

Rapidur 3202

(HS12-1-4-5)

C 1.35 Cr 4.10 Mo 0.80 V 3.80 W 12.00 Co 4.80

Steel properties High-performance high-speed steel featuring an extremely good cutting edge retention and wear resistance due to its high vanadium content. A high cobalt content contributes to a high red hardness and tempering resistance.

Standards AISI ~T15

Applications Machining of hard materials which wear cutting edges such as highly quenched and tempered chromium-nickel grades and non-ferrous metals, mother-of-pearl, paper, hard rubber, synthetic resins, marble, slate and the like. Ideally suited for turning and finishing tools, forming tools of all kinds, heavy-duty milling cutters and automatic lathes.

Heat treatment	Soft annealing °C 820 – 860	Cooling Furnace	Hardness HB max. 280			
	Stress-relief annealing °C 630 – 650	Cooling Furnace				
	1st pre-heating °C up to approx. 400 in an air-circulating furnace	2nd and 3rd pre-heating °C a) 850 b) 850 and 1050	Hardening¹ °C 1190 – 1240	Quenching a) Saltbath, 550 °C b) Oil c) Air	Tempering °C at least three times 540 – 580	Hardness after tempering HRC 64 – 67

¹ For cold-forming tools with a complex geometry, a hardening temperature at the lower end of the quoted range is recommended. The stated hardening temperatures apply to saltbath hardening only. For vacuum hardening, we suggest a reduction of 10 °C to 30 °C.

Rapidur 3207

HS10-4-3-10

C 1.23 Cr 4.10 Mo 3.50 V 3.30 W 9.50 Co 10.00

Steel properties High-speed steel of superlative performance combining optimal cutting-edge retention, high-temperature strength and toughness on account of its composition.

Standards **AISI** ~T42 **AFNOR** Z130WKCDV10-10-04-03

Applications Universally applicable for roughing and finishing where maximum tool life is required and for automatic lathes where wear is caused by large batch production. Also for all kinds of cutting tools and milling cutters exposed to exceedingly high stresses.

Heat treatment	Soft annealing °C	Cooling	Hardness HB			
	820 – 860	Furnace	max. 302			
	Stress-relief annealing °C	Cooling				
	630 – 650	Furnace				
	1st pre-heating °C	2nd and 3rd pre-heating °C	Hardening ¹ °C	Quenching	Tempering °C	Hardness after tempering HRC
	up to approx. 400 in an air-circulating furnace	a) 850 b) 850 and 1050	1190 – 1230	a) Saltbath, 550 °C b) Oil c) Air	at least three times 540 – 570	65 – 67

¹ For cold-forming tools with a complex geometry, a hardening temperature at the lower end of the quoted range is recommended. The stated hardening temperatures apply to saltbath hardening only. For vacuum hardening, we suggest a reduction of 10 °C to 30 °C.

Rapidur 3243

HS6-5-2-5

C 0.92 Cr 4.10 Mo 5.00 V 1.90 W 6.40 Co 4.80

Steel properties

The cobalt content in this high-performance high-speed steel results in high red hardness and tempering resistance. As a consequence, this grade is particularly suitable for conditions involving thermal stresses and discontinuous cutting. Under the name Rapidur 3245, AISI M 35 + S and material number 1.3245, this steel grade is supplied with a higher sulphur content (S = 0.10 %).

Standards

AISI M35

AFNOR Z85WDKCV06-05-05-04-02

Applications

Heavy-duty milling cutters of all kinds, highly stressed twist drills and taps, profile knives, machining of high-strength materials, broaches.

Heat treatment

Soft annealing °C

820 – 860

Cooling

Furnace

Hardness HB

max. 269

Stress-relief annealing °C

630 – 650

Cooling

Furnace

1st pre-heating °C

up to approx. 400
in an air-circulating
furnace

2nd and 3rd pre-heating °C

- a) 850
- b) 850 and 1050

Hardening¹ °C

1190 – 1230

Quenching

- a) Saltbath,
550 °C
- b) Oil
- c) Air

Tempering °C

at least
three times
540 – 570

Hardness after tempering HRC

64 – 67

¹ For cold-forming tools with a complex geometry, a hardening temperature at the lower end of the quoted range is recommended. The stated hardening temperatures apply to saltbath hardening only. For vacuum hardening, we suggest a reduction of 10 °C to 30 °C.

Rapidur 3247

HS2-9-1-8

C 1.08 Cr 4.10 Mo 9.50 V 1.20 W 1.50 Co 8.00

Steel properties High-carbon, high-speed steel based on molybdenum. Characterized by high wear resistance, red hardness and toughness. As a result of its low vanadium content, this grade exhibits good grindability.

Standards **AISI** M42 **AFNOR** Z110DKCW

Applications For tools subject to severe mechanical wear (e.g. in case of small cross-section cuts at high cutting speeds). Particularly suitable for die-sinking cutters, milling cutters and engraving machines including gravers as well as for tool bits in automatic lathes. Also suitable for non-cutting shaping (e.g. cold extrusion rams and tools employed in machining materials for the aviation industry such as titanium alloys).

Heat treatment	Soft annealing °C 820 – 860	Cooling Furnace	Hardness HB max. 277
	Stress-relief annealing °C 630 – 650	Cooling Furnace	

1st pre-heating °C	2nd and 3rd pre-heating °C	Hardening ¹ °C	Quenching	Tempering °C	Hardness after tempering HRC
up to approx. 400 in an air-circulating furnace	a) 850 b) 850 and 1050	1160 – 1190	a) Saltbath, 550 °C b) Oil c) Air	at least three times 530 – 560	66 – 69

¹ For cold-forming tools with a complex geometry, a hardening temperature at the lower end of the quoted range is recommended. The stated hardening temperatures apply to saltbath hardening only. For vacuum hardening, we suggest a reduction of 10 °C to 30 °C.

Rapidur 3333

HS3-3-2

C 1.00 Cr 4.00 Mo 2.60 V 2.30 W 3.00

Steel properties High-speed steel with economic use of alloys, universally applicable at medium performance. Suitable for series tooling.

Applications Twist drills, circular saws, hacksaws, reamers and milling cutters.

Heat treatment	Soft annealing °C	Cooling	Hardness HB							
	770 – 840	Furnace	max. 255							
Heat treatment	Stress-relief annealing °C	Cooling	Hardness HB							
	630 – 650	Furnace	max. 255							
1st pre-heating °C	2nd and 3rd pre-heating °C	Hardening ¹ °C	Quenching	Tempering °C			Hardness after tempering HRC			
up to approx. 400 in an air-circulating furnace	a) 850 b) 850 and 1050	1180 – 1220	a) Saltbath, 550 °C b) Oil c) Air	at least twice 540 – 560			62 – 64			
Tempering °C		100	200	300	400	500	525	550	575	600
HRC		63	61	60	58	62	63	64	63	62

¹ For cold-forming tools with a complex geometry, a hardening temperature at the lower end of the quoted range is recommended. The stated hardening temperatures apply to saltbath hardening only. For vacuum hardening, we suggest a reduction of 10 °C to 30 °C.

Rapidur 3343

HS6-5-2C

C 0.90 Si 0.30 Mn 0.30 Cr 4.10 Mo 5.00 V 1.90 W 6.40

Steel properties

Standard high-speed steel grade. Its well-balanced alloy composition forms the basis of its high toughness and good cutting edge retention, rendering it suitable for a large variety of applications.

Standards

AISI M2

AFNOR Z85WDCV06-05-04-02

Physical properties

Thermal conductivity

at °C	20	350	700
W/(m · K)	32.8	23.5	25.5

Applications

For all metal-cutting tools for roughing or finishing such as twist drills, diverse milling cutters, thread dies, broaches, reamers, countersinks, thread chasers, circular saw segments, shaping tools and woodworking tools. Also highly suitable for cold-forming tools such as cold extrusion rams and dies, as well as cutting and precision cutting tools, plastic moulds with elevated wear resistance and screws.

Heat treatment

Soft annealing °C

770 – 860

Cooling

Furnace

Hardness HB

max. 269

Stress-relief annealing °C

630 – 650

Cooling

Furnace

1st pre-heating °C

up to approx. 400
in an air-circulating
furnace

2nd and 3rd pre-heating °C

- a) 850
- b) 850 and 1050

Hardening¹ °C

1190 – 1230

Quenching

- a) Saltbath, 550 °C
- b) Oil
- c) Air

Tempering °C

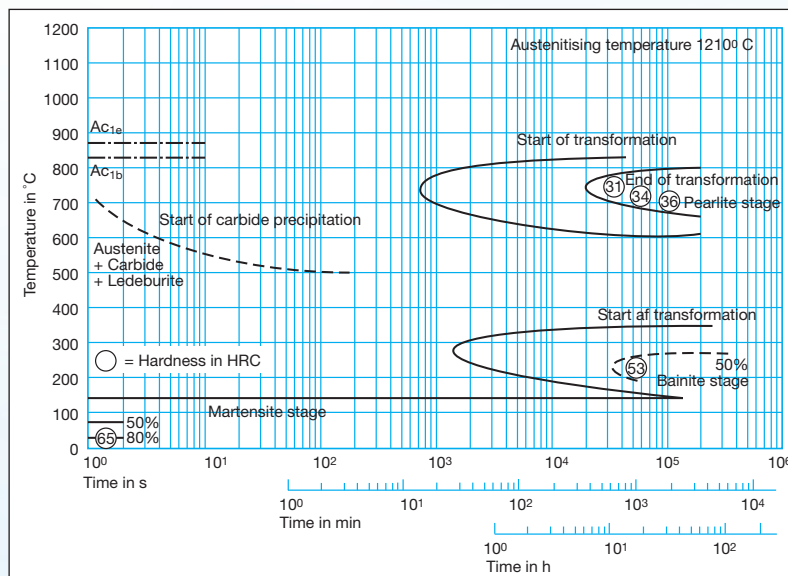
at least twice
530 – 560

Hardness after tempering HRC

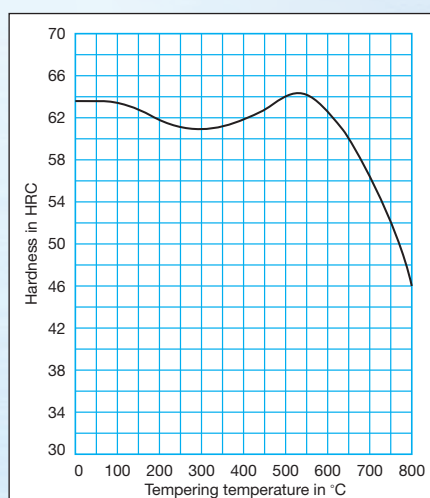
64 – 66

¹ For cold-forming tools with a complex geometry, a hardening temperature at the lower end of the quoted range is recommended. The stated hardening temperatures apply to saltbath hardening only. For vacuum hardening, we suggest a reduction of 10 °C to 30 °C.

Isothermal time-temperature-transformation diagram



Tempering diagram



Rapidur 3344

HS6-5-3

C 1,22 Cr 4,10 Mo 5,00 V 2,90 W 6,40

Steel properties Very similar composition to Rapidur 3343, but with substantially higher V and C content, resulting in combined maximum wear resistance and cutting edge retention with good toughness.

Standards **AISI** M3 Typ 2 **AFNOR** Z120WDCV06-05-04-03

Applications Taps, reamers, heavy-duty milling cutters, dies, rotary gear shaping and shaving cutters for the processing of hard materials, hexagon socket punches and piercing dies for the nut production.

Heat treatment	Soft annealing °C 820 – 860	Cooling Furnace	Hardness HB max. 269			
	Stress-relief annealing °C 630 – 650	Cooling Furnace				
	1st pre-heating °C up to approx. 400 in an air-circulating furnace	2nd and 3rd pre-heating °C a) 850 b) 850 and 1050	Hardening¹ °C 1190 – 1230	Quenching a) Saltbath, 550 °C b) Oil c) Air	Tempering °C at least three times 540 – 570	Hardness after tempering HRC 64 – 66

¹ For cold-forming tools with a complex geometry, a hardening temperature at the lower end of the quoted range is recommended. The stated hardening temperatures apply to saltbath hardening only. For vacuum hardening, we suggest a reduction of 10 °C to 30 °C.