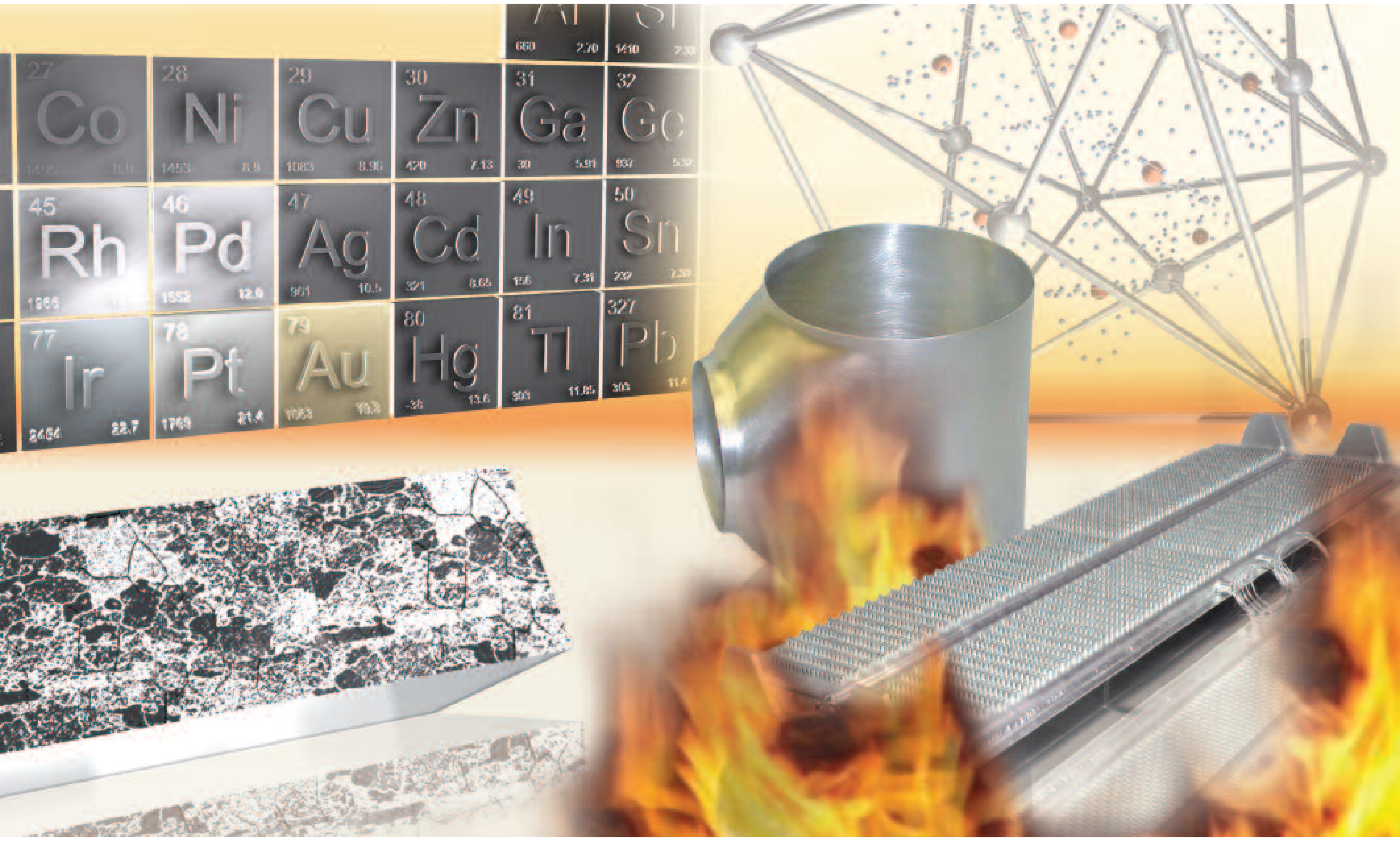
Heraeus




# Pt-5%Rh DPH

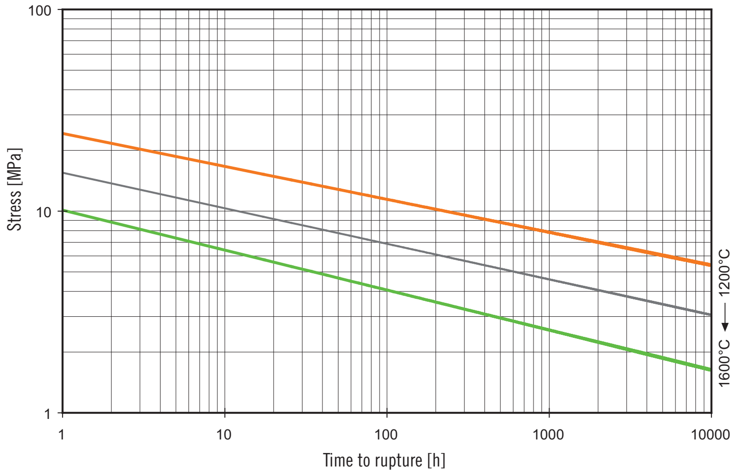
Pt-5%Rh DPH is an oxide dispersion hardened alloy that was originally developed as an alternative to the more widely used alloy Pt-10%Rh DPH as a reaction to very high rhodium prices. It was, however, found that the creep strength of Pt-5%Rh DPH was remarkably close to that of the 10% Rh alloy. Pt-5%Rh DPH has therefore become widely used as an alternative not only for Pt-10%Rh DPH but also as a full-value substitute for the non-dispersion hardened alloys Pt-10%Rh and Pt-20%Rh.

Pt-5%Rh DPH offers the well-known advantages of Pt-10%Rh DPH including very high resistance to oxidation and corrosion together with excellent forming properties and a high degree of ductility under service conditions. In common with the other DPH materials from Heraeus, Pt-5%Rh DPH can be readily welded by all standard techniques, including tungsten inert gas (TIG), laser and electron beam welding. The strength of the alloy is largely maintained after welding.

Pt-5%Rh DPH was first used in glass fiber bushings where it could be applied without significant design or process modifications. It is now becoming widely used in other structural applications in the glass industry, e.g. the manufacture of feeder systems and in linings for refractory components.

## Stress-Rupture Strength of Pt-5%Rh DPH

Stress-rupture test: A specimen of the material is subjected to a defined stress and the time to rupture of the specimen is determined. The time to rupture is measured for each temperature on a large number of specimens at different stresses and plotted in the stress-rupture diagram.




## High Temperature Mechanical Properties of Pt-5%Rh DPH

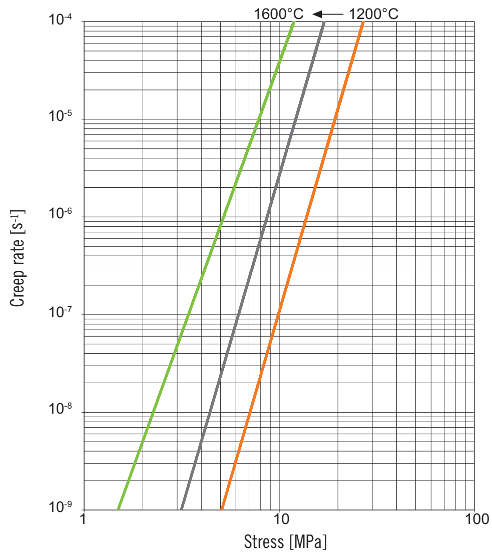
Standard values are needed to permit the comparison of different materials. The table summarizes the results of tensile and stress-rupture tests. The stress-rupture strength is shown for a life of 10,000 h, i.e. almost 14 months. The creep strength corresponds to a creep rate of about 3% per year.

| | | 1200°C | 1400°C | 1600°C |
|---|---|---|---|---|
| $R_m$ | [MPa] | 55.3 | 31.2 | 19.1 |
| $R_{p0.2}$ | [MPa] | 40.0 | 27.0 | 16.1 |
| A | [%] | 59 | 68 | 70 |
| $R_{m/10,000h}$ | [MPa] | 5.3 | 3.0 | 1.6 |
| $\sigma_{1.0E-09}$ | [MPa] | 5.0 | 3.1 | 1.4 |

$R_m$ Tensile strength
$R_{p0.2}$ Yield strength
A Tensile elongation
$R_{m/10,000h}$ 10,000 h stress-rupture strength
$\sigma_{1.0E-09}$ Stress for creep rate $10^{-9}$ $s^{-1}$

## Creep Strength of Pt-5%Rh DPH

During the stress-rupture test, the creep rate of each specimen is determined and plotted for each temperature as a function of the applied stress.





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