

Your Independent Bushing Supplier
Ihr unabhängiger Durchführungslieferant



TRAVESCA®- DTOI

Capacitance fine graded, dry type

Transformer-Outdoor bushing

Manual for Installation

Maintenance and Storage



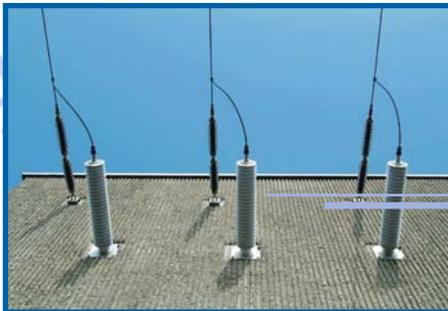
TRAVESCA®



DE 17,5 kV – 2500 A

Duresca®

Busbar systems
Schienensystem



DEMI 145 kV – 800 A

Duresca®

Wall bushings
Wanddurchführungen



TE 24 kV – 1250 A

Tiresca®

Busbar systems
Schienensystem



DTOI 123 kV – 1250 A

Travesca®

Transformer bushings
Transformator-Durchführungen



Gaslink®

SF₆ insulated busbar systems
SF₆ isoliertes Schienensystem

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1. Safety notes

1.1. Representation

1.1.1. Great danger of injury or mortal danger for persons



Danger

This symbol is used to indicate a high risk of injury or mortal danger for persons. It must always be followed in all cases.

1.1.2. Danger for installations and machines



Warning

This symbol is used to indicate information which, if ignored, could lead to considerable damage to property. This warning must always be followed in all cases.

1.1.3. Important note for trouble-free functioning



Note

This symbol is used to indicate information that contains important statements regarding use. Non-observation could lead to faults.

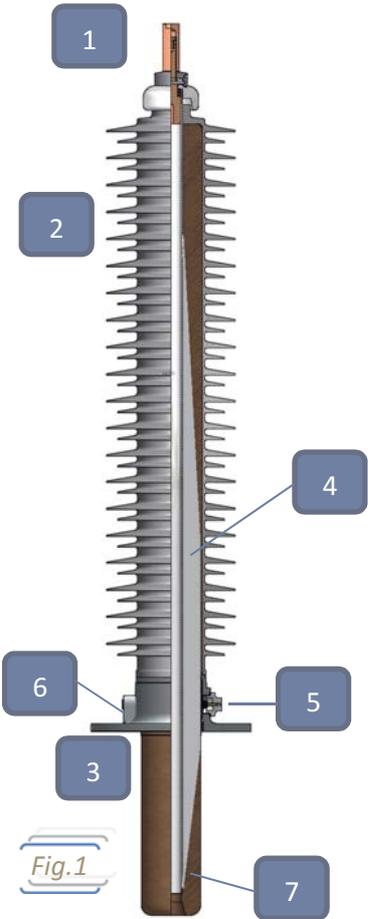
1.2. List of the safety notes

-  The function of the transformer bushing is only guaranteed with the planned arrangement of components to each other. Severe malfunctions could otherwise occur. The installation instructions on the following pages must therefore always be followed absolutely.
-  Local installation regulations are intended to ensure the safety of electrical installations. They are not taken into account in this operation manual, but must be observed in all cases. Poor earthing can lead to electric shocks to persons, faults on the complete installation or damage to the transformer bushing! A good earthing of the flange should be ensured in all cases, as well as the closing of the cover of the measurement tapping.
-  **Danger to life!** Disconnect the installation before working on the transformer bushing (disconnect the voltage supply)!

2. Description

2.1. Design

- 1 Top Terminal
- 2 Silicone Insulator
- 3 Mounting Flange
- 4 Condenser
- 5 Test Tap
- 6 Air Escape Screw
- 7 RIP, Insulating Body



2.2. Application

The TRAVESCA[®] transformer bushing type DTOI is used for oil to air applications. The air side from the DTOI is protected by silicone rubber sheds.

The TRAVESCA[®] transformer bushing conducts the electrical current by a round conductor or by a cable to the connectors. It is characterised by its compact design and the partial discharge-free operation. The TRAVESCA[®] transformer bushing can be described as being maintenance-free.

2.3. Description of the transformer bushing

The TRAVESCA[®] transformer bushing has a dry insulation of RIP (Resin Impregnated Paper). The insulation lies directly on the conductor or tube (in the cable version) and consists of wrapped paper, which is impregnated with special epoxy resin under vacuum. Conductive grading layers are embedded during the wrapping of the paper insulation for the optimal distribution of the electrical field. This structure ensures the longest possible operational reliability and the highest possible human safety.

2.4. Silicone rubber insulator

The silicone rubber insulator with alternating sheds has a uniform creepage distance of min. 31 mm/kV. This corresponds to a class 4 according to IEC 60815 for very high pollution level.

2.5. Standard operating conditions:

GENERAL

Application	Transformer to Outdoor Bushing
Standard	IEC 60137-2008

DESIGN

Type	Fine Graded Condenser Type
Insulation	RIP Resin Impregnated Paper
Material of Bushing's Head	Made of corrosion free aluminium alloy
Material Flange	Made of corrosion free aluminium alloy

OPERATING CONDITIONS

Altitude	< 1000 m
Ambient temperature	-40 up to +40°C
Oil Temperature	Daily average value +90°C, maximum value 100°C
Mounting Angle	0 to 90°
Insulator outdoor	Silicone
Pollution class level	Min 31mm/kV according to the IEC 60815

For deviation, consult the specific datasheet from the corresponding bushing.

3. Transport, storage and handling



Warning

The function of the transformer bushing is only guaranteed with the planned arrangement of components to each other. Severe malfunctions could otherwise occur. The installation instructions on the following pages must therefore always be followed absolutely. Local installation regulations are intended to ensure the safety of electrical installations. They are not taken into account in this operation manual, but must be observed in all cases.



Note

The protective foil on the oil-side of the transformer bushing must only be pulled off shortly before the installation into the transformer. This prevents any harmful environmental conditions from impairing the function of the transformer bushing.

3.1. Packaging

A special attention is taken for the packaging.

The bushings are packed in wooden crates for transportation.

All of our boxes are made of wood according to the ISPM 15 Standard.
(ISPM: *International Standards for Phytosanitary Measures*)



Fig.2



Fig.3

Each bushing is sealed individually in a plastic bag with desiccant material against humidity.

All packaging has to be examined against damage during transport.
A copy from the Routine test is attached in the box.

3.2. Removal from the case.

Small bushings can be taken by hand, larger require rope and lifting gear.

The bushings are secured as much as possible against transport damage.

The protective plastic bag must only be removed shortly before the assembly and installation.



Use of cutting tools is not recommended as it could damage the silicone sheds.

Please check the bushings for any transport damage immediately after the receipt of the goods.



Fig.4

In case of visual damage, proceed as following:

1. Inform the insurance from the carrier.
2. Declare the carrier as responsible on the Acknowledgement of receipt
3. Declare the carrier as responsible by registered letter. (In order to avoid prescribe the right of appeal against the carrier).

In case of transport under Moser Glaser responsibility the additional following points need to be followed:

4. MGC needs to be informed as quick as possible:
Tel. ++41 (0) 61 467 61 11 Fax. ++41 (0) 61 467 61 10
5. A copy of the registered letter has to send to MGC

info@mgc.ch

MGC Moser Glaser AG
Lerchenweg 21
4303 Kaiseraugst (Switzerland)

If no damage has been observed, you can continue with the removal of the bushing.

Remove the protective foil on the oil-side of the transformer bushing
For Draw lead application, remove the transport cable bolts

Lead a traction rope with a M10 screw (or a threaded traction rod) through the inner tube of the bushing; see Fig.5

Lifting out by hand or using a crane (Ring Bolts are not included)

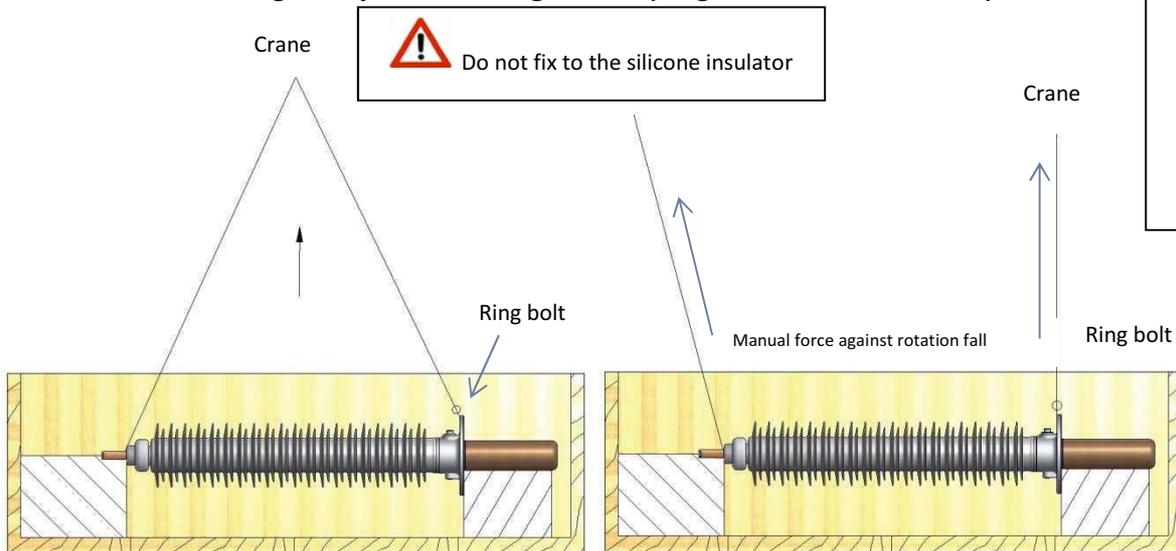


Fig.5

3.3. Bushing mounting in the transformer

Clean the sealing surface of the bushing as well as the seating surface from the transformer turret.

Clean the oil side surface and ensure that it's completely dry, for draw lead application clean also the inner part.

Position the bushing with the correct angle above the turret.

Setting up by hand or using a crane

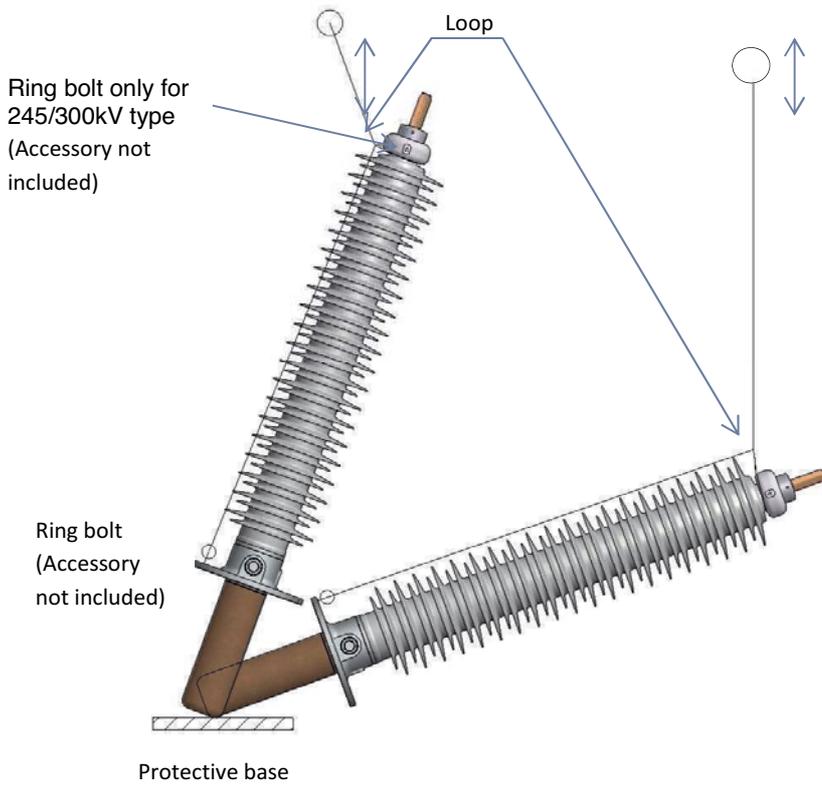


Fig.6

 Do not lift at the silicone insulator

Placing on the transformer by hand or using a crane

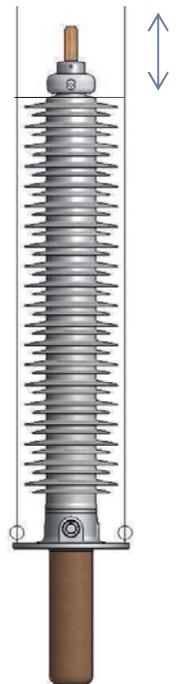


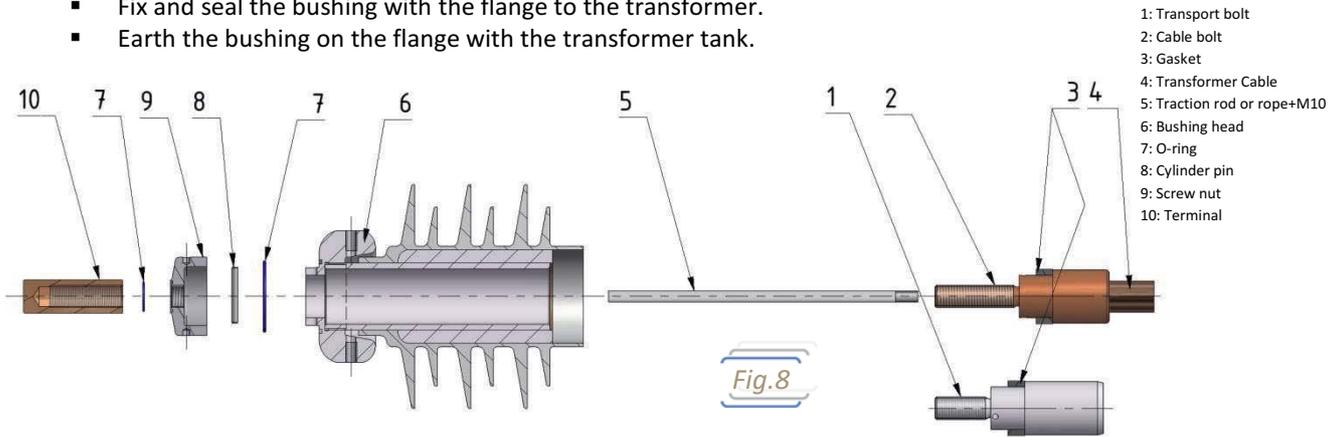
Fig.7



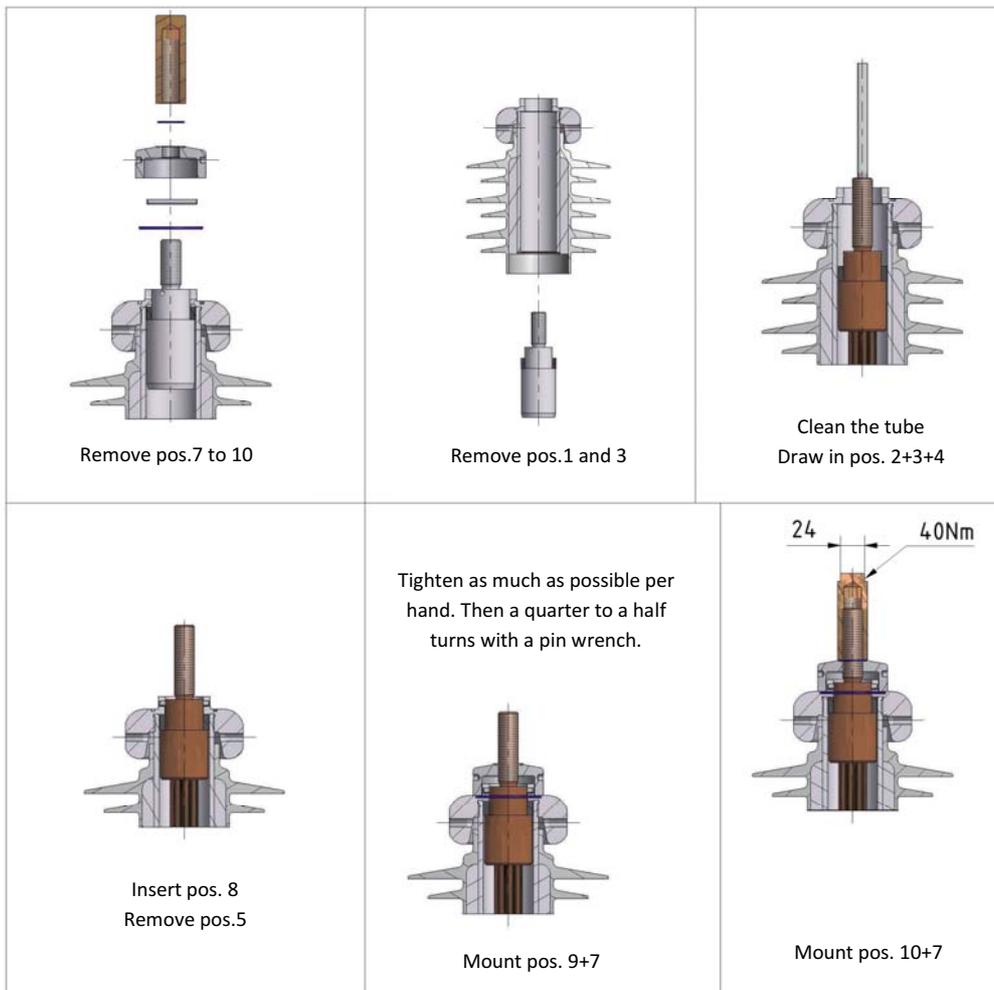
3.4. Connection to the transformer winding.

Draw lead application

- Lift the bushing onto the dedicated location on the transformer.
- Pull the transformer cable through the bushing and thereby insert the bushing into the transformer.
- Fix and seal the bushing with the flange to the transformer.
- Earth the bushing on the flange with the transformer tank.



Fit the bushing head according to the below sequence:

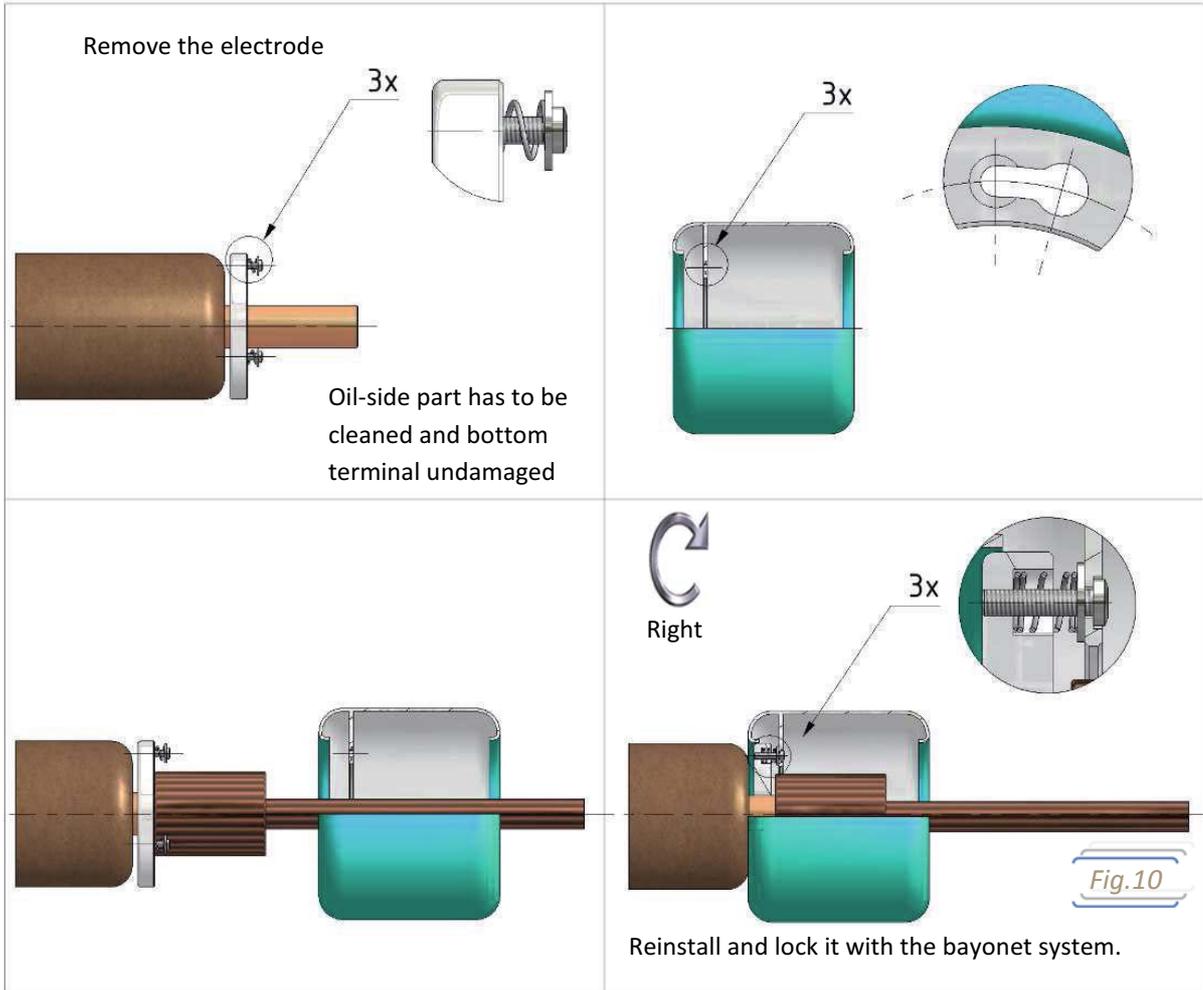


Remove air from bushing on the flange. If necessary, also at the bushing head. While doing this, ensure that the oil level in the bushing is at least up to the height of the flange. Torque of the oil venting screw is 30Nm. The threads and the seal out of Al have to be greased (e.g. with transformer oil).

Before connecting the voltage, a 24-hour waiting time should take place. This will allow the dissolving of any air bubbles on the insulation body.

Bottom connected bushings

Bottom connected bushings require a man-hole in the turret for the connection of the current leads.



Notes

- 1- For all type of connections, MGC strongly recommend to insulate the cable coming from the tranformer winding to the bushing
- 2- The quoted waiting time before connecting the mains voltage should be observed as far as is possible. If the waiting time cannot be observed, flashovers or partial discharges could occur as a result of air bubbles on the insulating body.



Warning

Poor earthing can lead to electric shocks to persons, faults on the complete installation or damage to the bushing! A good earthing of the flange should be ensured in all cases.



Danger

Danger to life! Work on the bushing must never be carried out while the voltage is connected or while unearthed.

3.5. Recommended checks before connecting the voltage

MGC Moser-Glaser AG recommends that the following checks be carried out after the installation of the bushing in order to ensure safe operation:

- ✓ Check the seal between the transformer tank and the bushing flange
- ✓ Check the seals of the bushing head
- ✓ If possible, measure the $\tan \delta$ and capacity at the test tap.

3.6. Maintenance during service work

The MGC Moser-Glaser AG bushing is **maintenance-free**.

Service intervals do not need to be considered.

The following check may be made during transformer inspection:



Danger
Danger to life! Work on the bushing must never be carried out while the voltage is connected or while unearthed.

Silicone insulator cleaning.

Hydrophobic properties of silicone rubber cause far lower leakage currents, which results in excellent behaviour in polluted environments. Thus, there is no need for washing or greasing, even in humid or polluted areas, which saves on maintenance and cleaning costs. Silicone disables the formation of conductive paths, which lead to flashovers, line outages, and erosion of the insulator.

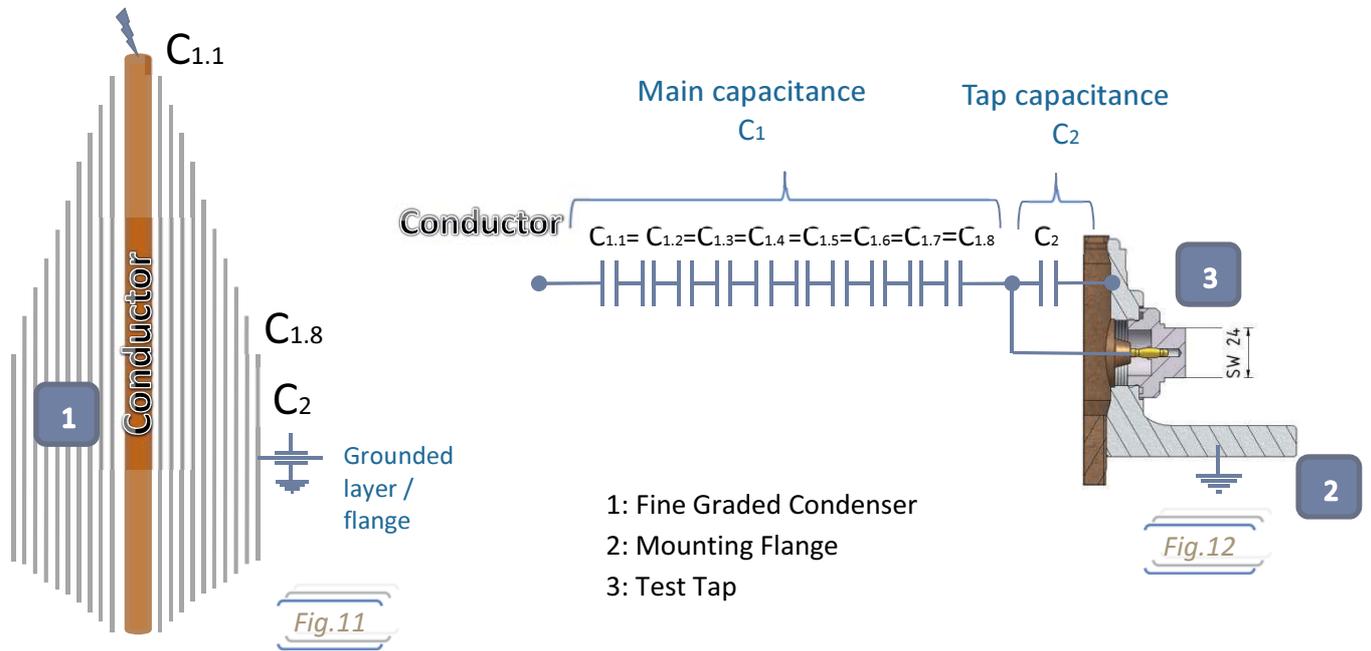
In case of exceptional severe site conditions, the insulators can be cleaned manually with solvents such as a solution of isopropyl alcohol (greater than 90%) and soft cloth.

No oils or detergents should be used.

Silicone rubber retains its hydrophobicity after washing.

Capacitance and tangent delta measurement.

Principle of functioning:



The test tap is designed for testing under an industrial frequency of 2kV.

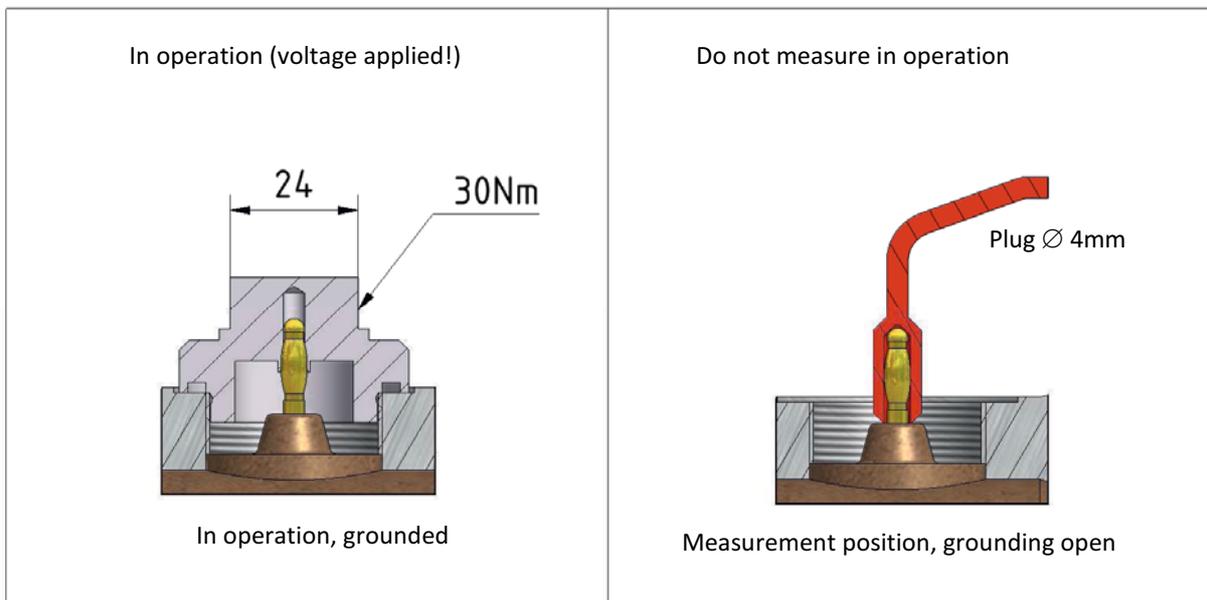


Fig.13

Measurement of the Capacitance and Tangent delta are made during the routine test and reported in the test report provided with the bushing.

Capacitance measured during routine test is engraved at the nameplate for bushings with $U_m > 100kV$. These values represent the references for the following measurement made on site.

- We recommend making a second reference measurement before the electrification on-site.

Capacitance C1	Under the same test conditions should not increase by more than 5-7%
Tangent delta	For new bushings, is in the range of 0.4 to 0.7% and should not increase by more than 0.10% at $1.05U_m/\sqrt{3}$ or U_m Tangent Delta is temperature linked, when possible, measurement needs to be done at an ambient temperature of 20°C for a direct comparison with factory measurement, otherwise contact MGC for other conditions.

These values can be influenced by the methods, equipment, position of the bushing (vertical or horizontal) and conditions on-site, humidity, pollution, weather...

- Capacitance and Tangent delta can be checked during the periodic transformer inspection.

In standard the Test tap is not self-grounded.
The cap has to be screwed tightly after measurement.



Fig.15

In option MGC can provide Self-earthed test tap.



Fig.16



Danger



Warning



Note

The measurement connection may only be used when the voltage supply is switched off. After making the measurements, the measurement connection cover must always be screwed in again.

4.Storage

For any duration, chose a location which will be protected again rain and humidity.

<p>Short - Medium term max. 2 years</p>	<p>In original transport box, unpacked</p> <p>All bushings are individually covered by a plastic bag with desiccant bag on oil side.</p>
<p>Long term</p>	<p>Lower part subject to be in transformer tank should be protected in container filled with oil.</p>



Fig.17



Fig.18

1 Aluminium tank with sealing flange

Contact MGC when long term storage is required.

If you have any doubt about after storage not appropriated, proceed to a capacitance and tan delta measurement.

If measured data deviate too much compared to the routine test provided, please contact MGC.

This operation manual is also available in German, French and Russian.
Please contact your local representative.

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