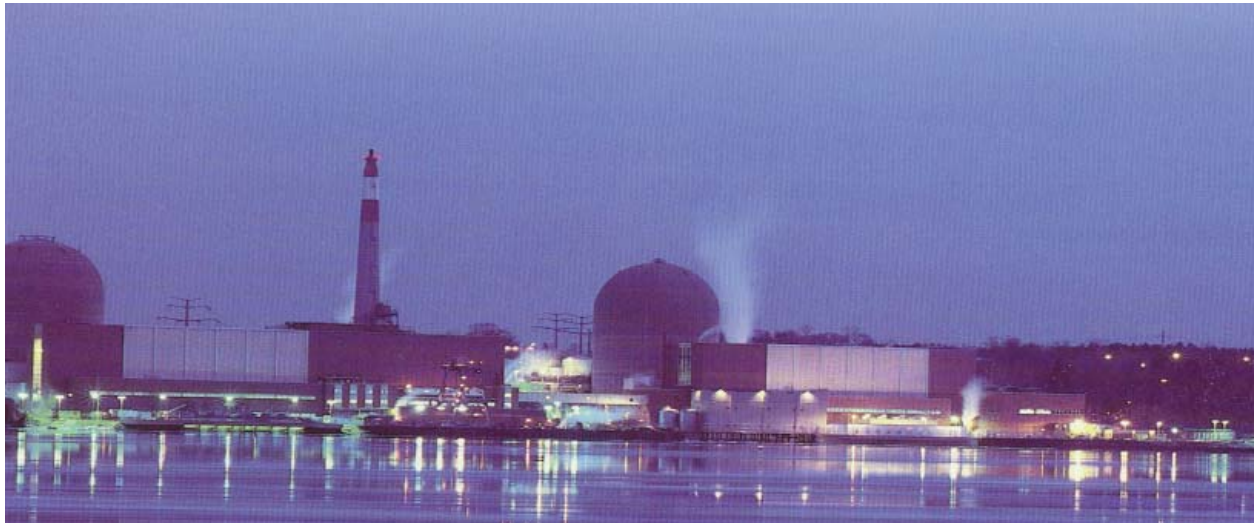


ABB Breaker Service Center

Factory Circuit Breaker Refurbishment Service

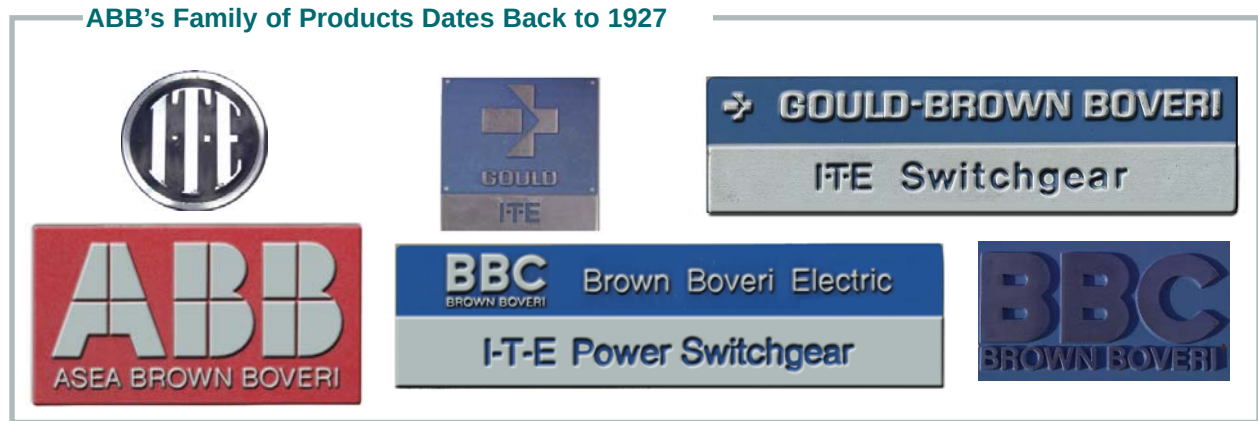


**Engineered
for
Safety™**
Follow the Leader.



ABB History

ABB Inc. is a world leader in electrical distribution equipment, with a long tradition of manufacturing low and medium voltage power circuit breakers, switchgear and related products for utility and industrial substations, power plants and distribution systems. The ABB family of products encompasses traditional market-leading brands such as I-T-E, Gould, Gould-Brown Boveri, Brown Boveri, BBC, Asea Brown Boveri, and now ABB. Throughout this history, ABB has kept a dedicated focus on the needs and success of customers by providing the best aftermarket product support in the industry.



Aftermarket Capabilities

ABB Medium Voltage Service (MV Service) is dedicated to providing customers with the maximum long-term value from their low and medium voltage circuit breakers and accessories. An experienced staff of engineers and technicians is familiar with all aspects of circuit breaker operations for various industrial environments and applications, ranging from nuclear utilities to commercial installations. The Breaker Service Center has all the capabilities necessary to help customers maintain the reliability and performance of distribution systems at the lowest possible cost backed by the factory that originally built the breakers.

Refurbishments - Refurbishments are for circuit breakers that have a high duty cycle and/or are near the end of the lubrication lifecycle and where renewal parts are readily available. ABB provides refurbishment services for both nuclear and non-nuclear low and medium voltage circuit breakers with factory trained technicians. ABB refurbishes circuit breakers to a "like new operating condition" and provides a **full one year warranty** that covers parts and labor.

Repairs - Trained technicians evaluate a circuit breaker's condition through diagnostic testing and inspection. Various options are available from immediate repair through full refurbishment.

Retrofits - Retrofits are conversions or upgrades of breakers to the latest technologies, usually including new trip units for low voltage breakers, or new vacuum interrupters and operating mechanisms for medium voltage breakers.

On-Site Field Support - Resources are available to perform maintenance, repairs, and refurbishments on-site to reduce cycle times and meet emergency needs.

Training - MV Service provides end user training for customers to perform their own maintenance and custom training programs tailored to meet specific customer needs.

Parts and Components - The Breaker Service Center maintains an extensive inventory of new and remanufactured parts for many types and vintages of power circuit breakers. Parts are manufactured to the original drawings, specifications, and on-going design improvements, assuring that any part purchased from ABB is interchangeable and of the highest quality and reliability. Parts kits are available for field rebuilds of components and sub-assemblies. Life extension and upgrade kits are also available for field installation.

Refurbishment Program



Breaker Service Center

“One Price” Refurbishment

ABB offers an exclusive refurbishment program for ABB lineage circuit breakers. ABB will provide a complete circuit breaker refurbishment price up front that includes all standard parts normally replaced during breaker refurbishment, plus any additional components that do not meet ABB acceptance standards. Excluded parts are the occasional high cost components such as arc chutes, phase barriers, spring charging motors, trip units and /or upgrade kits.

The program is conditional that the circuit breaker is received in working condition with no apparent damage found during the "as received" inspection. If damaged parts are found, customers are notified for approval prior to replacing these parts. Nuclear safety related work will incur a Certificate of Conformance charge per purchase order.

Other Manufacturers' Circuit Breakers

ABB has the expertise to refurbish other manufacturers' circuit breakers to "like new operating conditions." The refurbishment process is the same as with ABB circuit breakers. Base prices quoted cover typical refurbishment components and labor from qualified technicians. Other parts and repairs are performed based on an additional quote and customer approval.



*In-house factory plating operation
enhances the customer service level provided*

Refurbishment Process

Once a circuit breaker is received for refurbishment, an "as received" inspection is performed where all of the major assemblies are inspected and the breaker is production tested.

The circuit breaker is then completely disassembled down to the last movable part for cleaning. All non-current parts are cleaned by methods which remove all foreign material, but do not adversely affect the materials dielectric or structural properties. All current carrying components are cleaned by a method which does not deteriorate the original plating. After cleaning, all parts are inspected for cracks and deterioration utilizing approved acceptance criteria. Parts are replaced, re-painted and/or re-plated as required to meet the design life of the breaker. If more than 50% of the main contact surface is damaged, worn, or cracked, the main contact will be replaced.

All old lubricants are removed. Then the mechanism and all pivot points are re-lubricated with Mobil 28 or Anderol 757 lubricant as specified by the customer. The circuit breaker is reassembled per current assembly drawings.

Once the circuit breaker is reassembled, it is "final" tested as a new breaker in accordance with ANSI standards. A label is attached to each refurbished circuit breaker to ensure traceability of the refurbishment work. A copy of the test report is supplied for each circuit breaker and includes results obtained from "as received" and "final" testing with all discrepancies identified and a list of parts replaced.



Factory automated cycle testing

Customer Service Solutions

Besides providing excellent circuit breaker refurbishments, ABB works with customers to create refurbishment programs to meet specific needs and timeframes. Examples of customer service solutions include:

- Loaner breakers to minimize down time
- Spare breakers for refurbishment rotation and additional breakers
- On-site refurbishments
- Shipping crates to protect the breakers during transit

Products Supported

Specific ABB lineage products supported by the Breaker Service Center include K-Line® and K-Line Plus low voltage power circuit breakers, and medium voltage breaker types HK, HKV, VHK, GHK, VHK-R, VHK-X, VKBR and ADVAC®. Specific ratings for the popular HK and K-Line circuit breakers are listed below. Details on other breakers types are available on request.

Low Voltage K-Line Circuit Breakers

Breaker Type	Ratings	
	Voltage	Current
K225/MO	600 V	225 A
K225/EO	600 V	225 A
K600/MO	600 V	600 A
K600/EO	600 V	600 A
K-DON600/MO	600 V	600 A
K-DON600/EO	600 V	600 A
K800/MO	600 V	800 A
K800/EO	600 V	800 A
K-DON800/MO	600 V	800 A
K-DON800/EO	600 V	800 A
K1600/MO	600 V	1600 A
K1600/EO	600 V	1600 A
K-DON1600/MO	600 V	1600 A
K-DON1600/EO	600 V	1600 A
K2000/MO	600 V	2000 A
K2000/EO	600 V	2000 A
K3000/EO	600 V	3000 A
K4000/EO	600 V	3000 A

Medium Voltage HK Circuit Breakers

Breaker Type	Ratings		
	Voltage	MVA	Current
5HK-75	4.16 kV	75	1200 A
5HK-150	4.16 kV	150	1200A-2000 A
5HK-250	4.16 kV	250	1200A-2000 A
5HK-350	4.16 kV	350	1200A-3000 A
7.5HK-500	6.9 kV	500	1200A-3000 A
15HK-150	15 kV	150	1200A-2000 A
15HK-250	15 kV	250	1200A-2000 A
15HK-500	15 kV	500	1200A-3000 A
15HK-750	15 kV	750	1200A-3000 A
15HK-1000	15 kV	1000	1200A-3000 A

Circuit Breaker Services

ABB offers two levels of low and medium voltage service from the Breaker Service Center:

Class 1 E - Nuclear Safety Related Application

Non Class 1 E - Conventional Application

Low Voltage

ABB Factory Refurbishment Services	Class 1 E	Non Class 1 E
ISO 9001 process procedures	✓	✓
10 CFR 50 Appendix B procedures	✓	
Perform initial “incoming” inspection and testing	✓	✓
Remove arc chutes and inspect if shipped with CB	✓	✓
Perform contact resistance test	✓	✓
Perform insulation resistance test	✓	✓
Perform primary and secondary injection tests	✓	✓
Remanufacture trip units - OD type	✓	
Completely disassemble operating mechanism	✓	✓
Disassemble frame and current path parts	✓	✓
Clean and inspect all parts	✓	✓
Replate current carrying parts	✓	
Replate current path parts as required	✓	✓
Replate zinc parts as needed	✓	✓
Issue detailed “as found” condition report to customer for approval of rejected or defective and repaired parts	✓	✓
Replace worn or damaged parts (standard kit)	✓	✓
Reassemble, lubricate, inspect and test	✓	✓
Issue certificate of conformance	✓	
Complete breaker warranty	1 year	1 year
Install/upgrade solid state trip unit	when authorized	when authorized

Medium Voltage

ABB Factory Refurbishment Services	Class 1 E	Non Class 1 E
ISO 9001 process procedures	✓	✓
10 CFR 50 Appendix B procedures	✓	
Perform initial “incoming” inspection	✓	✓
Perform preliminary operational “incoming tests”	✓	✓
Perform preliminary insulation resistance tests	✓	✓
Perform preliminary timing tests	✓	✓
Perform main contact resistance tests	✓	✓
Dismantle as necessary for in-shop service and repair	✓	✓
Dismantle circuit breaker to component level	✓	✓
Dismantle the operating mechanism	✓	✓
Dismantle the current path components	✓	✓
Clean and inspect all parts	✓	✓
Replace needle bearings, thrust washers, mechanical bushings and other small hardware as required (standard kit)	✓	✓
Replace components as required (with customer approval)	✓	✓
Replate current carrying parts as required	✓	
Replate zinc parts as needed as required	✓	✓
Clean and inspect arc chutes (repairs can possibly be made to non-asbestos arc chutes) if shipped with CB	✓	✓
Reassemble, lubricate, inspect and test	✓	✓
Adjust breaker to manufacturer’s standards	✓	✓
Inspect for contact pressure & wipe & adjust per manufacturer’s specifications	✓	✓
Perform final testing	✓	✓
Issue certificate of conformance	✓	
Complete breaker warranty	1 year	1 year

MV Service Advantages

Proper care and maintenance of circuit breakers assures safe, reliable operation over the maximum life of the product.

The ABB combination of service-oriented personnel and factory capabilities assures the most cost-effective and timely solution to breaker maintenance issues. The Breaker Service Center has the resources and expertise to help customers offset high maintenance costs and the heavy demands placed on maintenance personnel, and offers many advantages in comparison to other maintenance and repair alternatives.

Breaker Service Center Benefits

- Facilities are properly equipped for safe handling, diagnostics, refurbishment, and testing
- Work is performed by professional technicians in a controlled environment and supported by factory product engineers that originally manufactured the breakers
- On-site fabrication ensures parts are manufactured to the latest design standards
- On-site warehouse stocks critical parts to meet emergency needs
- Nuclear-qualified factory service complies with 10 CFR 50 Appendix B, 10 CFR Part 21 and NQA1 requirements
- Work is validated by full production testing to original specifications and industry standards
- Vertically integrated facility for quick lead times and to support the needs of both breaker manufacturing and refurbishment services
- Factory certified training for customers
- In-house metal finishing to produce quality plated parts
- A one-year factory warranty on refurbished circuit breakers



OD device before replating



OD device after replating



Service technician makes a final adjustment

The Breaker Service Center also remanufactures individual subassemblies and components, such as operating mechanisms, to the original factory specifications.

Breaker Service Center Standards & Affiliations

ABB's strong commitment to excellence is reflected in the earned quality certifications and active participation in professional associations:

- ISO 9001
- 10 CFR 50, Appendix B
- 10 CFR Part 21
- NUPIC audits
- NIAC membership
- ANSI membership
- UL & CSA product certification
- CFE product certification
- ISO 14001
- IEEE PES membership



ABB Inc.
2300 Mechanicsville Road
Florence, SC 29501
Tel: 1-800-HELP-365 option 7 or
+1-407-732-2000
www.abb.us/mvservice