

# APPLICATION SHEET

Metals · Aerospace  
DSC 402

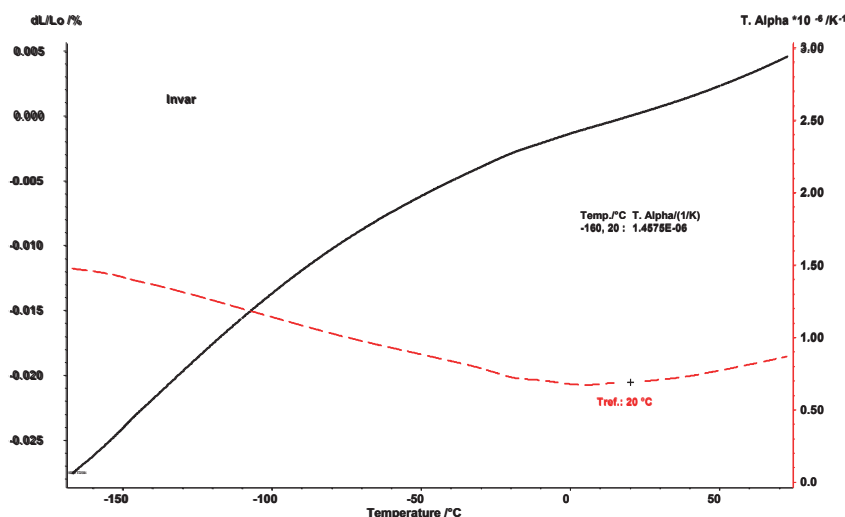


## Invar

### Introduction

Invar, also called FeNi36, is an alloy of 36% nickel and 64% iron with traces of carbon and chromium. It has an extremely low coefficient of thermal expansion ( $\sim 10^{-6} \cdot \text{K}^{-1}$ ). Through variation of the different metals' shares, the CTE

can be changed. It is being used, e.g. as the inner membrane of non-selfsupporting (membrane-type) liquified gas tanks (LNG = liquified natural gas), where it is supported by an insulation layer. It must not crack in exposure to extreme temperature changes (LNG has a temperature of about  $-196^\circ\text{C}$ ), so its CTE has to be carefully monitored throughout the process of development and production.



### Test Conditions

Temperature range:	-170 ... 70°C
Heating/cooling rates:	3 K/min
Atmosphere:	Helium
Sample length:	25.01 mm
Calibration:	with fused silica
Sample holder:	fused silica

### Test Results

The figure depicts the thermal expansion and the coefficient of thermal expansion related to a reference temperature of 20°C. The sample length increased continuously over the entire temperature range. The CTE values are between 0.672 and  $1.476 \cdot 10^{-6} \text{ K}^{-1}$ . Due to the low coefficient of thermal expansion, a highly accurate system such as the DIL 402 C is necessary for detailed analysis of the material.