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Type of Document

Manual

Title

Preventive Maintenance

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## PREVENTIVE MAINTENANCE GUIDE FOR PASS

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## 1. PREVENTIVE MAINTENANCE GUIDE

The operational safety of the PASS main components CB, DS, ES, CT, is not affected by any external impact (such as dirty, humidity, etc.) with the exception of the bushings. Bushings are qualified for use in polluted environment and in presence of rain. PASS module requires virtually no maintenance for a long time.

The prescribed activities are:

- periodical inspections
- preventive maintenance
- revision

### 1.1 Periodical inspection

Functional and visual inspections are carried out without opening the gas compartments. Every year a visual inspection (with the module in service) of the following parts is recommended:

- bushings
- SF6 density device and relevant indication;
- number of circuit breaker operations;
- tightness of Local Control Cabinet door gaskets;
- general check of the compartments: position indicators, connectors, cables, equipotential connections, earthing circuit. None of the auxiliary equipment shall be worn or overheated and no vibration shall harm the relays.

At the end of the first year we recommend to retighten screw joints related to anchor bolts and earthing connection and check the absence of corrosion or deterioration of components.

**NOTE: in case of daily breaker operations, all wirings shall be checked, of LCC and BLK (82-222) drive (if present). The check must be done every two years.**

#### Periodical inspections: module in-service

Inspection type	Timing / tools / personnel	Instructions
Visual inspection of bushing	Every year No Tools needed Unskilled personnel	Standing on land check on all sides the condition of sheds
Check of SF6 density device	Every year Tools needed: reference values on Schematic Diagram Unskilled personnel	Record the value seen on the device and compare it with the reference value
Recording the number of circuit breaker operations	Every year No Tools needed Unskilled personnel	Record the number of circuit-breaker operations reported on counter located on LCC
Tightness of door gaskets	Every year No Tools needed Unskilled personnel	Open the door of LCC and check the gasket condition
General check of the components	Every year No Tools needed Unskilled personnel	Check position indicators, connectors, cables, equipotential connections, earthing circuit. None of the auxiliary equipment must be worn or overheated and shall no vibration harm the relays.

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<b>Retighten screw joints related to anchor bolts and earthing connection</b>	<b>End of the first year Tools needed: torque wrench, module layout Unskilled personnel</b>	<b>Check the tightness of anchor bolts and earthing connection and retighten if necessary.</b>
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Tab. 1

### 1.2 Preventive maintenance

The preventive maintenance activities of the PASS are carried out with the module out of service. It shall be done if one of the following conditions is reached:

- after 5000 mechanical operations
- when the number of short-circuits is approaching the listed values:
- after 20 years of service.

The preventive maintenance is carried out with the replacement of PASS module with one previously reconditioned in order to reduce the outage time. Complete module revision and replacement of worn part is made.

#### FOR THE PASS M00

<b>N° (number of operations)</b>	<b>3000</b>	<b>1200</b>	<b>160</b>	<b>40</b>	<b>20</b>	<b>10</b>	<b>8</b>	<b>5</b>
<b>I [kA] Current</b>	<b>1.25</b>	<b>2</b>	<b>5</b>	<b>10</b>	<b>15</b>	<b>20</b>	<b>25</b>	<b>31.5</b>

#### FOR THE PASS M0 – M0S 40kA

<b>N° (number of operations)</b>	<b>5000</b>	<b>800</b>	<b>200</b>	<b>89</b>	<b>50</b>	<b>32</b>	<b>20</b>	<b>13</b>	<b>9</b>
<b>I [kA] Current</b>	<b>2</b>	<b>5</b>	<b>10</b>	<b>15</b>	<b>20</b>	<b>25</b>	<b>30</b>	<b>35</b>	<b>40</b>

#### FOR THE PASS M0S 50kA

<b>N° (number of operations)</b>	<b>5000</b>	<b>800</b>	<b>200</b>	<b>50</b>	<b>22</b>	<b>12</b>	<b>8</b>
<b>I [kA] Current</b>	<b>2</b>	<b>5</b>	<b>10</b>	<b>20</b>	<b>30</b>	<b>40</b>	<b>50</b>

**Preventive maintenance: module out of service**

Inspection type	Timing / tools / personnel	Instructions
Check of alarms, trips and blocks and check of pressure gauge condition	Every 20 years Tools needed: SF6 gas bottle, pressure gauge Skilled personnel or personnel certified by ABB Adda Service at level 2	Check the alarm and trip/block threshold by decreasing the pressure and by comparing relevant values with the reading of the sample gauge previously connected. NOTE: be aware that the density switch supplied with the module is temperature compensated (at 20°C): for comparison please refer to the conversion table in the Gas Manual.
Check of humidity level in the SF6 compartments	Every 20 years Tools needed: hygrometer Skilled personnel	Connect the hygrometer to the PASS filling valve type DN8 and check the humidity value is within the allowed range (please refer to the Gas Manual).
Check lubrication of gear box of disconnecting switch drive and inspect covers gaskets tightness	Every 20 years No tools needed Skilled personnel or personnel certified by ABB Adda Service at level 1	Refer to the "MAINTENANCE" paragraph of specific components
Check lubrication of circuit breaker drive mechanism and inspect covers gaskets tightness	Every 20 years No tools needed Skilled personnel	Refer to the "MAINTENANCE" paragraph of specific components
Repetition of commissioning mechanical test	Every 20 years Tools needed: recording tool, routine test report Skilled personnel or personnel certified by ABB Adda Service at level 3	Repeat the commissioning test
Visual inspection of contacts and CB chamber condition	Every 20 years Tools needed: special tools ABB authorized Personnel only	No description need
Check of contact resistance of main circuit	Every 20 years Tools needed: micro ohmmeter, routine test report Skilled personnel or personnel certified by ABB Adda Service at level 2	IEC 694 (IEC 62271 – 1): Injection of test current > 100 A The measured resistance shall be within the allowed range defined by manufacturer.
Absence of corrosion or deterioration of components	Every 20 years No tools needed Unskilled personnel	Refer to manual specific Manual "SPARE PARTS"
Retighten screw joints related to anchor bolts and earthing connection	Every 20 years Tools needed: torque wrench, module layout Skilled personnel	Check the tighten of anchor bolts and earthing connection and retighten if necessary

Tab. 2

### 1.3 Revision

The revision of the PASS is carried out with the module out of service.  
It shall be done if one of the following conditions is reached:

- **10000 mechanical operations**
- **40 years of service**

The general revision foresees at 40<sup>th</sup> year is carried out with the replacement of PASS module with one previously reconditioned in order to reduce the outage time. Complete module revision and replacement of worn part is made.

Revision: module out of service



**Note: all tools mentioned are not supplied by ABB, customer must provide them.  
Where ABB Personnel is indicated contact ABB Adda Service.**



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**NOTES**

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Thank You for your collaboration.

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**Notes**

These instructions describe high voltage technology products and are intended specifically for making known the use of such products.

These instructions are not intended to replace valid regulations, with regard to high voltage systems and equipment, and are intended for the use of specialists in the electrical field.