

Thermodur® 2999 EFS Superclean

Data Sheet
X45MoCrV5-3-1

Chemical composition in %

| C | Si | Mn | Cr | Mo | V |
|------|------|------|------|------|------|
| 0.45 | 0.30 | 0.30 | 1.40 | 5.00 | 1.00 |

Material Properties

- Maximum high-temperature strength
- Good high-temperature wear resistance
- Excellent thermal shock resistance
- Excellent thermal conductivity

Typical Applications

- Die inserts and high-speed forging tools exposed to severe wear stresses
- Heavy metal die casting
- Hot-work tool steels for use at highest temperatures

Physical properties

Coefficient of thermal expansion in 10⁻⁶ m/(m.K)

| | |
|-----------|------|
| 20-100 °C | 11.3 |
| 20-200 °C | 11.9 |
| 20-300 °C | 12.2 |
| 20-400 °C | 12.6 |
| 20-500 °C | 13.0 |
| 20-600 °C | 13.3 |
| 20-700 °C | 13.5 |

Thermal conductivity in W/(m.K)

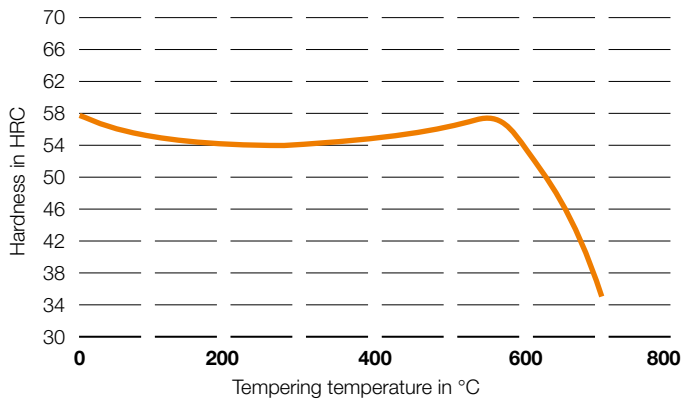
| | annealed | quenched and tempered |
|--------|----------|-----------------------|
| 20 °C | 37,8 | 31.4 |
| 350 °C | 39,5 | 35.2 |
| 700 °C | 39,5 | 36.2 |

Heat treatment

| | | | |
|----------------|--------------|---------------------------|------------------------|
| Soft annealing | 750-800 °C | Furnace | ≤ 230 HB |
| Hardening | 1070-1100 °C | Oil, hot bath, 500-550 °C | 57 HRC after quenching |
| Tempering | 100 °C | | 55 |
| | 200 °C | | 54 |
| | 300 °C | | 54 |
| | 400 °C | | 55 |
| | 500 °C | | 56 |
| | 550 °C | | 57 |
| | 600 °C | | 53 |
| | 650 °C | | 46 |

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Tempering



Time-temperature transformation

