

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

A technical, experience-based comparison of AISI H13 (DIN 2344 / 1.2344) and AISI H11 (DIN 2343) hot work tool steels — chemical composition, mechanical properties, heat treatment and real-world application guidance from Virat Special Steels, India's leading tool steel stockist and supplier.

Manufacturer-Backed Data

Specifications sourced directly from Virat Special Steels' technical data sheets and mill certification records.

Pan-India & Global Supply

Stocking and delivering H13 & H11 flat / square / round bar across India, Europe and the USA.

Engineering Support

Our metallurgical team assists in grade selection, heat treatment guidance and application-specific recommendations.

Quick Overview

H13 and H11 are both chromium-molybdenum-vanadium hot work tool steels from the AISI "H" series, sharing a similar 5% chromium base. The primary difference lies in vanadium content — H13 carries substantially more vanadium (0.80–1.20%) than H11 (0.20–0.50%) — which is what drives the difference in wear resistance, hardenability and typical die-casting versus forging applications discussed below.

Chemical Composition Comparison (%)

| Element | H13 (DIN 2344 / AISI H13) | H11 (DIN 2343 / AISI H11) |
|----------------------|---------------------------|---------------------------|
| Carbon (C) | 0.32 - 0.45 | 0.30 - 0.40 |
| Silicon (Si) | 0.80 - 1.25 | 0.80 - 1.25 |
| Manganese (Mn) | 0.20 - 0.60 | 0.20 - 0.60 |
| Chromium (Cr) | 4.75 - 5.50 | 4.75 - 5.50 |
| Molybdenum (Mo) | 1.10 - 1.75 | 1.25 - 1.75 |
| Vanadium (V) | 0.80 - 1.20 | 0.20 - 0.50 |
| Standard Designation | X40CrMoV5 / DIN 2344 | X37CrMoV5-1 / DIN 2343 |

Mechanical Properties Comparison

| Property | H13 | H11 |
|------------------------------|---------------------------|-------------------------------|
| Tensile Strength | 1550 - 2050 MPa | ~1792 MPa |
| Yield Strength | 1000 - 1380 MPa | ~1482 MPa |
| Elongation | 10% - 15% | ~8% |
| Impact Toughness | 20 - 40 J/cm ² | 13.6 - 33.9 J/cm ² |
| Hardness (as supplied range) | 45 - 52 HRC | 52 - 57 HRC |
| Machinability (vs W-group) | ~75% | ~75% |

Side-by-Side Grade Summary

DIN 2344 · AISI H13

H13 Tool Steel

High vanadium hot work steel offering superior wear resistance, better toughness and greater resistance to heat checking. Widely regarded as the most versatile, most commonly used hot-work grade worldwide.

- Higher vanadium content improves abrasion and wear resistance
- Excellent resistance to thermal fatigue cracking
- Available from Virat Special Steels in annealed & Pre-Hard (460–500 BHN) condition
- ESR (Electro-Slag Refined) grade available for critical, high-pressure die casting applications
- Good all-round toughness and machinability

DIN 2343 · AISI H11

H11 Tool Steel

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

- 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)

Applications

H13 - Typical Applications

- Aluminium / low-pressure die casting dies
- Aluminium extrusion dies
- Drop forging dies
- Gripper dies & punches
- Injection moulds
- Ejector pins, tool holders, shrink-fit chucks

H11 - Typical Applications

- Die casting dies
- Forging dies & hot punches
- Extrusion tooling
- Hot gripper dies
- Aircraft landing gear components
- Ejector pins, tool holders, liner holders

Which grade should you choose? 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 — typically forging dies, shock-loaded tooling and applications with severe mechanical impact. Our engineers can help confirm the right grade for your specific die design, working temperature and expected tool life.

Heat Treatment Snapshot

| Process | H13 | H11 |
|-----------------------|---|---|
| Annealing | 871°C, slow cool 4°C/hr | 871°C, slow cool 4°C/hr |
| Hardening Temp. | 1030 - 1060°C, air/oil/salt bath quench | 1000 - 1030°C, air/oil/salt bath quench |
| Hardness After Quench | ~55 HRC | ~54 HRC |
| Tempering Range | 500 - 650°C (double tempering advised) | 500 - 650°C (double tempering advised) |
| Normalizing | Not recommended | Not recommended (air-hardening grade) |

Technical data compiled from Virat Special Steels product specifications: viratsteels.com/h13.html and viratsteels.com/h11.html.

Need Help Choosing Between H13 and H11 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.

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