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4330 MOD Alloy Steel – AMS 6411 VAR - UNSK23080

4330 MOD VAR AMS 6411 is AISI 4330 Steel modified with the addition of Vanadium. It is a low alloy steel capable of being heat treated to high strength levels. Vanadium is added to improve impact strength and hardenability. This is a premium aircraft quality steel usually produced as a consumable electrode remelted product (VAR). AMS 6411 also allows the 2nd melt to be ESR (Electro-Slag Remelting) when specified by the end-user.

Service Steel Aerospace is one of the largest distributors / suppliers of 4330 Alloy Steel available in multiple forms including round bar and block. See below for product size ranges stocked.

4330 Mod VAR Alloy Steel Applications:

Aerospace applications are those requiring high tensile strength and good ductility, coupled with high impact strength, superior transverse properties, and hardness. The carbon content lower than AISI 4340 makes this grade useful for applications that involve shock loading or stress concentration.

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Common Trade Names:

- 4330+V
- 4330 CEVM
- 4330 Modified
- 4330M
- Lescalloy 4330+V VAC-ARC
- 4330V
- SAE 4330M
- 34CrNiMo6V
- HS220-27 Alloy Steel

Common Specifications:

- AMS 6411
- AMS 6427 except VAR
- BMS 7-122
- BMS 7-27 except VAR
- MIL-S-8699
- EMS 96242
- CE 0906
- FMS 1012
- GM 1010

Stocked Sizes:

Note: Stocked as Normalized & Tempered (N&T)

- Rounds: Rough Turned (RT) N&T:
  - 33 Diameters 0.500" through 10"
- Blocks (Bars): Forged, Machined 4 sides N&T
  - Stocked sizes
    - 12" x 23" or smaller
    - Custom thicknesses & widths available saw-cut

Macrostructure standards:

Class	Condition	Severity
1	Freckles	A
2	White Spots	A
3	Radial Segregation	B
4	Ring Pattern	B

Physical Properties:

- Density: 0.2836 #/in^3

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Chemical Composition:

Symbol	Element	Min %	Max %
C	Carbon	0.28%	0.33%
Mn	Manganese	0.65%	1.00%
Si	Silicon	0.15%	0.35%
P	Phosphorus		0.015%
S	Sulfur		0.015%
Cr	Chromium	0.75%	1.00%
Ni	Nickel	1.65%	2.00%
Mo	Molybdenum	0.35%	0.50%
V	Vanadium	0.05%	0.10%
Cu	Copper		0.35%

Fabrication

Forging	1950° – 2255° F (1066° – 1235° C)
Machinability	Normalize & temper at 1250° F (675° C) prior to machining. Machining at max strength is usually followed by stress relieving
Welding	Arc or Resistance Flash weldable

Heat Treatment

Type of Heat Treating	Process
Normalize	1600° - 1700° (870° - 925° C), air cool
Anneal	1525° - 1575° (830° - 860° C), furnace cool
Harden	Austenitize 1550° - 1600° (845° - 870° C), water, oil, or polymer quench
Temper	500° - 700° (260° - 240° C) for tensile 220-240 ksi

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Longitudinal Tensile Properties:

Property	Value
Tensile Strength	220 ksi
Yield Strength 0.2% offset	185 ksi
Elongation	10%
Reduction of Area	35%

After heat treating specimens per paragraph 3.4.5

Minimum Transverse Tensile Properties per AMS 6411:

Cross-section Area	Tensile Strength	Yield Strength 0.2% Offset	Avg. Reduction of Area	Individual Reduction of Area
Up to 144 in^2, incl	220 ksi	185 ksi	35%	30% min
Over 144 in^2 to 225 in^2, incl	220 ksi	185 ksi	30%	25% min
Over 225 in^2	220 ksi	185 ksi	25%	20% min