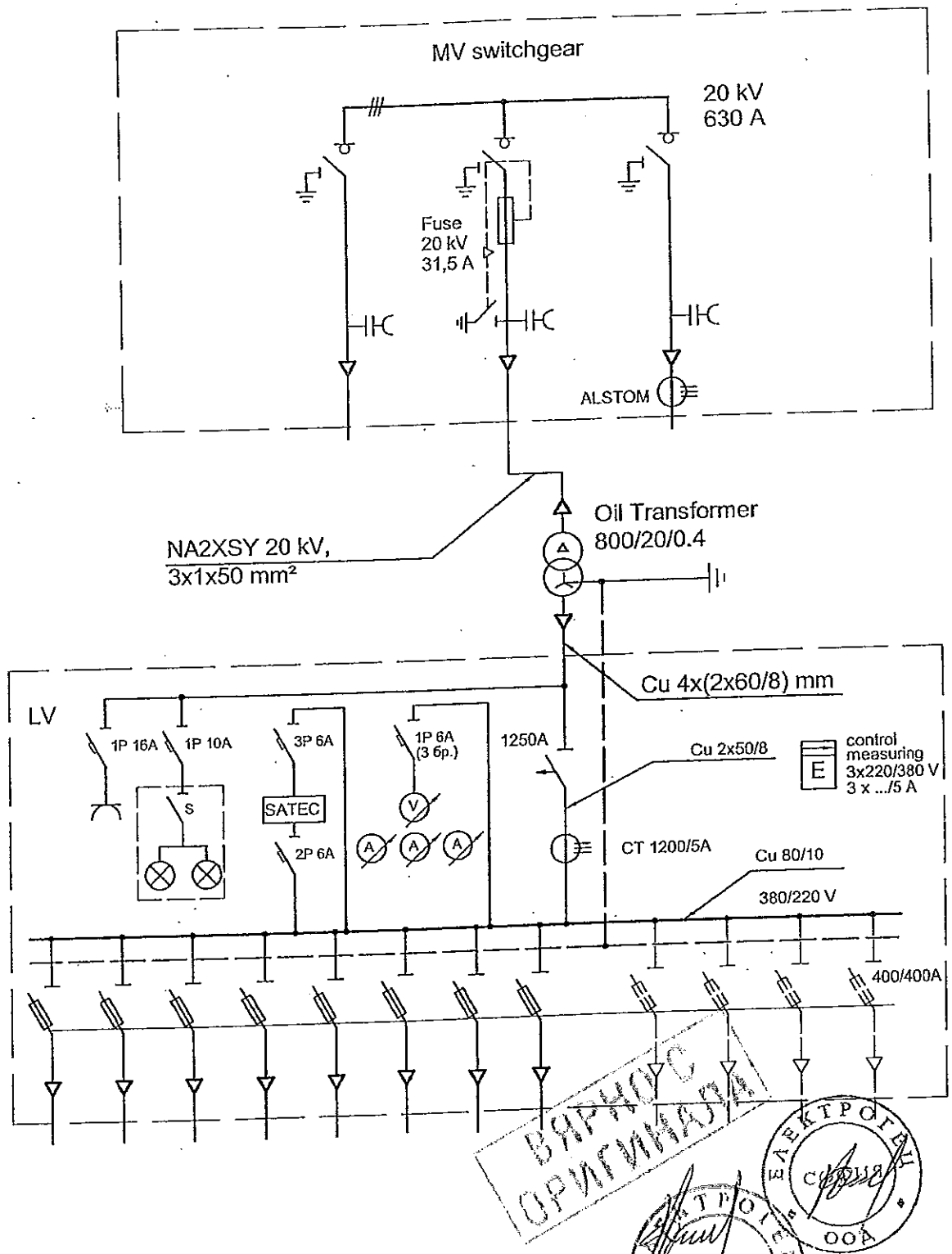
Manager		dipl. eng.Georgiev		09.08			



	Articcle No	Signature	Date
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Designed by	dipl.eng.Kyosev		09.08
Checked by	dipl. eng.Lazarov		09.08
Manager	dipl. eng.Georgiev		09.08

CCTU 800 kVA 20/0.4 kV
Single line diagram

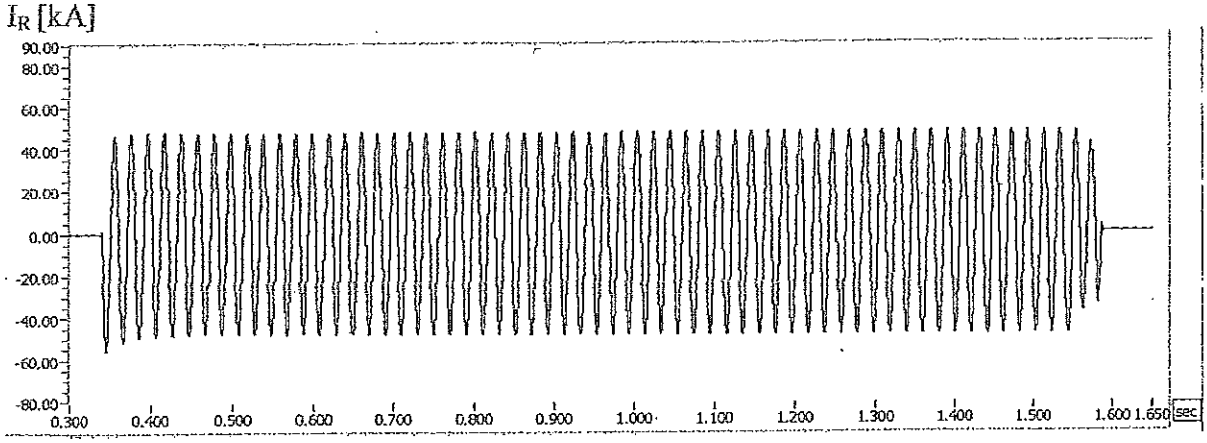
Object:

Scale

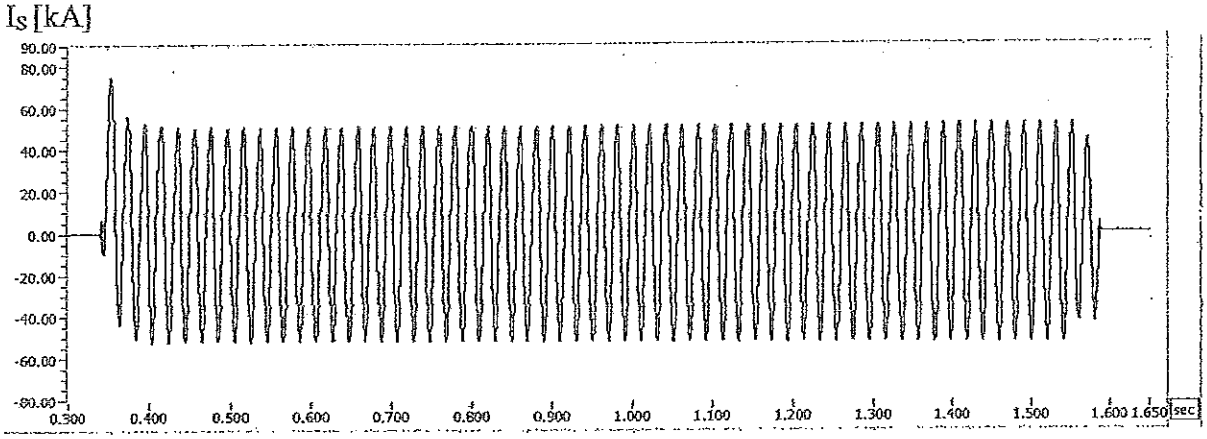
Sheet 1 | 1 Sh.

"ELEKTROGETZ" ltd.

I_R [kA]



I_S [kA]



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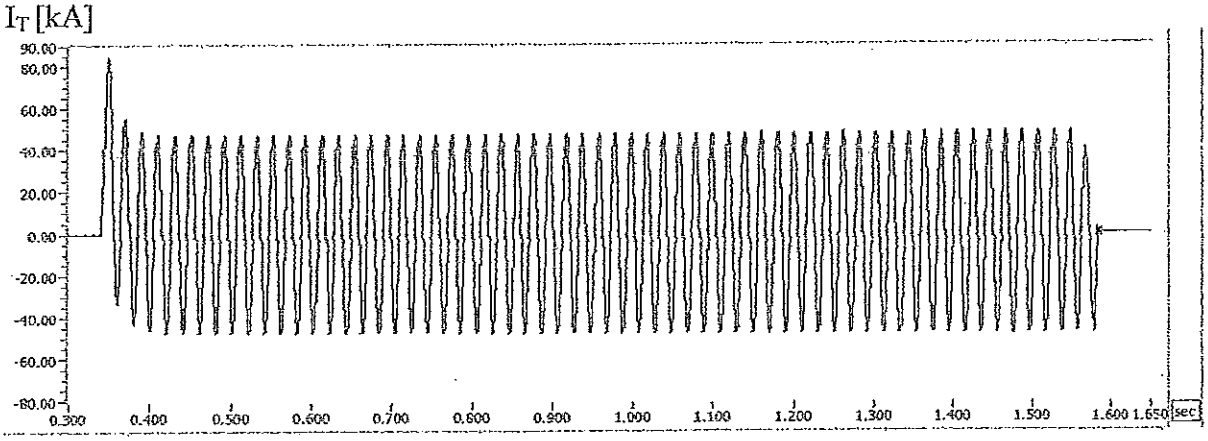
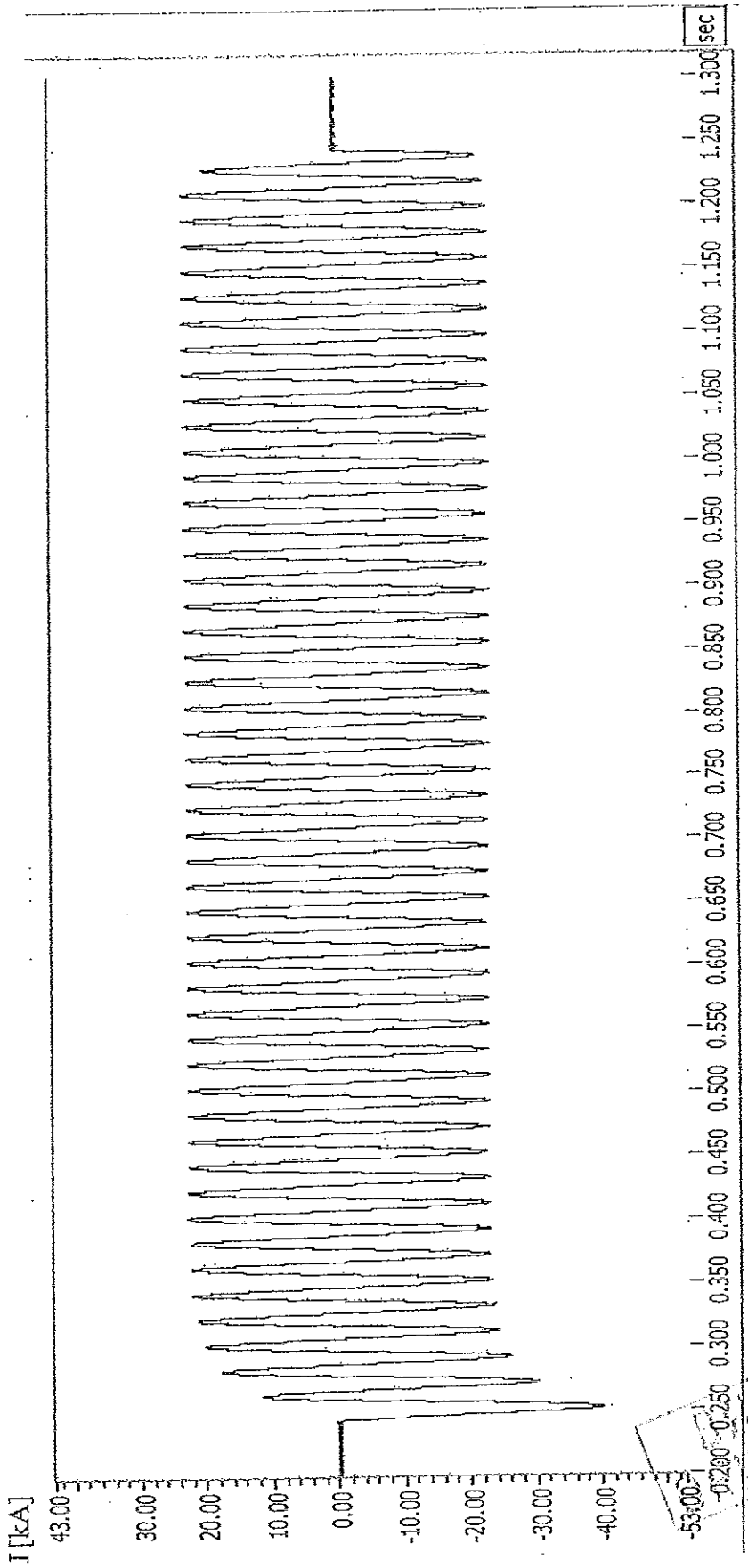


Oscillogram no. 73930 / 2008

ВЯРНО С ОРИГИНАЛА

ЕЛЕКТРОСЕЛ СОФИЯ ООД



Oscillogram no. 73934 / 2008

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E-mail: lmp@icmet.ro

Deutscher Akkreditierungs Rat
DAT-P-266/07-20

ÎNCERCARE
SR EN ISO / CEI 17025: 2005
CERTIFICAT DE ACREDITARE
nr. LI 004 / 2007

TEST REPORT
No. 10317

CUSTOMER: **ELECTROGETZ LTD**
1271 Sofia, BULGARIA, kv. Iliyantzi, 10 A Jerman Str

MANUFACTURER: **ELECTROGETZ LTD**
1271 Sofia, BULGARIA, kv. Iliyantzi, 10 A Jerman Str

TESTED PRODUCT 20/0.4 kV, 800 KVA Prefabricated concrete complex transformer Substation

REFERENCE STANDARD: IEC 62271-202 / 2006 clause 6.5

TEST PERFORMED: Functional tests

TEST DATE: 18.10.2008

TEST RESULT: Passed the tests

Report has 7 pages and it is edited in 4 copies from which 3 copies for customer.

HEAD OF HIGH POWER DIVISION:
Dr. Eng. George Curcanu

HEAD OF LABORATORY:
Eng. Constantin Iancu

DATE OF ISSUE: 29.10.2008

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Content

1.	Identification of the test product	3
2.	Technical characteristics established by manufacturer	3
3.	Tests program	3
4.	Responsible for tests	3
5.	Present at the tests	3
6.	Test report documentation	3
7.	Functional tests	4
8.	Test result	4

1. IDENTIFICATION OF TEST PRODUCT

	Substation	MV Switchboard (Ormazabal)	Transformer
Type	ВКТП	CGMCOSMOS-2LP	TM 800/20/0.4
Serial number/year	08-1029	30021701/2008	
Technical specification /Drawing	See page 7 / See pages 5,6		
Contract no.:	2212 / 10.10.2008		
Product receiving date:	16.10.2008		
Product condition at receiving:	New		

2. TECHNICAL CHARACTERISTICS ESTABLISHED BY MANUFACTURER

	Substation	MV Switchboard	LV Switchboard	Transformer
Rated power	800 kVA		-	800 kVA
Rated voltage	20/0.4 kV	20kV	0.4 kV	20/0.4 kV
Rated current	-	185A	1250A	23.1/1154.7
Rated frequency	50Hz	50Hz	50Hz	50Hz
Short-circuit voltage	-	-	-	6%
Connection	-	-	-	Dyn 5
Total loses				12111W

3, TESTS PROGRAM

3.1 Operation of the switchgear and controlgear
3.2 Mechanical operation of prefabrication substation doors.
3.2 Checking of the temperature and liquid level of the transformer.
3.4 Voltage indication check.
3.5 Fitting of earthing devices.
3.6 Replacement of fuses
3.7 Operation of the transformer tap-changer

4. RESPONSIBLE FOR TESTS: Eng. Catalin Boltasu

5. PRESENT AT THE TESTS:. Dipl. Eng. George Georgiev from "ELECTROGETZ" LTD

6. TEST REPORT DOCUMENTATION Diagrams - ; Tables - ;
Photos - ; Drawings 2 .

ВЯРНО С ОРИГИНАЛА

ЕЛЕКТРОГЕЦ СОФИЯ ЕООД

7. FUNCTIONAL TESTS

7.1 Operation of the switchgear and controlgear.
Manoeuvres were made with the medium and low voltage gear and were observed their correct operation.

7.2 Mechanical operation of prefabrication substation doors.
Mechanical manoeuvres were performed with the substation doors and were observed their correct operation.

7.3 Checking of temperature and liquid level of the transformer
Oil level indicator and temperature indicators worked correctly.

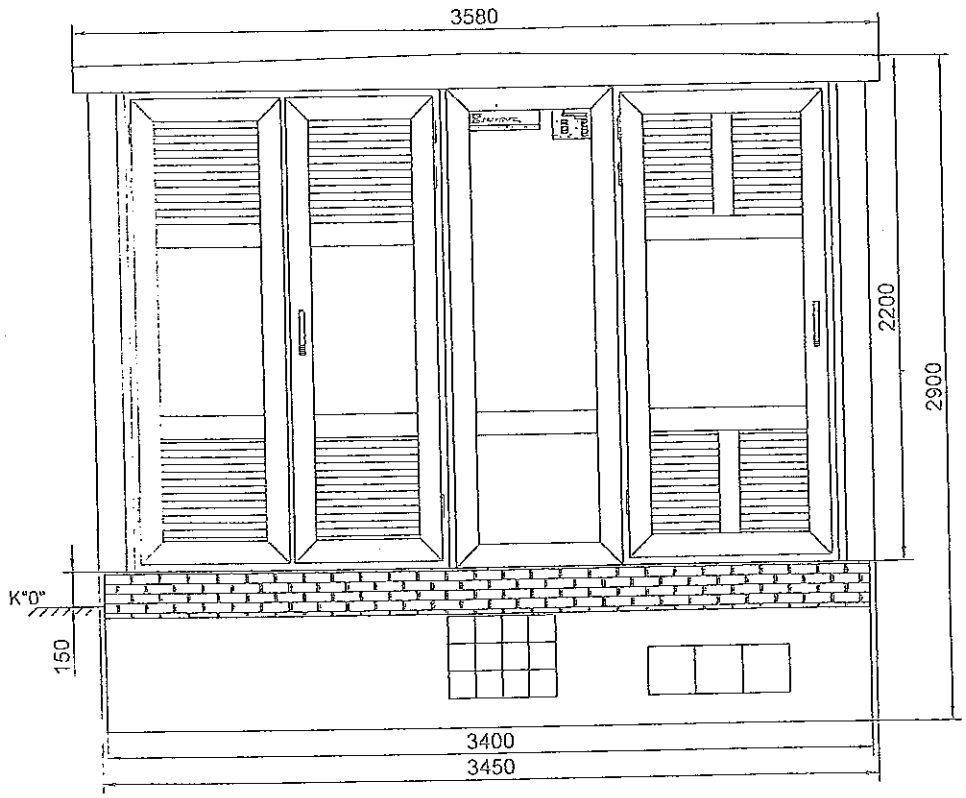
7.4 Voltage indication check
The indications of medium voltage switchgear and controlgear voltage indicators were correct.

7.5 Fitting of earthing devices.
Disconnectors of the medium voltage switchgear and controlgear worked correctly at close and clear operation.

7.6 Replacement of fuses
Fuses replacement has been easly made.

7.7 Operation of the transformer tap-changer
Tap-changer operation was correct on all five taps.

8. TEST RESULT: PASSED THE TEST



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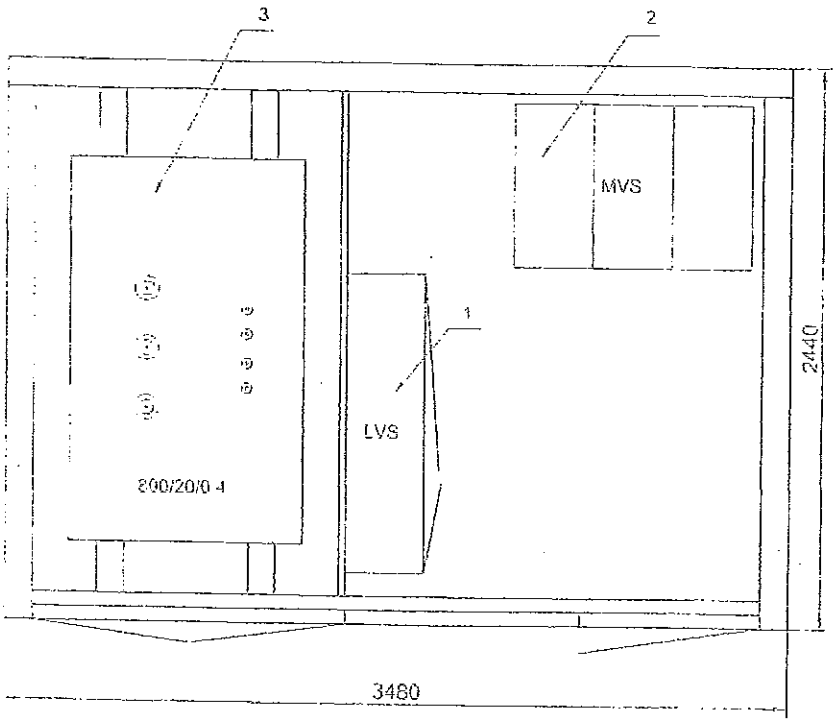
Designed by		dipl.eng. Kyosev		09.08	Object:	"ELEKTROGETZ" ltd.	
Checked by		dipl. eng.Lazarov		09.08			
Manager		dipl. eng.Georgiev		09.08			



№	Name	Pcs.
1	Main distubution low voltage board type: "TTPT 1250/12/400"	1
2	Medium voltage switchgear 20 kV 630A	1
3	Power tansformer, oil type 800 kVA 20/0.4 kV	1

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	Anicole No	Signature	Date	Situation		1:25
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Designed by	dipl.eng. Kyosev		09.08	Object		
Checked by	dipl. eng Lazarov		09.08		"ELEKTROGETZ" ltd.	
Manayer	dipl. eng Georgiev		09.08			

ВЕРНО С ОРИГИНАЛА

ЕЛЕКТРОГЕЦ СОФИЯ

LIST OF DECLARED VALUES

ELECTROGETZ Ltd. PREFABRICATED CONCRETE COMPLEX TRANSFORMER SUBSTATION, WALK-IN TYPE

* Ring Main Unit (RMU) – 20kV

- Voltage (Ur) – 24kV
- Rated current (Ir) – 630A
- Insulation level:
  - Voltage at 50Hz/1min (Ud) – 50kV
  - Impulse voltage 1.2/50μs (Up) – 125kV
- Short-time withstand current (Ik) – 21kA
- Peak withstand current (Ip) – 52.5kA
- Frequency – 50Hz
- Fuse feeder – 200A

* LV switchboard 1250/12/400:
- Voltage (Ur) – 0.69/0.4/0.23 kV
- Rated current (Ir) – 1250A

* MV and LV connection:
- MV connection – cable type NA2XSY 20kV, 3x1x50 mm², cable cold shrink MV terminations 20kV
  - Rated current (Ir) – 185A
  - Insulation level:
    - Voltage at 50Hz/1min (Ud) – 50kV
    - Impulse voltage (Up) – 125kV

- LV connection – copper busbar 4x{2x[8x(60x1mm)]}
  - Rated current (Ir) – 1250A
  - Insulation level:
    - Impulse voltage (Up) – 6kV

* Transformer 800 kVA/20kV/0.4kV:
- Voltage (Ur) – 20±2% /0.4 kV
- Rated current (Ir) – 23.09/1154.7A
- Frequency (Fr) – 50Hz
- Winding connection group – Dyn5
- Type of cooling– ONAN
- Insulation level:
  - Voltage 50Hz/1min (Ud) MV winding – 50kV
  - Voltage 50Hz/1min (Ud) LV winding – 3kV

ВЯРНО С ОРИГИНАЛА

ЕЛЕКТРОГЕТЗ СОФИЯ ООД

ЕЛЕКТРОГЕТЗ СОФИЯ ООД

RESEARCH-DEVELOPMENT AND TESTING NATIONAL INSTITUTE FOR ELECTRICAL ENGINEERING

ICMET CRAIOVA
HIGH POWER DIVISION

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"Ovidiu Rarinca"
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DAT-P-266/07-20

ÎNCERCARE
SR EN ISO / CEI 17025: 2005
CERTIFICAT DE ACREDITARE
nr. LI 004 / 2007

TEST REPORT
No. 10315

CUSTOMER: **"ELECTROGETZ" LTD**
1271 Sofia, BULGARIA, kv. Iliyantzi, 10 A Jerman Str.

MANUFACTURER: **"ELECTROGETZ" LTD**
1271 Sofia, BULGARIA, kv. Iliyantzi, 10 A Jerman Str.

TESTED PRODUCT: 20/0.4 kV, 800 KVA Prefabricated concrete complex transformer substation

REFERENCE STANDARD: IEC 62271-202/2006, Annex A

TEST PERFORMED: Internal arc test

TEST DATE: 17.10.2008

TEST RESULT: Passed the tests

Report has 17 pages and it is edited in 4 copies from which 3 copies for customer.

HEAD OF HIGH POWER DIVISION:
Dr. Eng. George Curcanu

ICMET LABORATORUL DE MARE PUTERE "OVIDIU RARINCA" CRAIOVA

HEAD OF LABORATORY:
Eng. Constantin Iancu

DATE OF ISSUE: 19.11.2008

1. Results refer to test product only.
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Content

1.	Identification of the test product	3
2.	Technical characteristics established by manufacturer	3
3.	Tests program	3
4.	Responsible for tests	3
5.	Present at the tests	3
6.	Test report documentation	3
7.	Data of testing and measuring circuit	4
8.	Values obtained on tests	4
9.	Test result	5
10.	Annexes	
	- Photo	6
	- Technical characteristics	10
	- Drawing	11
	- Oscillograms	15

1. IDENTIFICATION OF TEST PRODUCT

	Substation	MV Switchgear (Ormazabal)
Type	БКТП	CGMCOSMOS-2LP
Serial number/year	08-1029	30021701/2008
Technical specification /Drawing	See page 10 / See pages 11 to 14	
Contract No.:	2212 / 10.10.2008	
Product receiving date:	13.10.2008	
Product condition at receiving:	New	

2. TECHNICAL CHARACTERISTICS ESTABLISHED BY MANUFACTURER

	Substation	MV Switchgear (Ormazabal)
Rated power	800 KVA	- KVA
Rated voltage	20/0.4 kV	24 kV
Rated normal current	23.1/1154.7 A	630 A
Rated frequency	50 Hz	50 Hz
Rated short - time withstand current:		
- peak value	40 kA	40 kA
- r.m.s. value	16 kA	16 kA
Duration	1 s	1 s
IAC clasification	AB	

3. TESTS PROGRAM

Current calibration test.
Internal arc test with arc initiation point between R and S phases
- on input terminals of MV switchgear – left side (IAC A)
- on input terminals of MV switchgear – right side (IAC B)

Arcing point was initiated by means of a copper wire having 0.5 mm diameter.
Test parameters were: Ip = 40x0.87 = 34.8 kA, Ik = 16x0.87 = 13.92 kA, tk = 1 s and 6 kV three-phase applied voltage on the input terminal of MV switchgear.
The combined vertical and horizontal indicators were placed

- for IAC A in front of the MV Switchgear at 300 mm distance, with the doors of the MV compartment opened; in front of the door and the window of the transformer compartment at 100 mm distance
- for IAC B in front of the doors of the MV and LV compartments, in front of the door and window of power transformer compartment at 100 mm distance.

Tests are performed according to own procedure PT 03.07.

4. RESPONSIBLE FOR TESTS: Eng. Ilie Sbora

5. PRESENT AT THE TESTS: Dipl. Eng. George Georgiev from "ELECTROGETZ" LTD

6. TEST REPORT DOCUMENTATION Oscillograms 3 ; Tables 3 ; Photos 8 ; Drawings 4 .

ВЯРНО С ОРИГИНАЛА

ЕЛЕКТРОГЕЦ СОФИЯ ООД

7. DATA OF TESTING AND MEASURING CIRCUIT

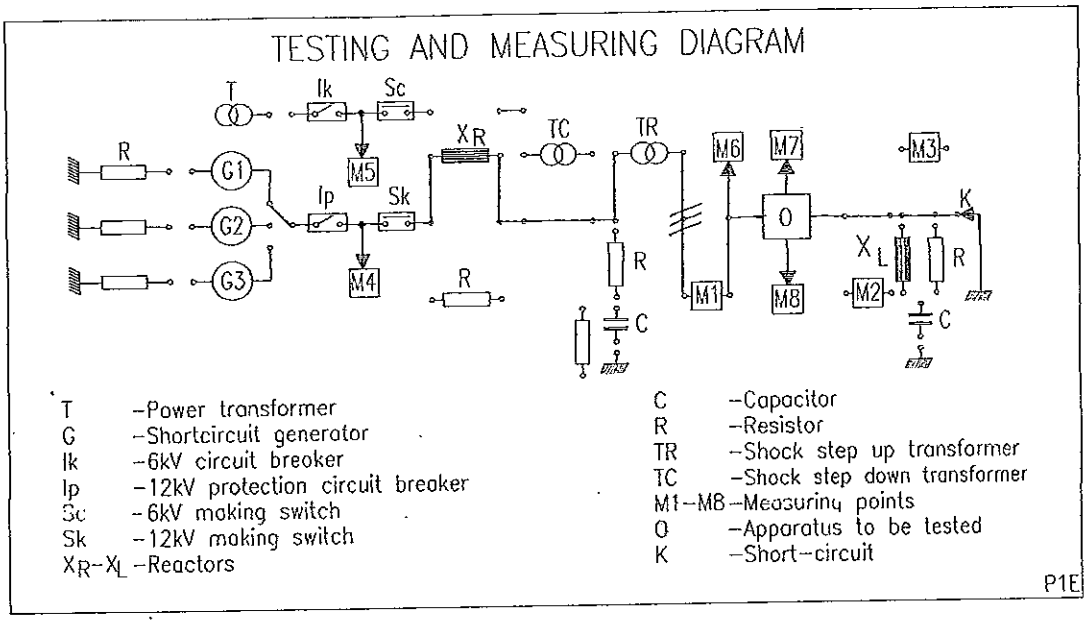


Table 1

Phases number		3
Source/ connection		G1 /Δ
Transformer/Rate		TC 4, 5, 6 / 1.07
Earthing	Source	-
	Apparatus	Net earthing connection
Reactor [Ω]		0.6
Power factor		<0.15
M1 - Apparatus current – Rogowski coils 30 kA/V		
M4 - Supply source voltage - Voltage transformer 15000 V/100 V		
M6 - Apparatus voltage – Voltage transformer 35000/100V		

8. INTERNAL ARC TEST

The test results are presented in table 2.

Table 2

Oscillogram No.	URS UST UTR [kV]	IpR IpS IpT [kA]	ItR ItR ItT [kA]	tt [sec.]	It med [kA]	DURS DUST DUTR [V]	Remarks
73944/2008	5.5 5.5 5.5	35.8 - -	14.2 14.2 -	0.25	14.2	- - -	Current calibration
73945/2008	5.95 5.95 5.95	35 - -	14.1 14.1 -	1	14.1	764 - -	Internal arc test for IAC A
73946/2008	6 6 6	36 - -	14.3 14.3 -	1	14.3	729 - -	Internal arc test for IAC B

Measurements were performed with uncertainty of: 1% for voltage; 1% for current; 0.5% for time and the confidence level P = 95 %.

8.1. Symbols used in tables and oscillograms

I_R I_S I_T = Short-circuit current

I_{pR} I_{pS} I_{pT} = Peak values of short-time withstand currents on the phases R, S, T.

I_{tR} I_{tS} I_{tT} = R.m.s. values of short - time withstand currents on the phases R, S, T.

t_t = The duration of short – circuit

$I_{t\,med}$ = Effective current mean value

DU_{RS}, DU_{ST}, DU_{TR} = Voltage drop on arc

U_{RS}, U_{ST}, U_{TR} = No-load applied voltage

8.2 Remarks

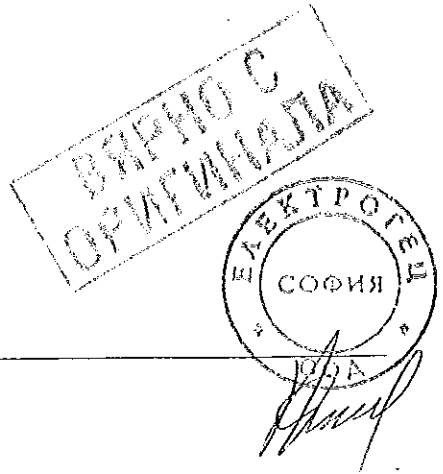
1. Aspects of Prefabricated Transformer Substation and indicators in the test circuit for IAC A are presented in photos 1 and 2.
2. Aspect of the Prefabricated Transformer Substation and indicators after the test for IAC A are presented in photo 3 and 4
3. Aspects of the Prefabricated Transformer Substation and indicators in the test circuit for IAC B are presented in photos 5 and 6.
4. Aspect of the Prefabricated Transformer Substation and indicators after the test for IAC B are presented in photo 7 and 8.
5. For IAC A the indicators were made of black cretton (140g/m^2)
6. For IAC B the indicators were made of black cotton (50g/m^2)
7. At the test for IAC A
- the doors of MV Switchgear and the doors and windows of Power Transformer Compartment didn't open and parts from the Substation didn't fly off ;
- the indicators didn't ignite
8. At the test for IAC B
- the doors of MV Switchgear and the doors and windows of Power Transformer Compartment didn't open and parts from the Substation didn't fly off;
- the indicators didn't ignite.

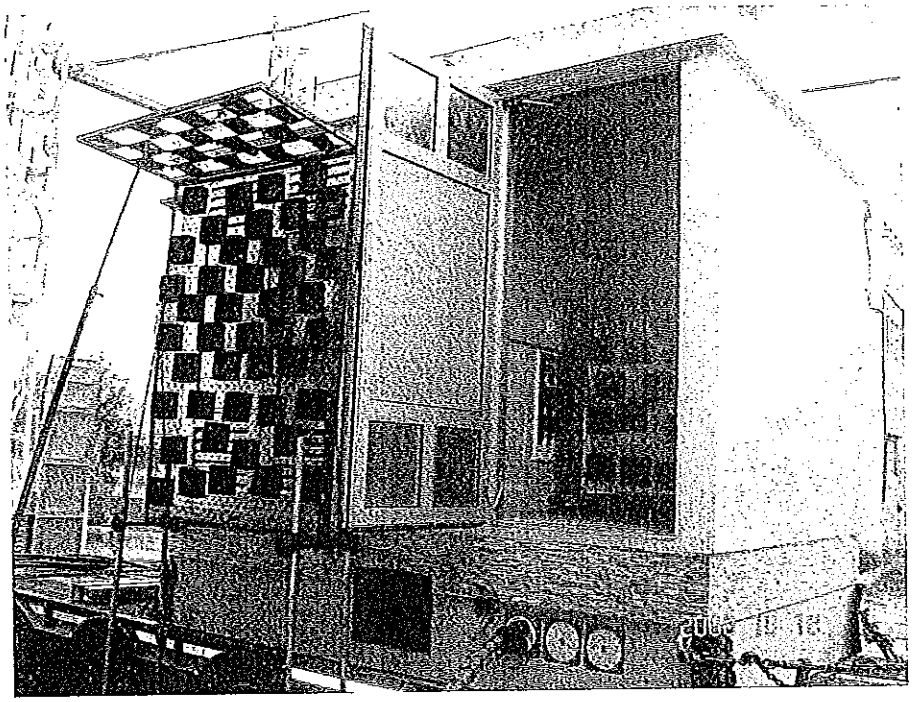
8.3 Assessment of the test result

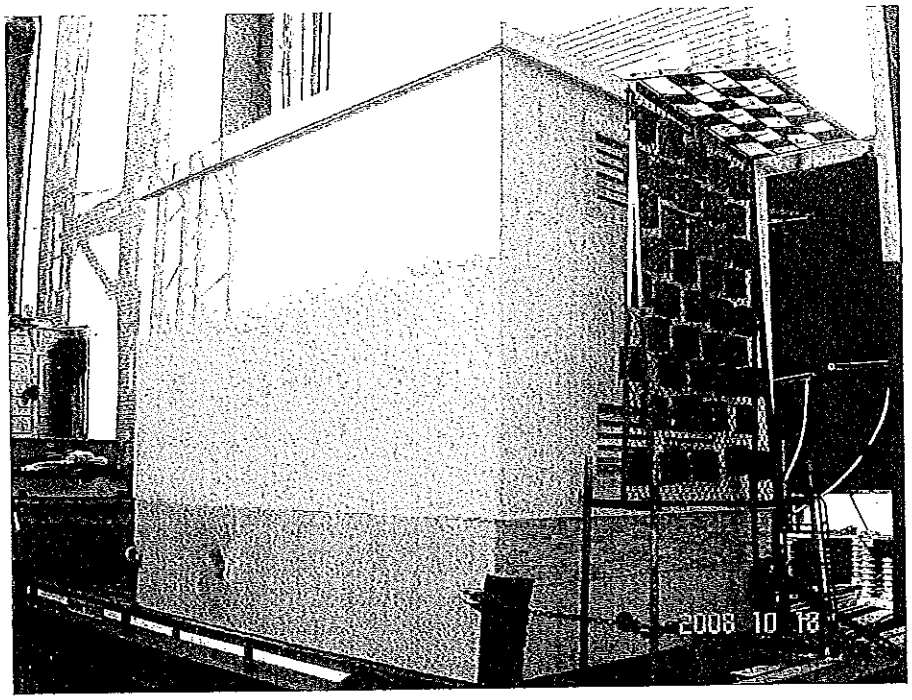
Table 3

Criterion	Result
1.The doors, covers etc. correctly secured do not open	Fulfilled
2. Parts which may cause a hazard do not fly off	Fulfilled
3. Arcing does not cause holes to develop in the freely accessible external parts of the enclosure as a result of burning or other effects	Fulfilled
4.The indicators arranged vertically do not ignite	Fulfilled
5. The indicators arranged horizontally do not ignite	Fulfilled
6. All earthing connections are still effective	Fulfilled

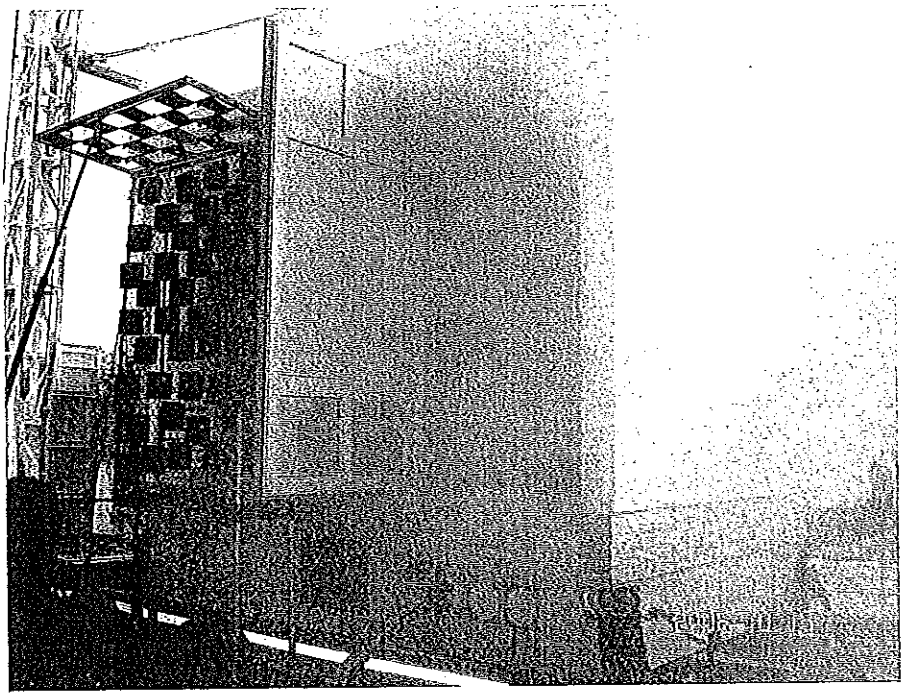
9. TEST RESULT: PASSED THE TEST

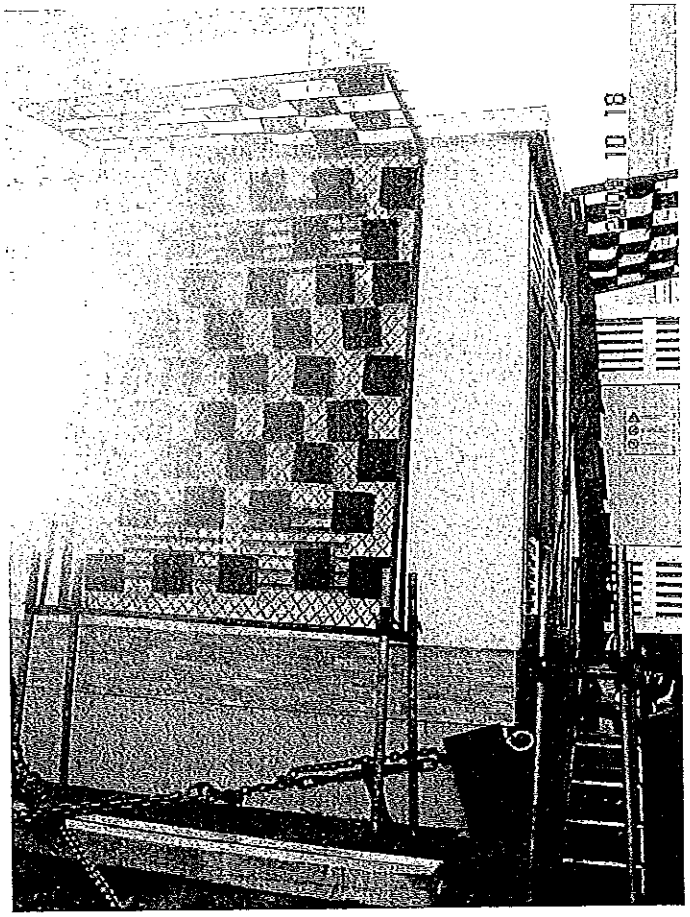




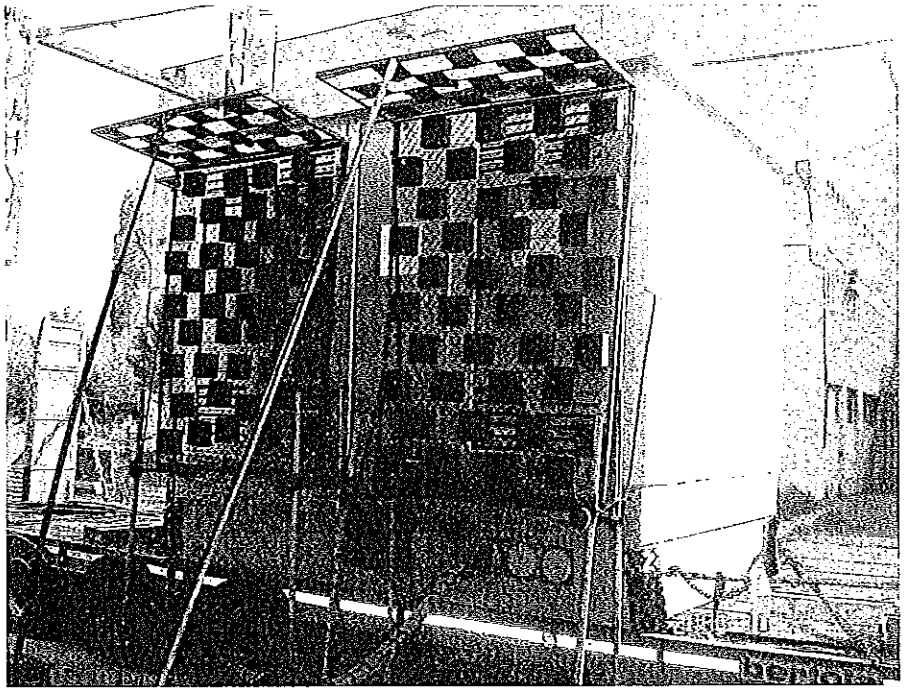


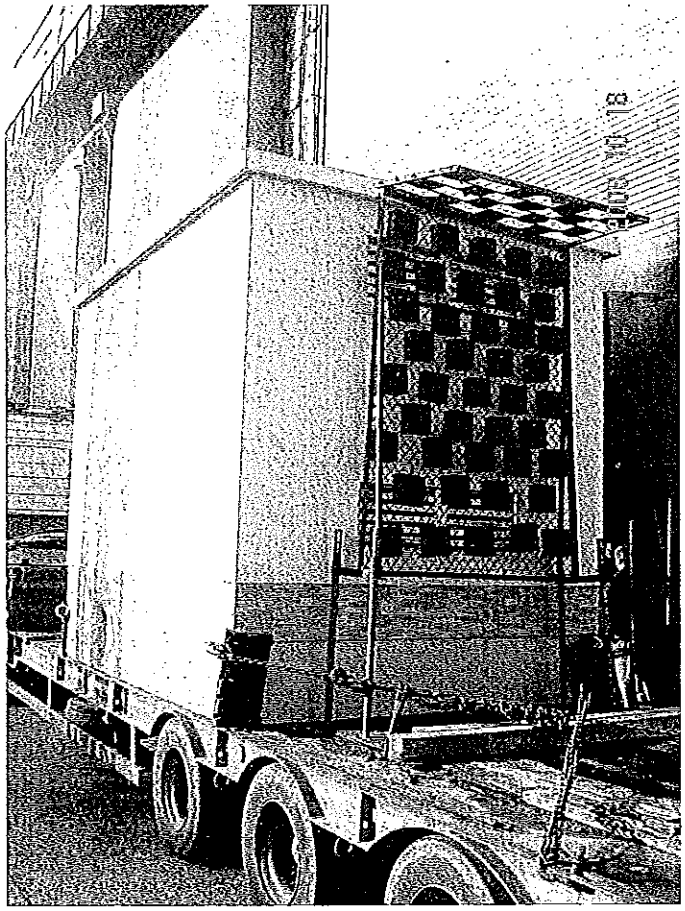
Photos 1 and 2 – Aspect of the Prefabricated concrete complex transformer substation and the indicators in the test circuit for IAC A



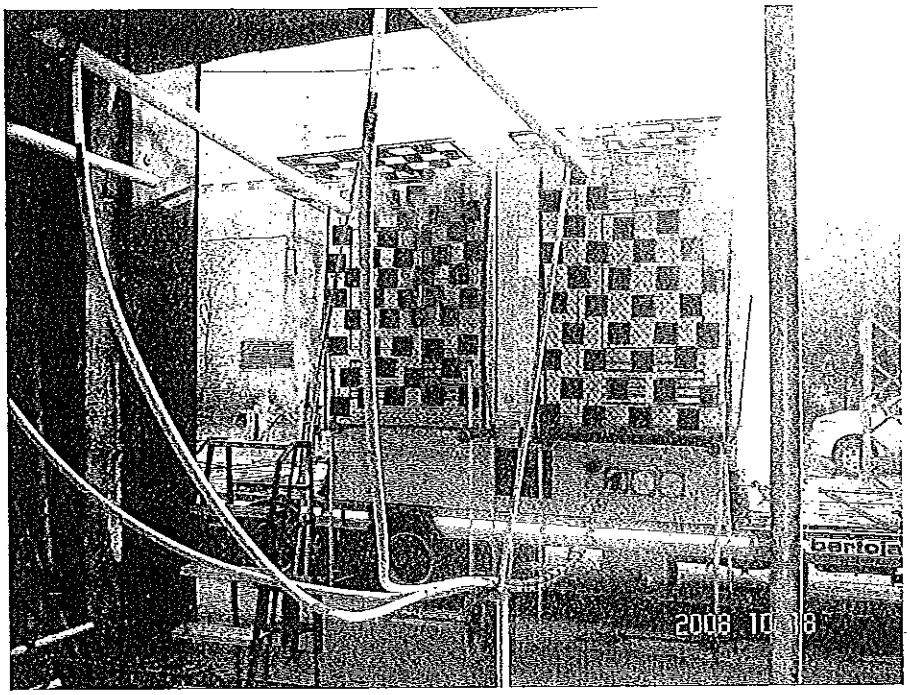


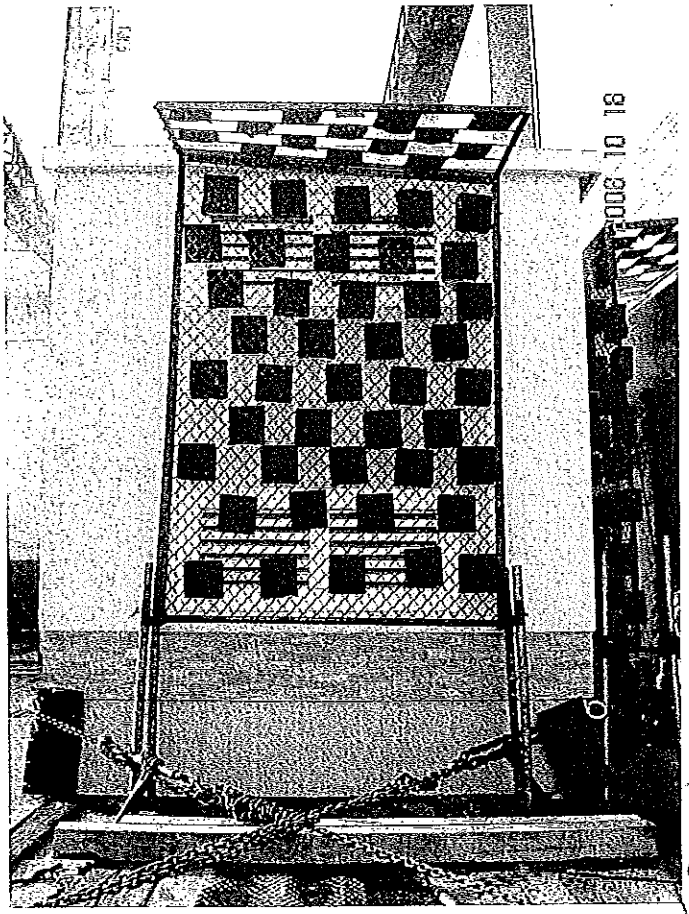
Photos 3 and 4 - Aspect of the Prefabricated concrete complex transformer substation and the indicators after test for IAC A





Photos 5 and 6 – Aspect of the Prefabricated concrete complex transformer substation and the indicators in the test circuit for IAC B





Photos 7 and 8 - Aspect of the Prefabricated concrete complex transformer substation and the indicators after test for IAC B

LIST OF DECLARED VALUES

ELECTROGETZ Ltd. PREFABRICATED CONCRETE COMPLEX TRANSFORMER SUBSTATION, WALK-IN TYPE

* Ring Main Unit (RMU) – 20kV

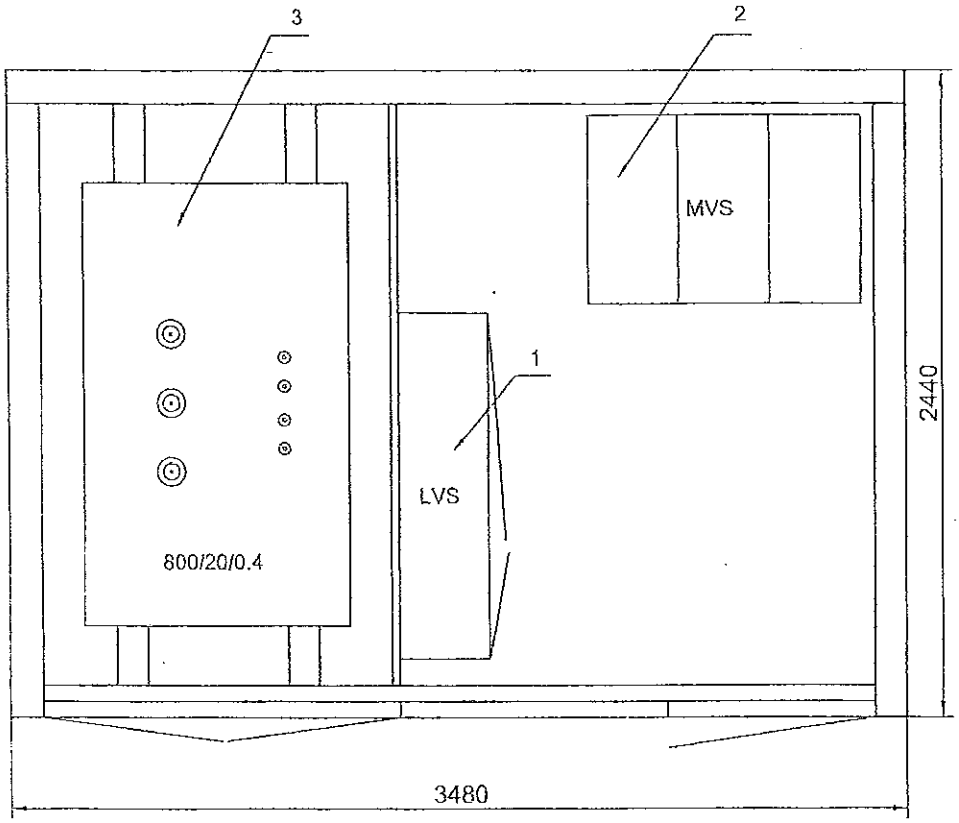
- Voltage (Ur) – 24kV
- Rated current (Ir) – 630A
- Insulation level:
  - Voltage at 50Hz/1min (Ud) – 50kV
  - Impulse voltage 1.2/50μs (Up) – 125kV
- Short-time withstand current (Ik) – 21kA
- Peak withstand current (Ip) – 52.5kA
- Frequency – 50Hz
- Fuse feeder – 200A

* LV switchboard 1250/12/400:
- Voltage (Ur) – 0.69/0.4/0.23 kV
- Rated current (Ir) – 1250A

* MV and LV connection:
- MV connection – cable type NA2XSY 20kV, 3x1x50 mm², cable cold shrink MV terminations 20kV
  - Rated current (Ir) – 185A
  - Insulation level:
    - Voltage at 50Hz/1min (Ud) – 50kV
    - Impulse voltage (Up) – 125kV

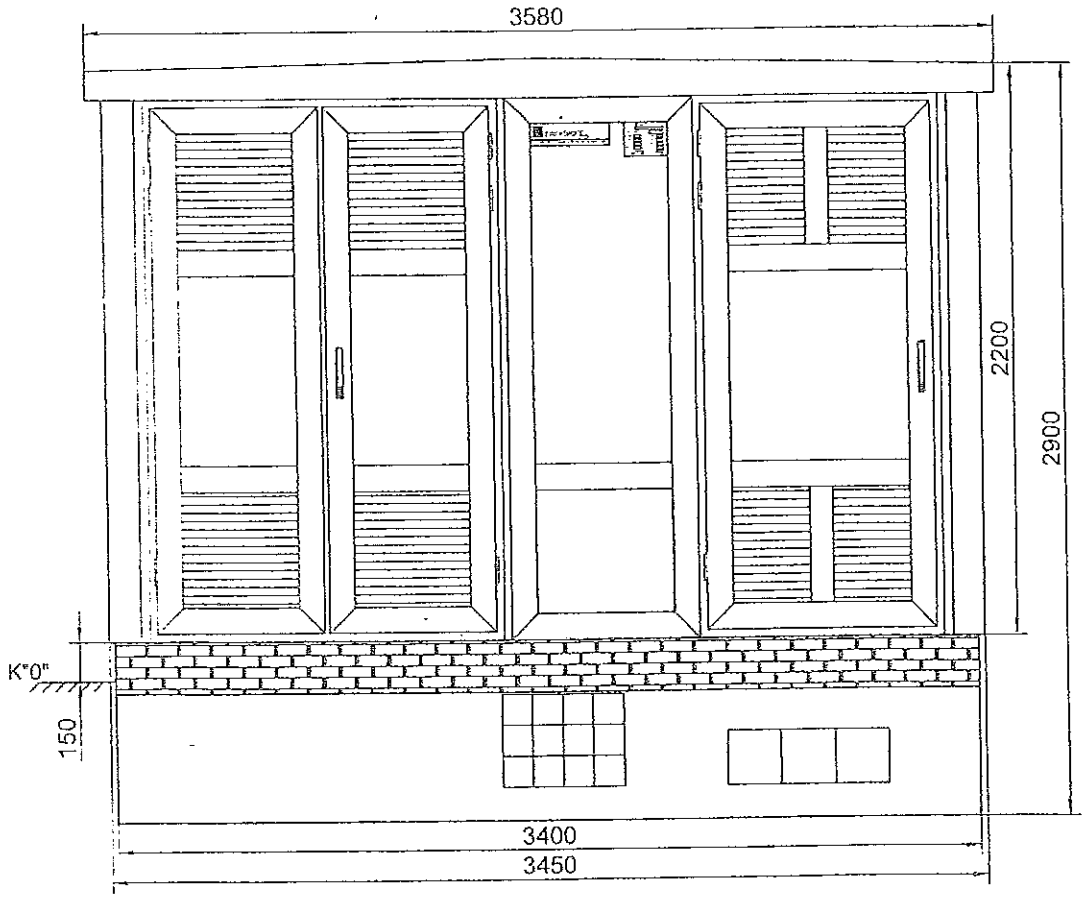
- LV connection – copper busbar 4x{2x[8x(60x1mm)]}
  - Rated current (Ir) – 1250A
  - Insulation level:
    - Impulse voltage (Up) – 6kV

* Transformer 800 kVA/20kV/0.4kV:
- Voltage (Ur) – 20±2% /0.4 kV
- Rated current (Ir) – 23.09/1154.7A
- Frequency (Fr) – 50Hz
- Winding connection group – Dyn5
- Type of cooling– ONAN
- Insulation level:
  - Voltage 50Hz/1min (Ud) MV winding – 50kV
  - Voltage 50Hz/1min (Ud) LV winding – 3kV



№	Name	Pcs.
1	Main distibution low voltage board type: "ГТРТ 1250/12/400"	1
2	Medium voltage switchgear 20 kV 630A	1
3	Power tansformer, oil type 800 kVA 20/0.4 kV	1

					CCTS 800/20/0.4		Scale
							1:25
		Articcle No	Signature	Date	Situation	Sheet 1	5 Sh.
Created by		dipl.eng. Kyosev		09.08			
Designed by		dipl.eng. Kyosev		09.08	Object:	"ELEKTROGETZ" ltd.	
Checked by		dipl. eng.Lazarov		09.08			
Manager		dipl. eng.Georgiev		09.08			



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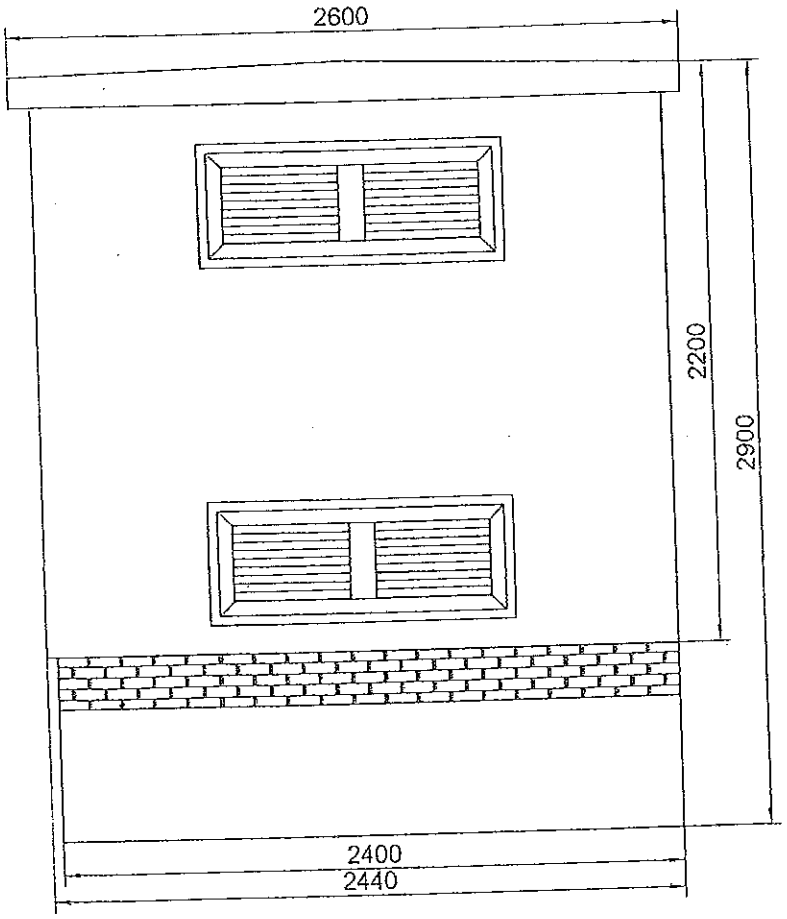
	Checked by	dipl. eng.Lazarov		09.08		
	Manager	dipl. eng.Georgiev		09.08		



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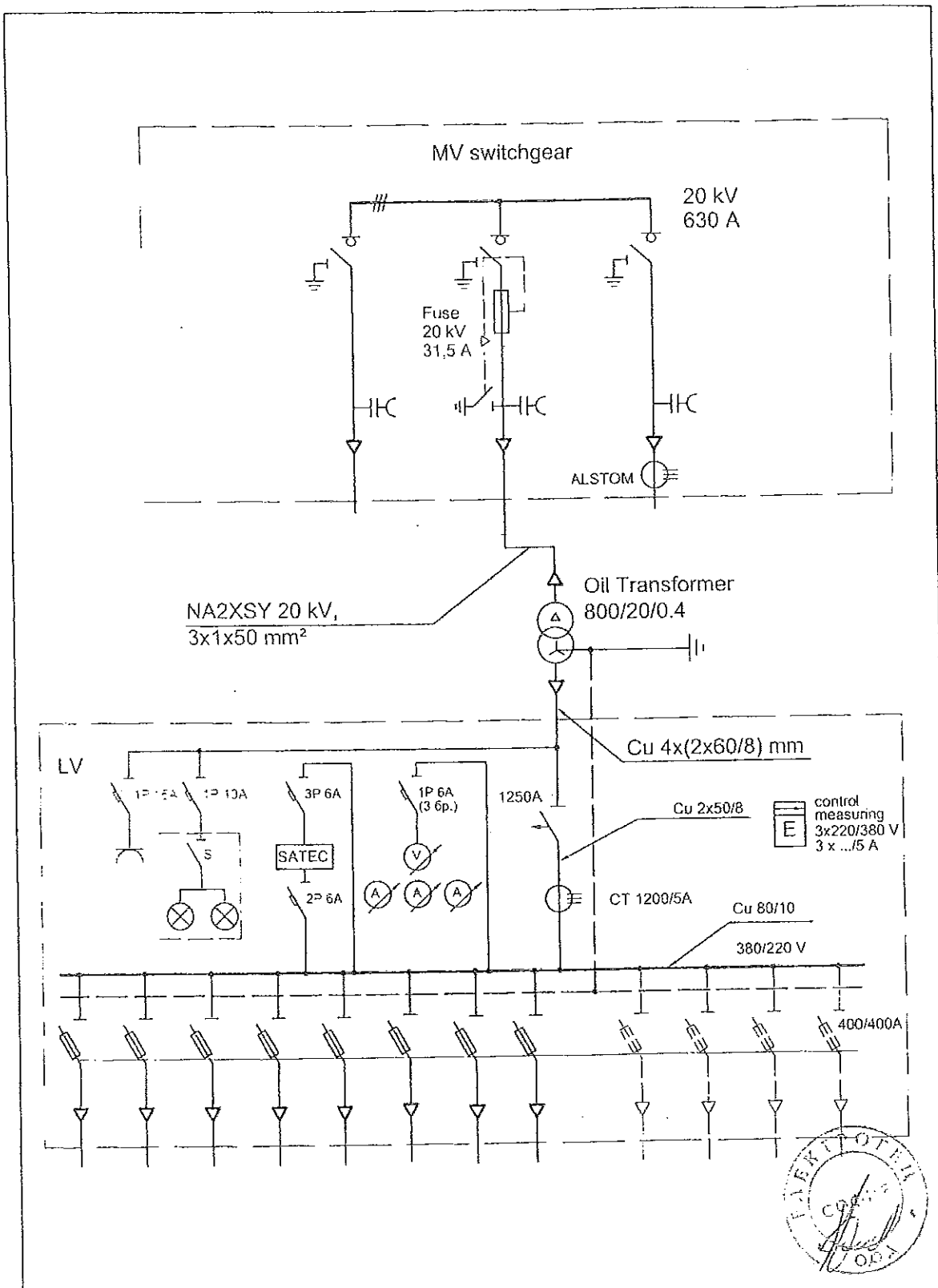
	Designed by	dipl.eng. Kyosev		09.08	Object:	ELEKTROGETZ ltd.
	Checked by	dipl. eng.Lazarov		09.08		
	Manager	dipl. eng.Georgiev		09.08		



						Scale
				CCTU 800 kVA 20/0.4 kV Single line diagram		
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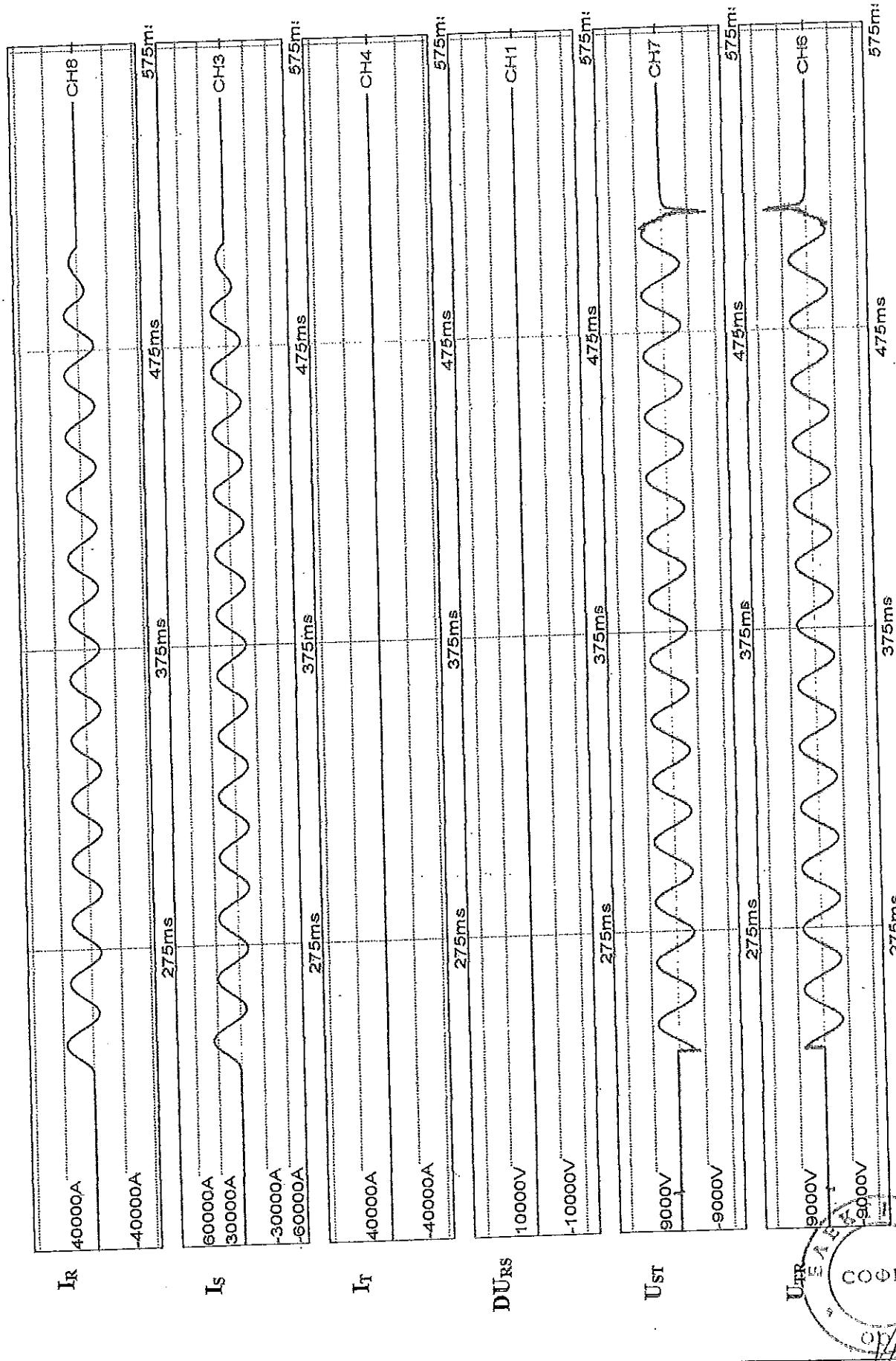
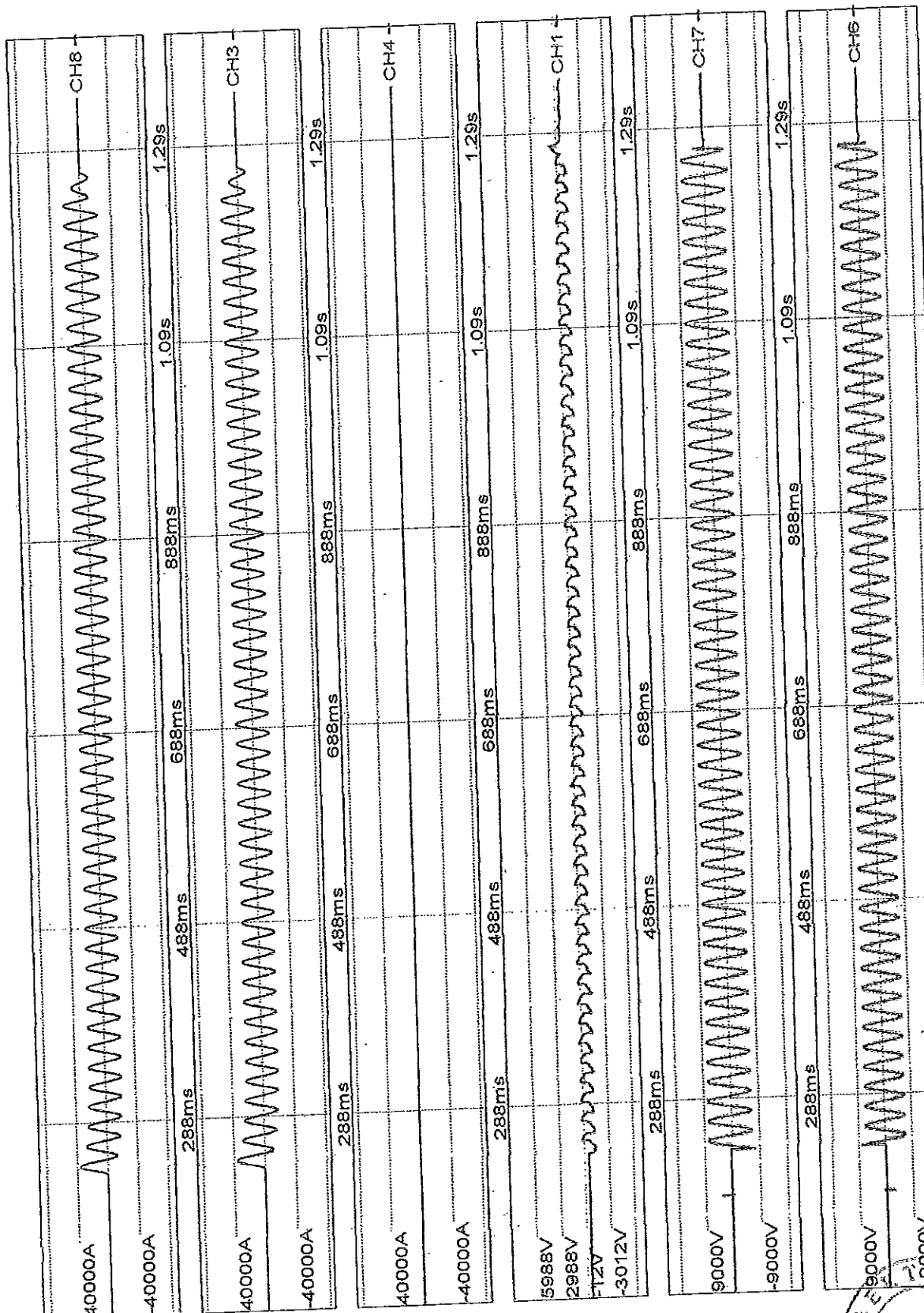
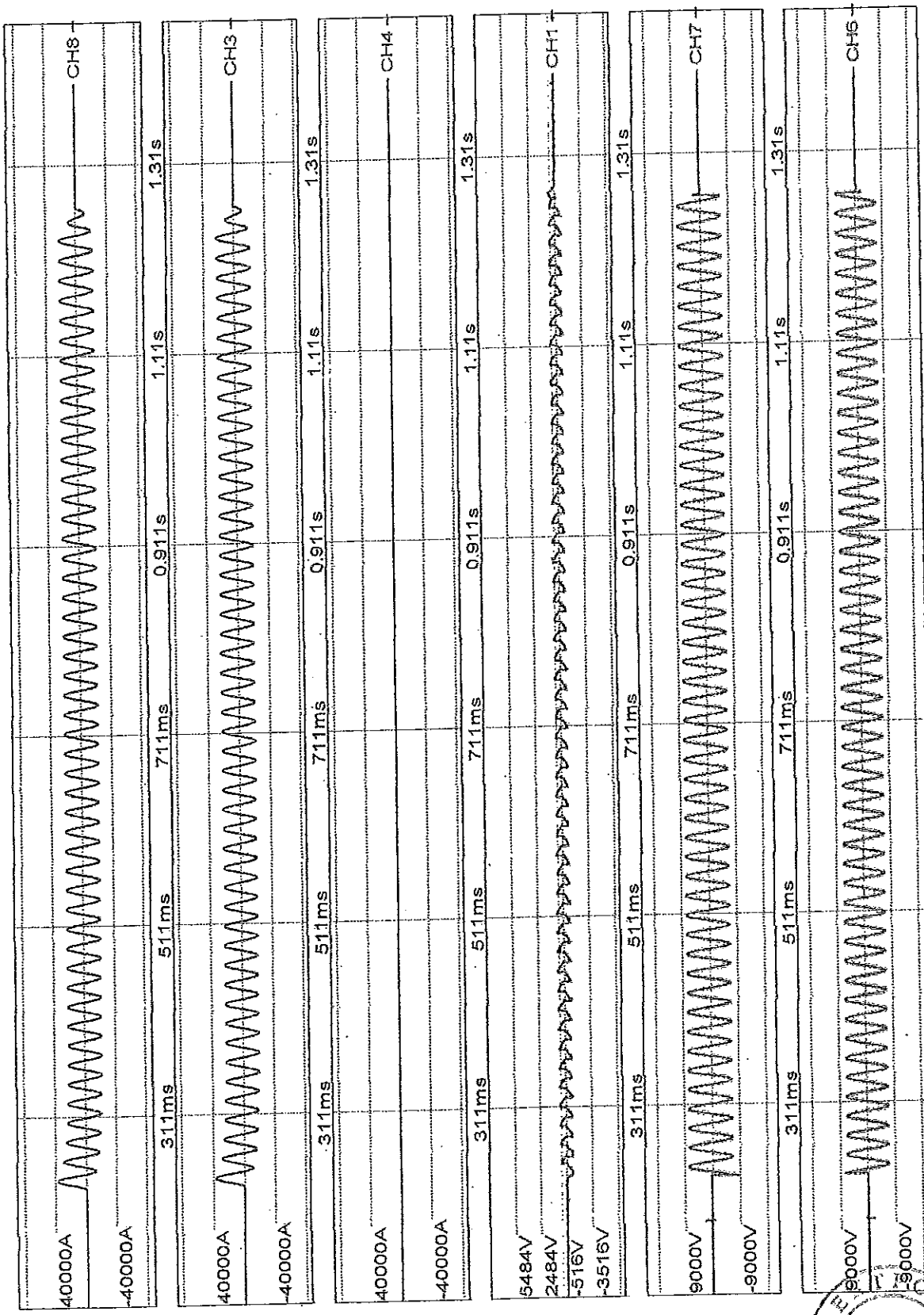
Designed by	dipl.eng.Kyosev		09.08	Object:	"ELEKTROGETZ" ltd.	
Checked by	dipl. eng.Lazarov		09.08			
Manager	dipl eng.Georgiev		09.08			



Oscillogram No. 73944 / 2008



Oscillogram No. 73945 / 2008



Oscillogram No. 73946 / 2008

RESEARCH-DEVELOPMENT AND TESTING NATIONAL
INSTITUTE FOR ELECTRICAL ENGINEERING

ICMET CRAIOVA
HIGH POWER DIVISION

HIGH POWER LABORATORY
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Phone: (351) 402 427; Fax: (251) 415482; (351) 404 890;
E-mail: lmp@icmet.ro

TEST REPORT
No. 10316

CUSTOMER: "ELECTROGETZ" LTD
1271 Sofia, BULGARIA, kv. Iliyantzi, 10 A Jerman Str.

MANUFACTURER: "ELECTROGETZ" LTD
1271 Sofia, BULGARIA, kv. Iliyantzi, 10 A Jerman Str.

TESTED PRODUCT: 20/0.4 kV, 800 KVA Prefabricated concrete complex transformer substation

REFERENCE STANDARD: IEC 60551+A1/1999 clause 5

TEST PERFORMED: Determination of sound level

TEST DATE: 16.10.2008

TEST RESULT: Passed the tests

Report has 6 pages and it is edited in 4 copies from which 3 copies for customer.

HEAD OF HIGH POWER DIVISION:
Dr. Eng. George Curcanu

ICMET LABORATORUL DE MARE PUTERE "OVIDIU RARINCA" CRAIOVA

HEAD OF LABORATORY:
Eng. Constantin Iancu

DATE OF ISSUE: 18.11.2008

ВЯРНО С ОРИГИНАЛА

СОФИЯ

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Content

1.	Identification of the test product	3
2.	Technical characteristics established by producer	3
3.	Tests program	3
4.	Responsible for tests	3
5.	Present at the tests	3
6.	Test report documentation	3
7.	Determination of sound level	4
9.	Test results	5
9.	Annexes	
	Drawings	6

ВЯРНО С ОРИГИНАЛА

ЕЛЕКТРОТЕД СОФИЯ ОФА

1. IDENTIFICATION OF TEST PRODUCT

	Substation	MV Switchgear (Ormazabal)
Type	БКТП	CGMCOSMOS-2LP
Serial number/year	08-1029	30021701/2008
Technical specification /Drawing	- / See page 6	
Contract No.:	2212 / 10.10.2008	
Product receiving date:	13.10.2008	
Product condition at receiving:	New	

2. TECHNICAL CHARACTERISTICS ESTABLISHED BY MANUFACTURER

	Substation		MV Switchgear (Ormazabal)	
Rated power	800	KVA	-	KVA
Rated voltage	20/0.4	kV	24	kV
Rated normal current	23.1/1154.7	A	630	A
Rated frequency	50	Hz	50	Hz
Rated short - time withstand current:				
- peak value	40	kA	40	kA
- r.m.s. value	16	kA	16	kA
Duration	1	s	1	s
IAC clasification	AB			

3 TEST PROGRAM

Determination of sound level of transformer substation.

4. RESPONSIBLE FOR TESTS: Phys. Daniel Truta

5. PRESENT AT THE TESTS: Dipl. Eng. George Georgiev from "ELECTROGETZ" LTD

6. TEST REPORT DOCUMENTATION Oscillograms - ; Tables 1 ;
Photos - ; Drawings 1

ВЯРНО С ОРИГИНАЛА

ЕЛЕКТРОГЕЦ СОФИЯ СОА

7. DETERMINATION OF SOUND LEVEL

7.1. General conditions:

- Supply voltage: 0.4 kV .
- Place of measurement: LIT - ICMET CRAIOVA.
- Dimensions of the test room: L x l x H = 45 x 22 x 28 m;
- Mean sound absorption coefficient of the test room: a = 0.25;

7.2. Performing of tests on equipment:

7.2.1. Conditions of performing the tests on equipment:

Microphone height over ground: 1 m;

Overall dimensions of the equipment are presented in drawing from page 6. Position of equipment and measuring points during test is given in Fig. 1.

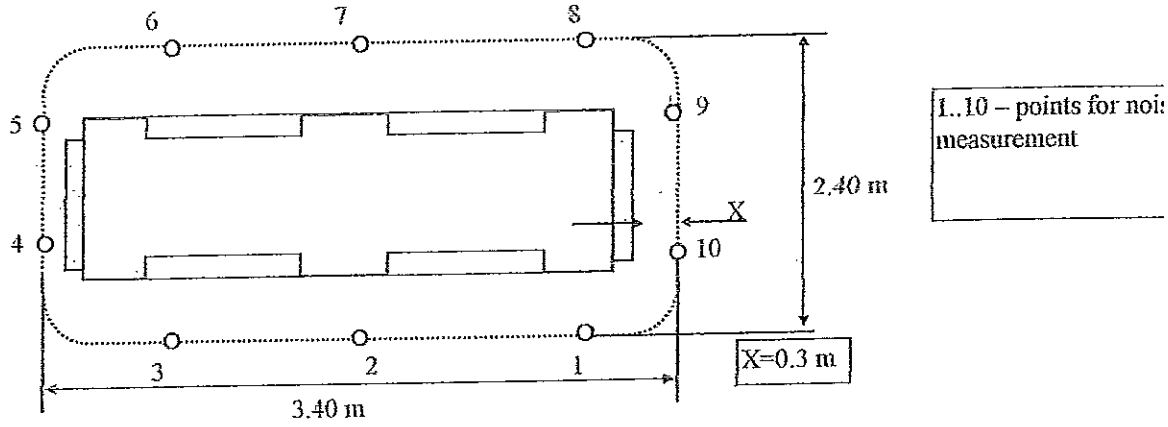


Fig.1. Position of tested equipment and of measuring points during test

7.2.2. Values obtained during the test on equipment:

The measuring of sound level has been made on a precise contour, spaced at 0.3 m away from the principal radiating surface of equipment. Values obtained during the test are presented in Table 1.

Table 1

Plan position	Measured sound level, A weighted [dB]		Corrected sound level, A weighted [dB] [$L_{Pi(A)}$]
	Background noise	Equipment sound level	
1	40.2	45.2	43.2
2	40.2	45.3	43.3
3	40.2	45.5	43.5
4	40.3	45.4	43.4
5	40.3	45.2	43.2
6	40.1	45.2	43.2
7	40.3	45.7	43.7
8	40.3	45.8	43.8
9	40.3	45.4	43.4
10	40.2	45.3	43.3
Mean of sound level meter readings			43.40

Mean sound level of equipment, A weighted and corrected: $\overline{L}_{p(A)} = 43.19$ **dB;**

Note: Following relations and notations were used for calculus.

- $\overline{L}_{p(A)} = 10 \cdot \log_{10} \frac{1}{N} \left(\sum_{i=1}^{N} 10^{0.1 \cdot L_{pi(A)}} \right) - Z;$
- Sound absorption: $A = a \cdot S_V = 1433$ m^2;
- Area of effective surface, at 0.3 m away for the principal radiating surface:

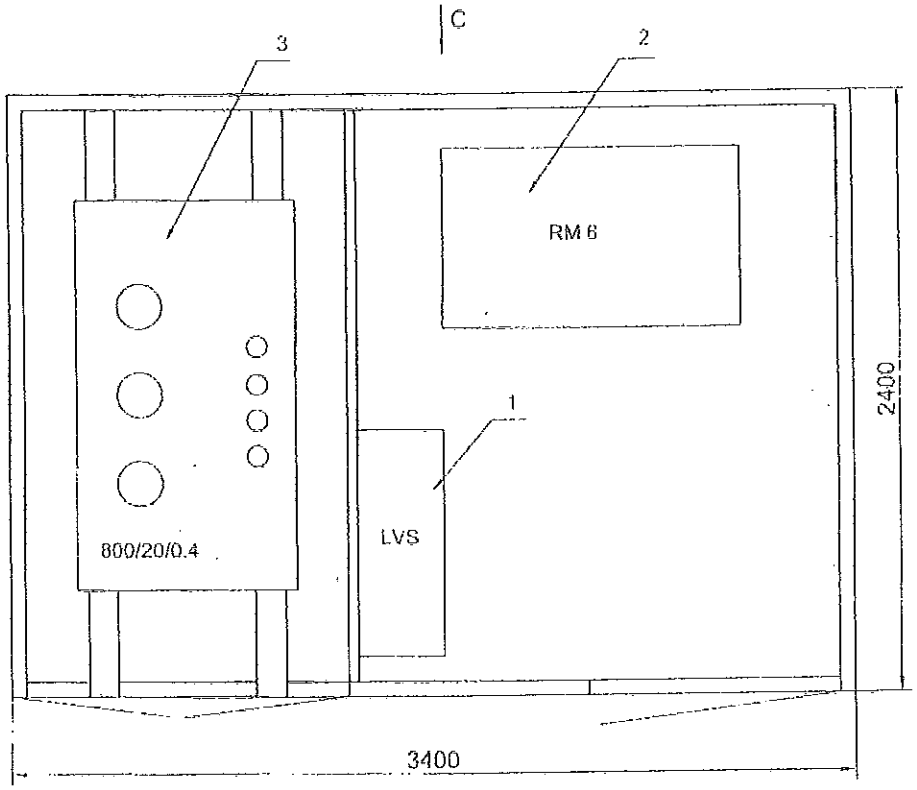
$S = 1.25 \cdot h \cdot p_m = 1.25 \cdot 1 \cdot 2 \cdot (3.40 + 0.6 + 2.40 + 0.6) = 17.5$ m^2

- Environmental correction factor: $Z = 10 \cdot \log_{10} \left(1 + \frac{4}{A/S} \right) = 0.21$ dB;
  - N - number of measurement points;
  - h - height of equipment;
  - p_m -length of the prescribed contour;
  - S_V - area of the surface of the test room;

Acceptance criteria:

Mean sound level of equipment, A weighted and corrected: $\overline{L}_{p(A)} = 43.19$ dB < 50 dB specified.

8. TEST RESULTS: Passed the test.



№	Name	Pcs.	Material	Note	Drawing №
1	Main distibution low voltage board type: "ГТРТ 1250/8/400"	1	-	-	-
2	Medium voltage switchgear 20 kV 630A type RH6 NE IQI	1	-	-	
3	Power tansformer, oil type 800 kVA 20/0.4 kV	1	-	-	-

					MCTU 800/20/0.4	Стадий	Маса	Scale
						РП		1:25
		Article No	Signature	Date	Situation	Sheet 1	8 Sh.	
Created by		dipl eng Kyosev		08.08				
Designed by		dipl.eng. Kyosev		08.08	Object	"ELEKTROGETZ" ltd.		
Checked by		dipl. eng.Lazarov		08.08				
Manager		dipl. eng Georgiev		08.08				

Ex. 2

RESEARCH, DEVELOPMENT AND TESTING NATIONAL INSTITUTE FOR ELECTRICAL ENGINEERING

I C M E T CRAIOVA

HIGH VOLTAGE DIVISION

ELECTROMAGNETIC COMPATIBILITY LABORATORY – EMC Laboratory

Calea Bucureşti Nr.144, 200515 Craiova, ROMÂNIA
Phone: + 40 351 402425, 404888, 404889; Fax: + 40 251 415482, 351 404890
www.icmet.ro, e-mail: market@icmet.ro

TEST REPORT

No. 41790 / 20.10.2008

1.	**Customer:**	ELECTROGETZ Ltd.
2.	**Customer's address:**	Kv. Iliyantzi, 10 A Jerman Str., 1271, Sofia - BULGARIA
3.	**Manufacturer:**	ELECTROGETZ Ltd.
4.	**Manufacturer's address:**	Kv. Iliyantzi, 10 A Jerman Str., 1271, Sofia - BULGARIA
5.	**EUT:**	**Prefabricated Concrete Transformer Substation 20/04 kV, 800 kVA type БКТЛ, Serial no. 08-1029**
6.	**Tests:**	- Measurement of electric field - Measurement of magnetic field
7.	**Test date:**	14.10.2008, 15.10.2008
8.	**Test standard:**	European Directive 2004/40/EC
9.	**Test result:**	The Results will be declared

10. **The Test Report contains 7 pages and was edited in 4 copies of which 3 copies for Customer.**

Head of High Voltage Division,
Eng. Dorin POPA

Head of Laboratory,
Eng. George MIHAI

CAUTIONS:

a. The results refer to test product only.
b. Publication or reproduction of the content of this report in any other form unless its complete photocopying is not allowed without the written approval of the division the laboratory belongs to.
c. Accreditation of the Laboratory or any of its Test Reports issued in accreditation regime, do not constitute or imply, themselves, an approval of the product by the accreditation body

Contents

1. General information about EUT 3

1.1. Description of the EUT 3

1.2. Technical data 3

1.3. Product's receiving date 3

1.4. Operating modes used for the test 3

1.5. Test Standard 3

2. Measuring results 3

2.1. Results of the electric field strength measurement 3

2.2. Results of the magnetic field strength measurement 4

3. Appendix 6

1. General information about EUT

1.1 Description of the EUT:

Type of EUT: Prefabricated Concrete Transformer Substation 20/04 kV, 800 kVA type,
Model: БКТЛ
Serial number: 08-1029

1.2 Technical data:

Rated voltage: 20/0,4 kV
Rated power: 800 kVA
Rated frequency: 50 Hz
Dimensions: 3580 x 2600 x 2900 mm

1.3 Product's receiving date: 13.10.2008

1.4 Operating modes used for the test:

1.4.1 During the electric field measurement the EUT was supplied at rated voltage.

1.4.2 During the magnetic field measurement the EUT was supplied at rated current.

1.5 Test Standard

Directive 2004/40/EC of the European Parliament and of the Council of 29 April 2004, on the minimum health and safety requirements regarding the exposure of workers to the risks arising from physical agents (electromagnetic fields)

2. Measuring results

2.1 Results of the electric field strength measurement

General information about the test:

Tested by:	Eng. Paul Nicoleanu
Test date:	14.10.2008

Measuring instruments:

Description	Manufacturer	Type	Serial
EM Field analyzer	Narda Safety Test Solution GmbH, Germany	EFA-300	S-0007
E-Field Unit (EFA-300)	Narda Safety Test Solution GmbH, Germany	BN 2245/90.31	P-0003

Environmental conditions:

Parameter	Rated value	Measured value
Ambient temperature:	0 °C ÷ 50 °C	(15.5 ± 0.1) °C
Atmospheric pressure:	unspecified	1009 mbar
Relative humidity:	5 % ÷ 85 %	64.5 %

Test plan:

Test set-up:	E-Field unit of EFA 300 EM Field Analyzer was placed in central part of each side of the EUT.
Operating modes:	According 1.4.1
Distance between EUT and E-Field unit:	1 m

Test procedure:

It was measured the electric field strength using the EFA 300 EM field analyzer and E-Field unit.
The measurement was performed on each side of the EUT.
The maximum value over 6 minutes period was measured

Measuring points:

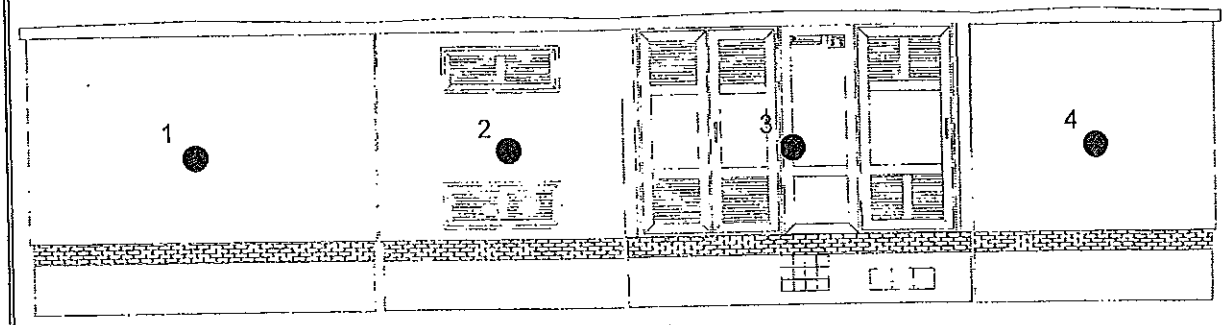


Figure 1

Measuring results:

Measuring point	1	2	3	4
Measured value E (V/m)	55.82	239.1	145.9	102.6
Percent of limit imposed by 2004/40/EC (%)	0.56	2.39	1.46	1.02

Result: The maximum value of electric field strength was 239.1 V/m and it was measured in the point No. 2 shown in the Figure 1 above.

The measurement uncertainty is ± 3.4 dB. The reported uncertainty is an expanded uncertainty, based on a standard uncertainty multiplied by a coverage factor k = 2, providing a confidence level of approximately 95 %.

2.2 Results of the magnetic field measurement

General information about the test:

Tested by:	Eng. Paul Nicoleanu
Test date:	15.10.2008

Measuring instruments:

Description	Manufacturer	Type	Serial
EM Field analyzer	Narda Safety Test Solution GmbH, Germany	EFA-300	S-0007

Environmental conditions:

Parameter	Rated value	Measured value
Ambient temperature:	0 °C ÷ 50 °C	(17.5 ± 0.1) °C
Atmospheric pressure:	unspecified	1008 mbar
Relative humidity:	5 % ÷ 85 %	68 %

Test plan:

Test set-up:	EFA 300 EM Field Analyzer was placed in central part of each side of the EUT (points 5 - 8); EFA 300 EM Field Analyzer was placed near the EUT (points 8 - 24);
Operating modes:	According 1.4.2
Distance between EUT and EM Field Analyzer:	1 m (points 5 - 8); 0,5 m (points 9 - 24)

Test procedure:

It was measured the magnetic induction using the EFA 300 EM field analyzer.
The measurement was performed on each side of the EUT.
The maximum value over 6 minutes period was measured.

Measuring points:

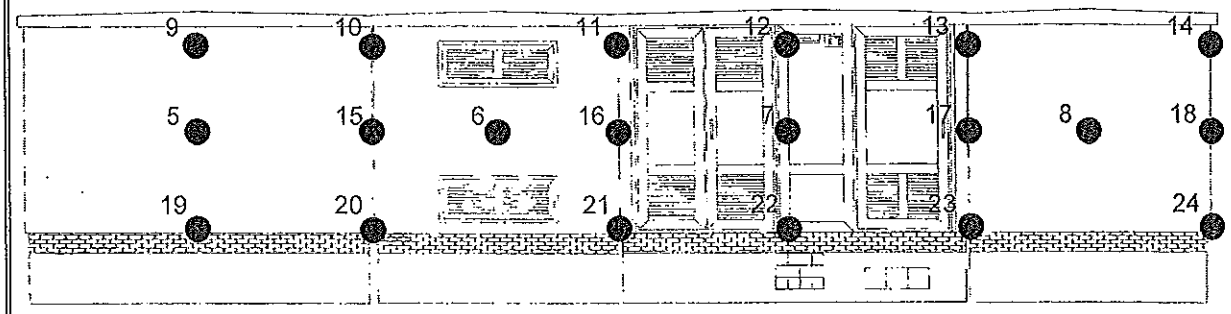


Figure 2

Measuring results:

Measuring point	5	6	7	8
Measured value B (μT)	4.02	11.36	30.65	2.47
Percent of limit imposed by 2004/40/EC (%)	0.81	2.27	6.13	0.49

Measuring point	9	10	11	12	13	14
Measured value B (μT)	7.55	13.12	14.43	16.77	6.84	2.62
Percent of limit imposed by 2004/40/EC (%)	1.51	2.62	2.88	3.35	1.37	0.52

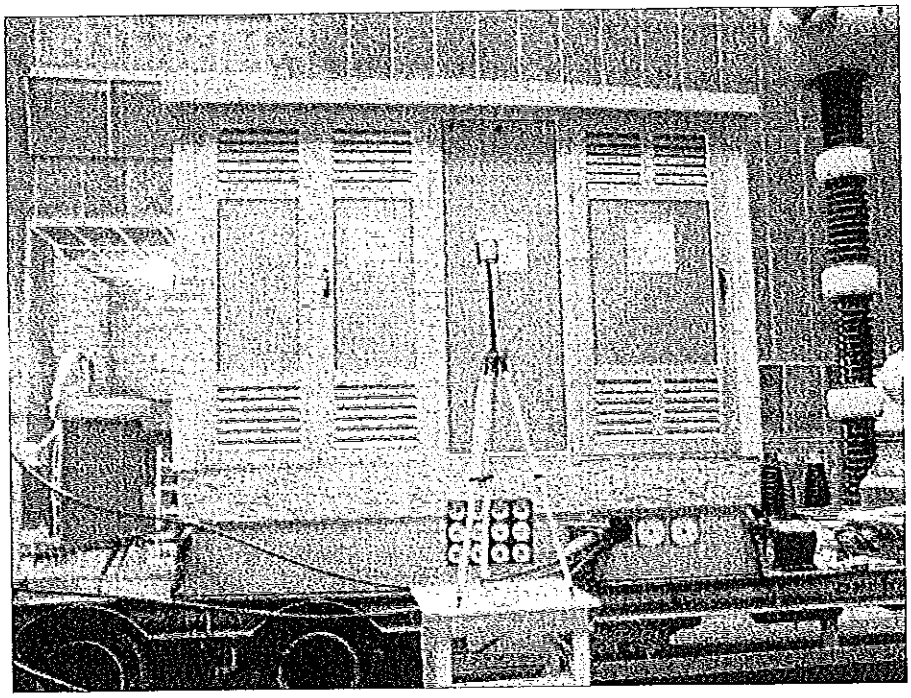
Measuring point	15	16	17	18
Measured value B (μT)	9.43	10.12	7.54	2.76
Percent of limit imposed by 2004/40/EC (%)	1.88	2.02	1.51	0.55

Measuring point	19	20	21	22	23	24
Measured value B (μT)	4.33	7.64	15.28	66.31	12.67	3.63
Percent of limit imposed by 2004/40/EC (%)	0.87	1.53	3.06	13.26	2.53	0.73

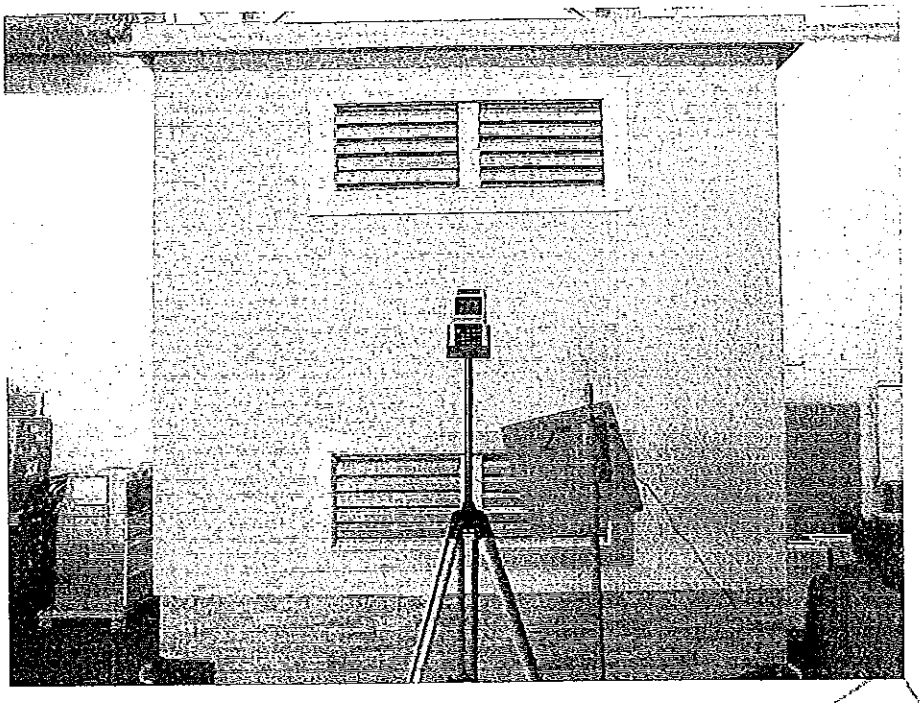
Result: The maximum value of magnetic induction measured was 66.31 μT and it was obtained in the point number 22 shown in the Figure 2 (over the power supply cables).

The measurement uncertainty is ± 3.3 dB. The reported uncertainty is an expanded uncertainty, based on a standard uncertainty multiplied by a coverage factor k = 2, providing a confidence level of approximately 95 %.

3. Appendix



Test set-up for measurement of electric field



Test set-up for measurement of magnetic field

ВЯРНО С ОРИГИНАЛА

ЕЛЕКТРОГЕЙЗ СОФИЯ

RESEARCH, DEVELOPMENT AND TESTING NATIONAL INSTITUTE
FOR ELECTRICAL ENGINEERING –ICMET CRAIOVA

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www.icmet.ro E-mail: market@icmet.ro ; icmet@icmet.ro

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RENAR LE 021: High Currents Calibration

Testing Laboratories:
RENAR Accreditations

RENAR LI 450: High Voltage + EMC
RENAR LI 004: High Power
RENAR LI 529: Low Voltage
RENAR LI 618: Fire Safety and Environment

No.8076 / 30.09.2013

SUMMARY OF TESTS

According to the Contract of applicative research 705.2/ 8707/20.08.2013 in **30.09.2013** at High Power Laboratory of ICMET Craiova were carried tests on:

400 V, 1250 A Low Voltage Panel, type GTRT (according to IEC 60439-1/2011)

Type tests	Parameters	Test result	Test Report No.
Short-circuit withstand strength: - Testing on main bus-bar and on outgoing circuit (three phase test)	I_{CW}=30 kA / t_k=0.2s I_{pk}=63 kA	Passed the test	**11759**
- Test on protective and neutral conductor (single phase tests)	I_{CP}=0.6x30 kA=18 kA / t_k=0.2s I_{pk}=37.8 kA		

More details will be included in the Test Reports Nos. 11759 that will be written in English language according to point 1.9 from Annex 2 of the Contract and will be sent in three copies to **ELECTROGETZ Ltd.**, Address: Sofia, Major Gortalov - 9a Street, Postal code 2500.

ELECTROGETZ Ltd.

Dipl. Eng. Victor LAZAROV

ICMET – Craiova

Dipl. Eng. Marian DUTA

Dipl. Eng. Constantin IANCU

RESEARCH-DEVELOPMENT AND TESTING NATIONAL INSTITUTE FOR ELECTRICAL ENGINEERING
ICMET CRAIOVA
HIGH POWER DIVISION

HIGH POWER LABORATORY
"Ovidiu Rarinca"
200746 CRAIOVA, Blvd. DECEBAL, No.118A, ROMANIA
Matriculation certificate: J16/312/1999, VAT number RO387 1599
Phone: (351) 402 427; Fax: (351) 404 890;
www.icmet.ro ; E-mail: lmp@icmet.ro, market@icmet.ro

acreditat pentru ÎNCERCARE
RO LA RE AR
SR EN ISO/CEI 17025:2005
CERTIFICAT DE ACREDITARE
nr. LI 004/2010

TEST REPORT
No. 11759

CUSTOMER: **ELECTROGETZ Ltd.**
2500 Sofia, Major Gortalov 9a Street - Bulgaria

MANUFACTURER: **ELECTROGETZ Ltd.**
2500 Sofia, Major Gortalov 9a Street - Bulgaria

TESTED PRODUCT: 400 V, 1250 A Low Voltage Switchgear Assembly

REFERENCE STANDARD: IEC 61439-1/2011, clause 10.11

TEST PERFORMED: Verification of short-circuit withstand strength

TEST DATE: 30.09.2013

TEST RESULT: Passed the test

Test Report has 13 pages and it is edited in 4 copies from which copy 1 for laboratory and copies 2, 3 and 4 for customer.

HEAD OF HIGH POWER DIVISION:
Dr. Eng. George Curcanu

ICMET LABORATORUL DE MARE PUTERE "OVIDIU RARINCA" CRAIOVA

HEAD OF LABORATORY:
Eng. Constantin Iancu

DATE OF ISSUE: 01.07.2013

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Content

		Page
1.	Identification of the tested product	3
2.	Technical characteristics established by producer	3
3.	Tests program	3
4.	Responsible for tests	3
5.	Present at the tests	3
6.	Test report documentation	3
7.	Data of testing and measuring circuit	4
8.	Values obtained on tests	5
9.	Test result	7
	Photo	8
	Drawings	9
	Oscillograms	11

1. IDENTIFICATION OF THE TESTED PRODUCT

Type:	GTRT
Serial number:	13-0250
Technical specification/Drawing:	- /See pages 9 and 10
Contract No.:	705.2 / 8708 / 20.08.2013
Product receiving date:	30.09.2013
Product condition at receiving:	New

2. TECHNICAL CHARACTERISTICS ESTABLISHED BY PRODUCER

Rated operational voltage, Ue	400 V
Rated current, In	1250 A
Rated frequency, fn	50 Hz
Rated peak withstand current, Ipk	63 kA
Rated thermal withstand current, Icw	30 kA
Rated duration of short-circuit	0.2 s

3. TESTS PROGRAM

3.1 Three-phase current calibration

3.2 Three-phase short-circuit withstand strength test on main bus bar and outgoing circuit at:
I_{cp} = 63 kA, I_{cw} = 30 kA, t_k = 0.2s.
Supply was made on the input terminals of the circuit breaker (L1, L2, L3) with flexible cables of 3x240 mm^2 and the short-circuit was made on the terminals of outgoing bars with cables of 240 mm^2.
Protection of the circuit breaker has been cancelled.

3.3 Single-phase short-circuit withstand strength test on protective circuit at:
I_{cp} = 37.8 kA, I_{cw} = 18 kA, t_k = 0.2s.
Supply was made on terminal L1 of circuit breaker's input and terminal of PEN bar with cables of 240 mm^2. The other terminals were serial connected.

4. RESPONSIBLE FOR TESTS: Eng. Catalin Boltasu

5. PRESENT AT THE TESTS: Eng. Victor Lazarov from ELECTROGETZ Ltd.

6. TEST REPORT DOCUMENTATION Oscillograms 3; Tables 5; Photos 1; Drawings 2 .

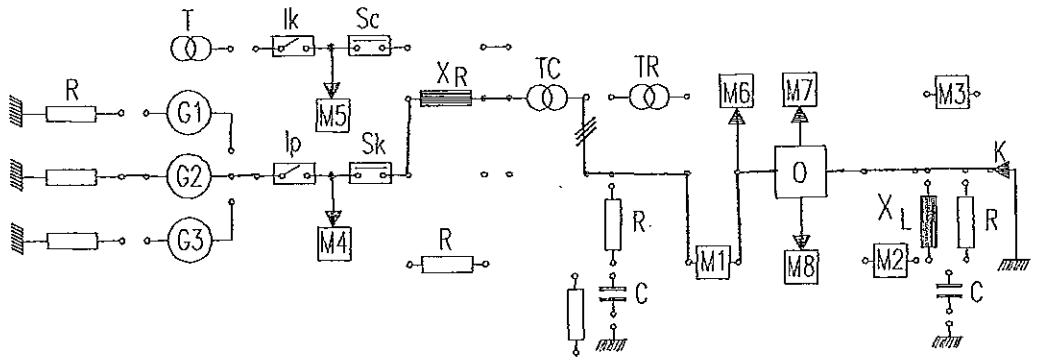
ВЯРНО С ОРИГИНАЛА

ЕЛЕКТРОГЕЙЗ СОФИЯ

7. DATA OF TESTING AND MEASURING CIRCUIT

7.1 Three-phase test

TESTING AND MEASURING DIAGRAM



T –Power transformer
G –Shortcircuit generator
Ik –6kV circuit breaker
Ip –12kV protection circuit breaker
Sc –6kV making switch
Sk –12kV making switch
X_R–X_L –Reactors

C –Capacitor
R –Resistor
TR –Shock step up transformer
TC –Shock step down transformer
M1–M8 –Measuring points
O –Apparatus to be tested
K –Short–circuit

P1E

Table 1

Test		Short-circuit withstand strength
Number of phases		3
Power supply/Connection		G2 / Y
Transformer /Ratio		TC 7, 8, 9 / 20
Earthing	Power supply	600 Ω
	Apparatus	Net earthing connection
Reactor [Ω]		0.4
Frequency [Hz]		50
M1 – Test current - Shunt 70 kA / 1.75 V		
M4 – Power supply voltage - Voltage transformer 15000 V/100 V		
M8 - Data acquisition system TRAS 2 : 16 bit, 16 channels		

7.2 Single-phase test

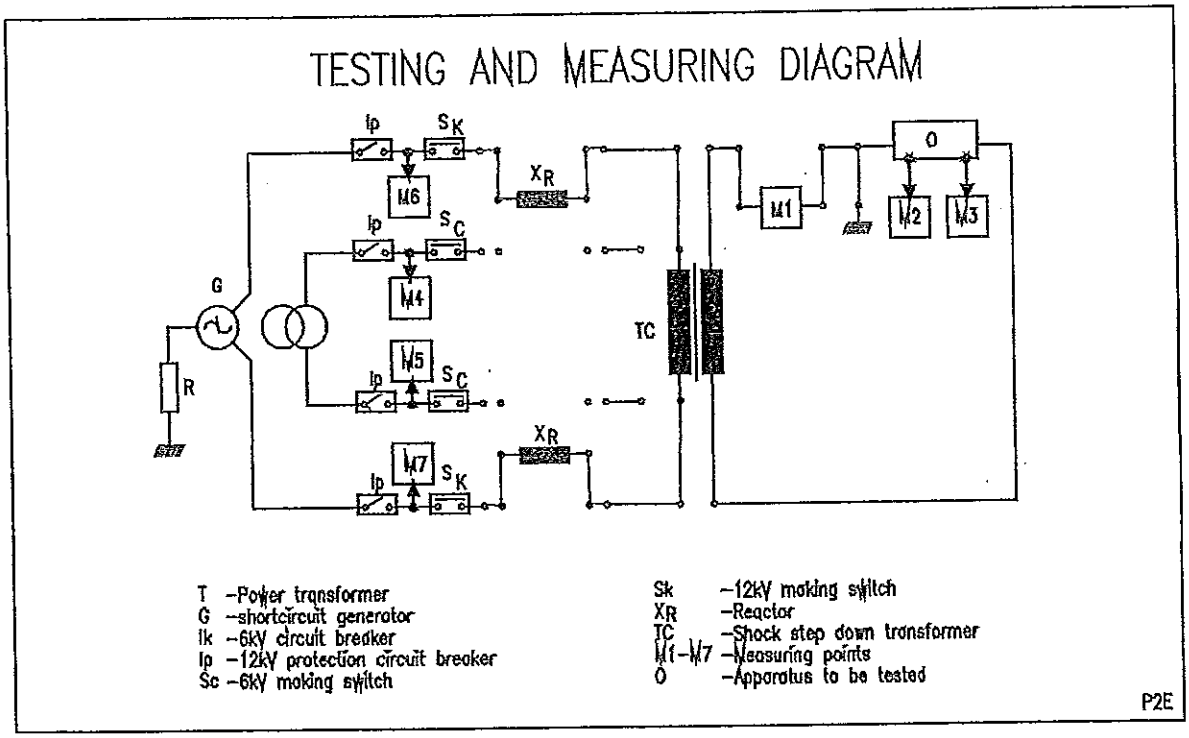


Table 2

Test		Short-time withstand current and peak withstand current
Phases number		2
Source / Connection		G2 /Y
Transformer / Rate		TC 8 / 20
Earthing	Source	600 Ω
	Apparatus	Net earthing connection
Reactor [Ω]		1.5
Power factor		< 0.15
M6 - Source voltage - Voltage transformer 15000/100V		
M1 - Apparatus current - Shunt 70 kA/1.75 V		
M2 - Data acquisition system TRAS 2 : 16 bit, 16 channels		

ВЯРНО С ОРИГИНАЛА

ЕЛЕКТРОТЕЕЛ СОФИЯ ООД

8. TEST RESULTS

8.1. Three-phase tests

Result of the three-phase short-circuit withstand strength test are presented in table 3.

Table 3

Oscilogram No.	I_{cpR} I_{cpS} I_{cpT} [kA]	I_{cR} I_{cS} I_{cT} [kA]	t [s]	U_{eR} U_{eS} U_{eT} [V]	Remarks
86244/2013	- - 66	29.7 30 30.1	- - -	- - -	Current calibration test
86245/2013	- - 62.8	29.6 30.4 30.1	0.2	- - -	Test on the main circuit

The measurements were performed with expanded uncertainty of: 1% for voltages; 1.5% for currents; 0.1% for time and the confidence level P = 95%.

Symbols used in tables and oscillograms

I_{CP} = Prospective short-circuit current on the phases R, S, T
I_C = Short-circuit current on the phases R, S, T
t_t = Working time of circuit breaker
U_e = Rated operational voltage on the phases R, S, T

8.2 Single-phase tests

Result of the single-phase short-circuit withstand strength tests are presented in table 4.

Table 4

Oscillogram No.	I_{pk} [kA]	I_{CW} [kA]	t_t [sec.]	$I_{t\ equiv.\ t_k}$ [kA]	Remarks
86246/2013	38	17.9	0.2	-	Test on PEN conductor

The measurements were performed with expanded uncertainty of: 1% for voltages; 1.5% for currents; 0.1% for time and the confidence level P = 95%.

Symbols used in tables and oscillograms

I_{pk} = Peak values of short-time withstand current
I_{CW} = R.m.s. values of short - time withstand current
t_t = The duration of short – circuit
$I_{t.equiv.tk.}$ = Equivalent value of short-time withstand current on $t_k = 1$ s calculated as follows:

$$I_{k\ equiv.t_k} = It^* \sqrt{\frac{t_t}{t_k}}$$

8.3 Remarks

1) Aspect of the Low voltage panel in the testing circuit is shown in the photo from page 8.
2) The environment temperature during the tests was 10^0 C.
3) After test the bus-bars presented no visible deformation and the circuit continuity was not compromised.

8.4 ASSESSMENT OF THE TEST RESULTS

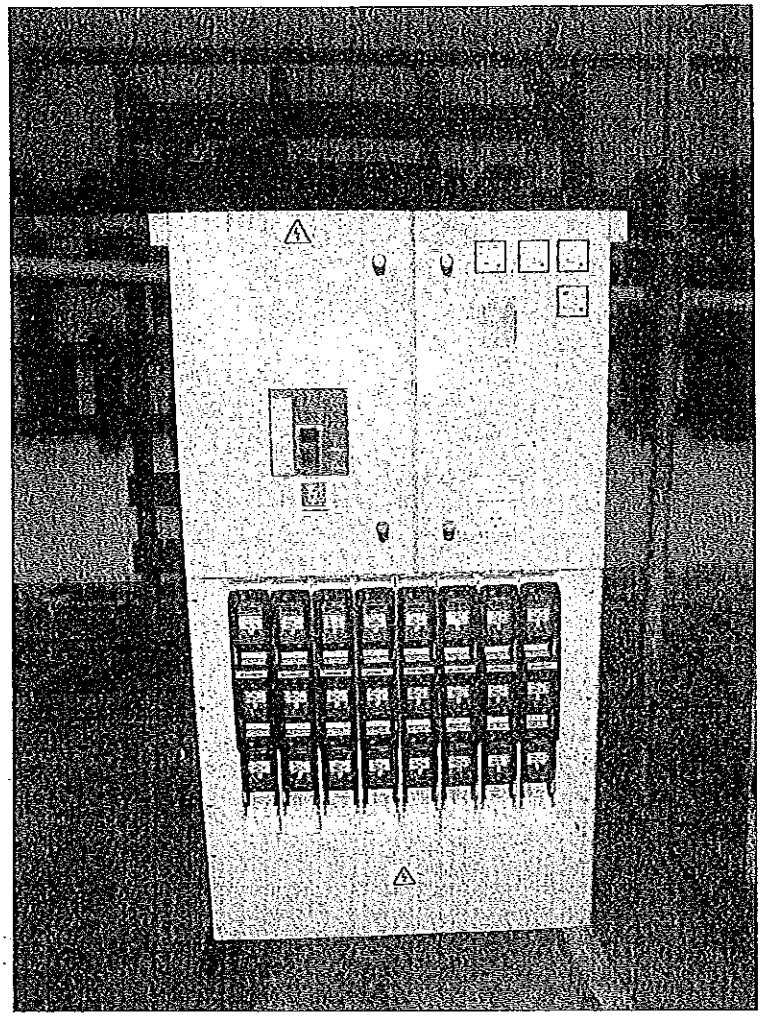
Table 5

Requirements	Result
1. After the test, the conductors and busbars shall not show any undue deformation. Slight deformation of busbar is acceptable provided that the clearances and creepage distances specified in IEC 61439-1, chapter 10.4. are still complied with. Also the insulation of the conductors and the supporting insulating parts shall not show any significant signs of deterioration, that is, the essential characteristics of the insulation remain such that the mechanical and dielectric properties of the equipment satisfy the requirements of IEC 61439-1/2011.	Fulfilled
2. There was no loosening of parts used for the connection of conductors and conductors did not separate from the outgoing terminals.	Fulfilled
3. Deformation of the enclosure is permissible to the extent to which the degree of protection is not impaired and the clearances are not reduced to values which are less than those specified.	Fulfilled
4. Any distortion of the busbar circuit or the frame of the assembly which impairs normal insertion of with draw able or removable units shall be deemed a failure.	Fulfilled
5. The continuity and the short-circuit withstand strength of the protective circuit, whether it consists of a separate conductor or the frame, shall not be significantly impaired.	Fulfilled

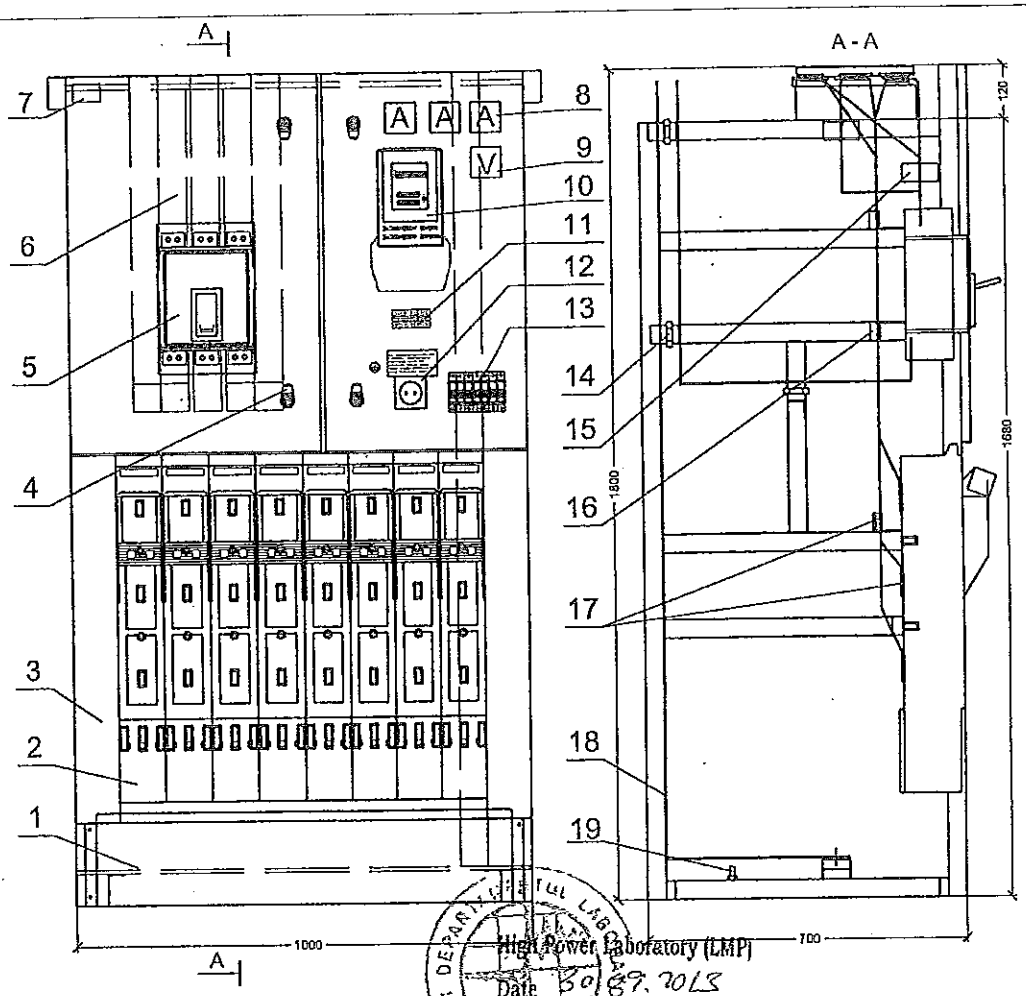
9. TEST RESULT: PASSED THE TEST

ВЯРНО С ОРИГИНАЛА

ЕЛЕКТРОГЕЙ СОФИЯ ООД



Aspect of 400 kV Low Voltage Switchgear Assembly in the test circuit

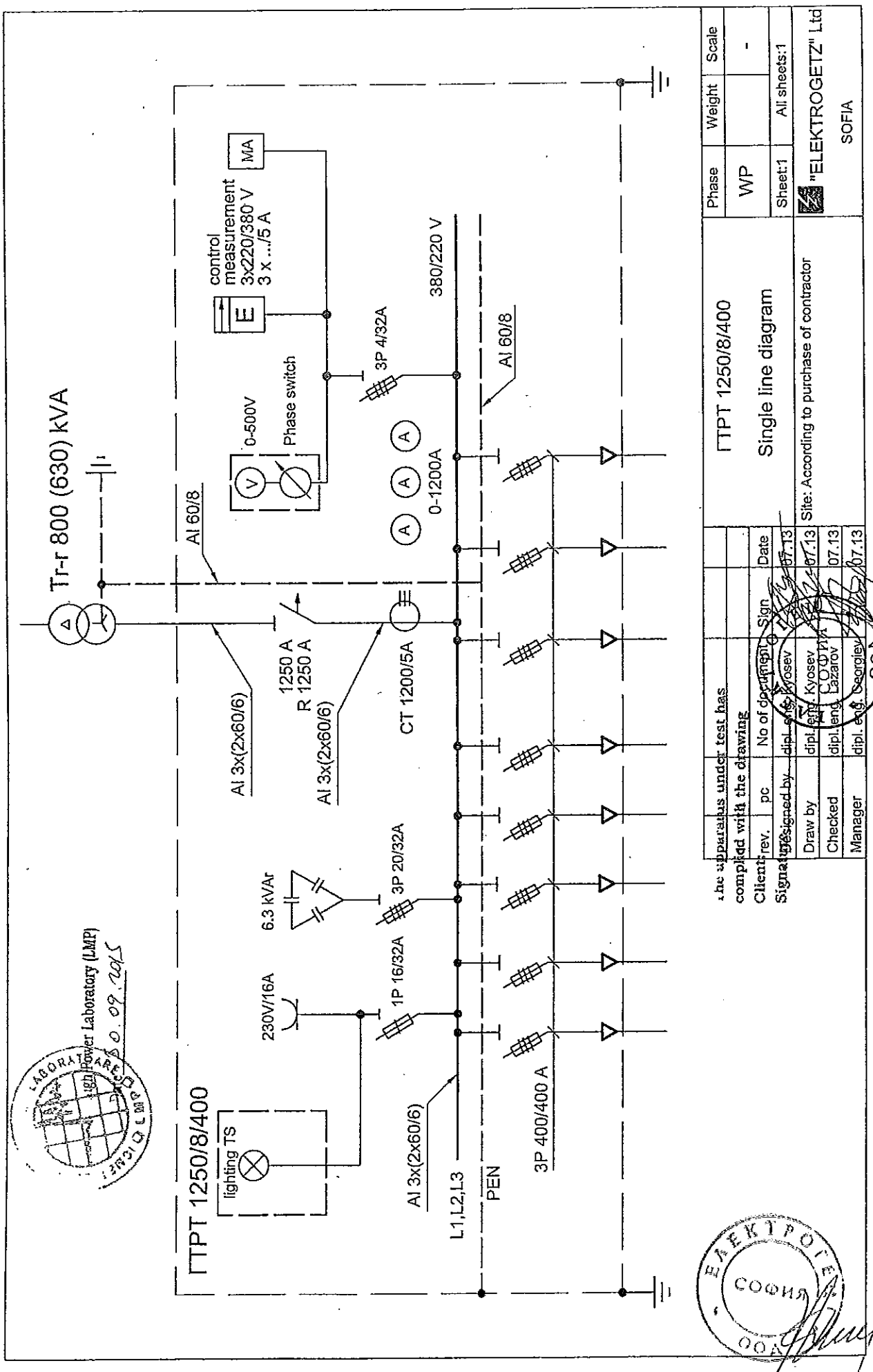


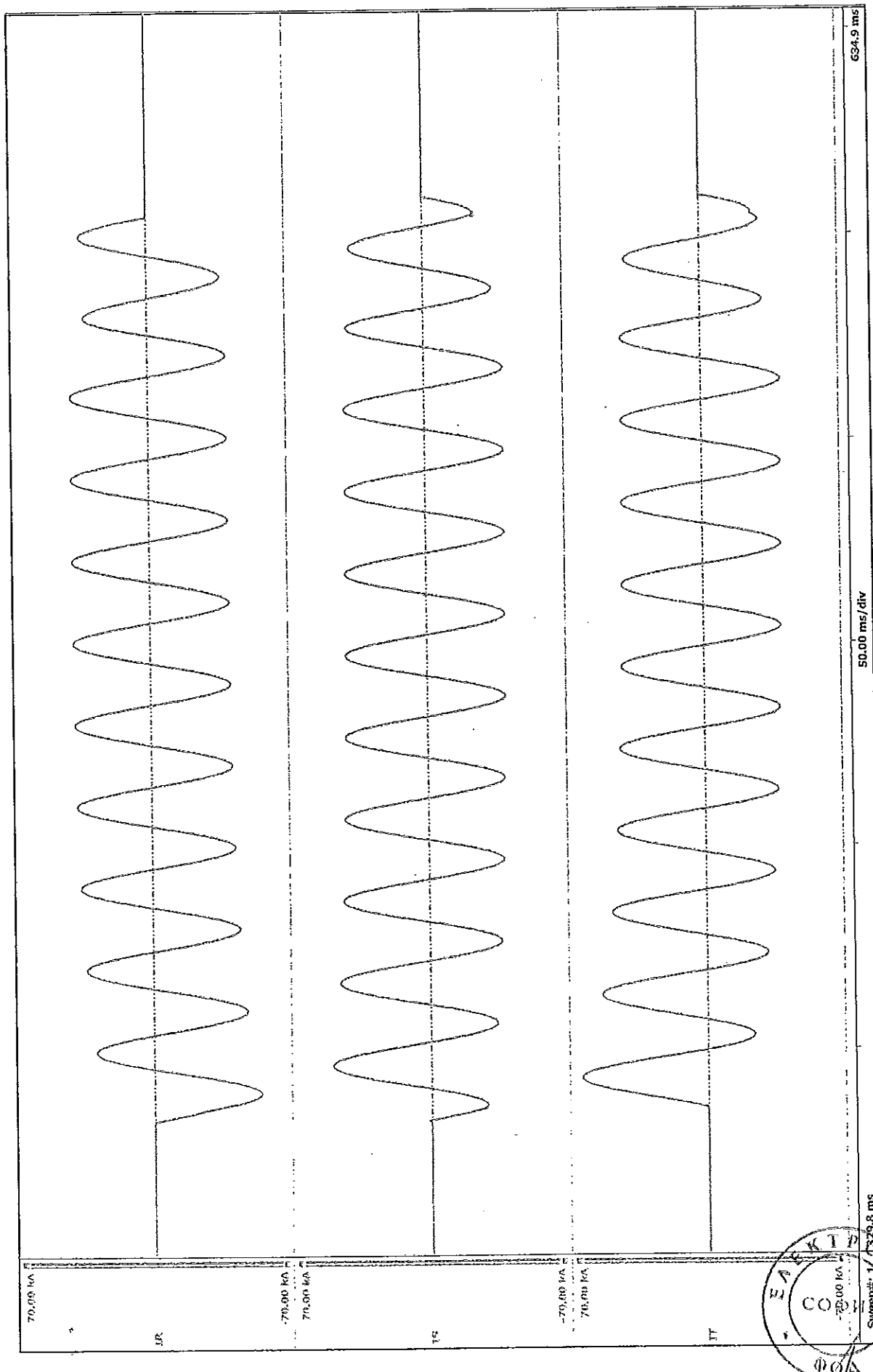
High Power Laboratory (LMP)
Date 30.07.2013

Pos No	Type of product and technical data		quantity
1	Front cover from galvanised steel sheet δ =1,5 mm	pc.	1
2	Vertical 3 pole switch with fusses 400 A	pcs.	8
3	Main structure from steel profiles, δ =2.5 мм	pc.	1
4	Lock with key	pcs.	4
5	Moulded case circuit breaker 1250 A	pc.	1
6	Door from galvanised steel sheet δ =2 mm	pcs.	2
7	Company label	pc.	1
8	Ampermeter 0 - 1200 A	pcs.	3
9	Voltmeter 0 - 500 V, with switch between phases	pc.	1
10	Single phase energy meter	pc.	1
11	Terminal block	pcs.	15
12	Single phase socket 16 A	pc.	1
13	Fused switches 3P 4A, 3P 20A, 1P 16A	pcs.	3
14	Polyester barholder, single	pcs.	9
15	Current transformer 1200/5 A	pcs.	3
16	Polyester barholder, tripple	pcs.	5
17	Phase bar, aluminum 2x60/6	pcs.	3
18	Neutral bar, aluminum 60/8	pc.	1
19	Grounding bolt M 10/40	pcs.	2

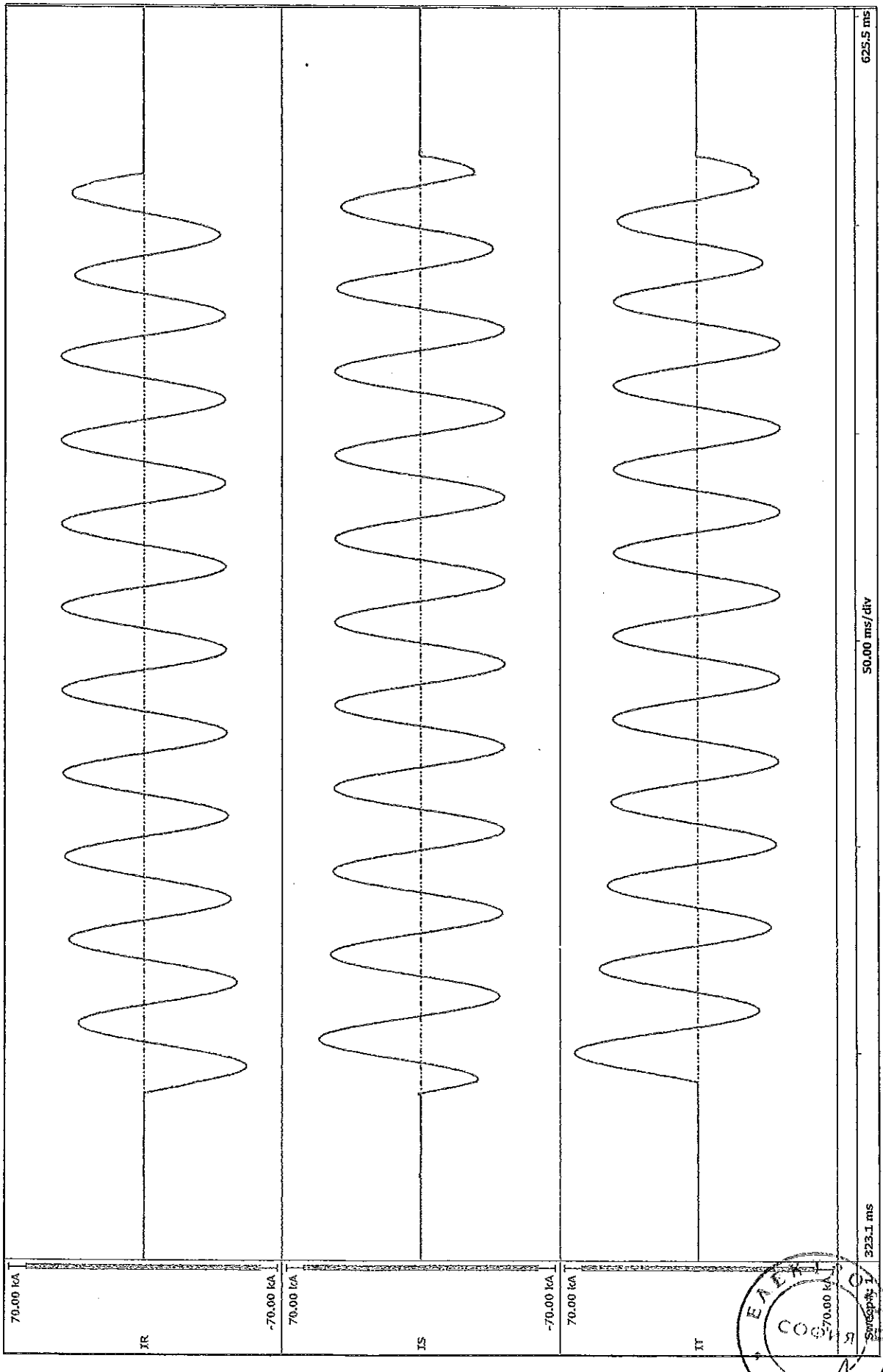
The apparatus under test has complied with the drawing

	Client:			ГТРТ 1250/8/400	Phase	Weight	Scale
1	Signature				WP		1:15
rev.	pc	No of document	Sign	Date			
Designed by		dipl. eng. Kyosev		07.13	General Drawing	Sheet:1	All sheets:1
Draw by		dipl. eng. Kyosev		07.13	Site: According to purchase of contractor	"ELEKTROGETZ" Ltd SOFIA	
Checked		dipl. eng. Lazarov		07.13			
Manager		dipl. eng. Georgiev		07.13			

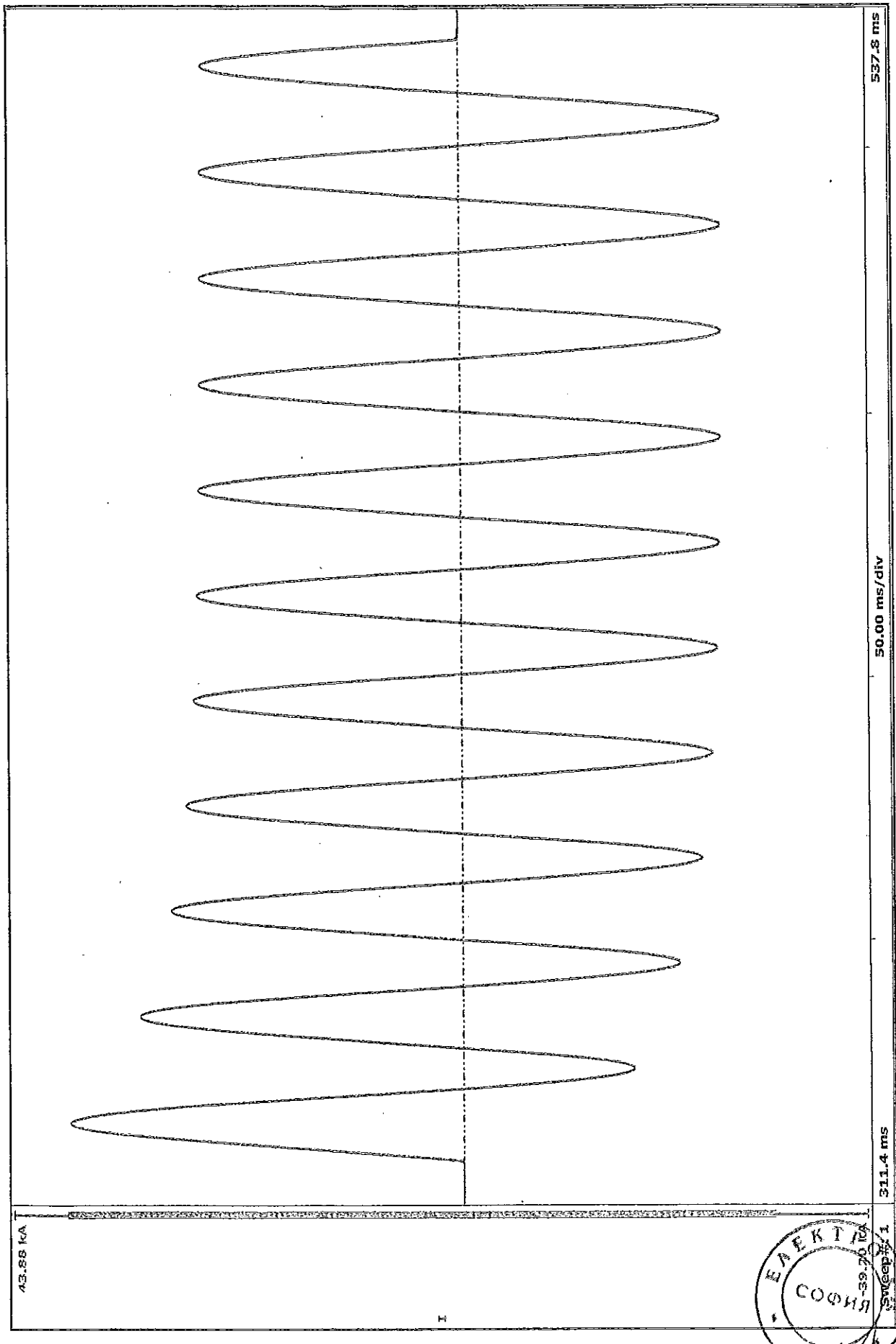




Oscillogram No. 86244 / 2013



Oscillogram No. 86245 / 2013



Oscillogram No. 86246 / 2013

ЛАБОРАТОРИЯ "ИЗПИТВАНЕ НА МАШИНИ, СЪОРЪЖЕНИЯ И УСТРОЙСТВА"

към ЦЕНТЪР ЗА ИЗПИТВАНЕ И ЕВРОПЕЙСКА СЕРТИФИКАЦИЯ

6000 гр. Стара Загора П.К. 131 ул. „Индустриална " 2 www.ctec-sz.com

тел: +359 42 630476; +359 42 620368; факс +359 42 602377; e-mail:ctec_limsu@abv.bg

П Р О Т О К О Л

за съответствие

№ 2-13-718 / 15.07.2013 г.

ОБЕКТ НА ИЗПИТВАНЕ: Електрическо табло ,
тип – ГТРТ 1250А/ 8х400А
(наименование на продукта - тип, марка, вид и др.)

ЗАЯВИТЕЛ НА ИЗПИТВАНЕТО: „Електрогец" ООД, гр. София, ул. "Майор Горталов" 9А,
тел. 02/8381220 факс. 02/ 8130871
Заявка № 718 / 28.06.2013 г.
(наименование на фирмата-заявител, адрес, телефон, номер и дата на заявката за изпитване)

НОРМАТИВЕН ДОКУМЕНТ: БДС EN 60439-1:2002+A1:2006 Комплектни комутационни устройства за ниско напрежение.Част 1: Типово изпитани и частично типово изпитани комплектни комутационни устройства - т.3, т.4, т.5, т.6, т.7.1, т.7.2, т.7.3, т.7.4, т.7.6, т.7.7, т.7.8, т.7.9, т.7.10, т.7.11
(номер и наименование на стандартите или валидираните методи)

ДАТА НА ПОЛУЧАВАНЕ НА ОБЕКТА ЗА ИЗПИТВАНЕ В ЛАБОРАТОРИЯТА: 11.07.2013 г.

КОЛИЧЕСТВО ИЗПИТВАНИ ОБРАЗЦИ: 1 брой, Ф. № 13-0250 , 2013
(фабричен номер на образците, количество на пробите, дата на производство)

ПРОИЗВОДИТЕЛ: „Електрогец" ООД, гр. София, ул. "Майор Горталов" 9А,
(фирма, търговска марка, адрес)

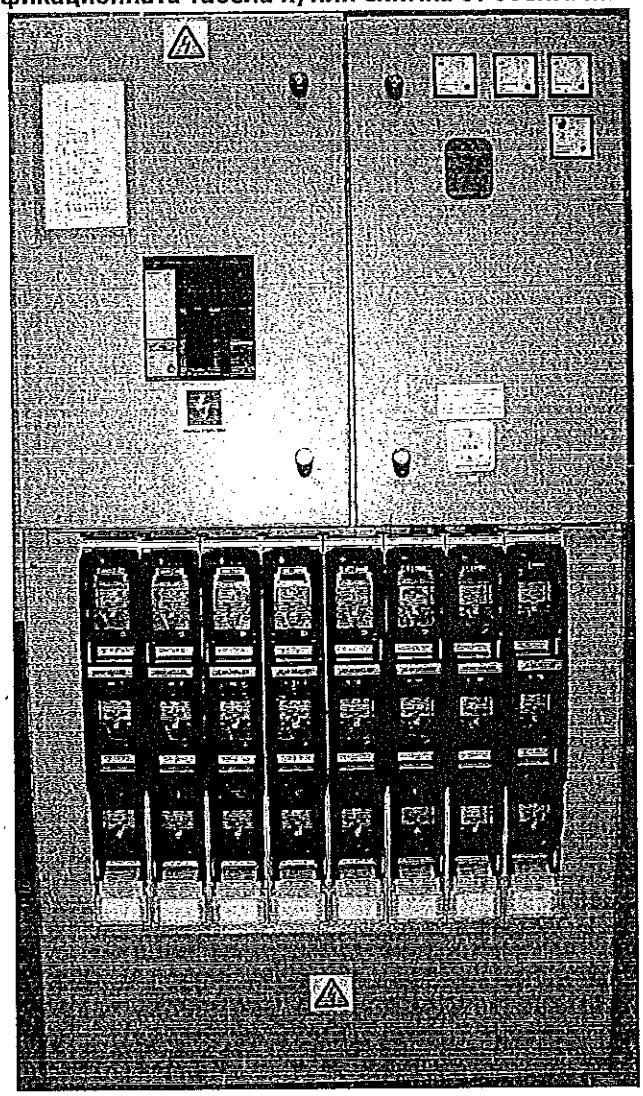
ОБЯВЕНИ ДАННИ:
Обявено напрежение U_e – 230/400V
Обявено напрежение на изолацията U_i – 690 V
Обявено импулсно издържано напрежение U_{imp} – 6 kV
Обявена честота f – 50 Hz
Обявен номинален ток I_n – 1250 A
Габаритни размери – 1000 / 1800 / 720 mm
Защита срещу поражение от ел. ток – I клас
Степен на защита - IP 20 на преден панел и страници

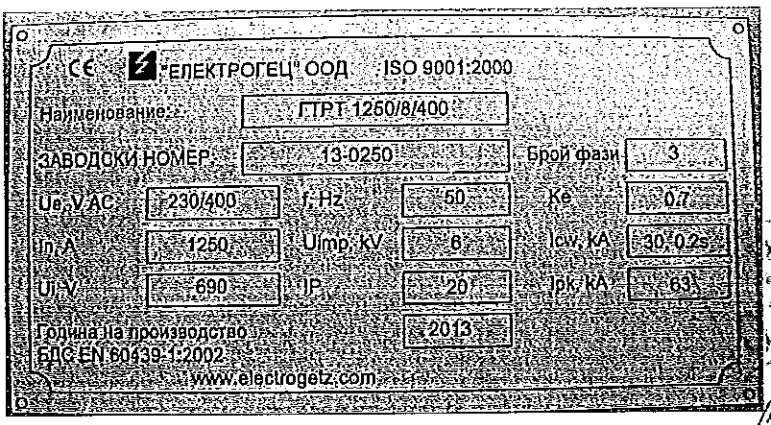
ДАТА НА ИЗВЪРШВАНЕ НА ИЗПИТВАНЕТО: 11.07.2013 – 15.07.2013 г.

РЪКОВОДИТЕЛ НА ЛАБОРАТОРИЯТА: .....
инж. Т. Христов

ВЯРНО С ОРИГИНАЛА

Копие от идентификационната табела и/или снимка от обекта на изпитването





РЕЗУЛТАТИ :

Стр. 3 от 14 **БДС EN 60439-1:2002** **Протокол : № 2-13-718 / 15.07.2013**

№ по ред	Наименование на показателя	Единица на величината	Методи стандартизирани	№ на образеца по вх.-изх. регистър	Резултати от изпитването (неопределеност)	Стойност и допуск на показателя по метода	Условия на изпитването
1.	**КЛАСИФИКАЦИЯ:**	-	т. 3	718	-	т. 3	-
1.1	Според вида на конструкцията	-	т. 3	718	ККУ отворен тип,	т. 3	-
1.2	Според мястото на монтаж	-	т. 3	718	за монтаж на закрито	т. 3	-
1.3	Според условията на монтаж от гледна точка мобилността на ККУ	-	т. 3	718	неподвижно	т. 3	-
1.4	Според степента на защита	-	т. 3	718	IP 20 преден панел и страници	т. 3	-
1.5	Според вида на обвивката	-	т. 3	718	метална конструкция	т. 3	-
1.6	Според начина на монтаж	-	т. 3	718	неподвижни части	т. 3	-
1.7	Според мерките за защита на хора срещу поражение от ел. ток	-	т. 3	718	защита срещу директен допир	т. 3	-
1.8	Според формата на вътрешно разделяне	-	т. 3	718	без разделяне	т. 3	-
1.9	Според вида на ел. свързвания на функционалните единици	-	т. 3	718	F – неподвижни свързвания	т. 3	-
2.	**ЕЛЕКТРИЧЕСКИ ХАРАКТЕРИСТИКИ на ККУ:**	-	т. 4	718	-	т. 4	-
2.1.	Обявени напрежения:	-	т. 4.1	718	-	т. 4.1	-
2.1.1	Обявено работно напрежение	V	т. 4.1.1	718	U_e = 230/400	т. 4.1.1	-
2.1.2	Обявено напрежение на изолацията	V	т. 4.1.2	718	U_i = 690	т. 4.1.2	-
2.1.3	Обявено издържано импулсно напрежение	kV	т. 4.1.3	718	U_{imp} = 6 kV	т. 4.1.3	-
2.2	Обявен ток	A	т. 4.2	718	I_n= 1250	т. 4.2	-
2.3	Обявен краткотраен ток (на термична устойчивост)	kA/0,2s	т. 4.3	718	I_{cw}= 30	т. 4.3	-
2.4	Обявен върхов издържан ток (на динамична устойчивост)	kA	т. 4.4	718	I_{pk}= 63	т. 4.4	-
2.5	Обявен условен ток при късо съединение	kA	т. 4.5	718	I_{cc}= 20	т. 4.5	-
2.6	Обявен ток при късо съединение при защита с предпазител	kA	т. 4.6	718	-	т. 4.6	-

№ по ред	Наименование на показателя	Единица на величината	Методи стандартизирани	№ на образеца по вх.-изх. регистър	Резултати от изпитването (неопределеност)	Стойност и допуск на показателя по метода	Условия на изпитването
2.7	Обявен коефицент на едновременност	-	т. 4.7	718	Ke = 0,7	т. 4.7	-
2.8	Обявена честота	Hz	т. 4.8	718	f = 50	т. 4.8	-
3.	**ИНФОРМАЦИЯ КОЯТО ТРЯБВА ДА СЕ ПОСОЧВА ЗА ВСЯКО ККУ:**	-	т. 5	718	-	т. 5	-
3.1	Фирмени табелки:	-	т. 5.1	718	-	т. 5.1	-
3.1.1	Име или търговска марка на производителя	-	т. 5.1.a	718	"Електрогец" ООД	т. 5.1.a	-
3.1.2	Означение на типа, номенклатурен номер	-	т. 5.1.b	718	ГТРТ 13-0250	т. 5.1.b	-
3.2	Фирмени табелки или техническа документация:	-	т. 5.1	718	-	т. 5.1	-
3.2.1	БДС EN 60439-1:2002	-	т. 5.1.c	718	изпълнено	т. 5.1.c	-
3.2.2	Вид на тока и честота	Hz	т. 5.1.d	718	f = 50	т. 5.1.d	-
3.2.3	Обявени работни напрежения	V	т. 5.1.e	718	U_e = 230/400	т. 5.1.e	-
3.2.4	Обявени напрежения на изолацията	V	т. 5.1.f	718	U_i = 690	т. 5.1.f	-
3.2.5	Обявено издържано импулсно напрежение	kV	т. 5.1.f	718	U_{imp} = 6 kV	т. 5.1.f	-
3.2.6	Обявени напрежения на помощните вериги	V	т. 5.1.g	718	не се прилага	т. 5.1.g	-
3.2.7	Граници на задействане	-	т. 5.1.h	718	-	т. 5.1.h	-
3.2.8	Обявен ток на всяка верига	A	т. 5.1.j	718	входове: I_n= 1250	т. 5.1.j	-
3.2.9	Устойчивост срещу късо съединение	kA	т. 5.1.k	718	I_{cw}= 30 kA/0,2s I_{pk}= 63	т. 5.1.k	-
3.2.10	Степен на защита	-	т. 5.1.l	718	IP 20 преден панел и страници	т. 5.1.l	-
3.2.11	Мерки за защита на хора срещу поражение от ел. ток	-	т. 5.1.m	718	изпълнено	т. 5.1.m	-
3.2.12	Работни условия при експлоатация	-	т. 5.1.n	718	изпълнено	т. 5.1.n	-
3.2.13	Степен на замърсяване	-	т. 5.1.n	718	3	т. 5.1.n	-
3.2.14	Видове заземявания на системата	-	т. 5.1.o	718	изпълнено	т. 5.1.o	-
3.2.15	Габаритни размери (височина, широчина, дълбочина)	mm	т. 5.1.p	718	1000 1800 720	т. 5.1.p	-
3.2.16	Тегло	kg	т. 5.1.q	718	130	т. 5.1.q	-
3.2.17	Форма на вътрешно разпределение	-	т. 5.1.r	718	изпълнено	т. 5.1.r	-

№ по ред	Наименование на показателя	Единица на величината	Методи стандартизирани	№ на образеца по вх.-изх. регистър	Резултати от изпитването (неопределеност)	Стойност и допуск на показателя по метода	Условия на изпитването
3.2.18	Видове ел. свързвания между функционалните единици	-	т. 5.1.s	718	изпълнено	т. 5.1.s	-
3.2.19	Електромагнитна обстановка	-	т. 5.1.t	718	изпълнено A	т. 5.1.t	-
3.3	Маркировка:	-	т. 5.2	718	-	т. 5.2	-
3.3.1	Маркиране на отделните вериги и техните защитни устройства	-	т. 5.2	718	изпълнено	т. 5.2	-
3.3.2	Идентичност на посоченото в БДС EN 60439-1:2002 и кабелните схеми	-	т. 5.2	718	изпълнено	т. 5.2	-
3.3.3	Означения съгласно IEC 60750	-	т. 5.2	718	изпълнено	т. 5.2	-
3.4	Инструкции за монтаж, обслужване и поддържане	-	т. 5.3	718	-	т. 5.3	-
3.4.1	Изисквания за монтаж, обслужване и поддържане	-	т. 5.3	718	изпълнено	т. 5.3	-
3.4.2	Мерки от особена важност	-	т. 5.3	718	не се прилага	т. 5.3	-
3.4.3	Информация за обхвата и честотата на поддържане	-	т. 5.3	718	не се прилага	т. 5.3	-
3.4.4	Схеми и таблици за свързването на проводниците	-	т. 5.3	718	изпълнено	т. 5.3	-
4.	**РАБОТНИ УСЛОВИЯ:**	-	т. 6	718	-	т. 6	-
4.1	Нормални работни условия:	-	т. 6.1	718	-	т. 6.1	-
4.1.1	Околна температура:	-	т. 6.1.1	718	-	т. 6.1.1	-
4.1.1.1	Температура на въздуха в околната среда за инсталации на закрито	°C	т. 6.1.1.1	718	-5 ÷ +40	т. 6.1.1.1	-
4.1.1.2	Температура на въздуха в околната среда за инсталации на открито	°C	т. 6.1.1.2	718	не се прилага	т. 6.1.1.2	
4.1.2	Атмосферни условия:	-	т. 6.1.2	718	-	т. 6.1.2	
4.1.2.1	Атмосферни условия за инсталации на закрито	-	т. 6.1.2.1	718	не се прилага	т. 6.1.2.1	
4.1.2.2	Атмосферни условия за инсталации на открито	-	т. 6.1.2.2	718	влажност до 90 % при +25°C	т. 6.1.2.2	-
4.1.2.3	Степен на замърсяване	-	т. 6.1.2.3	718	3	т. 6.1.2.3	-
4.1.3	Надморска височина	m	т. 6.1.3	718	≤ 1000 m	т. 6.1.3	
4.2	Специални работни условия	-	т. 6.2	718	не се прилага		

№ по ред	Наименование на показателя	Едини-ца на вели-чината	Методи стандартизи-рани	№ на образеца по вх.-изх. регистър	Резултати от изпитването (неопределе-ност)	Стойност и допуск на показателя по метода	Условия на изпитването
4.3	Условия по време на транспортиране, съхранение и изграждане или според договореното между производи-теля и потребителя	-	т. 6.3	718	изпълнено	т. 6.3	-
5.	**МЕХАНИЧНА КОНСТРУКЦИЯ:**	-	-	718	-	т. 7.1	-
5.1	Общи положения	-	-	718	-	т. 7.1.1	-
5.1.1	Материалите да издържат механичните, електрическите и топлинните натоварвания и въздействие на влага при нормална експлоатация	-	т. 8.2.6	718	изпълнено	т. 7.1.1	-
5.1.2	Защита срещу корозия	-	-	718	изпълнено	т. 7.1.1	-
5.1.3	Механичната якост на обвивките и разделителите	-	-	718	изпълнено	т. 7.1.1	-
5.1.4	Разположение на апаратите и веригите и осигуряване на степента на безопасност	-	-	718	изпълнено	т. 7.1.1	-
5.2	Изолационни разстояния през въздух, изолационни разстояния по повъхността на изолацията и разделящи разстояния :	-	т. 8.2.5	718	-	т. 7.1.2	-
5.2.1	Изолационни разстояния през въздух, изолационни разстояния по повъхността на изолацията	mm	т. 8.2.5	718	изпълнено виж т. 1.2 от протокол № 2а-13-718 / 15.07.2013 г.	т. 7.1.2.1 Таблица 14 > 5,5 Таблица 16 > 11,0	степен на замърсяване - 3
5.2.2	Разделящи разстояния в изтегляеми части	-	т. 8.2.5	718	не се прилага	т. 7.1.2.2	-
5.2.3	Електрическа якост на изолацията:	-	т. 8.2.2	718		т. 7.1.2.3	-
5.2.3.1	Импулсно издържано напрежение на главната верига -от токовод. части до частите, подлежащи на заземяване -между отворени контакти на изтегляеми части в разединено полож.	kV	т. 8.2.2.6	718	изпълнено виж т.1.3.3 от протокол № 2а-13-718 / 15.07.2013 г.	т. 7.1.2.3.2 Таблица 13 $U_{imp} = U_{1,2/50} = 1,2$ kV	U_{imp} = 6 kV; 200 m 3 пъти през

№ по ред	Наименование на показателя	Единица на величината	Методи стандартизирани	№ на образеца по вх.-изх. регистър	Резултати от изпитването (неопределеност)	Стойност и допуск на показателя по метода	Условия на изпитването
5.2.3.2	Импулсно издържано напрежение на помощни вериги - захранвани директно от главната верига - които не се захранват директно от главната верига	-	т. 8.2.2.6	718	изпълнено виж т. 1.3.4 от протокол № 2а-13-718 / 15.07.2013 г.	т. 7.1.2.3.3, а), табл.13 т. 7.1.2.3.3, b) Приложение G	-
5.2.3.3	Изолационни разстояния през въздух	mm	т. 8.2.2.7	718	изпълнено виж т. 1.2.1 от протокол № 2а-13-718 / 15.07.2013 г.	т. 7.1.2.3.4 Таблица 14 > 5.5	степен на замърсяване-3
5.2.3.4	Изолационни разстояния по повърхността на изолацията - оразмеряване - използване на ребра - специални приложения	mm	т. 8.2.2.7	718	изпълнено виж т. 1.2.2 от протокол № 2а-13-718 / 15.07.2013 г.	т. 7.1.2.3.5 Таблица 16 > 11.0	степен на замърсяване-3; изолационен материал от група III
5.2.3.5	Разстояния между разделени вериги	mm	т. 8.2.2.7	718	не се прилага	т. 7.1.2.3.6	-
5.3	Клеми за външни проводници:	-	-	718	-	т. 7.1.3	-
5.3.1	Клеми за алуминиеви или медни проводници, или за двата вида проводници	-	-	718	изпълнено	т. 7.1.3.1 да е посочено от производителя	-
5.3.2	Оразмеряване на клемите за медни проводници	-	-	718	изпълнено	т. 7.1.3.2 Таблица А.1	-
5.3.3	Пространство около клемите	-	-	718	изпълнено	т. 7.1.3.3 да осигурява удобно свързване на външните проводници	-
5.3.4	Клеми за неутрален проводник	-	-	718	изпълнено	т. 7.1.3.4 свързването на меден проводник с ток на натоварване в зависимост от сечението на фазовите проводници	-
5.4	Устойчивост на ненормална топлина и огън:	-	т. 8.2.9; IEC 60695-2-10	718	-	т. 7.1.4	-
5.4.1	Части от изолационен материал, поддържащи тоководещи части в определено положение	-	т. 8.2.9; IEC 60695-2-10	718	изпълнено виж т. 2.1 от протокол № 2а-13-718 / 15.07.2013 г.	пламъкът или тлеенето на образеца да изгасват сами в рамките на 30 s да не настъпва запалване на опаковъчна хартия тип тишу	нажежена жица (960 ± 15) °C
5.4.2	Други части от изолационен материал	-	т. 8.2.9; IEC 60695-2-10	718	изпълнено виж т. 2.2 от протокол № 2а-13-718 / 15.07.2013 г.	пламъкът или тлеенето на образеца да изгасват сами в рамките на 30 s	нажежена жица (650 ± 10) °C
6.	**ОБВИВКИ И СТЕПЕНИ НА ЗАЩИТА:**	-	т. 8.2.7	718		т. 7.2	
6.1	Степен на защита	-	т. 8.2.7	718		т. 7.2	

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6.1.1	Степен на защита на ККУ за работа на закрито	-	т. 8.2.7	718	изпълнено виж т. 3.2 от протокол № 2а-13-718 / 15.07.2013 г.	т. 7.2.1.1 т. 7.2.1.2 ≥ IP 2X	-
6.1.2	Степен на защита на ККУ за работа на открито	-	т. 8.2.7	718	-	т. 7.2.1.3 ≥ IP 23	-
6.1.3	Степента на защита на напълно завършено ККУ след монтажа в мястото на експлоатация	-	т. 8.2.7	718	не се прилага	т. 7.2.1.4 ≥ IP 20	-
6.1.4	Различни степени на защита на елементите на комплекта	-	т. 8.2.7	718	изпълнено	т. 7.2.1.5	-
6.2	Предотвратяване на вредната кондензация: вентилация, отопление, дренажни отвори и др.	-	т. 8.2.7	718	не се прилага	т. 7.2.1.5	-
7.	**ПРЕГРЯВАНИЯ:**	-	т. 8.2.1	718	изпълнено виж т. 4 от протокол № 2а-13-718 / 15.07.2013 г.	-	-
7.1	Вградени комплектуващи изделия	-	т. 8.2.1	718	-	-	-
7.1.1	Тов. Прек. I_n=1250 A Клема	K	т. 8.2.1	718	изпълнено	IEC 60947-2 ≤ 80	-
7.1.2	Тов. Прек. I_n=1250 A Органи за ръчно задействане изолационен материал	K	т. 8.2.1	718	изпълнено	IEC 60947-2 ≤ 50	-
7.2	Клеми за външни изолирани проводници	K	т. 8.2.1	718	изпълнено	≤ 70	-
7.3	Неизолирани шини и проводници	K	т. 8.2.1	718	изпълнено	-	-
7.4	Органи за ръчно задействане:	-	т. 8.2.1	718	-	-	-
7.4.1	От метал	K	т. 8.2.1	718	-	≤ 15	-
7.4.2	От изолационен материал	K	т. 8.2.1	718	изпълнено	≤ 25	-
7.5	Достъпни външни обвивки и капаци:	-	т. 8.2.1	718	-	-	-
7.5.1	От метални повърхности	K	т. 8.2.1	718	изпълнено	≤ 30	-
7.5.2	От изолационни повърхности	K	т. 8.2.1	718	-	≤ 40	-

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8.	**ЗАЩИТА СРЕЩУ ПОРАЖЕНИЕ ОТ ЕЛЕКТРИЧЕСКИ ТОК**	-	-	718	-	т. 7.4	-
8.1	Едновременна защита срещу директен и индиректен допир	-	-	718	не се прилага	т. 7.4.1.1 Безопасно свръхниско напрежение	-
8.2	Защита срещу директен допир:	-	-	718	-	т. 7.4.2	-
8.2.1	Защита чрез изолиране на активните части:	-	т. 8.2.2.2	718	-	т. 7.4.2.1	-
8.2.1.1	Активни части	-	т. 8.2.2.2	718	не се прилага	да бъдат покрити с изолация, отстранима само чрез разрушаване	-
8.2.1.2	Изолацията да издържа на:	-	-	718	не се прилага	механични, електрически и топлинни натоварвания	300 < U ≤ 690
8.2.1.2.1	Изпитване на обвивки от изолационен материал	V	т. 8.2.2.2	718	не се прилага	Таблица 10 $U_{изл.}$= 3750 V	300 < U ≤ 690
8.2.1.3	Неизползване на покрития от боя, лакове и емайли за изолазия	-	-	718	не се прилага	т. 7.4.2.1	-
8.2.2	Защита чрез прегради и обвивки:	-	-	718	-	т. 7.4.2.2	-
8.2.2.1	Степен на защита	-	т. 8.2.7	718	изпълнено	т. 7.4.2.2.1 ≥ IP 2X	-
8.2.2.2	Закрепване и здравина на прегради и обвивки	-	-	718	изпълнено	т. 7.4.2.2.2	-
8.2.2.3	Снемане на прегадите или отваряне на обвивките:	-	-	718	-	т. 7.4.2.2.3	-
8.2.2.3.1	Използване на ключ или инструмент	-	-	718	изпълнено	т. 7.4.2.2.3.a	-
8.2.2.3.2	Разединяване на активните части преди отваряне на вратата	-	-	718	не се прилага	т. 7.4.2.2.3.b	-
8.2.2.3.3	Вътрешно препятствие или щит	-	-	718	не се прилага	т. 7.4.2.2.3.c	-
8.2.3	Защита чрез препятствия	-	-	718	не се прилага	т. 7.4.2.3	-
8.3	Защита срещу индиректен допир:	-	т. 8.2.4.1	718	не се прилага	т. 7.4.3	-
8.3.1	Електрическа връзка между достъпни токопроводими части	Ω	т. 8.2.4.1	718	изпълнено виж т. 1.1 от протокол № 2а-13-718 / 15.07.2013 г.	т. 7.4.3.1.1 ≤ 0.1	10 A
8.3.2	Средства за ръчно задействане:	-	т. 8.2.4.3	718	изпълнено	т. 7.4.3.2.3	-
8.3.2.1	Електрически свързани към защитните вериги	-		718	не се прилага	т. 7.4.3.2.3	-

Резултатите посочени в настоящия протокол се отнасят само за изпитвания образец.
Протоколът от изпитване може да бъде възпроизвеждан само цялостно и с писменото разрешение на ЛАБОРАТОРИЯТА

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8.3.2.2	Снабдени с допълнителна изолация	-	т. 8.2.2.3	718	изпълнено	т. 7.4.3.1.3	-
8.3.2.3	Прилагане на изпитвателно напрежение	V	т. 8.2.2.3	718	изпълнено виж т. 1.3.2 от протокол № 2а-13-718 / 15.07.2013 г.	Таблица 10 $U_{изп.}$= 3750 V	метално фолио
8.3.3	Осигуряване на непрекъснатост на защитните вериги при:	-	т. 8.2.4.3	718	изпълнено	т. 7.4.3.1.5	-
8.3.3.1	Част на ККУ се снема от обвивката	-	т. 8.2.4.3	718	не се прилага	т. 7.4.3.1.5.a	-
8.3.3.2	Снемаеми и изтегляеми части	-	т. 8.2.4.3	718	не се прилага	т. 7.4.3.1.5.b	-
8.3.3.3	Метални резбови съединения и метални шарнири	-	т. 8.2.4.3	718	не се прилага	т. 7.4.3.1.5.c	-
8.3.4	Клеми за свързване на външни защитни проводници:	-	т. 8.2.4.3	718	-	т. 7.4.3.1.6	-
8.3.4.1	Клемите да са подходящи за медни проводници	-	т. 8.2.4.3	718	изпълнено	т. 7.4.3.1.6	-
8.3.4.2	Всяка изходна верига да има отделна клема за защитен проводник	-	т. 8.2.4.3	718	изпълнено	т. 7.4.3.1.6	-
8.3.4.3	Свързващите средства да не изпълняват други функции	-	т. 8.2.4.3	718	изпълнено	т. 7.4.3.1.6	-
8.3.5	Сечение на защитните проводници	-	т. 8.2.4.3	718	не се прилага	т. 7.4.3.1.7 Таблица 3	-
8.3.6	Използване на неизолирани защитни проводници	-	т. 8.2.4.3	718	изпълнено	т. 7.4.3.1.8	-
8.3.7	Използване на изолирани защитни проводници	-	т. 8.2.4.3	718	не се прилага	т. 7.4.3.1.9	-
8.3.8	Сечение на проводници за изравняване на потенциалите	-	т. 8.2.4.3	718	не се прилага	т. 7.4.3.1.10 Таблица 3А	-
8.4	Защита чрез мерки, в които не се ползват защитни вериги:	-	т. 8.2.4.3	718		т. 7.4.3.2	-
8.4.1	Защитно електрическо разделяне на вериги	-	т. 8.2.4.3	718	изпълнено	т. 7.4.3.2.1	-
8.4.2	Пълно защитно изолиране:	-	т. 8.2.4.3	718	не се прилага	т. 7.4.3.2.2	-
8.4.2.1	Комплектуващите елементи да са затворени в изолационен материал	-	т. 8.2.4.3	718	не се прилага	т. 7.4.3.2.2.a	-
8.4.2.2	Да има маркировка за II клас отвън	-	т. 8.2.4.3	718	не се прилага	т. 7.4.3.2.2.a	-

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8.4.2.3	Обвивката да издържа механичните , електрическите и топлинните натоварвания	-	т. 8.2.4.3	718	не се прилага	т. 7.4.3.2.2.b	-
8.4.2.4	Обвивката да не позволява да се подават токопроводими части	-	т. 8.2.4.3	718	не се прилага	т. 7.4.3.2.2.c	-
8.4.2.5	За всички достъпни метални части да се осигури степен на защита ≥ IP 3XD	-	т. 8.2.7	718	не се прилага	т. 7.4.3.2.2.d	-
8.4.2.6	Достъпните метални части във вътрешността на ККУ да не се свързват към защитна верига	-	т. 8.2.4.3	718	не се прилага	т. 7.4.3.2.2.e	-
8.4.2.7	Преграда от изолационен материал срещу допир до токопроводими части при отворена врата или капак	-	т. 8.2.4.3	718	не се прилага	т. 7.4.3.2.2.f	-
8.5	Разреждане на електрически заряди	-	т. 8.2.4.3	718	изпълнено	т. 7.4.4	-
8.6	Коридори за обслужване и поддържане	-	-	718	не се прилага	т. 7.4.5	-
8.7	Достъп на упълномощени лица в ККУ по време на работа	-	-	718	изпълнено	т. 7.4.6	-
8.7.1	Достъп за преглед и други подобни операции	-	-	718	изпълнено	т. 7.4.6.1	-
8.7.2	Достъп за поддържане	-	-	718	изпълнено	т. 7.4.6.2	-
8.7.3	Достъп под напрежение при извършване на разширение	-	-	718	не се прилага	т. 7.4.6.3	-
9.	**КОМУТАЦИОННИ АПАРАТИ И КОМПЛЕКТУВАЩИ ИЗДЕЛИЯ, МОНТИРАНИ В ККУ:**	-	-	718	-	т. 7.6	-
9.1	Избор	-	-	718	изпълнено	т. 7.6.1	-
9.2	Монтаж:	-	-	718	-	т. 7.6.2	-
9.2.1	Достъпност	-	-	718	изпълнено	т. 7.6.2.1	-
9.2.2	Вредни въздействия	-	-	718	изпълнено	т. 7.6.2.2	-
9.2.3	Прегради	-	-	718	изпълнено	т. 7.6.2.3	-
9.2.4	Условия в мястото на монтиране	-	-	718	изпълнено	т. 7.6.2.4	-

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11.2	Размери и обявени данни на шинните системи и изолирани проводници	-	-	718	изпълнено	т. 7.8.2	-
11.3	Монтаж и свързване на проводниците	-	-	718	изпълнено	т. 7.8.3	-
11.3.1	Изолация на проводниците	-	-	718	изпълнено	т. 7.8.3.1	-
11.3.2	Свързвания и снаждания	-	-	718	изпълнено	т. 7.8.3.2	-
11.3.3	Минаване на изолираните проводници край неизолирани активни части и остри ръбове	-	-	718	изпълнено	т. 7.8.3.3	-
11.3.4	Проводници към апарати монтирани на врати или капаци	-	-	718	изпълнено	т. 7.8.3.4	-
11.3.5	Съединения чрез запояване	-	-	718	не се прилага	т. 7.8.3.5	-
11.3.6	Поддържане на проводниците в места с големи вибрации	-	-	718	не се прилага	т. 7.8.3.6	-
11.3.7	Свързване на клема само по един проводник	-	-	718	изпълнено	т. 7.8.3.7	-
12.	**ЗАХРАНВАЩИ ВЕРИГИ КЪМ ЕЛЕКТРОННИ СЪОРЪЖЕНИЯ:**	-	-	718	не се прилага	т. 7.9	-
12.1	Изменения на входните напрежения	-	-	718	не се прилага	т. 7.9.1	-
12.2	Пренапрежения	-	-	718	не се прилага	т. 7.9.2	-
12.3	Форма на вълната	-	-	718	не се прилага	т. 7.9.3	-
12.4	Временни изменения на напрежението и честотата	-	-	718	не се прилага	т. 7.9.4	-
13.	**ЕЛЕКТРОМАГНИТНА СЪВМЕСТИМОСТ (ЕМС)**	-	Приложение H	718	-	т. 7.10	-
13.1	ЕМС обстановка:	-	-	718	-	т. 7.10.1	-
13.1.1	Обстановка А		-	718	изпълнено	т. 7.10.1 а)	-
13.1.2	Обстановка В		-	718	не се прилага	т. 7.10.1 b)	-
13.2	Изисквания за изпитване	-	-	718	не е необходимо изпитване съгласно под-точки а) и b)	т. 7.10.2	-
13.3	Тестове за ЕМС:	-	т. H. 8.2.8	718	-	-	-
13.3.1	Устойчивост срещу смущения:	-	т. H.8.2.8.1	718		т. 7.10.3	
13.3.1.1	ККУ, не съдържащи електронни вериги	-	т. H.8.2.8.1.1	718	изпълнено	т. 7.10.3.1	
13.3.1.2	ККУ, съдържащи електронни вериги	-	т. H.8.2.8.1.2	718	не се прилага	т. 7.10.3.2	

№ по ред	Наименование на показателя	Единица на величината	Методи стандартизирани	№ на образеца по вх.-изх. регистър	Резултати от изпитването (неопределеност)	Стойност и допуск на показателя по метода	Условия на изпитването
13.3.2	Излъчване на смущения:	-	т. Н.8.2.8.2	718	-	т. 7.10.4	-
13.3.2.1	ККУ, не съдържащи електронни вериги	-	т. Н.8.2.8.2.1	718	изпълнено	т. 7.10.4.1	-
13.3.2.2	ККУ, съдържащи електронни вериги	-	т. Н.8.2.8.2.2	718	не се прилага	т. 7.10.4.2	-
14.	**ОПИСАНИЕ НА ВИДОВЕТЕ ЕЛЕКТРИЧЕСКИ СВЪРЗВАНИЯ НА ФУНКЦИОНАЛНИ ЕДИНИЦИ**	-	-	718	изпълнено F – неподвижни свързвания	т. 7.11	-

ПРОВЕЛИ ИЗПИТВАНЕТО: 1. .....
/ инж. Ст. Сребранов /

2. .....
/ инж. Т. Христов /

ЦЕНТЪР ЗА ИЗПИТВАНЕ И ЕВРОПЕЙСКА СЕРТИФИКАЦИЯ ЕООД • ИЗПИТВАНЕ НА МАШИНИ, СЪОРЪЖЕНИЯ И УСТРОЙСТВА • ЛАБОРАТОРИЯ • СТАРА ЗАГОРА

РЪКОВОДИТЕЛ НА ЛАБОРАТОРИЯТА :.....
/инж. Т. Христов./

СЪГЛАСНО С ОРИГИНАЛА

ЕЛЕКТРОГЕЯ ЕООД СОФИЯ

Център за Изпитване и Европейска сертификация

ЛАБОРАТОРИЯ "ИЗПИТВАНЕ НА МАШИНИ, СЪОРЪЖЕНИЯ И УСТРОЙСТВА"
към ЦЕНТЪР ЗА ИЗПИТВАНЕ И ЕВРОПЕЙСКА СЕРТИФИКАЦИЯ

6000 гр. Стара Загора П.К. 131 ул. „Индустриална " 2 www.ctec-sz.com
тел: +359 42 630476; +359 42 620368; факс +359 42 602377; ctec_limsu@abv.bg

ИА "БСА" Рег.№ 101 ЛИ
ЛАБОРАТОРИЯ ЗА ИЗПИТВАНЕ
СЕРТИФИКАТ ЗА АКРЕДИТАЦИЯ № 101 ЛИ на ИА „БСА" валиден до: 31.05.2014

П Р О Т О К О Л

от изпитване

№ 2а-13-718 / 15.07.2013 г.

ОБЕКТ НА ИЗПИТВАНЕ: Комплектни комутационни устройства за ниско напрежение
Електрическо табло , тип – ГТРТ 1250А/ 8х400А
(наименование на продукта - тип, марка, вид и др.)

ЗАЯВИТЕЛ НА ИЗПИТВАНЕТО: „Електрогец" ООД, гр. София, ул. "Майор Горталов" 9А,
тел. 02/8381220 факс. 02/ 8130871
Заявка № 718 / 28.06.2013 г.
(наименование на фирмата-заявител, адрес, телефон, номер и дата на заявката за изпитване)

МЕТОД ЗА ИЗПИТВАНЕ: БДС EN 60439-1:2002+A1:2006 Комплектни комутационни устройства за ниско напрежение.Част 1: Типово изпитани и частично типово изпитани комплектни комутационни устройства
(номер и наименование на стандартите или валидираните методи)

ДАТА НА ПОЛУЧАВАНЕ НА ОБЕКТА ЗА ИЗПИТВАНЕ В ЛАБОРАТОРИЯТА: 11.07.2013 г.

КОЛИЧЕСТВО ИЗПИТВАНИ ОБРАЗЦИ: 1 брой, Ф. № 13-0250 , 2013
(фабричен номер на образците, количество на пробите, дата на производство)

ПРОИЗВОДИТЕЛ: „Електрогец" ООД, гр. София, ул. "Майор Горталов" 9А,
(*фирма, търговска марка, адрес*)

ОБЯВЕНИ ДАННИ:
Обявено напрежение U_e – 230/400V
Обявено напрежение на изолацията U_i – 690 V
Обявено импулсно издържано напрежение U_{imp} – 6 kV
Обявена честота f – 50 Hz
Обявен номинален ток I_n – 1250 A
Габаритни размери – 1000 / 1800 / 720 mm
Защита срещу поражение от ел. ток – I клас
Степен на защита - IP 20 на преден панел и страници

ДАТА НА ИЗВЪРШВАНЕ НА ИЗПИТВАНЕТО: 11.07.2013 – 15.07.2013 г.

РЪКОВОДИТЕЛ НА ЛАБОРАТОРИЯТА: .....
/инж. Т. Христов/

ЦЕНТЪР ЗА ИЗПИТВАНЕ И ЕВРОПЕЙСКА СЕРТИФИКАЦИЯ ЕООД • ИЗПИТВАНЕ НА МАШИНИ, СЪОРЪЖЕНИЯ И УСТРОЙСТВА • 6000 СТАРА ЗАГОРА • ССФИЯ • ООД

РЕЗУЛТАТИ ОТ ИЗПИТВАНЕТО :

Стр. 2 от 4 **БДС EN 60439-1:2002** **Протокол : № 2а-13-718 / 15.07.2013 г.**

№ по ред	Наименование на показателя	Единица на величината	Методи стандартизирани	№ на образеца по вх.-изх. регистър	Резултати от изпитването (неопределеност)	Стойност и допуск на показателя по метода	Условия на изпитването
1.	**ЗАЩИТА СРЕЩУ ПОРАЖЕНИЕ ОТ ЕЛЕКТРИЧЕСКИ ТОК**	-	т. 8.2.4.1	718	-	т. 7.4.3 ≤ 0,1	-
1.1	Защита срещу индиректен допир	Ω	т. 8.2.4.1	718	0,005	т. 7.4.3 ≤ 0,1	-
1.2	**Изолационни разстояния :**		т. 8.2.5	718	-	т. 7.1.2.1	-
1.2.1	през въздух	mm	т. 8.2.5	718	15.7	Таблица 14 > 5,5	-
1.2.2	по повърхността на изолацията	mm	т. 8.2.5	718	15.7	Таблица 16 > 11,0	-
1.3	**Електрическа якост на изолацията:**	-	т. 8.2.2	718	-	т. 7.1.2.3	-
1.3.1	Изпитване на обвивки от изолационен материал	V	т. 8.2.2.2	718	-	Таблица 10 $U_{изп.}$= 3750 V	300 < U ≤ 690 метално фолио
1.3.2	Прилагане на изпитвателно напрежение	V	т. 8.2.2.3	718	3750 V	Таблица 10 $U_{изп.}$= 3750 V	метално фолио
1.3.3	Импулсно издържано напрежение на главната верига -от токовод. части до частите, подлежащи на заземяване -между отворени контакти на изтегляеми части в разединено полож.	kV	т. 8.2.2.6	718	7,2 kV не се прилага	т. 7.1.2.3.2 Таблица 13 $U_{изп.}$=$U_{1,2/50}$ = 7,2 kV	U_{imp}= 6 kV; 3 пъти през 1s
1.3.4	Импулсно издържано напрежение на помощни вериги - захранвани директно от главната верига - които не се захранват директно от главната верига	kV	т. 8.2.2.6	718	7,2 kV не се прилага	т. 7.1.2.3.3, а), табл.13 $U_{изп.}$=$U_{1,2/50}$ = 7,2 kV т. 7.1.2.3.3, b) Приложение G	U_{imp}= 6 kV; 3 пъти през 1s
2.	**ИЗПИТВАНЕ УСТОЙЧИВОСТТА НА ЗАПАЛВАНЕ И РАЗПРОСТРАНЕНИЕ НА ОГЪН С НАЖЕЖЕНА ЖИЦА: (Устойчивост на ненормална топлина и огън)**	-	т. 8.2.9; IEC 60695-2-10	718	-	т. 7.1.4	-
2.1	Части от изолационен материал, поддържащи токоведещи части в определено положение	-	т. 8.2.9; IEC 60695-2-10	718	t_1 = 4 s; t_e = 3 s няма запалване на хартията	пламъкът или тлеенето на образеца да изгасват сами в рамките на 30 s да не настъпва запалване на опаковъчна хартия отстрани	с нажежена жица (960±15)

Резултатите посочени в настоящия протокол се отнасят само за изпитвания образец.
Протоколът от изпитване може да бъде възпроизвеждан само цялостно и с писменото разрешение на лабораторията

№ по ред	Наименование на показателя	Единица на величината	Методи стандартизирани	№ на образеца по вх.-изх. регистър	Резултати от изпитването (неопределеност)	Стойност и допуск на показателя по метода	Условия на изпитването
2.2	Други части от изолационен материал	-	т. 8.2.9; IEC 60695-2-10	718	t_i = 0 s; t_e = 0 s няма запалване на хартията	пламъкът или тлеенето на образеца да изгасват сами в рамките на 30 s	нажежена жица (650 ± 10) °C
3.	**СТЕПЕН НА ЗАЩИТА**	-	т. 8.2.7	718	-	т. 7.2.1	-
3.1	Степен на защита на КРУ за работа на закрито	-	т. 8.2.7 БДС EN 60529+A1:2004	718	IP 20 преден панел и страници	т. 7.2.1.1 т. 7.2.1.2 ≥ IP 2X	-
3.2	Степен на защита на КРУ за работа на открито	-	т. 8.2.7 БДС EN 60529+A1:2004	718	-	т. 7.2.1.3 ≥ IP 23	-
3.3	Степента на защита на напълно завършено КРУ след монтажа в мястото на експлоатация	-	БДС EN 60529+A1:2004	718	-	т. 7.2.1.3 ≥ IP 34D	-
4.	**ПРЕГРЯВАНИЯ:**	-	т. 8.2.1	718	-	т. 7.3, таблица 2	t_{ok}= 30 °C ; $I_{вх}$- 1250 A
4.1	Вградени комплектуващи изделия	-	т. 8.2.1	718	-	-	-
4.1.1	Тов. Прек. I_n=1250 A Клема	K	т. 8.2.1	718	68	IEC 60947-2 ≤ 80	-
4.1.2	Тов. Прек. I_n=1250 A Органи за ръчно задействане изолационен материал	K	т. 8.2.1	718	2	IEC 60947-2 ≤ 50	-
4.2	Клеми за външни изолирани проводници	K	т. 8.2.1	718	62	≤ 70	-
4.3	Неизолирани шини и проводници	K	т. 8.2.1	718	52	-	-
4.4	Органи за ръчно задействане:	-	т. 8.2.1	718	-	-	-
4.4.1	От метал	K	т. 8.2.1	718	-	≤ 15	-
4.4.2	От изолационен материал	K	т. 8.2.1	718	2	≤ 25	-
4.5	Достъпни външни обвивки и капаци:	-	т. 8.2.1	718	-	-	-
4.5.1	От метални повърхности	K	т. 8.2.1	718	3	≤ 30	-
4.5.2	От изолационни повърхности	K	т. 8.2.1	718	-	≤ 40	-

Използвани технически средства:

№	Наименование	Тип	Производител	Идентиф.№	Дата на последно калибриране
1.	Комбиниран уред	CA6160	CHAUVIN ARNOUX Франция	№ 109096DBH/ 16010173	08.07.2011 г.
2.	Цифров мултиметър	UNIGOR 390	LEM-Австрия	PI 3288	08.07.2011 г.
3.	Цифров шублер	-	Китай	090	30.10.2012 г.
4.	Клещов мултимер	FLUKE 345	САЩ	98060044	15.11.2011 г.
5.	Многоканален термометър	MT100TD-16	Унисист България	0420	06.12.2011 г.
6.	Цифров термохигрометър	177-H1	TESTO Германия	01320300/902	19.04.2012 г.

ПРОВЕЛИ ИЗПИТВАНЕТО: 1. .....
/ инж. Ст. Сребранов /

2. .....
/инж. Т. Христов /

ВЯРНО С ОРИГИНАЛА

РЪКОВОДИТЕЛ НА ЛАБОРАТОРИЯТА :.....
/инж. Т. Христов /

ЕЛЕКТРОТЕСТ СОФИЯ ОФА

МИНИСТЕРСТВО
НА ВЪТРЕШНИТЕ РАБОТИ
ГЛАВНА ДИРЕКЦИЯ "ПБС"

Рег. №ПО ПС 165 Екз. №.....
6. 3. 2009 г.

ДО
УПРАВИТЕЛЯ НА
"ЕЛЕКТРОГЕЦ" ЕООД
ИНЖ. ГЕОРГИ ГЕОРГИЕВ
ГР. СОФИЯ, 1271
УЛ. "ДЖЕРМАН" №10 А

Към вх. № ПС 170/13.02.2009 г.
Към рег.№ ИН 211/23.02.2009г. - НПИПБС
Към вх. № ПС 218/25.02.2009 г. – ЕС

Във връзка с молбата Ви за становището на ГДПБС, относно определяне степента на огнеустойчивост на произвежданите от Вас бетонни трансформаторни постове (БКТП), Ви уведомяваме следното:

Съгласно приложените проектни материали, ограждащите стени и покрива са стоманобетонни с дебелина 12см. Преградните стени за отделяне на килията за трансформатора от съседните килии (НН и СрН) са предвидени от трислоен панел (ламарина – минерална вата – ламарина) с дебелина 80мм, с граница на огнеустойчивост 72 минути, за който е приложено становище рег.№ ПО ПС 626/27.06.2006г. на ГДПБЗН.

По смисъла на таблица №2 към чл.5 от Наредба №2 за ПСТН и Приложение №3 на същата наредба, конструктивните елементи (носещи стени, неносещи стени и покрив) на предвидените два вида БКТП (БКТП 280/230/160см с външно обслужване и БКТП 340/240/220см с вътрешно обслужване), съответстват на изискванията за II^{ра} степен на огнеустойчивост.

Директор:
/инж. Н. Николов/

ГДПБС.НДНС.2009

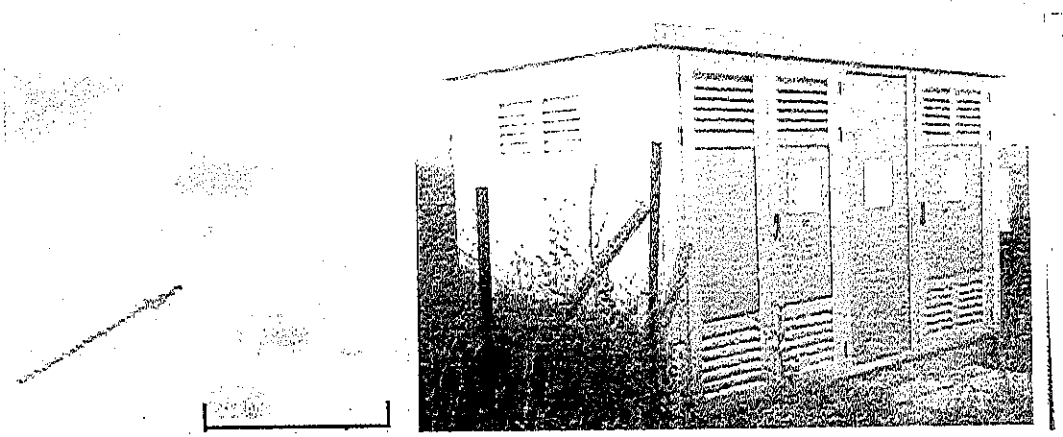
HYUNDAI
HEAVY INDUSTRIES CO. BULGARIA

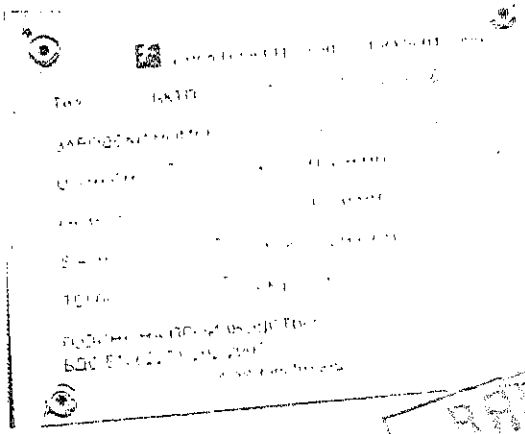
Laboratory Complex "Transformers"

41, Rojen Blvd., 1271 Sofia, Bulgaria, tel. +359 2 8033 379; fax: +359 2 8033 362

Измерване на Ниво на звуково налягане на БКТП тип 800 kVA, 20/0.4 kV

Дата на измерването: 30.06.2012, 19-20h
Местоположение: Землище на кв. Требич, гр. София (виж изгледа).
Състояние на измервания обект: Под напрежение с неопределен товар в час пик (19.20-19.45h)





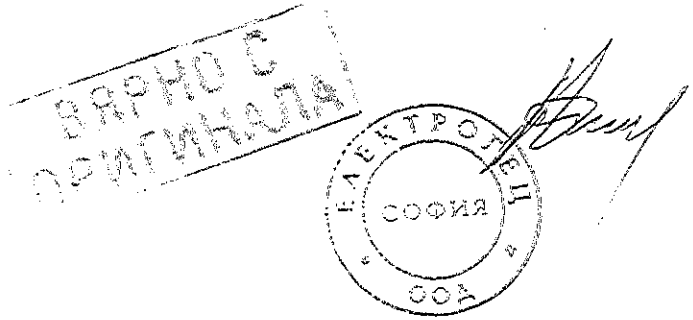
ВЯРНО С ОРИГИНАЛА

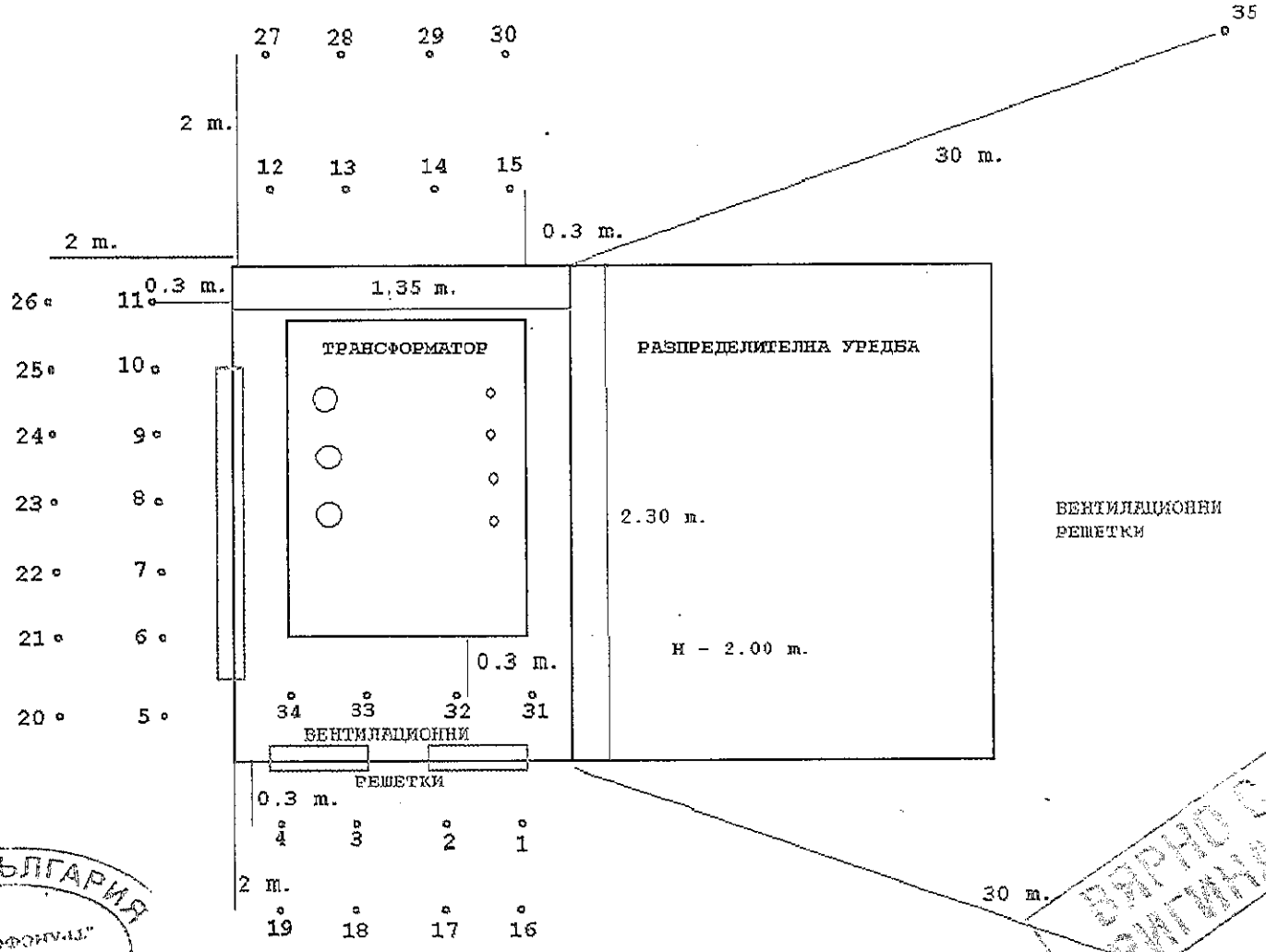
Тип на използван уред за измерване на нивото на звуковото налягане: SVAN 959, Сериен No. 14769.
Калибровъчен срок на използван уред за измерване на нивото на звуковото налягане: декември.2012
Стандарт: EN 60076-10 / 2001

Провел изпитанието: Ал. Райков, н-к лаб. Комплекс при ХХИБг

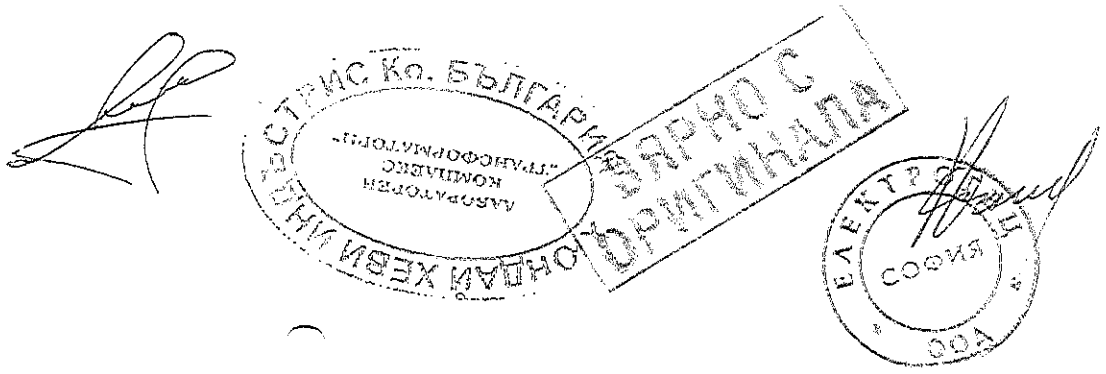
Измерени стойности на ниво на звуково налягане, dB(A) (съгласно приложената скица)

точка	dB(A)	точка	dB(A)	точка	dB(A)	точка	dB(A)
1	41,3	10	40,3	19	37,4	28	36,5
2	41,8	11	40,4	20	36,9	29	36,2
3	41,6	12	37,2	21	-	30	36,6
4	40,4	13	37,8	22	37,3	31	43,6
5	39,8	14	37,6	23	-	32	43,8
6	40,4	15	37,0	24	37,7	33	43,8
7	40,0	16	37,2	25	-	34	44,2
8	40,7	17	-	26	36,6	35	35,1
9	40,7	18	37,0	27	36,4	36	35,3




27
28
29
30
35
2 m.
30 m.
12
13
14
15
0.3 m.
2 m.
0.3 m.
1,35 m.
26
11
ТРАНСФОРМАТОР
РАЗПРЕДЕЛИТЕЛНА УРЕДБА
25
10
24
9
23
8
2.30 m.
ВЕНТИЛАЦИОННИ
РЕШЕТКИ
22
7
21
6
H - 2.00 m.
0.3 m.
20
5
34
33
32
31
ВЕНТИЛАЦИОННИ
РЕШЕТКИ
0.3 m.
4
3
2
1
2 m.
19
18
17
16
30 m.
36

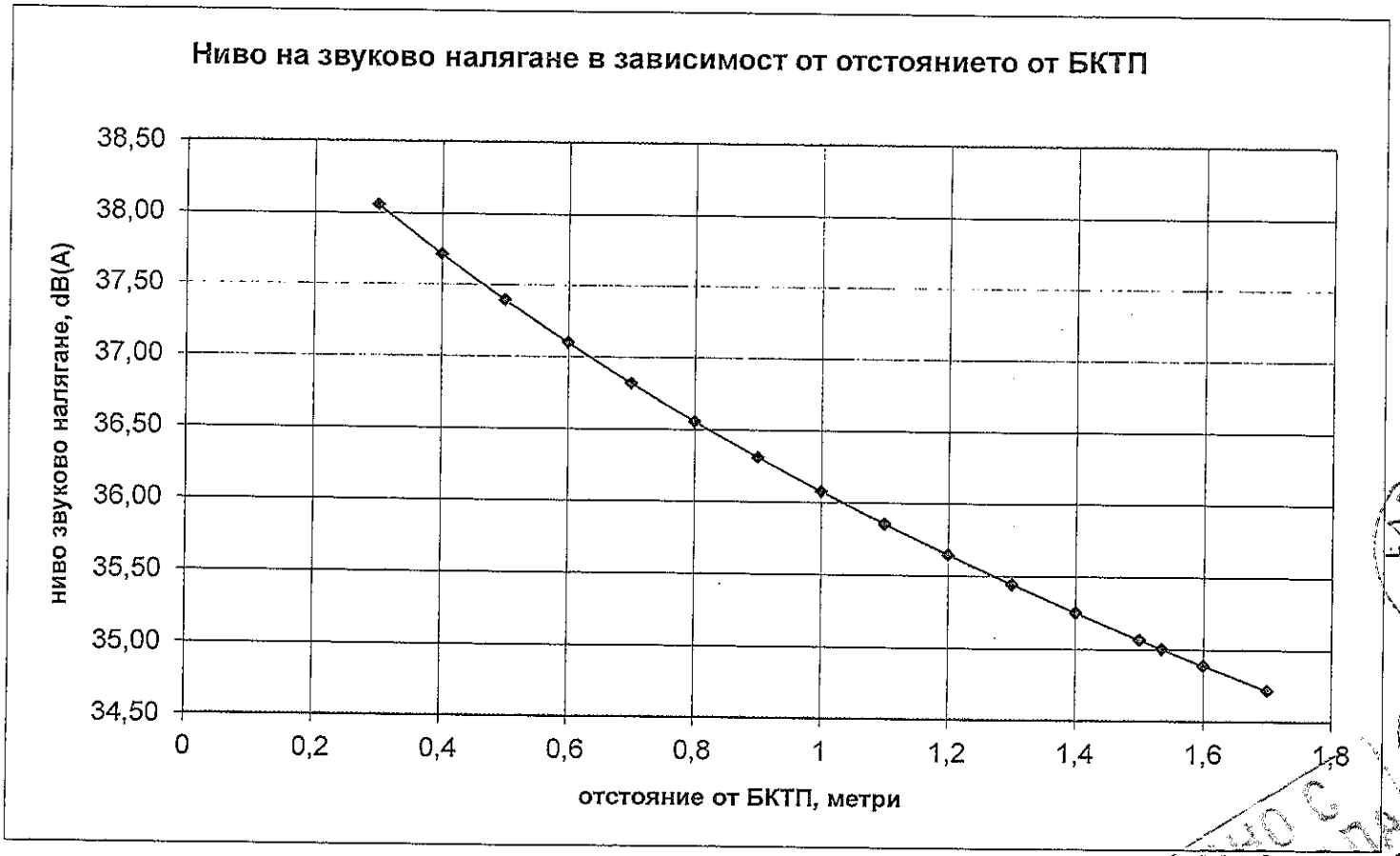
Ниво на звуковото налягане в БКТП, Lpa	dB(A)	43,85
Ниво на звуковото налягане на фоновата среда, Lpa	dB(A)	35,20
Корекция от нивото на звуковото налягане на обкръжаващата среда	dB(A)	0,64
Ниво на звуковото налягане в БКТП, след корекция за звуков фон, Lpa	dB(A)	**43,21**
Ниво на звуковото налягане на 0.3 м. дистанция от БКТП, Lpa	dB(A)	39,87
Корекция от нивото на звуковото налягане на обкръжаващата среда	dB(A)	1,81
Ниво на звуковото налягане от БКТП, след корекция за звуков фон, Lpa	dB(A)	**38,06**
Разлика в нивата на звуковото налягане в и извън БКТП	**dB(A)**	**5,15**
Ниво на звукова мощност на 0.3 м. от БКТП, Lwa dB(A)		51,90
Ниво на звуковото налягане на 2 м. дистанция от БКТП, Lpa dB(A)		36,90
Ниво на звуковото налягане на 2 м. дистанция от БКТП, след корекция за звуков фон, Lpa	dB(A)	недопустима от стандарта корекция, поради малка разлика между измерен и околен звук



Зависимост на нивото на звуковото налягане от разстоянието до измерваният обект.

Дистанция, м	Дължина на измер-вателната линия, м	Измервателна повърхност, м²	Ниво на звуковата мощност, dB(A)	Ниво на звуковото налягане, dB(A)
0,3	9,7	24,25	51,9	38,05
0,4	10,5	26,25	51,9	37,71
0,5	11,3	28,25	51,9	37,39
0,6	12,1	30,25	51,9	37,09
0,7	12,9	32,25	51,9	36,81
0,8	13,7	34,25	51,9	36,55
0,9	14,5	36,25	51,9	36,31
1	15,3	38,25	51,9	36,07
1,1	16,1	40,25	51,9	35,85
1,2	16,9	42,25	51,9	35,64
1,3	17,7	44,25	51,9	35,44
1,4	18,5	46,25	51,9	35,25
1,5	19,3	48,25	51,9	35,07
1,535	**19,58**	**48,95**	**52,9**	**35,00**
1,6	20,1	50,25	51,9	34,89
1,7	20,9	52,25	51,9	34,72
2	23,3	58,25	51,9	34,25

ЗАКЛЮЧЕНИЕ: При дистанция 1.535 метра от БКТП нивото на звуковото налягане пада под 35 dB(A)



ДОКУМЕНТАЦИЯ

за участие в процедура на договаряне с обявление
за сключване на рамково споразумение за възлагане на обществени поръчки

с предмет:

„Доставка и монтаж на бетонови комплектни трансформаторни постове /БКТП/"

РЕФ. № PPD 15-042

ОБОСОБЕНА ПОЗИЦИЯ 2

Комплектни трансформаторни постове, бетонови, за напрежение до 20 kV, с два трансформатори 800(630) kVA настрани, проходими-обслужвани отвътре, средни – Т55

Приложение № 5

DATech Deutsche Akkreditierungsstelle Technik in der TGA GmbH
Signatory of the Multilateral Agreement of EA and ILAC for the mutual recognition

represented in the

Deutschen AkkreditierungsRat

Akkreditierung

The TGA GmbH, represented by the DATech Deutsche Akkreditierungsstelle Technik in der TGA GmbH, confirms that the Testing Laboratory

Research-Development and Testing National Institute for Electrical Engineering
ICMET CRAIOVA
Calea Bucuresti No. 144
200515 CRAIOVA,
Romania

is competent under the terms of DIN EN ISO/IEC 17025:2005 to carry out testing in the fields of

Dielectric Tests of
High Voltage Electrical Appliances and Components

according to the annexed list of standards and specifications.

The accreditation is valid until: 2012-12-14

The annex is deemed part of this certificate and comprises 3 pages.

DAR-Registration No.: DAT-P-266/07-10

Frankfurt/Main, 2007-12-15

Correctness of the english translation confirmed: Frankfurt/Main, 2007-12-15

I.V. Dipl.-Ing.(FH) R. Egner
Head of the Accreditation Body

Member in EA, ILAC, IAF

Translation for information purposes only. The German Accreditation Certificate is authoritative. See notes overleaf

**Dielectric Tests of
High Voltage Electrical Appliances
and Components**

DATech Deutsche Akkreditierungsstelle Technik in der TGA GmbH
Signatory of the Multilateral Agreement of EA and ILAC for the mutual recognition

represented in the

Deutschen AkkreditierungsRat

Akkreditierung

The TGA GmbH, represented by the DATech Deutsche Akkreditierungsstelle Technik in der TGA GmbH, confirms that the Testing Laboratory

Research-Development and Testing National Institute for Electrical Engineering
ICMET CRAIOVA
Calea Bucuresti No. 144
200515 CRAIOVA,
Romania

is competent under the terms of DIN EN ISO/IEC 17025:2005 to carry out testing in the fields of

Electromagnetic Compatibility (EMC)

according to the annexed list of standards and specifications.

The accreditation is valid until: 2012-12-14

The annex is deemed part of this certificate and comprises 4 pages.

DAR-Registration No.: DAT-P-266/07-00

Frankfurt/Main, 2007-12-15

Correctness of the english translation confirmed: Frankfurt/Main, 2007-12-15

I.V. Dipl.-Ing.(FH) R. Egner
Head of the Accreditation Body

Member in EA, ILAC, IAF

Translation for information purposes only. The German Accreditation Certificate is authoritative. See notes overleaf

Electromagnetic Compatibility (EMC)

DATech Deutsche Akkreditierungsstelle Technik in der TGA GmbH
Signatory of the Multilateral Agreement of EA and ILAC for the mutual recognition

represented in the

Deutschen AkkreditierungsRat

Akkreditierung

The TGA GmbH, represented by the DATech Deutsche Akkreditierungsstelle Technik in der TGA GmbH, confirms that the Testing Laboratory

Research-Development and Testing National Institute for Electrical Engineering
ICMET CRAIOVA
Calea Bucuresti No. 144
200515 CRAIOVA,
Romania

is competent under the terms of DIN EN ISO/IEC 17025:2005 to carry out testing in the fields of

High power test for High voltage equipment and Components
and Low voltage equipment

according to the annexed list of standards and specifications.

The accreditation is valid until: 2012-12-14

The annex is deemed part of this certificate and comprises 4 pages.

DAR-Registration No.: DAT-P-266/07-20

Frankfurt/Main, 2007-12-15

Correctness of the english translation confirmed: Frankfurt/Main, 2007-12-15

I.V. Dipl.-Ing.(FH) R. Egner
Head of the Accreditation Body

Member in EA, ILAC, IAF

Translation for information purposes only. The German Accreditation Certificate is authoritative. See notes overleaf

**High Power Test for High Voltage Equipment
and Components and Low Voltage Equipment**

ROMANIAN ACCREDITATION ASSOCIATION - RENAR

Bucharest, #18 Plugarilor Street , sector 4, zip code 040443
CIF RO 4311980

ACCREDITATION CERTIFICATE
No. LI 004

Romanian Accreditation Association – RENAR, being recognized as National Accreditation Body by OG 23/2009, herewith declares:

Research, Development and Testing National Institute of Electrical Engineering – ICMET Craiova

Craiova, #118A Decebal Blvd., county Dolj

through

High Power Laboratory - (LMP)

satisfies the requirements of **SR EN ISO/CEI 17025:2005** and is competent to perform **TESTING** activities, as it is detailed in the Annex of the present accreditation certificate.

This accreditation is valid provided that the accreditation criteria, as established by the Romanian Accreditation Association – RENAR, are met continuously.

The present certificate includes Annex no. 1 (10 pages), which is an integrated part of it. In order to check validity of the accreditation certificate, including the Annex, please see RENAR's website, www.renar.ro.

Date of initial accreditation: 22.11.2010
The accreditation is valid until: 21.11.2014

GENERAL DIRECTOR

Cristian Dorin NICHITA

PRESIDENT OF THE ACCREDITATION COUNCIL

Prof. PhD. Eng. Ioan POPESCU

Annex no. 1 to Accreditation Certificate no. LI 004
Issue Date of Annex no. 1: 22.11.2010

High Power Laboratory

Craiova, #118A Decebal Blvd., county Dolj

Belonging to **Research, Development and Testing National Institute of Electrical Engineering – ICMET Craiova**

No.	CODE	Type / Name of test	Material / product	Reference documents
1		2	3	4
	A	TESTS FOR HIGH VOLTAGE ELECTRICAL EQUIPMENTS AND DEVICES		
	1	MAKING AND BREAKING TESTS		
1.	1.1	Basic short-circuit test duties (T10, T30, T60, T100s, T100a)	High voltage alternating-current circuit-breakers above 1 kV	SR EN 62271-100/2009, point 6.106 IEC 62271-100/2008, point 6.106 PT - 03.01, Ed.2, rev 5
2.	1.2	Critical current tests	High voltage alternating-current circuit-breakers above 1 kV	SR EN 62271-100/2009, point 6.107 IEC 62271-100/2008, point 6.107 PT - 03.01, Ed.2, rev 5
3.	1.3	Short-line fault tests (L60, L75, L90)	High voltage alternating-current circuit-breakers above 1 kV	SR EN 62271-100/2009, point 6.109 IEC 62271-100/2008, point 6.109 PT - 03.01, Ed.2, rev 5
4.	1.4	Out-of-phase making and breaking tests (OP1, OP2)	High voltage alternating-current circuit-breakers above 1 kV	SR EN 62271-100/2009, point 6.110 IEC 62271-100/2008, point 6.110 PT - 03.01, Ed.2, rev 5
5.	1.5	Rated line-charging breaking current tests (LC1, LC2)	High voltage alternating-current circuit-breakers above 1 kV	SR EN 62271-100/2009, point 6111 IEC 62271-100/2008, point 6.111 PT - 03.01, Ed.2, rev 5
6.	1.6	Rated cable-charging breaking current tests (CC1, CC2)	High voltage alternating-current circuit-breakers above 1 kV	SR EN 62271-100/2009, point 6.111 IEC 62271-100/2008, point 6.111 PT - 03.01, Ed.2, rev 5
7.	1.7	Rated single or back-to-back capacitor bank breaking current tests (BC1, BC2)	High voltage alternating-current circuit-breakers above 1 kV	SR EN 62271-100/2009, point 6.111 IEC 62271-100/2008, point 6.111 PT - 03.01, Ed.2, rev 5
8.	1.8	Transformer magnetizing currents switching tests	High voltage alternating-current circuit-breakers above 1 kV	SR EN 62271-110/2009, chapter 2 IEC 62271-110/2009, chapter 2 PT - 03.01, Ed.2, rev 5
9.	1.9	High voltage motors switching tests	High voltage alternating-current circuit-breakers above 1 kV	SR EN 62271-110/2009, point 6.114 IEC 62271-110/2009, point 6.114 PT - 03.01, Ed.2, rev 5
10	1.10	Checking electrical wear (electrical endurance)	High voltage alternating-current circuit-breakers above 1 kV	SR EN 62271-100/2009, point 6.106 and 6.112 IEC 62271-100/2008, point 6.106 and 6.112 PT - 03.01, Ed.2, rev 5
11	1.11	Shunt reactor switching tests	High voltage alternating-current circuit-breakers above 1 kV	SR EN 62271-110/2009 point 6.115 IEC 62271-110/2009, point 6.115 PT - 03.01, Ed.2, rev 5
12	1.12	Single-phase and double earth fault tests	High voltage alternating-current circuit-breakers above 1 kV	SR EN 62271-100/2009, point 6.108 IEC 62271-100/2008, point 6.108 PT - 03.01, Ed.2, rev 5

No.	CODE	Type / Name of test	Material / product	Reference documents
1		2	3	4
13	1.13	Bus-transfer current switching tests	Alternating current disconnectors	SR EN 62271-102/2003, point 6.106 IEC 62271-102/2001, cor. 1/2002, cor.2/2003, cor.3/2005, point 6.106; PT - 03.01, Ed.2, rev 5
14	1.14	Induced currents switching tests	Alternating earthing disconnectors	SR EN 62271-102/2003, point 6.107 IEC 62271-102/2001, cor. 1/2002, cor.2/2003, cor.3/2005, point 6.107; PT - 03.01, Ed.2, rev 5
15	1.15	Verification of the making and breaking nominal capacity	High-voltage alternating current contactors	SR EN 60470/2003, point 6.102; IEC 60470/1999, point 6.102; PT - 03.01, Ed.2, rev 5
16	1.16	Overload current switching tests	High-voltage alternating current contactors	SR EN 60470/2003, point 6.103; IEC 60470/1999, point 6.103; PT - 03.01, Ed.2, rev 5
17	1.17	Making and breaking short-circuit currents tests	High-voltage alternating current contactors	SR EN 60470/2003, point 6.104; IEC 60470/1999, point 6.104; PT - 03.01, Ed.2, rev 5
18	1.18	Verification of making and breaking capacities	AC metal-enclosed switchgears and controlgears from 1 kV up to 52 kV	SR EN 62271-200/2004, point 6.101 IEC 62271-200/2003; point 6.101 PT - 03.01, Ed.2, rev 5
19	1.19	Tests for verification of making and breaking capacities	Earthing switches for voltage over 1 kV	SR EN 62271-102/2003, point 6.101 IEC 62271-102/2001, cor. 1/2002, cor.2/2003, cor.3/2005, point 6.101 PT - 03.01, Ed.2, rev 5
20	1.20	Mainly active load current tests (Sequence 1)	High voltage switchers for voltage over 1 kV (< 52 kV)	SR EN 60265-1/2003, point 6.101 IEC 60265-1/1998, cor.1/2000 point 6.101; PT - 03.01, Ed.2, rev 5
21	1.21	Closed-loop distribution circuit current tests (Sequence 2a)	High voltage switchers for voltage over 1 kV (< 52 kV)	SR EN 60265-1/2003, point 6.101 IEC 60265-1/91998, cor.1/2000 point 6.101; PT - 03.01, Ed.2, rev 5
22	1.22	Line and cable charging current tests (Sequences 4a; 4b)	High voltage switchers for voltage over 1 kV (< 52 kV)	SR EN 60265-1/2003, point 6.101 IEC 60265-1/1998, cor.1/2000 point 6.101; PT - 03.01, Ed.2, rev 5
23	1.23	Short-circuit making current tests (Sequence 5)	High voltage switchers for voltage over 1 kV (< 52 kV)	SR EN 60265-1/2003, point 6.101 IEC 60265-1/1998, cor.1/2000 point 6.101; PT - 03.01, Ed.2, rev 5
24	1.24	Earth fault current tests (Sequence 6a)	High voltage switchers for voltage over 1 kV (< 52 kV)	SR EN 60265-1/2003, point 6.101 IEC 60265-1/1998, cor.1/2000 point 6.101; PT - 03.01, Ed.2, rev 5

No.	CODE	Type / Name of test	Material / product	Reference documents
1		2	3	4
25	1.25	Cable and line charging current under earth faults tests (Sequence 6b)	High voltage switchers for voltage over 1 kV (< 52 kV)	SR EN 60265-1/2003, point 6.101 IEC 60265-1/1998, cor.1/2000 point 6.101; PT - 03.01, Ed.2, rev 5
26	1.26	Making and breaking tests at the rated short-circuit current	High voltage alternating current fuse-switch combination	SR EN 62271-105/2004, point 6.101.2.1 IEC 62271-105/2002, point 6.101.2.1 PT - 03.01, Ed.2, rev 5 PT - 03.02, Ed.2, rev 5
27	1.27	Making and breaking tests at the maximum breaking I^2t	High voltage alternating current fuse-switch combination	SR EN 62271-105/2004, point 6.101.2.1 IEC 62271-105/2002, point 6.101.2.1 PT - 03.01, Ed.2, rev 5 PT - 03.02, Ed.2, rev 5
28	1.28	Making and breaking tests at the rated transfer current	High voltage alternating current fuse-switch combination	SR EN 62271-105/2004, point 6.101.2.1 IEC 62271-105/2002, point 6.101.2.1 PT - 03.01, Ed.2, rev 5 PT - 03.02, Ed.2, rev 5
29	1.29	Breaking tests (Test sequences 1,2,3)	High voltage fuses over 1kV	SR EN 60282-1/2006, point 6.6; IEC 60282-1/2009, point 6.6 PT - 03.02, Ed.2, rev 5
30	1.30	Breaking tests (Test sequences 1,2,3,4,5)	Low voltage fuses	SR EN 60269-1/2008, A1/2010 point 8.5 IEC 60269-1/2009, point 8.5 PT - 03.02, Ed.2, rev 5
31	1.31	Breaking tests	DC high voltage fuses	UIC-550-OR-57 pct. 3.6 PT - 03.02, Ed.2, rev 5
32	2.	**SHORT–TIME WITHSTAND CURRENT TEST**	High voltage alternating circuit breakers over 1 kV	SR EN 62271-100/2009, point 6.6 IEC 62271-100/2008, point 6.6; PT - 03.03, Ed.2, rev 5
			High voltage switches over 1 kV	SR EN 60265-1/2003, point 6.6 IEC 60265-1/1998, cor.1/2000 point 6.6 SR EN 62271-1/2009, point 6.6 IEC 62271-1/2007, point 6.6 PT - 03.03, Ed.2, rev 5
			Alternating current disconectors over 1 kV	SR EN 62271-102/2003 point 6.6 IEC 62271-102/2001, cor.1/2002, cor.2/2003, cor.3/2005, point 6.6 PT - 03.03, Ed.2, rev 5
			AC metal - enclosed switchgears and controlgears (1-52 kV)	SR EN 62271-200/2004 point 6.6 IEC 62271-200/2003, point 6.6; PT - 03.03, Ed.2, rev 5
			Gas insulated metal enclosed switchgears equal and over 72.5 kV	SR EN 62271-203/2004 point 6.6 IEC 62271-203/2003, point 6.6 PT - 03.03, Ed.2, rev 5

No.	CODE	Type / Name of test	Material / product	Reference documents
1		2	3	4
33	3.	SHORT-CIRCUIT CURRENT TEST	Portable equipment for earthing or earthing and short-circuiting	SR EN 61230/2009, point 6.6. IEC 61230/2008, point 6.6. PT - 03.18, Ed.2, rev 5
34	4.	ABILITY TO WITHSTAND THE DYNAMIC EFFECTS OF SHORT-CIRCUIT TEST	Power transformers • in oil • dry	SR EN 60076-5/2006, point 4.2, IEC 60076-5/2006, point 4.2 PT - 03.04, Ed.2, rev 5 SR EN 60076-11/2005, point 23 IEC 60076-11/2004, point 23; PT-03.04, Ed.2, rev 5
			Reactors	SR EN 60076-6/2009 point 8.9.13 IEC 60076-6/2007, point 8.9.13 PT-03.22, Ed.2, rev 5
			Line traps for AC power systems	IEC 60353/1989, A1/2002, point 19.4 PT-03.22, Ed.2, rev 5
	5.	INTERNAL ARC TESTS		
35	5.1	Tests under arc conditions due to internal fault	AC metal - enclosed switchgears and control gears from 1 kV up to 52 kV	SR EN 62271-200/2004, Annex A IEC 62271-200/2003, Annex A PT - 03.07, Ed.2, rev 5
			Gas insulated metal enclosed switchgears equal and over 72,5 kV.	SR EN 62271-203/2004, point 6.106 IEC 62271-203/2003, point 6.106 PT - 03.07, Ed.2, rev 5
			Prefabricated substation Current transformers Voltage transformers	SR EN 62271-202/2007, Annex A IEC 62271-202/2006, Annex A SR EN 60044-1/2002, A1/2002, A2/2003 IEC 60044-1/2003 SR EN 60044-2/2003, A1/2003, A2/2003 IEC 60044-2/2003 PT – 03.07, Ed.2, rev 5
36	5.2	AC power arc tests	Insulator strings with a nominal voltage greater than 1000 V	SR EN 61467/2009 IEC 61467/2008 PT – 03.23, Ed.2, rev 5
37	5.3	Short-circuit tests	Surge arresters	SR EN 60099-1/2002, A1/2003 point 8.7 IEC 60099-1/1999, point 8.7 SR EN 60099-4/2005, A1/2007, A2/2009 point 8.7 IEC 60099-4/2009, point 8.7 PT – 03.08, Ed.2, rev 5

No.	CODE	Type / Name of test	Material / product	Reference documents
1		2	3	4
38	6.	TEMEPERTURE-RISE TESTS		
			High voltage alternating current over 1 kV	SR EN 62271-100/2009, point 6.5 IEC 62271-100/2008, point 6.5 PT - 03.05, Ed.2, rev 5
			Switches for rated voltages above 1 kV	SR EN 60265-1/2003, point 6.5 IEC 60265-1/1998, cor.1/2000, point 6.5 PT - 03.05, Ed.2, rev 5
			Current transformers	SR EN 60044-1/2002, A1/2002, A2/2003 pct.7.2 IEC 60044-1/2003, point 7.2 PT-I-03.05, Ed.2, rev 5
			High voltage fuses	SR EN 60282-1/2006, point 6.5 IEC 60282-1/2009, point 6.5 PT - 03.05, Ed.2, rev 5
			Alternating current disconnectors above 1 kV	SR EN 62271-102/2003, point 6.5 IEC 62271-102/2001, Corr1/2002, Corr.2/2003, Corr.3/2005, point 6.5. PT - 03.05, Ed.2, rev 5
			Insulated bushings	SR EN 60137/2008, point 25 IEC 60137/2008, point 25 PT - 03.05, Ed.2, rev 5
			High voltage alternating current contactors	SR EN 60470/2003, point 6.5 IEC 60470/1999, point 6.5; PT - 03.05, Ed.2, rev 5
			AC metal - enclosed switchgears and controlgears for rated voltages above 1kV and up to and including 52 kV	SR EN 62271-200/2004, point 6.5 IEC 62271-200/2003, point 6.5 PT - 03.05, Ed.2, rev 5
			Gas insulated metal enclosed switchgears for rated voltages equal to and above 72,5 kV	SR EN 62271-203/2004, point 6.3 IEC 62271-203/2003, point 6.3 PT - 03.05, Ed.2, rev 5
			Inductive voltage transformers	SR EN 60044-2/2003, A1/2003, A2/2003, point 8.1 IEC 60044-2/2003, point 8.1 PT - 03.05, Ed.2, rev 5
			Capacitor voltage transformers	SR EN 60044-5/2005, point 9.1 IEC 60044-5/2004, point 9.1 PT-03.24, Ed.2, rev 5
			Power transformers • in oil • dry	SR EN 60076-2/2002, point 5 IEC 60076-2/1993, point 5, Corr. 1/1997 IEC 60076-7/2005 PT-03.16, Ed.2, rev 5 SR EN 60076-11/2005, point 21 IEC 60076-11/2004, point 21 PT - 03.16, Ed.2, rev 5
			Prefabricated substations	SR EN 62271-202/2007, point 6.3 IEC 62271-202/2006, point 6.3 PT - 03.16, Ed.2, rev 5

No.	CODE	Type / Name of test	Material / product	Reference documents
1		2	3	4
39	7.	INTER-TURN OVERVOLTAGE TESTS	Current transformers	SR EN 60044-1/2002, A1/2002, A2/2003, point 8.4 IEC 60044-1/2003, point 8.4. PT – 03.26, Ed.2, rev 5
40	8.	MECHANICAL ENDURANCE		
			High voltage alternating circuit breakers above 1 kV	SR EN 62271-100/2009, point 6.5 IEC 62271-100/2008, point 6.5 PT - 03.06, Ed.2, rev 5
			High voltage switches over 1 kV	SR EN 60265-1/2003, point 6.102 IEC 60265-1/1998, Corr.1/2000 point 6.102; PT - 03.06, Ed.2, rev 5
			Alternating current disconnectors over 1 kV	SR EN 62271-102/2003, point 6.102 IEC 62271-102/2001, Corr1/2002, Corr.2/2003, Corr.3/2005, point 6.102 PT - 03.06, Ed.2, rev 5
			High voltage alternating current contactors	SR EN 60470/2003, point 6.101.2 IEC 60470/1999, point 6.101.2 PT - 03.06, Ed.2, rev 5
	B	SPECIFIC TESTS FOR LOW VOLTAGE SWITCHGEAR AND CONTROLGEAR		
	B1	TESTS FOR AUTOMATIC BREAKERS		
	9.	TEST SEQUENCE I: General operational characteristics		
41	9.1	Tripping limits and characteristics	Low voltage switchgear and controlgear Automatic breakers	SR EN 60947-2:2007, A1/2010 IEC 60947-2:2006, A1/2009, point 8.3.3.1 PT-03.32, Ed.2, rev.0
41	9.2	Dielectric properties	Low voltage switchgear and controlgear Automatic breakers	SR EN 60947-2:2007, A1/2010 IEC 60947-2:2006, A1/2009, point 8.3.3.2 PT-03.32, Ed. 2, rev. 0
43	9.3	Mechanical operation and operational performance capability	Low voltage switchgear and controlgear Automatic breakers	SR EN 60947-2:2007, A1/2010 IEC 60947-2:2006, A1/2009, point 8.3.3.3; PT-03.32, Ed.2, rev. 0
44	9.4	Overload performance (where applicable)	Low voltage switchgear and controlgear Automatic breakers	SR EN 60947-2:2007, A1/2010 IEC 60947-2:2006, A1/2009, point 8.3.3.4; PT-03.32, Ed.2, rev. 0
45	9.5	Verification of dielectric withstand	Low voltage switchgear and controlgear Automatic breakers	SR EN 60947-2:2007, A1/2010 IEC 60947-2:2006, A1/2009, point 8.3.3.5; PT-03.32, Ed.2, rev. 0
46	9.6	Verification of temperature-rise	Low voltage switchgear and controlgear Automatic breakers	SR EN 60947-2:2007, A1/2010 IEC 60947-2:2006, A1/2009, point 8.3.3.6; PT-03.32, Ed.2, rev.0
47	9.7	Verification of overload releases	Low voltage switchgear and controlgear Automatic breakers	SR EN 60947-2:2007, A1/2010 IEC 60947-2:2006, A1/2009, point 8.3.3.7; PT-03.32, Ed.2, rev. 0
48	9.8	Verification of undervoltage and shunt releases	Low voltage switchgear and controlgear Automatic breakers	SR EN 60947-2:2007, A1/2010 IEC 60947-2:2006, A1/2009, point 8.3.3.8 PT-03.32, Ed.2, rev. 0
49	9.9	Verification of the main contact position (where applicable)	Low voltage switchgear and controlgear Automatic breakers	SR EN 60947-2:2007, A1/2010 IEC 60947-2:2006, A1/2009, point 8.3.3.9 PT-03.32, Ed.2, rev.0

No.	CODE	Type / Name of test	Material / product	Reference documents
1		2	3	4
	10	**TEST SEQUENCE II: Rated service short-circuit breaking capacity**		
50	10.1	Rated service short-circuit breaking capacity	Low voltage switchgear and controlgear Automatic breakers	SR EN 60947-2:2007, A1/2010 IEC 60947-2:2006, A1/2009, point 8.3.4.1 PT-03.32, Ed.2, rev. 0
51	10.2	Verification of operational capability	Low voltage switchgear and controlgear Automatic breakers	SR EN 60947-2:2007, A1/2010 IEC 60947-2:2006, A1/2009, point 8.3.4.2 PT-03.32, Ed.2, rev. 0
52	10.3	Verification of dielectric withstand	Low voltage switchgear and controlgear Automatic breakers	SR EN 60947-2:2007, A1/2010 IEC 60947-2:2006, A1/2009, point 8.3.4.3 PT-03.32, Ed.2, rev. 0
53	10.4	Verification of temperature-rise	Low voltage switchgear and controlgear Automatic breakers	SR EN 60947-2:2007, A1/2010 IEC 60947-2:2006, A1/2009, point 8.3.4.4 PT-03.32, Ed.2, rev. 0
54	10.5	Verification of overload releases	Low voltage switchgear and controlgear Automatic breakers	SR EN 60947-2:2007, A1/2010 IEC 60947-2:2006, A1/2009, point 8.3.4.5 PT-03.32, Ed.2, rev. 0
	11	**TEST SEQUENCE III: Rated ultimate short-circuit breaking capacity**		
55	11.1	Verification of overload releases	Low voltage switchgear and controlgear Automatic breakers	SR EN 60947-2:2007, A1/2010 IEC 60947-2:2006, A1/2009, point 8.3.5.1 PT-03.32, Ed.2, rev. 0
56	11.2	Rated ultimate short-circuit breaking capacity	Low voltage switchgear and controlgear Automatic breakers	SR EN 60947-2:2007, A1/2010 IEC 60947-2:2006, A1/2009, point 8.3.5.2 PT-03.32, Ed.2, rev. 0
57	11.3	Verification of dielectric withstand	Low voltage switchgear and controlgear Automatic breakers	SR EN 60947-2:2007, A1/2010 IEC 60947-2:2006, A1/2009, point 8.3.5.3 PT-03.32, Ed.2, rev. 0
58	11.4	Verification of overload releases	Low voltage switchgear and controlgear Automatic breakers	SR EN 60947-2:2007, A1/2010 IEC 60947-2:2006, A1/2009, point 8.3.5.4 PT-03.32, Ed.2, rev. 0
	12	**TEST SEQUENCE IV: Rated short-time withstand current**		
59	12.1	Verification of overload releases	Low voltage switchgear and controlgear Automatic breakers	SR EN 60947-2:2007, A1/2010 IEC 60947-2:2006, A1/2009, point 8.3.6.1 PT-03.32, Ed.2, rev. 0
60	12.2	Rated short-time withstand current	Low voltage switchgear and controlgear Automatic breakers	SR EN 60947-2:2007, A1/2010 IEC 60947-2:2006, A1/2009, point 8.3.6.2 PT-03.32, Ed.2, rev. 0

Annex no. 1 to Accreditation Certificate no. LI 004
Issue Date of Annex no. 1: 22.11.2010

No.	CODE	Type / Name of test	Material / product	Reference documents
1		2	3	4
61	12.3	Verification of temperature-rise	Low voltage switchgear and controlgear Automatic breakers	SR EN 60947-2:2007, A1/2010 IEC 60947-2:2006, A1/2009, point 8.3.6.3 PT-03.32, Ed.2, rev. 0
62	12.4	Short-circuit breaking capacity at maximum short-time withstand current	Low voltage switchgear and controlgear Automatic breakers	SR EN 60947-2:2007, A1/2010 IEC 60947-2:2006, A1/2009, point 8.3.6.4 PT-03.32, Ed.2, rev. 0
63	12.5	Verification of dielectric withstand	Low voltage switchgear and controlgear Automatic breakers	SR EN 60947-2:2007, A1/2010 IEC 60947-2:2006, A1/2009 point 8.3.6.5 PT-03.32, Ed.2, rev. 0
64	12.6	Verification of overload releases	Low voltage switchgear and controlgear Automatic breakers	SR EN 60947-2:2007, A1/2010 IEC 60947-2:2006, A1/2009, 8.3.6.6 PT-03.32, Ed.2, rev. 0
	13	**TEST SEQUENCE V: Performance of integrally fused circuit-breakers**		
	13.1	***Phase 1***		
65	13.1.1	Short-circuit at the selective limit current	Low voltage switchgear and controlgear Automatic breakers	SR EN 60947-2:2007, A1/2010 IEC 60947-2:2006, A1/2009, point 8.3.7.1 PT-03.32, Ed.2, rev. 0
66	13.1.2	Verification of temperature-rise	Low voltage switchgear and controlgear Automatic breakers	SR EN 60947-2:2007, A1/2010 IEC 60947-2:2006, A1/2009 point 8.3.7.2 PT-03.32, Ed.2, rev. 0
67	13.1.3	Verification of dielectric withstand	Low voltage switchgear and controlgear Automatic breakers	SR EN 60947-2:2007, A1/2010 IEC 60947-2:2006, A1/2009, point 8.3.7.3 PT-03.32, Ed.2, rev. 0
	13.2	***Phase 2***		
68	13.2.1	Verification of overload releases	Low voltage switchgear and controlgear Automatic breakers	SR EN 60947-2:2007, A1/2010 IEC 60947-2:2006, A1/2009, point 8.3.7.4 PT-03.32, Ed.2, rev. 0
69	13.2.2	Short-circuit at 1,1 times take-over current	Low voltage switchgear and controlgear Automatic breakers	SR EN 60947-2:2007, A1/2010 IEC 60947-2:2006, A1/2009, point 8.3.7.5 PT-03.32, Ed.2, rev. 0
70	13.2.3	Short-circuit at ultimate short-circuit breaking capacity	Low voltage switchgear and controlgear Automatic breakers	SR EN 60947-2:2007, A1/2010 IEC 60947-2:2006, A1/2009, point 8.3.7.6 PT-03.32, Ed.2, rev. 0
71	13.2.4	Verification of dielectric withstand	Low voltage switchgear and controlgear Automatic breakers	SR EN 60947-2:2007, A1/2010 IEC 60947-2:2006, A1/2009, point 8.3.7.7 PT-03.32, Ed.2, rev. 0
72	13.2.5	Verification of overload releases	Low voltage switchgear and controlgear Automatic breakers	SR EN 60947-2:2007, A1/2010 IEC 60947-2:2006, A1/2009, point 8.3.7.8 PT-03.32, Ed.2, rev. 0

No.	CODE	Type / Name of test	Material / product	Reference documents
1		2	3	4
	B2	TESTS FOR SWITCHES, DISCONNECTORS, SWITCH-DISCONNECTORS AND FUSE-COMBINATION UNITS		
	14	TEST OF BREAKING AND MAKING CAPACITY		
73	14.1	Test of making and breaking capacities	Low voltage switchgear and controlgear: brakers, switch-fuse combination	SR EN 60947-3/2009, IEC 60947-3/2008, point 8.3.3.3 PT - 03.33, Ed.2, rev 0
74	14.2	Operational performance test	Low voltage switchgear and controlgear: brakers, switch-fuse combination	SR EN 60947-3/2009, point 8.3.4.1 IEC 60947-3/2008, point 8.3.4.1 PT - 03.33, Ed.2, rev 0
75	14.3	Test of short-circuit breaking capacity	Low voltage switchgear and controlgear: brakers, switch-fuse combination	SR EN 60947-3/2009, point 8.3.5.2 IEC 60947-3/2008, point 8.3.5.2 PT - 03.33, Ed.2, rev 0
76	14.4	Test of fuse protected short-circuit making	Low voltage switchgear and controlgear: brakers, switch-fuse combination	SR EN 60947-3/2009, point 8.3.6.2.1 IEC 60947-3/2008, point 8.3.6.2.1 PT - 03.33, Ed.2, rev 0
77	15	SHORT-TIME WITHSATND CURENT TEST	Low voltage switchgear and controlgear: brakers, switch-fuse combination	SR EN 60947-3/2009 point 8.3.5.1 IEC 60947-3/2008 point 8.3.5.1 PT - 03.33, Ed.2, rev 0
78	16	TEST OF TEMPERATURE-RISE	Low voltage switchgear and controlgear: brakers, switch-fuse combination	SR EN 60947-1/2008, point 8.3.3.3 IEC 60947-1/2007, point 8.3.3.3 SR EN 60947-3/2009 point 8.3.3.6 IEC 60947-3/2008 point 8.3.3.6, PT - 03.33, Ed.2, rev 0
	B3	TESTS FOR CONTACTORS AND MOTOR-STARTERS		
	17	TEST SEQUENCE 1		
79	17.1	Verification of temperature-rise	Electromechanical contactors and motor-starters	SR EN 60947-4-1:2001, A1:2003, A2:2006 IEC 60947-4-1:2009, point 9.3.3.3 PT - 03.34, Ed.2, rev 0
80	17.2	Verification of operation and operating limits	Electromechanical contactors and motor-starters	SR EN 60947-4-1:2001, A1:2003, A2:2006 IEC 60947-4-1:2009 point 9.3.3.1, 9.3.3.2 PT - 03.34, Ed.2, rev 0
81	17.3	Dielectric strength verification	Electromechanical contactors and motor-starters	SR EN 60947-4-1:2001, A1:2003, A2:2006 IEC 60947-4-1:2009 point 9.3.3.4 PT - 03.34, Ed.2, rev 0
	18	TEST SEQUENCE 2		
82	18.1	Verification of rated making and breaking capacities, change-over ability and reversibility (where applicable)	Electromechanical contactors and motor-starters	SR EN 60947-4-1:2001, A1:2003, A2:2006 IEC 60947-4-1:2009, point 9.3.3.5 PT - 03.34, Ed.2, rev 0
83	18.2	Verification of conventional operational performance	Electromechanical contactors and motor-starters	SR EN 60947-4-1:2001, A1:2003, A2:2006 IEC 60947-4-1:2009, point 9.3.3.6 PT - 03.34, Ed.2, rev 0

No.	CODE	Type / Name of test	Material / product	Reference documents
1		2	3	4
	19	TEST SEQUENCE 3		
84	19.1	Verification of performance under short-circuit conditions	Electromechanical contactors and motor-starters	SR EN 60947-4-1:2001, A1:2003, A2:2006 IEC 60947-4-1:2009, point 9.3.4 PT - 03.34, Ed.2, rev 0
	20	TEST SEQUENCE 4 (applicable to contactors only)		
85	20.1	Verification of ability to withstand Overload currents	Electromechanical contactors and motor-starters	SR EN 60947-4-1:2001, A1:2003, A2:2006 IEC 60947-4-1:2009 point 9.3.5 PT - 03.34, Ed.2, rev 0
	B4	TESTS FOR ENCAPSULATED BARS AND LOW VOLTAGE ASSEMBLIES		
86	21.	SHORT-TIME WITHSTAND CURRENT TEST	Low voltage encapsulated bars and assemblies (distribution boxes, screened entries, measurement and protection blocks)	SR EN 60439-1/2001, A1/2004, point 8.2.3 IEC 61439-1/2009, point 8.2.3 SR EN 60439-2/2001, A1/2006 point 8.2.3 IEC 60439-2/2005 point 8.2.3 PT - 03-03, Ed.2, rev 5
87	22.	TESTS FOR TEMPERATURE-RISE	Low voltage encapsulated bars and assemblies	SR EN 60439-1/2001, A1/2004, point 8.2.1 IEC 61439-1/2009, point 8.2.1; SR EN 60439-2/2001, A1/2006 point 8.2.1 IEC 60439-2/2005, point 8.2.1. PT-03.05, Ed.2, rev 5
	C	INDIVIDUAL TESTS FOR POWER TRANSFORMERS		
	23	INDIVIDUAL TESTS		
88	23.1	Measurement of winding resistance	Power transformers	SR EN 60076-1+A11:2001, A1:2003, A12:2003 IEC 60076-1:2000, point 10.2 PT - 03.16, Ed.2, rev 6
89	23.2	Measurement of voltage ratio and check of phase displacement	Power transformers	SR EN 60076-1+A11:2001, A1:2003, A12:2003 IEC 60076-1:2000, point 10.3 PT - 03.16, Ed.2, rev 6
90	23.3	Measurement of short-circuit impedance and load loss	Power transformers	SR EN 60076-1+A11:2001, A1:2003, A12:2003 IEC 60076-1:2000, point 10.4 PT - 03.16, Ed.2, rev 6
91	23.4	Measurement of no-load loss and current	Power transformers	SR EN 60076-1+A11:2001, A1:2003, A12:2003 IEC 60076-1:2000, point 10.5 PT - 03.16, Ed.2, rev 6

End of document

GENERAL DIRECTOR
Cristian Dorin NICHITA

ВЯРНО С ОРИГИНАЛА

БЪЛГАРСКА СЛУЖБА ЗА АКРЕДИТАЦИЯ

СЕРТИФИКАТ ЗА АКРЕДИТАЦИЯ

"ЦЕНТЪР ЗА ИЗПИТВАНЕ И ЕВРОПЕЙСКА СЕРТИФИКАЦИЯ" ЕООД

ЛАБОРАТОРИЯ ЗА ИЗПИТВАНЕ НА МАШИНИ, СЪОРЪЖЕНИЯ И УСТРОЙСТВА

Адрес на управление: гр. Стара Загора 6000 бул. „Св. Патриарх Евтимий" № 23

Адрес на лабораторията: гр. Стара Загора 6000 ул. "Идустриална" № 2, П.К. 131

ЕИК: 123618423

ОБХВАТ НА АКРЕДИТАЦИЯ:

Да извършва изпитване на:
Машини за обработка на дървесина и подобни материали, машини за обработка на метал, машини и съоръжения за хранително-вкусовата промишленост, електрически съоръжения за ниско напрежение, комплектни комутационни устройства за ниско напрежение, електромедицински апарати, детски играчки, портативни машини за обработка (ръчни инструменти), други машини, съоръжения и устройства по показатели за безопасност, еднакви с тези на изложените.

АКРЕДИТИРАН СЪГЛАСНО БДС EN ISO/IEC 17025:2006

Заповед № *775/21.06.2013г.* е неделима част от сертификата за акредитация,

общо *42* страници

Валиден до: *31.05.2014 г.* БСА рег. № *101 ЛИ*

Дата на първоначална акредитация: 18.02.2005г.

Дата на преакредитация: 10.05.2010г.

Изпълнителен директор:
инж. Елза Янева

София *21.06.2013г.*

1797 София, бул. „Д-р Г.М. Димитров" 52А; тел.: 02 873 5302; факс: 02 873 5303
e-mail: ea_bas@abv.bg / www.nab-bas.bg

„ЧЕЗ РАЗПРЕДЕЛЕНИЕ БЪЛГАРИЯ" АД

ДОКУМЕНТАЦИЯ

за участие в процедура на договаряне с обявление
за сключване на рамково споразумение за възлагане на обществени поръчки

с предмет:

„Доставка и монтаж на бетонови комплектни трансформаторни постове /БКТП/"

РЕФ. № PPD 15-042

ОБОСОБЕНА ПОЗИЦИЯ 2

Комплектни трансформаторни постове, бетонови, за напрежение до 20 kV, с два трансформатори 800(630) kVA настрани, проходими-обслужвани отвътре, средни – Т55

Приложение № 6

ВЯРНО С ОРИГИНАЛА

ЕЛЕКТРОГЕН СОФИЯ ЕООД

ЕЛЕКТРОГЕЦ ООД

„ЕЛЕКТРОГЕЦ" ООД
гр. София, п.к. 1271, ул. „Джерман" 10 А,
тел. +359 (2) 838 12 20, факс +359 (2) 813 08 71
e-mail: elgec@omega.bg, www.electrogetz.com

ДЕКЛАРАЦИЯ ЗА СЪОТВЕТСВИЕ

Долуподписаният, инж. Георги Георгиев в качеството си на Управител на „Елекрогец" ООД, декларирам на собствена отговорност, че продуктът:

Стоманобетонова кострукция за бетонов комплектен трансформаторен пост

произведен от „Електрогец" ООД

с адрес: гр.София, ул. Майор Горталов № 9 А,

за който се отнася тази декларация, е в съответствие с изискванията на:

БДС EN 13670-1:2009

и Наредба за съществените изисквания към строежите и оценяване съответствието на строителните продукти.

Декларацията се издава въз основа на:

Сертификат за производствен контрол

№ НСИСОССП-3090 от 15.05.2012 г.

Издаден от:

"Ен Джи Ен" ООД - гр. Хасково

с адрес: гр. Хасково, Търговски комплекс XXI век, ет. 4 офис 5, Разрешение РОССП-05 от 12.11.2007 г. и Нотифициран орган от Европейската комисия NB 1888.

Декларирам, че ми е известна отговорността, която нося съгласно чл. 313 от НК.

ВЯРНО С ОРИГИНАЛА

Дата: 13.01.2015 г.
гр. София

Управител:

ЕЛЕКТРОГЕЦ СОФИЯ ООД

„Ен Джи Ен" ООД гр. Хасково

6300 гр.Хасково, Търговски комплекс XXI век, тел./факс: +359 38 602423,
e-mail: njn@dir.bg, web: www.njn-cert.com

СЕРТИФИКАТ ЗА СЪОТВЕТСТВИЕ

№ НСИСОССП – 3090

В съответствие с част трета на Наредбата за съществените изисквания към строежите и оценяване съответствието на строителните продукти е установено, че Системата за производствен контрол при производство на строителният продукт

БЕТОНОВИ КОНСТРУКЦИИ ЗА БКТП

предназначени за монтаж на трансформаторни устройства

пуснат на пазара от:

"ЕЛЕКТРОГЕЦ" ООД

гр. София, ул."Майор Гроталов"№ 9 А

и произведен в завод

ЕЛЕКТРОГЕЦ

гр.София, ул."Джерман"№ 10 А

е подложен от производителя на първоначално изпитване на типа на продукта, на производствен контрол и на текущо изпитване на пробни образци взети от производството по предписан план за изпитване и че **"Ен Джи Ен" ООД** е извършил първоначален контрол (одит) на производствения контрол и осъществява постоянен контрол (надзор), оценка и одобряване на производствения контрол.

Този сертификат удостоверява, че всички разпоредби по отношение на оценяването на производствения контрол, определени с

БДС EN 13670:2009

са приложени и изпълнени и че продуктът съответства на всички предписани изисквания.

Този сертификат е издаден за първи път на **15.05.2012г.** и остава валиден, докато изискванията на техническата спецификация са изпълнени и условията на производство или производствен контрол не са изменени.

гр.Хасково
15.05.2012г.

Управител:
(инж.Н.Атанасов)

ДОКУМЕНТАЦИЯ

за участие в процедура на договаряне с обявление
за сключване на рамково споразумение за възлагане на обществени поръчки

с предмет:

„Доставка и монтаж на бетонови комплектни трансформаторни постове /БКТП/"

РЕФ. № PPD 15-042

ОБОСОБЕНА ПОЗИЦИЯ 2

Комплектни трансформаторни постове, бетонови, за напрежение до 20 kV, с два трансформатори 800(630) kVA настрани, проходими-обслужвани отвътре, средни – Т55

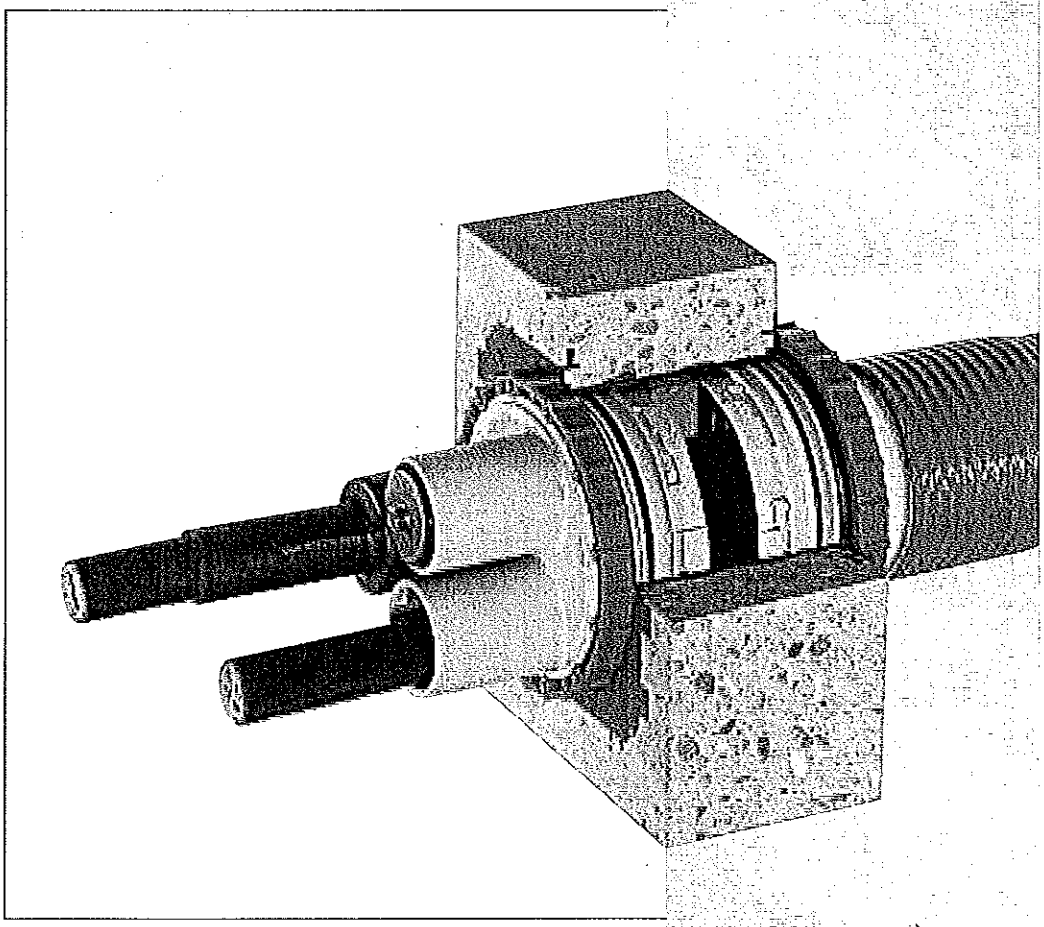
Приложение № 7

ВЯРНО С ОРИГИНАЛА

ЕЛЕКТРОТЕЛ СОФИЯ ООД

BKD 150

Bayonet Cable Bushing



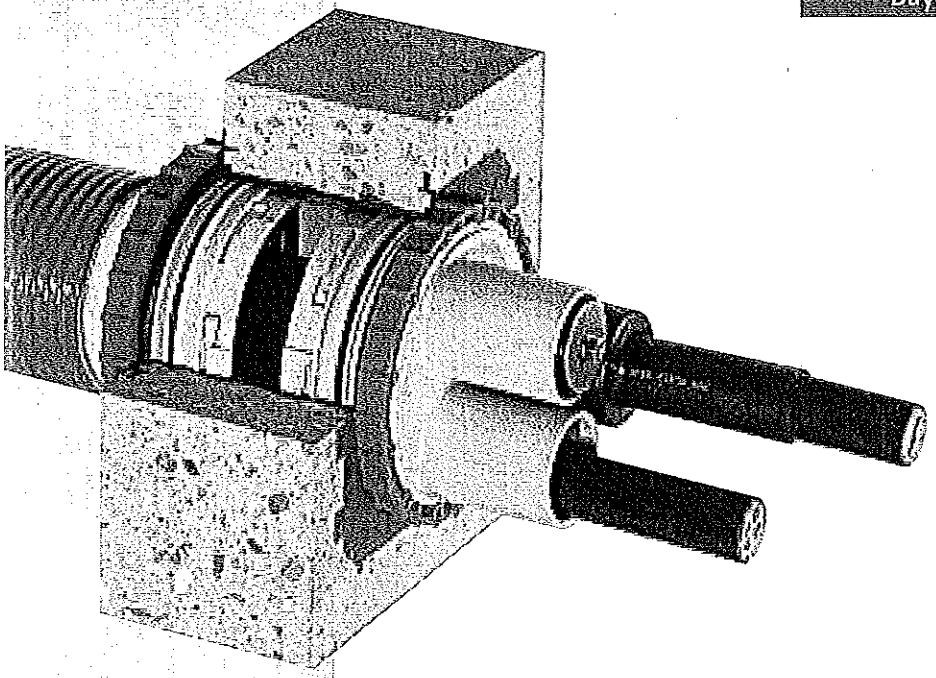
VGA®

SYSTEM-TECHNIK

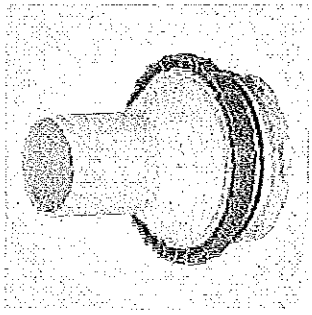
Leading ideas

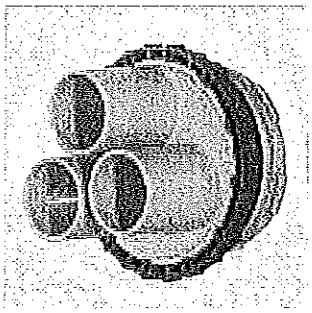
BKD 150

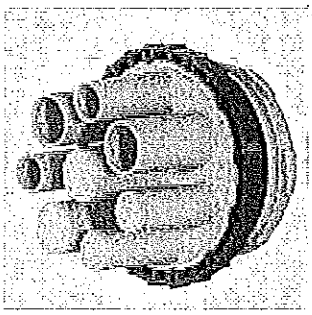
Bayonet Cable Bushing



- System BKD 150 with its bayonet catch fulfils highest requirements and offers a technology for quick and simple installation.
- Bayonet cable bushing BKD 150 is suitable for the application of various sealing techniques. The standard design is supplied with heat shrink-on sleeves. As an option, sleeves are also available in cold shrink-on technique KS.
- Bayonet cable bushing BKD 150 offers compatibility with other systems and is prepared for numerous special solutions.
- For special applications and requirements please contact our technical department.







Bayonet Cable Bushing BKD 150

System BKD with its bayonet reception consists of a sealing collar which is designed as single or double collar and can be assembled into packages by means of the frames around the collar to be imbedded flush into the concrete of the formwork. The frame is provided with nail holes for fixing with stud nails.

In order to prevent voids the bayonet cable bushing must be completely enclosed by concrete.

When using individual packages the direction of installation has to be determined with the principal or planner prior to concreting.

BKD 150 sealing collars will be supplied fitting to the wall thickness of the structural works and are inserted flush into the formwork. (L = wall thickness in mm)

BKD 150 is provided with protective foils and sealing caps. Thus the interior of the sealing collar stays clean during installation and is **gas- and presswater tight immediately** after concreting.

BKD 150 system covers have the suitable bayonet connection offering a technology for quick and simple installation which is finished with only 1/12 turn.

Bayonet Sealing Collars

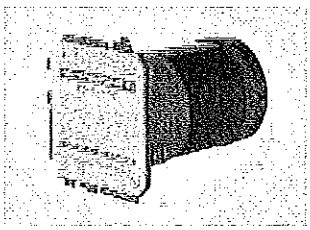
Application and Function

BKD 150 sealing collars are undivided plastic elements which will be supplied fitting to the wall thickness to be imbedded flush into the concrete of the formwork.
Upon supply each sealing collar is provided with a closed cover and is thus gas- and presswater tight immediately after concreting. Permanent sealing towards the concrete is ensured by the novel expansion sealing system.

Single sealing collars can be plugged together next to each other or one on top of the other. These packages create „check holes" which allow subsequent control of the concrete compaction.

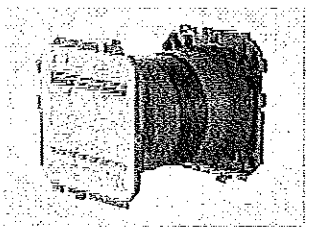
The frame is provided with nail holes for easy fixing of the sealing collar to the formwork. The inner diameter of the sealing collar is 150 mm

Connection technology BKD 150 is characterized by easy installation and the bayonet type joining between sealing collar and system cover.



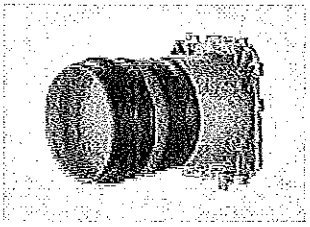
Single Sealing Collar
suitable for connection of a system cover or system KSS on one side. Applicable for a wall thickness from 60 mm. Direction of installation has to be determined!

order no.: BKD 150-K/L
(L) = wall thickness in mm



Double Sealing Collar
Suitable for connection of a system cover or system KSS on both sides. Applicable for a wall thickness from 140 mm.

order no.: BKD 150-K2/L
(L) = wall thickness in mm



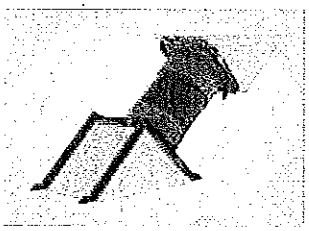
Single Sealing Collar with pipe connection plug-type sleeve
Suitable for connection of a system cover or system KSS on one side. Other side for direct connection of a smooth-walled cable protection tube with an outside diameter of 110, 125, 140, or 160 mm.

Minimum wall thickness 200 mm.

order no.: BKD 150-SMB-110/(L)
BKD 150-SMB-125/(L)
BKD 150-SMB-140/(L)
BKD 150-SMB-160/(L)
(L) = wall thickness in mm

Also available as single sealing collar with pipe connection glue-in sleeve

order no. e.g.:
BKD 150-KMB-110/(L)

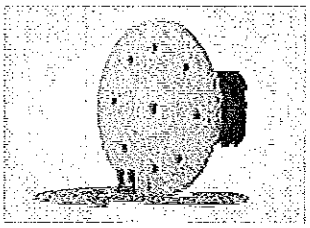


Angular Sealing Collar
suitable for cables laid at an angle of 30°, 45° or 60° from any direction. With auxiliary frame and polystyrene wedge. Single or double sealing collar also available as package.

Minimum wall thickness 250 mm.

order no.:
Angular Single Sealing Collar
BKD 150-S30-K/(L)
BKD 150-S45-K/(L)
BKD 150-S60-K/(L)

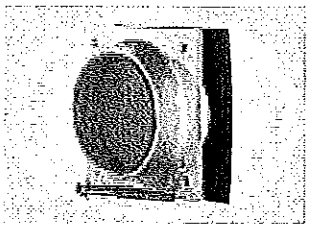
order no.:
Angular Double Sealing Collar
BKD 150-S30-K2/(L)
BKD 150-S45-K2/(L)
BKD 150-S60-K2/(L)
(L) = wall thickness in mm



Stainless Steel Flange Sealing Collar
suitable for sealing to DIN 18195 part 9 (integral / slip-on type flange design for black basement lining). On both sides connection of system cover or system KSS possible.
Also available as package (flange plate). Flange diameter 500 mm

Minimum wall thickness 160 mm

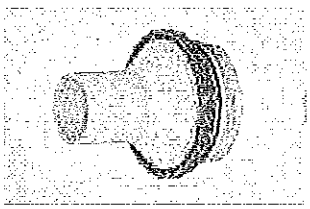
order no.: BKD 150-KF2/(L)
(L) = wall thickness in mm



Aluminium Flange Sealing Collar AF
suitable for sealing in front of diamond tipped drilled holes in walls or ceilings. Supplied with flange gasket, protective cover and fastening elements. Connection of a system cover or system KSS possible. Diameter of diamond tipped drilled hole max. 150 mm. Flange 235 x 235 mm.

order no.: BKD 150-AF 235
(L) = wall thickness in mm

Bayonet System Covers



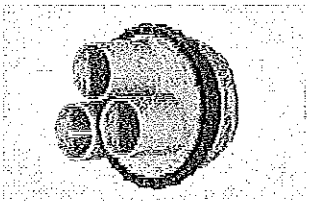
System cover with 1 connection piece and appropriate shrink-on sleeve.

Design for 1 cable
of diameter 34 - 108 mm

order no.: BKD 150-D1/110

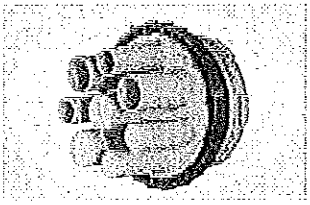
design for 1 cable
of diameter 26 - 78 mm

order no.: BKD 150-D1/80



System cover with 3 connection pieces and 3 shrink-on sleeves. Suitable for 3 cables of diameter 21 - 56 mm. Several joint boxes AK or sealing plugs VS 60 (as blind cover) are available as accessory.

order no.: BKD 150-D3/60



System cover with 8 connection pieces and 4 shrink-on sleeves. 4 connection pieces are closed upon supply and can be opened when necessary. Suitable for max. 4 cables of diameter 7 - 23 mm and max. 4 cables of diameter 12 - 33 mm.

order no.: BKD 150-D8/35/25

A set of special thermal sleeves for the subsequently opened connection pieces is available as accessory.

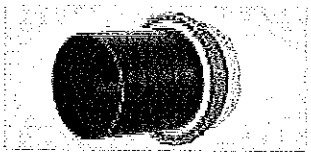
order no.: BKD 150-TM Set-D8

Accessory

Application and Function

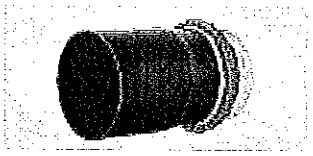
BKD 150 system covers offer various possibilities for sealing cables and cable protection tubes. They are screwed in manually and tightened by means of the installation spanner GSS prior to laying the cables into a BKD 150 sealing collar or a BKD 150 aluminium flange AF 235. Several shrink-on techniques are available for sealing occupied cover connection pieces. (Standard design with heat shrink-on sleeves).

Unused cover connection pieces are sealed with sealing plugs and can be subsequently used as spare ducts.



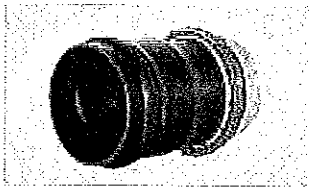
System Cover with Sleeve
for connection of a cable protection tube with an outside diameter of 80, 110, 125, 140, or 160 mm.
Sealing by means of provided shrink-on sleeve.

order no.: BKD 150-DM 80
BKD 150-DM 110
BKD 150-DM 125
BKD 150-DM 140
BKD 150-DM 160



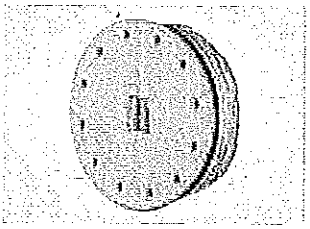
System Cover
with 1 thick-walled connection piece and appropriate shrink-on sleeve. Suitable for 1 cable of dia. 60 - 158 mm or for the connection of a cable protection tube of max. 160 mm outside diameter.

order no.: BKD 150-D1/160



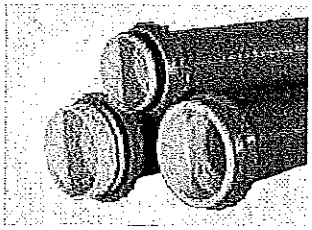
System Cover with Plug-type Sleeve
for connection of a smooth-walled cable protection tube with an outside diameter of 110, 125, 140, or 160 mm. Sealing by means of sealing lip in the plug-type sleeve.

order no.: BKD 150-DSM 110
BKD 150-DSM 125
BKD 150-DSM 140
BKD 150-DSM 160

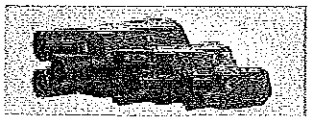


System Cover
suitable as blind cover for unused sealing collars. **This system cover is included in the scope of supply of each sealing collar.** A square wrench VMS is available for economical installation.

order no.: BKD 150-D



Instead of using a system cover it is also possible to connect flexible cable protection hose systems. For further information see Systems KSS.

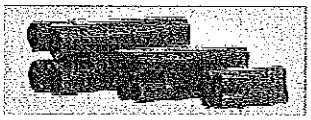


Three-finger Joint Box AK
(heat shrink-on technique) for sealing 3 cables in one cover connection piece.

order no.: AK 35-3F-12/2
for cover BKD 150-D8/35/25 and cables with an outside dia. of 2 - 12 mm

order no.: AK 50-3F-22/5
for cover BKD 150-D8/35/25 and cables with an outside dia. of 5 - 22 mm

order no.: AK 75-3F-29/8
for cover BKD 150-D3/60 and cables with an outside dia. of 8 - 29 mm

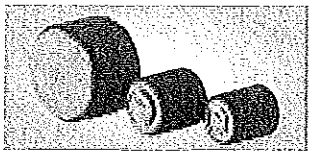


Four-finger Joint Box AK
(heat shrink-on technique) for sealing 4 cables in one cover connection piece.

order no.: AK 35-4F-13/2
for cover BKD 150-D8/35/25 and cables with an outside dia. of 2 - 13 mm

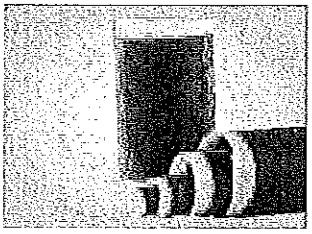
order no.: AK 50-4F-20/5
for cover BKD 150-D8/35/25 and cables with an outside dia. of 5 - 20 mm

order no.: AK 75-4F-29/8
for cover BKD 150-D3/60 and cables with an outside dia. of 8 - 29 mm



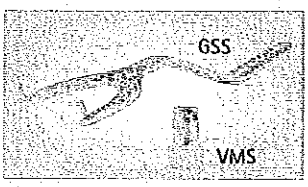
Sealing Plugs VS
for sealing unused cover connection pieces. Plugs can be removed for using the connection piece.
Available for connection pieces of dia. 25, 35, 60 mm

order no.: VS 25 / VS 35 / VS 60



Cold Shrink-on Technique KS
for quick and simple installation without auxiliaries under all weather conditions. Gas- and watertight up to 2 bars. Absorbs tension and pressure loads.

Available for all system covers.

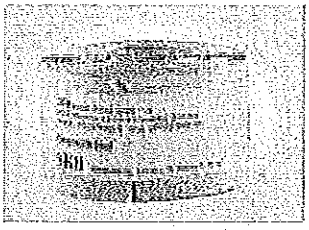


Articulated Face Spanner GSS
with adjustable leg. Suitable for mounting all system covers and KSS systems.

order no.: GSS

Square Mounting Wrench VMS
suitable for efficiently mounting and dismounting BKD 150, KD 150 and KD 85 blind covers with 1/2" ratchet spanner.

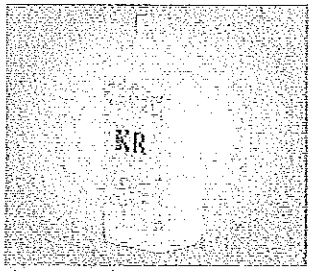
order no.: VMS



Melt-type Adhesive Tape SKB
is a cold welding-type tape with very good adhesive properties. Suitable for all cable sheath materials, for plastics and metals, for sealing and corrosion protection.

Tape thickness: 1 mm
Tape width: 50 mm
Roll length: 3.30 m

order no.: SKB



Cable Cleaner KR
for ecologically cleaning cables of all types, removes even tenacious dirt. Inodorous, evaporating without residues.

Density at 20 °C: 0,762
Flash point: >+55 °C
Evaporation number: 60
Characteristic value: 0
Duty to mark: none
Packing drum: 1000 ml
5000 ml
500 ml
spray bottle

order no.: KR

Packages

Application and Function

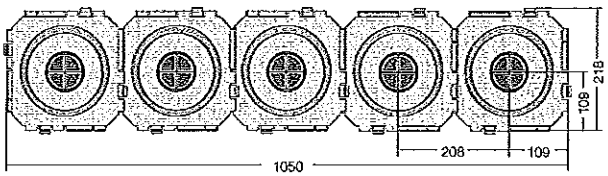
Variable Packages
Single sealing collars can be plugged together at random next to each other or one on top of the other.

Safety at a Glance
Packages create central check holes which allow subsequent control of the concrete compaction!

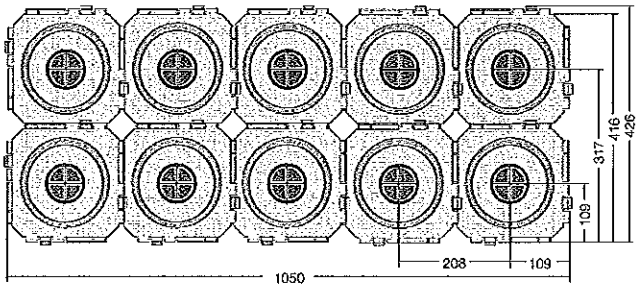
System KD consists of a sealing collar which is designed as single or double collar and can be assembled into packages by means of the frames around the collar to be imbedded flush into the concrete of the formwork.

Variable Packages

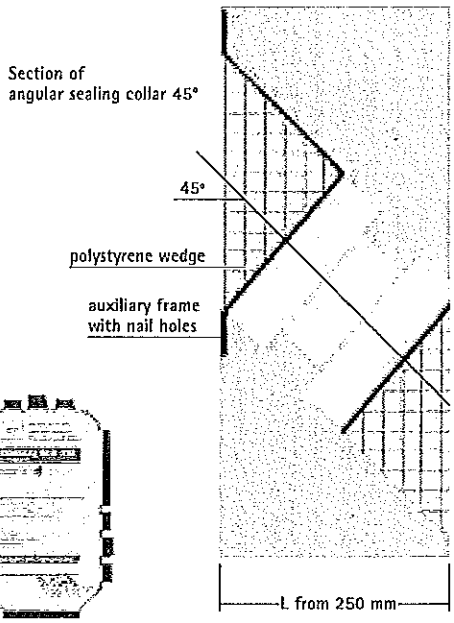
BKD 150-1x5-K2/(L)

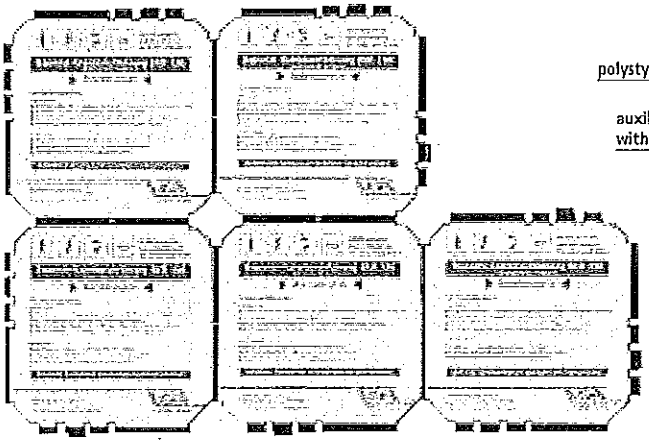


BKD 150-2x5-K2/(L)



Angular Sealing Collar





Product Nomenclature

Example:
Single Bayonet Sealing Collar

BKD 150 - K/ (L)
- wall thickness in mm
- single sealing collar
- system designation

Example:
Double Bayonet Sealing Collar

BKD 150 - K2 / (L)
- double sealing collar

Example:
Double Bayonet Sealing Collar as package 2 x 3

BKD 150 - 2 x 3 - K2/ (L)
- wall thickness in mm
- double sealing collar
- 3 sealing collars next to each other
- 2 sealing collars one on top of the other
- system designation

Example:
Angular Bayonet Sealing Collar 45° as double sealing collar

BKD 150-S45-K2/ (L)
- wall thickness in mm
- double sealing collar
- angular sealing collar 45°
- system designation

Test Report Bayonet Cable Bushing BKD 150

For this test the testing arrangement was set similarly to the tests of system KD. Here the installation of the system into concrete was simulated with a test bell.

All test specimens proved successful in the tests for gastightness and presswater tightness.

Due to the closeness of system BKD 150 to system KD 150 only system cover BKD 150-D3/60 was subjected to the helium gastightness test and the presswater tightness test at low temperatures as an example.

In the helium test the specimens were checked for gastightness. In this test, the partial pressure of helium in the atmosphere directly after the experimental set-up is to give conclusions about the leakage rate of the system.

In the test for presswater tightness at low temperatures the specimens were checked for presswater tightness (with a water / antifreeze compound solution) at extremely low temperatures for a period of 24 hours.

The obtained results confirm that system BKD 150 is an excellent sealing system and exceeds the values demanded for practical purposes by far.

Test Results in Detail

The following tightness tests were carried out:

1. presswater tightness at low temperatures at a pressure of 5 bars.
2. gastightness with helium at a pressure of 5 bars

▶ Result of Gastightness Test:
Partial pressure (directly after experimental set-up) was 4.8 x 10^{-6} mbars. This is a very good value as the partial pressure of helium in the atmosphere is ca. 4.8 x 10^{-6} mbars.

▶ Result of Presswater Tightness Test:
Liquid did not emerge. A feature was made of the optimum structure of the sealing collar and the very good expansion seal which is applied annularly around the sealing collar. This expansion seal guarantees that the connection between sealing collar and concrete does not break when the concrete dries.

UGA®

Sealing systems and fire protection for cables and pipes

UGA SYSTEM-TECHNIK GmbH & Co.
Technical Systems and Products for integration into buildings
Heidenheimer Str. 80-82 · 89542 Herbrechtingen
Postfach 12 61 · 89539 Herbrechtingen
Phone: 0049 73 24 / 96 96 - 0 · Fax: 0049 73 24 / 96 96 - 96
e-mail: info@uga-systeme.de · internet: www.uga-systeme.de

Fraunhofer Institut
Fertigungstechnik
Materialforschung

Messung der Dichtigkeit einer Kabeldurchführung der Fa. UGA des Typs BKD 150 gegenüber Helium

Kurzbericht WP-PB-A301033go-001 zum
Angebot Nr. A301033go
Auftragseingang: 25.06.2001

UGA SYSTEM-TECHNIK GmbH & Co.
Heidenheimer Straße 80-82

89542 Herbrechtingen

Fraunhofer-Institut Fertigungstechnik Materialforschung
Klebtechnik und Polymere
Wiener Straße 12, 28359 Bremen
Institutsleiter: Prof. Dr. O.-D. Hennemann

M. Brede

M. Gomm

Bremen, 23.08.2001

1 Aufgabenstellung

Messung der Dichtigkeit einer Kabeldurchführung der Fa. UGA des Typs BKD 150 gegenüber Helium

Prüfgegenstände: Kabeldurchführungssystem BKD 150

2 Prüfgegenstand

Zu prüfende Einzelteile des Systems:	Einfach-Dichtpackung	BKD 150-K/150
	Systemdeckel	BKD 150-D3/60
Prüfvorrichtung:	s. Zeichnung Anlage 1	
Versuchsdurchführung:	Die Prüfvorrichtung wurde von einem Mitarbeiter des Auftraggebers für die Messung vorbereitet. Nach Beaufschlagung des Prüfdruckes von 5 bar mit Helium, wurde der Partikeldruck des Gases mit Hilfe eines Heliumdetektors Leybold UL 200 gemessen.	
Prüfdatum:	25.06.2001	
Prüfer:	Michael Gomm	

3 Messergebnisse

Ergebnistabelle:

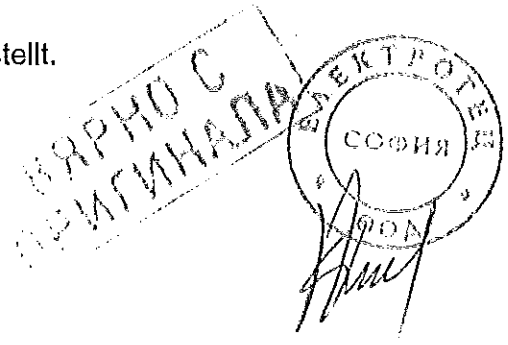
Prüfung	Prüfmedium	Prüfdruck [bar]	gemessener Partikeldruck [mbar l/s]	Partikeldruck der Atmosphäre [mbar l/s]
1	Helium	5	≈ 4.8 E-6	≈ 4.8 E-6

4 Prüfbericht

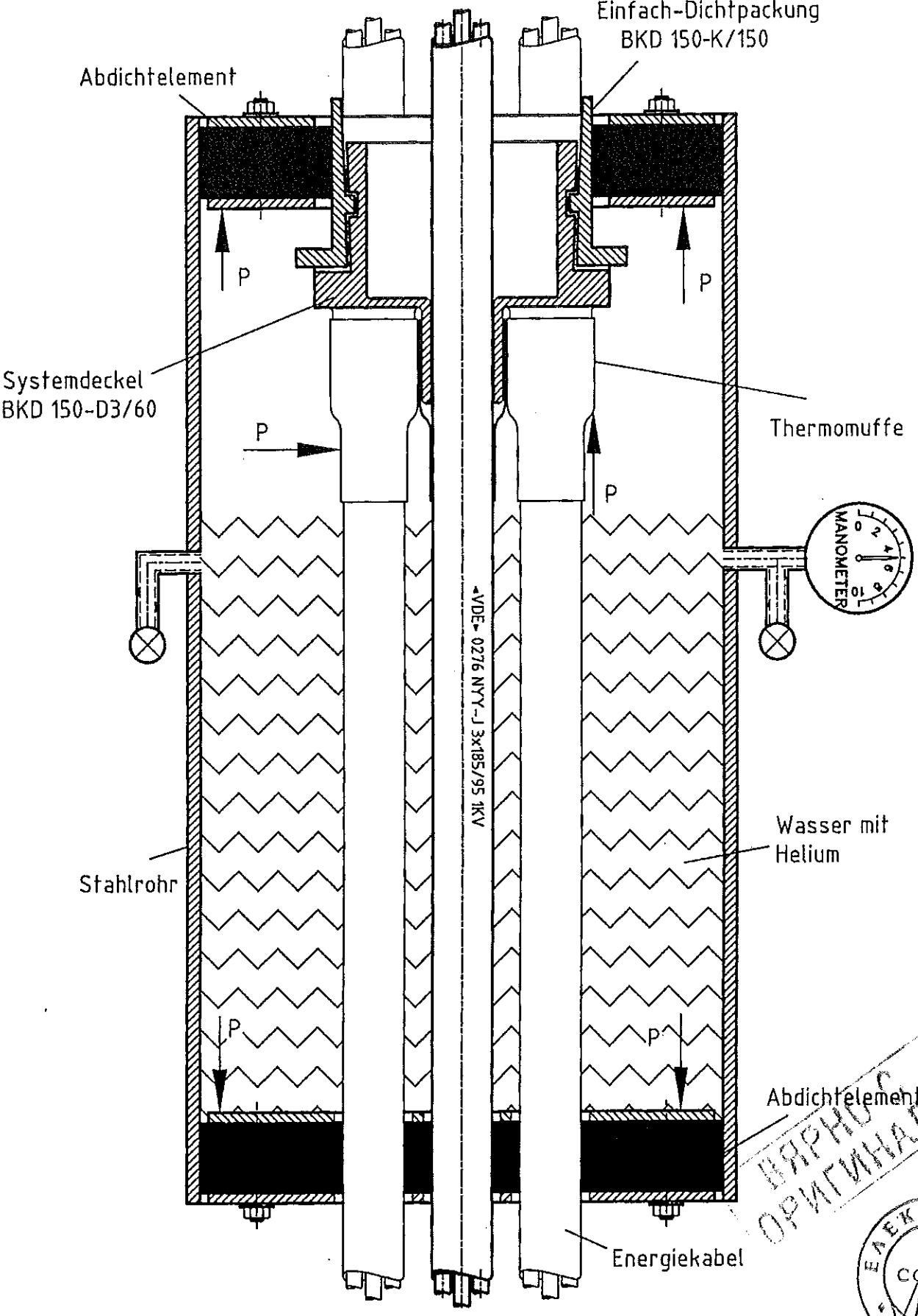
WP-PB-A301033Go-001

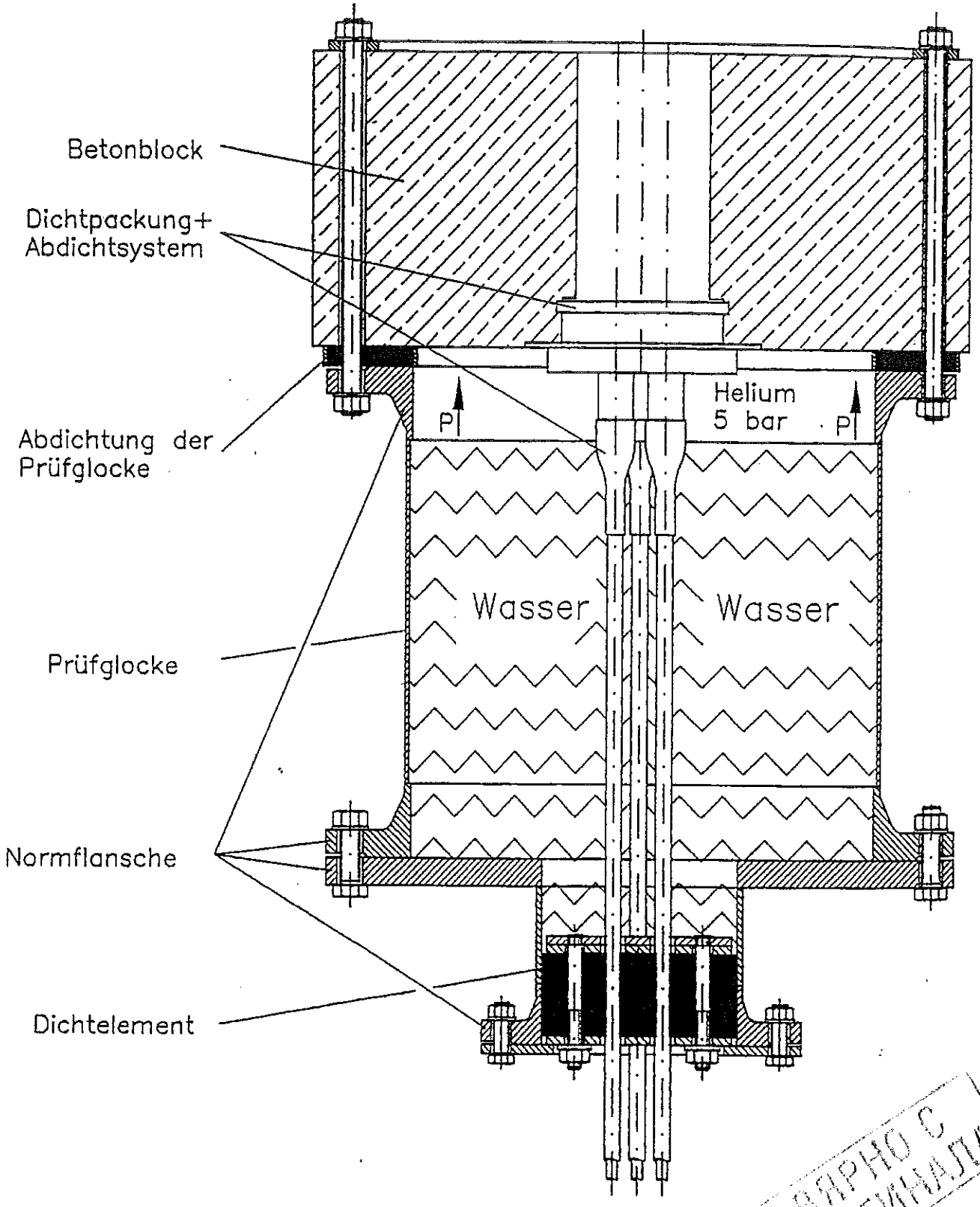
5 Bemerkungen

Die Helium-Dichtigkeit der Dichtpackung des (B)KD-Systems in einem Betonprüfkörper wird im Prüfbericht WP-PB-398012-007 der IFAM vom 28.01.1999 mit einem gemessenen Partialdruck von 5.4E-6 mbar nachgewiesen.
Der Versuchsaufbau ist in Form einer Skizze in Anлage 2 dargestellt.



Anlage Nr. 1 zu IFAM Prüfbericht
WP-PB-A3o.1o33go-oo1





Anlage Nr. 2 zu IFAM Prüfbericht
WP-PB-130103390-001

ВЯРНО С ОРИГИНАЛА

ЕЛЕКТРОТЕЕ СОФИЯ ЕОД

Fraunhofer Institut
Fertigungstechnik
Materialforschung

Messung der Dichtigkeit einer Kabeldurchführung der Fa. UGA des Typs BKD 150 gegenüber Wasserdruck bei –25°C

Kurzbericht WP-PB-A301033go-002 zum
Angebot Nr. A301033go
Auftragseingang: 25.06.2001

UGA SYSTEM-TECHNIK GmbH & Co.
Heidenheimer Straße 80-82

89542 Herbrechtingen

Fraunhofer-Institut Fertigungstechnik Materialforschung
Klebtechnik und Polymere
Wiener Straße 12, 28359 Bremen
Institutsleiter: Prof. Dr. O.-D. Hennemann

M. Brede

M. Gomm

Bremen, 23.08.2001

1 Aufgabenstellung

Messung der Dichtigkeit einer Kabeldurchführung der Fa. UGA des Typs BKD 150 gegenüber Wasserdruck bei -25 °C

Prüfgegenstände:	Kabeldurchführungssystem BKD 150

2 Prüfgegenstand

Zu prüfende Einzelteile des Systems:	Einfach-Dichtpackung	BKD 150-K/150
	Systemdeckel	BKD 150-D3/60
Prüfvorrichtung:	s. Zeichnung Anlage 1	
Versuchsdurchführung:	Die Prüfvorrichtung wurde von einem Mitarbeiter des Auftraggebers für die Messung vorbereitet. Nach Kühlung der Prüfanordnung auf -25 °C wurde das System mit einem Wasserdruck von 5 bar beaufschlagt. Die Höhe des anstehenden Wasserdruckes wurde über einen Zeitraum von > 24 Stunden gemessen und aufgezeichnet.	
Prüfdatum:	29.06.2001 bis 02.07.2001	
Prüfer:	Michael Gomm	

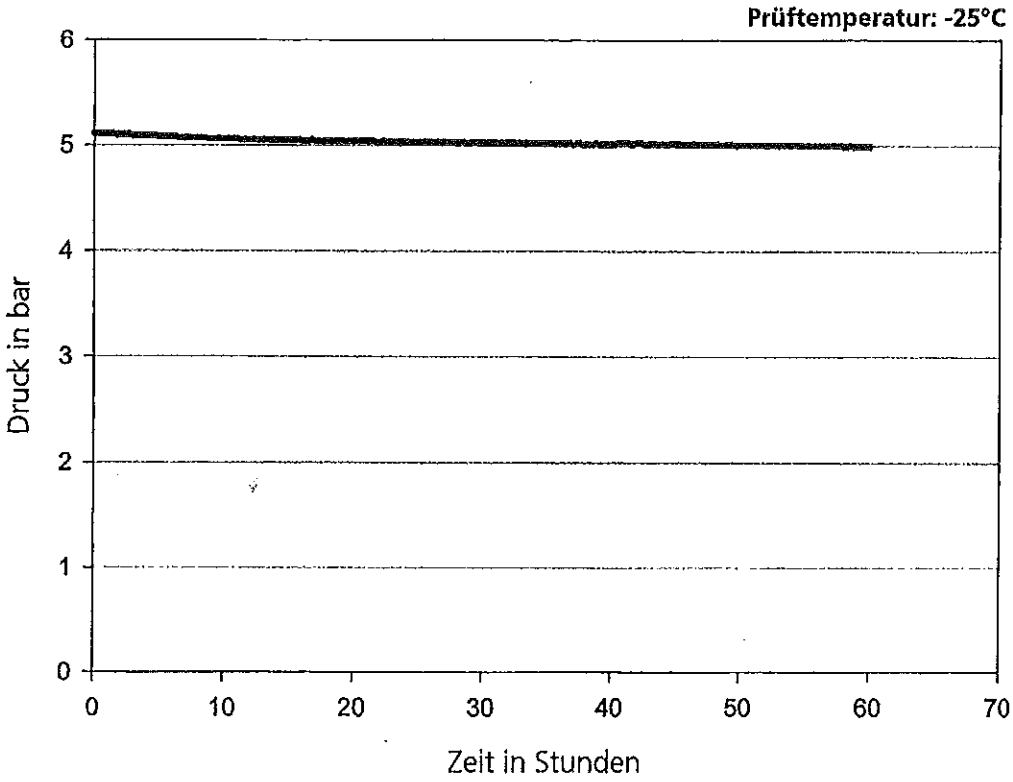
3 Messergebnisse

Ergebnistabelle:

Prüfung	Prüfmedium	Prüfdruck [bar]	Prüfdauer [Stunden]	Druck zu Beginn der Messung [bar]	Druck am Ende der Messung [bar]
1	Wasser mit Frostschutz	5	60	5.11	4.99

Es war zu keinem Zeitpunkt ein Wasseraustritt zu beobachten.
Der leichte Druckabfall ist durch die Abkühlung des Prüfmedium zurückzuführen.

Graphische Darstellung:



4 Prüfbericht

WP-PB-A301033Go-002

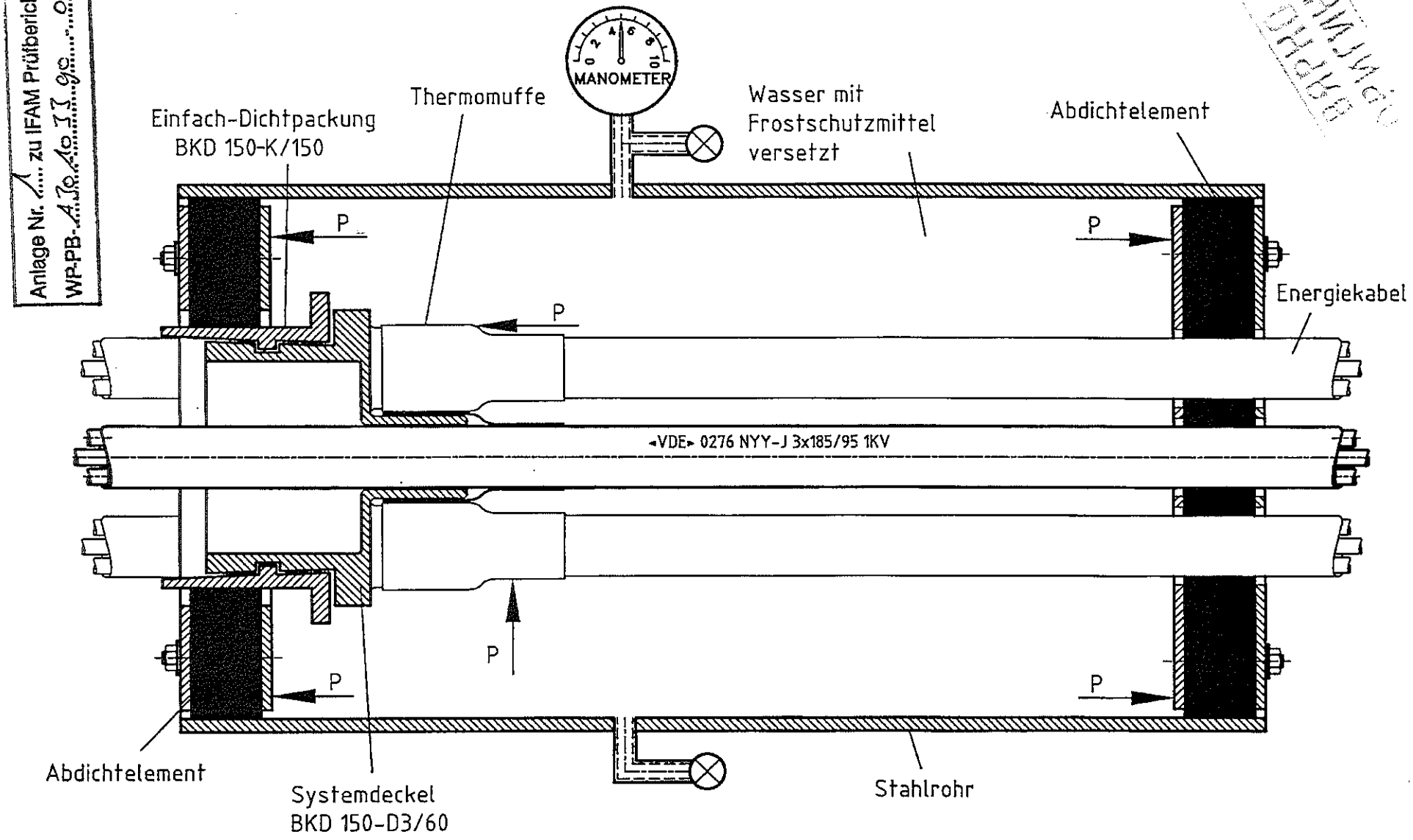
5 Bemerkungen

keine

ВЯРНО С ОРИГИНАЛА

ЕЛЕКТРОГЕЙ СОФИЯ ООД

Anlage Nr. 1 zu IFAM Prüfbericht
WP-PB-A19.40.13.90-002



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Професионален Транслейшън ООД - България, 1606 София, ул. Ами Буе № 44, ет. 3

Превод от немски език

ИТПИМ
Фрауенхофер
институт
технология
изследване на материалите

Измерване на херметичността на кабелен ввод на фирма UGA модел BKD 150 по отношение на хелий

Кратък протокол WP-PB-A301033go-001 към
оферта № A301033go
Постъпване на поръчката: 25.06.2001 г.

UGA SYSTEM-TECHNIK ООД и К°
Хайденхаймер щрасе 80-82

89542 Хербрехтинген

Фрауенхофер институт технология изследване на материалите
Технология на слепването и полимери
Винер щрасе 12, 28359 Бремен
Ръководител на института: проф. д-р О.-Д. Хенеман

подпис /не се чете/
М. Бреде

подпис /не се чете/
М. Гом

ВЯРНО С ОРИГИНАЛА

Бремен, 23.08.2001 г.

ЕЛЕКТРОПЕЛ София

1 Задание

Измерване на херметичността на кабелен ввод на фирма UGA модел BKD 150 по отношение на хелий

Обекти на изпитване: Система кабелен ввод BKD 150

2 Обект на изпитване

Отделни части на системата, подлежащи на изпитване:

Единично уплътнение	BKD 150-K/150
Системен капак	BKD 150-D3/60

Изпитвателно приспособление: вж. чертеж Приложение 1

Провеждане на опита: Изпитвателното приспособление беше подготвено за измерването от сътрудник на Възложителя. След подаване на изпитвателното налягане от 5 bar с хелий беше измерено налягането на частиците на газа с помощта на детектор за хелий Leybold UL 200.

Дата на изпитването: 25.06.2001 г.

Изпитващ: Михаел Гом

3 Резултати от измерването

Таблица с резултатите:

Изпитване	Изпитвателна среда	Изпитвателно налягане [bar]	Измерено налягане на частиците [mbar l/s]	Налягане на частиците на атмосферата [mbar l/s]
1	Хелий	5	≈ 4,8 E-6	≈ 4,8 E-6

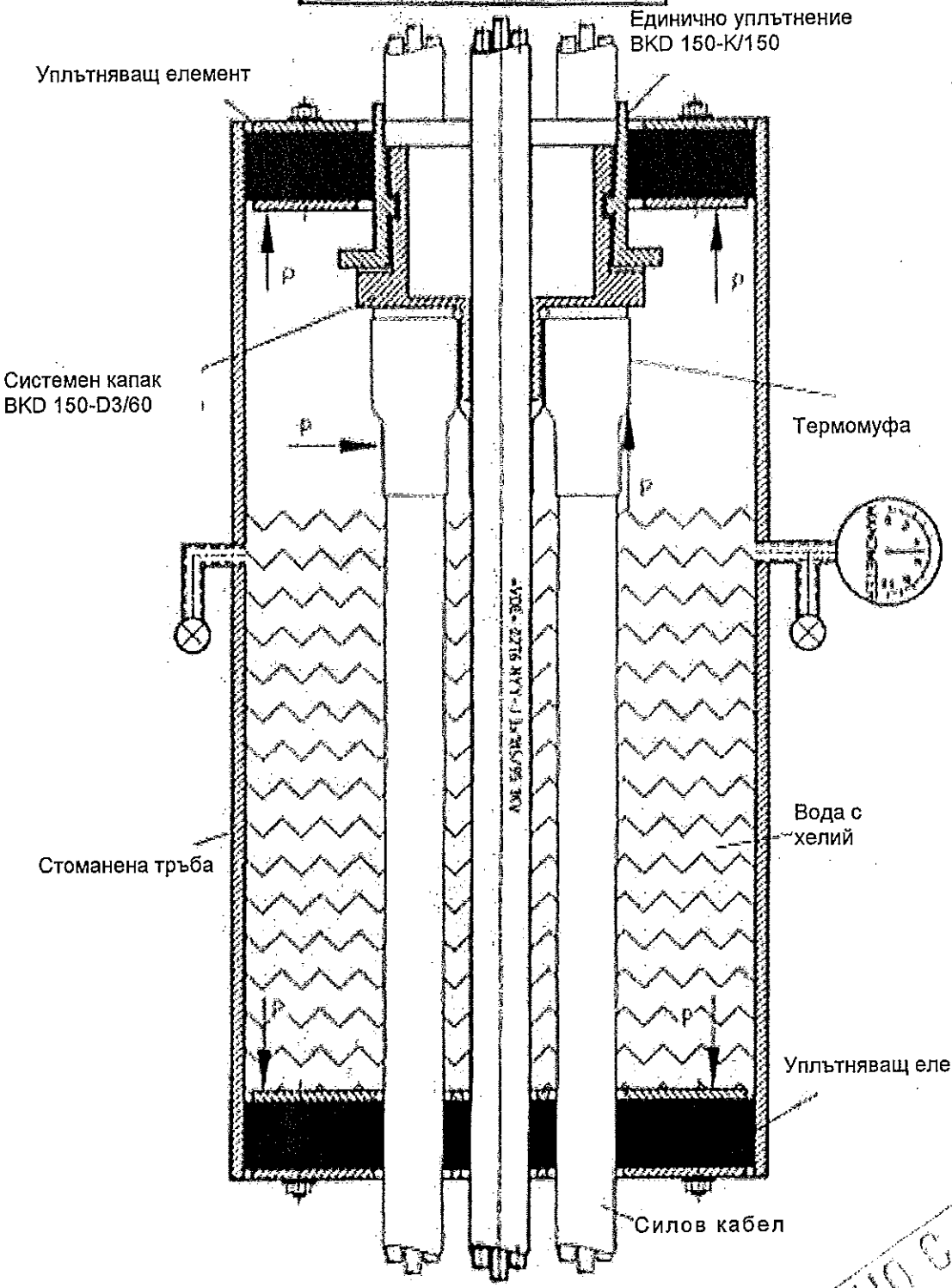
4 Протокол от изпитване

WP-PB-A301033Go-001

5 Забележки

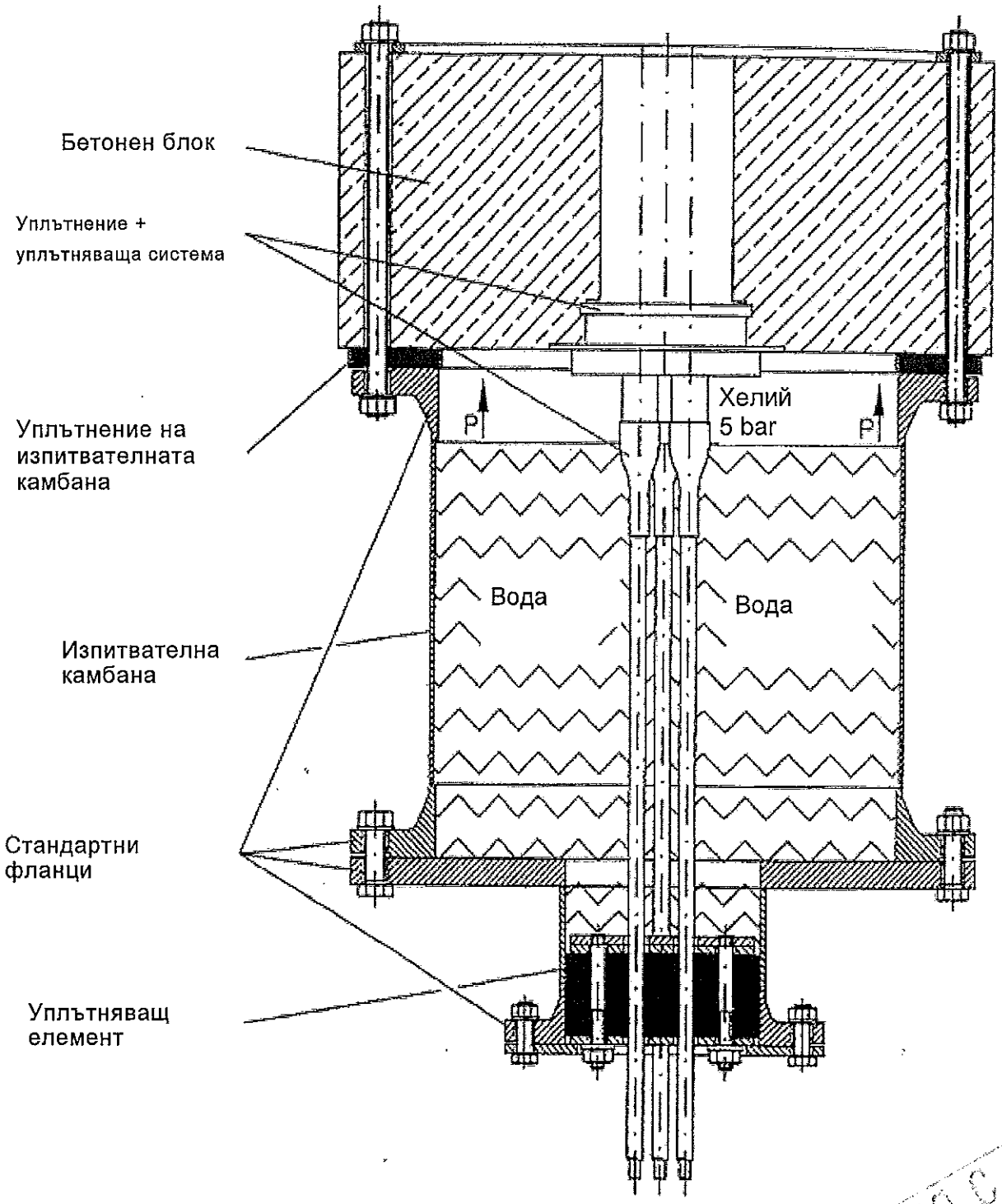
Херметичността по отношение на хелий на уплътнението на система (B)KD в бетонно пробно тяло се потвърждава в протокол от изпитване WP-PB-398012-007 на ИТПИМ от 28.01.1999 г. с измерено парциално налягане от 5,4E-6 mbar. Опитната конструкция е представена под формата скица в Приложение 2.

Приложение № 1 към протокол от изпитване на ИТПИМ
WP-PB-A301033go-001



ВЯРНО С ОРИГИНАЛА

ЕЛЕКТРОТЕЕ
СОФИЯ
ООД



Приложение № 1 към протокол от изпитване на ИТПИМ
WP-PB-A301033go-001_

ВЯРНО С ОРИГИНАЛА

ЕЛЕКТРОГЕЙ 4 СОФИЯ ФОА

Фрауенхофер ИТПИМ
институт
технология
изследване на материалите

Измерване на херметичността на кабелен ввод на фирма UGA модел BKD 150 по отношение на водно налягане при -25°C

Кратък протокол WP-PB-A301033go-002 към
оферта № A301033go
Постъпване на поръчката: 25.06.2001 г.

UGA SYSTEM-TECHNIK ООД и К°
Хайденхаймер щрасе 80-82

89542 Хербрехтинген

Фрауенхофер институт технология изследване на материалите
Технология на слепването и полимери
Винер щрасе 12, 28359 Бремен
Ръководител на института: проф. д-р О.-Д. Хенеман

подпис /не се чете/
М. Бреде

подпис /не се чете/
М. Гом

ВЯРНО С ОРИГИНАЛА

Бремен, 23.08.2001 г.

ЕЛЕКТРОГЕЦ СОФИЯ ОФА

1 Задание

Измерване на херметичността на кабелен ввод на фирма UGA модел BKD 150 по отношение на водно налягане при -25°C

Обекти на изпитване: Система кабелен ввод BKD 150

2 Обект на изпитване

Отделни части на системата, подлежащи на изпитване:

Единично уплътнение	BKD 150-K/150
Системен капак	BKD 150-D3/60

Изпитвателно приспособление: вж. чертеж Приложение 1

Провеждане на опита: Изпитвателното приспособление беше подготвено за измерването от сътрудник на Възложителя. След охлаждане на изпитвателната структура до -25°C на системата беше подадено налягане от 5 bar.
Големината на постъпващото водно налягане беше измервана и регистрирана в интервал от време > 24 часа.

Дата на изпитването: 29.06.2001 г. до 02.07.2001 г.

Изпитващ: Михаел Гом

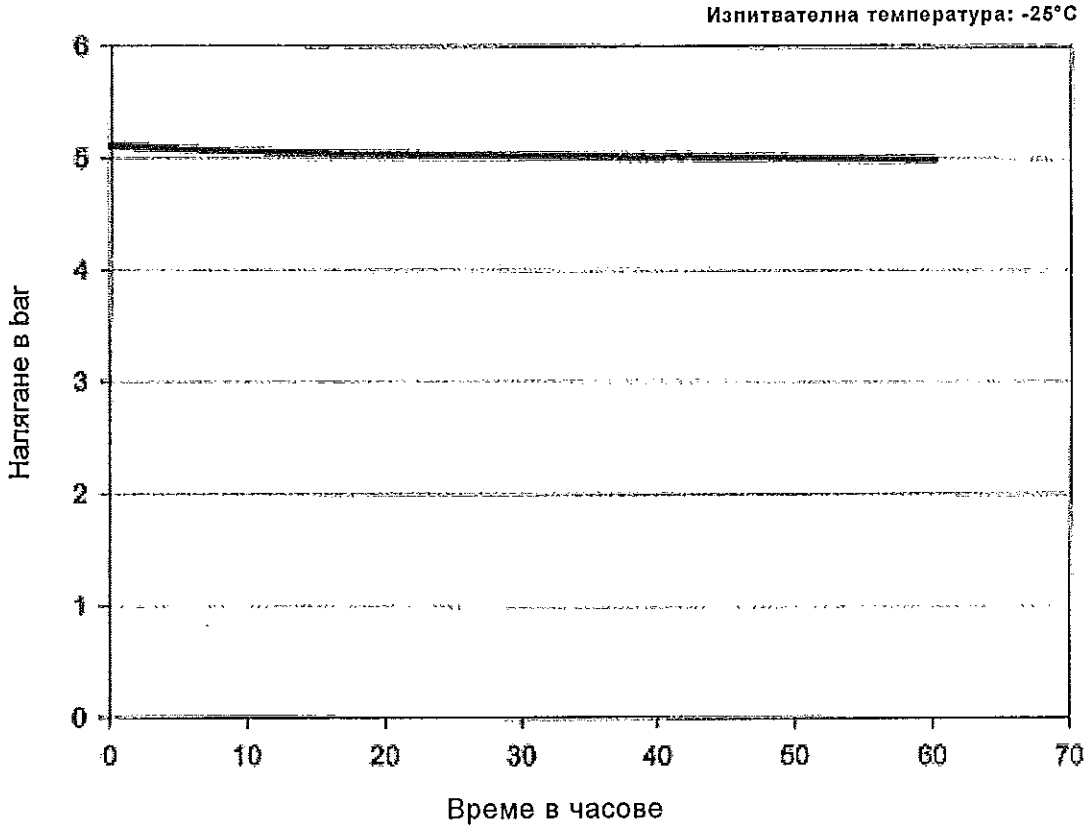
3 Резултати от измерването

Таблица с резултатите:

Изпитване	Изпитвателна среда	Изпитвателно налягане [bar]	Времетраене на изпитването [часове]	Налягане в началото на измерването [bar]	Налягане в края на измерването [bar]
1	Вода с антифриз	5	60	5,11	4,99

В никой момент не беше наблюдавано излизане на вода.
Лекото спадане на налягането се дължи на охлаждане на изпитвателната среда.

Графично представяне:



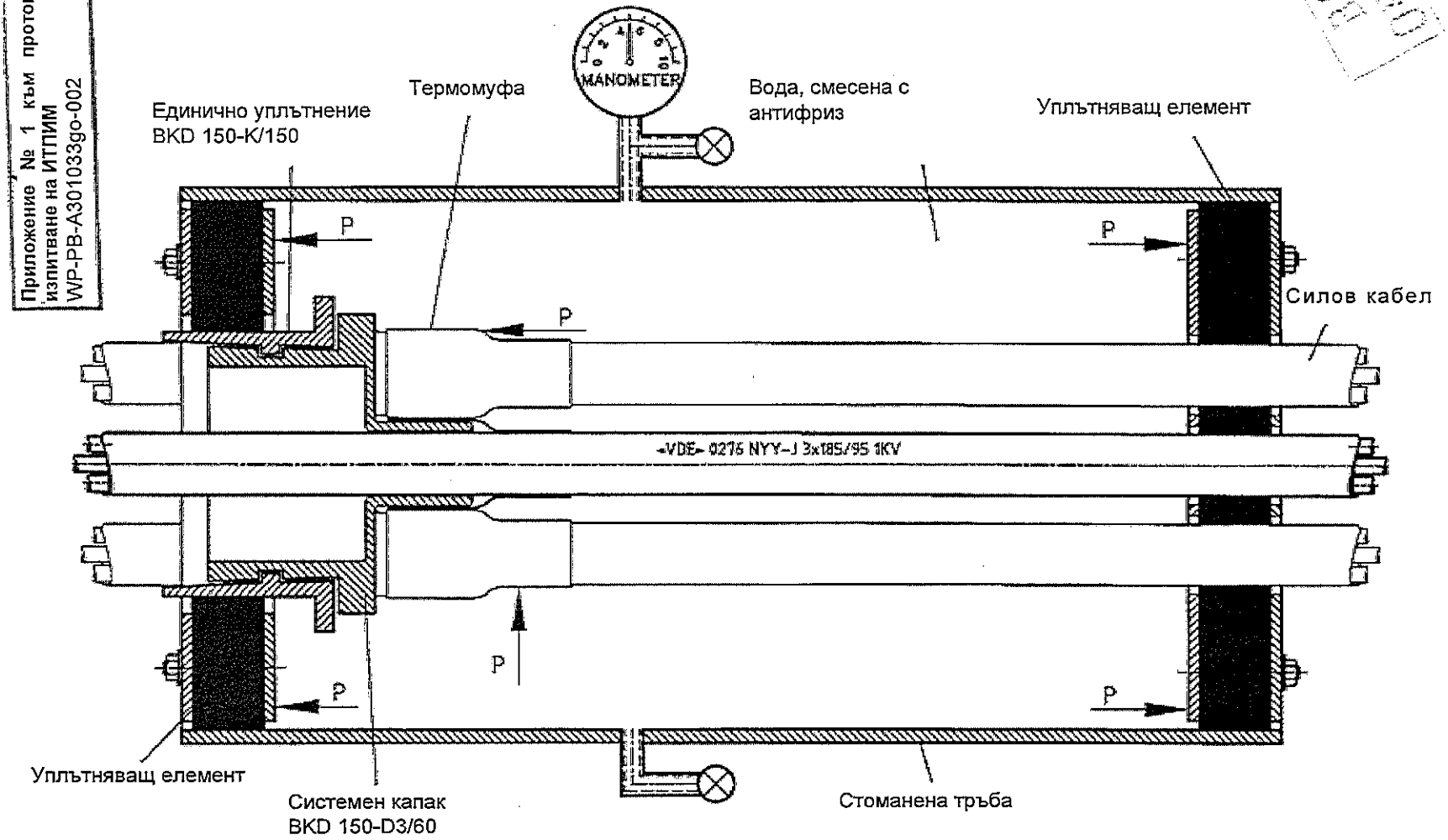
4 Протокол от изпитване

WP-PB-A301033Go-002

5 Забележки

няма

Приложение № 1 към протокол от изпитване на ИТПИМ
WP-PB-A301033go-002



Долуподписаният Иван Спасов Клюнчев удостоверявам верността на извършения от мен превод от немски на български език на приложеният документ. Преводът се състои от 9 страници.
Преводач: Иван Спасов Клюнчев

ПРОФЕШЪНЪЛ ТРАНСЛЕЙТ НЯТ ЕООД София

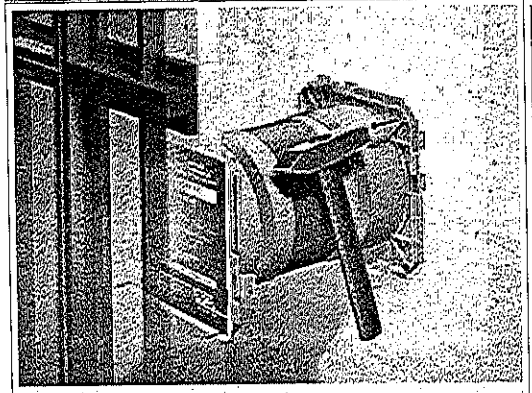
ВЯРНО С ОРИГИНАЛА

ЕЛЕКТРОГЕЙ ООД София

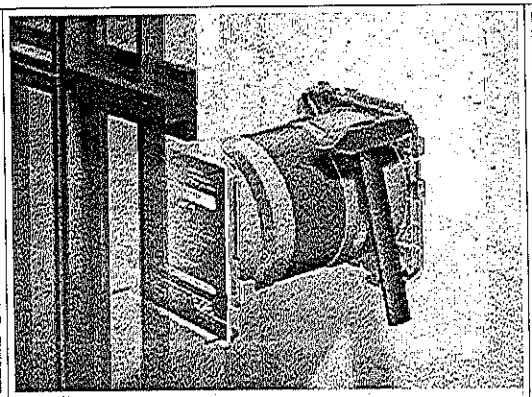
Инструкция за монтаж на кабелна уплътнителна система тип KD и BKD в бетонна стена

Кабелната уплътнителна система се състои от уплътнителна муфа и уплътнителна капачка.

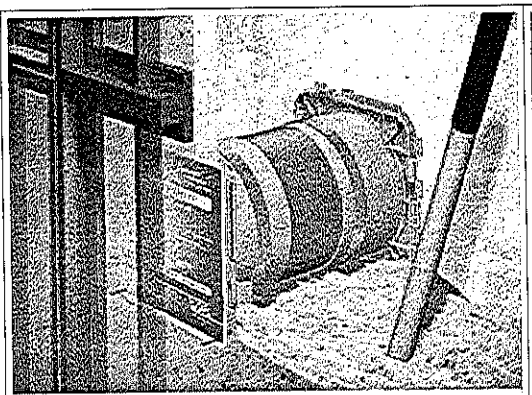
1. Монтаж на уплътнителната муфа



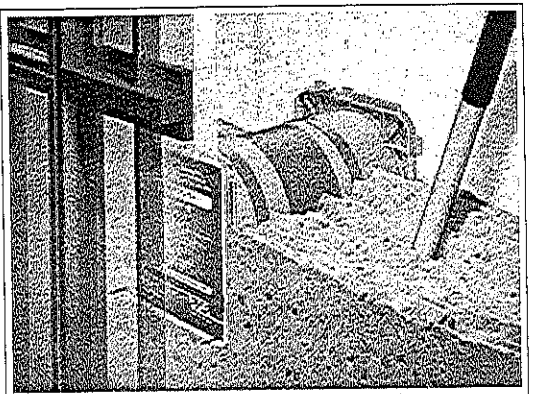
Закрепване на муфата към кофража посредством отворите в ъглите.



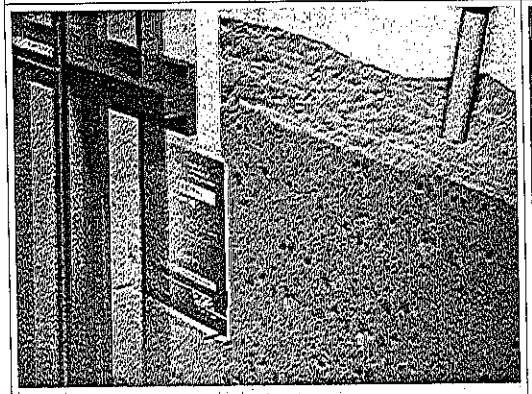
Закрепване на муфата може да стане посредством чук и четири пирона



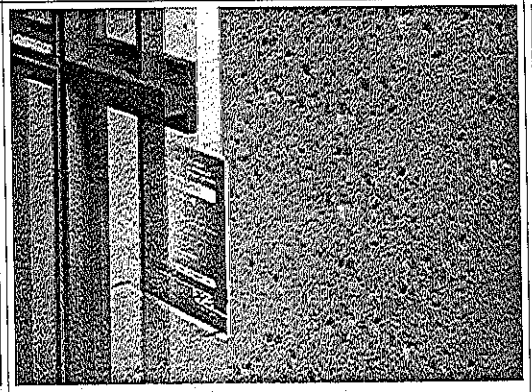
Вибрирането на бетона започва още в началото на изливането в кофража



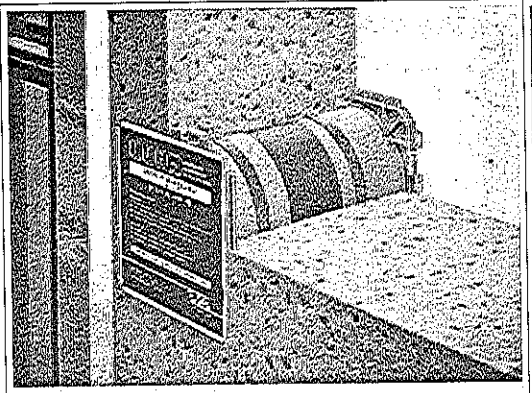
По време на изливането бетонът се вибрира постоянно



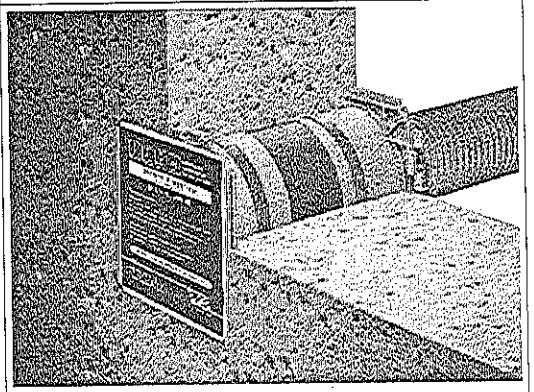
Бетонът се вибрира до запълването на кофражната форма.



След втвърдяването на бетона се демонтират кофражните подпори



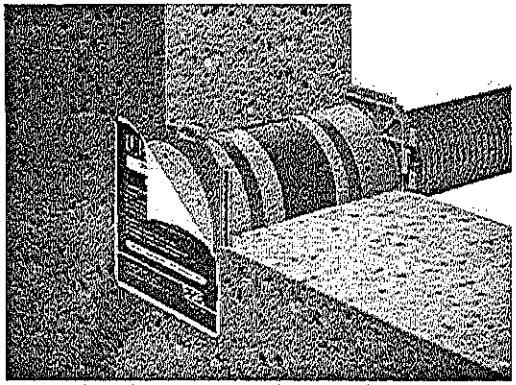
След кофражните подпори се демонтира и кофражната форма



Изглед на муфата вътре в бетонната стена

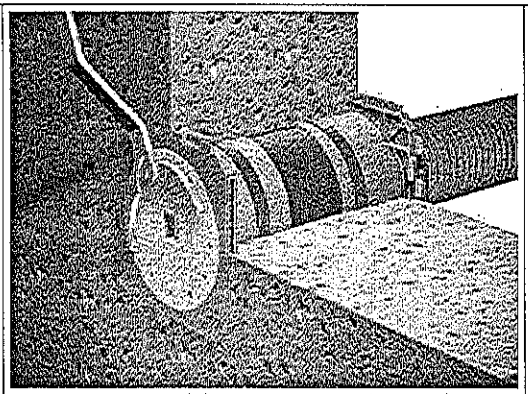
Уплътнителната муфа е снабдена с херметизираща капачка и защитно покритие. По този начин кабелният преход остава затворен и херметизиран до момента на монтаж на уплътнителната капачка и кабелите.

2. Монтаж на уплътнителната капачка и кабелит



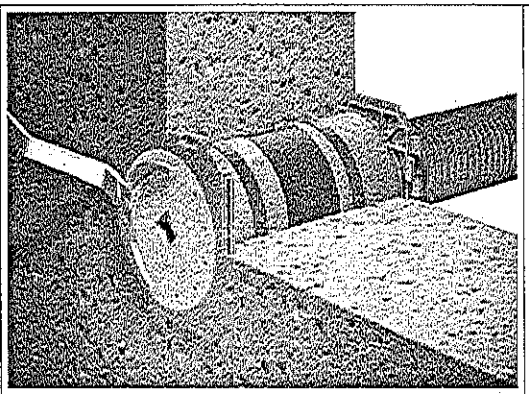
Abziehen des Aufklebers

Първо се отстранява защитното покритие, като при необходимост се нагрява



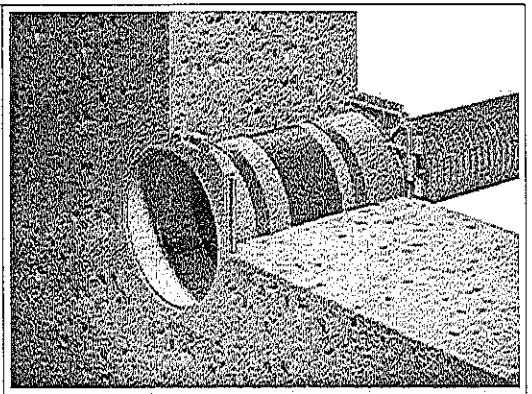
Entfernen des Blinddeckels

След защитното покритие се демонтира херметизиращата капачката на муфата



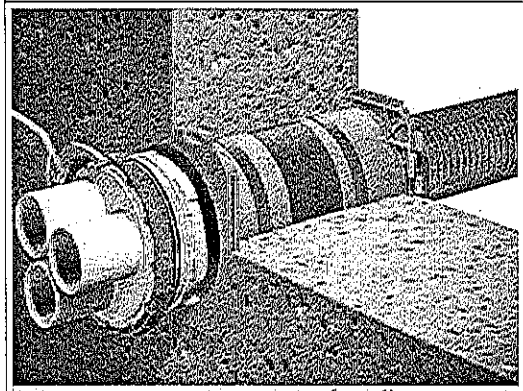
Entfernen des Blinddeckels

Капачката на муфата се демонтира посредством специален ключ или подходящо приспособление чрез завъртане обратно на ч.с.



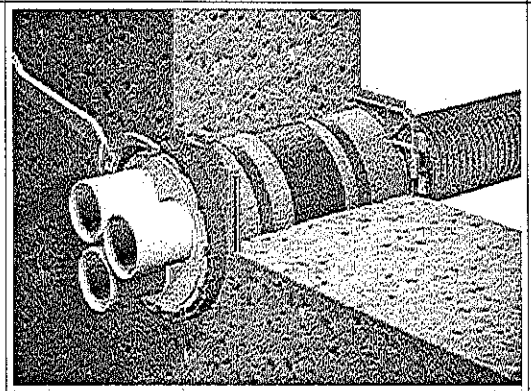
Dichtpackung ohne Systemdeckel

Вид на муфата преди монтиране на уплътнителната капачка за кабели



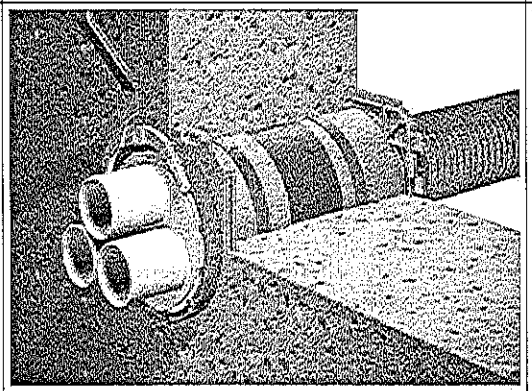
Systemdeckel mit Bajonett-verschluss einsetzen

Уплътнителната капачка се поставя къммуфата посредством водещите канали и зъби



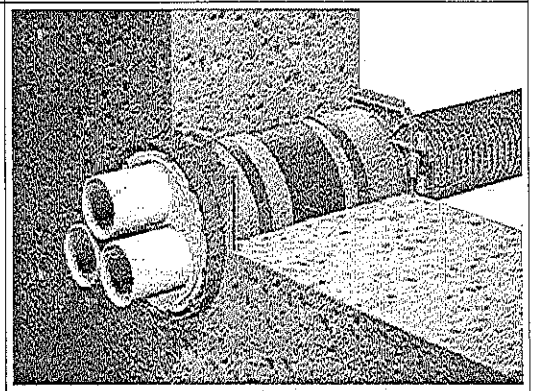
Systemdeckel mit Bajonett-verschluss einsetzen

Уплътнителната капачка се притяга към муфата посредством специален ключ или подходящо приспособление



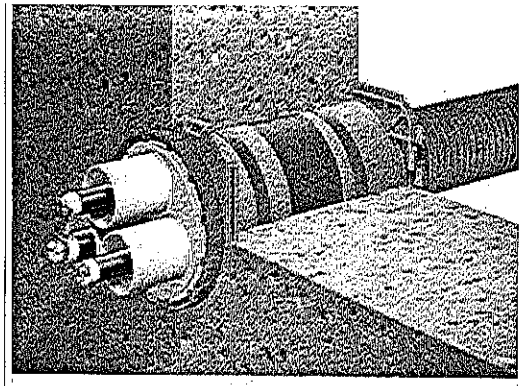
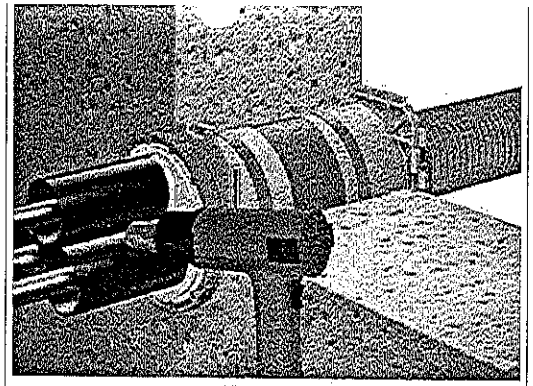
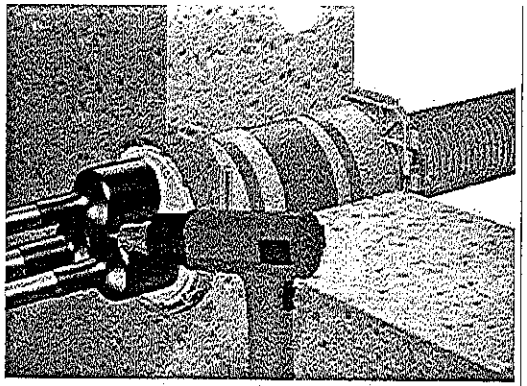
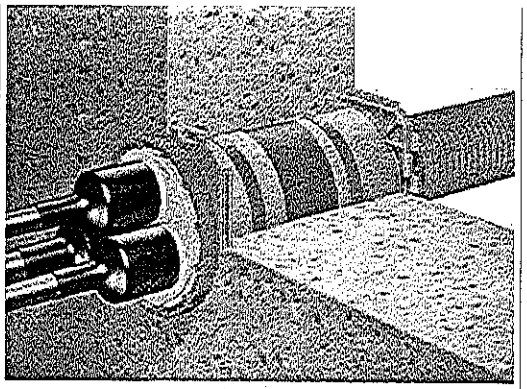
... und mit einer viertel Umdrehung arretieren

Притягането се осъществява посредством завъртане по посока на ч.с.



... Klick und dicht

Уплътнителната капачка се завърта до постигане на пълно притягане към муфата (при байонетен тип е достатъчно завъртане на 30°)

 **Einziehen der Kabel**	 **Schrumpfschlauch aufsetzen und verschrumpfen**	 **Schrumpfschlauch aufsetzen und verschrumpfen**	 **fertig**
След монтажа на уплътнителната капачка се полагат кабелите в отворите на капачката	Върху кабелите и капачката се полага термосвиваемият шлаух	Термосвиваемият шлаух се уплътнява посредством пистолет с горещ въздух или горелка	Като краен резултат се постига пълно херметизиране на кабелите при прехода им през стената

ВЯРНО С ОРИГИНАЛА

ЕЛЕКТРОТЕЛ СОФИЯ

B-POWER

За контакти:

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1408 София
ул. „Янко Забунов", бл. 59, ап. 33
Тел. : 02/ 954 91 87
Факс: 02/ 954 91 97
office@bpower-bg.com