



# Kuhn Special Steel

Reliable solutions. Always.



New material:  
**Ultra-Lean-Duplex 1.4093**

## The best price-performance ratio for the construction of industrial valves and decanters

The new Ultra-Lean-Duplex 1.4093 by Kuhn Special Steel is the cost-efficient alternative to conventional V2A or duplex materials.

The evermore demanding specifications applying to high-alloy-content materials create a need for ongoing and continuous new developments. Kuhn Special Steel already has several years' successful experience in the development of new duplex materials.

The growing demand for cost-efficient ("designed-to-cost") solutions, the scarcity of raw materials and the ever-present threat of wild fluctuations in the cost of alloys all increase our customers' need for economy-priced lean duplex materials with an outstanding performance profile.

Lean duplex material 1.4093 (with patent pending) once more demonstrates the ability of Kuhn Special Steel to offer its customers ever-more innovative and competitive materials-based solutions.

Nickel content has been reduced once more, in comparison to conventional lean duplex material 1.4392 (GX3CrNi23-4), and other elements that could have a negative effect on strength at low temperatures were severely delimited. This lowering of nickel-content also leads to a clear reduction of expenses.

Mechanical properties remain within the usual range of those envisaged for lean duplex materials.

$R_{p0,2}$  offers a **minimum of 400MPa**, i. e. **double** that of conventional austenitic V2A and V4A grades. This alloy achieves a tensile strength of  $R_m = 620MPa$ , resulting in elongation at rupture of at

least **25%**. The Charpy impact test delivers **at least 80J** at room temperature, and the **outstanding performance profile** of this material includes **excellent welding properties**. Thanks to its preeminent mechanical properties, a change of material can be applied to existing construction drawings without any problem.

This new lean duplex steel can be employed in the chemical industry, for example, as an alternative to V2A-grade materials. In the area of decanter construction, it can be used to replace the duplex alloys previously used in the manufacture of decanter bowls and conveyor bodies, or to expand the product-portfolio accordingly. Material no. 1.4093 likewise has many applications in the area of valve construction where it can be used in the manufacture of such items as ball valves and clamping/spacer rings.

Our R&D department will be pleased to deal with any questions that you might have regarding this new material. Please call your usual contact person in our sales department, who will put you in touch with our materials experts for further discussion on the subject.

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# Data sheet Ultra-Lean-Duplex 1.4093

Ferritic-austenitic cast alloy GX3CrNiCuN 22-2 (1.4093)

<b>KUHN-designation</b>	1.4093										
<b>Standard</b>	Kuhn Special Steel specification										
<b>Chemical composition</b>		C	Si	Mn	P	S	N	Cr	Cu	Mo	Ni
	min.						0.10	21.0	1.0	0	1.0
	max.	0.040	1.00	2.00	0.040	0.015	0.30	23.0	3.0	0.05	3.0
<b>PREN</b>	Cr+3.3×Mo+16N>24										
<b>As-delivered condition</b>	Solution annealed & water quenching										
<b>Microstructure</b>	Ferrite, Austenite (Ferrite content: 35–65 Vol.-%)										
<b>Mechanical properties (minimum values)</b>	T	0.2% yield strength			ultimate tensile strength		elongation at fracture		notch impact test		
	20 °C	400 MPa			620 MPa		25 %		80 J		
	100 °C	300 MPa			–		–		–		
	150 °C	280 MPa			–		–		–		
	200 °C	230 MPa			–		–		–		
	250 °C	210 MPa			–		–		–		
<b>Physical properties at 20 °C (reference values)</b>	thermal expansion coefficient					heat conductivity					
	20–100 °C		$13.0 \times 10^{-6} \times K^{-1}$			50 °C		18 W/(m × K)			
	20–300 °C		$14.0 \times 10^{-6} \times K^{-1}$			100 °C		19 W/(m × K)			
	specific heat capacity				magnetism			density			
	450 J/(kg × K)				highly magnetizable			7.7 kg/dm <sup>3</sup>			
<b>Welding advice</b>	Electrode: e. g. Thermanit 22/09 preheating: T < 100 °C interpass temperature: T < 250 °C heat treatment after welding: solution annealing										
<b>Special advice</b>	Highest temperature for pressure containing parts: 250 °C										