

C: max. 0,03
Cr: 17,0 - 18,0
Ni: 8,5 - 10,0
Cu: 3,0 - 3,5

1.4567
X3CrNiCu 18-9-4

1.4567

**Chromium-nickel austenitic stainless steel
with low carbon content and copper addition**

Relevant current and obsolete standards:

- EN 10088-3 : 1.4567 X3CrNiCu 18-9-4
- AISI : 304 Cu
- BS : -
- JIS : XM7
- AFNOR : Z3CNU 18-10
- DIN 17440 : 1.4567
- SIS : -

Special grades for particular applications

- cold heading grade: DIN EN 10263-5

General properties

- corrosion resistance : good
- mechanical properties : average
- forgeability : good
- weldability : good (seldom)
- machinability : very good

Special properties

- suited for cryogenic applications
- non-magnetic grade ($\mu_r \leq 1,3$)
- suited to a very high degree of cold deformation

Physical properties

- density (kg/dm³) : 7,9
- electrical resistivity
at 20°C ($\Omega \text{ mm}^2/\text{m}$) : 0,73
- magnetisability : slight
- thermal conductivity
at 20°C (W/m K) : 15
- specific heat capacity
at 20°C (J/kg K) : 500
- thermal expansion
(10^{-6}K^{-1}) between
- 20 and 100°C : 16,7
- 20 and 200°C : 17,2
- 20 and 300°C : 17,7
- 20 and 400°C : 18,1
- 20 and 500°C : 18,4

Typical applications

- automotive industry
- chemical industry
- food and beverage industry
- decorative items and kitchen utensils
- electronic equipment
- ship building

Hint: - delivery of diameters in excess of 20mm, only when ordering in large quantities.

Processing

- automated machining : yes
- machinable : yes
- hammer and die forging : not common
- cold forming : yes
- cold heading : yes
- suited to polishing : yes

Finished product forms and conditions

- wire rod
- bright bar h9, \varnothing 2 - 25
- bright coils h9, \varnothing 0,8 - 20
- solution annealed and quenched
- pickled
- drawn
- straightened
- peeled
- ground

Demand tendency

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Properties, applications and processing

1.4567 is essentially the same as **1.4301**, with the exception of a copper addition of between 3 and 3.5%. The copper addition allows for superb cold forming and deformation.

Corrosion resistance (PRE = 17,0 to 20,76)

Since this grade of stainless steel is still resistant to intergranular corrosion after welding, i.e. in the sensitised condition, corrosion testing in accordance with the following corrosion testing specifications is sufficient to establish resistance to corrosion:

AFNOR NF 05-159
ASTM A262-75. Practice E
DIN EN ISO 3651-2

1.4567 is resistant to corrosion in most natural waters and urban and rural atmospheres, provided that the chloride and salt contents are low. This grade of stainless steel is not resistant to sea water and as such must not be used in any sea water applications. Its resistance to corrosion in moderate chloride containing environments and organic acids, makes **1.4567** suited for use in the food and beverage industries.

The corrosion resistance of **1.4567** is very similar to that of **1.4307**, but due to its higher copper content, **1.4567** displays improved resistance to corrosion in many reducing acid environments, such as H₂SO₄ environments.

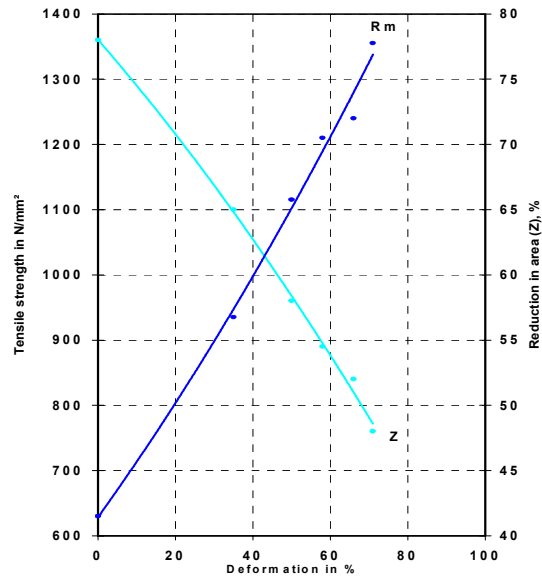
Heat treatment / mechanical properties

Optimal material properties are realised after solution annealing in the temperature range 1000 - 1100 °C followed by rapid cooling in air or water. During operation and fabrication, the time spent in the temperature range 450 - 850 °C must be minimised to avoid embrittlement.

In the solution annealed condition, the following mechanical properties may be attained when testing in the longitudinal direction:

Property	Specification	Typical
- yield strength (N/mm ²)	R _{p0,2} : ≥ 175	340
- tensile strength (N/mm ²)	R _m : 450 – 650	630
- tensile elongation (%)	A ₅ : ≥ 45	51
- hardness	HB : ≤ 215	195

A typical work hardening curve for **1.4567** is presented below:



Welding

Although **1.4567** can be welded with, or without, the use of filler material, this steel is seldom welded. If a filler metal is required, then the use of **Novonit® 4404** (AISI 316 L) would be recommended. Post weld heat treatment is not necessary.

Forging

Usually heated to within the temperature range 1180 - 1210°C to allow forging which takes place at temperatures between 1210 and 950°C. Forging is followed by air cooling, or water quenching when no danger of distortion exists.

Machining

As a result of the high copper addition to this steel, the work hardening tendency is retarded, i.e. the austenite phase is more stable, and as such drilling, threading and other machining operations can be performed with comparative ease.

The following cutting parameters are thus proposed as a guideline when using coated hard metal cutting tools.

tensile strengths	depth of cut (mm)		
	feed (mm/rev)		
R _m in N/mm ²	6 mm 0,5 mm/r	3 mm 0,4 mm/r	1 mm 0,2 mm/r
solution annealed (520 - 660)	160 m/min	240 m/min	290 m/min