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Typical aerospace-standard materials

Material - No.	Description	Comparable to other standards	R_m [MPa]	A_5 [%]
1.4314.7	Stainless, austenitic steel 0,05C-18Cr-9Ni	X5 CrNi 18 9 ~ 1.4301 / AISI 304	860 *	10 *
Special Properties: weldable, resistant to erosive corrosion, intercrystalline and stress corrosion possible (passivating ! !) **Application:** rustless components, fasteners and bolts with improved strength properties				
1.4534.4 1. 4534.5 1. 4534.6	High-strength precipitation-hardening stainless steel / 13-8 Mo 0,04C-13Cr-8Ni-2,2Mo-1Al	AMS 5629 G H 1050 H 1000 H 950 EN 3357 EN 3358	1220 - 1400 1400 - 1550 1500 - 1650	10 9 9
Special Properties: resistant to corrosion and resistant to stress corrosion, highly strength up to elevated temperatures of 315°C, weldable, perfect tensile strength and toughness - isotrope **Application:** highly strenght chassis components, fasteners, bolts				
1.4544.9 1.4544.7	Stainless, austenitic steel 0,05C-18Cr-10Ni-0,4Ti	X10 CrNiTi 18 9 ~ 1.4541 / AISI 321 EN 3487	500 600	40 35
Special Properties: resistant to erosive and intercrystalline corrosion, weldable, scale resistant up to 850°C **Application:** corrosion resistant, scale resistant components up to elevated temperatures of 850°C				
1.4545.4 1.4545.5	precipitation-hardening stainless steel / 15-5 PH 0,05C-15Cr-5Ni-4Cu	AMS 5659 R H 1025 H 925 EN 2817	1070 1170	11 9
Special Properties: low-destortion, weldable, good toughness and strength properties also in transverse direction, lower delta-ferrite content than 1.4548 **Application:** high corrosion resistance in combination with good strength properties up to elevated temperatures of approx. 300°C				

* semifinished product diameter ≤ 18 mm

Material - No.	Description	Comparable to other standards	R_m [MPa]	A_5 [%]
1.4548.4	Stainless, austenitic steel / 17-4 PH 0,05C-16Cr-4Ni-4Cu	AMS 5643 T H 1025 H 925 H 900	1070	11
1.4548.5			1170	10
1.4548.6			1310	10
Special Properties: corrosion resistant, low tendency to distortion, appropriate for welding **Application:** components with high strength and high corrosion resistance up to 300°C				
1.4939.5	Heat-resisting hardened tempered steel 0,1C-12Cr-1,8Mo-2,5Ni-0,3V	---	900 - 1100	14
1.4939.6			1100 - 1300	10
Special Properties: weldable, corrosion resistant if a fine grounded surface is available **Application:** impeller components, fasteners, bolts, nuts up to approx. 550°C				
1.4944.4	Heat-resisting, precipitation-hardening steel / A286 0,06C-25Ni-15Cr-2,1Ti-1,2Mo	AMS 5731 L AMS 5737 P	960	12
1.4944.6		AMS 5853 C	1100	8
		AMS 5726 E	1379	8 ++
Special Properties: heat resistant and resistant to erosive corrosion up to approx. 725°C (comparable to austenitic 18/8 CrNi-Steel), resistant to stress corrosion **Application:** gas turbine components, shafts, bolts, fasteners and nuts up to 700°C, assembling with light metals possibel (expansion coefficient !)				
1.6604.4	Low-alloyed hardened tempered steel 0,3C-2Cr-2Ni-0,4Mo	30CrNiMo8 / 1.6580 / EN 2475 30 NCD 16 (AIR 9160) EN 3517 EN 3519	900 - 1100	12
1.6604.5			1100 - 1300	10
1.6604.6			1250 - 1450	9
Special Properties: not weldable and not corrosion resistant, ductile **Application:** components with high requirements to strength and toughness up to 350°C				

Material - No.	Description	Comparable to other standards	R_m [MPa]	A_5 [%]
1.7224.5 1.7224.6	Low-alloyed hardened tempered steel 0,35C-1Cr-0,2Mo	34CrMo4 / 1.7220 35 CD 4 / EN 2446 35 NC 6 / EN 2438 AMS 6322 P AISI 8740	900 - 1100 1100 - 1300	12 10
Special Properties: not weldable and not corrosion resistant (cadmium plated !) **Application:** high strength fasteners, bolts and nuts up to a maximum of 200°C				
1.7734.4 1.7734.5 1.7734.6	Low-alloyed hardened tempered steel 0,15C-1,4Cr-0,9Mo-0,25V	15CrMoV6 ~ 1.7262 EN 3523	700 980 - 1180 1080 - 1250	13 11 10
Special Properties: weldable, not corrosion resistant, improved high temperature strength and better tempering strength as the material 1.7214 **Application:** weldable components with high tempering strenght up to approx. 500°C				
1.7784.5 1.7784.6	High strength hardened tempered steel 0,4C-5Cr-1,3Mo-0,5V	E40CDV20 H11 accord. to AMS 6487 K	1520 - 1670 1800 - 2000	9 7
Special Properties: highly temperature and highly strength up to approx. 450°C, not corrosion resistant, low tendency to distortion, limited weldable, nitrable, scaling possible already at 500°C **Application:** gas tanks, chassis components, fasteners and bolts with highly strength requirements up to elevated temperatures of approx. 500°C				
4340 Alloy Steel	Hardened tempered steel 0,4C-0,8Cr-1,8Ni-0,7Mn-0,25Mo	36CrNiMo4 35 NCD6 AMS 6415	1100 - 1300 1400 – 1550	9 9
Special Properties: can be heat treated for a high strength level in combination with good toughness, wear resistance and fatigue properties up to 300°C. **Application:** fasteners and bolts with high strength requirements up to elevated temperatures in the commercial and military aircraft industry				

Material - No.	Description	Comparable to other standards	R_m [MPa]	A_5 [%]
2.4631.7	High strength precipitation-hardening Nickel-Alloy „Nimonic 80A“ 20Cr-2,3Ti-1,4Al-0,1C	2.4952 (NiCr20TiAl)	1000	20
Special Properties: high temperature strength and scale resistant up to 1000°C, weldable, corrosion resistant, hot gas corrosion with S and Na compounds **Application:** turbine blades, turbine rings, turbine disks and fasteners up to elevated temperatures of 815°C				
2.4668.7 2.4668.9	High strength precipitation-hardening Nickel-Alloy „Inconel 718“ 19Cr-18Fe-5Nb-3Mo-0,05C	AMS 5662 M AMS 5663 M EN 4376 AMS 5962 A EN 3666	1270 1550 - 1750	11 8
Special Properties: high temperature strength, scale resistant and ductile up to approx. 700°C, high resistant to oxidation and corrosion, stress corrosion resistant, weldable **Application:** fasteners, bolts, turbine and rocket components up to elevated temperatures of 700°C				
3.7164.1 3.7164.7	(α+β) – Titanium-Alloy Ti-6Al-4V	AMS 4928 U AMS 4965 L	900 1100 ***	10 8
Special Properties: high ratio of strenght to weight, high fracture toughness, corrosion resistant, resistant to stress corrosion up to 300°C, weldable, reaction with gases already at 200°C possible – attention: lost in ductility to improve the fretting and contact corrosion the anodic oxidation and thin film coating with lubricant on molybdenum disulphide will be helpful **Application:** turbine blades and discs, fasteners and bolts for the aircraft and space industry				

*** semifinished product diameter ≤ 13 mm

Special alloys for high strength applications

Material - No.	Description	Comparable to other standards	R_m [MPa]	A_5 [%]
MP 35 N	Cobalt-based alloy 35Ni-20Cr-10Mo	AMS 5844 H AMS 5845 J	1800 - 2000	8 ++
Special Properties: highly strength up to 550°C, ductile, corrosion and stress corrosion resistant, resistant to hydrogen embrittlement **Application:** highly strength and stress corrosion resistant fasteners and bolts				
MP 159	Cobalt-based alloy 25Ni-19Cr-7Mo-9Fe-0,5Cb-2,9Ti-0,5Cb-0,2Al	AMS 5843 F	1800	6 ++
Special Properties: high strength up to 600°C, corrosion resistant, resistant to hydrogen embrittlement **Application:** high strength and corrosion resistant fasteners and bolts				
30NCD16	Hardened tempered steel 0,3C-3,5Ni-1,2Cr-0,45Mo	~ 1.6747 EN 2137	1080 - 1230 1220 - 1370 +++	10 8
Special Properties: highly strength and ductile, not corrosion resistant, high depth of hardness **Application:** components with high bending stress, impact stress and shock loading				
E35NCD16	Hardened tempered steel 0,35C-3,8Ni-1,7Cr-0,3Mo	1.6773 EN 2480	1080 - 1270 1230 - 1380 +++	10 8
Special Properties: comparable to 30 NCD 16 **Application:** highly stressed components with a extensive design and a high wear resistance				
Marval X12H	High-strength precipitation-hardening stainless steel		1400 1520	10 9
Special Properties: highly strength and ductile, corrosion resistant and resistant to stress corrosion **Application:** highly stressed components for chassis, fasteners , bolts and components for applications in the aerospace industry				

Material - No.	Description	Comparable to other standards	R_m [MPa]	A_5 [%]
VascoMax C-300 Alloy	High-strength nickel maraging steel 18,5Ni-9Co-4,9Mo-0,65Ti	AMS 6514 E	2000	8 ++
Special Properties: high ultimate and yield strength, high toughness, ductility and impact strength, hardness and wear resistant, high resistance to crack propagation, good weldability **Application:** missile and rocket motor cases, wind tunnel models, landing gear components, high performance shafting, gears and fasteners				
MLX 17	High-strength precipitation hardened stainless steel 12Cr-11Ni-2Mo-1,5Al-0,3Ti	AMS 5937	1520 1680	11 ++ 10 ++
Special Properties: excellent balance between strength and toughness properties, excellent fatigue resistance, good resistance to corrosion and stress corrosion, very good weldability **Application:** missile components, offshore industry, fasteners, structural parts for the aerospace industry, high pressure pumps and valves				
Ti Beta-C	Ti-3Al-8V-6Cr-4Mo-4Zr Titanium near β-Alloy	--- cold drawn	1250 1400	9 8
The mechanical properties have to be adjusted by the heat treatment and manufacturing process parameters and are only "provisional values". The effectively demands of mechanical properties at the finished components have to be clarified first. **Special Properties:** extremely light with a density from 4,82, high-strength and ductile compared to TiAl6V4. **Application:** light and high strength fasteners and bolts with good processing and formability				

++ measured with a A4 test sample according to AMS
+++ a higher strength is possible, but with a lost in ductility

Remark:

The specified mechanical values refer to semifinished rolled or pulled bars parallel to the axis. In the case of single values in the above tables these are represent minimum values. Furthermore the values are considered to semifinished products with a diameter up to 30 mm.