

ASSAB 7210M

M-STEELS... A new concept in machinery steels

ASSAB M-steels are machinery steels with unique machinability. They are made by a special melting technique which makes it possible to increase the cutting speed by up to 30% or extend the tool life up to four times.

NEAREST STANDARDS

AISI/SAE	DIN	BS	AFNOR	JIS	SS
3115	15CrNi6	637A16 (EN 352)	16Nc6	SNC21	2511

CHEMICAL COMPOSITION

C %	Si %	Mn %	Cr %	Ni %	Mo %
0.15	0.25	0.90	0.80	1.2	0.1

PROPERTIES AND APPLICATIONS

ASSAB 7210M is an alloyed case hardening steel with high core strength. It is used for applications requiring a hard, wear resistant surface and a tough core, such as transmissions components for the automotive industry.

ASSAB 7210M is used for complicated parts, subjected to strict demands on dimensional stability, core hardness and toughness.

SIZE RANGE

ASSAB 7210M is available in standard sizes: 20—200 mm diameter, unmachined and pre-machined.

In non-M-execution ASSAB 7210 is available in standard sizes 200—406 mm diameter, unmachined and pre-machined.

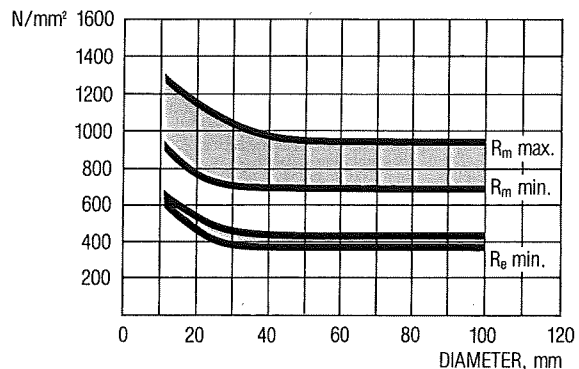
MECHANICAL PROPERTIES

Supplied hot rolled to max. 217 Brinell.

Core strength in hardened condition.

Diameter, mm	11	63
Yield strength, Re	min. 640	440
Tensile strength, Rm	980—1320	690—980
Elongation, A5	min. 8	11
Reduction of area, Z	min. 30	30
Impact strength, KU	—	30*
Hardness HB	300—405	200—300

* For guidance only



CUTTING DATA

Turning with coated carbide tools P15

ROUGH TURNING

Tool life T = 15 min

Feed s mm/r	Cutting depth a, mm			Power requirement per cutting depth, kW/mm
	<2	2—5	>5	
0.25	535	485	440	6.0
0.32	485	440	395	6.4
0.40	440	395	350	6.8
0.50	395	350	320	7.5
0.65	350	320	290	8.3
0.80	320	290	260	9.2

FINE TURNING

The feed is determined on the basis of reference radius (nose radius) and desired surface finish

Tool life T = 30 min

Surface roughness R _a μm	Reference radius r, mm			
	0.4	0.8	1.2	1.6
	Feed s, mm/r			
0.8	0.08	0.10	0.12	0.16
1.6	0.12	0.16	0.20	0.25
3.2	0.16	0.20	0.25	0.32
6.3	0.25	0.32	0.40	0.50

Recommended cutting speed

Feed s, mm/r	Cutting speed v, m/min
0.12	545
0.16	500
0.20	455
0.25	415
0.32	380
0.40	340

CORRECTION COEFFICIENTS

		Coefficient for cutting speed
Tool (coated)	P15	1.00
	P25	0.85
	P35	0.65
Cutting conditions	Forged or rolled surface	0.7—0.9
	Non-continuous machining or large variations in cutting depth	0.8—0.9
	Internal turning	0.8
	Work piece difficult to machine or poor condition of the machine	0.7—0.9

Drilling with high speed steel drills

Cutting lubrication, emulsion

Cutting speed v = 20 m/min

Diam. of drill	Feed	Revolutions	Feeding speed	Power consumption	Drilling depth to 1st chip removal	Drilling depth to next chip removal
d mm	s mm/r	n r/min	n × s mm/min	P kW	mm	mm
3	0.10	3290	329	0.3	12	6
4	0.12	2465	296	0.5	15	8
5	0.15	1975	296	0.6	20	8
6	0.17	1645	280	0.8	25	10
8	0.22	1235	272	1.2	30	12
10	0.27	985	266	1.7	35	14
12	0.31	820	254	2.1	40	16
16	0.38	615	234	3.0	55	20
18	0.40	550	220	3.5	60	20
20	0.41	495	203	3.8	60	22
25	0.44	395	174	4.7	75	24
30	0.47	330	155	5.7	85	26
40	0.50	245	123	7.2	110	26
50	0.53	195	103	8.9	140	26

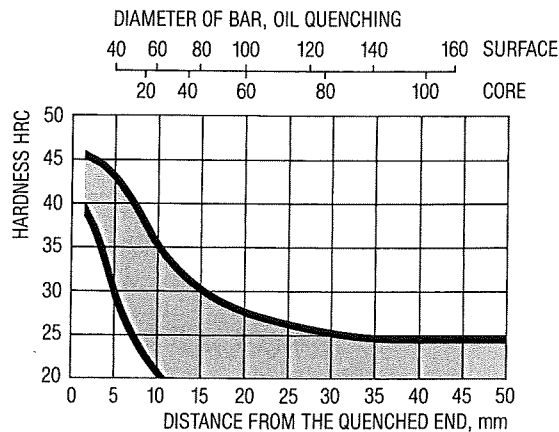
CORRECTION COEFFICIENTS

		Coefficient for cutting speed	Coefficient for feed
Drilling depth l	l ≤ 4 × d	1.00	1.00
	l = 4 × d — 8 × d	0.80	0.80
Machining condition	Through hole	0.85	
	Poor condition or lack of stability of the machine	0.80	0.80
	Especially favourable machining conditions	1.20	

The values in the above tables are applicable for ASSAB 7210M, hot rolled to max. 217 HB as supplied.

HEAT TREATMENT

Hardenability diagram



Soft annealing at 600—670°C

Soak at temperature for 2 hours. Cool with furnace to 600°C, then freely in air.

Carburizing at 850—950°C

The carburizing temperature must be adjusted to suit the carburizing agent and the required depth of case. (See table above!)

880—925°C in box with carburizing powder.

850—900°C in salt bath.

Mainly used for case depths up to 0,5 mm.

880—950°C in gas. When desired case depth has been reached, lower the temperature to 820—840°C before quenching.

Intermediate annealing at 650—680°C.

Soak at temperature for 2 hours. Cool with furnace to 600°C, then freely in air. Should be carried out if the material is to be machined after carburizing.

Isothermal annealing

Austenitising at 950—1000°C, cooling to 620—650°C, soak for 3 hours, then freely in air. Should be carried out for optimum machinability.

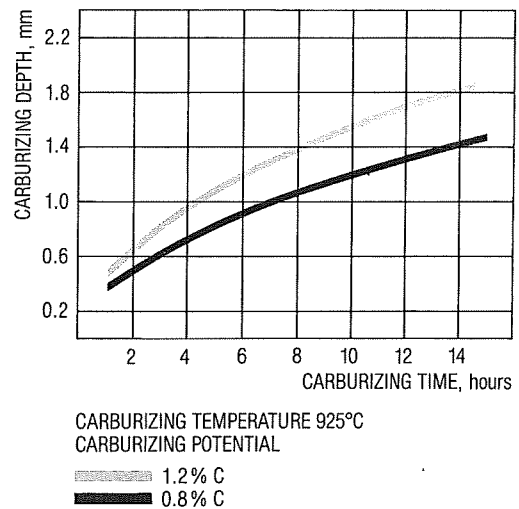
Hardening at 780—880°C

Direct hardening for case depths up to 0,5 mm (if gas carburized also bigger depths. Quench direct from carburizing temperature in oil or salt bath (180—220°C).

Single treatment for box carburized parts with case depths up to 1.25 mm. After carburizing leave to cool in box to room temperature. Reheat to 780—830°C and quench in oil or salt bath (180—220°C).

Double treatment for box carburized parts with case depths over 1.25 mm. After carburizing leave to cool in box to room temperature. Reheat to 860—890°C and then cool freely in air (normalising). Reheat once more to 780—830°C and quench in oil or salt bath (180—220°C).

Carburizing diagram



The carburizing depth is the depth that corresponds to a carbon content of 0.3%.

Tempering at 160—200°C

Soaking time should be 1—2 hours after the workpiece has attained full temperature throughout, and a surface hardness of 58—62 HRC can then be obtained, provided a case depth of minimum 0.5 mm. For smaller depths the Vickers or Rockwell 15 N test should be used.

Tempering diagram

