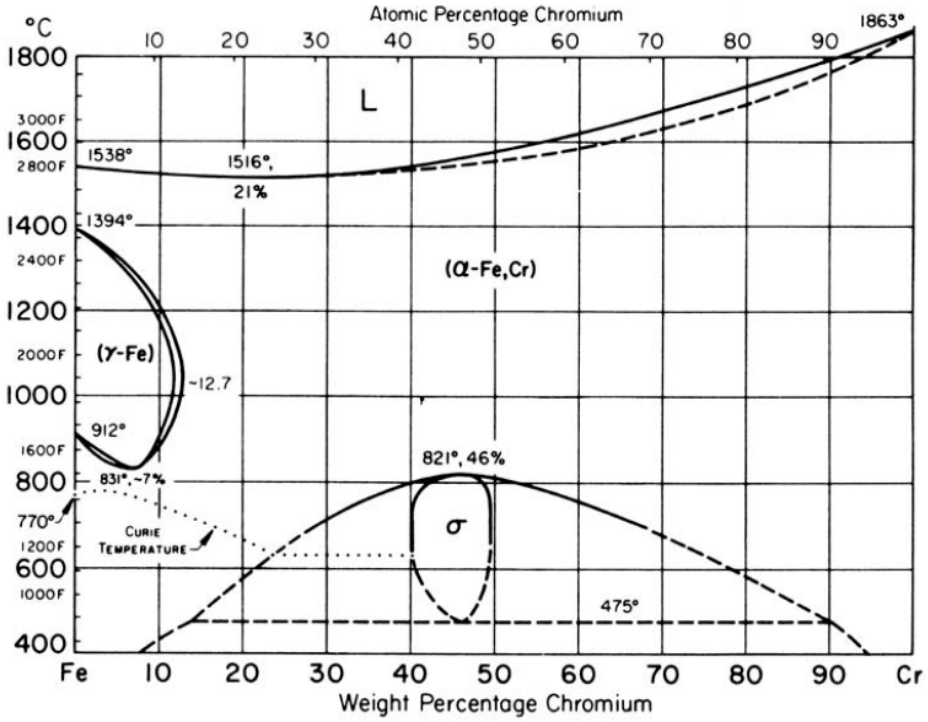
STAINLESS STEEL- Basics for FERRITIC STAINLESS STEEL – 400 Series



The iron-chromium phase diagram showing the gamma loop and the nature of the ferrite-stable field. Source: George Krauss, Steels: Processing, Structure, and Performance, Fifth Edition, ASM International, 2005, p 496

Stainless Steels, 400 Series
Heat- and corrosion-resistant steels, commonly referred to as stainless steels, are an important group of highly alloyed steels. **Chromium in excess of 12 percent by weight is required to impart "stainless" characteristics to iron alloys.**
This threshold of the Chromium Content (>12%) must be achieved in the entire microstructure in order to avoid local staining or corrosion reaction.

Chromium stabilizes the body centered cubic (bcc) ferrite structure of iron; that is, the high-temperature and low-temperature delta and alpha ferrite fields expand with increasing chromium.

As the ferrite field expands, the austenite field contracts, producing the so-called gamma loop. Binary iron alloys containing more than about 12 percent chromium are ferritic from room temperature up to the melting point. Ferritic stainless steels cannot be heat treated or hardened; their microstructure and mechanical properties can be altered only by cold working and annealing.

Ferritic stainless steels, however, are showing only a ***slight to moderate*** **cold working effect** in comparison to austenitic stainless steel
Ferritic stainless steels are magnetizable below the Curie Temperature.