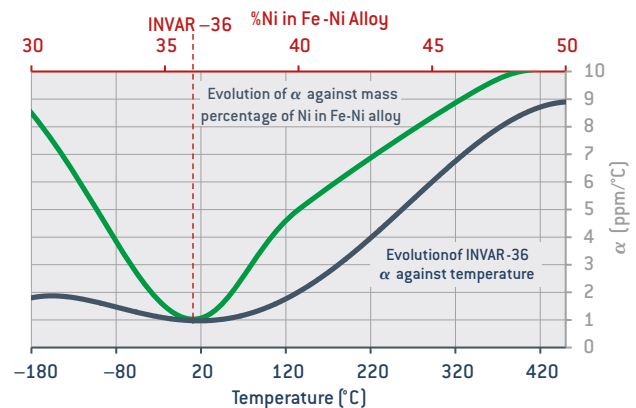


INVAR TUNING ELEMENTS

INVAR TUNING ELEMENTS WITH SELF-LOCKING SYSTEM

Tuning Elements for high frequency Space Applications

New



Evolution of the thermal coefficient of expansion of INVAR-36 and of Fe-Ni Alloy against respectively temperature (°C) and %Ni

OBJECTIVES

Increasing demands in Tuning Elements for high frequency Space Applications pushed us to develop a range of tuning elements based on Invar. Nowadays, and especially in space applications, working frequencies are shifting to higher values. This requires very precise tuning elements matching with smaller cavity filters working in Ka, Ku or even Q bands. In order to provide an efficient response to those constraints, EXXELIA TEMEX has developed an innovative and unrivalled solution: Invar Tuning Elements with Self-Locking System.

STATEMENT

Invar-36 is a unique alloy Iron-Nickel which has for main properties a very low thermal coefficient of expansion at a precise composition (64 % Fe / 36 % Ni).

With 1.1 ppm. K⁻¹ between 0°C and 100°C, Invar-36 is about 17 times more stable than Brass which is the traditional and most used alloy to make Tuning Elements.

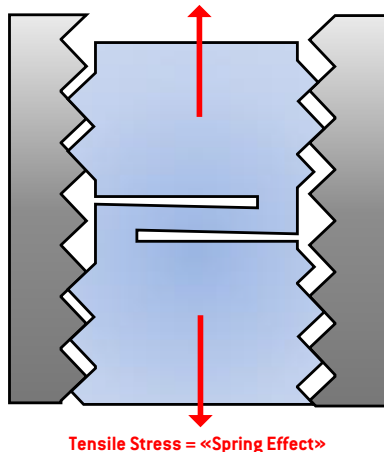
The working range of temperatures is so wide in Space that this property becomes essential for a reliable and stable cavity filter tuning.

Self-locking system is a technology commonly used on Tuning Element made of Brass or other alloys easy to machine.

This mechanism consists of two threaded segments separated by two parallel slots. After cutting the both parallel slots, the rotor is compressed in its length in order to create a plastic deformation. Thus, we have induced an offset between both threaded segments that generates a constant tensile stress in the rotor as soon as both threaded segments are screwed.

The spring effect created by the self-locking system has several advantages: controlled torque (no need to add a locking nut), high electrical contacts, size reduction and precision of the setting by avoiding any slack while tuning.

INVAR TUNING ELEMENTS



Self-Locking System operating principle

ABILITIES

Despite the high difficulty to machine Invar, we are now able to manufacture a complete Invar rotor with self-locking system. All our Invar rotors are customized and made under specific request. Our flexibility and our experience with Invar allow us to now respond to almost every request.

Our common abilities are displayed in the below table, valid with or without self-locking system:

Rotor diameter (mm)	Finest Thread (mm)	Maximum Length (mm)	Tolerances
1.2	0.25	8	6G
1.5	0.25	9	6G
2.0	0.25	11	6G

Beyond those values, we can make every intermediate diameters and even bigger than 2.0 mm. Given maximum lengths can be overtaken after a debug step.

If you need a complete Tuning Element with its bushing, we can design specific Brass bushing that will fit exactly with the Invar rotor. This will guarantee the best «setting drift» and therefore, the screwing torque will be perfectly controlled.

EXXELIA TEMEX has a very long space history with numerous companies. This new range of product has already been qualified by some of them. We escort our customers from the earliest step of design-in to the industrialization and we are always ready to take up new challenges.

They use our Invar Screws...

