

Tool steel description

| L % | C | Si | Mn | Cr | Ni | Mo | W | V | S |
|---------------|-------------|-------------|-------------|-------------|------|-------------|---|---|-------------|
| 1.2312 | 0,40 | 0,40 | 1,50 | 1,90 | | 0,20 | | | 0,10 |
| 1.2311 | 0,35 | 0,35 | 1,40 | 2,00 | | 0,20 | | | |
| 1.7225 | 0,35 | 0,35 | 1,40 | 2,00 | | 0,20 | | | |
| 1.2738 | 0,40 | 0,30 | 1,50 | 1,90 | 1,00 | 0,20 | | | |

P20 / 1.2312

40 Cr Mn Mo S 8-6

Pre-hardened to 1100N/mm²

★★★

Pre-heat treated (re-sulphurised) Plastic Mold Steel

Special steel in for plastic forms is supplied in hardened and tempered condition with a tensile strengths of approx. 1000N/mm² (approx. 100 Kg/mm²) (45.000 psi; 65tsi). Owing to the chemical composition, the steel is considerably better and machineable in hardened and tempered condition than any other steel of the same tensile strength. On account of its superior capability of being polished. P20+S is also suitable for the manufacture of forms with superior surface qualities. In order to improve the properties of surface, P20 can be nitrided, chromium plated or hard-nickel plated. No further heat treatment by the consumer is necessary. No problems with regard to change dimension or distortion by heat treatment, in particular with large forms, are to be anticipated. Apart from manufacture of plastic forms the steel can also be used for light metal and zinc printing forms. P20 +S is supplied in heat treated bars or forged blocks.

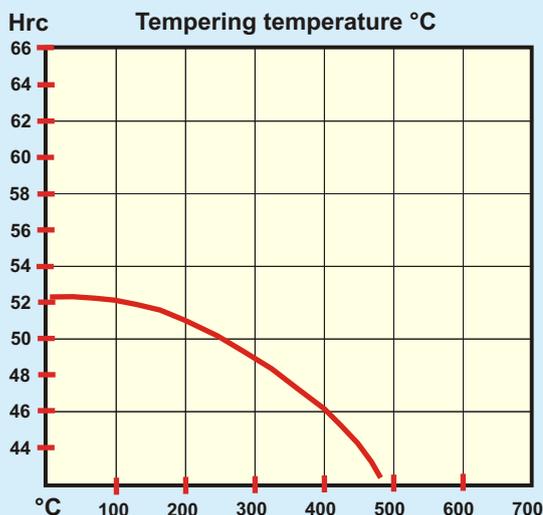
Some typical Applications: Transfer-, Injection-, Compression MOLDS. All types of dies. Backers and Holders. No further heat treatment is required.

EDM: Normally not used for park erosion, but can be performed. After hardening and tempering stress relieving at 550°C (1020°F)

Nitriding: To increase wear resistance nitride in ammonia at 520°C (970°F) for a surface hardness of 56-64Hrc.

Machinability: Due to the sulfur (S) content P20 can easily be machined with HSS and carbide tools. Vc=110m/min.

HEAT treatment and HARDENING instructions



| | |
|----------------------------|---|
| Forging..... | 1050 - 850 °C (1.920 - 1560°F) cool slowly |
| Soft annealing | 710 - 740 °C max. 235 HB, max. 790 N/mm 4 - 6 hrs. Cool slowly. |
| Stress Relieving..... | 650 - 680 °C (1200 - 1260°F) in pre-hardened condition below the last tempering temperature. Cool slowly. |
| Pre-heating..... | 350 °C depending on size. |
| Hardening..... | 840 - 870 °C (1540-1600°F) (51 HRC) |
| Tempering..... | 450 - 650 °C (840-1200°F) |
| Quenching..... | Oel, Warmbath 180 - 220°C (355-430°F) |
| Thermal expansion..... | (Mm/m °C): 11.1 -14,9 10-6 at 25 °C- 700 °C |
| Thermal conductivity..... | (j/cm s °C): 0.345 - 0.320 |
| Extending limit..... | Rp 0,2 Mpa 800 at 20°C Stab 25mm Ø / 300HB |
| Tensile strength Rm MPa..: | 1020 at 20°C |
| Data sheet | D/04 |

100 °C = 51 +/- 1Hrc 200 °C = 50 +/- 1Hrc 300 °C = 48 +/- 1Hrc 400 °C = 46 +/- 1Hrc 500 °C = 42 +/- 1Hrc

Offer and prices for P20 S (1.2312)

| | Length mm | Page |
|---|--------------|---------------------------|
| Material description and hardening instructions | | 33 i |
| Pre-machined (oversize) | 1030 | 34 Prices |
| Pre-machined universal plates | various | 35 Prices |
| Universal bar and plate | 505 / 1030 | 36 Prices |
| Universal plates 508 x 1030, Thickness | 8,2 to 100,4 | 55 Prices |

Delivery condition: pre-hardened 1050 N/mm²

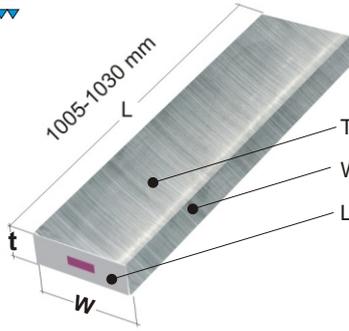
Colour code for P20 S **LILAC**

Usually used as delivered



P20+S / 1.2312

40 CrMnMoS 8-6



| | | |
|------------|------------|---|
| Thickness: | + 0,2/0 mm | N8 Segmental ground, fine milled (Ra 3,2) |
| Width: | +0,2/0 mm | N8 Segmental ground, fine milled (Ra 3,2) |
| Length: | +5/0 mm | N11 Sawn only (Ra 25) |



PRE-MACHINED (over size)

Delivery: EX STOCK

PRICELIST EUR/pc

Length: 1005 - 1030 mm

| t | 8,2 | 10,4 | 12,4 | 15,4 | 16,4 | 20,4 | 22,4 | 25,4 | 27,4 | 30,4 | 32,4 | 36,4 | 40,4 | 46,4 | 50,4 | 56,4 | 60,4 | 70,4 | 76,4 | 80,4 | 100,4 | 120,4 | 150,4 | | |
|-------|-----|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-------|-------|-------|-----|--|
| 20,4 | 22 | 23 | 26 | 32 | | 38 | | | | | | | | | | | | | | | | | | | |
| 25,4 | 23 | 24 | 28 | 33 | | 37 | | 49 | | | | | | | | | | | | | | | | | |
| 30,4 | 25 | 24,5 | 29 | 34 | | 39 | | 48 | | 63 | | | | | | | | | | | | | | | |
| 32,4 | 26 | 26 | 32 | 37 | | 42 | | | | 64 | 67 | | | | | | | | | | | | | | |
| 40,4 | 27 | 28 | 36 | 40 | | 44 | | 54 | | 65 | | | 70 | | | | | | | | | | | | |
| 50,4 | 32 | 38 | 41 | 44 | | 50 | | 58 | | 67 | 71 | | 75 | | 94 | | | | | | | | | | |
| 60,4 | 37 | 45 | 47 | 50 | | 56 | | 62 | | 72 | | | 87 | | 100 | | 128 | | | | | | | | |
| 63,4 | | | | | | | | | | | | | | | | | | | | | | | | | |
| 70,4 | | | 49 | 54 | | 63 | | 70 | | 81 | | | 92,5 | | 114 | | 135 | 148 | | | | | | | |
| 80,4 | 46 | 51 | 53 | 60 | | 67 | | 77 | | 91 | | | 99 | | 125 | | 156 | 181 | | 210 | | | | | |
| 90,4 | | | | | | 83 | | 92 | | 108 | | | | | | | | | | | | | | | |
| 100,4 | 62 | 65 | 71 | 76 | 81 | 88 | | 93 | | 106 | 120 | | 128 | | 155 | | 175 | 186 | | 219 | 276 | | | | |
| 110,4 | | | | | | 111 | | 113 | | 137 | | | | | | | | | | | | | | | |
| 120,4 | | | | 99 | | 111 | | 113 | | 137 | | | 149 | | 174 | | 208 | 215 | | 289 | | | 360 | | |
| 130,4 | | | | | | 124 | | 129 | | 159 | | | | | | | | | | | | | | | |
| 140,4 | | | | | | 135 | | 139 | | 174 | | | 179 | | | | | | | | | | | | |
| 150,4 | | 105 | 112 | 120 | 135 | 135 | | 139 | | 169 | 178 | | 179 | | 200 | | 224 | 256 | | 311 | 390 | | | 560 | |
| 156,4 | | | 122 | | | | | 149 | | 175 | | | 189 | | 209 | | 239 | | | 300 | | | | | |
| 160,4 | | | | | | 148 | | 159 | | 191 | | | | | | | | | | | | | | | |
| 180,4 | | | | 138 | | 148 | | 159 | | 191 | | | 209 | | 235 | | 281 | 333 | | | | | | | |
| 196,4 | | | 138 | | | | | 173 | | 197 | | | 212 | | 244 | | 295 | | | 355 | | | | | |
| 200,4 | | 131 | 138 | 150 | 161 | 156 | | 179 | | 209 | 232 | | 229 | | 261 | | 320 | 334 | | 377 | 529 | | | | |
| 220,4 | | | | | | 205 | | 209 | | 249 | | | | | | | | | | | | | | | |
| 246,4 | | | 166 | | | | | 224 | | 250 | | | 281 | | 308 | | 340 | | | 395 | | | | | |
| 250,4 | | 159 | 189 | 213 | | 223 | | 232 | | 265 | | | 279 | | 310 | | | | | | | | | | |
| 296,4 | | | 209 | | | | | 262 | | 299 | | | 315 | | 356 | | 383 | | | 438 | | | | | |
| 300,4 | | 183 | 209 | 230 | | 237 | | 263 | | 298 | 314 | | 318 | | 364 | | 392 | 410 | | | | | | | |
| 350,4 | | | | 260 | | 269 | | 299 | | 345 | | | 389 | | | | | | | | | | | | |
| 396,4 | | | | | | | | 344 | | 363 | | | 406 | | 440 | | 523 | | | 639 | | | | | |
| *405 | | | | | | | | | | | | | | | | | | | | | | | | | |
| *505 | 292 | 310 | 368 | 400 | | 456 | | 516 | | 590 | | | 556 | | 656 | | 748 | 812 | | 989 | 1156 | | | | |

* Plates: Thickness ground. Width and Length sawn

SQUARES

| € | 8,2 | 10,4 | 12,4 | 15,4 | 16,4 | 20,4 | 22,4 | 25,4 | 27,4 | 30,4 | 32,4 | 36,4 | 40,4 | 46,4 | 50,4 | 56,4 | 60,4 | 70,4 | 76,4 | 80,4 | 100,4 | 120,4 | 150,4 |
|---|-----|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-------|-------|-------|
| | | | | | | 38 | | 49 | | 63 | | | 70 | | 94 | | 128 | 148 | | 210 | 274 | 360 | 560 |

Tol: +0,4/0 mm

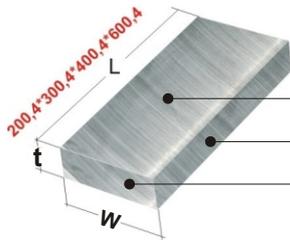
NON STANDARD SIZES UPON REQUEST

Hardening and Machining instructions see page 33 or our data sheet D/04

Delivery condition: pre-hardened 1050 N/mm²

Colour code for P20 S **LILAC**

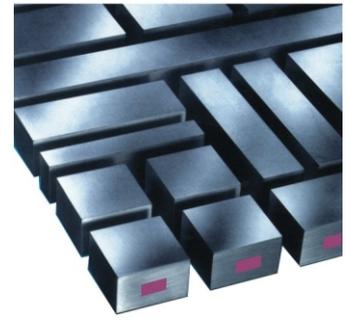
Usually used as delivered

B

| | | |
|------------|------------|---|
| Thickness: | + 0,2/0 mm | N8 Segmental ground, fine milled (Ra 3,2) |
| Width: | +0,2/0 mm | N8 Segmental ground, fine milled (Ra 3,2) |
| Length: | +0,40/0 mm | N8 Segmental ground, fine milled (Ra 3,2) |

P20 / 1.2312

40 CrMnMoS 8-6



UNIVERSAL PLATES PRE-MACHINED (Over size)

Delivery: EX STOCK

PRICELIST EUR/pc

Length: 200,4 * 300,4 * 400,4 * 600,4 mm

Length: 200,4 mm

| | | | | | | | | |
|----------|----------|-------|-------|-------|-------|-------|-------|-------|
| | w | | | | | | | |
| t | → | 15,4 | 20,4 | 25,4 | 30,4 | 40,4 | 50,4 | 60,4 |
| 100,4 | | 19,60 | 24,20 | 30,50 | 37,00 | 45,50 | 53,80 | 56,80 |
| 150,4 | | 28,20 | 33,40 | 43,00 | 49,20 | 53,40 | 71,60 | 83,20 |
| 200,4 | | 38,40 | 45,20 | 54,00 | 63,00 | 81,00 | 92,00 | 106 |

Length: 300,4 mm

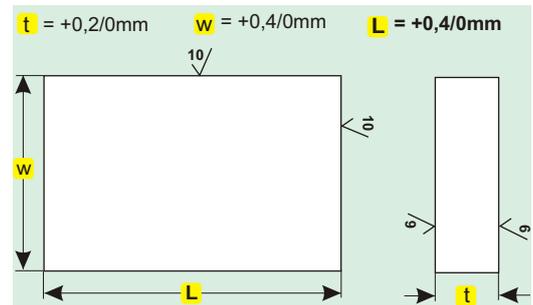
| | | | | | | | | |
|-------|--|-------|-------|-------|-------|-------|-------|-------|
| | | 15,4 | 20,4 | 25,4 | 30,4 | 40,4 | 50,4 | 60,4 |
| 100,4 | | 26,20 | 34,60 | 42,00 | 49,00 | 62,00 | 76,00 | 82,00 |
| 150,4 | | 40,00 | 44,60 | 57,00 | 76,00 | 83,00 | 107 | 118 |
| 200,4 | | 53,00 | 58,00 | 74,00 | 98,00 | 108 | 140 | 153 |
| 250,4 | | 62,00 | 70,00 | 89,00 | 118 | 130 | 168 | 184 |
| 300,4 | | 75,00 | 84,00 | 106 | 131 | 142 | 192 | 210 |

Length: 400,4 mm

| | | | | | | | | |
|-------|--|-------|-------|-------|-------|-------|-------|------|
| | | 15,4 | 20,4 | 25,4 | 30,4 | 40,4 | 50,4 | 60,4 |
| 100,4 | | 34,80 | 46,20 | 55,20 | 60,00 | 77,00 | 94,00 | 102 |
| 150,4 | | 51,60 | 56,00 | 72,40 | 96,00 | 105 | 136 | 151 |
| 200,4 | | 68,40 | 74,20 | 93,40 | 128 | 140 | 172 | 202 |
| 250,4 | | 82,00 | 96,00 | 118 | 152 | 170 | 216 | 240 |
| 300,4 | | 96,00 | 118 | 140 | 176 | 200 | 240 | 278 |
| 400,4 | | 126 | 137 | 178 | 236 | 258 | 336 | 373 |

Length: 600,4 mm

| | | | | | | | | |
|-------|--|-------|-------|-------|-------|------|------|------|
| | | 15,4 | 20,4 | 25,4 | 30,4 | 40,4 | 50,4 | 60,4 |
| 100,4 | | 48,00 | 65,00 | 77,00 | 84,00 | 107 | 130 | 141 |
| 150,4 | | 72,00 | 79,00 | 100 | 134 | 146 | 186 | 210 |
| 200,4 | | 96,00 | 104 | 130 | 170 | 196 | 254 | 284 |
| 250,4 | | 115 | 134 | 165 | 212 | 238 | 299 | 334 |
| 300,4 | | 134 | 165 | 196 | 246 | 280 | 336 | 388 |
| 400,4 | | 170 | 188 | 245 | 325 | 356 | 436 | 514 |
| 500,4 | | 204 | 225 | 294 | 390 | 427 | 523 | 618 |



UNIVERSAL PLATES: the thickness is fine milled or segmental ground. Width and length fine milled.

These prices are used to calculate the price of NON STANDARD Sizes as shown below.

Price example:

Your size = 192 x 48 x 378 mm = Euro 172,--
 Price of 200,4 x 50,4 x 400,4 mm = Euro 172,--

We charge the price of the nearest larger standard size.

MINIMUM order value for non standard sizes
Euro 120,-- per size

NON STANDARD SIZES UPON REQUEST

Hardening and Machining instructions see page 33 or our data sheet D/04

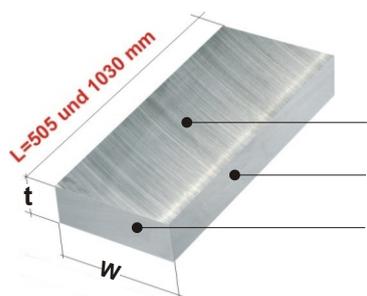
Delivery condition: pre-hardened 1050 N/mm²Colour code for P20 S **LILAC**

Usually used as delivered



P20 / 1.2312

40 CrMnMoS 8-6



| | Tolerance | Surface |
|----------|------------|----------------------------|
| Thickn.: | + 0,2/0 mm | N8 pre-machined (Ra 3,2) |
| Width : | ±2 mm | N11 sawn (Ra 25) |
| Length : | ±2 mm | N11 sawn (Ra 25) |

DECARB FREE



**Any width between
53 and 505 mm
available**

UNIVERSAL BAR and PLATE

PRICELIST EUR/pc.

For length **505** mm. For length 1030 mm Prices **x2**

| t \ W | 8,2 | 10,4 | 12,4 | 15,4 | 20,4 | 25,4 | 30,4 | 40,4 | 50,4 | 60,4 | 70,4 | 80,4 | 100,4 |
|-------|-----|------|------|------|------|------|------|------|------|------|------|------|-------|
| 23 | | | | | 19 | | | | | | | | |
| 33 | | | | | 20 | 23 | 28 | | | | | | |
| 43 | | | | | 21 | 24 | 29 | 31 | | | | | |
| 53 | 18 | 19 | 20 | 21 | 22 | 25 | 30 | 33 | 44 | | | | |
| 63 | 19 | 20 | 22 | 23 | 26 | 29 | 33 | 41 | 47 | 59 | | | |
| 73 | 20 | 21 | 23 | 25 | 28 | 32 | 37 | 43 | 53 | 63 | 68 | | |
| 83 | 21 | 23 | 24 | 28 | 32 | 36 | 42 | 46 | 28 | 71 | 84 | 97 | |
| 93 | 28 | 30 | 32 | 34 | 38 | 42 | 47 | 56 | 69 | 77 | 85 | 100 | |
| 103 | 29 | 31 | 33 | 35 | 39 | 43 | 49 | 59 | 72 | 80 | 86 | 102 | 132 |
| 113 | 34 | 36 | 40 | 43 | 47 | 50 | 59 | 67 | 76 | 90 | 97 | 124 | 162 |
| 123 | 35 | 37 | 42 | 45 | 50 | 52 | 63 | 68 | 79 | 94 | 100 | 130 | 173 |
| 133 | 40 | 44 | 47 | 53 | 57 | 59 | 73 | 82 | 85 | 97 | 108 | 136 | 186 |
| 143 | 48 | 49 | 50 | 55 | 62 | 63 | 79 | 84 | 87 | 100 | 115 | 140 | 192 |
| 153 | 48 | 51 | 52 | 56 | 64 | 64 | 81 | 87 | 94 | 112 | 128 | 161 | 200 |
| 163 | 52 | 54 | 57 | 61 | 67 | 72 | 89 | 94 | 105 | 121 | 144 | 172 | 218 |
| 183 | 58 | 60 | 62 | 64 | 69 | 78 | 94 | 104 | 117 | 139 | 165 | 182 | 249 |
| 203 | 60 | 62 | 64 | 68 | 74 | 85 | 104 | 114 | 129 | 155 | 178 | 200 | 262 |
| 223 | 66 | 68 | 76 | 84 | 90 | 96 | 114 | 126 | 142 | 168 | 189 | 211 | 279 |
| 253 | 72 | 73 | 88 | 98 | 102 | 106 | 123 | 136 | 156 | 179 | 207 | 251 | 300 |
| 303 | 80 | 83 | 95 | 104 | 107 | 119 | 138 | 168 | 186 | 196 | 216 | 286 | 373 |
| 353 | 88 | 89 | 103 | 118 | 128 | 138 | 156 | 176 | 197 | 243 | 308 | 352 | 429 |
| 403 | 99 | 109 | 121 | 138 | 149 | 162 | 196 | 221 | 256 | 296 | 372 | 396 | 509 |
| 505 | 108 | 115 | 136 | 148 | 169 | 189 | 220 | 278 | 328 | 374 | 406 | 494 | 578 |

NON STANDARD SIZES UPON REQUEST

Hardening and Machining instructions see page 33 or our data sheet D/04

Delivery condition: pre-hardened 1050 N/mm²

Colour code for P20 S **LILAC**

Usually used as delivered