



Hot Work Tool Steel

HP1

High Premium Quality Standards Specifically supplemented

High premium Quality HP1

A new developed quality standard by specific use of trace elements with improved useful properties and a high economic efficiency.

Material properties:

HP1 is a hot working tool steel with a high level of high-temperature strength and outstanding toughness properties. HP1 is only available as an ESR (Electro Slag Remelting) grade.

| | Temperature | Cooling |
|------------------|-----------------------------------|---|
| Soft annealing | 820 - 840 °C 4 – 6 h | slow cooling in furnace |
| Stress relieving | approx. 650 °C 2 – 4 h | slow cooling |
| Hardening | 1020 °C Soaking time 60 min | Air, nitrogen gas at vacuum hardening, martempering at 540 °C, oil or polymer (to be interrupted at 230 – 280 °C) |

Application:

To be used at applications with highest demands like die casting, extrusion industries and hot forming.

Delivery condition:

Soft annealed, max. 220 HB.

Nitriding possible:

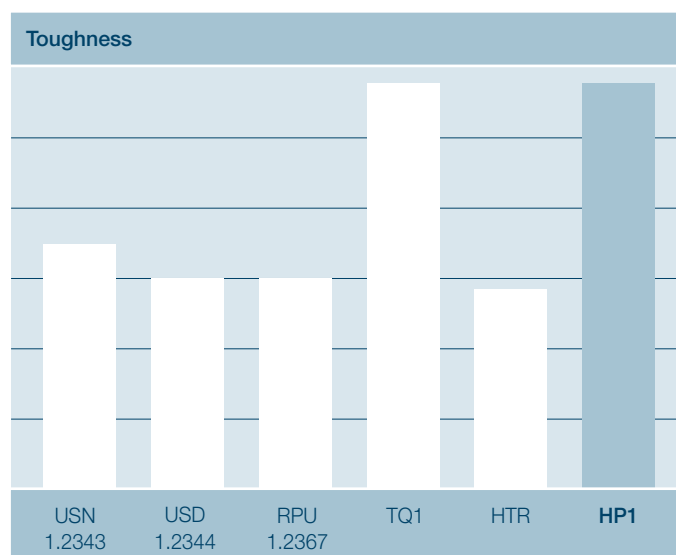
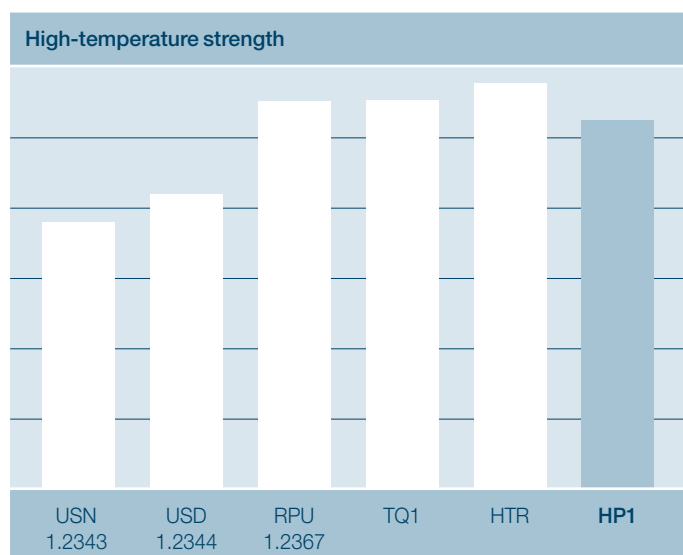
For die casting dies we recommend our nitriding Program 99 without compound layer.

Preheating before use:

100-400 °C depending on application.

| Material | Short name | C | Si | Mn | P | S | Cr | Mo | V | Nb | W |
|------------------|-------------|------|------|------|--------|--------|------|------|------|----|------|
| USN 1.2343 (H11) | X37CrMoV5-1 | 0,37 | 1,00 | 0,40 | <0,020 | <0,005 | 5,20 | 1,20 | 0,40 | | |
| USD 1.2344 (H13) | X40CrMoV5-1 | 0,40 | 1,00 | 0,40 | <0,020 | <0,005 | 5,20 | 1,30 | 1,00 | | |
| RPU 1.2367 | X38CrMoV5-3 | 0,38 | 0,40 | 0,40 | <0,020 | <0,005 | 5,00 | 3,00 | 0,50 | | |
| TQ1** | | 0,36 | 0,25 | 0,40 | <0,012 | <0,003 | 5,20 | 1,90 | 0,55 | | |
| HTR | | 0,32 | 0,20 | 0,30 | <0,015 | <0,005 | 2,20 | 1,20 | 0,50 | | 3,80 |
| HP1** | | 0,35 | 0,20 | 0,30 | <0,012 | <0,003 | 5,20 | 1,40 | 0,55 | + | |

* Specific use of trace elements ** With lowest level of trace elements



Tempering diagram 60 mm Ø, 1020°C Oil

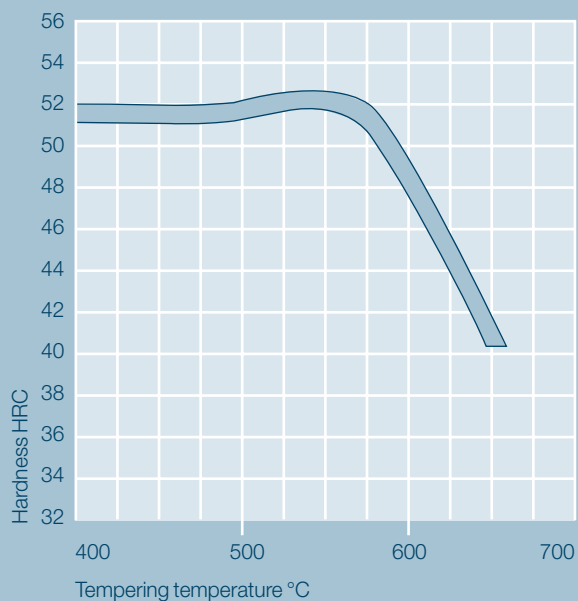
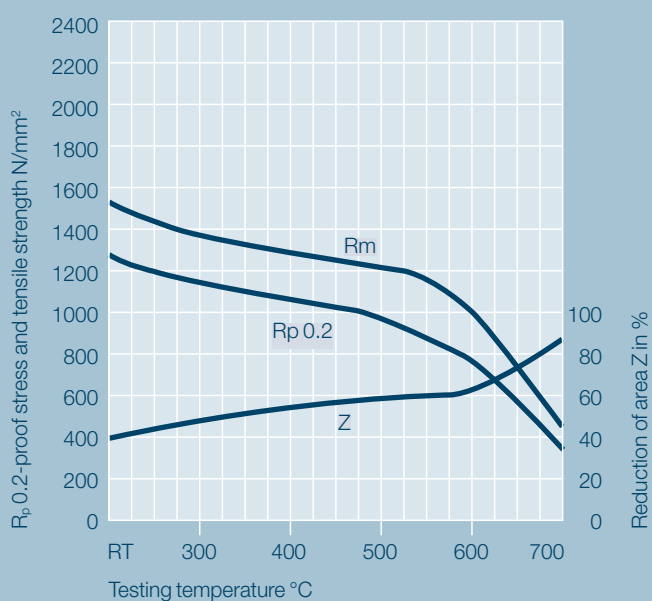


Diagram of high temperature strength 30 mm Ø, 1020°C Oil



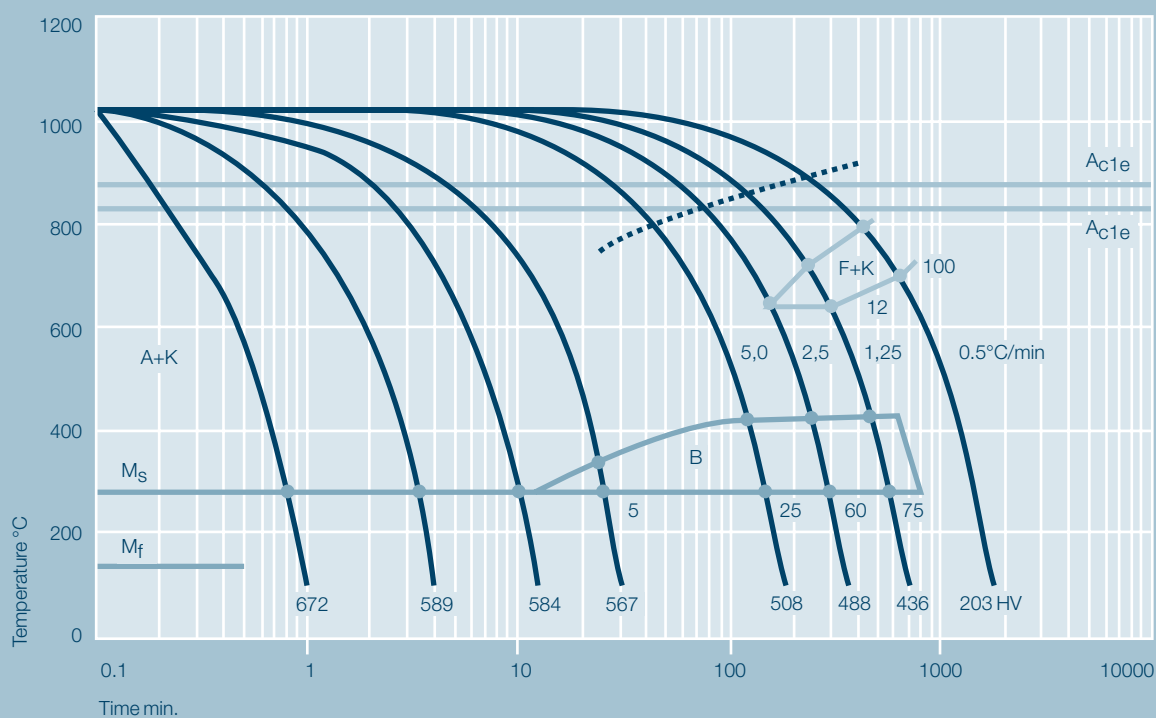
Coefficient of linear thermal expansion 10⁻⁶m/(m x K)

| Material | Temperature interval in °C | | |
|--------------|----------------------------|-------------|-------------|
| | 20-100 | 20-400 | 20-600 |
| 1.2343 (H11) | 11.8 | 12.7 | 12.9 |
| 1.2344 (H13) | 10.9 | 12.7 | 13.3 |
| 1.2367 | 11.9 | 12.8 | 13.3 |
| HTR | 12.3 | 13.6 | 13.8 |
| TQ1 | 10.3 | 12.5 | 13.0 |
| HP1 | 11.5 | 12.6 | 13.1 |

Thermal conductivity W/(m x K)

| Material | Testing temperature in °C | | |
|--------------|---------------------------|-------------|-------------|
| | 20 | 200 | 400 |
| 1.2343 (H11) | 26.8 | 27.8 | 27.3 |
| 1.2344 (H13) | 25.5 | 27.1 | 27.7 |
| 1.2367 | 29.9 | 32.1 | 32.4 |
| HTR | 35.2 | 34.6 | 33.0 |
| TQ1 | 29.8 | 31.0 | 31.4 |
| HP1 | 29.5 | 30.5 | 30.5 |

TTT-Diagram Austenitizing temperature 1020 °C



More ESR, more power, even more quality

Electroslag remelting is used to meet special quality requirements in terms of purity, toughness, and polishability, all in a reproducible manner.

Open Die Forging – an optimum of forging ratio for more value

The first forming operation for the manufacturing of hot-work tool steels with outstanding toughness and high temperature resistance properties is an important step in the process chain of producing high premium toolings.



Service

Tool Steels
Melting
Forging
Heat Treatment
Machining
Surface Treatment

Products

Hot Work Tool Steels
Cold Work Tool Steels
Die Forging Steel
Steel for Plastic Moulds

Industries

Punching
Cutting
Forming
Bending
Rolling

Heat treatment – the way to the desired useful properties
Reliability and profitability are the essential criteria which make the difference of the quality of a tooling. Beside the steel grade special refining procedures will optimize the wear resistance of your superior toolings ending up in a longer lifetime.



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