



16MnCr5 vs 20MnCr5 Steel: Key Differences in Composition, Heat Treatment, and Applications

Description

Introduction

16MnCr5 and 20MnCr5 are popular case-hardening steels used in high-stress components. While similar, their carbon and manganese differences impact:

- Core strength after heat treatment
- Case hardness depth
- Optimal applications

Steelmet Industries provides both grades as:

• Round bars (10mm – 300mm)

• Precision ground stock

• Custom-cut blanks

Chemical Composition Comparison

Element (%)	16MnCr5	20MnCr5
Carbon (C)	0.14 – 0.19	0.17 – 0.22
Manganese (Mn)	1.00 – 1.30	1.10 – 1.40
Chromium (Cr)	0.80 – 1.10	1.00 – 1.30
Phosphorus (P)	≤ 0.025	≤ 0.025

Element (%)	16MnCr5	20MnCr5
Sulfur (S)	≤ 0.035	≤ 0.035

Key Difference: 20MnCr5 has **higher carbon and chromium** for increased hardenability.

Mechanical Properties (After Case Hardening)

Property	16MnCr5	20MnCr5
Surface Hardness	58 ~ 62 HRC	58 ~ 62 HRC
Core Strength	800 ~ 1000 MPa	900 ~ 1100 MPa
Impact Toughness	Good	Moderate

20MnCr5 develops **10-15% higher core strength** but slightly lower toughness.

Key Differences & Applications

1. Heat Treatment Response

- 16MnCr5: Better for **shallow case depths** (0.5-1mm)
- 20MnCr5: Preferred for **deeper hardening** (1-2mm case depth)

2. Typical Uses

- 16MnCr5 Best For:
 - Light-duty gears
 - Clutch components
 - Camshafts
 - 20MnCr5 Best For:
 - Heavy-duty transmission gears
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- Axle shafts
- High-load bearings

3. Machinability

Both grades machine well in **annealed condition**, with 16MnCr5 being slightly easier.

Equivalents & Alternatives

Grade	DIN	AISI	ISO
16MnCr5	1.7131	5115	14MnCr5
20MnCr5	1.7147	5120	20MnCr5

For higher toughness: **18CrNiMo7-6**

Selection Guide

- **Moderate loads + better impact resistance** → 16MnCr5
- **Heavy loads + deeper hardening** → 20MnCr5

Steelmet Industries offers:

• Both grades in **annealed or pre-hardened** conditions

• Custom heat treatment services

• Precision machining stock

• **Request samples or datasheets** for your specific application.

Conclusion

While both are excellent case-hardening steels, **20MnCr5's higher carbon** makes it stronger for heavy-duty applications, while **16MnCr5** offers better toughness for dynamic loads.

Steelmet Industries stocks **16MnCr5 and 20MnCr5** in ready-to-machine forms → contact us for technical support and pricing.

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