Xometry

Datasheet

Cr12

Description

Cr12 stainless steel (designated under the Chinese GB standard) is a high-carbon, high-chromium ledeburitic tool steel and one of the most widely used cold-work die steels in China. It corresponds to several international standards, including: German DIN: 1.2080, British BS: BD3, etc. Its core characteristics include high carbon and high chromium content, with uniformly distributed carbides. It offers excellent hardenability, outstanding wear resistance, and moderate hot workability. High hardness can be achieved without complex heat treatment. This steel is primarily used to manufacture complex-shaped, heavily loaded cold-work tooling and wear-resistant components, such as: cold punching dies and punches, thread rolling dies, wire drawing dies, cold shears and cutting blades, gauges and precision measuring tools.

Features

The combination of high carbon and high chromium content results in the formation of a substantial amount of hard chromium carbides, which are uniformly distributed. This provides wear resistance far superior to that of ordinary alloy structural steels and austenitic stainless steels, making it highly suitable for cold-work die applications subjected to prolonged friction and extrusion. In the annealed state, the steel offers moderate hardness, facilitating ease of machining. After quenching, it can achieve a high hardness of ≥58 HRC without the need for complex tempering treatments, and the hardness is evenly distributed, ensuring long-term dimensional accuracy of the dies. Compared to materials like 40Cr and 2205 stainless steel, Cr12 exhibits lower toughness and insufficient impact

resistance. Therefore, it is not suitable for manufacturing parts subjected to severe impact loads, in order to prevent die cracking or fracture. Its corrosion resistance is generally poor. Although it contains a relatively high chromium content, the high carbon level reduces its corrosion resistance. It can only withstand mildly corrosive media and is not suitable for use in humid, saline, or acidic environments. When exposed to air for prolonged periods, it is prone to slight rusting.

Parameters

Chemical Composition of Cr12 (%)

Composition	C	Si	Mn	P	S	Cr	Co
Min.	2	-	-	-	-	11.5	-
Max.	2.3	0.4	0.4	0.03	0.03	13	1

Mechanical Property Information:

Yield Strength Rp0.2 (MPa)	Tensile Strength Rm (MPa)	Impact Rate	Elongation at Break	Reduction of Area	Heat Treatment Condition	Brinell Hardness (HBW)
397 (≥)	985 (≥)	12	21	22	Solution and Aging, Annealing, Ausaging, Q+T, etc	234

Xometry

Datasheet ▸

Physical Property Information:

Temperature	Elastic Modulus	Coefficient	Thermal Conductivity	Specific Heat Capacity	Specific Resistivity	Density	Weighting Factor
43	-	-			0.11	-	
639	595	-	24.3	444		-	
253	-	43	13.2			443	141