15CDV6 ALLOY STEEL

Typical Applications

Roll Cages

Pressure Vessels

Rocket Motor Casings

Subframes

Track and Push rods

Wishbones

Uprights

15CDV6 is a low carbon alloy steel with very good yield strength. It also has very good toughness and excellent weldability. Welding can be achieved without subsequent heat treatment and with negligible loss of properties. Related Specs - W.Nr 1.7734, AIR 9160C, GT1000

Its defining characteristic is the ability to be welded without subsequent heat treatment while maintaining negligible loss of properties. This unique capability dramatically simplifies fabrication processes, reduces production costs, and enables the creation of complex structural assemblies that would be impractical with traditional high-strength steels requiring post-weld heat treatment.

The steel's composition features carefully balanced additions of chromium (1.25-1.50%), molybdenum (0.80-1.00%), and vanadium (0.20-0.30%) alongside a low carbon content (0.12-0.18%). This deliberate chemistry creates a material that achieves tensile strengths ranging from 980 to 1280 MPa depending on heat treatment condition, with yield strengths exceeding 930 MPa in fully hardened conditions. The chromium enhances hardenability and provides resistance to elevated temperature degradation, while molybdenum increases overall strength and creep resistance. Vanadium forms fine carbides that contribute to grain refinement, resulting in superior toughness and impact resistance.

When properly heat treated through quenching and tempering processes, 15CDV6 (W.Nr 1.7734, AIR 9160C, GT1000) can achieve hardness levels between 291-352 HB, providing excellent wear resistance for components subjected to sliding contact and abrasion. The material also exhibits a favorable strength-to-weight ratio compared to heavier alloy alternatives, making it particularly valuable in weight-critical aerospace applications where every gram matters.

15CDV6's thermal stability allows it to maintain mechanical properties at elevated service temperatures, withstanding operating conditions up to approximately 400°C without significant degradation. This heat resistance, combined with its excellent fatigue resistance under cyclic loading, makes it ideally suited for components experiencing repetitive stress cycles and temperature fluctuations during operation.

Primary applications include roll cage structures for racing vehicles, pressure vessels for rocket propulsion systems, solid rocket motor casings, aircraft fuselage components and stringers, suspension components such as wishbones and push rods, structural subframes, landing gear elements, and high-stress fasteners throughout aerospace assemblies. The material's excellent weldability enables fabrication of complex truss structures and space frames that would be challenging or impossible to manufacture from higher-carbon steels requiring extensive post-weld heat treatment.

Technical specification

Related Specifications

W.Nr 1.7734

AIR 9160C

Specific Gravity

7.8 g/cm3

Chemical Composition (WT %)

	Min	Max
C	0.12	0.18
Si	-	0.20
Mn	0.80	1.10
S	-	0.015
P	-	0.020
Cr	1.25	1.50
Mo	0.80	1.00
V	0.20	0.30

Typical Mechanical Properties (in the solution treated condition)

	Condition	1.7734.2 (Annealed)	1.7734.4	1.7734.5	1.7745.6
0.2% Proof Stress	MPA	-	550	790	930
Tensile Strength	MPA	-	700	980-1180	1080-1250
Elongation	%	-	13	11	10
Reduction	HB	197	207	293-352	321-363

What is 15CDV6 Alloy Steel?

15CDV6 is a low-carbon chromium-molybdenum-vanadium alloy steel developed specifically for high-performance structural applications in aerospace, motorsport, and defense industries. Its composition includes approximately 0.15% carbon, 1.4% chromium, 0.9% molybdenum, and 0.25% vanadium. The low carbon content ensures excellent weldability without cold cracking risks, while the chromium provides hardenability and oxidation resistance. Molybdenum increases strength at both ambient and elevated temperatures, and vanadium promotes fine grain structure for superior toughness. This steel is heat-treatable to achieve tensile strengths exceeding 1100 MPa while maintaining good ductility and impact resistance. 15CDV6 is widely recognized as offering superior yield strength compared to SAE 4130 while providing better weldability than higher-strength alternatives like 30HGSA.

Can 15CDV6 be welded without heat treatment?

Yes, one of 15CDV6's most valuable characteristics is its ability to be welded in the fully heat-treated condition without requiring pre-weld or post-weld heat treatment.

Unlike many high-strength steels that become brittle or develop cold cracks when welded, 15CDV6's controlled low-carbon chemistry and balanced alloy composition allow welding using standard techniques including TIG (GTAW), MIG (GMAW), and stick (SMAW) processes with minimal risk of cracking or significant property loss in the heat-affected zone. Proper joint preparation, appropriate filler metal selection (typically 8CD12 or similar), and controlled heat input are still important, but the elimination of mandatory post-weld heat treatment dramatically reduces fabrication complexity and cost, particularly for large structural assemblies that would be difficult to fit into heat treatment furnaces.

This makes 15CDV6 exceptionally practical for complex aerospace frames, roll cages, and pressure vessel fabrication.

What are typical applications for 15CDV6 steel?

15CDV6 finds extensive use in weight-critical, high-stress applications across aerospace, motorsport, and defense sectors. In aerospace, it's employed for aircraft fuselage structures and stringers, landing gear components, rocket motor casings, pressure vessels, and structural fasteners where high strength-to-weight ratio is essential.

The motorsport industry utilises 15CDV6 for roll cage construction, suspension components including wishbones and track rods, vehicle subframes, and uprights that must withstand severe impact loads while meeting weight restrictions. Defense applications include components for military vehicles and systems requiring ballistic protection combined with structural integrity.

The material's combination of weldability, strength, and toughness makes it particularly suitable for fabricating complex structural assemblies that experience dynamic loading, vibration, and occasional impact while operating in demanding environmental conditions.

How does 15CDV6 compare to similar aerospace steels?

15CDV6 offers distinct advantages over alternative aerospace structural steels. Compared to SAE 4130 (25CrMo4), 15CDV6 provides superior yield strength (typically 930 MPa versus 650-850 MPa) while maintaining comparable weldability and toughness. Against 30HGSA, a traditional aerospace structural steel, 15CDV6 delivers similar strength levels but with dramatically improved weldability, eliminating the mandatory post-weld heat treatment that 30HGSA requires. This makes fabrication of large, complex structures far more practical and cost-effective.

The material's vanadium addition provides finer grain structure than molybdenum-only steels, resulting in better impact resistance and fatigue properties. While steels like 4340 can achieve higher ultimate strengths, they sacrifice weldability and require more complex heat treatment protocols. 15CDV6 occupies an optimal balance point, delivering aerospace-grade strength with manufacturing-friendly characteristics that reduce production costs and lead times without compromising structural performance or safety margins.

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