

Material data sheet

SWG 2316 VICTORY ESR

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|--------------------------|--|---|----------------------|-----------|------------------------|------|------|
| material characteristics | material number / grade | SWG 2316 VICTORY ESR | | | | | |
| | DIN standard | X38CrMo16 | | | | | |
| | comparable grade | - | | | | | |
| | chemical composition - reference analysis [%] | C | Si | Mn | Cr | Mo | Ni |
| | | 0.35 | 0.35 | 0.70 | 15.50 | 1.00 | 0.50 |
| | production technology | EAF/LF/VD, ESR, forging, Q+T or annealing | | | | | |
| | service hardness / strength converted acc. to internal hardness table | | HB | HRC | N/mm ² | | |
| | | | 276 - 335 | 28 - 34 | 872 - 1059 | | |
| | delivery condition | Q+T | 276 - 335 | 28 - 34 | 872 - 1059 | | |
| | | annealed | ≤ 248 HB | - | - | | |
| | maximum dimension | diameter | | thickness | | | |
| ≤ 750 mm | | ≤ 500 mm | | | | | |
| US-specification | EN 10228-3 | | SEP 1921 | | | | |
| | table 3 - type 1 - qual. class 4 | | group 3 - class E,e | | | | |
| cleanliness | DIN 50602 | | ASTM E45 method A | | | | |
| | K1 ≤ 10 | | A ≤ 0,5; B, C, D ≤ 1 | | | | |
| | | | | | variation upon request | | |

| technological properties | | 0 | 1 | 2 | 3 | 4 | 5 | comment | |
|--------------------------|-------------------------------|---|---|---|---|---|---|---------|--|
| | toughness | | ■ | ■ | ■ | | | | in relation to service hardness 276 - 335 HB |
| | hot strength at working temp. | | ■ | ■ | ■ | | | | |
| | wear resistance | | ■ | ■ | | | | | |
| | corrosion resistance | | ■ | ■ | ■ | ■ | | | polished surface for best corrosion resistance |
| | machinability | | ■ | ■ | ■ | ■ | | | annealed |
| | polishability | | ■ | ■ | ■ | ■ | | | ISO/SPI: N2/A-2; 30-34 HRC |
| | weldability | | ■ | | | | | | CET = 1.33 % acc. DIN EN 1011-2 |
| | texturability | | ■ | ■ | ■ | | | | |
| | nitridability | | ■ | ■ | ■ | ■ | | | nitriding hardness 900 - 1200 HV1 |
| | chrome-platability | | ■ | ■ | ■ | ■ | | | ESR: high cleanliness |

rating properties: 0 = not suitable; 1 = low; 2 = middle; 3 = good; 4 = very good; 5 = perfectly suitable

| physical properties | thermal conductivity [W · m ⁻¹ · K ⁻¹] | 20 °C | 200 °C | 300 °C | 500 °C |
|---------------------|---|--------|--------|--------|--------|
| | | 23.5 | 24.2 | 24.3 | 23.2 |
| | coefficient of thermal expansion between 20 °C and ... [10 ⁻⁶ · K ⁻¹] | 100 °C | 200 °C | 300 °C | 500 °C |
| | | 10.3 | 10.8 | 11.2 | 11.9 |
| | elastic modulus [kN/mm ²] | 20 °C | 200 °C | 300 °C | 500 °C |
| | | 218 | 206 | 198 | 180 |

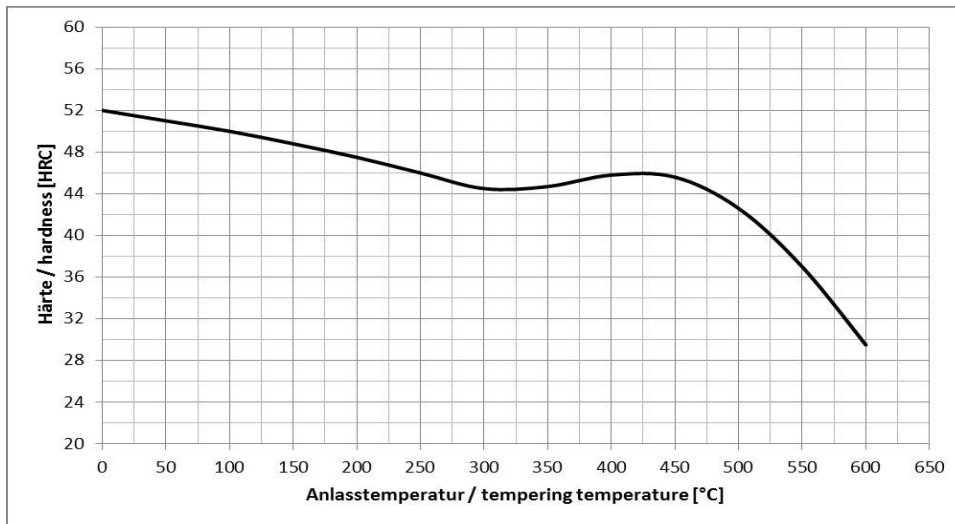
| | | |
|-------------|---------------------|--|
| application | technology | mold making PVC processing, corrosion resistant |
| | tools | corrosion resistant plastic molds for PVC, extrusion tools, matrices |
| | process temperature | < 300 °C |
| | tool size | small- and medium-sized molds |
| | final products | PVC tubes, PVC profiles, PVC plastic parts |
| | features | processing of chemically aggressive plastics with chloride atmosphere for high surface quality |

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|-----------------------------|---|
| SWG processing instructions | welding, texturing, vacuum hardening |
|-----------------------------|---|

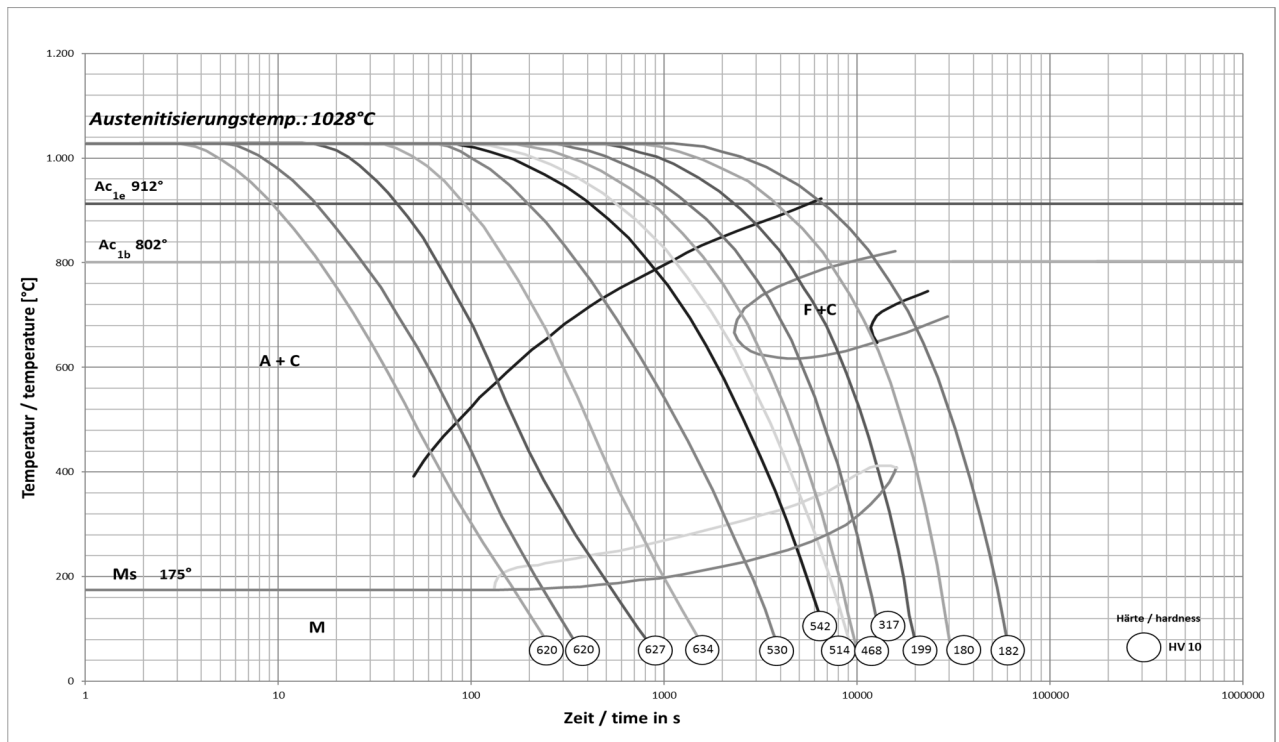
| heat treatment | | T min [°C] | T max [°C] | medium / comment |
|----------------|----------------------------|------------|------------|----------------------------------|
| | annealing | 780 | 820 | furnace |
| | hardening | 1000 | 1040 | vacuum, oil |
| | tempering | 580 | 700 | air, protective atmosphere |
| | stress relieving | 520 | 550 | min. 30 °C below tempering temp. |
| | pre-heating before welding | 220 | 250 | |
| | nitriding | 450 | 550 | min. 30 °C below tempering temp. |
| | PVD-treating | 450 | 550 | |

| | | |
|------------------------|--------------------------|-------------------------------------|
| diagrams/ structure | CCT-diagram | yes |
| | tempering diagram | yes |
| | advice on heat treatment | soft annealing before new hardening |
| | microstructure | martensitic |

Tempering diagram: Average values on samples dia 25 mm x length 50 mm; hardened at 1010 °C in oil



CCT-diagram



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