

709M Improved machinability high tensile steel

Typical Analysis (Ave. values %)	C	Si	Mn	Cr	Mo	S	P
	0.4	0.2	0.8	1.0	0.2	0.025	0.025
NEAREST STANDARD	AS		DIN		BS		AISI
	4140		1.7225 41CrMo4		EN19A		4140

DESCRIPTION	When compared to other 4140 steels 709M has guaranteed superior machinability characteristics in all sizes up to 320 mm Dia, effectively reducing costs. By using 709M machinability will be increased by up to 30% or tool life extended by up to 3 times. 709M has superior, guaranteed minimum mechanical properties in all dimensions to ensure higher safety margins with longer component life.
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APPLICATIONS	709M is the most commonly used of the high tensile steels with a wide range of applications in automotive, Gear and Engine construction, Crankshafts, Steering knuckles, Connecting rods, Spindles, Intermediate gears, Pump and Gear shafts. Axles, Nuts and Bolts.
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HEAT TREATMENT	Forge	850-1050°C. Cool in furnace.
	Normalize	840-880°C. Air cool.
	Anneal	680-720°C. Cool slowly in controlled furnace.
	Stress relieve	In the quenched and tempered condition, about 30-50°C below the tempering temperature. Air cool. In the annealed condition, 600-650°C. Air cool.
	Harden	830-860°C Oil quench.
	Temper	540-680°C hold for 1 hour min. at temperature, air cool. (see tempering chart)
	Nitride	Suitable for both liquid and gas nitriding.

WELDING	Parts should be welded in the hardened and tempered condition. Strength properties of the joint will not be the same as the base metal. Preheat 300-400°C. Temper after welding to about 35-50°C below the recommended tempering temperature. Filler metal: - FOX CM2-KB electrodes or CM2-IGwire. For advice in connection with difficult welding, please consult our engineers.
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MECHANICAL PROPERTIES (Comparisons)	Grade	Size	Tensile Strength MPa	Yield Strength MPa	Elong. %
	709M	63	1030	830	14
	4140 Cond. "U"	63	930	740	12
	4340 Cond. "V"	63	1000	835	12
	709M	100	960	760	14
	4140 Cond. "T"	100	850	665	13
	4340 Cond. "U"	100	930	740	12
	709M	150	930	720	14
	4140 Cond. "T"	150	770	570	15
	4340 Cond. "U"	150	850	665	13
	709M	250	900	900	14
	4140 Cond. "S"	250	770	770	13
	4340 Cond. "T"	250	850	850	13

PHYSICAL PROPERTIES	Density (kg/dm ³)	7.85
	Modulus of elasticity 10 ³ N/mm ²	210
	Thermal conductivity W/(m.K)	42
	Electric resistivity Ohm.mm ² /m	0.19
	Specific heat capacity J/(kg.K)	460
	Modulus of elasticity 10 ³ N/mm ²	205
	Thermal expansion 10 ⁶ m/(m.K)	11.1

SIZE RANGE	Standard stock condition "T" (Refer to mechanical properties)	
	Round	10 to 650 mm
	Hollow	45/28 to 200/140 mm
	Hexagon	19 to 75 mm A/F
	Square	28 to 127 mm
	Flat	76.2 x 38.1 mm

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	Chrome Bar	19.05 to 101.6 mm Dia.
	Ground	12.7 to 110 mm Dia. (H9 Tolerance)
	Peeled & polished	19.05 to 101.6 mm Dia. (H11 Tolerance)

Notes

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