



Dalian Hivolt Power System Co., Ltd.

FOR A SAFE POWER LINE !

Installation & Maintenance Instruction

RIS & RIP & RIP Types HC(F)R Bushings For Bulk-Oil Circuit-Breakers
& Switchgear Equipment



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1. Description of HC(F)R bushing

In order to meet the requirements of maintenance-free and high reliability of high-voltage circuit breakers put forward by the electric power department, our company has developed and produced RIS & RIP dry capacitance graded circuit breaker bushing. It is a dry capacitance graded bushing developed by using newest insulation materials and bushing patent technology.

In addition to meeting GB/T 4109-2008, IEC 60137, GB/T 22382-2008, IEC 61639 and the latest relevant standards, this product also has the following significant advantages:

- a. Pure solid without oil and gas.
- b. Large margin of insulation design, semiconductor material capacitive screen, greatly improving the initial voltage of partial discharge of the bushing.
- c. Flame-retardant insulating material, no decomposition, stable electrical performance, no burning and explosion hazard.
- d. Compact structure, lightweight, easy to transport, can be installed at any angle.
- e. Outer layer glass fiber reinforced winding, optimized mechanical layer design, high bending strength, excellent mechanical properties.

2. Structure of Design

The main insulation of the resin-impregnated synthetic dry-type capacitor circuit breaker bushing is the capacitor core. The capacitor core is made of imported high-insulating synthetic fiber impregnated with ultra-low viscosity and high-temperature resistant epoxy resin, and the winding device is controlled by a computer to wind according to the geodesic line. The insulating layer is made of a semiconductor conformal material to make a capacitive screen. The insulating layer and the capacitive screen are alternately wound at intervals and cured at high temperature to make a pure solid capacitor core; the coupling flange is made of high-strength aluminum alloy

3. Product scope of use

The RIS & RIP dry capacitance graded circuit breaker bushing (hereinafter referred to as bushing) is suitable for direct connection with bulk-oil circuit breaker or metal-enclosed switchgear. The design and size of the bushing flange, air connection



terminal and copper connection terminal can be specially designed according to customer requirements.

- 3.1 Suitable for 72.5~550kV power system.
- 3.2 Can be used indoors and outdoors;
- 3.3 Ambient temperature: $-60^{\circ}\text{C}\sim+55^{\circ}\text{C}$;
- 3.4 Installation angle: Installation at any angle
- 3.5 Anti-pollution level: It can be used in heavily polluted areas above level IV.

4. Main Technical Parameters

- 4.1 The test tap withstand voltage to ground is 2kV;
- 4.2 The partial discharge of the bushing at the highest working voltage $\nless 5\text{pC}$;
- 4.3 The measured dielectric loss factor ($\tan \delta$) of the bushing $\nless 0.005$, at room temperature not lower than 10°C and 10.5 times the highest maximum working phase voltage.
- 4.4 The structure of the bushing is shown in Figure 1 and Figure 2.

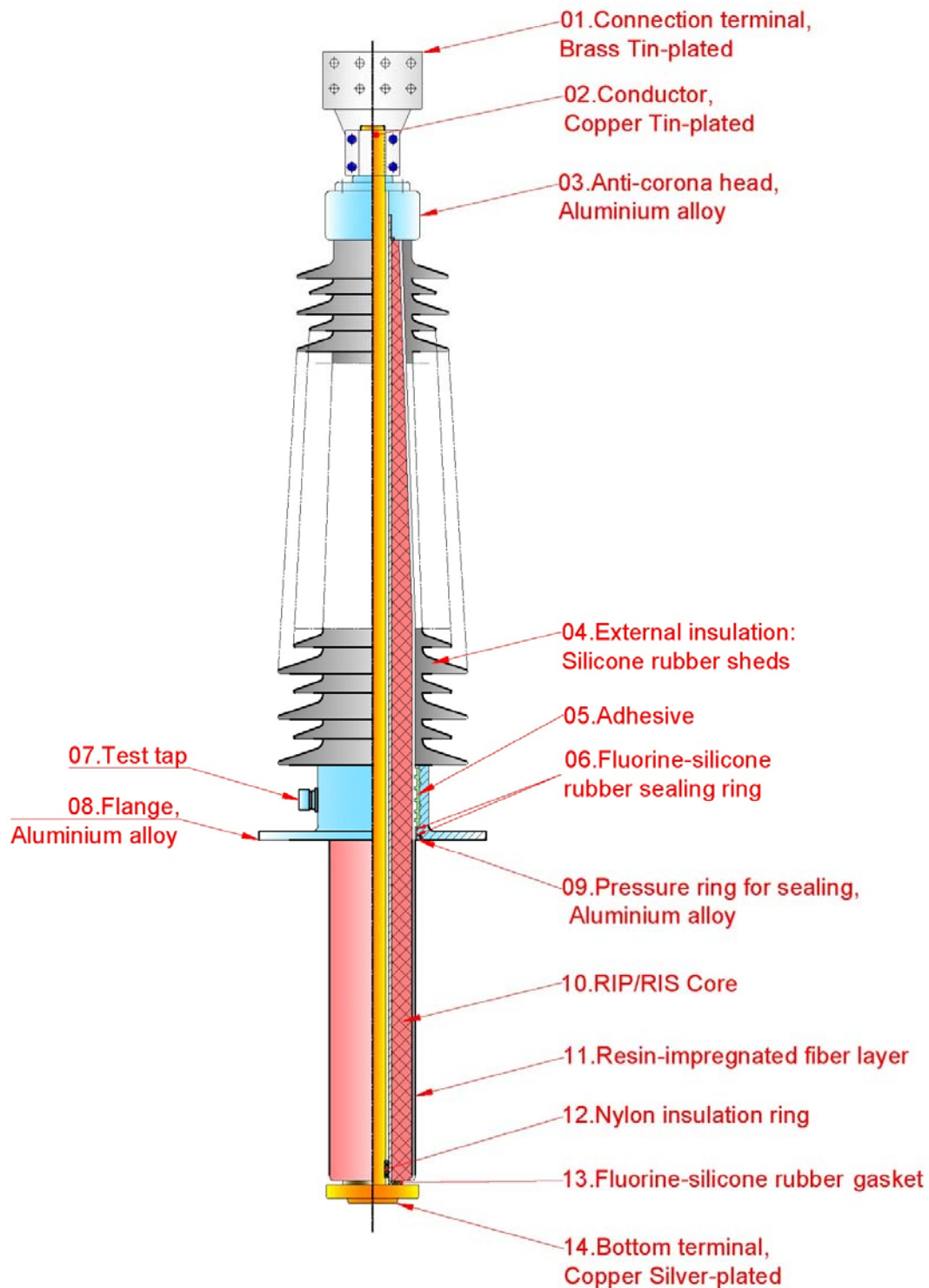


Fig. 1. The structure of built-oil circuit breaker bushing
(External Insulation: Silicone Rubber)

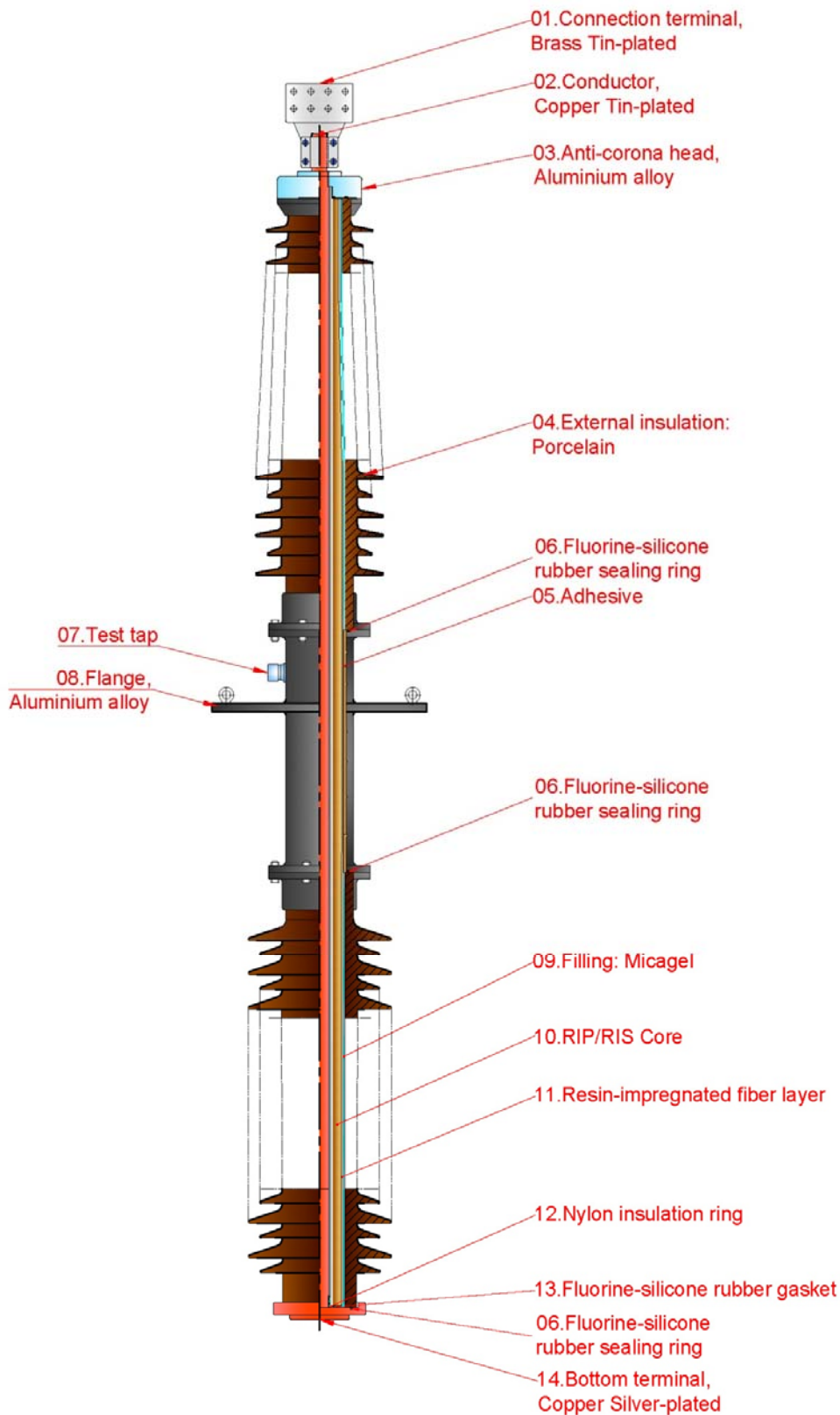


Fig. 2. The structure of built-oil circuit breaker bushing
(External Insulation: Porcelain)

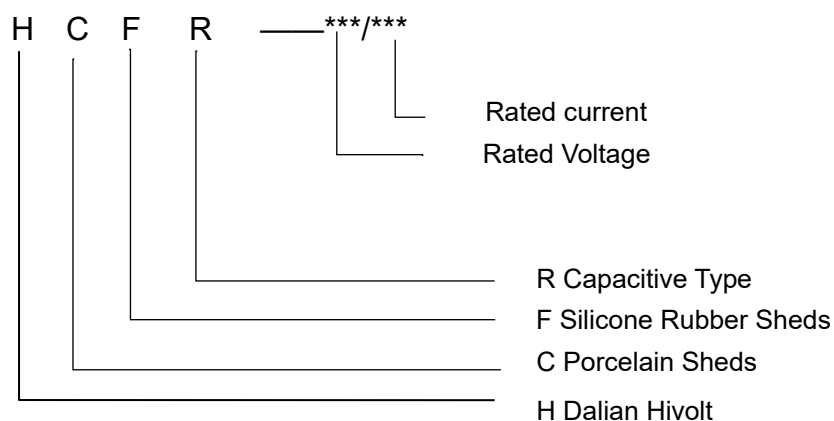


4.5 Main electrical parameters of typical products.

Table 1 Main parameters

Rated Voltage (kV)		72.5	126	252	363	550
Nominal Voltage (kV)		66	110	220	330	500
Maximum phase-to-earth voltage (kV)		42	73	145	210	318
60s power frequency withstand voltage (dry) (kV) (Effective Value)		140	230	460	570	680
60s power frequency withstand voltage (wet) (kV) (Effective Value)		140	230	460	535	-
Lightning impulse withstand voltage (kV) (Peak Value)		325	550	1050	1175	1550
Cantilever test load (N)		2000	3000	4000	5000	5000
Rated current (A)		≤5000				
Tanδ	Added Value	Between 1.05Um and Um≧0.001				
	Max Value	Measured at 1.05Um≧0.005				
Partial discharge level at Um (pC)		≧5				
Installation angle		0-90°	0-90°	0-90°	0-90°	0-90°
Rated dynamic current (KA)		125	125	125	125	125
Thermal current (3 sec) (KA)		50	50	50	50	50
Maximum through current (crest value) (KA)		4	4	4	4	4
Maximum through short circuit current (start value of periodic component) (KA)		50	50	50	50	50
Creepage distance, mm, and corresponding pollution degree according to IEC60137, at least		2248(IV)	3906(IV)	7812(IV)	11253(IV)	17050(IV)
Seismic stability on the MSK-64 scale		9	9	9	9	9
Altitude design, m		≤1000	≤1000	≤1000	≤1000	≤1000

4.6 Description of bushing model





5. Installation preparation

5.1 Before installation, check whether the bushing model, specification, and bushing nameplate number meet the order form and usage requirements. Check whether the accessories and documents are complete according to the packing list. After the bushing is hoisted out of the packing box, the materials (packing box, packing bag, inner support plate and fixing bolts, etc.) must be retained for repackaging after the test.

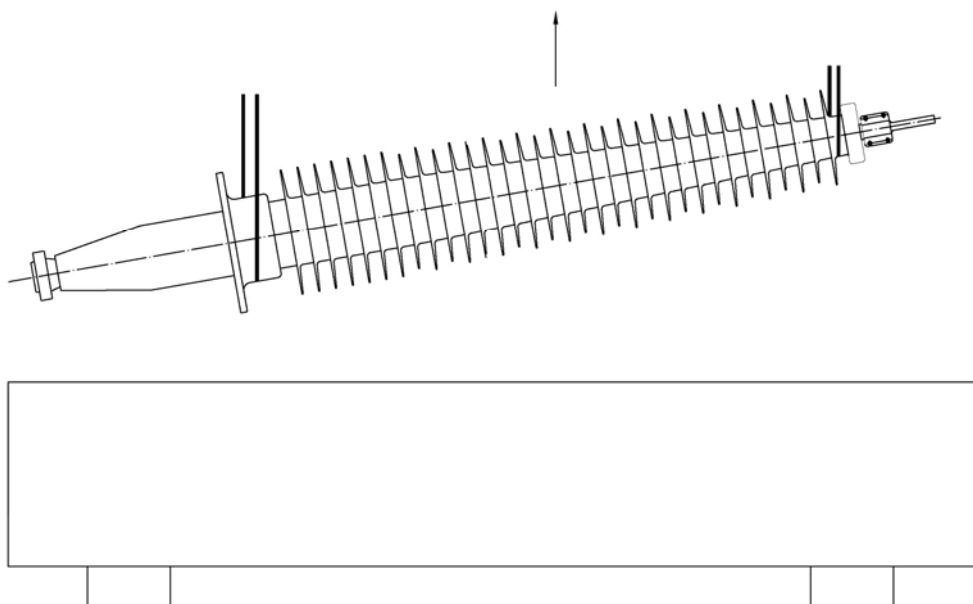
5.2 Check whether the bushing is bumped or damaged by strong shocks. If there is any damage, please contact us in time.

5.3 Before putting the bushing into the circuit breaker or switchgear equipment, clean the flange sealing surface, bushing core surface and wiring terminals.

5.4 When hoisting the bushing, the sling should be fixed on the lifting ring at the flange position, and the measuring terminal should not be subjected to mechanical force to avoid damage; the main insulation core should not be impacted or bumped to avoid damage; the wiring terminal is strictly prohibited to be bumped.

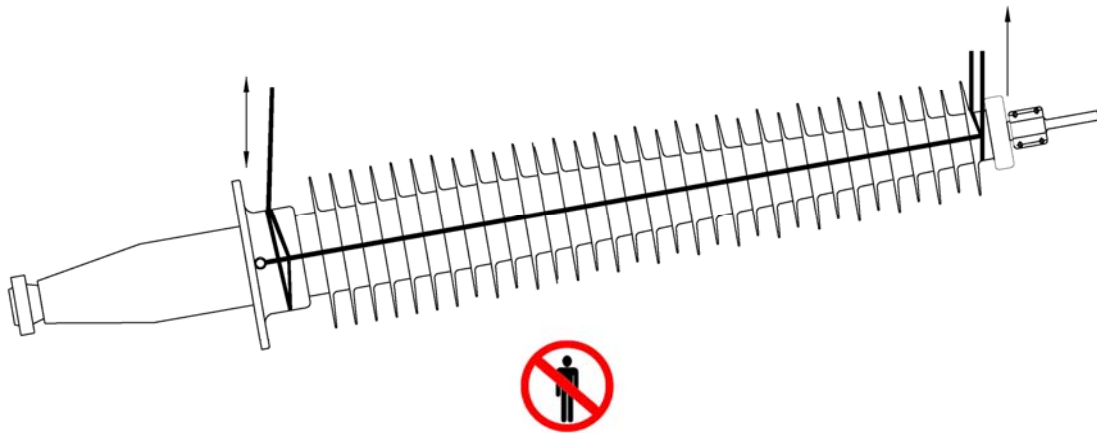
The method of hoisting is as follows:

Step 01. Unpacking the bushing.

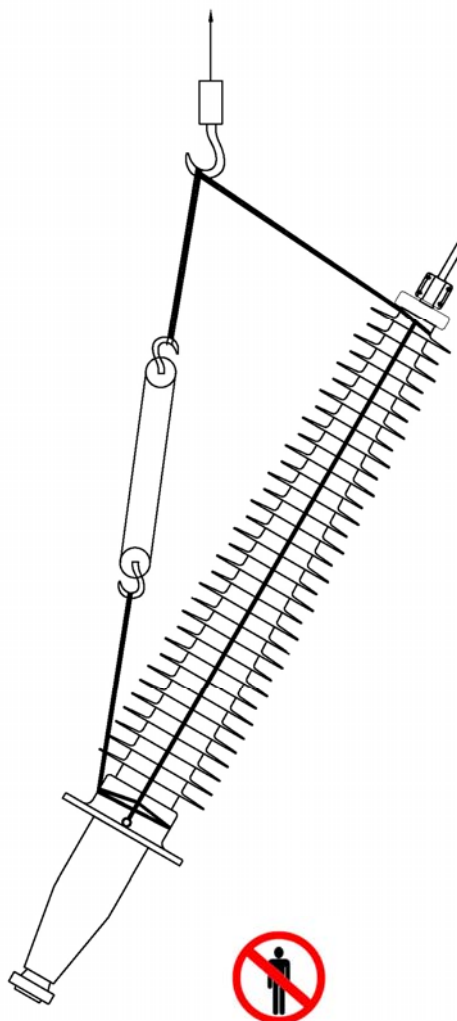




Step 02. Bringing the bushing into a vertical position by two slings.



Step 03. The bushing lifting at a definite angle.



CAUTION

It is strictly
prohibited to
stand under
the bushing!

6. Test Tap

As shown in Figure 3, unscrew the grounding cap of the test tap. At this time, the lead pin is disconnected from the flange. Use a lead to connect with the lead post. When the test equipment is connected to the lead, it can be tested. After the test is completed, remove the lead wire and tighten the protective cover 1 grounding nut of the end screen. At this time, the bushing lead and flange are grounded through the grounding nut.

If the test tap is used in an open structure, the tap must be grounded at the far end through the lead of the lead column during operation to ensure the safe operation of the bushing. It is recommended to use it only when the test tap is connected to a low-voltage resistor with over-current protection

Note: Open circuit operation is strictly prohibited!

After the test, re-tighten the grounding cap to ensure that the bushing is grounded and sealed.

Note:

1. During the test, be sure to connect the measuring bridge first, and then apply voltage to the bushing. When there is no load, the voltage of test tap can reach several thousand volts.
2. It is absolutely forbidden to install and unload the grounding cap of the test tap when the power is on. **High voltage is dangerous!**
3. When the test tap is in the electrical test, the bushing should be placed in a simulated running state in accordance with the provisions of GB/T 778 "Test Methods for Insulators".

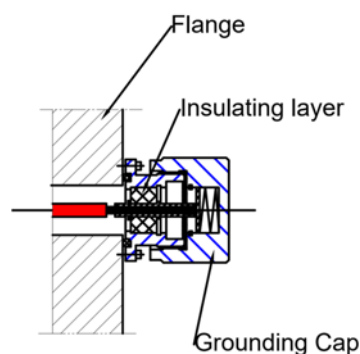


Fig. 3. Test Tap



7. Acceptance Check

Bushings' acceptance check, the testing job should be done in the simulate using environment. The bushing cannot be directly placed in the air for testing. The humidity and impurities in the air will affect the detection data of the bushing. The bushing shall be tested according to the standards of GB/T4109-2008, IEC 60137 and GB/T 22382-2008, IEC 61639.

8. Packaging and Transportation

8.1 The bushing is packed by wooden box, and the mechanical strength of the wooden box can ensure that the bushing is safe, reliable and not easily damaged during transportation. There are supporting plates and fixing plates in the packing box. The plates are uniformly stressed to keep the bushing horizontally placed, and it is not easy to move during transportation. Box with cushioning plastic bags, foam pads do the transport protection.

8.2 When the bushing is reinstalled in the original box, the original packaging box should be carefully checked and reinforced if necessary to ensure safe transportation.

8.3 When loading and unloading, find the hoisting center of the bushing to avoid being too heavy on one side. It is strictly forbidden to put the box upside down and shake it during transportation.

9. Storage

9.1 The bushing shall be covered with plastic film when it is put into the packing box and placed in the packing box horizontally. The two ends of the packing box shall have fixed plates and support plates to prevent the bushing from moving and tilting horizontally.

9.2 Use waterproof felt cloth or similar materials to completely cover the packing box. Under no circumstances should it be exposed to rain or moisture.

9.3 If it is not used for a long time, it should be stored in a dry room away from fire, heat, and without major vibration.



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Note: We would like to please you share bushing's operation records, preventive test records and opinions on bushing quality to the manufacturer at any time, so as to make timely improvements and solve unknown problems that aRIS & RIPE. Thank you!

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