

UL Circuit Breakers

UL 489 vs. UL 1077



For circuit breakers, UL offers two standards: UL 489 – the standard for **Molded-Case Circuit Breakers**, and UL 1077 – the standard for **Supplementary Protectors for Use in Electrical Equipment**.

OptiFuse CBW Thermal Circuit Breakers are designed for supplementary protection only (UL 1077). That means that they must be used in conjunction with an upstream branch-rated circuit breaker or fuse, such as our UL Class CC fuses (FPK-R / TPK-R). Without branch circuit protection upstream, the thermal breaker will be at risk of damage, and can even partly rupture or explode.

Typically, supplementary circuit protectors like our CBW series are used in appliances or industrial equipment that are plugged into a wall. The wall socket is always protected with a branch-rated circuit protector at the panel, so the usage meets the requirements for all plug-in devices.

UL 489	UL 1077
UL 489 is the standard for devices built for branch circuit protection.	UL 1077 is the standard for devices designed for supplementary protection.
Circuit breakers that test successfully against the UL 489 standards become UL Listed for use as standalone circuit protectors.	In contrast, devices tested successfully against UL 1077 standards are built for use only as supplementary circuit protectors. They are intended for overcurrent protection in equipment that requires no branch circuit protection or that has branch circuit protection already installed upstream in the circuit.

Both UL 489 and UL 1077 require the same general testing, but the intensity of the test parameters varies depending on the standard under which a device is covered and the intended use for the device. Below is a table highlighting some of the general testing required for UL 489 and for UL 1077.

Test	UL 489 Parameter	UL 1077 Parameter
Calibration	100% of rating - hold 135% of rating - trip in one hour ( $\leq 50A$ ) 200% of rating - trip in 2 min. max. ( $\leq 30A$ )	100% of rating - hold Manufacturer specifies trip rating 300% of rating - trip within trip curve limits of manufacturer.
Overload	50 cycles at 600% of rated current or 150 Amps minimum at .4-.5 lagging power factor (pf).	50 cycles at 600% of rated current at .4-.5 pf for motor/inductive load or 50 cycles at 150% of rated current at .75-.80 pf for general loads.
Endurance (Switching devices only)	6,000 cycles at 100% of rated current at .75-.8 pf +4,000 mechanical no-load cycles.	6,000 cycles at 100% of rated current at .75-.8 pf.
Dielectric Voltage-Withstand	1,000 volts + 2X rated voltage between: A) Live parts and the metal mounting surface or enclosure with the breaker both open and closed. B) Across line/load terminals with the breacker open.	Test not always required, but if performed then: A) Same as UL489 B) Lower Voltage than UL489 and only performed for certain short circuit ratings.
Short Circuit	5,000 Amps minimum (higher for breakers rated over 100A or 250V), power factor of .4-.5, must operate at 200% after 3 short circuit operations.	Suggested table value of 200-5,000 Amps depending on ratings at .75-.8 pf or as specified by manufacturer. May not operate after short circuit, as defined by manufacturer.

One thing to note when reviewing this table is that manufacturers of supplementary devices tested for UL 1077 Recognition may specify the parameters of the calibration, overload and short circuit tests. This results in a multitude of potential performance variations and means that what is ostensibly the same UL Recognized part can vary from manufacturer to manufacturer.

A UL Recognized device from OptiFuse might have different specifications than seemingly the same UL Recognized device from another manufacturer. UL does not publish manufacturers’ test parameters used for testing these supplementary devices. Thus, the only way to compare UL Recognized products is to scrutinize each manufacturer’s data sheets.