BH DÖVME METAL SANAYİ ve TİCARET LTD. ŞTİ.
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Grade	Code	UNS	Titanium
Titanium Grade 21	TiGr21	R58210	

General Characteristics

TiGr21, is a metastable beta titanium alloy that combines high strength with relatively low density. In the solution-treated condition, it offers good formability, while subsequent aging can significantly increase its mechanical strength. The alloy is distinguished by its ability to retain strength and structural stability at elevated temperatures, together with good creep and oxidation resistance. Its beta structure provides favorable cold-forming capability compared with many high-strength titanium alloys. Its high specific strength and thermal stability make it advantageous where both weight reduction and demanding mechanical performance are required.

Chemical Composition (TiGr21)

Ti %	Mo %	Nb %	Al %	Si %	Fe %	O %	C %	N %	H %	* %	** %
Bal.	14.00–16.00	2.40–3.20	2.50–3.50	0.15–0.25	≤0.40	0.11–0.17	≤0.05	≤0.05	≤0.015	≤0.10	≤0.40

**Other, each*
*** Other, total*

Mechanical Properties

Product Form	Rp0.2 [MPa]*	Rm [MPa]*	Elongation [%]*	Density [g/cm³]
Bar	≥759	≥793	≥15	4.93
Plate				
Sheet				

** Solution Treated*

Product Form	Rp0.2 [MPa]*	Rm [MPa]*	Elongation [%]*	Density [g/cm³]
Round Bar	1104–1276	≥1172	≥8	4.93
Plate	Per order requirements	Per order requirements	Per order requirements	
Sheet**	≥1103	≥1172	≥4	

**Solution Treated + Aged (STA)*
*** Minimum values for the condition: 843°C solution treatment + air cooling + aging at 538°C / 8 h.*

Applications

Sector / Application Area	Typical Products and Components
Aerospace – Engine and Exhaust Systems	Engine exhaust plugs, nozzle assemblies, high-temperature engine structural components
Aerospace – Airframe Structural Systems	Warm airframe structures, honeycomb panels, high-strength fasteners
Aerospace – Tubing and Fluid Systems	Welded tubes, seamless tubes, tubing and structural fluid-system components for aircraft hydraulic systems
Advanced Composites / Space Technologies	Titanium matrix composites (MMC), fiber-reinforced metal-matrix laminates, thin titanium-foil-based composite structures

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Technical Notes

TiGr21, is particularly suited to elevated-temperature applications in the approximate range of 228°C to 593°C and offers good weldability characteristic of beta titanium alloys. Machining is preferably carried out after aging because the heavily cold-worked surface layer produced during machining may respond differently during subsequent aging. Prolonged exposure of solution-treated material in the 260–427°C range should be controlled to minimize the risk of embrittlement. In addition, when processing above the beta transus temperature of approximately 807°C, time at temperature should be kept as short as practical to limit excessive grain growth.

Specification

TiGr21, Titanium Grade 21, Beta 21S, TIMETAL® 21S, UNS R58210, Ti-15Mo-3Nb-3Al-0.2Si

Standards

Product Form	ASTM	AMS
Round Bar	ASTM B348/B348M – Grade 21	—
Plate	ASTM B265 – Grade 21	—
Sheet	ASTM B265 – Grade 21	AMS 4897F

Other Grades for Consideration

1. TiGr5, Ti6Al4V