

For Atomic power station

**DIODES OF TYPES  
Д105-630 and Д105-630Х  
C E R T I F I C A T E  
ИЕАЛ.432518.001-01 ПС**

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## **1 General information**

1.1 Diodes of Д105-630 and Д105-630X types are designed for complete set of the excitation systems of power turbogenerators, synchronous condensers and other devices.

**1.2 Manufacturer-country:** Russia

**Manufacturer-enterprise:** OJSC "Electrovypryamitel"

**Legal address of the manufacturer-enterprise:** Bld. 126 Proletarskaya Str., Saransk, Mordovia, 430001.

## 2 Basic technical specifications

2.1 Basic parameters of the diodes conform to the rates, given in table 1.

Type of diode	Maximum permissible average forward current, A (at case temperature, °C)	Repetitive peak reverse voltage, V
Д105-630 Д105-630X	630 (100)	2000-2800

2.2 Maximum permissible parameters and characteristics of the diodes at acceptance (delivery) should conform to the rates, given in table 2.

Table 2

Parameter name, conditions of rates determination	Type of diode	Rate
1 Non-repetitive peak reverse voltage, V, not less than	Д105-630 Д105-630X	In accordance with table 3
2 Repetitive peak reverse voltage, V, not less than		In accordance with tables 1 and 3
3 Maximum permissible average forward current, A, not less than		In accordance with table 1
4 Surge forward current: - at maximum permissible junction temperature, A, not less than		15000
- at junction temperature $(25 \pm 10) ^\circ\text{C}$ , A, not less than		16500
5 Junction temperature: - maximum permissible, °C - minimum permissible, °C		175 -60
6 Operating ambient temperature: - maximum permissible, °C - minimum permissible, °C		55 -60
7 Storage temperature: - maximum permissible, °C - minimum permissible, °C		50 -60

Continuation of table 2

Parameter name, conditions of rates determination	Type of diode	Rate
8 Peak forward voltage, V, no more than	Д105-630 Д105-630X	1.60
9 Repetitive peak reverse current: - at maximum permissible junction temperature, mA, no more than		50
10 Threshold voltage: - at maximum permissible junction temperature, V, no more than		1.0
11 Slope resistance: - at maximum permissible junction temperature, mOhm, no more than		0.4
12 Thermal resistance of junction to case, °C/W, no more than		0.06
Notes		
1 Parameters by items from 1 to 7 are maximum permissible.		
2 During storage and after minimum operating time, it is admitted to increase the values of repetitive peak reverse current by 30 %, peak forward voltage by 20 % and thermal resistance by 30 %.		

2.3 The diodes are subdivided into classes in accordance with table 3.

Table 3

Convention of class as per voltage	Repetitive peak reverse voltage, V, not less than	Non-repetitive peak reverse voltage, V, not less than
20	2000	2300
22	2200	2600
24	2400	2800
26	2600	3000
28	2800	3200

2.4 Probability of the diodes survival for operating time of 25000 hours should be not less than 0.983.

2.5 95-percentage diodes service life should be not less than 10 years under condition of the total operation, not less than 87000 hours.

2.6 98-percentage keeping quality life of the diodes in package of the manufacturer-enterprise should be not less than 3 years.

2.7 Overall, mounting dimensions and mass of the diodes are given in Appendix A.

### 3 Directions for mounting and operation

3.1 The diodes mounting should provide reliable thermal and electrical contacts between current-collecting leads of the diodes, feeding buses and heatsinks.

3.2 The diodes are fastened to the heatsinks or other points of fit with clamping ring by four bolts.

3.3 The torques value of bolts used for fastening of the diodes at rotating rectifiers or other points of fit, should be  $(15 \pm 2)$  N·m. Clamping force of the diodes to the heatsinks or other points of fit should be  $(12000 \pm 2000)$  N.

3.4 At forced air cooling the diodes permit the operation in any position.

3.5 Prior to assembling the diode with the heatsink, it is necessary to clean the contact surfaces of the diode, current-leading bus and the heatsink with tissue wad, wetted in alcohol. The pollutions, wire-edges, damages and any outside particles should not be on the contact surface.

3.6 The roughness of the heatsink contact surface should be no more than  $1.6 \mu$ , tolerance of planeness – no more than 0.03 mm, tolerance of perpendicularity of cylindrical surface of pipe current lead relatively to the basis plane should be no more than 1.0 mm.

3.7 The circuitry of installation with diodes use should be provided with fast protection against impermissible overloads, short-circuits and switching overvoltages.

Recommended modes of the diodes operation:

- for normal modes of operation it is not admitted to exceed the values of repetitive peak reverse voltage, surge forward current more than 60 % from the values, given in tables 1 and 2;
- junction temperature should not exceed 80 % from the maximum permissible one.

3.8 The diodes permit operation under conditions of attacking mechanical loads to them in accordance with table 4.

Table 4

Environmental factor name	Environmental factor value
Vibration: frequency range , Hz acceleration, $\text{m/s}^2$ (g)	from 0.5 to 500 inclusive 75 (7.5)
Single impacts: acceleration, $\text{m/s}^2$ (g) duration, ms	1500 (150) from 1 to 5 inclusive

Continuation of table 4

Environmental factor name	Environmental factor value
Multiple impacts: acceleration, $\text{m/s}^2$ (g) duration, ms	750 (75) from 2 to 6 inclusive
Centrifugal accelerations, operating along the diode symmetry axis to the basic side:*) prolonged, $\text{m/s}^2$ (g) momentary (during 5 min), $\text{m/s}^2$ (g)	47088 (4800) up to 66708 (6800)
Prolonged tangential accelerations, operating perpendicularly to the diode axis, $\text{m/s}^2$ (g)	4900 (500)
*) While this the mass of current-removing bus should not exceed 0.3 kg, asymmetry of its position relatively to the pipe lead – $\pm 0.5$ %.	

The diodes are antiseismic:

- at installation on the building constructions immediately – on exposure of earthquakes with intensity of force 9 as per MSK-64 at setting level of 70 m above zero mark;
- at installation on the intermediate constructions or in the complete devices as built-in elements – on exposure of earthquakes with intensity of force 9 as per MSK-64 to the complete devices or the intermediate construction at setting level of 70 m above zero mark (at absence of resonances in the range from 1 to 30 Hz in the installation place of devices).

3.9 The diodes permit operation on exposure of climatic factors to them in accordance with table 5.

Table 5

Environmental factor name	Factor value for versions	
	УХЛ2	T2
Operating ambient temperature, °C	from - 60 to + 45	from - 20 to + 55
Relative air humidity at temperature: 25 °C, %	100	-
35 °C, %	-	100
Atmospheric pressure, Pa (mm of mercury column)	$(86-106) \cdot 10^3$ (650-800)	



3.10 The diodes of climatic version YXJ should be serviceable on exposure of the hoar-frost and dew to them.

3.11 The diodes of climatic version T should be proof against the exposure of environment, contaminated with moulds.

3.12 When setting the diodes on the rotating places, the load should be fed to them only at attainment of the centrifugal accelerations values in accordance with table 4.

It is not admitted to operate the diodes in modes, where the simultaneous effect of two and more maximum permissible values of parameters takes place.

3.13 In the course of diodes use it is necessary to clean them from dust and other impurities periodically.

#### **4 Transportation and storage**

4.1 Transportation of the diodes is carried out in the shipping container of the manufacturer-enterprise by all kinds of transport in the sheltered vehicles at air temperature from minus 60 to plus 50 °C and relative air humidity up to 100 % at 25 °C.

Note – It is admitted to transport the diodes by air in the hermetically sealed heated compartments.

4.2 It is admitted to transport and store the diodes, built-in to the rectifiers of brushless excitation systems of synchronous motors, generators and compensators, as well as components of the SPTA at temperature not less than 60 °C.

4.3 The diodes should be stored in package of the manufacturer-enterprise, free of vapours effect of acids, alkalis and other chemical products, corroding metals and insulation.

## 5 Marking

5.1 The marking, applied on the body of diode should be interpreted as follows, for example:

Д105-630Х-20-1.60 УХЛ 2

Д – diode;

1 – the ordinal number of construction modification;

0 – designation of modification;

5 – designation of constructive case version;

630 – maximum permissible average forward current in amperes;

Х – letter, designating the opposite polarity of the diodes;

20 – class;

1.60 – peak forward voltage in volts (indicated in technically justified conditions for the diodes, designed for parallel operation);

УХЛ – climatic version;

2 – siting category.

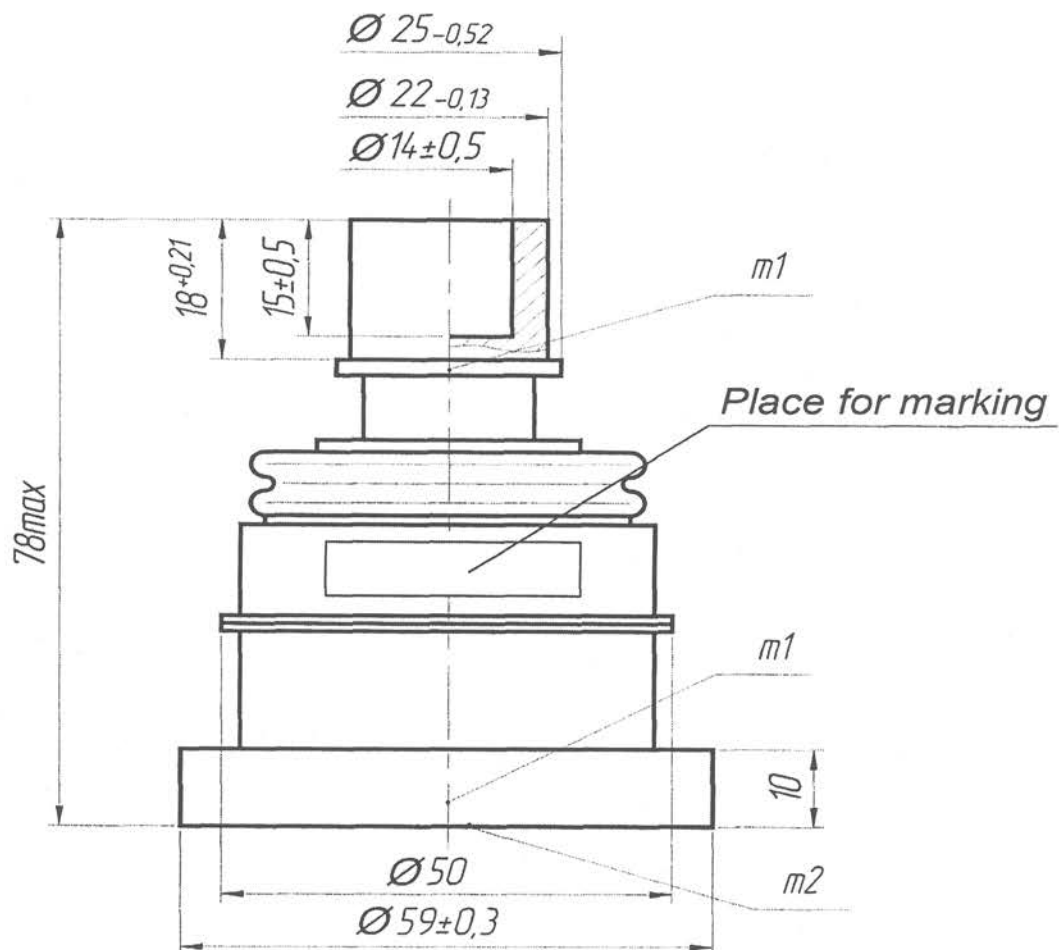
Besides that, the following is marked on the case:

- symbol of polarity;
- date of manufacture (month and two final figures of manufacture year);
- trade mark;
- stamp of Quality Control Department;
- diode No;
- inscription "Made in Russia".

## Appendix A

(obligatory)

### Overall, mounting dimensions and mass of diodes



m1 – check points for measurement of peak forward voltage;

m2 – check point for measurement of case temperature in the circle with radius 10 mm

Mass of diode ( $0.58 \pm 0.01$ ) kg

Figure A.1 – Diodes of types Д105-630, Д105-630X