SAFINA a.s.

SAFINA, a.s. enforces EN ISO 9001:2000 and EN ISO 14001:2004 certified standards and places an extraordinary emphasis on quality of its products. Our laboratories guarantee reliable control over quality of materials and precisions and correctness of analytics results. SAFINA,a.s. is concurrently the holder of the European conformity sign CE granted by the British company Lloyd's Register Quality Assurance Ltd. pursuant to the standard EN ISO 13485.

SAFINA, a.s., Vídeňská 104, 252 42 Vestec, Czech Republic
tel.: +420 241 024 111, fax: +420 241 024 292, e-mail: platina@safina.cz

www.safina.cz

PRECIOUS METALS PROCESSING AND RECYCLING

THERMO ELECTRIC **COUPLES**

THERMOCOUPLE **WIRES**

THERMOELECTRIC COUPLES

Thermocouple Wires

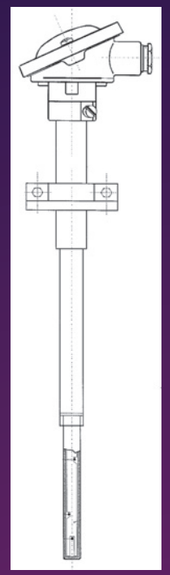
Assortment

SAFINA, a.s. is a renowned and traditional manufacturer of PtRh thermocouples. It has been dealing with their manufacturing for almost half a century. An extraordinary emphasis is placed on accuracy and reliability of thermocouples during manufacturing process. Each manufactured batch is tested in modern equipped accredited calibration laboratory and is provided with a quality certificate. Measured values are compared to measurement standards, which are based on international norms.

SAFINA, a.s. offers thermoelectric couples in form of individual thermocouple branches (wires) as well as in form of couples produced by connection of both branches. Additionally thermocouples clad in protective ceramic capillary can be supplied on request.

Type	Branch composition		Temperature scope of application (°C)		Tolerance
			Long-term	Short-term	
S	Pt Pt–10%Rh	(–) (+)	0 – 1 300	0 – 1 600	IEC 584–2 Class 1 or 2
R	Pt Pt–13%Rh	(–) (+)	0 – 1 300	0 – 1 600	IEC 584–2 Class 1 or 2
B	Pt–6%Rh Pt–30%Rh	(–) (+)	0 – 1 600	0 – 1 800	IEC 584–2 Class 2 or 3

Scope of offered diameters of manufactured thermocouple wires is from 0.04 mm to 0.80 mm.



Accuracy of thermoelectric couples

All thermoelectric couples supplied by SAFINA, a.s. are in compliance with the standard EN 60584 – 1 stemming from the international temperature range ITS – 90 and comply with temperature limits defined in the IEC 584 – 2.

Tolerance classes

1. class for temperatures from 0 to 1100 °C +/- 1 °C
   for temperatures from 1100 to 1600 °C +/-[1 + 0,003* (t–100)]°C
2. class for temperatures from 0 to 600 °C +/- 1,5 °C
   for temperatures from 600 to 1600 °C +/- 0,0025t °C
3. class for temperatures from 600 to 800 °C +/- 4 °C
   for temperatures from 800 to 1700 °C +/- 0,005t °C

   where the t is temperature in °C

(See the table of tolerance values)

Tolerance values

Temperature (°C)	1. class (+/- °C)	2. class (+/- °C)	3. class (+/- °C)
0–600	1,00	1,50	4,00
700	1,00	1,75	4,00
800	1,00	2,00	4,00
900	1,00	2,25	4,50
1 000	1,00	2,50	5,00
1 100	1,00	2,75	5,50
1 200	1,30	3,00	6,00
1 300	1,60	3,25	6,50
1 400	1,90	3,50	7,00
1 500	2,20	3,75	7,50
1 600	2,50	4,00	8,00
1 700	-	4,25	8,50

Correct manipulation with thermoelectric couples:

Materials of extreme purity are used for manufacturing of thermoelectric couples. Any contamination with dirt or inconsiderate manipulation has a significant impact on the accuracy of measurement with thermoelectric couple. Following factors, which cause its deterioration at the application, must be taken into account for ensuring of thermocouple accuracy:

- **Contamination by chemical substances vapours**

  Vapours of metal and non-metal substances can condensate on the surface of thermocouple in case of measurement with a unprotected couple. The substances diffuse under high temperatures into the surface of thermocouple wires and thus decrease accuracy.

- **Reduction atmosphere**

  Platinum atomisation occurs in the reduction atmosphere, which decreases the operating life of thermoelectric couple and its accuracy.

- **Contamination with lubricants and organic substances**

  Organic substances are decomposed by heat and create reduction atmosphere acting in the above mentioned way.

- **Selection of suitable type and diameter of thermoelectric couple**

  Selection of an optimal type of thermoelectric couple depends on application temperature, atmosphere and required length of operating life, accuracy and sensitivity of the couple.

- **Long-term usage**

  Subject to compliance with all aforementioned measures, gradual decrease of the thermoelectric voltage value occurs in thermoelectric couples (type S and R) exposed to high temperatures on a long-term basis. It is caused by diffusion of rhodium into the Pt branch. Unfortunately, this phenomenon cannot be prevented and therefore thermoelectric couples must be regularly checked and exchanged.