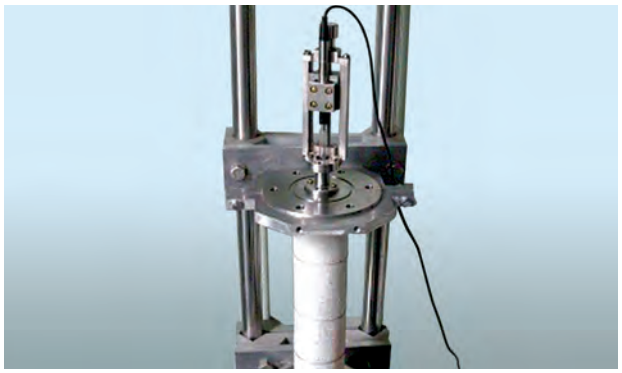
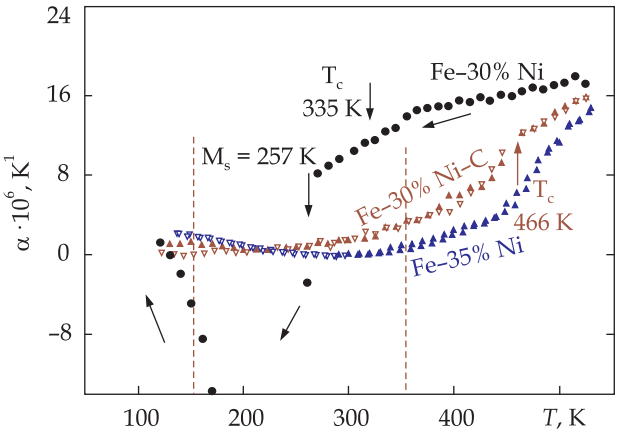
HIGH-STRENGTH INVAR ALLOY



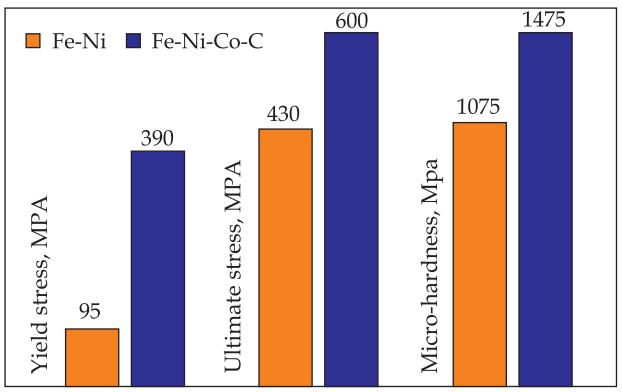
Quartz dilatometer in the structure of which the developed high-strength invar alloy is used



Temperature dependence of thermal expansion coefficient of the alloys with different content of nickel and carbon

Areas of Application

The alloy can be used in metrology, geodesy, instrument engineering, and in laser optics (for telescopic systems and their structural components to ensure stability of their geometrical dimensions at varying temperature; electro-engineering products and measuring instruments, etc.)



Dependence of yield stress, ultimate stress, and micro-hardness of invar Fe–Ni-based alloys: orange columns correspond to the conventional alloy; purple columns correspond to proposed invar alloy

Advantages

High mechanical properties: the yield stress is four times higher as compared with the conventional invar, the ultimate stress and hardness exceed the standard values by 40%; the alloy is stable under cyclic loads; at minor changes in the chemical composition, the alloy shows the anti-invar effect, i. e. abnormally high TEC within the range from 250 to 500 K, which is impossible to realize in the conventional alloys; its chemical composition enables adjusting TEC by thermomechanical treatment in the same product; the alloy shows the invar or anti-invar properties with a reduced content of expensive Ni, which is lower than the standard one (36%)

Specification

Thermal expansion coefficient (TEC) within the temperature range 100—400 K: $\alpha = (0{,}9\text{–}5) \cdot 10^{-6}\ K^{-1}$.

Yield stress, MPa	~390
Ultimate stress, MPa	600
Micro-hardness, MPa	1475

IPR Protection

IPR3

Stage of Development. Suggestions for Commercialization

IRL3, TRL4
Vending of patent based on license agreement

Contact Information

Vitalii P. Bevz, G.V. Kurdyumov Institute for Metal Physics of the NAS of Ukraine;
+38 044 424 12 05, e-mail: BevzV@ukr.net