



Medium voltage service

Medium Voltage Service Maintenance by ABB

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Maintenance strategies

Concepts description



Corrective maintenance

Maintenance carried out following detection of an anomaly and aimed at restoring normal operating conditions.

This approach is based on the firm belief that the costs sustained for downtime and repair in case of fault are lower than the investment required for a maintenance programme.

This strategy may be cost-effective until catastrophic faults occur.



Preventive maintenance

Maintenance carried out at predetermined intervals or according to prescribed criteria, aimed at reducing the failure risk or performance degradation of the equipment.

This method is based on scheduled activities performed on the out-of-service equipment including: visual checks, apparatus cleaning, mechanical components lubrication, worn parts replacement and routine tests execution.

The maintenance cycles are planned according to the need to take the device out of service. The incidence of operating faults is reduced.



Risk-based maintenance

Maintenance carried out by integrating analysis, measurement and periodic test activities to standard preventive maintenance.

The gathered information is viewed in the context of the environmental, operation and process condition of the equipment in the system. The aim is to perform the asset condition and risk assessment and define the appropriate maintenance program.

All equipment displaying abnormal values is refurbished or replaced. In this way it is possible to extend the useful life and guarantee over time high levels of reliability, safety and efficiency of the plant.



Condition-based maintenance

Maintenance based on the equipment performance monitoring and the control of the corrective actions taken as a result.

The real actual equipment condition is assessed by the on-line detection of significant working device parameters and their automatic comparison with average values and performance. Maintenance is carried out when certain indicators give the signaling that the equipment is deteriorating and the failure probability is increasing.

This strategy, in the long term, allows reducing drastically the costs associated with maintenance, thereby minimizing the occurrence of serious faults and optimizing the available economic resources management.

Support by ABB

Our competence

- The first priority of all ABB services is the safety
- Only ABB, as original product manufacturer, has the technical knowledge
- Service Center continuously supported by the factory and the technology center
- Certified personnel in the factory
- Replacement of worn or faulty components with original spare parts
- Use of “Upgrade Kits” to update the product with state of the art technology
- Guarantee that high levels of product reliability in compliance with maintenance plans are maintained over time
- Integration of the latest technologies to increase safety, performance and functionality
- Upgrade solutions to bring equipment in line with current standards



ABB product service and acquired brands

ABB guarantees full service for the entire range of brands acquired products, of which it manages archives containing all technical information (ABB, ASEA, BBC, Calor Emag, SACE, Stromberg, Gardy, EKF, ITE, ZWAR, LK NES, Reyrolle, Westinghouse).

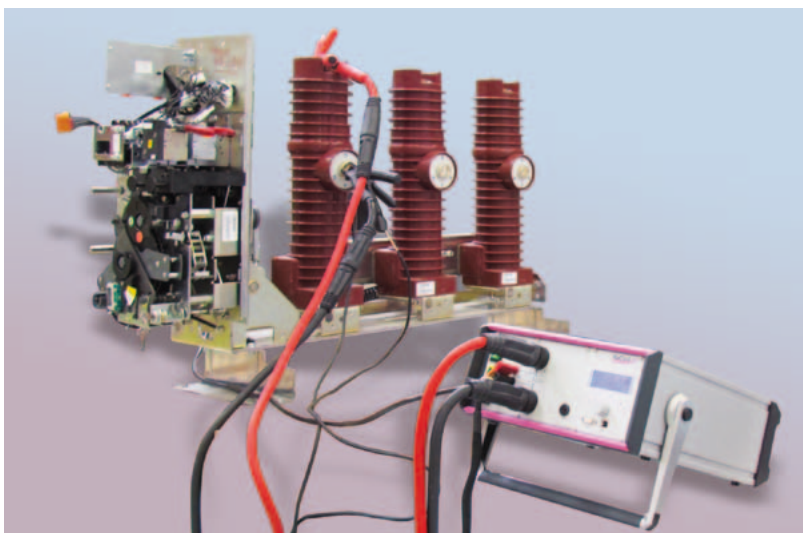


ABB technicians' standard equipment

To perform maintenance activities correctly, it is indispensable to have suitable equipment, scrupulously maintained, periodically checked and calibrated according to quality procedures (ISO 9001) in force in the company and in accordance with safety regulations.

Our strategy

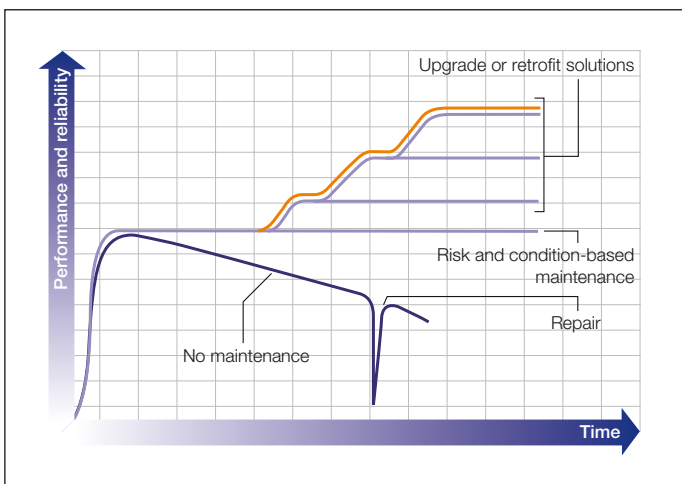
ABB proposes risk and condition-based maintenance strategies to ensure maximum plant reliability.

Service portfolio

- Emergency Line h24
- On-call service
- Assistance in emergency conditions within a defined time (24/48h)
- Scheduled maintenance
- Asset condition assessment
- Risk assessment for each product
- Assessment of spare parts to keep in store
- Risk-based maintenance interventions
- Condition-based maintenance interventions

Benefits

- Support Line 24x365 service guaranteed
- Intervention of skilled personal
- Rapid problems solving
- Plant downtimes scheduled according to production needs
- Installed equipment condition assessment
- Analysis of the operating and environmental conditions to determine maintenance cycles
- Definition of maintenance strategy with relation to critical level of the equipment
- Definition of the spare parts list to ensure rapid resolution of problems
- Monitoring and diagnostic
- Preservation of the equipment working life
- Increase in the reliability and efficiency of the system
- Personal safety guaranteed
- Environmental protection
- Reduction in the failure probability
- Reduction in downtimes
- Reduction in maintenance costs (direct costs connected to emergency maintenance management, indirect costs connected to production losses)

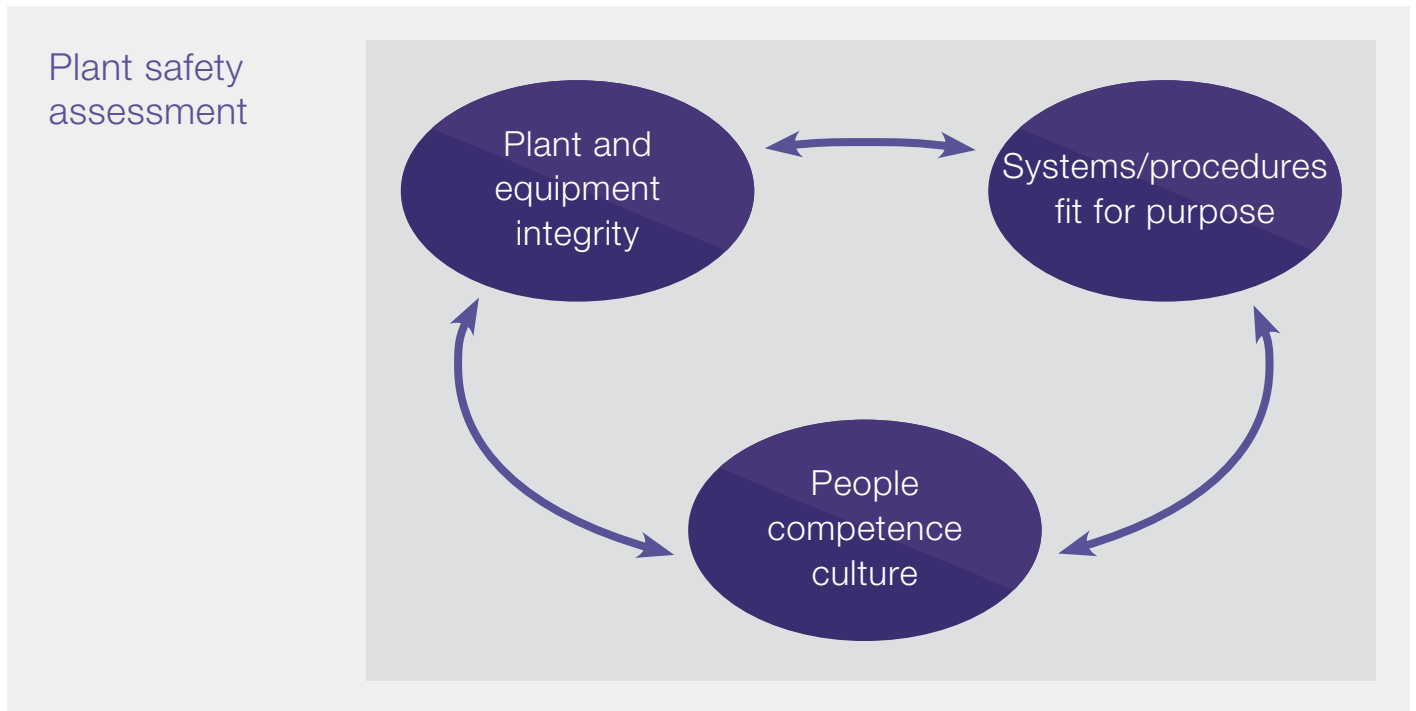


Switchgear working trend over time based on the maintenance adopted strategy

Safety first and foremost

We guarantee your peace of mind

ABB offers numerous solutions for increasing the safety level of operators, devices and process and preventing the principal fault risks.



Major weaknesses and related corrective actions

Obsolete devices

Risk based maintenance
Compliance with standards
Treatment and disposal of harmful substances in accordance with current standards:

- SF₆ gas as prescribed by European Regulations EC 842/2006
- Components made of asbestos

Use of original spare parts
Refurbishment
Retrofit solutions

Incorrect operating method

Training courses on the plant or in the ABB Service Center.
Technicians certification according to the knowledge level acquired:

- current standards
- current products
- obsolete products
- equipment emergency maintenance procedures
- protection and monitoring devices

Electrical properties deterioration

Inspections and measures to identify any anomalies:

- presence of electrical discharges
- overvoltages
- thermal increases (thermography)

Unsuitable fail safe

Solutions for rapidly detecting the internal arc and containing damage
Rapid switching systems
Motor operated systems for electric control
Racking in/out with closed door, including also the motor operated solution
Opening/closing and racking in/out remote control

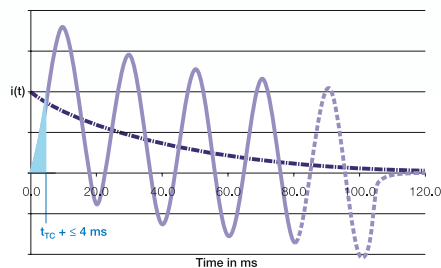
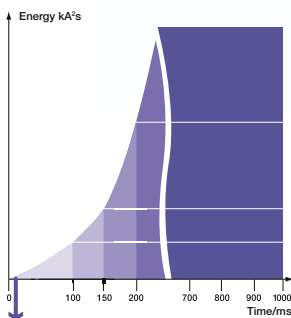
Full protection

UFES (Ultra Fast Earthing Switch): a protection system able to detect and extinguish an internal arc fault in a switchgear in a few milliseconds, much earlier than the short-circuit current reaches the first peak value, drastically reducing the devastating effects caused by such faults.

UFES system (Ultra Fast Earthing Switch)

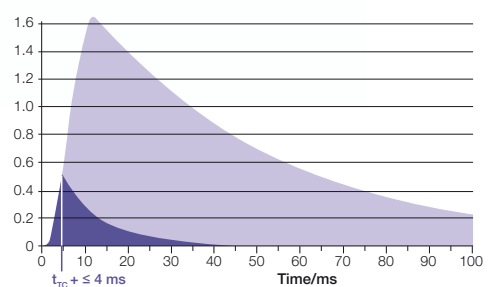


Arc extinction within ≤ 4 ms (after detection)



— Short-circuit current I_k - - - Final clearing of fault current by upstream circuit-breaker - $80 \text{ ms} + \text{time } x$
— DC component — t_{rc} Reaching time for tripping criteria
— Arcing time with UFES — $t_{rc} + \leq 4 \text{ ms}$

Overpressure in bar



— Pressure curve with UFES (4 ms) — Pressure curve without UFES
— $t_{rc} + \leq 4 \text{ ms}$ t_{rc} Reaching time for tripping criteria

Professional maintenance

Our qualified technicians

- High level of professionalism guaranteed by a continuous training process and refresher courses
- Instructions and maintenance schedules specific to each product
- Access to all technical information on the product and relative updates
- Rapid diagnosis thanks to specific testing instruments and identification of faults and/or not proper working, thereby reducing plant downtimes
- The activities are conducted in complete safety in compliance with the OHSAS 18001 standard or other equivalent one
- Personnel qualified to perform maintenance activities on SF6 gas-insulated equipment in accordance with EC Regulation 305/2008
- Release of an accurate maintenance intervention report

The 7 safety steps



1. Clearly identify the work location



2. Disconnect and secure against reconnection



3. Protect against any other live parts



4. Take special precautions when close to bare conductors



5. Check the installation is dead



6. Carry out earthing and short circuiting



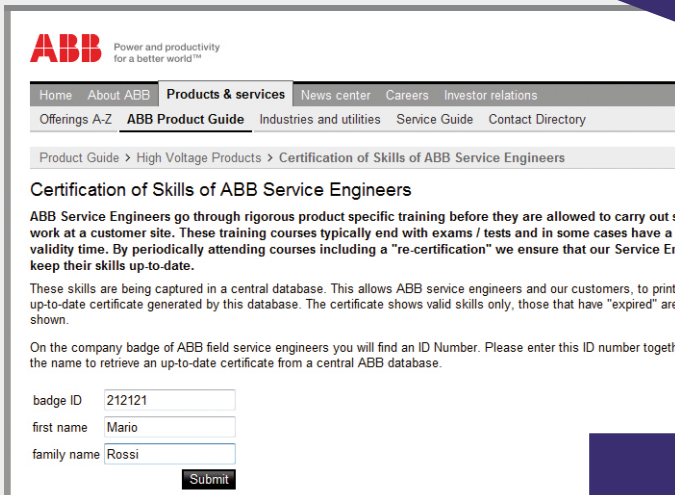
7. Issue a permit work

Full transparency

Given the importance of maintenance activities and the technical knowledge required, ABB provides its professionalism and qualified technician's teams, giving access to information certifying the qualifications of each personnel working at site. Access to this information is simple and rapid.



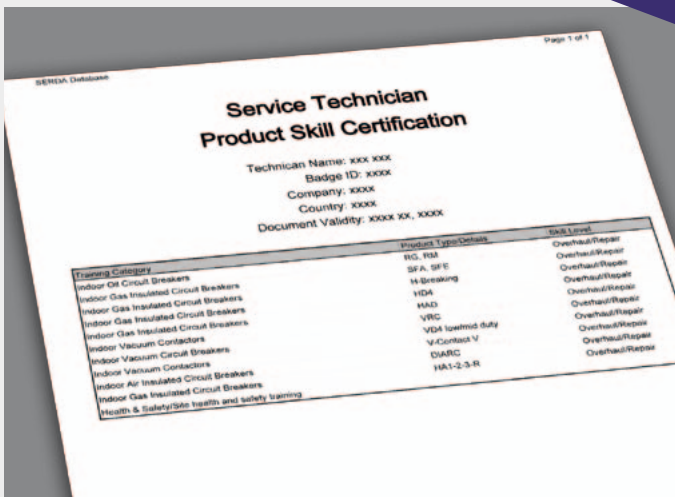
ABB technician at the plant with identification badge



Page that appears at our website

→ www.abb.com/mediumvoltage by selecting
→ Service → Certification of Skills of ABB Service Engineers.

The input data is detected by the technician's badge.

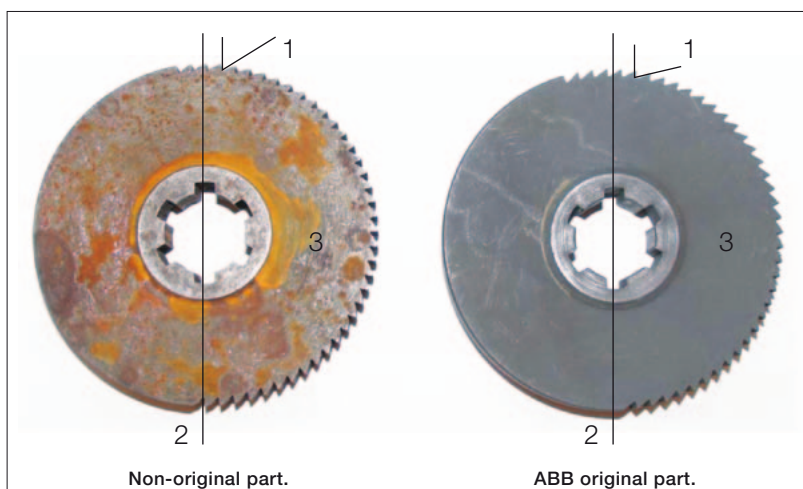


Certification regarding the qualification of the technician and his skills

Original spare parts

Reduce your risk

- ABB guarantees the quality and reliability of the components used during maintenance interventions
- The spare parts are certified according to ABB standards
- The key aspect for guaranteeing the service continuity is the spare parts availability:
 - ABB keeps a large stock of certified components and guarantees their availability for the entire product life cycle (even for obsolete products)
 - ABB offers a global logistic network that guarantees a rapid supply service
- Guarantee of the compliance with procedures and safety measures during use and installation of the products
- Classification of the spare parts according to the level of technical knowledge required for their replacement



Example of non original spare part applied to a circuit breaker operating mechanism.

- The following design mistakes have been detected on non-original spare component:
1. Teeth inclination angle is wider than maximum allowed tolerance.
 2. First tooth catches the linked mechanism earlier than needed.
 3. The surface is not properly treated to avoid the rusting process.

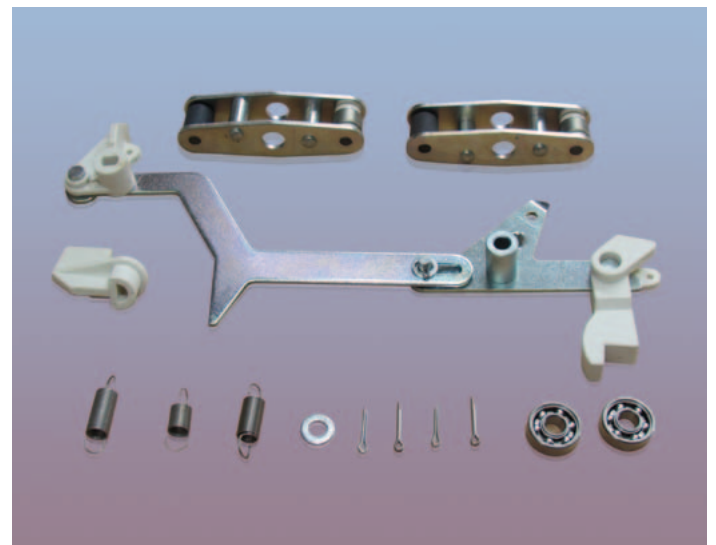
The installation of spare parts that do not conform to the original design, in terms of material and/or mechanical features, may seriously compromise the operation and reliability of the product and the safety of the operators.

Upgrade your equipment

The goal of ABB strategy is not only to restore working conditions but also to upgrade the product. This guarantees that the product is always in line with the latest introduced innovations and maintains top performance.

Thanks to the knowledge of the product and its history, ABB has defined a range of Upgrade kits, which consists of a set of components that ABB considers must be replaced at precise intervals. Replacement normally occurs during the planned maintenance activities and in accordance with the relevant product maintenance schedule.

Example of upgrade kit




Warranty extension

Trust in ABB

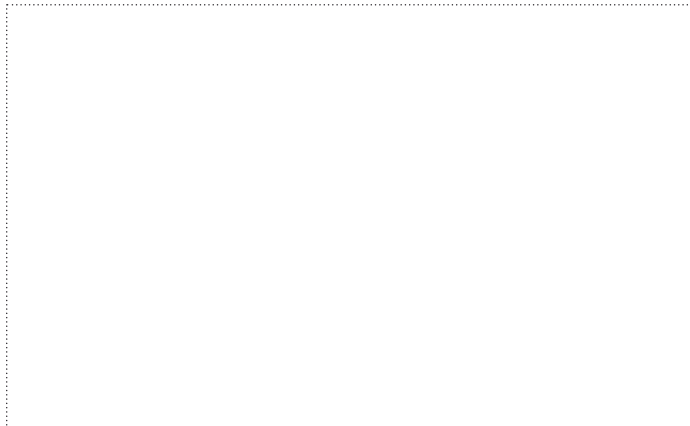
ABB relies on its product quality and its maintenance intervention effectiveness.

- For new equipment, ABB offers a “Multi-Service Package” that includes:
 - Warranty extension
 - Supervision during installation
 - Commissioning supervision
 - Spare parts for the entire extension period
 - Performance of risk-based maintenance during the warranty extension period
 - Practical training on the use and control of the equipment featured in the contract
- For expired warranty products “Risk-Based Maintenance Package”
 - Risk-based maintenance intervention in accordance with ABB maintenance schedule
 - Application of Upgrade Kits (where applicable)
 - Warranty extension for the entire maintained equipment

Medium Voltage Service		
ABB Service Center Address	Tel.: Emergency Line h 24: Fax: E-mail:	Served by ABB and covered by warranty <input type="checkbox"/> YES <input type="checkbox"/> NO up to: <input type="text"/> / <input type="text"/> / <input type="text"/> / <input type="text"/> / <input type="text"/> / <input type="text"/>
Serial number		
RMO		
Date		
1VCS004162F0003		
		

Label that is affixed to the equipment after a maintenance intervention performed by ABB qualified technicians and filled-in according to the results of the mechanical, electrical and functional tests. Where the warranty extension is not applicable, corrective actions will be suggested and/or appropriate solutions proposed.

Contact us



Your Service sales contact: www.abb.com/contacts

More Service information: www.abb.com/productguide

The data and illustrations are not binding. We reserve the right to make changes without notice in the course of technical development of the product.

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