Material Selection

High carbon spring steels are the most commonly used of all materials. Try to use these materials in preference to others because they are least expensive, readily available, easy worked, and most popular. These materials are not satisfactory for high or low temperatures or for shock or impact loading.

	Material	Method of Manufacture • Chief Uses • Special Properties
High Carbon Wire	Music Wire ATSM 228	Cold drawn. High and uniform Tensile. High quality springs and wire forms
	Hard Drawn ASTM A 227	Cold drawn. Average stress applications. Lower cost springs and wire forms
	High Tensile Hard Drawn ASTM A 679	Cold drawn. Higher quality springs and wire forms.
	Oil Tempered ASTM A 229	Cold drawn and heat treated before fabrication. General purpose spring wire.
	Carbon Valve ASTM A 230	Cold drawn and heat treated before fabrication. Good surface condition and uniform tensile.

The alloy spring steels have a definite place in the field of spring materials. Try to use these materials, particularly for conditions involving high stress and for applications where shock or impact loading occurs. Alloy spring steels can also withstand higher and lower temperatures than the high-carbon steels and are obtainable in either the annealed or pre-tempered conditions.

	Material	Method of Manufacture • Chief Uses • Special Properties
Alloy Steel Wire	Chrome Vanadium ATSM A231	Cold drawn and heat treated before fabrication. Used for shock loads and moderately elevated temperatures.
	Chrome Silicon ASTM A401	Cold drawn and heat treated before fabrication. Used for shock loads and moderately elevated temperatures. (***Mid-West Spring recommends that Chrome Silicon never be electro-plated.)***

The use of stainless steels has increased considerably in recent years. Several new compositions are now available to withstand corrosion. All of these materials can be used for high temperatures up to 650°F.

	Material	Method of Manufacture • Chief Uses • Special Properties
Stainless Steel Wire	ASI 302-304 ATSM 313	Cold drawn. General purpose corrosion and heat resistant. Magnetic in spring temper.
	ASI 316 ASTM A313	Cold drawn. Heat resistant and better corrosion resistant than 302. Magnetic in spring temper.
	17-7 PH ASTM A313 (631)	Cold drawn & precipitation hardened after fabrication. High strength and general purpose corrosion resistance. Slightly magnetic in spring temper.

Copper-based alloys are important spring materials because of their good electrical properties combined with their excellent resistance to corrosion. Although these materials are more expensive than the high-carbon and alloy steels, they nevertheless are frequently used in electrical components and in subzero temperatures. All copperbased alloys are drawn to the American wire gage (same as Brown & Sharpe gage) and are magnetic.

	Material	Method of Manufacture • Chief Uses • Special Properties
Non-Ferrous Alloy Wire	Phosphor Bronze Grade A ASTM B159	Cold drawn. Good corrosion resistance and for electrical conductivity.
	Beryllium Cooper ASTM B197	Cold drawn and may be mill hardened before fabrication, good corrosion resistance and electrical conductivity. High physicals.
	Monel 400 AMS 7233	Cold drawn. Good corrosion resistance at moderately elevated temperatures.
	Monel K500 QQ-N-286	Excellent corrosion resistance at moderately elevated temperatures.

Nickel-based alloys are especially useful spring materials to combat corrosion and to withstand both elevated and below-zero temperature applications. Their magnetic characteristics are important for such devices as gyroscopes, chronoscopes and indicating instruments. These materials have high electrical resistance and should not be used for conductors of electric current.

	Material	Method of Manufacture • Chief Uses • Special Properties
High Temperature Alloy Wire	A286 Alloy	Cold drawn & precipitation hardened after fabrication. Good corrosion resistance at elevated temperatures.
	Inconel 600 QQ-W-390	Cold drawn. Good corrosion resistance at elevated temperatures.
	Inconel 718	Cold drawn & precipitation hardened after fabrication. Good corrosion resistance at elevated temperatures.
	Inconel X-750 AMS 5698, 5699	Cold drawn & precipitation hardened after fabrication. Good corrosion resistance at elevated temperatures.

Flat High-Carbon Spring Steels	Flat high-carbon Spring Steels General. Although several types of thin flat strip are available for specific applications in watches, clocks and certain instruments only two types are readily available. These two compositions are used for over 95% of all applications requiring flat high-carbon strip. Although these materials are frequently plated, sections under 0.015 in. having carbon content over 0.85 with hardness over Rockwell C47 are highly susceptible to hydrogen-embrittlement even though special plating and heating operations are employed.

MID-WEST SPRING AND STAMPING