

# Data Sheet: Tool Steel MS1

## Alternative Designations

| Standard    | Din    | ISO                  | BS     | JIS | SIS | UNE |
|-------------|--------|----------------------|--------|-----|-----|-----|
| Designation | 1.2709 | X3NiCoMoTi<br>18-9-5 | 1.2709 | -   | -   | -   |

## Details

This is a high wear resistant material with ultra-high strength and is easily machinable. It has enhanced ductility with a yield strength of about 900MPa. It is widely used in tooling, plastic injection molding and die casting tools.

## Key Features

Ultra high strength • Good machinability

## Chemical Composition

| Element    | Fe      | Ni      | Co           | Mo           | Ti  | Al             | Cr  | Mn  | C    |
|------------|---------|---------|--------------|--------------|-----|----------------|-----|-----|------|
| Percentage | balance | 17 - 19 | 8.5 –<br>9.5 | 4.5 –<br>5.3 | 0.6 | 0.05 –<br>0.15 | 0.5 | 0.1 | 0.03 |

## Mechanical Properties

| Property | Yield strength<br>[MPa] | Ultimate tensile strength<br>[MPa] | Elongation<br>[%] | Hardness |
|----------|-------------------------|------------------------------------|-------------------|----------|
| Value    | 2010                    | 2080                               | 4                 | 550      |

## Physical Properties

| Property   | Value       |
|--|-------------|
| Density [g/cm <sup>3</sup> ]   | <b>8.1</b>  |
| Module of elasticity [GPa]   | <b>180</b>  |
| Electrical conductivity [m/Ω · mm <sup>2</sup> ]                       | <b>10.1</b> |
| Coefficient of thermal expansion [K <sup>-1</sup> · 10 <sup>-6</sup> ] | <b>10</b>   |
| Thermal conductivity [W/m · K]   | <b>15.8</b> |
| Specific heat capacity [J/kg · K]                                      | <b>430</b>  |

## Reference

Datasheets provided by Xometry contain materials sourced through trusted OEMs, material distributors, and databases. Please visit [Materialdatacenter.com](https://www.materialdatacenter.com) for further information on this material.