

DB6 vs H13 vs H11 vs D2: Which Hot Work Die Steel Should You Choose?

A technical, experience-based comparison of DB6 (DIN 1.2714), AISI H13 (DIN 2344), AISI H11 (DIN 2343) and AISI D2 (DIN 2379) tool steels — chemical composition, mechanical properties and real-world application guidance from Virat Special Steels, India's leading tool steel stockist and supplier.

Manufacturer-Backed Data	Pan-India & Global Supply	Engineering Support
Specifications sourced directly from Virat Special Steels' technical data sheets and mill certification records.	Stocking and delivering DB6, H13, H11 & D2 flat / square / round bar across India, Europe and the USA.	Our metallurgical team assists in grade selection, heat treatment guidance and application-specific recommendations.

Quick Overview

DB6, H13 and H11 are all chromium-based hot work tool steels, but DB6 takes a different alloying route: instead of relying on ~5% chromium like H13/H11, DB6 uses a lower-chromium, nickel-bearing composition (1.50–1.80% Ni) that trades some hot-hardness for substantially higher core toughness and impact resistance. This is why DB6 dominates in large, shock-loaded forging dies while H13 and H11 dominate in die casting and extrusion, where sustained heat — not impact — is the main failure driver. D2 is included as a cold-work reference point only; it is not a hot-work substitute for any of the other three grades.

Chemical Composition Comparison (%)

Element	DB6 (1.2714)	H13 (2344)	H11 (2343)	D2 (2379)
Carbon (C)	0.50 – 0.60	0.32 – 0.45	0.30 – 0.40	1.50 – 1.60
Silicon (Si)	0.10 – 0.40	0.80 – 1.25	0.80 – 1.25	0.10 – 0.40
Manganese (Mn)	0.50 – 0.90	0.20 – 0.60	0.20 – 0.60	0.15 – 0.45
Chromium (Cr)	1.00 – 1.50	4.75 – 5.50	4.75 – 5.50	11.0 – 12.0
Nickel (Ni)	1.50 – 1.80	—	—	—
Molybdenum (Mo)	0.45 – 0.55	1.10 – 1.75	1.25 – 1.75	0.60 – 0.80
Vanadium (V)	0.10 – 0.25	0.80 – 1.20	0.20 – 0.50	0.90 – 1.10
Designation	55NiCrMoV7	X40CrMoV5	X37CrMoV5-1	X153CrMoV12

Mechanical Properties Comparison

Property	DB6	H13	H11	D2
Tensile Strength	High (case-dep.)	1550 – 2050 MPa	~1792 MPa	~1900 MPa
Yield Strength	—	1000 – 1380 MPa	~1482 MPa	—
Elongation	—	10% – 15%	~8%	—
Impact Toughness	Excellent	20 – 40 J/cm2	13.6 – 33.9 J/cm2	77 J/cm2
Hardness (as supplied)	35 – 40 HRC	45 – 52 HRC	52 – 57 HRC	217–255 HB

Property	DB6	H13	H11	D2
Working / Hardened Range	45 – 56 HRC	44 – 54 HRC	44 – 52 HRC	58 – 62 HRC
Machinability (vs W-group)	Good	~75%	~75%	Good (annealed)

D2's higher hardness range reflects cold-work service and is not directly comparable to hot-work hardness targets for DB6, H13 or H11.

Side-by-Side Grade Summary

DIN 1.2714 · DB6

High-nickel hot work steel offering the best available toughness and impact-crack resistance among the four grades. The preferred choice for large forging dies and hammer dies subject to repeated heavy impact.

- Nickel content (1.50–1.80%) delivers exceptional core toughness and crack resistance
- Excellent resistance to thermal fatigue and die cracking under impact loading
- Available pre-hardened (35–40 HRC) and in forged / ESR block form
- Longer die life and reduced maintenance cost in impact service
- Good polishability and machinability for its toughness class

DIN 2344 · AISI H13

High vanadium hot work steel offering superior wear resistance, better hot hardness and greater resistance to heat checking. The most versatile, most widely used hot work grade worldwide.

- Higher vanadium content improves abrasion and wear resistance
- Excellent resistance to thermal fatigue cracking
- Available in annealed & pre-hard (460–500 BHN) condition
- ESR grade available for critical, high-pressure die casting applications
- Good all-round toughness and machinability

DIN 2343 · AISI H11

Lower vanadium hot work steel with excellent toughness, very high resistance to gross cracking and thermal shock, and minimal distortion during hardening.

- Lower vanadium content favours toughness over pure wear resistance
- Very high resistance to thermal shock during rapid water-cooling
- Minimal deformation on through-hardening and air-hardening
- Well suited for high-impact, shock-loaded forging tooling
- Good hardfacing weldability (e.g., with Stellite 6)

DIN 2379 · AISI D2

High-carbon, high-chromium cold work steel with outstanding abrasion resistance. Included here as a reference point only — it is not a hot-work die steel and should not replace DB6, H13 or H11.

- Very high wear and abrasion resistance from dense chromium carbides
- Air-hardening with minimal dimensional distortion
- Mild (semi-stainless) corrosion resistance
- Not suitable for sustained high-temperature or high-impact hot-work service
- Best reserved for cold blanking, piercing and trimming tooling

Applications

DB6 – Typical Applications	H13 – Typical Applications
• Drop forging & hammer dies • Crankshaft & connecting rod dies • Extrusion dies • Large mould bases & die holders • Aerospace & defence tooling	• Aluminium / low-pressure die casting dies • Aluminium extrusion dies • Drop forging dies • Gripper dies & punches • Injection moulds, ejector pins
H11 – Typical Applications	D2 – Typical Applications

- Die casting dies
- Forging dies & hot punches
- Extrusion tooling
- Hot gripper dies
- Aircraft landing gear components

- Blanking & piercing dies
- Cold forming rolls, punches
- Shear blades, slitters
- Precision gauges
- Cold trimming & stamping tools

Which grade should you choose?

Choose **DB6** when your dies face high-energy, repeated impact — drop forging, hammer forging, crankshaft/connecting-rod dies — where cracking under shock load, not wear, is the dominant failure mode. Choose **H13** when wear resistance, hot-hardness retention and resistance to heat checking are the priority — typically aluminium die casting, extrusion dies and high-volume production tooling. Choose **H11** when toughness, resistance to gross/thermal-shock cracking and dimensional stability during hardening matter most, at a lower vanadium cost than H13. Choose **D2** only for cold-work operations — never for hot-work dies. Our engineers can help confirm the right grade for your specific die design, working temperature and expected tool life.

Heat Treatment Snapshot

Process	DB6	H13	H11	D2
Annealing	840-860°C, furnace cool	871°C, cool 4°C/hr	871°C, cool 4°C/hr	840-870°C, furnace cool
Hardening Temp.	840-870°C, oil/polymer	1030-1060°C, air/oil/salt	1000-1030°C, air/oil/salt	1000-1050°C, air/oil/salt
Hardness After Quench	~54-56 HRC	~55 HRC	~54 HRC	~63 HRC
Tempering Range	450-650°C (double)	500-650°C (double)	500-650°C (double)	Immediate, double
Normalizing	Not recommended	Not recommended	Not recommended	Not recommended

Technical data compiled from Virat Special Steels product specifications: viratsteels.com/db6.html, viratsteels.com/h13.html, viratsteels.com/h11.html and viratsteels.com/aisi-d2.html.

Need Help Choosing Between DB6, H13, H11 or D2 for Your Application?

Talk to Virat Special Steels' technical team for grade selection, custom sizes (flat / square / round bar), ESR options and bulk stock availability across India, Europe and the USA.

Submit an Enquiry → www.viratsteels.com/enquiry.php | Visit Website → www.viratsteels.com
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