

APPLICATION TEMPERATURE LIMITS AND APPLICATION ADVICE FOR MINERAL INSULATED MATERIALS

Application temperature limits:

The different mineral insulated thermocouple types have generally a metal sheath made of special steel material no. 1.4541 or of Inconel material no. 2.4816.

Other sheath materials are available on request.

The max. application temperature of mineral insulated thermocouples in pure air without any further harmful gaseous components are as follows:

| material no. | sheath material | max. application temperature |
|--------------|-----------------|------------------------------|
| 1.4541 | special steel | 800°C |
| 2.4816 | Alloy 600 | 1100°C |

- An important quality characteristic of the sheath material is its resistance against corrosion
- With higher measuring temperatures especially with cyclic stress, the wall thickness is reduced by scaling
- Aggressive gaseous components can be harmful to the sheath material
- Bigger diameters increase the service life of mineral insulated thermocouples

The above mentioned information do not claim to be complete.

Herewith, we would like to point out that the allowed application temperature and service life of mineral insulated thermocouples are influenced by lots of circumstances.

Mineral insulated material:

The following table shows in which fields mineral insulated materials have good oxidation and alternating temperature resistance.

The application temperature limits in different media are as follows.

| measuring medium | application temperature | |
|------------------------------|-------------------------|-----------------|
| | 1.4541 | 2.4816 |
| air | approx. 800°C | approx. 1100°C |
| carbon dioxide | approx. 650°C | approx. 500°C |
| benzene | approx. 100°C | not recommended |
| benzol | approx. 100°C | not recommended |
| boric acid | approx. 100°C | not recommended |
| butyl alcohol | approx. 100°C | not recommended |
| up to 50°G.L phosphoric acid | approx. 100°C | not recommended |
| nitric acid | approx. 100°C | not recommended |
| liquid sodium | not recommended | approx. 750°C |
| sulphurous air | not recommended | approx. 550°C |
| chlorine free water | not recommended | approx. 590°C |

sheath materials for mineral insulated thermocouples:

| trade mark | mat. no. | material characteristics | application | availability |
|--------------------|----------|---|---|--|
| Inconell Alloy 600 | 2.4816 | very good general resistance against corrosion as well as resistant against stress corrosion / excellent resistance against oxidation temperatures about approx. 1000°C | pressurised water reactor / nuclear power / industrial furnaces / steam boiler / turbines / exhaust gas measurement | type L (Ø 1,5/3/6) / type K (Ø 0,25/...10) / type K double wall thickness (Ø 1,5/3) / type S (Ø 1,5/3/18) / type J (Ø 1, 5/6) / type N (Ø 1/1,5/3/6) |