Enhancing material safety and performance for MCBs

Globally, electric energy consumption is expected to double by 2050. This is due in large part to the growth of sustainability-focused technologies, including smart grids, electric cars and connected homes.

To meet increasing demands and the need for more sustainable power systems, power distribution providers work closely with equipment manufacturers to optimize compact electrical systems – including miniature circuit breakers (MCBs) for residential and industrial electrical distribution. Designed to handle more power, MCBs are highly durable, and better integrate with next-generation electrical distribution technology.

The increase in global demand for power distribution, together with ongoing miniaturization and electronics integration requirements is driving the adoption of high-performance plastics in parts manufacturing. Since MCB manufacturers need to fit intricate components into a small space, thermoset materials previously used to produce parts fail to provide the required design flexibility. Thermoplastics are the widely used replacement material, since they're recyclable, more cost-effective and provide better heat resistance, dimensional stability and higher flow – making them easier to mold with.

Yet, manufacturers need to minimize the risk of potentially catastrophic electrical accidents by ensuring all replacement materials they select consistently meet or exceed safety standards – including UL94 flammability and arc-cutting performance testing.

Key MCB Application Requirements

ENCLOSURE

Encases the circuit breaker and requires:

- CTI above 400V
- GWFI up to 960°C
- Excellent short circuit properties
- High dielectric strength after short circuit

BOBBIN SUPPORT

Initiates a short circuit inside the MCB and requires:

- GWFI up to 650°C
- High tensile strength to prevent overheating or malfunction

FLANGE

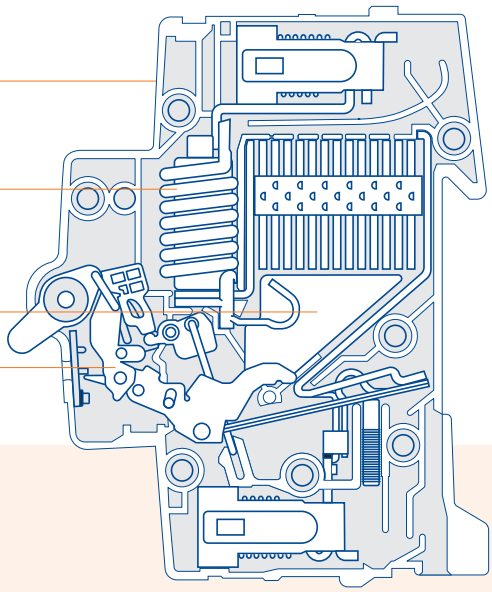
Contains the arc-cutting or quenching mechanism that stops an electric current and requires:

- Reliable arc breaking performance
- Low soot formation to prevent build-up of conductive surfaces

SWITCHING MECHANISM

Shuts off power when dangerous conditions are detected and requires:

- GWFI up to 650°C
- Low friction
- Low creep
- High dimensional stability



DSM MATERIAL SOLUTIONS

DSM Expertise in Power Distribution

DSM is a leading global supplier of engineering plastics for power distribution applications. Working directly with industry leaders to understand their requirements, we've developed a portfolio of thermoplastic materials designed to fully replace thermoset materials in all MCB housing and internal parts. Leveraging extensive research and development, our proven solutions meet the safety and performance requirements for each component, including:

- High comparative tracking index (CTI)
- High glow wire flammability index (GWFI)
- Industry-leading arc-cutting performance
- Excellent V-0 and V-2 performance in UL94 testing
- Superior flow and processability for thin-walled designs
- Fully halogen-free and flame-retardant grades
- Low corrosion, both in manufacturing and use
- Excellent heat deflection temperature (HDT) and dielectric aging performance

DSM RECOMMENDED MATERIALS

Enclosure	Bobbin support	Flange	Switching mechanism
Akulon® *K222-KGV5 (PA6, 25% GF)*	Stanyl® *TE200F6 (PA46, 30% GF)*	Stanyl® *CR310 (PA46, 30% GF)*	Arnite® *AV2 372 (PET, 35% GF)*
Akulon® *K222-KGV6 (PA6, 30% GF)*	Arnite® *TV4 251 XG2 (PA46, 25% GF)*	Akulon® *S227-C (PA66, Unreinforced)*	Xytron™ *G4010W (PPS, 40% GF)*
Akulon® *SG-KGS5/HV (PA66, 25% GF)*			
Stanyl® *HFX63S (PA46, 35% GF)*			
ForTii® *F11/T11 (PA4T/PPA, 30%GF)*			

Contact us at dsm.com/contactdem to learn more about DSM's proven portfolio of thermoplastic solutions for power distribution.

DSM
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