

## OIL TEMPERED CHROMIUM-VANADIUM WIRE COMMERCIAL QUALITY

Chromium-vanadium is the most popular alloy steel for springs that are required to withstand a large number of operating cycles. It is medium carbon steel with chromium and vanadium added to increase its hardness and tensile strength. The pre-tempered material is best for valve or gun springs. Springs can be used at extremely high stresses in applications where they will also be subject to extreme shock and impact loading. For springs of high endurance, the alloy is usually used at a hardness of Rockwell C44-49. Where extreme stresses and short life are expected, the hardness is increased to Rockwell C50-53.

In sizes .375 and under, chromium-vanadium alloy springs have no higher endurance limits than plain carbon steels of valve spring quality. However, the alloy springs have less tendency to relax at temperatures as high as 400°F and satisfactory operation can be obtained at temperatures up to 750°F. when loads are not severe, when the stress range is narrow, or when stress changes are infrequent. The following tolerances are standard.

Recommendations for heat treatment: Immediately after coiling, the springs should be stress relieved at about 400°C. (750°F.) for 30 minutes. After shot peening, the springs should be stress relieved at about 250°C.(480°F.) for 30 minutes.

Gibbs oil tempered commercial quality chromium-vanadium meets ASTM-A-231 specification. Wire is available in size ranges from .125 to .625

Chemical Composition Per ASTM-A-231 *Max value		Nominal Diameter (Inches)	Tolerance (inch)
Carbon	0.48 to 0.53%	Over .125 to .375 incl.	+/- .002
Manganese	0.70 to 0.90%	Over .375 to .500 incl.	+/- .003
Phosphorus	0.040% *		
Sulfur	0.040% *		
Silicon	0.15 to 0.35%		
Chromium	0.80 to 1.10%		
Vanadium	0.15% Min.		

Tensile Strength Table ( ASTM-A-231)

Dia. Inch	Tensile Min PSI	Tensile Max PSI	Dia. Inch	Tensile Min PSI	Tensile Max PSI
.135	235,000	255,000	.500	190,000	210,000
.162	225,000	245,000			
.192	220,000	240,000			
.244	210,000	230,000			
.283	205,000	225,000			
.312	203,000	223,000			
.375	200,000	220,000			
.438	195,000	215,000			

The above charts are intended to provide general background information. You should also review the appropriate material specification. Please contact Gibbs if you have any questions.