4330 MOD Alloy Steel - AMS 6411 VAR - UNSK23080

It is a low alloy steel capable of being heat treated to high strength levels.

4330 MOD VAR AMS 6411 is AISI 4330 Steel modified with the addition of Vanadium. 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.

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.

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

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%

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

Macrostructure standards:

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

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

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 in2, incl	220 ksi	185 ksi	35%	30% min
Over 144 in2 to 225 in2, incl	220 ksi	185 ksi	30%	25% min
Over 225 in2	220 ksi	185 ksi	25%	20% min