

# EIGENSCHAFTEN NANOFOLIEN

## General

Typical Products (others available)	NF40	NF60	NF80
Maximum Single Sheet Size	43.5" x 9" 1.105 mm x 229 mm		
Overall Thickness (others available)	40 microns	60 microns	80 microns
Reaction Energy	23 - 25 J/cm <sup>2</sup>	35 - 38 J/cm <sup>2</sup>	47 - 51 J/cm <sup>2</sup>
Heat of Reaction	1.050 - 1.250 J/g		
Reaction Velocity	2 - 10 m/s		
Estimated Maximum Reaction Temperature	1.400°C - 1.600°C		
Composition Before Reaction	Alternating layers of NiV and Al		
Composition After Reaction	50Ni/50Al		
Appearance	Shiny, metallic foil		
Outer Layers	InCuSiI 1 micron per side		
RoHS Compliant	Pb-Free		

NanoFoil® products are composed of multiple nano-layers of nickel and aluminium. Upon reaction, nickel aluminide (NiAl) is formed. The following data was obtained from published literature and may be useful in estimating the physical properties of the end use.

## Reaction NanoFoil® Nickel Aluminium Properties

Density	5.9 g/cm <sup>3</sup>
Thermal Conductivity	60 W/mK
Coefficient of Thermal Expansion	13.2 x 10 <sup>-6</sup> /K
Specific Heat	0.64 J/g x K
Melting Point	1.638°C
Electrical Resistivity	8 - 10 x 10 <sup>-8</sup> W x m
Rc Hardness (annealed)	12
Young's Modulus	188 - 235 GPa
Fracture Strength	200 - 500 MPa
Fracture Toughness at 21°C	12 - 15 MPa x m <sup>-0.5</sup>
Crystal Structure	B2 (cubic)

## Safety

Impact Sensitivity	Passes a 2 kg weight drop from 45 cm on 1.6 cm <sup>2</sup> (1/4 in <sup>2</sup> ) area
Auto Ignition Temperature	>200°C (392°F)

## Transportation

DOT Shipping Designation	CFR49 4.1: flammable solid
CAS Registry Number	12003-78-0
Proper Ship Name	„Flammable Solid Inorganic, N.O.S. UN 3178 class 4.1 Packing Group II“
HS Code	7106.92.0000

## InnoJoin GmbH & Co. KG

## Typische Einsatzfelder zur Verwendung von Nanofolien

- Energietechnik: Fügen von Keramik-Metall-Kombinationen
- Photovoltaik: Fügen von Stromleitern an Anschlusselemente
- Biomedizin: Fügen von komplexen, temperaturempfindlichen Legierungen
- Elektronik: Anschlusskontaktierung von Sensorabgriffen in der Elektromobilität, Fügen von SMD-Bauelementen auf Kühlkörper
- Automobilindustrie: Kontaktierung von Steckelementen sowie Montage von Gehäuseteilen
- Optik: Fügen von Saphir auf Speziallegierungen