Advanced Materials
Raising insulation performance with advanced chemistries

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Epoxy systems

Chemistry

Main features and benefits

- Ambient and hot curing systems
- Long pot life, latency
- Excellent cross linking
- Excellent impregnation
- High voltage behavior on impregnated parts
- High Tg
- Thermal endurance, high temperature applications
- Long-term reliability
Polyurethane systems

Chemistry

Main features and benefits
- Flammability resistance
- Low viscosity and easy processing
- Low exothermic reaction and low shrinkage
- Reactivity can be easily adjusted
- Flexibility at medium and low temperatures
- Suitable for pressure sensitive devices
- Crack resistance
- Thermal cycling
- Casting of big volumes
- Good adhesion
- Lower cost of materials
Compared viscosity

Viscosity progression

- Mix viscosity (mPa·s)
- Gel time
- Time (min)

- Epoxy
- Polyurethane
Compared viscosity

Epoxy resins
- Higher viscosity ca. 10 000 - 16 000 mPa.s
- Reduction of viscosity through reactive diluents or plastisizer

PU systems
- Much lower viscosity of polyols << 10 000 mPa.s
- Low viscosity of standard MDI < 250 mPa.s
- Further dilution not required in most cases
- Low mix viscosity with excellent flowability
Compared exothermic reaction

Exotherm progression

Temperature (°C)

Time (min)

Epoxy
Polyurethane
Compared exothermic reaction

General rule for epoxy and polyurethane
- Exotherm of PU << EP systems
- Unfilled systems show stronger exothermic reaction
- Pot life of bigger quantities of reaction mix is lower
- Casting of big volumes preferably with PU
- PU’s are less sensitive towards crack formation
- The use of PU prepolymers provides additional reduction of the exotherm
- Exothermic reaction has an impact on shrinkage
Compared chemical resistance

**Depends on**
- Building blocks
- Crosslinking density and degree of conversion
- Hard systems show a better resistance than soft systems

**General rule for epoxy and polyurethane**
- Concentrated acid and base destroy the material
- Polar solvents damage the material
- Good resistance against diluted acid and bases, apolar solvents and fuel
- Aromatic solvents cause swelling of the material
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