INVAR 36

FeNi36, also known as Invar, Invar 36 or 64FeNi, is a nickel-iron alloy with a low coefficient of thermal expansion. It is widely used in applications with critical dimensional stability, such as Precision Instruments, Optical Devices, and Aerospace components.

AML3D has successfully used ARCEMY® and Wire-arc Additive Manufacturing to produce tooling for the aerospace industry, finding the material provides customers with the ability to make parts that require thermal stability in elevated temperature environments due to its extremely low coefficient of thermal expansion.

Wire Classification

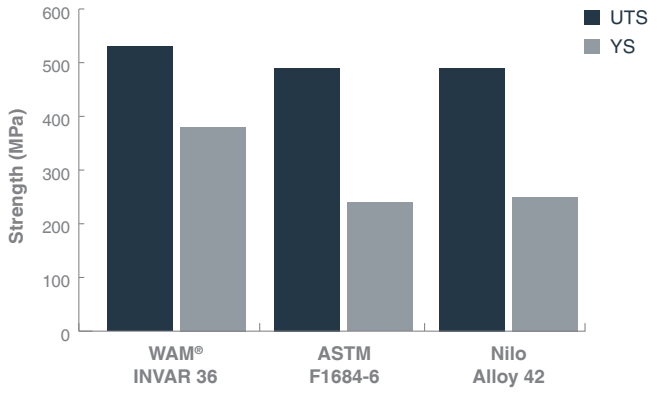
BOEING D33028, ASTM-F1684-6

Wire Diameter	Shielding Gas	Process
1.14 mm	Argon	WAM® – DED-Arc

Equivalent Designations

BOEING D33028, ASTM-F1684-6, UNS K93600, Nilo, Nilvar, Permalloy D.

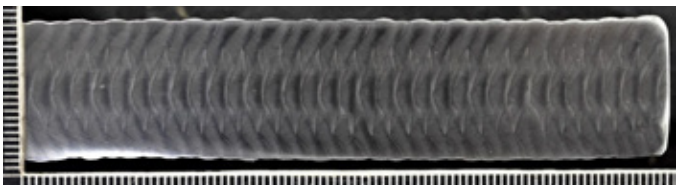
WAM® Invar 36 Tensile Strength Comparison



Properties

Composition	Amount %
Nickel	35-38
Carbon	≤ 0.1
Manganese	≤ 0.06
Phosphorus	≤ 0.025
Sulphur	≤ 0.025
Silicon	≤ 0.35
Chromium	≤ 0.50
Molybdenum	≤ 0.50
Cobalt	≤ 1.00
Iron	Rest

Mechanical	WAM® X, Y & Z Typical	AWS Typical
Ultimate Tensile Strength (MPa)	480 - 530	480
0.2% Proof stress (MPa)	340 - 380	310
Reduction in area (%)	-	-
Elongation (%)	23 - 28	30
Condition	as built	
Classification	ASTM F1684-6	
Density (kg/m³)	8050	
Peak Vickers Hardness (HV)	200	
Co. of Thermal Expansion (α)	2.05 - 2.67 @ 20 - 100˚C	



Invar 36 Macro examination.

Showing top and middle hardness survey locations.

WAM® Test Number, 210014AM-05, 210014AM-14, 210014AM-20. Mechanical property values for the 'as-deposited WAAM' values are based on the median value and repeatability testing. Deposited density can be lower than wire density. AWS data source: D20.1/D20.1M:2019 Specification for Fabrication of Metal Components Using Additive Manufacturing.

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