

## Maintenance Interval and Life Extension Solutions Program

The first fully-tested and proven aging program to extend circuit breaker maintenance interval

### Challenge

Ensuring safe, reliable, long-term operation of low and medium voltage circuit breakers is critical to the nuclear industry. Utilities are faced with obsolescence, lack of parts availability, increased maintenance costs and reliability issues for vintage circuit breakers. In addition, customers are challenged to decrease operation and maintenance costs.

### Solution

The Framatome Total Breaker Solutions team has expertise in breaker design, maintenance and functional application; nuclear power plant safety system design licensing, regulatory compliance and continuous improvement; qualification testing and commercial grade dedication.

Maintenance Interval and Life Extension Solutions program is a comprehensive program developed by Framatome to help you maximize the value of your assets including new breakers, refurbishment of existing breakers and certified parts kits.

Framatome has established a comprehensive preventative maintenance approach through analysis of wear items on nuclear installed breakers from multiple utilities. Framatome's circuit breakers lubricated with advanced synthetic grease maintained consistent and acceptable functional test results throughout 25 years of simulated aging. When supplied with our certification, circuit breakers carry justification for extending maintenance intervals and achieving related cost savings, while improving overall safety and equipment reliability.

Encompassing all aspects of a comprehensive equipment qualification program, our program includes enhancements to breaker design, material aging tests and analyses, maintenance recommendations and life extension methodology.



### Customer benefits

- Increase safety by eliminating grease hardening, which improves reliability of breaker and reduces risk to personnel and plant equipment
- Lower operating and maintenance costs through extended maintenance interval and reduced required maintenance
- Improve maintenance planning due to reduced probability of unplanned grease hardening and breaker wear maintenance
- Reduce spare parts inventory due to decreases in breaker wear and required maintenance
- An extended warranty can also be provided as part of the program

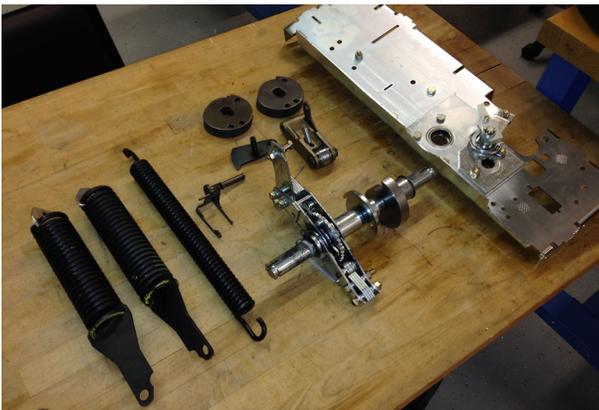
**Your performance**  
is **our** everyday **commitment**

## Certification of Synthetic Lubricant to Extend Maintenance Interval

Grease hardening within circuit breakers necessitates frequent maintenance on low and medium voltage circuit breakers to ensure reliable operation, which results in higher plant operation and maintenance (O&M) costs. With improved breaker operating mechanisms and new advanced synthetic lubricants available, the nuclear fleet needed a formal demonstration to verify the advantages to the industry. A Framatome innovative R&D program has demonstrated an extended maintenance interval through successful testing of Eaton and Siemens low and medium voltage circuit breakers. The aging program of breaker functional testing and analytical tests of new lubricants confirmed performance remained consistent with criteria based on manufacturer's published operating characteristics.

The advanced lubricants can be supplied on new circuit breakers, replacement operating mechanisms, reconditioning parts kits or through our reconditioning services. Our certification supports elimination of interim preventative maintenance on the operating mechanism to perform re-lubrication or rejuvenation required with conventional greases currently in use. The program validates commercial OEM statements for synthetic lubrication life and extends maintenance intervals in nuclear industry applications.

Operational tests of Eaton and Siemens low and medium voltage breakers during the age-simulation program confirmed the performance remained consistent with criteria based on manufacturers' published operating characteristics. The program includes certification of new synthetic lubricants in conjunction with critical parts/sub-assemblies for an extended life through detailed testing of greases and breaker operation. Other recommended maintenance practices should still be followed to benefit from the demonstrated elimination of known grease failure modes.



## Program Deliverables

For breakers or parts kits provided through the certification program, Framatome will provide customers with:

- Certification to Framatome's Qualification Test Program (Siemens, Eaton)
- A copy of the appropriate Qualification Test Report referenced
- A statement on the certificate of conformance, which includes shelf life
- A breaker label with origination date clearly identified

## Expansion of Certification

Because the program established a benchmark to validate synthetic lubricants, Framatome can apply the methodology to other breaker manufacturers. The method could be applied (or adapted) to any electro-mechanical device or mechanism that relies on one or more lubricants essential to functionality. Other advanced lubricants could be subject to the certification method to establish or confirm service life and extend maintenance interval. Framatome's Total Breaker Solutions team is committed to finding innovative solutions to your most pressing challenges.



**Contact:** [electrical-systems@framatome.com](mailto:electrical-systems@framatome.com)  
[www.framatome.com](http://www.framatome.com)

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