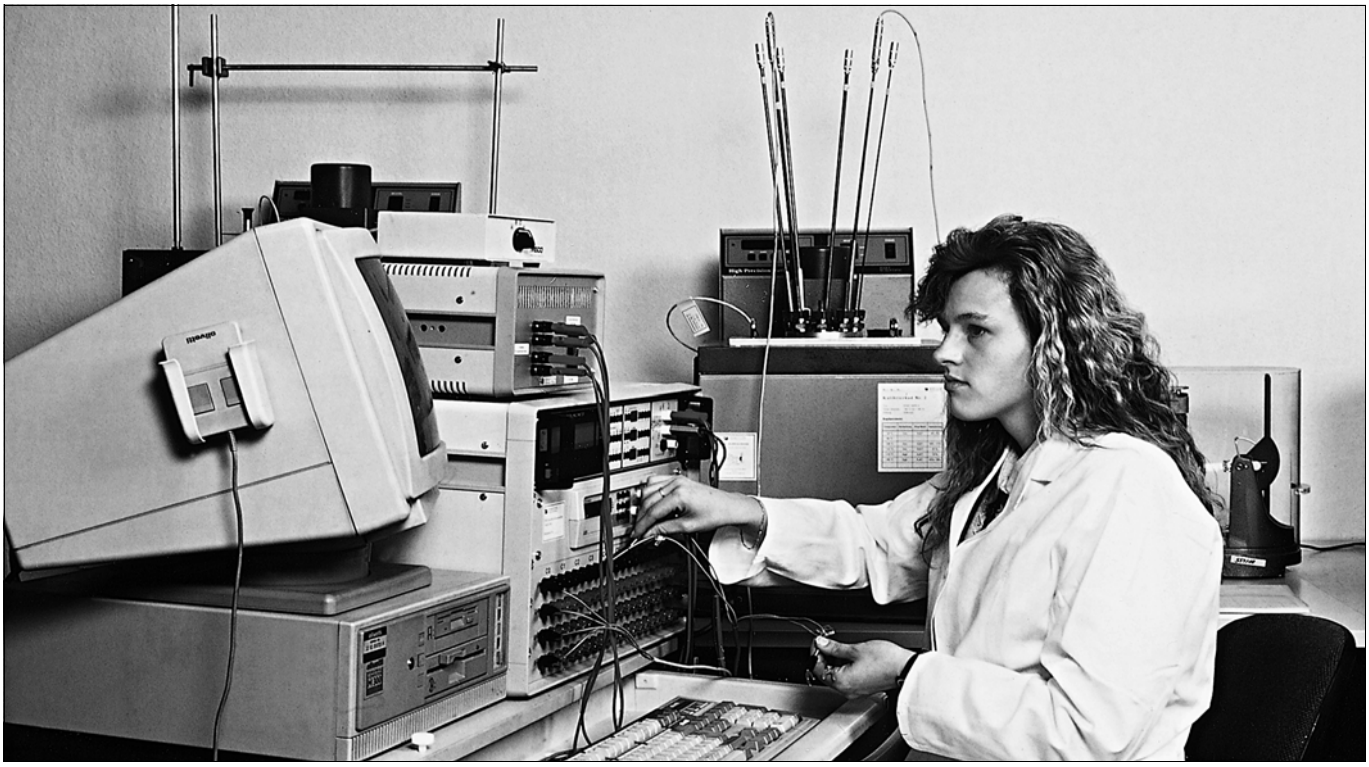
Tests and measurements

on thermometers with certificate or DKD calibration certificate

10/10-3.81 EN



- Tests and measurements of
  - quality characteristics
  - properties
  - characteristic values
  - specific requirements
- Certificates in accordance with
  - EN 10 204 (DIN 50 049)
  - DIN 55 350 part 18
- DKD calibration certificate
  - Calibrations in the temperature range -35 °C to +1200 °C
  - Calibration of temperature sensors, also with connected transmitters
  - production of individual reference tables and calculation of thermometer constants
  - Protection and restoration of calibrated thermometers to national standards in acc. with EN 29 000 (DIN ISO 9000)

DKD = Deutscher Kalibrierdienst (German Calibration Service), supervised by the PTB - Physical and Technical Federal Institute)

Sensycon thermometers are subjected to final inspection and testing as standard before delivery in order to ensure compliance with the order.

This standard final inspection contains the following tests:
- insulation and continuity test
- visual inspection
- dimensional inspection
- identification test

If special requirements are made by the user or approval authorities, tests and inspections can be performed and documented with certificates.

Increased requirements apply in particular in the following fields:
- Press. Vessel Executive Order, techn. rules for steam boilers
- Explosion Protection Executive Order
- Chemical plants
- Nuclear plants
- Aeronautical and aerospace engineering
- Technical Rules for flammable liquids

General principles

Standards

Verification of compliance with quality characteristics, properties, characteristic values and specific requirements is governed by standards EN 10 204 (DIN 50 049) and DIN 55 350, part 18.

These standards specify who may issue certificates on which conditions.

EN 10 204 (previously DIN 50 049)

This standard deals with the certification of metallic materials by means of test reports and inspection certificates.

Material monitoring

Material monitoring ensures that the certified material is identifiable from melting until the end product and thus that the chemical and mechanical data are verifiable.

- Inspection certificate acc. to EN 10 204-3.1B
  with monitoring by an appointed expert of the manufacturer who is independent from the manufacturing
- Inspection certificate acc. to EN 10 204-3.1A
  with monitoring by an official expert (for example TÜV)
- Test report acc. to EN 10 204-2.2
  Certification of compliance with the order on the basis of non-specific tests with the test results stated
- Test report acc. to EN 10204-2.1
  Certification of compliance with the order on the basis of non-specific tests, without the test results stated

DIN 55 350, part 18

This standard deals with the certification of quality characteristics by quality test certificates:

- Quality test certificate DIN 55 350-18-4.1.1
  Certification of compliance with the order
- Quality test certificate DIN 55 350-18-4.1.2
  Certification of measurement results not related to the order (for example, batch values of thermocouples)
- Quality test certificate DIN 55 350-18-4.2.1
  Certification of compliance with the order with regard to compliance with specified limits (pressure, tightness, dimension, etc.)
- Quality test certificate DIN 55 350-18-4.2.2
  Certification of individual measurement results (for example, resistance values, thermoelectric voltages)

Tests used

Pressure test

The pressure test is performed by pressurising the test sample with water/gas from the inside or outside. Evaluation is by endoscopic examination, which is more precise than the pressure drop method. The test sample may have no leakages.

The operating pressure is stated by the customer. The test pressure is at least 1.5 times the operating pressure.

Helium leak test

The helium leak test serves to detect very small leakages in components and semi-finished products. The test can be performed in accordance with the vacuum or helium pressure method. Detection of leaks following pressurization is by means of a “sniffing probe”.

X-ray test

The X-ray or radiographic test serves to test welds for hidden defects such as pores, shrink holes, pore lines, unsufficient root fusion, etc.

Tolerances of form and position of integrated components can also be determined.

Dye penetrant test

The Dye penetrant test is performed using fluorescing penetrants or in accordance with the red-white method. Both methods serve to detect surface defects such as cracks, craters, open pores, etc. They are mainly used on welds.

Calibration/Comparison measurement

Calibration/comparison measurement serves to determine the deviation of the thermometers to be tested from the respective reference tables in accordance with EN 60584 (thermocouples) and EN 60751 (resistance thermometers) or from specified tolerances and to check that they comply with the required tolerance zone position.

In calibration/comparison measurement, the measuring element (thermometer) can be tested on its own or as a measuring chain with transmitter and supply device.

In comparison calibration (often also called comparison measurement), the test piece is calibrated against a standard thermometer (also called a standard), i.e. the measured values of the test sample and the standard are recorded.

The exact calibration temperature can be calculated from the measured values of the standard.

Agitated, thermostat-controlled baths of liquid (up to approximately 500 °C) or tube furnaces (up to max. 1200 °C).

A precondition for calibration is a suitable design of the temperature sensor, i.e. it must have a certain minimum insertion length. For comparison calibration, this is:

up to	500 °C	120 mm
>	500 °C	450 mm

DKD calibration certificates

DKD calibration certificates certify the results of the calibration of temperature sensors on the basis of multinational agreements between the most important European and international industrial nations. They completely meet the requirements of EN ISO 9000 ff. for restorability to national standards.

Underlying temperature scale

The temperature data of all calibrations relate to the International Practical Temperature Scale of 1990 (ITS 90).

Ordering information					
These code numbers apply to the designs in Data Sheets 10/10-3.22 EN to 10/10-3.59 EN and must be stated there			Code		
Issue of certificate in **German**		per certificate	511		
Issue of certificate in **English**		per certificate	512		
Number of copies of certificates		per certificate	513		
Material monitoring in accordance with EN 10 204 (previously DIN 50 049)					
Inspection certificate acc. to EN 10 204-3.1B for parts in contact with media		per position	315		
Inspection certificate acc. to EN 10 204-3.1A		per position	321		
(for drilled thermowells of designs D1, D2, D4, D5, D4S, D5S)					
Test report acc. to EN 10 204-2.2 for parts in contact with media		per position	301		
Quality test certificate DIN 55 350-18-4.1.1					
Certification of compliance with the order		per position	901		
Quality test certificate DIN 55 350-18-4.1.2					
Batch values of the thermocouple		per position	908		
Quality test certificate DIN 55 350-18-4.2.1 (mechanical tests)		per position			
Visual, dimensional and functional test		per piece	902		
Pressure test on the thermowell,		per piece	331		
test pressure = ... bar (clear text)			333		
Helium leak test		per piece	335		
X-ray test		per piece	338		
Dye penetrant test		per piece	341		
Surface roughness measurement		per piece	344		
Quality test certificate DIN 55 350-18-4.2.1 (electrical tests)		per position			
Tolerance test on the temperature sensor		per piece	903		
Quality test certificate DIN 55 350-18-4.2.2		per position			
Comparison measurement on the temperature sensor without or with transmitter (with a common certificate for all test samples)					
Comparison measurement at 1 test temperature		per piece	904		
at 2 test temperatures		per piece	905		
at 3 test temperatures		per piece	906		
at 4 test temperatures		per piece	907		
every additional text point					
Statement of test temperatures (from -40 °C to +1200 °C)			909		
Calculation of the individual reference table	1)	per piece	972		
Calculation of the thermometer constants	1)	per piece	973		
Calculation and programming of the freestyle characteristic		per piece	974		
- at the temperature sensor and analog head mounted transmitter assembly (4...20 mA/HART)					
- at the temperature sensor and analog fieldbus-type head mounted transmitter assembly (FF/PA)					
In the temperature range from ... °C to ... °C			975		
At ... tie points (tie point = calibration temperature)			976		

1) only in connection with a comparison measurement at 3 or more temperatures

Tests and measurements on thermometers with certificate or DKD calibration certificate

Ordering information						
These code numbers apply to the designs in Data Sheets 10/10-3.22 EN to 10/10-3.59 EN and must be stated there				Code		
Issue of certificate in **German**			per certificate	511		
Issue of certificate in **English**			per certificate	512		
Number copies of certificates			per certificate	513		
DKD calibration certificates			per order			
Comparison measurement on the temperature sensor without or with transmitter (for a DKD calibration certificate, a separate certificate is required for each test piece)						
DKD Comparison measurement	at 1 test temperature		per piece	951		
	at 2 test temperatures		per piece	952		
	at 3 test temperatures		per piece	953		
	at 4 test temperatures		per piece	954		
	every additional text point					
Statement of test temperatures (from -40 °C to +1200 °C)				959		
Calculation of the individual reference table		1)	per piece	972		
Calculation of the thermometer constants		1)	per piece	973		
Calculation and programming of the freestyle characteristic - at the temperature sensor and analog head mounted transmitter assembly (4...20 mA/HART) - at the temperature sensor and analog fieldbus-type head mounted transmitter assembly (FF/PA)			per piece	974		
In the temperature range from ... °C to ... °C				975		
At ... tie points (tie point = calibration temperature)				976		

1) only in connection with a comparison measurement at 3 or more temperatures

Other versions

This Data Sheet contains only a small selection of our range of tests and measurements on thermometers with certificate or DKD calibration certificate. Other versions can be supplied on request.

Calibration at more than 4 temperatures

Naturally, it is possible to calibrate at more than 4 temperatures. Prices on request.

Other temperatures

Temperatures below -40 °C and above +1200 °C on request.

Fixed reference point calibration

The thermometers can also be calibrated at fixed reference points. Prices and implementation on request.

Certificates

It is also possible to document materials in accordance with EN 10 204-3.1C (third party inspection agency e.g. Lloyd Register of shipping).

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