

Pt-10%Rh DPH^{plus}

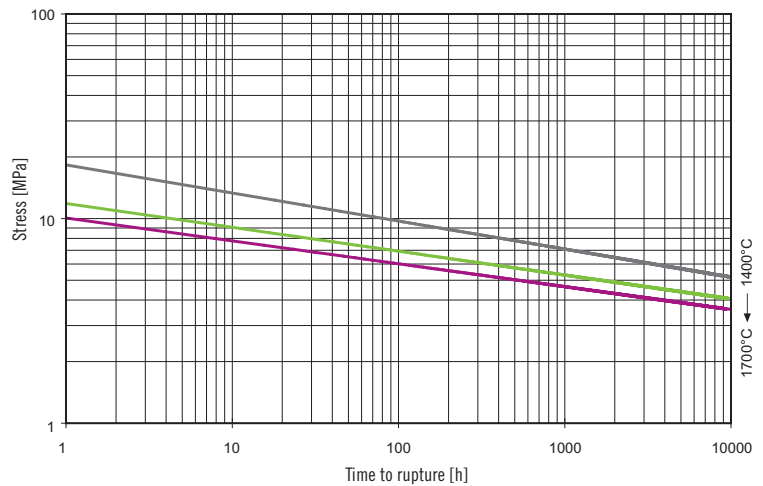
Pt-10%Rh DPH^{plus} is a new modification of the established oxide dispersion hardened alloy Pt-10%Rh DPH with greatly increased strength at high temperatures. The improvement in strength has been achieved by specially developed thermo-mechanical processing techniques without changing the chemical composition of the alloy. In this way it has been possible to maintain the outstanding levels of weldability, fabricability and corrosion resistance which have made Pt-10%Rh DPH

and the other DPH materials so popular among users in the glass industry.

Pt-10%Rh DPH^{plus} is ideally suited for use in electrically heated equipment for glass making at temperatures up to 1700°C. Particularly at these very high temperatures, the creep and stress-rupture strength of Pt-10%Rh DPH^{plus} is second to none.

Stress-Rupture Strength of Pt-10%Rh DPHplus

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-10%Rh DPHplus

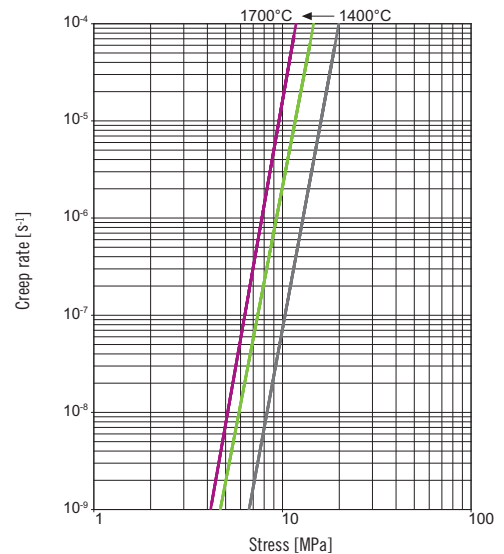
Standard values are needed to permit the comparison of different materials. The table summarizes the results of tensile and stress-rupture tests. The stress-rupture strength is shown for a life of 10,000 h, i.e. almost 14 months. The creep strength corresponds to a creep rate of about 3% per year. The table includes a comparison with the approximate stress-rupture strength of the conventional alloy Pt-20%Rh.

		1400°C	1600°C	1700°C
R_m	[MPa]	43.5	25.0	–
R_{p0.2}	[MPa]	36.1	23.3	–
A	[%]	59	64	–
R_{m/10,000h}	[MPa] (Pt-10%Rh DPHplus)	5.2	4.0	3.5
R_{m/10,000h}	[MPa] (Pt-20%Rh)	2.0	0.8	0.5
σ_{1.0E-09}	[MPa] (Pt-10%Rh DPHplus)	6.6	4.6	4.1

R _m	Tensile strength
R _{p0.2}	Yield strength
A	Tensile elongation
R _{m/10,000h}	10,000 h stress-rupture strength
R _{m/10,000h} (Pt-20%Rh)	Approximate comparative values for Pt-20%Rh
σ _{1.0E-09}	Stress for creep rate 10 ⁻⁹ s ⁻¹

Creep Strength of Pt-10%Rh DPHplus

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



Heraeus Materials Technology GmbH & Co. KG

Engineered Materials Division
 Business Unit Precious Metals Technology
 Heraeusstr. 12-14
 63450 Hanau, Germany
 Phone +49 6181.35-3740
 Fax +49 6181.35-8620
 precious-metals-technology@heraeus.com
 www.heraeus-materials-technology.com
 www.pt-labware.com

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