ATI Defense

Mission Critical Metallics®

Nickel-Titanium Shape Memory and Superelastic Alloys

INTRODUCTION

NiTi, also known as Nitinol, was developed in the 1950s at the Naval Ordinance Laboratories. ATI started melting and fabricating NiTi ingots into various size bars in the 1970s. ATI is a fully integrated supplier of the alloy in many shapes, sizes, and compositions. We offer low-carbon compositions and other specialty grades.

NiTi is one of several alloy systems that can "remember" a preset form, exhibiting shape memory. Another feature of these alloys is superelasticity. The alloy can undergo deformation up to 8%, and upon removal of the load the material will return to its original shape. These effects are the result of a phase transformation within the alloy that takes place at specific temperatures controlled by the chemical composition. These two features have inspired numerous engineering applications for nickel-titanium alloys.

APPLICATIONS

NiTi applications include: armor; hydraulic fittings; wear-resistant ball bearings; temperature-sensitive actuators; vascular tools, including guide wires for placing catheters; arterial stents; and damping rods for seismic applications. NiTi has unique properties that can be tailored for a wide variety of applications.

AVAILABLE FORMS

- Wire
- Rod
- Bar
- Billet
- Sheet
- Plate

COMPOSITIONS

Other compositions not listed below may be available upon request.

Superelastic NiTi (meets ASTM F2063)	
Typical Transformation Temperature	
-10°C to 0°C A_f tested via DSC	
Typical Chemistry	**(WT. %)**
Ni	55.8 ± 2
Ti	Balance
C	< 0.01
O	< 0.05

Data are typical and should not be construed as maximum or minimum values for specification or for final design. Data on any particular piece of material may vary from those herein. The starburst logo is a registered trademark of ATI Properties, Inc. U.S. and foreign patents; other patents pending.

ATI Defense

Nickel Titanium Alloys

Shape Memory NiTi

Typical Transformation Temperature

90°C to 100°C A_f tested via DSC

Typical Chemistry	(WT. %)
Ni	54.5 ± 2
Ti	Balance
C	< 0.01
O	< 0.05

Shape Memory NiTiFe

Typical Transformation Temperature

-115°C to -140°C M_s tested via CLD at 40 Ksi load

Typical Chemistry	(WT. %)
Ni	52 ± 3
Ti	44.5 ± 1.5
C	< 0.010
O	< 0.05
Fe	3.5 ± 1.5

Shape Memory NiTiNb

Typical Transformation Temperature

< -50°C M_s tested via CLD at 20 Ksi load

> 45°C A_s tested via CLD at 40 Ksi load

Typical Chemistry	(WT. %)
Ni	48.5 ± 2
Ti	37 ± 2
C	< 0.010
O	< 0.05
Nb	14 ± 1

DSC: Differential Scanning Calorimetery CLD
Constant Load Dilatometery

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