

Epoxy Technology Embedded Poles



IndustrialIT
enabled™



Epoxy Technology

Epoxy processing

- Experience in manufacturing of epoxy resin for indoor and outdoor applications
- Processing of more than 1,000 tons epoxy resin per year
- Manufacturing of components for different voltage levels
- Processing of insulating and conductive silicone
- Industrial IT based process management to ensure maximum production quality
- Cooperation with well-known chemical industry companies
- Supplier for different industries (e.g. cable, electronic device)



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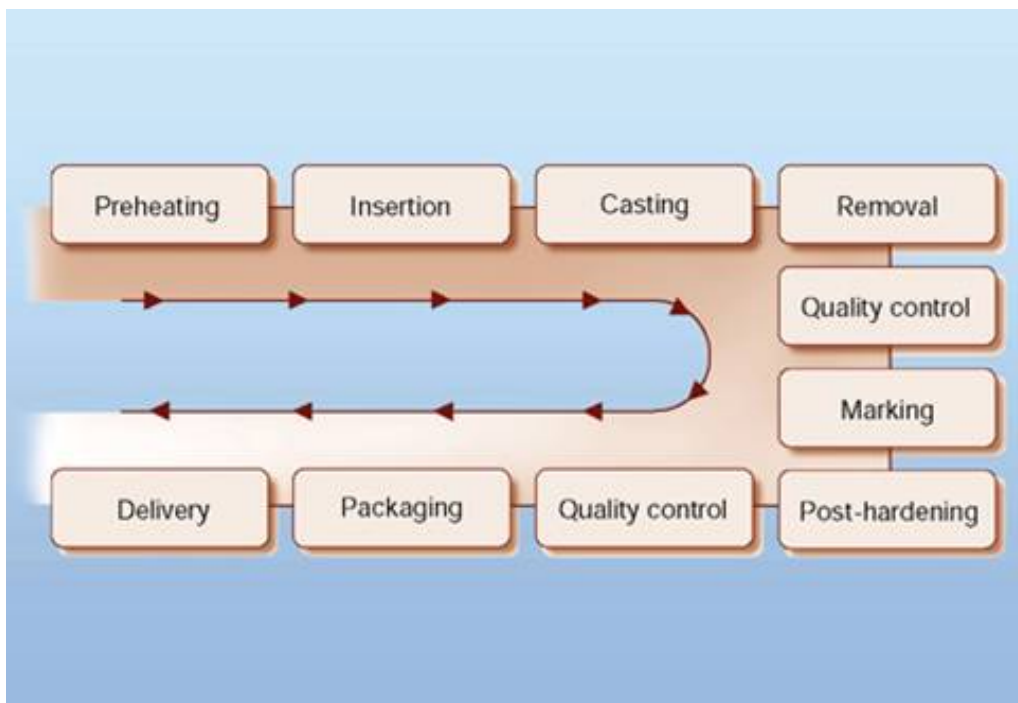


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Manufacturing of embedded poles



Components filler, resin
and hardener

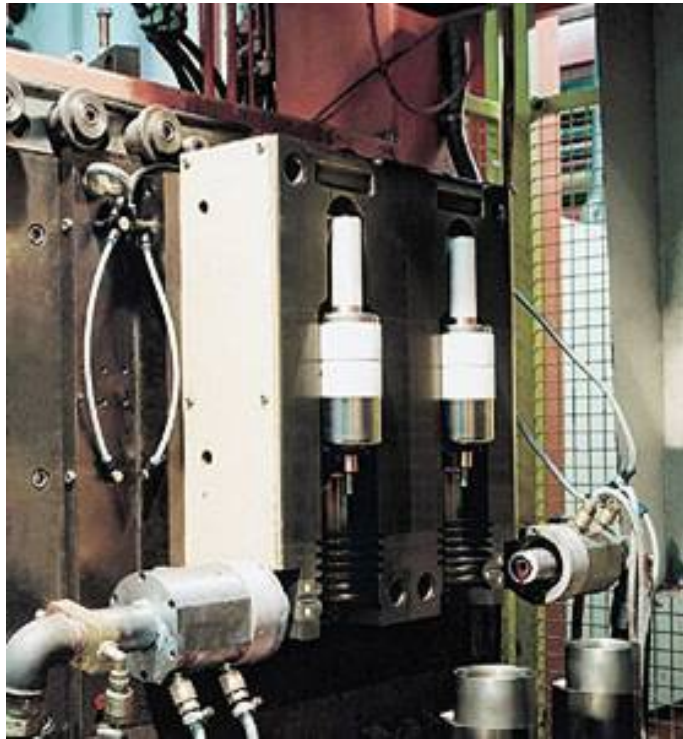


Process sequence for direct casting
of vacuum interrupters



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Manufacturing of embedded poles



Mould with pre-assembled groups of vacuum interrupters



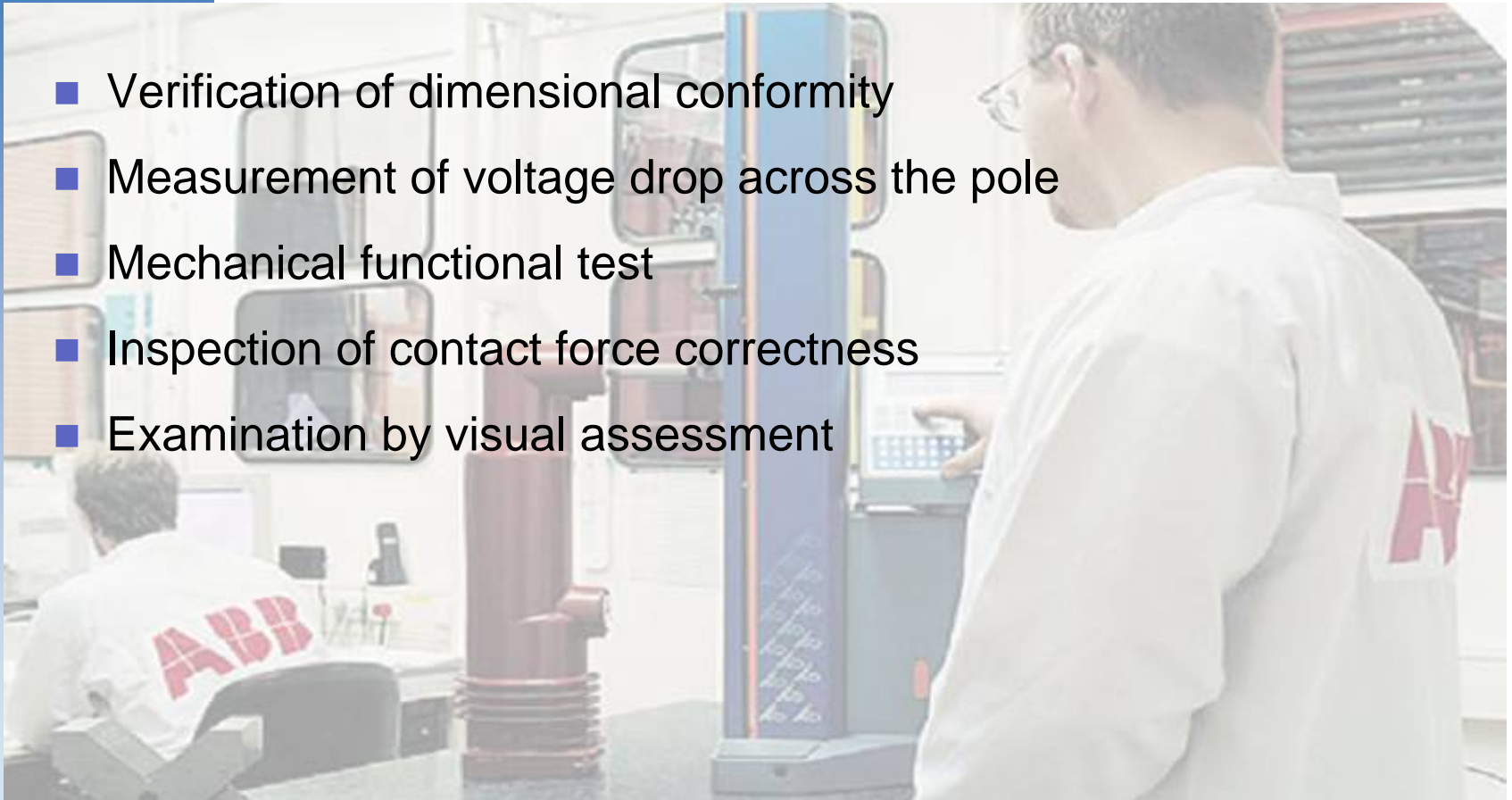
Removal of finished embedded poles from the mould



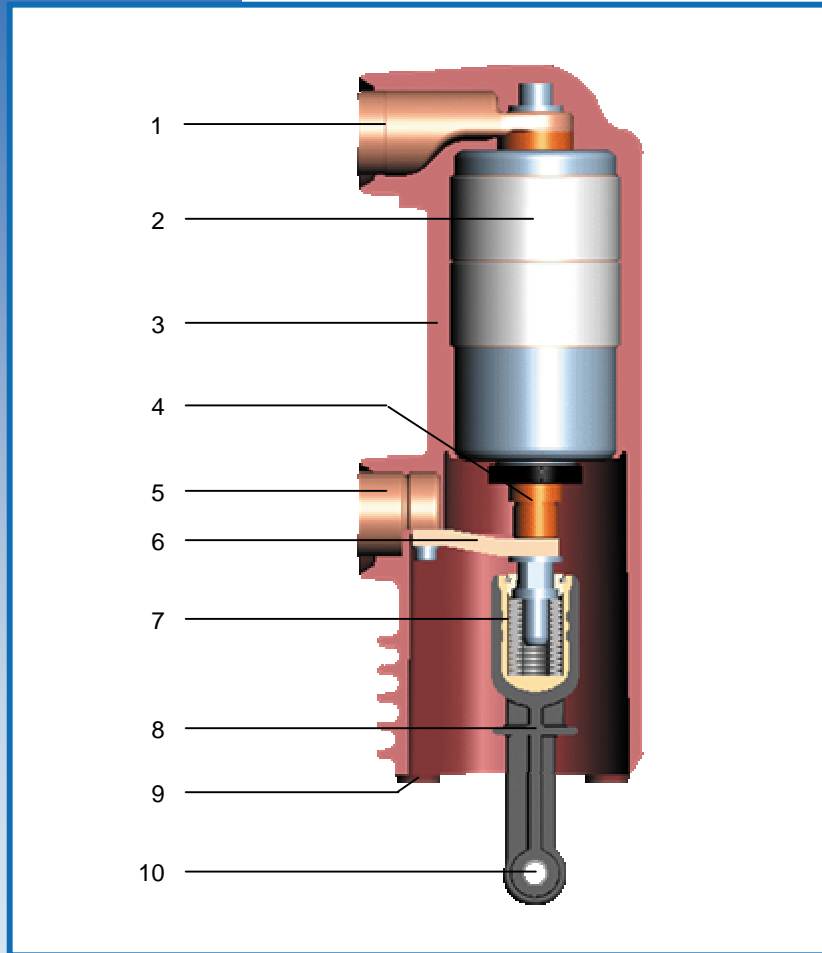
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Quality control – Embedded poles

- Verification of dimensional conformity
- Measurement of voltage drop across the pole
- Mechanical functional test
- Inspection of contact force correctness
- Examination by visual assessment



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The embedded Pole Principle structure

- 1 Terminal
- 2 Vacuum interrupter
- 3 Epoxy resin
- 4 Stem
- 5 Terminal
- 6 Flexible connection
- 7 Contact force spring
- 8 Push rod
- 9 Fixing point
- 10 Connection to drive





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Embedded poles

Indoor

Outdoor

							
P1 12/17.5 kV ...1250 A ...31.5/...31.5 kA	P4 24 kV ...1250 A ...25 kA	P4-S 24 kV ...1250 A ...25 kA	P3 12/17.5 kV ...1600/1250 A ...40/...31.5 kA	P2 12/17.5 kV ...2500 A ¹⁾ ...40/...31.5 kA	P5 24 kV ...2500 A ¹⁾ ...25 kA	OP1 ...27 kV ...800 A ...16 kA	OP2 ...38 kV ...1000 A ...16 kA
H = 205/140 mm	H = 310/205 mm	H = -/205 mm	H = 310/160 mm	H = 310/160 mm	H = 310/205 mm	H = 346/247 mm	H = 383/367 mm
VG5 VG4 VG4-S	VG5 VG4 VG4-S	VG5 VG4 VG4-S	VG4 VG4-S VG6	VG4-S VG6	VG4-S	VS4 VG5	VG6

1) 2500 A with heat sink



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Indoor poles



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Indoor pole P1

Rated
voltage

12/17.5 kV

Rated
current

...1250 A

Rated short-
circuit breaking
current

...31.5 kA



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Indoor pole P2

Rated voltage	Rated current	Rated short-circuit breaking current
12 kV	...2500 A ¹⁾	...40 kA
17.5 kV	...2500 A ¹⁾	...31.5 kA

¹⁾ 2500 A with heat-sink



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Indoor pole P3

Rated
voltage

12 kV

17.5 kV

Rated
current

...1600 A

...1250 A

Rated short-
circuit breaking
current

...40 kA

...31.5 kA



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Indoor pole P4

Rated
voltage

24 kV

Rated
current

...1250 A

Rated short-
circuit breaking
current

...25 kA



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Indoor pole P4-S

Rated
voltage

24 kV

Rated
current

...1250 A

Rated short-
circuit breaking
current

...25 kA



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Indoor pole P5

Rated voltage	Rated current	Rated short-circuit breaking current
24 kV	...2500 A ¹⁾	...25 kA

¹⁾ 2500 A with heat-sink



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Outdoor poles



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Outdoor pole OP1



Rated
voltage

...27 kV

Rated
current

...800 A

Rated short-
circuit breaking
current

...16 kA



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Outdoor pole OP2

Rated
voltage

...38 kV

Rated
current

...1000 A

Rated short-
circuit breaking
current

...16 kA



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Embedded poles

Embedded poles type	Rated voltage kV	Rated Power frequency withstand voltage kV	Rated lightning impulse withstand voltage kV	Rated current A	Short-circuit breaking current kA	Mechanical operating cycles	Vertical distance mm
P1	12 17.5	...42	75 95	...1250	...31.5	...30,000	205
P2	12 17.5	...42	75 95	...2500 ¹⁾	...40 ...31.5	...30,000	310
P3	12 17.5	...42	75 95	...1600 ...1250	...40 ...31.5	...30,000	310
P4	24	50	125	...1250	...25	...30,000	310
P4-S	24	50	125	...1250	...25	...30,000	-
P5	24	50	125	...2500 ¹⁾	...25	...30,000	310
OP1	...27	...60	...125	...800	...16	...15,000	-
OP2	...38	...70	...170	...1000	...16	...15,000	-

2500 A with heat sink

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Vacuum interrupter in silicone embedding technique

VG5 Silicone

24 kV ...1250 A ...16 kA ...30,000 CO
Silicone diameter : 75 mm

VG4 Silicone

24 kV ...2500 A ...20 kA ...30,000 CO
Silicone diameter : 100 mm

VG4-S Silicone

24 kV ...2500 A ...25 kA ...30,000 CO
Silicone diameter : 100 mm

VG6 Silicone

36 kV ...3150 A ...25 kA ...30,000 CO
Silicone diameter : 119 mm



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Vacuum interrupters in silicone embedding technique



By embedding in silicone, VIs are suitable for the application in air with higher rated voltage levels

Example (in air):

VG4

12 kV ...2500 A ...25 kA ...30,000 CO

Ceramic diameter : 90 mm

VG4 Silicone

24 kV ...2500 A ...20 kA ...30,000 CO

Silicone diameter : 100 mm

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Embedded poles

- High dielectric strength without any further external precautions
- Optimum protection of the vacuum interrupter from moisture, dust and external damage
- Suitability for different climatic conditions
- High reliability and long life due to modular structure
- Compact and robust design
- Easy adaption on the circuit-breaker
- Maintenance-free
- High quality standard
- Industrial IT enabled



ABB