X-ray tubes
Operating Instruction

1. Safeguards instructions

The use of tubes is realized in the X-ray apparatus "MYR-4" (the 1st tubes' embodiment) and "MYR-2" (the 2nd tubes' embodiment) that provide electrical safety working with the voltage and protect from unused X-ray emission.

Unpacking, cleaning and installing the tubes, it is necessary to protect them from the damages of solid objects.

Unpacking, cleaning and installation of tubes in the apparatus is made in the gloves without nap.

2. Application conditions

2.1. The tubes must be used in the X-ray apparatus in the scheme with the direct voltage, with grounded cathode and body.
Voltage ripple factor is not more than 5%.
The voltage and current instability of the tube must be not more than 2%.
The filament voltage is stable, the ripple factor – not more than 5%.
The filament voltage instability must be not more than 0.3%.
The tubes of the first embodiment must be used in the X-ray apparatus "MYR-4".
The tubes of the second embodiment must be used in the apparatus "MYR-2".
The value of the active resistance, cut in-series in circuit of the tube's anode must be not less than 30 megaohm.

2.2. The tube's anode cooling is natural, through emission.

Note. The change of the structure and electrical network of apparatus must be agreed with the tube's manufacturer.

3. Setting-up procedures of tubes

Take off the film of stop-off lacquer HS-567 TU-6-10-1164-77 from the surface of exit window by hooking the border of the film.

Check and install the tube in the gloves made of a textile without nap.

Clean the tube before installation into the apparatus with a dry piece of textile without nap. If it is dirty or dusty clean it with the textile wetted with spirits.

Check the tube carefully to be sure it doesn't have mechanical damages.

Check the tube to be sure it doesn't have leakage during giving the short-term voltage in the range (1-3) kilovolt without turning on the cathode heating.
Before turning on the voltage, it is necessary to switch microammeter of the anode circuit to the highest limit of effective range.
Reject the tube as defective if the violet or rosy shinning appears or if the indicator needle of microammeter swings sharply to the whole scale.

Note: If the necessary equipment is absent, it is possible not to check the leakage.

4. Installation and energizing of tubes

Put the tube into the protective cover of apparatus.

test the tube by making the voltage higher in the range (1-15) kilovolts for the tubes of the 1st embodiment and in the range (1-10) kilovolts for the tubes of second embodiment.
Give the voltage to the tube gradually adding 1 kilovolt after each (3-5) minutes of time lag with the rated power starting from 4 kilovolts.

Note: If discharges appear in the tube it is necessary to make the voltage lower to the note when they stop appearing and then to continue testing.

The time of the tube's introduction into the nominal rating must be not more than two hours.

5. The usage order

Follow the next directions using the tubes:

1) electric parameters and operating conditions must correspond to the ratings
2) the introduction of the tube into the nominal rating with the pauses from 6 hours to 5 days must be realized gradually during 30 minutes.
3) During the pauses in work that make more than 5 days the introduction of tubes into the nominal rating should be realized according to the item 4 of this instruction.

Note: in the case of the tube's failure that happened because of reasons not depending from customer, the tube must be returned to the manufacturer for its inspection test with the filled passport application.

6. Keeping guidance

the tubes must be kept in the packing of the manufacturer, embed into apparatus in the conditions 1 (L) according to GOST 15150-69.

X-ray tubes
Registration Certificate

1. General information

The X-ray tubes 0.00002BS7-W without protection from unused X-ray emission, with front outlet of X-ray emission, are used for microradiography and X-ray microscopy.
The tubes are made in two embodiments for the use in different used equipment.
Tubes of the 1st embodiment are used in the X-ray apparatus "MYR-4".
Tubes of the 2nd embodiment are used in the X-ray apparatus "MYR-2".
Individual # 1777 Due date 10-90.
Climatic test UHL 4.2

2. General technical information

2.1. Electric parameters during delivery, use and keeping

Parametres, unit of measurement	Norm			Measuring data	Note
	Not lower	Rate	Not higher		
Filament current, A	-	-	1.5	1.29	1.2
The tube voltage, kilovolt					3
For tubes of 1st embodiment	4.0	-	15	-	
For tubes of 2nd embodiment	4.0	-	10	-	
The tube's current, microampere					
For tubes of 1st embodiment	1.3	-	5.0	-	
For tubes of 2nd embodiment	2.0	-	5.0	-	
Dimensions of effective focal spot, micrometer					4
In the apex angle of used pencil of X-rays 5^o	-	1	2	1.7-1.8	
The distance from the real focal spot to the front surface of the tube, mm	-	-	2.5	2.3	4
Mottles distribution of X-ray emission energy flux density on radiation field, %	-	-	35	33	4

Note: 1. If the tube voltage is 2 kV, the current of the tube is 5 mcA
2.Average dependence of filament current from the filament voltage is given in application1.
3.Dependence of permitted values of the tube's current from the tube's voltage is given in application 2.
4.If the tube's voltage is 10 kV, the tube's current is 2mcA.

2.2. Ultimate permissible regime of usage.

Parametres, unit of measurement	Norm			Note
	Not lower	Rate	Not higher	
Filament current, A	-	-	1.5	
Filament voltage, V	0.4	-	1.5	
The tube's current, microampere				
For tubes of 1st embodiment	1.3	-	5.0	
For tubes of 2nd embodiment	2.0	-	5.0	
The tube's voltage, kilovolt				
For tubes of 1st embodiment	4.0	-	15	
For tubes of 2nd embodiment	4.0	-	10	
The tube's rated power, kilowatt	-	-	0.00002	

2.3. Minimum time 400 hours
80% storageability time is not less than 4 years.
2.4. Overall dimensions of the tube:
of the 1st embodiment
the biggest length, mm 115
the biggest diameter, mm 36
of the 2nd embodiment
the biggest length of the tube (without outputs), mm 90
the biggest length of outputs, mm 180
the biggest diameter of the tube, mm 32
Mass, kg, not more than 0.125
2.5. Precious metals concentration
of 1st embodiment: doesn't contain any precious metals.
of 2nd embodiment: silver- 0.02398 g in pins.
2.6. Non-ferrous metals concentration
Copper and it's alloy – 9.22 g in pins, cup and ring.
Molybdenum and its alloy – 1.6 g in output.

3. Certificate of delivery

The X-ray tube 0.00002BS7-W individual # 17777, embodiment 1 corresponds to ODO.339.455TU and is admitted valid for usage.

4. Usage instructions

Usage instructions correspond to the operating instruction of the tube.

5. Keeping rules

Keeping rules according to the operating instruction

6. Warranty

Manufacturer guarantees the correspondance of the quality of this tube to the requirements ODO.339.455 TU if customers follow all conditions and rules of keeping and usage given in certificate.

Application 2

Dependence of permitted value of the tube from the tube's voltage

For 1st embodiment

For second embodiment