Kuhn Special Steel

Reliable solutions. Always.

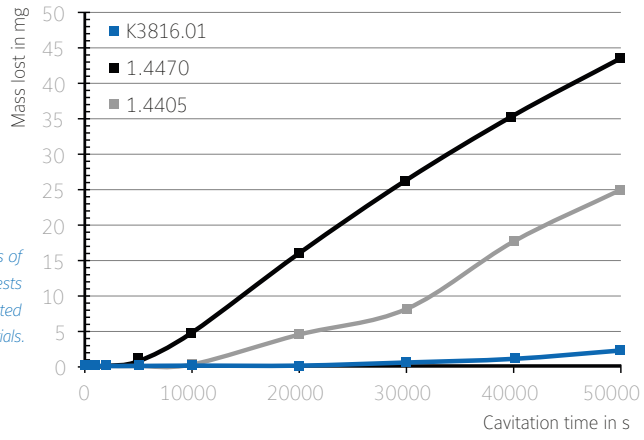
New material:
CrMn alloy K3816.01

For maximum pump/valve performance requirements

The corrosion- and cavitation-resistant CrMn alloy K3816.01 from Kuhn Special Steel

Pumps, compressors and valve assemblies are increasingly being exposed to corrosive substances and environments. This has led to a rising demand for materials that offer extra resistance to corrosion and cavitation. Certain subassemblies are also difficult to access, and therefore not straightforward to maintain or replace.

In order to tackle this constantly-growing demand, we at Kuhn Special Steel have been carrying out a series of tests on various pump materials to determine their resistance to corrosion and cavitation.



Graph: results of cavitation tests on three selected test-materials.

Cavitation occurs when gas-bubbles form in a flowing liquid. These bubbles are created by local pressure differences, which are in turn caused by the flow properties and gas pressure of the fluid concerned. A change in these pressure conditions leads to instability causing the bubbles to implode. If this occurs near the wall surface, a sudden impulse of pressure (known as a microjet) is directed on the surface. This short cyclic impulse can amount to several hundred MPa.

Cavitation can be classified further into cavitation corrosion and cavitation erosion. In the case of cavitation corrosion, cavitation leads to local degradation of the passivating layer, and thus to corrosion of the material. The continuous impact of microjets on the surface of the material impedes the forming of a new passivating layer.

In the case of cavitation erosion, the action of the microjets gradually wears down the surface of the material directly, eventually leading to the affected component being eaten away.

As part of a comprehensive series of tests, our R&D department has conducted trials involving various centrifugally cast materials with focus on their resistance to cavitation erosion. These experiments involved putting samples into a water bath and subjecting them to artificially-generated cavitation bubbles. Measurements were then taken to determine the amount of erosion relative to exposure time.

Our alloy K3816.01 proved to be the most resistant to cavitation in these tests. As it is also very resistant to corrosion, this material is ideal for use in applications that are subject to highly corrosive substances and cavitation.

Kuhn Special Steel is a supplier of innovative, highly-competitive, centrifugally-cast alloys. For further information on our K3816.01 material, please contact our sales department. Working in close cooperation with our R&D department, we will be pleased to offer you a made-to-measure solution for your specific application.

Our sales team can be contacted by phone +49 (0)2195 671-229 or e-mail sales@kuhn-edelstahl.com

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Data sheet CrMn alloy K3816.01

Antimagnetic austenitic cast alloy GX20-70CrMn18-18 (K3816.01)

KUHN-designation

K3816.01

Standard

Kuhn Special Steel specification

Chemical composition

C	Cr	Ni	Mn	Mo	N
0.1–0.3	17–19	< 1	18–20	< 0.5	0.5–1.0

As-delivered condition

solution annealed

Microstructure

austenite

Mechanical properties at 20 °C (minimum values)

0.2 % yield strength	ultimate tensile strength	elongation at fracture	notch impact test
430 MPa	700 MPa	40 %	100 J

Mechanical properties at 20 °C (measured values)

0.2 % yield strength	ultimate tensile strength	elongation at fracture	notch impact test
473 MPa	792 MPa	62 %	243 J
491 MPa	817 MPa	54 %	274 J

Physical properties at 20 °C (reference values)

thermal expansion coefficient	
20–100 °C	$16.0 \times 10^{-6} \times K^{-1}$
20–200 °C	$17.1 \times 10^{-6} \times K^{-1}$
20–300 °C	$17.9 \times 10^{-6} \times K^{-1}$
20–400 °C	$18.7 \times 10^{-6} \times K^{-1}$

heat conductivity
14 W / (m × K)

specific heat capacity
500 J / (kg × K)

specific electric resistance	specific magnetic permeability	density
0.7 Ω mm² / m	< 1.01 μ_r	7.7 kg / dm³

Welding advice

EB welding is possible

Applications

- Antimagnetic austenitic parts with increased strength
- corrosion and wear resistant bushings
  (surface hardness of more than 40 HCR possible)