# Material Information

# Spring Steel 1095

## Introduction

Spring Steel 1095, also known as AISI 1095 or UNS G10950, is a high-carbon steel renowned for its exceptional hardness, high tensile strength, and spring-like elasticity. Containing approximately 0.90%–1.03% carbon, it is one of the most widely used high-carbon spring steels in sheet metal fabrication for components requiring high wear resistance and fatigue strength. While difficult to form in its fully hardened state, 1095 sheet metal is commonly cut and formed in an annealed condition and subsequently heat-treated (quenched and tempered) to achieve its final high-resilience spring temper.

## Advantages

Spring Steel 1095 offers outstanding tensile strength, yield strength, and fatigue resistance after proper heat treatment, allowing parts to undergo repeated cyclic loading without permanent deformation. It exhibits excellent shape memory and spring retention, as well as superior hardness and wear resistance compared to lower carbon steels. Its high carbon content also enables fine edge retention for cutting and scraping applications.

## Disadvantages

Spring Steel 1095 has poor corrosion resistance and is highly susceptible to rusting and oxidation if left unprotected in humid or outdoor environments, requiring surface plating, bluing, or painting. Due to its high carbon content, it possesses low weldability and is prone to cracking during welding or severe cold forming when hardened. Extensive bending or forming must be performed while the steel is in an annealed state prior to post-fabrication heat treatment.

## Tolerance

We offer tolerances as tight as +/- 0.005". Tighter tolerances are available upon manual review.

## Recommendation

The combination of exceptional spring retention, high hardness, wear resistance, and fatigue strength makes Spring Steel 1095 ideal for sheet metal fabricated parts subjected to high stress and repetitive deflection. It is particularly recommended for flat springs, clips, retaining rings, shims,

Belleville washers, doctor blades, and high-wear mechanical components where shape memory and elasticity are essential.

| Material Specifications (For reference only.) | |
|---|---|
| Tensile strength | 685MPa |
| Yield strength | 525MPa |
| Fatigue strength | 275MPa |
| Elongation at Break | 12% |
| Hardness | 190 HB |
| Young's modulus | 205GPa |
| Density | 7.84 g/cm$^3$ |

## Attention

To avoid cracking and severe springback, complex bending and forming operations on Spring Steel 1095 should be performed in the annealed condition prior to heat treatment. Post-fabrication quenching and tempering are necessary to achieve optimal spring properties and toughness. Because 1095 steel is vulnerable to rust and stress corrosion cracking under tension, adequate surface protection (such as black oxide, zinc plating, or rust-inhibitive coating) must be applied. Direct welding should generally be avoided unless specialized pre-heating and post-weld stress relief procedures are utilized.

## Applications

3DSPRO finds people using Spring Steel 1095 to make functional parts and prototypes in the following industries and applications.

*Automotive and machinery:*
Flat springs, leaf springs, retaining rings, Belleville washers, clutch components, and high-stress mechanical fasteners requiring high fatigue limit and elasticity.

*Tools and industrial equipment:*
Doctor blades, industrial saw blades, scrapers, knives, feeler gauges, wear plates, and precision shims where hardness, wear resistance, and sharp edge retention are critical.

*Electronics and consumer products:*
Battery contacts, spring clips, switch contacts, lock components, and flexible mounting brackets requiring reliable long-term spring tension.

*General sheet metal fabrication:*

Custom spring clamps, snap rings, resilient structural clips, and high-carbon prototype parts designed for cyclic loading and shape memory.