41CrAIMo7-10 (1.8509 / LK3)

EN 10085

Quenced Tempered Stabilized (+QT +SR)

PROPERTIES AND EMPLOYEMENTS

41CrAIMo7-10 steel, also known by the numerical designation 1.8509 (according to EN/DIN standards) and the trade name LK3, represents a high-performance chromium-aluminum-molybdenum alloy steel specifically designed for nitriding applications. It is classified as an alloy structural steel for nitriding, in accordance with international standards such as EN 10085. 1 This material is highly valued in various industries that require components subjected to extreme conditions, thanks to its unique combination of properties, which are particularly evident after specific heat treatments.

The intrinsic characteristics of 41CrAlMo7-10 steel make it ideal for critical applications. Its elevated hardenability and significant carbon content make it suitable for the construction of large parts, which are submitted to elevated pulsating and dynamic stresses. The presence of aluminum is a determining factor, as it confers exceptional surface hardness in the nitrided state, although it may lead to a slight reduction in core toughness. It is important to note that, while presenting more complex machinability, this can be optimized by paying attention to the inclusion rate and the steel's microstructure.



Heat-Treated Condition Quenched and Tempered (+QT) it's the condition that provides the fundamental core properties before nitriding, essential for the structural integrity and load-bearing capacity of the component.

41CrAIMo7-10 steel is a versatile and robust material, whose excellent combination of surface wear resistance (after nitriding) and core toughness makes it indispensable in a wide range of industrial sectors. Its ability to withstand high loads, friction, and harsh environments positions it as a preferred choice for critical components.

General Industrial Applications:

• Automotive Industry: Used for the production of critical components such as engine parts, transmission systems, and suspension components. Its strength ensures that parts can withstand the rigors of daily operation, contributing to the overall performance and safety of vehicles.

• Manufacturing Industry: Employed for the production of tools, dies, and jigs necessary for the production

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of other goods. Its hardness and wear resistance ensure that tools remain effective for extended periods, supporting efficiency in production lines. It is also used for industrial machinery components such as gears and shafts, contributing to the overall reliability and longevity of equipment.

• Mechanical Engineering and Machine Tools: Guarantees long service life, reliable functioning, and consistently high precision for machine tools, such as spindles, guide rails, grinding and drilling equipment, as well as milling machines and lathes.

• Oil and Gas Industry: Its ability to withstand extreme environments makes it ideal for use in pipelines, drilling rigs, and other offshore platforms. Its toughness and resistance to stress corrosion prevent catastrophic failures in these critical applications.

• Aerospace Industry: Used in the production of gears, shafts, and other small but critical components that must operate reliably under extreme conditions, where component failure is not permissible.

Specific Mechanical Components:

- Gears: Essential for power transmission, they require high surface wear resistance and good core toughness to withstand dynamic and pulsating loads.
- Shafts and Spindles: Rotating components that require high fatigue, torsional, and wear resistance. Examples include camshafts, crankshafts, grinding and milling spindles, automatic lathe spindles.
- Cylinders and Bushings: Require hard, wear-resistant surfaces to ensure smooth movement and long service life.
- Pump and Valve Components: Fuel pump parts for diesel engines, valve plates, valve stems, high-pressure valves, and valve parts in superheated steam operation (e.g., flanges).

• Molds and Tools: Used for plastic pressing molds, forming dies, cold extrusion tooling, punches and die inserts, gauges and fixtures, plastic molding components, press tooling, and forging dies.

- Engine Components: Pistons, connecting rods, piston rods, governors on steam turbines.
- Precision Screws and Worm Gears: Require high dimensional precision after heat treatment and high wear resistance.
- Extruder Components: Various wear-resistant parts on rubber and plastic extruders.

CORRESPONDENCE TO INTERNATIONAL DESIGNATIONS

steel grade	EUROPE	GERMA	NY	FRANCE	SPAIN	G.B.	USA
	EN	DIN	Werk.n.	AFNOR	UNE	B.S.	AISI/SAE
41CrAlMo7-10 (LK3)	41CrAlMo7-10	41CrAlMo7	1.8509	40CAD6.12	F1740	905M39	~8620H

CHEMICAL ANALYSIS % (EN 10085)

С	Mn	Si max	P max	S max	AI	Cr	Мо	Ni	V
0,38 - 0,45	0,40 - 0,75	0,40	0,025	0,035	0,80 - 1,20	1,50 - 1,80	0,20 - 0,35	-	-

MECHANICAL CHARACTERISTICS

	16mm < d ≤	40mm		40mm < d ≤ 100mm				10	00mm < d	l ≤ 160m	m	16				
Re min	Rm	A min	KV min	Re min	Rm	A min	KV min	Re min	Rm	A min	KV min	Re min	Rm	A min	KV min	HV1
	N/mm2	%	J	N/r	nm2	%	J	N/	′mm2	%	J	N/	'mm2	%	J	
750	950-1150	11	25	720	900- 1100	13	25	670	850 to 1050	14	30	625	800 to 1000	15	30	950

TEMPRABILITÀ JOMINY

acciaio		range	H	IRC H.	ARDNES	S MEAS	URED	FROI	M THE Q	UENCHE	D END C	F THE T	EST SAM	PLE (MN	1)
designazione	Werk.no.	limiti	1,5	3	5	7	9	11	13	15	20	25	30	35	40
61C-0100-7 10 / 11/2	1 9500	max	60	60	59,5	59,5	59	59	58,5	58	57	56,5	55	55	51
4 TCTAIIVI07-107 LK5	1.0009	min	53	52	51	50	49	48	47	44,5	44,5	41	39,5	37,5	36



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41CrAlMo7-10 (1.8509) mechanical properties in the +QT condition [ISO 683-5]



USUALLY AVAILABLE EX STOCK

color M.T.	steel grade	heat treatment	STATO SUPERFICIALE	DIAMETRO (mm)		
	41CrAIMo7-10 /	Quenched Tempered (+QT)	hot rolled peeled	20-300		
	LK3	Quenched Tempered Stabilized (+QT/+SR)	forged turned	300-520		