

● Raw material minimum tensile properties

Ultimate Tensile Strength	170 ksi
0.2% Yield Strength	150 ksi
Elongation	15%
Reduction of Area	40%

● MP98T alloy chemistry (AMS 5842)

Co	Ni	CR	Fe	Mo	Ti	Nb	Al
36	25	19	9	7	3	0.6	0.2

● Typical properties of MP98T Alloy

Ultimate tensile strength	185 ksi
0.2% Yield Strength	170 ksi
Elongation	20%
RA	55%
K _{JIC}	≥200 ksi in. ^{-1/2}

The SPS Superalloy Family

SPS Technologies Aerospace Fastener Group also manufactures fastener products from these other SPS-developed superalloys.

● MULTIPHASE® MP35N® Superalloy:

Provides the ultimate combination of strength and corrosion resistance. The recommended temperature range is from cryogenic through 750°F.

● MULTIPHASE® MP159® Superalloy:

Formulated to meet the demands of turbine engine manufacturers, offers an operating temperature capability to 1100°F, while maintaining the high strength of MP35N alloy and excellent corrosion resistance.

● AEREX® 350:

Greater toughness than the MULTIPHASE alloys at cryogenic temperatures. Pushes the maximum operating temperature envelope to 1350°F. No other fastener alloy can match the combination of strength and temperature range. Corrosion oxidation and sulfidation resistance are excellent.



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NEW **SPS MP98T[®]** **Fasteners**



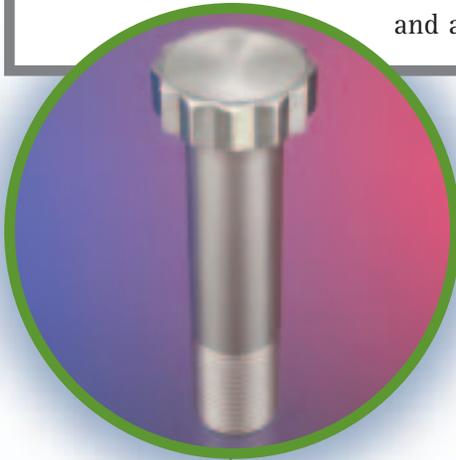
● *Superalloy Fasteners*

*Offering An Unmatched
Combination of Strength,
Toughness And
Corrosion Resistance*

SPS MP98T® Fasteners: A Combination of Properties You

SPS Technologies, Inc., a leading manufacturer of high-strength fasteners and precision components since 1903, offers a line of fasteners manufactured from new SPS MP98T® superalloy. This new alloy exhibits a combination of strength, fracture toughness and corrosion resistance not previously available in a fastener material.

Originally developed to meet the special requirements of marine applications, the new MP98T alloy's strength levels, unparalleled fracture toughness, wide temperature range and corrosion resistance also make it suitable for aerospace engine and airframe applications.



Unrivaled Aerospace Advantages

The new MP98T fasteners offer users a minimum tensile strength of 180 ksi. Fracture toughness values for MP98T specimens tested in accordance with ASTM E1820 exceed 200 ksi in.^{-1/2}. The alloy also resists embrittlement in high-pressure hydrogen environments, making it suitable for use in rocket motors using liquid hydrogen for fuel.

Leaders in Alloy R&D

Based on SPS Technologies' high-temperature, high-strength and corrosion-resistant MULTIPHASE MP159® superalloy, SPS engineers modified the material processing steps to impart increased fracture toughness for the MP98T alloy. The new alloy has the same chemistry as MP159 (AMS 5842) with different cold work and age hardening parameters.

MP98T bolts and nuts are available in a variety of configurations. Bolts have been produced in sizes up to 1.75 in. diameter, but even larger sizes are possible.

Strength

Won't Find Anywhere Else



MP98T[®] superalloy

Aerospace Application Advantages

- *High reliability*
- *Low inspection costs*
- *Low MRO costs*
- *Decreased life cycle costs*

Insight to a New Superalloy

MP98T alloy's principle strengthening mechanism is the solid-state phase transformation of part of the matrix from a face-centered cubic (fcc) crystal structure to a hexagonal close-packed (hcp) structure by cold working. Called the MULTIPHASE Reaction, this transformation is due to the high cobalt content in the alloy.

The presence of two distinct crystal structures creates a barrier to the motion of dislocations and leads to pronounced strengthening while retaining ductility. Subsequent age hardening acts to stabilize these two phases through the process of solute partitioning, which contributes to further strengthening. In addition, age hardening causes the precipitation of the gamma-prime (γ') phase which provides further strengthening.

Toughness