
H.S.G.
The Art of Cutting
PROMOTION
MAX POWER
New Drills
Best Price
1 - 2015

P M K N S H

The solution you've been waiting for.

New HSG Drill MaxPower

OG2113 - OO2105 - OE2003 - OM2005 - OT2108 - TM2112 Type

Your lower - hole - cost alternative

- High efficent drilling in wide application range
- General purpose application
- Maximum performance by increased feed capabilities
- Latest technology of „HSG-Max Power“ Coating

TOP GEOMETRIES

Advantages

- The specific and optimum solution for a wide range of application conditions
- Top performance parameters, maximum feed and stable long tool life
- Double margin design for high-precision holes
- Good balance of high wear resistance and toughness
- Curved cutting edge - ideal for removing chips
- Reliable and high productivity performance

La soluzione che stavi aspettando

Nuova punta HSG Max Power

Tipo OG2113 - OO2105 - OE2003 - OM2005 - OT2108 - TM2112

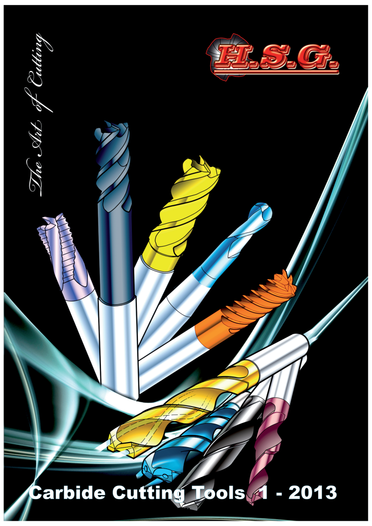
L’alternativa per minimizzare il costo del foro

- Foratura ad elevata efficenza in un ampio range applicativo
- Per applicazioni generiche
- Massime prestazioni grazie agli elevati avanzamenti applicabili
- Rivestita con la più avanzata tecnologia „HSG Max Power“

UNIVERSAL PERFORMANCE DRILL

Vantaggi

- Soluzione specifica e ottimale per una vasta gamma di applicazioni.
- Parametri di lavoro al Top,massimo avanzamento, vita utensile lunga e stabile.
- Doppio margine disegnato per ottenere fori precisi.
- Ottimo compromesso fra tenacità e resistenza all‘usura.
- Tagliente curvo, ottimo per una migliore evacuazione del truciolo.
- Prestazioni affidabili e di elevata produttività.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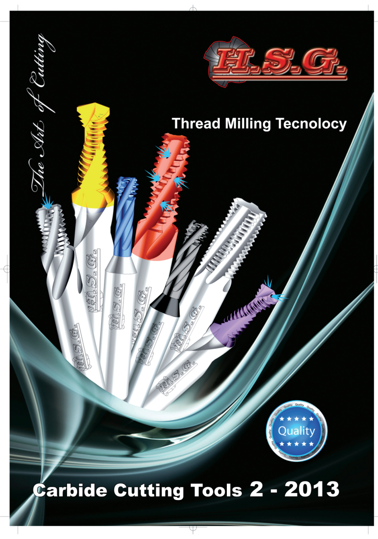
The Art of Cutting
Carbide Cutting Tools 1 - 2013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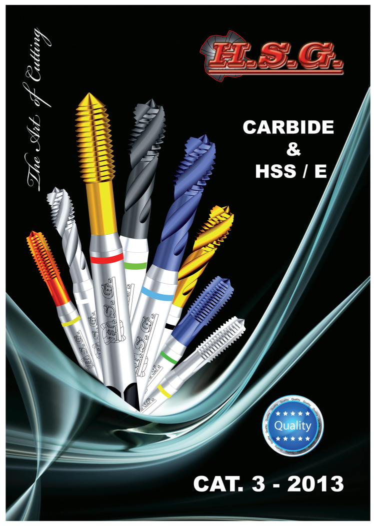
The Art of Cutting
Thread Milling Tecnolocy
Quality
Carbide Cutting Tools 2 - 2013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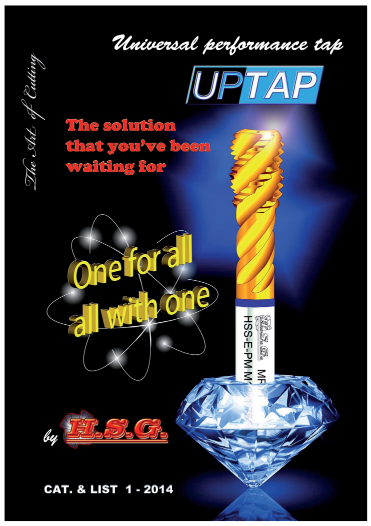
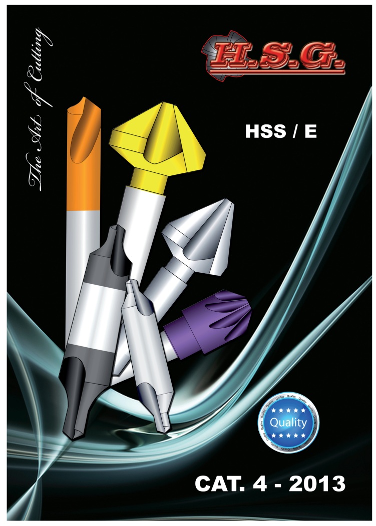
The Art of Cutting
CARBIDE
&
HSS / E
Quality
CAT. 3 - 2013


Quality
H.S.G.
The Art of Cutting
New solution for machining die & mold
MORE...
Radius Tolerance R ± 0.01mm
42YD.. > 72 size
42YF.. > 38 size
Radius
Diameter
42YD / 42YF
can achieve
highly precise and
highly machining
die & mold
High Precision Corner Radius End Mills 6 - 2013


Universal performance tap
UPTAP
The Art of Cutting
The solution
that you've been
waiting for
One for all
all with one
by H.S.G.
CAT. & LIST 1 - 2014


H.S.G.
The Art of Cutting
HSS / E
Quality
CAT. 4 - 2013


NEW
UNDER CONSTRUCTION

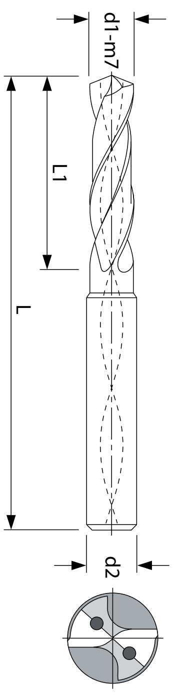

100% 100% 100%
GUARANTEED
100% 100% 100%


H.S.G.

Carbide Drills

DIN 6535 Form HA | DIN 6537 | 3 D | DX | MaxPower | P | M | K | N | S

OG 2103



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OG2103-0320HA	3.20	6	62	20	36,80
OG2103-0330HA	3.30	6	62	20	36,80
OG2103-0340HA	3.40	6	62	20	36,80
OG2103-0350HA	3.50	6	62	20	36,80
OG2103-0360HA	3.60	6	62	20	36,80
OG2103-0370HA	3.70	6	62	20	36,80
OG2103-0380HA	3.80	6	66	24	36,80
OG2103-0390HA	3.90	6	66	24	36,80
OG2103-0400HA	4.00	6	66	24	39,78
OG2103-0410HA	4.10	6	66	24	39,78
OG2103-0420HA	4.20	6	66	24	39,78
OG2103-0430HA	4.30	6	66	24	39,78
OG2103-0440HA	4.40	6	66	24	39,78
OG2103-0450HA	4.50	6	66	24	39,78
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OG2103-0500HA	5.00	6	66	28	39,78
OG2103-0510HA	5.10	6	66	28	39,78
OG2103-0520HA	5.20	6	66	28	39,78
OG2103-0530HA	5.30	6	66	28	39,78
OG2103-0540HA	5.40	6	66	28	39,78
OG2103-0550HA	5.50	6	66	28	39,78
OG2103-0560HA	5.60	6	66	28	39,78
OG2103-0570HA	5.70	6	66	28	39,78
OG2103-0580HA	5.80	6	66	28	39,78
OG2103-0590HA	5.90	6	66	28	39,78
OG2103-0600HA	6.00	6	66	28	39,78
OG2103-0610HA	6.10	8	79	34	54,70
OG2103-0620HA	6.20	8	79	34	54,70
OG2103-0630HA	6.30	8	79	34	54,70
OG2103-0640HA	6.40	8	79	34	54,70
OG2103-0650HA	6.50	8	79	34	54,70
OG2103-0660HA	6.60	8	79	34	54,70
OG2103-0670HA	6.70	8	79	34	54,70
OG2103-0680HA	6.80	8	79	34	54,70
OG2103-0690HA	6.90	8	79	34	54,70
OG2103-0700HA	7.00	8	79	34	54,70
OG2103-0710HA	7.10	8	79	41	54,70
OG2103-0720HA	7.20	8	79	41	54,70
OG2103-0730HA	7.30	8	79	41	54,70
OG2103-0740HA	7.40	8	79	41	54,70
OG2103-0750HA	7.50	8	79	41	54,70
OG2103-0760HA	7.60	8	79	41	54,70
OG2103-0770HA	7.70	8	79	41	54,70
OG2103-0780HA	7.80	8	79	41	54,70
OG2103-0790HA	7.90	8	79	41	54,70
OG2103-0800HA	8.00	8	79	41	54,70
OG2103-0810HA	8.10	10	89	47	60,66
OG2103-0820HA	8.20	10	89	47	60,66
OG2103-0830HA	8.30	10	89	47	60,66
OG2103-0840HA	8.40	10	89	47	60,66
OG2103-0850HA	8.50	10	89	47	60,66
OG2103-0860HA	8.60	10	89	47	60,66
OG2103-0870HA	8.70	10	89	47	60,66

Item code	Ø d1	Ø d2	L	L1	€
OG2103-0880HA	8.80	10	89	47	60,66
OG2103-0890HA	8.90	10	89	47	60,66
OG2103-0900HA	9.00	10	89	47	60,66
OG2103-0910HA	9.10	10	89	47	60,66
OG2103-0920HA	9.20	10	89	47	60,66
OG2103-0930HA	9.30	10	89	47	60,66
OG2103-0940HA	9.40	10	89	47	60,66
OG2103-0950HA	9.50	10	89	47	60,66
OG2103-0960HA	9.60	10	89	47	60,66
OG2103-0970HA	9.70	10	89	47	60,66
OG2103-0980HA	9.80	10	89	47	60,66
OG2103-0990HA	9.90	10	89	47	60,66
OG2103-1000HA	10.00	10	89	47	60,66
OG2103-1010HA	10.10	12	102	55	86,52
OG2103-1020HA	10.20	12	102	55	86,52
OG2103-1030HA	10.30	12	102	55	86,52
OG2103-1040HA	10.40	12	102	55	86,52
OG2103-1050HA	10.50	12	102	55	86,52
OG2103-1060HA	10.60	12	102	55	86,52
OG2103-1070HA	10.70	12	102	55	86,52
OG2103-1080HA	10.80	12	102	55	86,52
OG2103-1090HA	10.90	12	102	55	86,52
OG2103-1100HA	11.00	12	102	55	86,52
OG2103-1110HA	11.10	12	102	55	86,52
OG2103-1120HA	11.20	12	102	55	86,52
OG2103-1130HA	11.30	12	102	55	86,52
OG2103-1140HA	11.40	12	102	55	86,52
OG2103-1150HA	11.50	12	102	55	86,52
OG2103-1160HA	11.60	12	102	55	86,52
OG2103-1170HA	11.70	12	102	55	86,52
OG2103-1180HA	11.80	12	102	55	86,52
OG2103-1190HA	11.90	12	102	55	86,52
OG2103-1200HA	12.00	12	102	55	86,52
OG2103-1220HA	12.20	14	107	60	121,33
OG2103-1230HA	12.30	14	107	60	121,33
OG2103-1250HA	12.50	14	107	60	121,33
OG2103-1280HA	12.80	14	107	60	121,33
OG2103-1300HA	13.00	14	107	60	121,33
OG2103-1350HA	13.50	14	107	60	121,33
OG2103-1380HA	13.80	14	107	60	121,33
OG2103-1400HA	14.00	14	107	60	147,19
OG2103-1450HA	14.50	16	115	65	147,19
OG2103-1470HA	14.70	16	115	65	147,19
OG2103-1500HA	15.00	16	115	65	147,19
OG2103-1520HA	15.20	16	115	65	147,19
OG2103-1550HA	15.50	16	115	65	147,19
OG2103-1570HA	15.70	16	115	65	147,19
OG2103-1600HA	16.00	16	115	65	147,19
OG2103-1650HA	16.50	18	123	73	236,69
OG2103-1700HA	17.00	18	123	73	236,69
OG2103-1750HA	17.50	18	123	73	236,69
OG2103-1800HA	18.00	18	123	73	236,69
OG2103-1850HA	18.50	20	131	79	258,57
OG2103-1900HA	19.00	20	131	79	258,57
OG2103-1950HA	19.50	20	131	79	258,57
OG2103-2000HA	20.00	20	131	79	258,57

Cutting Conditions P.14

DIN 6535 Form HA | DIN 6537 | 3 D | DX | 140° 30° | MaxPower | P | M | K | N | S

OE 2003

Item code	Ø d1	Ø d2	L	L1	€
OE2003-0300HA	3.00	6	62	20	34,52
OE2003-0310HA	3.10	6	62	20	34,52
OE2003-0320HA	3.20	6	62	20	34,52
OE2003-0330HA	3.30	6	62	20	34,52
OE2003-0340HA	3.40	6	62	20	34,52
OE2003-0350HA	3.50	6	62	20	34,52
OE2003-0360HA	3.60	6	62	20	34,52
OE2003-0370HA	3.70	6	62	20	34,52
OE2003-0380HA	3.80	6	66	24	34,52
OE2003-0390HA	3.90	6	66	24	34,52
OE2003-0400HA	4.00	6	66	24	34,52
OE2003-0410HA	4.10	6	66	24	34,52
OE2003-0420HA	4.20	6	66	24	34,52
OE2003-0430HA	4.30	6	66	24	34,52
OE2003-0440HA	4.40	6	66	24	34,52
OE2003-0450HA	4.50	6	66	24	34,52
OE2003-0460HA	4.60	6	66	24	34,52
OE2003-0470HA	4.70	6	66	24	34,52
OE2003-0480HA	4.80	6	66	28	34,52
OE2003-0490HA	4.90	6	66	28	34,52
OE2003-0500HA	5.00	6	66	28	34,52
OE2003-0510HA	5.10	6	66	28	34,52
OE2003-0520HA	5.20	6	66	28	34,52
OE2003-0530HA	5.30	6	66	28	34,52
OE2003-0540HA	5.40	6	66	28	34,52
OE2003-0550HA	5.50	6	66	28	34,52
OE2003-0560HA	5.60	6	66	28	34,52
OE2003-0570HA	5.70	6	66	28	34,52
OE2003-0580HA	5.80	6	66	28	34,52
OE2003-0590HA	5.90	6	66	28	34,52
OE2003-0600HA	6.00	6	66	28	34,52
OE2003-0610HA	6.10	8	79	34	34,52
OE2003-0620HA	6.20	8	79	34	34,52
OE2003-0630HA	6.30	8	79	34	34,52
OE2003-0640HA	6.40	8	79	34	34,52
OE2003-0650HA	6.50	8	79	34	34,52
OE2003-0660HA	6.60	8	79	34	34,52
OE2003-0670HA	6.70	8	79	34	34,52
OE2003-0680HA	6.80	8	79	34	34,52
OE2003-0690HA	6.90	8	79	34	34,52
OE2003-0700HA	7.00	8	79	34	34,52
OE2003-0710HA	7.10	8	79	41	34,52
OE2003-0720HA	7.20	8	79	41	34,52
OE2003-0730HA	7.30	8	79	41	34,52
OE2003-0740HA	7.40	8	79	41	34,52
OE2003-0750HA	7.50	8	79	41	34,52
OE2003-0760HA	7.60	8	79	41	34,52
OE2003-0770HA	7.70	8	79	41	34,52
OE2003-0780HA	7.80	8	79	41	34,52
OE2003-0790HA	7.90	8	79	41	34,52
OE2003-0800HA	8.00	8	79	41	34,52
OE2003-0810HA	8.10	10	89	47	38,03
OE2003-0820HA	8.20	10	89	47	38,03
OE2003-0830HA	8.30	10	89	47	38,03
OE2003-0840HA	8.40	10	89	47	38,03
OE2003-0850HA	8.50	10	89	47	38,03
OE2003-0860HA	8.60	10	89	47	38,03
OE2003-0870HA	8.70	10	89	47	38,03
OE2003-0880HA	8.80	10	89	47	38,03

Item code	Ø d1	Ø d2	L	L1	€
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OE2003-0910HA	9.10	10	89	47	38,03
OE2003-0920HA	9.20	10	89	47	38,03
OE2003-0930HA	9.30	10	89	47	38,03
OE2003-0940HA	9.40	10	89	47	38,03
OE2003-0950HA	9.50	10	89	47	38,03
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OE2003-0970HA	9.70	10	89	47	38,03
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OE2003-1000HA	10.00	10	89	47	38,03
OE2003-1010HA	10.10	12	102	55	57,33
OE2003-1020HA	10.20	12	102	55	57,33
OE2003-1030HA	10.30	12	102	55	57,33
OE2003-1040HA	10.40	12	102	55	57,33
OE2003-1050HA	10.50	12	102	55	57,33
OE2003-1060HA	10.60	12	102	55	57,33
OE2003-1070HA	10.70	12	102	55	57,33
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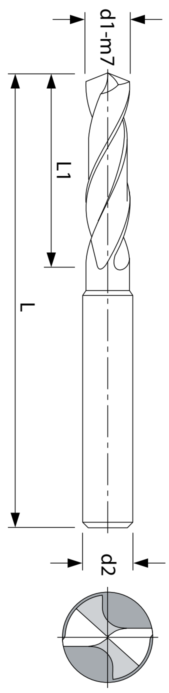
OE2003-1100HA	11.00	12	102	55	57,33
OE2003-1110HA	11.10	12	102	55	57,33
OE2003-1120HA	11.20	12	102	55	57,33
OE2003-1130HA	11.30	12	102	55	57,33
OE2003-1140HA	11.40	12	102	55	57,33
OE2003-1150HA	11.50	12	102	55	57,33
OE2003-1160HA	11.60	12	102	55	57,33
OE2003-1170HA	11.70	12	102	55	57,33
OE2003-1180HA	11.80	12	102	55	57,33
OE2003-1190HA	11.90	12	102	55	57,33
OE2003-1200HA	12.00	12	102	55	57,33
OE2003-1220HA	12.20	14	107	60	76,05
OE2003-1250HA	12.50	14	107	60	76,05
OE2003-1270HA	12.70	14	109	60	76,05
OE2003-1300HA	13.00	14	107	60	76,05
OE2003-1350HA	13.50	14	107	60	76,05
OE2003-1370HA	13.70	14	107	60	76,05
OE2003-1400HA	14.00	14	107	60	76,05
OE2003-1420HA	14.20	16	115	65	98,28
OE2003-1450HA	14.50	16	115	65	98,28
OE2003-1470HA	14.70	16	115	65	98,28
OE2003-1500HA	15.00	16	115	65	98,28
OE2003-1520HA	15.20	16	115	65	98,28
OE2003-1550HA	15.50	16	115	65	98,28
OE2003-1570HA	15.70	16	115	65	98,28
OE2003-1600HA	16.00	16	115	65	98,28
OE2003-1650HA	16.50	18	123	73	168,48
OE2003-1700HA	17.00	18	123	73	168,48
OE2003-1750HA	17.50	18	123	73	168,48
OE2003-1800HA	18.00	18	123	73	168,48
OE2003-1850HA	18.50	20	131	79	184,86
OE2003-1900HA	19.00	20	131	79	184,86
OE2003-1950HA	19.50	20	131	79	184,86
OE2003-2000HA	20.00	20	131	79	184,86



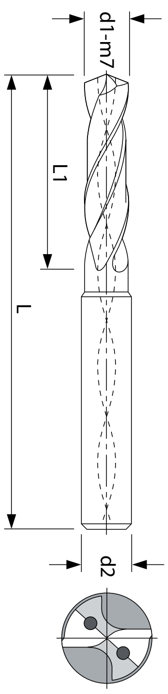
Cutting Conditions P.15

H.S.G.

Carbide Drills

DIN 6535 Form HA | DIN 6537 | 5 D | DX | 140° 30° | MaxPower | P | M | K | N | S

OO 2105



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OO2105-0320HA	3.20	6	66	28	47,74
OO2105-0330HA	3.30	6	66	28	47,74
OO2105-0340HA	3.40	6	66	28	47,74
OO2105-0350HA	3.50	6	66	28	47,74
OO2105-0360HA	3.60	6	66	28	47,74
OO2105-0370HA	3.70	6	66	28	47,74
OO2105-0380HA	3.80	6	74	36	47,74
OO2105-0390HA	3.90	6	74	36	47,74
OO2105-0400HA	4.00	6	74	36	50,72
OO2105-0410HA	4.10	6	74	36	50,72
OO2105-0420HA	4.20	6	74	36	50,72
OO2105-0430HA	4.30	6	74	36	50,72
OO2105-0440HA	4.40	6	74	36	50,72
OO2105-0450HA	4.50	6	74	36	50,72
OO2105-0460HA	4.60	6	74	36	50,72
OO2105-0470HA	4.70	6	74	36	50,72
OO2105-0480HA	4.80	6	82	44	50,72
OO2105-0490HA	4.90	6	82	44	50,72
OO2105-0500HA	5.00	6	82	44	50,72
OO2105-0510HA	5.10	6	82	44	50,72
OO2105-0520HA	5.20	6	82	44	50,72
OO2105-0530HA	5.30	6	82	44	50,72
OO2105-0540HA	5.40	6	82	44	50,72
OO2105-0550HA	5.50	6	82	44	50,72
OO2105-0560HA	5.60	6	82	44	50,72
OO2105-0570HA	5.70	6	82	44	50,72
OO2105-0580HA	5.80	6	82	44	50,72
OO2105-0590HA	5.90	6	82	44	50,72
OO2105-0600HA	6.00	6	82	44	50,72
OO2105-0610HA	6.10	8	91	53	56,69
OO2105-0620HA	6.20	8	91	53	56,69
OO2105-0630HA	6.30	8	91	53	56,69
OO2105-0640HA	6.40	8	91	53	56,69
OO2105-0650HA	6.50	8	91	53	56,69
OO2105-0660HA	6.60	8	91	53	56,69
OO2105-0670HA	6.70	8	91	53	56,69
OO2105-0680HA	6.80	8	91	53	56,69
OO2105-0690HA	6.90	8	91	53	56,69
OO2105-0700HA	7.00	8	91	53	56,69
OO2105-0710HA	7.10	8	91	53	56,69
OO2105-0720HA	7.20	8	91	53	56,69
OO2105-0730HA	7.30	8	91	53	56,69
OO2105-0740HA	7.40	8	91	53	56,69
OO2105-0750HA	7.50	8	91	53	56,69
OO2105-0760HA	7.60	8	91	53	56,69
OO2105-0770HA	7.70	8	91	53	56,69
OO2105-0780HA	7.80	8	91	53	56,69
OO2105-0790HA	7.90	8	91	53	56,69
OO2105-0800HA	8.00	8	91	53	56,69
OO2105-0810HA	8.10	10	103	61	64,64
OO2105-0820HA	8.20	10	103	61	64,64
OO2105-0830HA	8.30	10	103	61	64,64
OO2105-0840HA	8.40	10	103	61	64,64
OO2105-0850HA	8.50	10	103	61	64,64
OO2105-0860HA	8.60	10	103	61	64,64
OO2105-0870HA	8.70	10	103	61	64,64
OO2105-0880HA	8.80	10	103	61	64,64

Item code	Ø d1	Ø d2	L	L1	€
OO2105-0890HA	8.90	10	103	61	64,64
OO2105-0900HA	9.00	10	103	61	64,64
OO2105-0910HA	9.10	10	103	61	64,64
OO2105-0920HA	9.20	10	103	61	64,64
OO2105-0930HA	9.30	10	103	61	64,64
OO2105-0940HA	9.40	10	103	61	64,64
OO2105-0950HA	9.50	10	103	61	64,64
OO2105-0960HA	9.60	10	103	61	64,64
OO2105-0970HA	9.70	10	103	61	64,64
OO2105-0980HA	9.80	10	103	61	64,64
OO2105-0990HA	9.90	10	103	61	64,64
OO2105-1000HA	10.00	10	103	61	64,64
OO2105-1010HA	10.10	12	118	71	94,48
OO2105-1020HA	10.20	12	118	71	94,48
OO2105-1030HA	10.30	12	118	71	94,48
OO2105-1040HA	10.40	12	118	71	94,48
OO2105-1050HA	10.50	12	118	71	94,48
OO2105-1060HA	10.60	12	118	71	94,48
OO2105-1070HA	10.70	12	118	71	94,48
OO2105-1080HA	10.80	12	118	71	94,48
OO2105-1090HA	10.90	12	118	71	94,48
OO2105-1100HA	11.00	12	118	71	94,48
OO2105-1110HA	11.10	12	118	71	94,48
OO2105-1120HA	11.20	12	118	71	94,48
OO2105-1130HA	11.30	12	118	71	94,48
OO2105-1140HA	11.40	12	118	71	94,48
OO2105-1150HA	11.50	12	118	71	94,48
OO2105-1160HA	11.60	12	118	71	94,48
OO2105-1170HA	11.70	12	118	71	94,48
OO2105-1180HA	11.80	12	118	71	94,48
OO2105-1190HA	11.90	12	118	71	94,48
OO2105-1200HA	12.00	12	118	71	94,48
OO2105-1220HA	12.20	14	124	77	126,30
OO2105-1250HA	12.50	14	124	77	126,30
OO2105-1280HA	12.80	14	124	77	126,30
OO2105-1300HA	13.00	14	124	77	126,30
OO2105-1350HA	13.50	14	124	77	126,30
OO2105-1370HA	13.70	14	124	77	126,30
OO2105-1400HA	14.00	14	124	77	126,30
OO2105-1420HA	14.20	16	133	83	157,13
OO2105-1450HA	14.50	16	133	83	157,13
OO2105-1470HA	14.70	16	133	83	157,13
OO2105-1500HA	15.00	16	133	83	157,13
OO2105-1520HA	15.20	16	133	83	157,13
OO2105-1550HA	15.50	16	133	83	157,13
OO2105-1570HA	15.70	16	133	83	157,13
OO2105-1600HA	16.00	16	133	83	157,13
OO2105-1650HA	16.50	18	143	93	250,61
OO2105-1700HA	17.00	18	143	93	250,61
OO2105-1750HA	17.50	18	143	93	250,61
OO2105-1800HA	18.00	18	143	93	250,61
OO2105-1850HA	18.50	20	153	101	272,49
OO2105-1900HA	19.00	20	153	101	272,49
OO2105-1950HA	19.50	20	153	101	272,49
OO2105-2000HA	20.00	20	153	101	272,49

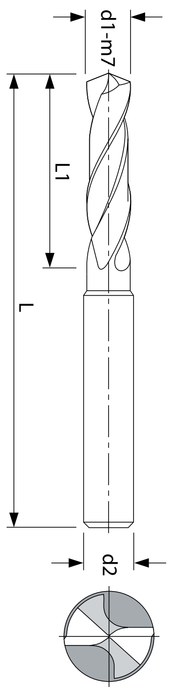
Cutting Conditions P.14

DIN 6535 Form HA | DIN 6537 | 5 D | DX | 140° | 30° | MaxPower | P | M | K | N | S

OM 2005

Item code	Ø d1	Ø d2	L	L1	€
OM2005-0300HA	3.00	6	66	28	38,61
OM2005-0310HA	3.10	6	66	28	38,61
OM2005-0320HA	3.20	6	66	28	38,61
OM2005-0330HA	3.30	6	66	28	38,61
OM2005-0340HA	3.40	6	66	28	38,61
OM2005-0350HA	3.50	6	66	28	38,61
OM2005-0360HA	3.60	6	66	28	38,61
OM2005-0370HA	3.70	6	66	28	38,61
OM2005-0380HA	3.80	6	74	36	38,61
OM2005-0390HA	3.90	6	74	36	38,61
OM2005-0400HA	4.00	6	74	36	38,61
OM2005-0410HA	4.10	6	74	36	38,61
OM2005-0420HA	4.20	6	74	36	38,61
OM2005-0430HA	4.30	6	74	36	38,61
OM2005-0440HA	4.40	6	74	36	38,61
OM2005-0450HA	4.50	6	74	36	38,61
OM2005-0460HA	4.60	6	74	36	38,61
OM2005-0470HA	4.70	6	74	36	38,61
OM2005-0480HA	4.80	6	82	44	38,61
OM2005-0490HA	4.90	6	82	44	38,61
OM2005-0500HA	5.00	6	82	44	38,61
OM2005-0510HA	5.10	6	82	44	38,61
OM2005-0520HA	5.20	6	82	44	38,61
OM2005-0530HA	5.30	6	82	44	38,61
OM2005-0540HA	5.40	6	82	44	38,61
OM2005-0550HA	5.50	6	82	44	38,61
OM2005-0560HA	5.60	6	82	44	38,61
OM2005-0570HA	5.70	6	82	44	38,61
OM2005-0580HA	5.80	6	82	44	38,61
OM2005-0590HA	5.90	6	82	44	38,61
OM2005-0600HA	6.00	6	82	44	38,61
OM2005-0610HA	6.10	8	91	53	39,78
OM2005-0620HA	6.20	8	91	53	39,78
OM2005-0630HA	6.30	8	91	53	39,78
OM2005-0640HA	6.40	8	91	53	39,78
OM2005-0650HA	6.50	8	91	53	39,78
OM2005-0660HA	6.60	8	91	53	39,78
OM2005-0670HA	6.70	8	91	53	39,78
OM2005-0680HA	6.80	8	91	53	39,78
OM2005-0690HA	6.90	8	91	53	39,78
OM2005-0700HA	7.00	8	91	53	39,78
OM2005-0710HA	7.10	8	91	53	39,78
OM2005-0720HA	7.20	8	91	53	39,78
OM2005-0730HA	7.30	8	91	53	39,78
OM2005-0740HA	7.40	8	91	53	39,78
OM2005-0750HA	7.50	8	91	53	39,78
OM2005-0760HA	7.60	8	91	53	39,78
OM2005-0770HA	7.70	8	91	53	39,78
OM2005-0780HA	7.80	8	91	53	39,78
OM2005-0790HA	7.90	8	91	53	39,78
OM2005-0800HA	8.00	8	91	53	39,78
OM2005-0810HA	8.10	10	103	61	43,88
OM2005-0820HA	8.20	10	103	61	43,88
OM2005-0830HA	8.30	10	103	61	43,88
OM2005-0840HA	8.40	10	103	61	43,88
OM2005-0850HA	8.50	10	103	61	43,88
OM2005-0860HA	8.60	10	103	61	43,88
OM2005-0870HA	8.70	10	103	61	43,88
OM2005-0880HA	8.80	10	103	61	43,88

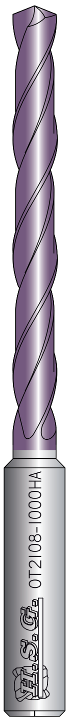
Item code	Ø d1	Ø d2	L	L1	€
OM2005-0890HA	8.90	10	103	61	43,88
OM2005-0900HA	9.00	10	103	61	43,88
OM2005-0910HA	9.10	10	103	61	43,88
OM2005-0920HA	9.20	10	103	61	43,88
OM2005-0930HA	9.30	10	103	61	43,88
OM2005-0940HA	9.40	10	103	61	43,88
OM2005-0950HA	9.50	10	103	61	43,88
OM2005-0960HA	9.60	10	103	61	43,88
OM2005-0970HA	9.70	10	103	61	43,88
OM2005-0980HA	9.80	10	103	61	43,88
OM2005-0990HA	9.90	10	103	61	43,88
OM2005-1000HA	10.00	10	103	61	43,88
OM2005-1010HA	10.10	12	118	71	65,52
OM2005-1020HA	10.20	12	118	71	65,52
OM2005-1030HA	10.30	12	118	71	65,52
OM2005-1040HA	10.40	12	118	71	65,52
OM2005-1050HA	10.50	12	118	71	65,52
OM2005-1060HA	10.60	12	118	71	65,52
OM2005-1070HA	10.70	12	118	71	65,52
OM2005-1080HA	10.80	12	118	71	65,52
OM2005-1090HA	10.90	12	118	71	65,52
OM2005-1100HA	11.00	12	118	71	65,52
OM2005-1110HA	11.10	12	118	71	65,52
OM2005-1120HA	11.20	12	118	71	65,52
OM2005-1130HA	11.30	12	118	71	65,52
OM2005-1140HA	11.40	12	118	71	65,52
OM2005-1150HA	11.50	12	118	71	65,52
OM2005-1160HA	11.60	12	118	71	65,52
OM2005-1170HA	11.70	12	118	71	65,52
OM2005-1180HA	11.80	12	118	71	65,52
OM2005-1190HA	11.90	12	118	71	65,52
OM2005-1200HA	12.00	12	118	71	65,52
OM2005-1220HA	12.20	14	124	77	86,58
OM2005-1250HA	12.50	14	124	77	86,58
OM2005-1270HA	12.70	14	124	77	86,58
OM2005-1300HA	13.00	14	124	77	86,58
OM2005-1350HA	13.50	14	124	77	86,58
OM2005-1370HA	13.70	14	124	77	86,58
OM2005-1400HA	14.00	14	124	77	86,58
OM2005-1420HA	14.20	16	133	83	112,32
OM2005-1450HA	14.50	16	133	83	112,32
OM2005-1470HA	14.70	16	133	83	112,32
OM2005-1500HA	15.00	16	133	83	112,32
OM2005-1520HA	15.20	16	133	83	112,32
OM2005-1550HA	15.50	16	133	83	112,32
OM2005-1570HA	15.70	16	133	83	112,32
OM2005-1600HA	16.00	16	133	83	112,32
OM2005-1650HA	16.50	18	143	93	179,01
OM2005-1700HA	17.00	18	143	93	179,01
OM2005-1750HA	17.50	18	143	93	179,01
OM2005-1800HA	18.00	18	143	93	179,01
OM2005-1850HA	18.50	20	153	101	194,22
OM2005-1900HA	19.00	20	153	101	194,22
OM2005-1950HA	19.50	20	153	101	194,22
OM2005-2000HA	20.00	20	153	101	194,22



Cutting Conditions P.15

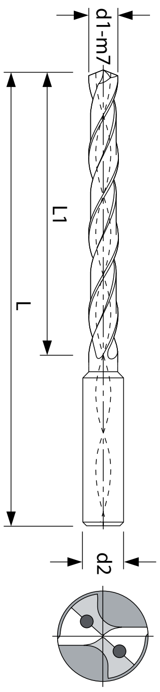
DIN 6535 Form HA | DIN 6537 | 8 D | DX | 140° 30° | MaxPower | P | M | K | N | S

OT 2108



Item code	Ø d1	Ø d2	L	L1	€
OT2108-0300HA	3	6.0	70	30	113,64
OT2108-0310HA	3,1	6.0	70	30	113,64
OT2108-0320HA	3,2	6.0	70	30	113,64
OT2108-0330HA	3,3	6.0	70	30	113,64
OT2108-0340HA	3,4	6.0	75	35,5	113,64
OT2108-0350HA	3,5	6.0	75	35,5	113,64
OT2108-0360HA	3,6	6.0	75	35,5	113,64
OT2108-0370HA	3,7	6.0	75	35,5	113,64
OT2108-0380HA	3,8	6.0	75	37,5	113,64
OT2108-0390HA	3,9	6.0	75	37,5	113,64
OT2108-0400HA	4,0	6.0	75	37,5	113,64
OT2108-0410HA	4,1	6.0	75	37,5	113,64
OT2108-0420HA	4,2	6.0	75	37,5	113,64
OT2108-0430HA	4,3	6.0	85	45	113,64
OT2108-0440HA	4,4	6.0	85	45	113,64
OT2108-0450HA	4,5	6.0	85	45	113,64
OT2108-0460HA	4,6	6.0	85	45	113,64
OT2108-0470HA	4,7	6.0	85	45	113,64
OT2108-0480HA	4,8	6.0	90	50	113,64
OT2108-0490HA	4,9	6.0	90	50	113,64
OT2108-0500HA	5,0	6.0	90	50	113,64
OT2108-0510HA	5,1	6.0	90	50	113,64
OT2108-0520HA	5,2	6.0	90	50	113,64
OT2108-0530HA	5,3	6.0	90	50	113,64
OT2108-0540HA	5,4	6.0	97	57	113,64
OT2108-0550HA	5,5	6.0	97	57	113,64
OT2108-0560HA	5,6	6.0	97	57	113,64
OT2108-0570HA	5,7	6.0	97	57	113,64
OT2108-0580HA	5,8	6.0	97	57	113,64
OT2108-0590HA	5,9	6.0	97	57	113,64
OT2108-0600HA	6,0	6.0	97	57	113,64
OT2108-0610HA	6,1	8.0	106	66	132,03
OT2108-0620HA	6,2	8.0	106	66	132,03
OT2108-0630HA	6,3	8.0	106	66	132,03
OT2108-0640HA	6,4	8.0	106	66	132,03
OT2108-0650HA	6,5	8.0	106	66	132,03
OT2108-0660HA	6,6	8.0	106	66	132,03
OT2108-0670HA	6,7	8.0	106	66	132,03
OT2108-0680HA	6,8	8.0	106	66	132,03
OT2108-0690HA	6,9	8.0	116	76	132,03
OT2108-0700HA	7,0	8.0	116	76	132,03
OT2108-0710HA	7,1	8.0	116	76	132,03
OT2108-0720HA	7,2	8.0	116	76	132,03
OT2108-0730HA	7,3	8.0	116	76	132,03
OT2108-0740HA	7,4	8.0	116	76	132,03
OT2108-0750HA	7,5	8.0	116	76	132,03
OT2108-0760HA	7,6	8.0	116	76	132,03
OT2108-0770HA	7,7	8.0	116	76	132,03
OT2108-0780HA	7,8	8.0	116	76	132,03
OT2108-0790HA	7,9	8.0	116	76	132,03
OT2108-0800HA	8,0	8.0	116	76	132,03
OT2108-0810HA	8,1	10.0	131	87	159,09
OT2108-0820HA	8,2	10.0	131	87	159,09
OT2108-0830HA	8,3	10.0	131	87	159,09
OT2108-0840HA	8,4	10.0	131	87	159,09
OT2108-0850HA	8,5	10.0	131	87	159,09
OT2108-0860HA	8,6	10.0	131	87	159,09
OT2108-0870HA	8,7	10.0	131	87	159,09
OT2108-0880HA	8,8	10.0	131	87	159,09

Item code	Ø d1	Ø d2	L	L1	€
OT2108-0890HA	8,9	10.0	131	87	159,09
OT2108-0900HA	9,0	10.0	131	87	159,09
OT2108-0910HA	9,1	10.0	139	95	159,09
OT2108-0920HA	9,2	10.0	139	95	159,09
OT2108-0930HA	9,3	10.0	139	95	159,09
OT2108-0940HA	9,4	10.0	139	95	159,09
OT2108-0950HA	9,5	10.0	139	95	159,09
OT2108-0960HA	9,6	10.0	139	95	159,09
OT2108-0970HA	9,7	10.0	139	95	159,09
OT2108-0980HA	9,8	10.0	139	95	159,09
OT2108-0990HA	9,9	10.0	139	95	159,09
OT2108-1000HA	10,0	10.0	139	95	159,09
OT2108-1010HA	10,1	12.0	155	106	209,96
OT2108-1020HA	10,2	12.0	155	106	209,96
OT2108-1030HA	10,3	12.0	155	106	209,96
OT2108-1040HA	10,4	12.0	155	106	209,96
OT2108-1050HA	10,5	12.0	155	106	209,96
OT2108-1060HA	10,6	12.0	155	106	209,96
OT2108-1070HA	10,7	12.0	155	106	209,96
OT2108-1080HA	10,8	12.0	155	106	209,96
OT2108-1090HA	10,9	12.0	155	106	209,96
OT2108-1100HA	11,0	12.0	155	106	209,96
OT2108-1110HA	11,1	12.0	163	114	209,96
OT2108-1120HA	11,2	12.0	163	114	209,96
OT2108-1130HA	11,3	12.0	163	114	209,96
OT2108-1140HA	11,4	12.0	163	114	209,96
OT2108-1150HA	11,5	12.0	163	114	209,96
OT2108-1160HA	11,6	12.0	163	114	209,96
OT2108-1170HA	11,7	12.0	163	114	209,96
OT2108-1180HA	11,8	12.0	163	114	209,96
OT2108-1190HA	11,9	12.0	163	114	209,96
OT2108-1200HA	12,0	12.0	163	114	209,96
OT2108-1210HA	12,1	14.0	182	133	298,70
OT2108-1220HA	12,2	14.0	182	133	298,70
OT2108-1230HA	12,3	14.0	182	133	298,70
OT2108-1250HA	12,5	14.0	182	133	298,70
OT2108-1270HA	12,7	14.0	182	133	298,70
OT2108-1300HA	13,0	14.0	182	133	298,70
OT2108-1310HA	13,1	14.0	182	133	298,70
OT2108-1350HA	13,5	14.0	182	133	298,70
OT2108-1400HA	14,0	14.0	182	133	298,70
OT2108-1410HA	14,1	16.0	204	152	372,29
OT2108-1420HA	14,2	16.0	204	152	372,29
OT2108-1450HA	14,5	16.0	204	152	372,29
OT2108-1500HA	15,0	16.0	204	152	372,29
OT2108-1510HA	15,1	16.0	204	152	372,29
OT2108-1550HA	15,5	16.0	204	152	372,29
OT2108-1600HA	16,0	16.0	204	152	372,29
OT2108-1650HA	16,5	18.0	223	171	465,37
OT2108-1690HA	16,9	18.0	223	171	465,37
OT2108-1700HA	17,0	18.0	223	171	465,37
OT2108-1750HA	17,5	18.0	223	171	465,37
OT2108-1800HA	18,0	18.0	223	171	465,37
OT2108-1850HA	18,5	20.0	244	190	551,95
OT2108-1890HA	18,9	20.0	244	190	551,95
OT2108-1900HA	19,0	20.0	244	190	551,95
OT2108-1950HA	19,5	20.0	244	190	551,95
OT2108-2000HA	20,0	20.0	244	190	551,95



Cutting Conditions P.16

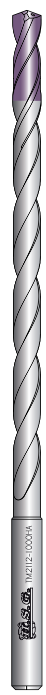
H.S.G.

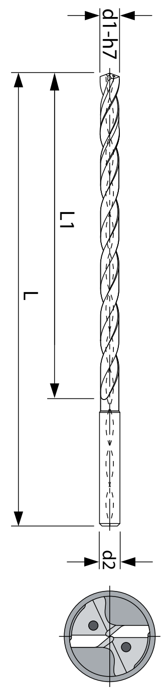
DIN 6535 Form HA | DIN | 12 D | DX | 140° | MaxPower | P | M | K | N | S

TM 2112

Item code	Ø d1	Ø d2	L	L1	€
TM2112-0300HA	3.00	6	90	50	152,60
TM2112-0310HA	3.10	6	90	50	152,60
TM2112-0320HA	3.20	6	90	50	152,60
TM2112-0330HA	3.30	6	90	50	152,60
TM2112-0340HA	3.40	6	90	50	152,60
TM2112-0350HA	3.50	6	90	50	152,60
TM2112-0360HA	3.60	6	90	50	152,60
TM2112-0370HA	3.70	6	90	50	152,60
TM2112-0380HA	3.80	6	102	64	152,60
TM2112-0390HA	3.90	6	102	64	152,60
TM2112-0400HA	4.00	6	102	64	152,60
TM2112-0410HA	4.10	6	102	64	152,60
TM2112-0420HA	4.20	6	102	64	152,60
TM2112-0430HA	4.30	6	102	64	152,60
TM2112-0440HA	4.40	6	102	64	152,60
TM2112-0450HA	4.50	6	102	64	152,60
TM2112-0460HA	4.60	6	102	64	152,60
TM2112-0470HA	4.70	6	102	64	152,60
TM2112-0480HA	4.80	6	116	78	152,60
TM2112-0490HA	4.90	6	116	78	152,60
TM2112-0500HA	5.00	6	116	78	152,60
TM2112-0510HA	5.10	6	116	78	152,60
TM2112-0520HA	5.20	6	116	78	152,60
TM2112-0530HA	5.30	6	116	78	152,60
TM2112-0540HA	5.40	6	116	78	152,60
TM2112-0550HA	5.50	6	116	78	152,60
TM2112-0560HA	5.60	6	116	78	152,60
TM2112-0570HA	5.70	6	116	78	152,60
TM2112-0580HA	5.80	6	116	78	152,60
TM2112-0590HA	5.90	6	116	78	152,60
TM2112-0600HA	6.00	6	116	78	152,60
TM2112-0610HA	6.10	8	146	108	178,57
TM2112-0620HA	6.20	8	146	108	178,57
TM2112-0630HA	6.30	8	146	108	178,57
TM2112-0640HA	6.40	8	146	108	178,57
TM2112-0650HA	6.50	8	146	108	178,57
TM2112-0660HA	6.60	8	146	108	178,57
TM2112-0670HA	6.70	8	146	108	178,57
TM2112-0680HA	6.80	8	146	108	178,57
TM2112-0690HA	6.90	8	146	108	178,57
TM2112-0700HA	7.00	8	146	108	178,57
TM2112-0710HA	7.10	8	146	108	178,57
TM2112-0720HA	7.20	8	146	108	178,57
TM2112-0730HA	7.30	8	146	108	178,57
TM2112-0740HA	7.40	8	146	108	178,57
TM2112-0750HA	7.50	8	146	108	178,57
TM2112-0760HA	7.60	8	146	108	178,57
TM2112-0770HA	7.70	8	146	108	178,57
TM2112-0780HA	7.80	8	146	108	178,57
TM2112-0790HA	7.90	8	146	108	178,57
TM2112-0800HA	8.00	8	146	108	178,57
TM2112-0810HA	8.10	10	162	120	225,11
TM2112-0820HA	8.20	10	162	120	225,11
TM2112-0830HA	8.30	10	162	120	225,11
TM2112-0840HA	8.40	10	162	120	225,11
TM2112-0850HA	8.50	10	162	120	225,11
TM2112-0860HA	8.60	10	162	120	225,11
TM2112-0870HA	8.70	10	162	120	225,11
TM2112-0880HA	8.80	10	162	120	225,11

Item code	Ø d1	Ø d2	L	L1	€
TM2112-0890HA	8.90	10	162	120	225,11
TM2112-0900HA	9.00	10	162	120	225,11
TM2112-0910HA	9.10	10	162	120	225,11
TM2112-0920HA	9.20	10	162	120	225,11
TM2112-0930HA	9.30	10	162	120	225,11
TM2112-0940HA	9.40	10	162	120	225,11
TM2112-0950HA	9.50	10	162	120	225,11
TM2112-0960HA	9.60	10	162	120	225,11
TM2112-0970HA	9.70	10	162	120	225,11
TM2112-0980HA	9.80	10	162	120	225,11
TM2112-0990HA	9.90	10	162	120	225,11
TM2112-1000HA	10.00	10	162	120	225,11
TM2112-1010HA	10.10	12	204	156	298,70
TM2112-1020HA	10.20	12	204	156	298,70
TM2112-1030HA	10.30	12	204	156	298,70
TM2112-1050HA	10.50	12	204	156	298,70
TM2112-1060HA	10.60	12	204	156	298,70
TM2112-1070HA	10.70	12	204	156	298,70
TM2112-1080HA	10.80	12	204	156	298,70
TM2112-1090HA	10.90	12	204	156	298,70
TM2112-1100HA	11.00	12	204	156	298,70
TM2112-1150HA	11.50	12	204	156	298,70
TM2112-1200HA	12.00	12	204	156	298,70
TM2112-1230HA	12.30	14	230	182	370,13
TM2112-1250HA	12.50	14	230	182	370,13
TM2112-1270HA	12.70	14	230	182	370,13
TM2112-1300HA	13.00	14	230	182	370,13
TM2112-1350HA	13.50	14	230	182	370,13
TM2112-1400HA	14.00	14	230	182	370,13
TM2112-1450HA	14.50	16	260	208	523,81
TM2112-1500HA	15.00	16	260	208	523,81
TM2112-1550HA	15.50	16	260	208	523,81
TM2112-1600HA	16.00	16	260	208	523,81
TM2112-1650HA	16.50	18	285	234	584,42
TM2112-1700HA	17.00	18	285	234	584,42
TM2112-1750HA	17.50	18	285	234	584,42
TM2112-1800HA	18.00	18	285	234	584,42
TM2112-1850HA	18.50	20	310	258	833,33
TM2112-1900HA	19.00	20	310	258	833,33
TM2112-1950HA	19.50	20	310	258	833,33
TM2112-2000HA	20.00	20	310	258	833,33

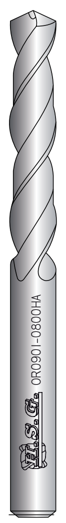




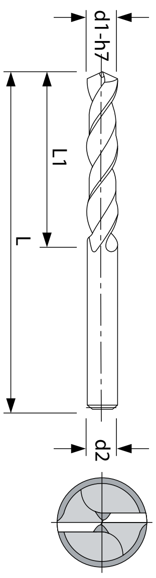
Cutting Conditions P.17

DIN 6535 Form HA | DIN 1897 | DX | 120° | 30° | Un Coated | P | K | N

OA 0901



Item code	Ø d1	Ø d2	L	L1	€
OA0901-0100HA	1.00	1.0	26	6	5,50
OA0901-0110HA	1.10	1.1	28	7	5,67
OA0901-0120HA	1.20	1.2	30	8	5,97
OA0901-0130HA	1.30	1.3	30	8	5,97
OA0901-0140HA	1.40	1.4	32	9	5,97
OA0901-0150HA	1.50	1.5	32	9	5,97
OA0901-0160HA	1.60	1.6	34	10	6,08
OA0901-0170HA	1.70	1.7	34	10	6,20
OA0901-0180HA	1.80	1.8	36	11	6,08
OA0901-0190HA	1.90	1.9	36	11	6,20
OA0901-0200HA	2.00	2.0	38	12	4,56
OA0901-0210HA	2.10	2.1	38	12	4,56
OA0901-0220HA	2.20	2.2	40	13	4,56
OA0901-0230HA	2.30	2.3	40	13	4,56
OA0901-0240HA	2.40	2.4	43	14	4,56
OA0901-0250HA	2.50	2.5	43	14	4,56
OA0901-0260HA	2.60	2.6	43	14	4,56
OA0901-0270HA	2.70	2.7	46	16	6,67
OA0901-0280HA	2.80	2.8	46	16	6,67
OA0901-0290HA	2.90	2.9	46	16	6,67
OA0901-0300HA	3.00	3.0	46	16	6,67
OA0901-0310HA	3.10	3.1	49	18	6,67
OA0901-0320HA	3.20	3.2	49	18	6,67
OA0901-0330HA	3.30	3.3	49	18	6,67
OA0901-0340HA	3.40	3.4	52	20	7,02
OA0901-0350HA	3.50	3.5	52	20	7,02
OA0901-0360HA	3.60	3.6	52	20	7,61
OA0901-0370HA	3.70	3.7	52	20	7,61
OA0901-0380HA	3.80	3.8	52	20	8,31
OA0901-0390HA	3.90	3.9	55	22	8,31
OA0901-0400HA	4.00	4.0	55	22	8,31
OA0901-0410HA	4.10	4.1	55	22	9,13
OA0901-0420HA	4.20	4.2	55	22	9,13
OA0901-0430HA	4.30	4.3	58	24	9,13
OA0901-0440HA	4.40	4.4	58	24	9,13
OA0901-0450HA	4.50	4.5	58	24	9,13
OA0901-0460HA	4.60	4.6	58	24	9,13
OA0901-0470HA	4.70	4.7	58	24	9,71
OA0901-0480HA	4.80	4.8	62	26	9,71
OA0901-0490HA	4.90	4.9	62	26	9,71
OA0901-0500HA	5.00	5.0	62	26	9,71
OA0901-0520HA	5.20	5.2	62	26	12,52
OA0901-0550HA	5.50	5.5	66	28	12,52
OA0901-0580HA	5.80	5.8	66	28	13,22
OA0901-0600HA	6.00	6.0	66	28	13,22
OA0901-0650HA	6.50	6.5	70	31	16,73
OA0901-0680HA	6.80	6.8	74	34	20,94
OA0901-0700HA	7.00	7.0	74	34	20,12
OA0901-0750HA	7.50	7.5	74	34	23,40
OA0901-0800HA	8.00	8.0	79	37	26,91
OA0901-0850HA	8.50	8.5	79	37	33,35
OA0901-0880HA	8.80	8.8	84	40	36,27
OA0901-0900HA	9.00	9.0	84	40	35,10
OA0901-0950HA	9.50	9.5	84	40	37,44
OA0901-1000HA	10.00	10.0	89	43	40,37
OA0901-1020HA	10.20	10.2	89	43	46,80
OA0901-1050HA	10.50	10.5	89	43	46,80
OA0901-1110HA	11.00	11.0	95	47	51,48
OA0901-1150HA	11.50	11.5	95	47	58,50



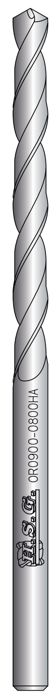
Carbide Drills-Jobber

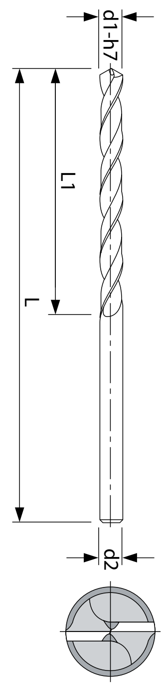
H.S.G.

DIN 6535 Form HA | DIN 338 | DX | 120° | Un Coated | P | K | N

OR 0900

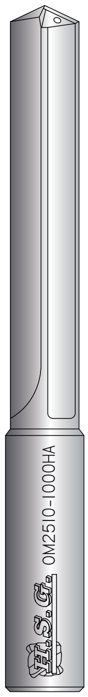
Item code	Ø d1	Ø d2	L	L1	€
OR0900-0100HA	1.00	1.0	34	12	6,67
OR0900-0110HA	1.10	1.1	36	14	7,25
OR0900-0120HA	1.20	1.2	38	16	7,61
OR0900-0130HA	1.30	1.3	38	16	8,07
OR0900-0140HA	1.40	1.4	40	18	8,66
OR0900-0150HA	1.50	1.5	40	18	8,66
OR0900-0160HA	1.60	1.6	43	20	8,89
OR0900-0170HA	1.70	1.7	43	20	9,83
OR0900-0180HA	1.80	1.8	46	22	10,30
OR0900-0190HA	1.90	1.9	46	22	10,30
OR0900-0200HA	2.00	2.0	49	24	5,56
OR0900-0210HA	2.10	2.1	49	24	6,32
OR0900-0220HA	2.20	2.2	53	27	7,02
OR0900-0230HA	2.30	2.3	53	27	7,02
OR0900-0240HA	2.40	2.4	57	30	7,02
OR0900-0250HA	2.50	2.5	57	30	7,02
OR0900-0260HA	2.60	2.6	57	30	9,71
OR0900-0270HA	2.70	2.7	61	33	9,71
OR0900-0280HA	2.80	2.8	61	33	9,71
OR0900-0290HA	2.90	2.9	61	33	9,71
OR0900-0300HA	3.00	3.0	61	33	9,13
OR0900-0310HA	3.10	3.1	65	36	9,13
OR0900-0320HA	3.20	3.2	65	36	9,13
OR0900-0330HA	3.30	3.3	65	36	9,13
OR0900-0340HA	3.40	3.4	70	39	10,41
OR0900-0350HA	3.50	3.5	70	39	9,71
OR0900-0360HA	3.60	3.6	70	39	11,12
OR0900-0370HA	3.70	3.7	75	43	11,12
OR0900-0380HA	3.80	3.8	75	43	11,12
OR0900-0390HA	3.90	3.9	75	43	11,12
OR0900-0400HA	4.00	4.0	75	43	11,12
OR0900-0410HA	4.10	4.1	75	43	11,82
OR0900-0420HA	4.20	4.2	75	43	11,82
OR0900-0430HA	4.30	4.3	80	47	15,33
OR0900-0440HA	4.40	4.4	80	47	15,33
OR0900-0450HA	4.50	4.5	80	47	13,92
OR0900-0460HA	4.60	4.6	80	47	16,03
OR0900-0470HA	4.70	4.7	80	47	16,03
OR0900-0480HA	4.80	4.8	86	52	16,03
OR0900-0490HA	4.90	4.9	86	52	16,03
OR0900-0500HA	5.00	5.0	86	52	15,33
OR0900-0510HA	5.10	5.1	86	52	27,50
OR0900-0550HA	5.50	5.5	93	57	20,94
OR0900-0600HA	6.00	6.0	93	57	21,65
OR0900-0650HA	6.50	6.5	101	63	26,91
OR0900-0680HA	6.80	6.8	109	69	32,18
OR0900-0690HA	6.90	6.9	109	69	50,90
OR0900-0700HA	7.00	7.0	109	69	32,18
OR0900-0750HA	7.50	7.5	109	69	32,18
OR0900-0800HA	8.00	8.0	117	75	37,44
OR0900-0850HA	8.50	8.5	117	75	43,88
OR0900-0860HA	8.60	8.6	125	81	76,05
OR0900-0900HA	9.00	9.0	125	81	45,63
OR0900-0950HA	9.50	9.5	125	81	50,31
OR0900-1000HA	10.0	10.0	133	87	56,16
OR0900-1020HA	10.2	10.2	133	87	66,69
OR0900-1030HA	10.3	10.2	133	87	95,94
OR0900-1050HA	10.5	10.5	133	87	65,52
OR0900-1100HA	11.0	11.0	142	94	78,39
OR0900-1150HA	11.5	11.5	142	94	83,07
OR0900-1200HA	12.0	12.0	151	101	91,26



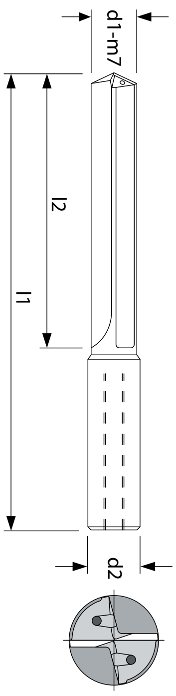


DIN 6535 Form HA | DIN 6537 | 10 D | DX | 140° | Un Coated | M | K | N | S

ON 2510



Item code	Ø d1	Ø d2	L	L1	€
ON2510-0300HA	3,0	6.0	91	42	67,86
ON2510-0317HA	3,17	6.0	91	42	67,86
ON2510-0325HA	3,25	6.0	91	42	67,86
ON2510-0330HA	3,3	6.0	91	42	67,86
ON2510-0350HA	3,5	6.0	91	48	67,86
ON2510-0357HA	3,57	6.0	91	48	67,86
ON2510-0380HA	3,8	6.0	121	77	67,86
ON2510-0397HA	3,97	6.0	121	77	67,86
ON2510-0400HA	4,0	6.0	121	77	67,86
ON2510-0420HA	4,2	6.0	121	77	67,86
ON2510-0450HA	4,5	6.0	121	77	67,86
ON2510-0500HA	5,0	6.0	121	82	67,86
ON2510-0550HA	5,5	6.0	121	82	67,86
ON2510-0600HA	6,0	6.0	121	82	67,86
ON2510-0630HA	6,3	8.0	146	106	88,92
ON2510-0650HA	6,5	8.0	146	106	88,92
ON2510-0680HA	6,8	8.0	146	106	88,92
ON2510-0700HA	7,0	8.0	146	106	88,92
ON2510-0750HA	7,5	8.0	146	106	88,92
ON2510-0780HA	7,8	8.0	146	106	88,92
ON2510-0800HA	8,0	8.0	146	106	88,92
ON2510-0850HA	8,5	10.0	175	130	112,32
ON2510-0900HA	9,0	10.0	175	130	112,32
ON2510-0950HA	9,5	10.0	175	130	112,32
ON2510-0952HA	9,52	10.0	175	130	112,32
ON2510-1000HA	10,0	10.0	175	130	112,32
ON2510-1020HA	10,2	12.0	209	159	139,23
ON2510-1050HA	10,5	12.0	209	159	139,23
ON2510-1100HA	11,0	12.0	209	159	139,23
ON2510-1150HA	11,5	12.0	209	159	139,23
ON2510-1200HA	12,0	12.0	209	159	139,23
ON2510-1250HA	12,5	14.0	233	183	186,03
ON2510-1270HA	12,7	14.0	233	183	186,03
ON2510-1300HA	13,0	14.0	233	183	186,03
ON2510-1350HA	13,5	14.0	233	183	186,03
ON2510-1400HA	14,0	14.0	233	183	186,03
ON2510-1450HA	14,5	16.0	260	207	234,00
ON2510-1500HA	15,0	16.0	260	207	234,00
ON2510-1550HA	15,5	16.0	260	207	234,00
ON2510-1600HA	16,0	16.0	260	207	234,00



Cutting Conditions P.13

Coolant: ● Air ● Neat oil ● Soluble oil   Cutting direction : R right-hand cutting   ● Aria ● Olio ● Emulsione   Direzione di taglio: R destre

Material group	Materiali	Material examples, new description (old description in brackets) Figures in bold = material no. to DIN EN Esempi di materiali, nuove designazioni (tra parentesi quelle precedenti) numeri in grassetto = numero materiale a DIN EN	Tensile strength MPa (N/mm²) Hardness Resistenza MPa (N/mm²) Durezza	Coolant Refri-gerante	v_c m/min	Ø 3	Ø 4	Ø 5	Ø 6	Ø 8	Ø 10	Ø 12	Ø 14	Ø 16	Ø 18	Ø 20
						Feed / Avanzamento f (mm/rev.) f (mm/giro)										
Common structural steels	Acciai da costruzione in generale	1.0035 S185(St33), 1.0486 P275N(StE285), 1.0345 P235GH(H1), 1.0425 P265GH(H2) 1.0050 E295 (St50-2), 1.0070 E360 (St70-2), 1.8937 P500NH (WStE500)	≤500 >500-850	Soluble oil Soluble oil												
Free-cutting steels	Acciai automatici	1.0718 11SMnPb30 (9SMnPb28), 1.0736 11SMn37 (9SMn36) 1.0727 46S20 (45S20), 1.0728 (60S20), 1.0757 46SPb20 (45SPb20)	≤850 850-1000	Soluble oil Soluble oil												
Unalloyed heat-treatable steels	Acciai da bonifica non legati	1.0402 C22, 1.1178 C30E (Ck30) 1.0503 C45, 1.1191 C45E (Ck45) 1.0601 C60, 1.1221 C60E (Ck60)	≤ 700 700-850 850-1000	Soluble oil Soluble oil Soluble oil												
Alloyed heat-treatable steels	Acciai da bonifica legati	1.5131 50MnSi4, 1.7003 38Cr2, 1.7030 28Cr4 1.5710 36NiCr6, 1.7035 41Cr4, 1.7225 42CrMo4	850-≤1000 1000-1200	Soluble oil Soluble oil												
Unalloyed case hardened steels	Acc.da cementazione non legati	1.0301 (C10), 1.1121 C10E (Ck10)	≤750	Soluble oil												
Alloyed case hardened steels	Acc.da cementazione legati	1.7043 38Cr4 1.5752 15NiCr13 (15NiCr13), 1.7131 16MnCr5, 1.7264 20CrMo5	850-≤1000 1000-1200	Neat oil Neat oil												
Nitriding steels	Acciai nitrurati	1.8504 34CrAl6 1.8519 31CrMoV9, 1.8550 34CrAlNi7	≥850-≤1000 >1000-1200	Soluble oil Neat oil												
Tool steels	Acciai utensili	1.1750 C75W, 1.2067 102Cr6, 1.2307 29CrMoV9 1.2080 X210Cr12, 1.2083 X42Cr13, 1.2419 105WCr6, 1.2767 X45NiCrMo4	≤850 >850-1000	Soluble oil Neat oil												
High speed steels	Acciiai super rapidi	1.3243 S 6-5-2-5, 1.3343 S 6-5-2, 1.3344 S 6-5-3	≥650-1000	Neat oil												
Spring steels	Acciai per molle	1.5026 55Si7, 1.7176 55Cr3, 1.8159 51CrV4 (51CrV4)	≤330 HB	Neat oil												
Stainless steels, sulphured austenitic martensitic	Acciai inossidabili, allo zolfo austenitici martensitici	1.4005 X12CrS13, 1.4104 X14CrMoS17, 1.4105 X6CrMoS17, 1.4305 X8CrNiS18-9 1.4301 X5CrNi18-10 (V2A), 1.4541 X6CrNiTi18-10, 1.4571 X6CrNiMoTi 17-12-2 (V4A) 1.4057 X20CrNi 17 2 (X17CrNi16-2), 1.4122 X39CrMo17-1, 1.4521 X2CrMoTi18-2	≤850 ≤850 ≤850	Neat oil Neat oil Neat oil												
Hardened steels	Acciai temprati	–	≤40-48 HRC >48-60 HRC	Neat oil Neat oil												
Special alloys	Leghe speciali	Nimonic, Inconel, Monel, Hastelloy	≤1200	Neat oil												
Cast iron	Ghise	0.6010 EN-GJL-100(GG10), 0.6020 EN-GJL-200(GG20) 0.6025 EN-GJL-250(GG25), 0.6035 EN-GJL-350(GG35)	≤240 HB <300 HB	Soluble oil, Air Soluble oil, Air	120 100	0.100 0.100	0.125 0.125	0.125 0.125	0.160 0.160	0.200 0.200	0.250 0.250	0.250 0.250	0.315 0.315	0.315 0.315	0.400 0.400	0.400 0.400
New cast materials CGI	Nuove ghise GGV	EN-GJV250 (GGV25) , EN-GJV350 (GGV35) EN-GJV400 (GGV40), EN-GJV500 (GGV50), SiMo 6	≤220 HB <300 HB	Soluble oil, Air Soluble oil, Air												
New cast materials ADI	Nuove ghise ADI	EN-GJS-800-8 (ADI800), EN-GJS-1000-5 (ADI1000) EN-GJS-1200-2 (ADI1200), EN-GJS-1400-1 (ADI1400)	800-1000 1200-1400	Soluble oil, Air Soluble oil, Air												
Spheroidal graphite iron and malleable cast iron	Ghise sferoidali, ghise temprate	0.7050 EN-GJS-500-7(GGG50), 0.8035 EN-GJMW-350-4(GTW35) 0.7070 EN-GJS-700-2(GGG70), 0.8170 EN-GJMB-700-2(GTS70)	≤240 HB <300 HB	Soluble oil Soluble oil	90 80	0.100 0.100	0.125 0.125	0.125 0.125	0.160 0.160	0.200 0.200	0.250 0.250	0.250 0.250	0.315 0.315	0.315 0.315	0.400 0.400	0.400 0.400
Chilled cast iron	Ghisa in conchiglia	–	≤350 HB	Soluble oil	40	0.032	0.040	0.040	0.050	0.063	0.080	0.080	0.100	0.100	0.125	0.125
Ti and Ti-alloys	Titanio e leghe di titanio	3.7024 Ti99,5, 3.7114 TiAl5Sn2,5, 3.7124 TiCu2 3.7154 TiAl6Zr5, 3.7165 TiAl6V4, 3.7184 TiAl4Mo4Sn2,5, -TiAl8Mo1V1	≤850 >850-1200	Neat oil Neat oil												
Aluminium and Al-alloys	Alluminio e leghe di alu	3.0255 Al99,5, 3.2315 AlMgSi1, 3.3515 AlMg1	≤400	Soluble oil	410	0.160	0.200	0.200	0.250	0.315	0.400	0.400	0.500	0.500	0.630	0.630
Al wrought alloys	Leghe di alu per lav. plastiche	3.0615 AlMgSiPb, 3.1325 AlCuMg1, 3.3245 AlMg3Si, 3.4365 AlZnMgCu1,5	≤450	Soluble oil	410	0.160	0.200	0.200	0.250	0.315	0.400	0.400	0.500	0.500	0.630	0.630
Al cast alloys ≤ 10 % Si > 10 % Si	Leghe alu-ghisa ≤ 10% Si > 10% Si	3.2131 G-AlSi5Cu1, 3.2153 G-AlSi7Cu3, 3.2573 G-AlSi9 3.2581 G-AlSi12, 3.2583 G-AlSi12Cu, - G-AlSi12CuNiMg	≤600 ≤600	Soluble oil Soluble oil	380 330	0.160 0.160	0.200 0.200	0.200 0.200	0.250 0.250	0.315 0.315	0.400 0.400	0.400 0.400	0.500 0.500	0.500 0.500	0.630 0.630	0.630 0.630
Magnesium alloys	Leghe di magnesio	3.5200 MgMn2, 3.5812.05 G-MgAl8Zn1, 3.5612.05 G-MgAl6Zn1	≤450	Air												
Copper, low-alloyed	Rame legato in bassa percentuale	2.0070 SE-Cu, 2.1020 CuSn6, 2.1096 G-CuSn5ZnPb	≤400	Soluble oil												
Brass, short-chipping long-chipping	Ottone, a truciolo corto a truciolo lungo	2.0380 CuZn39Pb2, 2.0401 CuZn39Pb3, 2.0410 CuZn43Pb2 2.0250 CuZn20, 2.0280 CuZn33, 2.0332 CuZn37Pb0,5	≤600 ≤600	Soluble oil Soluble oil	280	0.125	0.160	0.160	0.200	0.250	0.315	0.315	0.400	0.400	0.500	0.500
Bronze, short-chipping	Bronzi, a truciolo corto	2.1090 CuSn7ZnPb, 2.1170 CuPb5Sn5, 2.1176 CuPb10Sn 2.0790 CuNi18Zn19Pb	≤600 >600-850	Soluble oil, Neat oil Neat oil	110 80	0.100 0.080	0.125 0.100	0.125 0.100	0.160 0.125	0.200 0.160	0.250 0.200	0.250 0.200	0.315 0.250	0.315 0.250	0.400 0.315	0.400 0.315
Bronze, long-chipping	Bronzi, a truciolo lungo	2.0916 CuAl5, 2.0960 CuAl9Mn, 2.1050 CuSn10 2.0980 CuAl11Ni, 2.1247 CuBe2	≤850 >850-1000	Neat oil Neat oil												

Coolant: Air (purple dot) · Neat oil (black dot) · Soluble oil (grey dot) — Cutting direction: [R] right-hand cutting

Aria (purple dot) · Olio (black dot) · Emulsione (grey dot) — Direzione di taglio: [R] destre

Material group	Materiali	Material examples, new description (old description in brackets) Figures in bold = material no. to DIN EN / Esempi di materiali, nuove designazioni (tra parentesi quelle precedenti) numeri in grassetto = numero materiale a DIN EN	Tensile strength MPa (N/mm²) Hardness / Resistenza MPa (N/mm²) Durezza	Coolant / Refrigerante	v_c m/min	Feed f (mm/rev.) / Avanzamento f (mm/giro) Ø 3	Ø 4	Ø 5	Ø 6	Ø 8	Ø 10	Ø 12	Ø 14	Ø 16	Ø 18	Ø 20
Common structural steels	Acciai da costruzione in generale	1.0035 S185(St33), 1.0486 P275N(StE285), 1.0345 P235GH(H1), 1.0425 P265GH(H2)	≤500	Soluble oil	145	0.125	0.160	0.160	0.200	0.250	0.315	0.315	0.400	0.400	0.500	0.500
		1.0050 E295 (St50-2), 1.0070 E360 (St70-2), 1.8937 P500NH (WStE500)	>500-850	Soluble oil	120	0.100	0.125	0.125	0.160	0.200	0.250	0.250	0.315	0.315	0.400	0.400
Free-cutting steels	Acciai automatici	1.0718 11SMnPb30 (9SMnPb28), 1.0736 11SMn37 (9SMn36)	≤850	Soluble oil	170	0.160	0.200	0.200	0.250	0.315	0.400	0.400	0.500	0.500	0.630	0.630
		1.0727 46S20 (45S20), 1.0728 (60S20), 1.0757 46SPb20 (45SPb20)	850-1000	Soluble oil	145	0.160	0.200	0.200	0.250	0.315	0.400	0.400	0.500	0.500	0.630	0.630
Unalloyed heat-treatable steels	Acciai da bonifica non legati	1.0402 C22, 1.1178 C30E (Ck30)	≤ 700	Soluble oil	130	0.160	0.200	0.200	0.250	0.315	0.400	0.400	0.500	0.500	0.630	0.630
		1.0503 C45, 1.1191 C45E (Ck45)	700-850	Soluble oil	125	0.125	0.160	0.160	0.200	0.250	0.315	0.315	0.400	0.400	0.500	0.500
		1.0601 C60, 1.1221 C60E (Ck60)	850-1000	Soluble oil	120	0.125	0.160	0.160	0.200	0.250	0.315	0.315	0.400	0.400	0.500	0.500
Alloyed heat-treatable steels	Acciai da bonifica legati	1.5131 50MnSi4, 1.7003 38Cr2, 1.7030 28Cr4	850-≤1000	Soluble oil	120	0.125	0.160	0.160	0.200	0.250	0.315	0.315	0.400	0.400	0.500	0.500
		1.5710 36NiCr6, 1.7035 41Cr4, 1.7225 42CrMo4	1000-1200	Soluble oil	105	0.125	0.160	0.160	0.200	0.250	0.315	0.315	0.400	0.400	0.500	0.500
Unalloyed case hardened steels	Acc.da cementazione non legati	1.0301 (C10), 1.1121 C10E (Ck10)	≤750	Soluble oil	145	0.160	0.200	0.200	0.250	0.315	0.400	0.400	0.500	0.500	0.630	0.630
Alloyed case hardened steels	Acc.da cementazione legati	1.7043 38Cr4	850-≤1000	Neat oil	120	0.125	0.160	0.160	0.200	0.250	0.315	0.315	0.400	0.400	0.500	0.500
		1.5752 15NiCr13 (15NiCr13), 1.7131 16MnCr5, 1.7264 20CrMo5	1000-1200	Neat oil	85	0.080	0.100	0.100	0.125	0.160	0.200	0.200	0.250	0.250	0.315	0.315
Nitriding steels	Acciai nitrurati	1.8504 34CrAl6	≥850-≤1000	Soluble oil	110	0.125	0.160	0.160	0.200	0.250	0.315	0.315	0.400	0.400	0.500	0.500
		1.8519 31CrMoV9, 1.8550 34CrAlNi7	>1000-1200	Neat oil	105	0.080	0.100	0.100	0.125	0.160	0.200	0.200	0.250	0.250	0.315	0.315
Tool steels	Acciai utensili	1.1750 C75W, 1.2067 102Cr6, 1.2307 29CrMoV9	≤850	Soluble oil	80	0.100	0.125	0.125	0.160	0.200	0.250	0.250	0.315	0.315	0.400	0.400
		1.2080 X210Cr12, 1.2083 X42Cr13, 1.2419 105WCr6, 1.2767 X45NiCrMo4	>850-1000	Neat oil	65	0.080	0.100	0.100	0.125	0.160	0.200	0.200	0.250	0.250	0.315	0.315
High speed steels	Acciiai super rapidi	1.3243 S 6-5-2-5, 1.3343 S 6-5-2, 1.3344 S 6-5-3	≥650-1000	Neat oil	60	0.080	0.100	0.100	0.125	0.160	0.200	0.200	0.250	0.250	0.315	0.315
Spring steels	Acciai per molle	1.5026 55Si7, 1.7176 55Cr3, 1.8159 51CrV4 (51CrV4)	≤330 HB	Neat oil	60	0.050	0.063	0.063	0.080	0.100	0.125	0.125	0.160	0.160	0.200	0.200
Stainless steels, sulphured	Acciai inossidabili, allo zolfo	1.4005 X12CrS13, 1.4104 X14CrMoS17, 1.4105 X6CrMoS17, 1.4305 X8CrNiS18-9	≤850	Neat oil	60	0.080	0.100	0.100	0.125	0.160	0.200	0.200	0.250	0.250	0.315	0.315
austenitic	austenitici	1.4301 X5CrNi18-10 (V2A), 1.4541 X6CrNiTi18-10, 1.4571 X6CrNiMoTi 17-12-2 (V4A)	≤850	Neat oil	55	0.080	0.100	0.100	0.125	0.160	0.200	0.200	0.250	0.250	0.315	0.315
martensitic	martensitici	1.4057 X20CrNi 17 2 (X17CrNi16-2), 1.4122 X39CrMo17-1, 1.4521 X2CrMoTi18-2	≤850	Neat oil	45	0.080	0.100	0.100	0.125	0.160	0.200	0.200	0.250	0.250	0.315	0.315
Hardened steels	Acciai temprati	–	≤40-48 HRC	Neat oil	55	0.050	0.063	0.063	0.080	0.100	0.200	0.200	0.160	0.160	0.200	0.200
			>48-60 HRC	Neat oil	35	0.040	0.050	0.050	0.063	0.080	0.100	0.100	0.125	0.125	0.160	0.160
Special alloys	Leghe speciali	Nimonic, Inconel, Monel, Hastelloy	≤1200	Neat oil	35	0.063	0.063	0.063	0.100	0.125	0.160	0.160	0.200	0.200	0.250	0.250
Cast iron	Ghise	0.6010 EN-GJL-100(GG10), 0.6020 EN-GJL-200(GG20)	≤240 HB	Soluble oil, Air	210	0.160	0.200	0.200	0.315	0.315	0.400	0.400	0.630	0.630	0.630	0.630
		0.6025 EN-GJL-250(GG25), 0.6035 EN-GJL-350(GG35)	<300 HB	Soluble oil, Air	160	0.160	0.200	0.200	0.315	0.315	0.400	0.400	0.63	0.63	0.630	0.630
New cast materials CGI	Nuove ghise GGV	EN-GJV250 (GGV25), EN-GJV350 (GGV35)	≤220 HB	Soluble oil, Air												
		EN-GJV400 (GGV40), EN-GJV500 (GGV50), SiMo 6	<300 HB	Soluble oil, Air												
New cast materials ADI	Nuove ghise ADI	EN-GJS-800-8 (ADI800), EN-GJS-1000-5 (ADI1000)	800-1000	Soluble oil, Air												
		EN-GJS-1200-2 (ADI1200), EN-GJS-1400-1 (ADI1400)	1200-1400	Soluble oil, Air												
Spheroidal graphite iron and malleable cast iron	Ghise sferoidali, ghise temprate	0.7050 EN-GJS-500-7(GGG50), 0.8035 EN-GJMW-350-4(GTW35)	≤240 HB	Soluble oil	140	0.160	0.200	0.200	0.315	0.315	0.400	0.400	0.630	0.630	0.630	0.630
		0.7070 EN-GJS-700-2(GGG70), 0.8170 EN-GJMB-700-2(GTS70)	<300 HB	Soluble oil	130	0.160	0.200	0.200	0.250	0.315	0.400	0.400	0.500	0.500	0.630	0.630
Chilled cast iron	Ghisa in conchiglia	–	≤350 HB	Soluble oil	40	0.050	0.063	0.063	0.080	0.100	0.125	0.125	0.160	0.160	0.200	0.200
Ti and Ti-alloys	Titanio e leghe di titanio	3.7024 Ti99,5, 3.7114 TiAl5Sn2,5, 3.7124 TiCu2	≤850	Neat oil	45	0.063	0.063	0.063	0.100	0.125	0.160	0.160	0.200	0.200	0.250	0.250
		3.7154 TiAl6Zr5, 3.7165 TiAl6V4, 3.7184 TiAl4Mo4Sn2,5, -TiAl8Mo1V1	>850-1200	Neat oil	40	0.050	0.063	0.063	0.080	0.100	0.125	0.125	0.160	0.160	0.200	0.200
Aluminium and Al-alloys	Alluminio e leghe di alu	3.0255 Al99,5, 3.2315 AlMgSi1, 3.3515 AlMg1	≤400	Soluble oil	310	0.160	0.200	0.200	0.315	0.315	0.400	0.400	0.630	0.630	0.630	0.630
Al wrought alloys	Leghe di alu per lav. plastiche	3.0615 AlMgSiPb, 3.1325 AlCuMg1, 3.3245 AlMg3Si, 3.4365 AlZnMgCu1,5	≤450	Soluble oil	310	0.160	0.200	0.200	0.315	0.315	0.400	0.400	0.630	0.630	0.630	0.630
Al cast alloys ≤ 10 % Si	Leghe alu-ghisa ≤ 10% Si	3.2131 G-AlSi5Cu1, 3.2153 G-AlSi7Cu3, 3.2573 G-AlSi9	≤600	Soluble oil	260	0.160	0.200	0.200	0.315	0.315	0.400	0.400	0.630	0.630	0.630	0.630
> 10 % Si	> 10% Si	3.2581 G-AlSi12, 3.2583 G-AlSi12Cu, - G-AlSi12CuNiMg	≤600	Soluble oil	220	0.160	0.200	0.200	0.315	0.315	0.400	0.400	0.630	0.630	0.630	0.630
Magnesium alloys	Leghe di magnesio	3.5200 MgMn2, 3.5812.05 G-MgAl8Zn1, 3.5612.05 G-MgAl6Zn1	≤450	Air	280	0.160	0.200	0.200	0.250	0.315	0.400	0.400	0.500	0.500	0.630	0.630
Copper, low-alloyed	Rame legato in bassa percentuale	2.0070 SE-Cu, 2.1020 CuSn6, 2.1096 G-CuSn5ZnPb	≤400	Soluble oil	125	0.125	0.160	0.160	0.200	0.250	0.315	0.315	0.400	0.400	0.500	0.500
Brass, short-chipping	Ottone, a truciolo corto	2.0380 CuZn39Pb2, 2.0401 CuZn39Pb3, 2.0410 CuZn43Pb2	≤600	Soluble oil	325	0.160	0.200	0.200	0.250	0.315	0.400	0.400	0.500	0.500	0.630	0.630
long-chipping	a truciolo lungo	2.0250 CuZn20, 2.0280 CuZn33, 2.0332 CuZn37Pb0,5	≤600	Soluble oil	220	0.125	0.160	0.160	0.200	0.250	0.315	0.315	0.400	0.400	0.500	0.500
Bronze, short-chipping	Bronzi, a truciolo corto	2.1090 CuSn7ZnPb, 2.1170 CuPb5Sn5, 2.1176 CuPb10Sn	≤600	Soluble oil, Neat oil	125	0.125	0.160	0.160	0.200	0.250	0.315	0.315	0.400	0.400	0.500	0.500
		2.0790 CuNi18Zn19Pb	>600-850	Neat oil	105	0.100	0.125	0.125	0.160	0.200	0.250	0.250	0.315	0.315	0.400	0.400
Bronze, long-chipping	Bronzi, a truciolo lungo	2.0916 CuAl5, 2.0960 CuAl9Mn, 2.1050 CuSn10	≤850	Neat oil	90	0.100	0.125	0.125	0.160	0.200	0.250	0.250	0.315	0.315	0.400	0.400
		2.0980 CuAl11Ni, 2.1247 CuBe2	>850-1000	Neat oil	80	0.100	0.125	0.125	0.160	0.200	0.250	0.250	0.315	0.315	0.400	0.400

Coolant: Air ● Neat oil ● Soluble oil   Cutting direction : R right-hand cutting   Aria ● Olio ● Emulsione   Direzione di taglio: R destre

Material group	Materiali	Material examples, new description (old description in brackets) Figures in bold = material no. to DIN EN / Esempi di materiali, nuove designazioni (tra parentesi quelle precedenti) numeri in grassetto = numero materiale a DIN EN	Tensile strength MPa (N/mm²) Hardness / Resistenza MPa (N/mm²) Durezza	Coolant / Refri-gerante	v_c m/min	Ø 3	Ø 4	Ø 5	Ø 6	Ø 8	Ø 10	Ø 12	Ø 14	Ø 16	Ø 18	Ø 20
						Feed / Avanzamento f (mm/rev.) / f (mm/giro)										
Common structural steels	Acciai da costruzione in generale	1.0035 S185(St33), 1.0486 P275N(StE285), 1.0345 P235GH(H1), 1.0425 P265GH(H2)	≤500	Soluble oil	145	0.125	0.160	0.160	0.200	0.250	0.315	0.315	0.400	0.400	0.500	0.500
		1.0050 E295 (St50-2), 1.0070 E360 (St70-2), 1.8937 P500NH (WStE500)	>500-850	Soluble oil	120	0.100	0.125	0.125	0.160	0.200	0.250	0.250	0.315	0.315	0.400	0.400
Free-cutting steels	Acciai automatici	1.0718 11SMnPb30 (9SMnPb28), 1.0736 11SMn37 (9SMn36)	≤850	Soluble oil	170	0.160	0.200	0.200	0.250	0.315	0.400	0.400	0.500	0.500	0.630	0.630
		1.0727 46S20 (45S20), 1.0728 (60S20), 1.0757 46SPb20 (45SPb20)	850-1000	Soluble oil	145	0.160	0.200	0.200	0.250	0.315	0.400	0.400	0.500	0.500	0.630	0.630
Unalloyed heat-treatable steels	Acciai da bonifica non legati	1.0402 C22, 1.1178 C30E (Ck30)	≤ 700	Soluble oil	130	0.160	0.200	0.200	0.250	0.315	0.400	0.400	0.500	0.500	0.630	0.630
		1.0503 C45, 1.1191 C45E (Ck45)	700-850	Soluble oil	125	0.125	0.160	0.160	0.200	0.250	0.315	0.315	0.400	0.400	0.500	0.500
		1.0601 C60, 1.1221 C60E (Ck60)	850-1000	Soluble oil	120	0.125	0.160	0.160	0.200	0.250	0.315	0.315	0.400	0.400	0.500	0.500
Alloyed heat-treatable steels	Acciai da bonifica legati	1.5131 50MnSi4, 1.7003 38Cr2, 1.7030 28Cr4	850-≤1000	Soluble oil	120	0.125	0.160	0.160	0.200	0.250	0.315	0.315	0.400	0.400	0.500	0.500
		1.5710 36NiCr6, 1.7035 41Cr4, 1.7225 42CrMo4	1000-1200	Soluble oil	105	0.125	0.160	0.160	0.200	0.250	0.315	0.315	0.400	0.400	0.500	0.500
Unalloyed case hardened steels	Acc.da cementazione non legati	1.0301 (C10), 1.1121 C10E (Ck10)	≤750	Soluble oil	145	0.160	0.200	0.200	0.250	0.315	0.400	0.400	0.500	0.500	0.630	0.630
Alloyed case hardened steels	Acc.da cementazione legati	1.7043 38Cr4	850-≤1000	Neat oil	120	0.125	0.160	0.160	0.200	0.250	0.315	0.315	0.400	0.400	0.500	0.500
		1.5752 15NiCr13 (15NiCr13), 1.7131 16MnCr5, 1.7264 20CrMo5	1000-1200	Neat oil	85	0.080	0.100	0.100	0.125	0.160	0.200	0.200	0.250	0.250	0.315	0.315
Nitriding steels	Acciai nitrurati	1.8504 34CrAl6	≥850-≤1000	Soluble oil	110	0.125	0.160	0.160	0.200	0.250	0.315	0.315	0.400	0.400	0.500	0.500
		1.8519 31CrMoV9, 1.8550 34CrAlNi7	>1000-1200	Neat oil	105	0.080	0.100	0.100	0.125	0.160	0.200	0.200	0.250	0.250	0.315	0.315
Tool steels	Acciai utensili	1.1750 C75W, 1.2067 102Cr6, 1.2307 29CrMoV9	≤850	Soluble oil	80	0.100	0.125	0.125	0.160	0.200	0.250	0.250	0.315	0.315	0.400	0.400
		1.2080 X210Cr12, 1.2083 X42Cr13, 1.2419 105WCr6, 1.2767 X45NiCrMo4	>850-1000	Neat oil	65	0.080	0.100	0.100	0.125	0.160	0.200	0.200	0.250	0.250	0.315	0.315
High speed steels	Acciiai super rapidi	1.3243 S 6-5-2-5, 1.3343 S 6-5-2, 1.3344 S 6-5-3	≥650-1000	Neat oil	60	0.080	0.100	0.100	0.125	0.160	0.200	0.200	0.250	0.250	0.315	0.315
Spring steels	Acciai per molle	1.5026 55Si7, 1.7176 55Cr3, 1.8159 51CrV4 (51CrV4)	≤330 HB	Neat oil	60	0.050	0.063	0.063	0.080	0.100	0.125	0.125	0.160	0.160	0.200	0.200
Stainless steels, sulphured	Acciai inossidabili, allo zolfo	1.4005 X12CrS13, 1.4104 X14CrMoS17, 1.4105 X6CrMoS17, 1.4305 X8CrNiS18-9	≤850	Neat oil	60	0.080	0.100	0.100	0.125	0.160	0.200	0.200	0.250	0.250	0.315	0.315
austenitic	austenitici	1.4301 X5CrNi18-10 (V2A), 1.4541 X6CrNiTi18-10, 1.4571 X6CrNiMoTi 17-12-2 (V4A)	≤850	Neat oil	55	0.080	0.100	0.100	0.125	0.160	0.200	0.200	0.250	0.250	0.315	0.315
martensitic	martensitici	1.4057 X20CrNi 17 2 (X17CrNi16-2), 1.4122 X39CrMo17-1, 1.4521 X2CrMoTi18-2	≤850	Neat oil	45	0.080	0.100	0.100	0.125	0.160	0.200	0.200	0.250	0.250	0.315	0.315
Hardened steels	Acciai temprati	–	≤40-48 HRC	Neat oil	55	0.050	0.063	0.063	0.080	0.100	0.125	0.125	0.160	0.160	0.200	0.200
			>48-60 HRC	Neat oil	35	0.040	0.050	0.050	0.063	0.080	0.100	0.100	0.125	0.125	0.160	0.160
Special alloys	Leghe speciali	Nimonic, Inconel, Monel, Hastelloy	≤1200	Neat oil	35	0.063	0.080	0.080	0.100	0.125	0.160	0.160	0.200	0.200	0.250	0.250
Cast iron	Ghise	0.6010 EN-GJL-100(GG10), 0.6020 EN-GJL-200(GG20)	≤240 HB	Soluble oil, Air	210	0.160	0.200	0.200	0.315	0.315	0.400	0.400	0.630	0.630	0.630	0.630
		0.6025 EN-GJL-250(GG25), 0.6035 EN-GJL-350(GG35)	<300 HB	Soluble oil, Air	160	0.160	0.200	0.200	0.315	0.315	0.400	0.400	0.630	0.630	0.630	0.630
New cast materials CGI	Nuove ghise GGV	EN-GJV250 (GGV25) , EN-GJV350 (GGV35)	≤220 HB	Soluble oil, Air												
		EN-GJV400 (GGV40), EN-GJV500 (GGV50), SiMo 6	<300 HB	Soluble oil, Air												
New cast materials ADI	Nuove ghise ADI	EN-GJS-800-8 (ADI800), EN-GJS-1000-5 (ADI1000)	800-1000	Soluble oil, Air												
		EN-GJS-1200-2 (ADI1200), EN-GJS-1400-1 (ADI1400)	1200-1400	Soluble oil, Air												
Spheroidal graphite iron and malleable cast iron	Ghise sferoidali, ghise temprate	0.7050 EN-GJS-500-7(GGG50), 0.8035 EN-GJMW-350-4(GTW35)	≤240 HB	Soluble oil	140	0.160	0.200	0.200	0.315	0.315	0.400	0.400	0.630	0.630	0.630	0.630
		0.7070 EN-GJS-700-2(GGG70), 0.8170 EN-GJMB-700-2(GTS70)	<300 HB	Soluble oil	130	0.160	0.200	0.200	0.250	0.315	0.400	0.400	0.500	0.500	0.630	0.630
Chilled cast iron	Ghisa in conchiglia	–	≤350 HB	Soluble oil	40	0.050	0.063	0.063	0.080	0.100	0.125	0.125	0.160	0.160	0.200	0.200
Ti and Ti-alloys	Titanio e leghe di titanio	3.7024 Ti99,5, 3.7114 TiAl5Sn2,5, 3.7124 TiCu2	≤850	Neat oil	45	0.063	0.080	0.080	0.100	0.125	0.160	0.160	0.200	0.200	0.250	0.250
		3.7154 TiAl6Zr5, 3.7165 TiAl6V4, 3.7184 TiAl4Mo4Sn2,5, -TiAl8Mo1V1	>850-1200	Neat oil	40	0.050	0.063	0.063	0.080	0.100	0.125	0.125	0.160	0.160	0.200	0.200
Aluminium and Al-alloys	Alluminio e leghe di alu	3.0255 Al99,5, 3.2315 AlMgSi1, 3.3515 AlMg1	≤400	Soluble oil	310	0.160	0.200	0.200	0.315	0.315	0.400	0.400	0.63	0.63	0.630	0.630
Al wrought alloys	Leghe di alu per lav. plastiche	3.0615 AlMgSiPb, 3.1325 AlCuMg1, 3.3245 AlMg3Si, 3.4365 AlZnMgCu1,5	≤450	Soluble oil	310	0.160	0.200	0.200	0.315	0.315	0.400	0.400	0.630	0.630	0.630	0.630
Al cast alloys ≤ 10 % Si	Leghe alu-ghisa ≤ 10% Si	3.2131 G-AlSi5Cu1, 3.2153 G-AlSi7Cu3, 3.2573 G-AlSi9	≤600	Soluble oil	260	0.160	0.200	0.200	0.315	0.315	0.400	0.400	0.630	0.630	0.630	0.630
> 10 % Si	> 10% Si	3.2581 G-AlSi12, 3.2583 G-AlSi12Cu, - G-AlSi12CuNiMg	≤600	Soluble oil	220	0.160	0.200	0.200	0.315	0.315	0.400	0.400	0.630	0.630	0.630	0.630
Magnesium alloys	Leghe di magnesio	3.5200 MgMn2, 3.5812.05 G-MgAl8Zn1, 3.5612.05 G-MgAl6Zn1	≤450	Air	280	0.160	0.200	0.200	0.250	0.315	0.400	0.400	0.500	0.500	0.630	0.630
Copper, low-alloyed	Rame legato in bassa percentuale	2.0070 SE-Cu, 2.1020 CuSn6, 2.1096 G-CuSn5ZnPb	≤400	Soluble oil	125	0.125	0.160	0.160	0.200	0.250	0.315	0.315	0.400	0.400	0.500	0.500
Brass, short-chipping	Ottone, a truciolo corto	2.0380 CuZn39Pb2, 2.0401 CuZn39Pb3, 2.0410 CuZn43Pb2	≤600	Soluble oil	325	0.160	0.200	0.200	0.250	0.315	0.500	0.500	0.500	0.500	0.630	0.630
long-chipping	a truciolo lungo	2.0250 CuZn20, 2.0280 CuZn33, 2.0332 CuZn37Pb0,5	≤600	Soluble oil	220	0.125	0.160	0.160	0.200	0.250	0.315	0.315	0.400	0.400	0.500	0.500
Bronze, short-chipping	Bronzi, a truciolo corto	2.1090 CuSn7ZnPb, 2.1170 CuPb5Sn5, 2.1176 CuPb10Sn	≤600	Soluble oil, Neat oil	125	0.125	0.160	0.160	0.200	0.250	0.315	0.315	0.400	0.400	0.500	0.500
		2.0790 CuNi18Zn19Pb	>600-850	Neat oil	105	0.100	0.125	0.125	0.160	0.200	0.250	0.250	0.315	0.315	0.400	0.400
Bronze, long-chipping	Bronzi, a truciolo lungo	2.0916 CuAl5, 2.0960 CuAl9Mn, 2.1050 CuSn10	≤850	Neat oil	90	0.100	0.125	0.125	0.160	0.200	0.250	0.250	0.315	0.315	0.400	0.400
		2.0980 CuAl11Ni, 2.1247 CuBe2	>850-1000	Neat oil	80	0.100	0.125	0.125	0.160	0.200	0.250	0.250	0.315	0.315	0.400	0.400

OT2108

Coolant: ◍ Air ● Neat oil ○ Soluble oil Cutting direction : [R] right-hand cutting ◍ Aria ● Olio ○ Emulsione Direzione di taglio: [R] destre

Material group	Materiali	Material examples, new description (old description in brackets) Figures in bold = material no. to DIN EN / Esempi di materiali, nuove designazioni (tra parentesi quelle precedenti) numeri in grassetto = numero materiale a DIN EN	Tensile strength MPa (N/mm²) Hardness / Resistenza MPa (N/mm²) Durezza	Coolant / Refri-gerante	v_c m/min	Feed f (mm/rev.) Avanzamento f (mm/giro) Ø 3	Ø 4	Ø 5	Ø 6	Ø 8	Ø 10	Ø 12	Ø 14	Ø 16	Ø 18	Ø 20
Common structural steels	Acciai da costruzione in generale	1.0035 S185(St33), 1.0486 P275N(StE285), 1.0345 P235GH(H1), 1.0425 P265GH(H2)	≤500	○	90	0.125	0.160	0.160	0.200	0.250	0.315	0.315	0.400	0.400	0.500	0.500
		1.0050 E295 (St50-2), 1.0070 E360 (St70-2), 1.8937 P500NH (WStE500)	>500-850	○	80	0.100	0.125	0.125	0.160	0.200	0.250	0.250	0.315	0.315	0.400	0.400
Free-cutting steels	Acciai automatici	1.0718 11SMnPb30 (9SMnPb28), 1.0736 11SMn37 (9SMn36)	≤850	○	100	0.160	0.200	0.200	0.250	0.315	0.400	0.400	0.500	0.500	0.630	0.630
		1.0727 46S20 (45S20), 1.0728 (60S20), 1.0757 46SPb20 (45SPb20)	850-1000	○	90	0.160	0.200	0.200	0.250	0.315	0.400	0.400	0.500	0.500	0.630	0.630
Unalloyed heat-treatable steels	Acciai da bonifica non legati	1.0402 C22, 1.1178 C30E (Ck30)	≤ 700	○	90	0.160	0.200	0.200	0.250	0.315	0.400	0.400	0.500	0.500	0.630	0.630
		1.0503 C45, 1.1191 C45E (Ck45)	700-850	○	80	0.125	0.160	0.160	0.200	0.250	0.315	0.315	0.400	0.400	0.500	0.500
		1.0601 C60, 1.1221 C60E (Ck60)	850-1000	○	80	0.125	0.160	0.160	0.200	0.250	0.315	0.315	0.400	0.400	0.500	0.500
Alloyed heat-treatable steels	Acciai da bonifica legati	1.5131 50MnSi4, 1.7003 38Cr2, 1.7030 28Cr4	850-≤1000	○	80	0.125	0.160	0.160	0.200	0.250	0.315	0.315	0.400	0.400	0.500	0.500
		1.5710 36NiCr6, 1.7035 41Cr4, 1.7225 42CrMo4	1000-1200	○	60	0.125	0.160	0.160	0.200	0.250	0.315	0.315	0.400	0.400	0.500	0.500
Unalloyed case hardened steels	Acc.da cementazione non legati	1.0301 (C10), 1.1121 C10E (Ck10)	≤750	○	90	0.160	0.200	0.200	0.250	0.315	0.400	0.400	0.500	0.500	0.630	0.630
Alloyed case hardened steels	Acc.da cementazione legati	1.7043 38Cr4	850-≤1000	●	80	0.125	0.160	0.160	0.200	0.250	0.315	0.315	0.400	0.400	0.500	0.500
		1.5752 15NiCr13 (15NiCr13), 1.7131 16MnCr5, 1.7264 20CrMo5	1000-1200	●	60	0.100	0.100	0.100	0.125	0.160	0.200	0.200	0.250	0.250	0.315	0.315
Nitriding steels	Acciai nitrurati	1.8504 34CrAl6	≥850-≤1000	○	60	0.125	0.160	0.160	0.200	0.250	0.315	0.315	0.400	0.400	0.500	0.500
		1.8519 31CrMoV9, 1.8550 34CrAlNi7	>1000-1200	●	50	0.100	0.100	0.100	0.125	0.160	0.200	0.200	0.250	0.250	0.315	0.315
Tool steels	Acciai utensili	1.1750 C75W, 1.2067 102Cr6, 1.2307 29CrMoV9	≤850	○	50	0.100	0.125	0.125	0.160	0.200	0.250	0.250	0.315	0.315	0.400	0.400
		1.2080 X210Cr12, 1.2083 X42Cr13, 1.2419 105WCr6, 1.2767 X45NiCrMo4	>850-1000	●	40	0.100	0.100	0.100	0.125	0.160	0.200	0.200	0.250	0.250	0.315	0.315
High speed steels	Acciiai super rapidi	1.3243 S 6-5-2-5, 1.3343 S 6-5-2, 1.3344 S 6-5-3	≥650-1000	●	35	0.100	0.100	0.100	0.125	0.160	0.200	0.200	0.250	0.250	0.315	0.315
Spring steels	Acciai per molle	1.5026 55Si7, 1.7176 55Cr3, 1.8159 51CrV4 (51CrV4)	≤330 HB	●	35	0.050	0.063	0.063	0.080	0.100	0.125	0.125	0.160	0.160	0.200	0.200
Stainless steels, sulphured	Acciai inossidabili, allo zolfo	1.4005 X12CrS13, 1.4104 X14CrMoS17, 1.4105 X6CrMoS17, 1.4305 X8CrNiS18-9	≤850	●	40	0.100	0.100	0.100	0.125	0.160	0.200	0.200	0.250	0.250	0.315	0.315
austenitic	austenitici	1.4301 X5CrNi18-10 (V2A), 1.4541 X6CrNiTi18-10, 1.4571 X6CrNiMoTi 17-12-2 (V4A)	≤850	●	40	0.100	0.100	0.100	0.125	0.160	0.200	0.200	0.250	0.250	0.315	0.315
martensitic	martensitici	1.4057 X20CrNi 17 2 (X17CrNi16-2), 1.4122 X39CrMo17-1, 1.4521 X2CrMoTi18-2	≤850	●	40	0.100	0.100	0.100	0.125	0.160	0.200	0.200	0.250	0.250	0.315	0.315
Hardened steels	Acciai temprati	-	≤40-48 HRC	●		0.050	0.063	0.063	0.080	0.100	0.125	0.125	0.160	0.160	0.200	0.200
			>48-60 HRC	●		0.040	0.050	0.050	0.063	0.080	0.100	0.100	0.125	0.125	0.160	0.160
Special alloys	Leghe speciali	Nimonic, Inconel, Monel, Hastelloy	≤1200	●		0.063	0.080	0.080	0.100	0.125	0.160	0.160	0.200	0.200	0.250	0.250
Cast iron	Ghise	0.6010 EN-GJL-100(GG10), 0.6020 EN-GJL-200(GG20)	≤240 HB	○ ◍	120	0.160	0.200	0.200	0.315	0.315	0.400	0.400	0.630	0.630	0.630	0.630
		0.6025 EN-GJL-250(GG25), 0.6035 EN-GJL-350(GG35)	<300 HB	○ ◍	120	0.160	0.200	0.200	0.315	0.315	0.400	0.400	0.630	0.630	0.630	0.630
New cast materials CGI	Nuove ghise GGV	EN-GJV250 (GGV25) , EN-GJV350 (GGV35)	≤220 HB	○ ◍												
		EN-GJV400 (GGV40), EN-GJV500 (GGV50), SiMo 6	<300 HB	○ ◍												
New cast materials ADI	Nuove ghise ADI	EN-GJS-800-8 (ADI800), EN-GJS-1000-5 (ADI1000)	800-1000	○ ◍												
		EN-GJS-1200-2 (ADI1200), EN-GJS-1400-1 (ADI1400)	1200-1400	○ ◍												
Spheroidal graphite iron and malleable cast iron	Ghise sferoidali, ghise temprate	0.7050 EN-GJS-500-7(GGG50), 0.8035 EN-GJMW-350-4(GTW35)	≤240 HB	○	90	0.160	0.200	0.200	0.315	0.315	0.400	0.400	0.630	0.630	0.630	0.630
		0.7070 EN-GJS-700-2(GGG70), 0.8170 EN-GJMB-700-2(GTS70)	<300 HB	○	80	0.160	0.200	0.200	0.250	0.315	0.400	0.400	0.500	0.500	0.630	0.630
Chilled cast iron	Ghisa in conchiglia	-	≤350 HB	○		0.050	0.063	0.063	0.080	0.100	0.125	0.125	0.160	0.160	0.200	0.200
Ti and Ti-alloys	Titanio e leghe di titanio	3.7024 Ti99,5, 3.7114 TiAl5Sn2,5, 3.7124 TiCu2	≤850	●		0.063	0.080	0.080	0.100	0.125	0.160	0.160	0.200	0.200	0.250	0.250
		3.7154 TiAl6Zr5, 3.7165 TiAl6V4, 3.7184 TiAl4Mo4Sn2,5, -TiAl8Mo1V1	>850-1200	●		0.050	0.063	0.063	0.080	0.100	0.125	0.125	0.160	0.160	0.200	0.200
Aluminium and Al-alloys	Alluminio e leghe di alu	3.0255 Al99,5, 3.2315 AlMgSi1, 3.3515 AlMg1	≤400	○	150	0.160	0.200	0.200	0.315	0.315	0.400	0.400	0.630	0.630	0.630	0.630
Al wrought alloys	Leghe di alu per lav. plastiche	3.0615 AlMgSiPb, 3.1325 AlCuMg1, 3.3245 AlMg3Si, 3.4365 AlZnMgCu1,5	≤450	○	150	0.160	0.200	0.200	0.315	0.315	0.400	0.400	0.630	0.630	0.630	0.630
Al cast alloys ≤ 10 % Si	Leghe alu-ghisa ≤ 10% Si	3.2131 G-AlSi5Cu1, 3.2153 G-AlSi7Cu3, 3.2573 G-AlSi9	≤600	○	150	0.160	0.200	0.200	0.315	0.315	0.400	0.400	0.630	0.630	0.630	0.630
> 10 % Si	> 10% Si	3.2581 G-AlSi12, 3.2583 G-AlSi12Cu, - G-AlSi12CuNiMg	≤600	○	120	0.160	0.200	0.200	0.315	0.315	0.400	0.400	0.630	0.630	0.630	0.630
Magnesium alloys	Leghe di magnesio	3.5200 MgMn2, 3.5812.05 G-MgAl8Zn1, 3.5612.05 G-MgAl6Zn1	≤450	◍	150	0.160	0.200	0.200	0.315	0.315	0.400	0.400	0.500	0.500	0.630	0.630
Copper, low-alloyed	Rame legato in bassa percentuale	2.0070 SE-Cu, 2.1020 CuSn6, 2.1096 G-CuSn5ZnPb	≤400	○	80	0.125	0.160	0.160	0.200	0.250	0.315	0.315	0.400	0.400	0.500	0.500
Brass, short-chipping	Ottone, a truciolo corto	2.0380 CuZn39Pb2, 2.0401 CuZn39Pb3, 2.0410 CuZn43Pb2	≤600	○	120	0.160	0.200	0.200	0.250	0.315	0.400	0.400	0.500	0.500	0.630	0.630
long-chipping	a truciolo lungo	2.0250 CuZn20, 2.0280 CuZn33, 2.0332 CuZn37Pb0,5	≤600	○	120	0.125	0.160	0.160	0.200	0.250	0.315	0.315	0.400	0.400	0.500	0.500
Bronze, short-chipping	Bronzi, a truciolo corto	2.1090 CuSn7ZnPb, 2.1170 CuPb5Sn5, 2.1176 CuPb10Sn	≤600	○ ●	40	0.125	0.160	0.160	0.200	0.250	0.315	0.315	0.400	0.400	0.500	0.500
		2.0790 CuNi18Zn19Pb	>600-850	●		0.100	0.125	0.125	0.160	0.200	0.250	0.250	0.315	0.315	0.400	0.400
Bronze, long-chipping	Bronzi, a truciolo lungo	2.0916 CuAl5, 2.0960 CuAl9Mn, 2.1050 CuSn10	≤850	●	40	0.100	0.125	0.125	0.160	0.200	0.250	0.250	0.315	0.315	0.400	0.400
		2.0980 CuAl11Ni, 2.1247 CuBe2	>850-1000	●		0.100	0.125	0.125	0.160	0.200	0.250	0.250	0.315	0.315	0.400	0.400

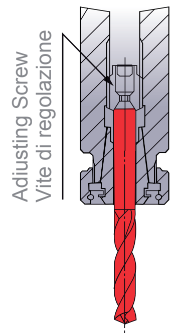
Coolant: ◍ Air ● Neat oil ○ Soluble oil   Cutting direction : R right-hand cutting   ◍ Aria ● Olio ○ Emulsione   Direzione di taglio: R destre

Material group		Material examples, new description (old description in brackets) Figures in bold = material no. to DIN EN	Tensile strength MPa (N/mm²) Hardness	Coolant	v_c m/min	Feed				Avanzamento			f (mm/rev.) f (mm/giro)			
	Materiali	Esempi di materiali, nuove designazioni (tra parentesi quelle precedenti) numeri in grassetto = numero materiale a DIN EN	Resistenza MPa (N/mm ²) Durezza	Refri-gerante	v_c m/min	Ø 3	Ø 4	Ø 5	Ø 6	Ø 8	Ø 10	Ø 12	Ø 14	Ø 16	Ø 18	Ø 20
Common structural steels	Acciai da costruzione in generale	1.0035 S185(St33), 1.0486 P275N(StE285), 1.0345 P235GH(H1), 1.0425 P265GH(H2)	≤500	○	90	0.125	0.160	0.160	0.200	0.250	0.315	0.315	0.400	0.400	0.500	0.500
		1.0050 E295 (St50-2), 1.0070 E360 (St70-2), 1.8937 P500NH (WStE500)	>500-850	○	80	0.100	0.125	0.125	0.160	0.200	0.250	0.250	0.315	0.315	0.400	0.400
Free-cutting steels	Acciai automatici	1.0718 11SMnPb30 (9SMnPb28), 1.0736 11SMn37 (9SMn36)	≤850	○	100	0.160	0.200	0.200	0.250	0.315	0.400	0.400	0.500	0.500	0.630	0.630
		1.0727 46S20 (45S20), 1.0728 (60S20), 1.0757 46SPb20 (45SPb20)	850-1000	○	90	0.160	0.200	0.200	0.250	0.315	0.400	0.400	0.500	0.500	0.630	0.630
Unalloyed heat-treatable steels	Acciai da bonifica non legati	1.0402 C22, 1.1178 C30E (Ck30)	≤ 700	○	90	0.160	0.200	0.200	0.250	0.315	0.400	0.400	0.500	0.500	0.630	0.630
		1.0503 C45, 1.1191 C45E (Ck45)	700-850	○	80	0.125	0.160	0.160	0.200	0.250	0.315	0.315	0.400	0.400	0.500	0.500
		1.0601 C60, 1.1221 C60E (Ck60)	850-1000	○	80	0.125	0.160	0.160	0.200	0.250	0.315	0.315	0.400	0.400	0.500	0.500
Alloyed heat-treatable steels	Acciai da bonifica legati	1.5131 50MnSi4, 1.7003 38Cr2, 1.7030 28Cr4	850-≤1000	○	80	0.125	0.160	0.160	0.200	0.250	0.315	0.315	0.400	0.400	0.500	0.500
		1.5710 36NiCr6, 1.7035 41Cr4, 1.7225 42CrMo4	1000-1200	○	60	0.125	0.160	0.160	0.200	0.250	0.315	0.315	0.400	0.400	0.500	0.500
Unalloyed case hardened steels	Acc.da cementazione non legati	1.0301 (C10), 1.1121 C10E (Ck10)	≤750	○	90	0.160	0.200	0.200	0.250	0.315	0.400	0.400	0.500	0.500	0.630	0.630
Alloyed case hardened steels	Acc.da cementazione legati	1.7043 38Cr4	850-≤1000	●	80	0.125	0.160	0.160	0.200	0.250	0.315	0.315	0.400	0.400	0.500	0.500
		1.5752 15NiCr13 (15NiCr13), 1.7131 16MnCr5, 1.7264 20CrMo5	1000-1200	●	60	0.100	0.100	0.100	0.125	0.160	0.200	0.200	0.250	0.250	0.315	0.315
Nitriding steels	Acciai nitrurati	1.8504 34CrAl6	≥850-≤1000	○	60	0.125	0.160	0.160	0.200	0.250	0.315	0.315	0.400	0.400	0.500	0.500
		1.8519 31CrMoV9, 1.8550 34CrAlNi7	>1000-1200	●	50	0.100	0.100	0.100	0.125	0.160	0.200	0.200	0.250	0.250	0.315	0.315
Tool steels	Acciai utensili	1.1750 C75W, 1.2067 102Cr6, 1.2307 29CrMoV9	≤850	○	50	0.100	0.125	0.125	0.160	0.200	0.250	0.250	0.315	0.315	0.400	0.400
		1.2080 X210Cr12, 1.2083 X42Cr13, 1.2419 105WCr6, 1.2767 X45NiCrMo4	>850-1000	●	40	0.100	0.100	0.100	0.125	0.160	0.200	0.200	0.250	0.250	0.315	0.315
High speed steels	Acciiai super rapidi	1.3243 S 6-5-2-5, 1.3343 S 6-5-2, 1.3344 S 6-5-3	≥650-1000	●	35	0.100	0.100	0.100	0.125	0.160	0.200	0.200	0.250	0.250	0.315	0.315
Spring steels	Acciai per molle	1.5026 55Si7, 1.7176 55Cr3, 1.8159 51CrV4 (51CrV4)	≤330 HB	●	35	0.050	0.063	0.063	0.080	0.100	0.125	0.125	0.160	0.160	0.200	0.200
Stainless steels, sulphured	Acciai inossidabili, allo zolfo	1.4005 X12CrS13, 1.4104 X14CrMoS17, 1.4105 X6CrMoS17, 1.4305 X8CrNiS18-9	≤850	●	40	0.100	0.100	0.100	0.125	0.160	0.200	0.200	0.250	0.250	0.315	0.315
austenitic	austenitici	1.4301 X5CrNi18-10 (V2A), 1.4541 X6CrNiTi18-10, 1.4571 X6CrNiMoTi 17-12-2 (V4A)	≤850	●	40	0.100	0.100	0.100	0.125	0.160	0.200	0.200	0.250	0.250	0.315	0.315
martensitic	martensitici	1.4057 X20CrNi 17 2 (X17CrNi16-2), 1.4122 X39CrMo17-1, 1.4521 X2CrMoTi18-2	≤850	●	40	0.100	0.100	0.100	0.125	0.160	0.200	0.200	0.250	0.250	0.315	0.315
Hardened steels	Acciai temprati	–	≤40-48 HRC	●		0.050	0.063	0.063	0.080	0.100	0.125	0.125	0.160	0.160	0.200	0.200
			>48-60 HRC	●		0.040	0.050	0.050	0.063	0.080	0.100	0.100	0.125	0.125	0.160	0.160
Special alloys	Leghe speciali	Nimonic, Inconel, Monel, Hastelloy	≤1200	●		0.063	0.080	0.080	0.100	0.125	0.160	0.160	0.200	0.200	0.250	0.250
Cast iron	Ghise	0.6010 EN-GJL-100(GG10), 0.6020 EN-GJL-200(GG20)	≤240 HB	○ ◍	120	0.160	0.200	0.200	0.315	0.315	0.400	0.400	0.630	0.630	0.630	0.630
		0.6025 EN-GJL-250(GG25), 0.6035 EN-GJL-350(GG35)	<300 HB	○ ◍	120	0.160	0.200	0.200	0.315	0.315	0.400	0.400	0.630	0.630	0.630	0.630
New cast materials CGI	Nuove ghise GGV	EN-GJV250 (GGV25) , EN-GJV350 (GGV35)	≤220 HB	○ ◍												
		EN-GJV400 (GGV40), EN-GJV500 (GGV50), SiMo 6	<300 HB	○ ◍												
New cast materials ADI	Nuove ghise ADI	EN-GJS-800-8 (ADI800), EN-GJS-1000-5 (ADI1000)	800-1000	○ ◍												
		EN-GJS-1200-2 (ADI1200), EN-GJS-1400-1 (ADI1400)	1200-1400	○ ◍												
Spheroidal graphite iron and malleable cast iron	Ghise sferoidali, ghise temprate	0.7050 EN-GJS-500-7(GGG50), 0.8035 EN-GJMW-350-4(GTW35)	≤240 HB	○	90	0.160	0.200	0.200	0.315	0.315	0.400	0.400	0.630	0.630	0.630	0.630
		0.7070 EN-GJS-700-2(GGG70), 0.8170 EN-GJMB-700-2(GTS70)	<300 HB	○	80	0.160	0.200	0.200	0.250	0.315	0.400	0.400	0.500	0.500	0.630	0.630
Chilled cast iron	Ghisa in conchiglia	–	≤350 HB	○		0.050	0.063	0.063	0.080	0.100	0.125	0.125	0.160	0.160	0.200	0.200
Ti and Ti-alloys	Titanio e leghe di titanio	3.7024 Ti99,5, 3.7114 TiAl5Sn2,5, 3.7124 TiCu2	≤850	●		0.063	0.080	0.080	0.100	0.125	0.160	0.160	0.200	0.200	0.250	0.250
		3.7154 TiAl6Zr5, 3.7165 TiAl6V4, 3.7184 TiAl4Mo4Sn2,5, -TiAl8Mo1V1	>850-1200	●		0.050	0.063	0.063	0.080	0.100	0.125	0.125	0.160	0.160	0.200	0.200
Aluminium and Al-alloys	Alluminio e leghe di alu	3.0255 Al99,5, 3.2315 AlMgSi1, 3.3515 AlMg1	≤400	○	150	0.160	0.200	0.200	0.315	0.315	0.400	0.400	0.630	0.630	0.630	0.630
Al wrought alloys	Leghe di alu per lav. plastiche	3.0615 AlMgSiPb, 3.1325 AlCuMg1, 3.3245 AlMg3Si, 3.4365 AlZnMgCu1,5	≤450	○	150	0.160	0.200	0.200	0.315	0.315	0.400	0.400	0.630	0.630	0.630	0.630
Al cast alloys ≤ 10 % Si	Leghe alu-ghisa ≤ 10% Si	3.2131 G-AlSi5Cu1, 3.2153 G-AlSi7Cu3, 3.2573 G-AlSi9	≤600	○	150	0.160	0.200	0.200	0.315	0.315	0.400	0.400	0.630	0.630	0.630	0.630
> 10 % Si	> 10% Si	3.2581 G-AlSi12, 3.2583 G-AlSi12Cu, - G-AlSi12CuNiMg	≤600	○	120	0.160	0.200	0.200	0.315	0.315	0.400	0.400	0.630	0.630	0.630	0.630
Magnesium alloys	Leghe di magnesio	3.5200 MgMn2, 3.5812.05 G-MgAl8Zn1, 3.5612.05 G-MgAl6Zn1	≤450	◍	150	0.160	0.200	0.200	0.315	0.315	0.400	0.400	0.500	0.500	0.630	0.630
Copper, low-alloyed	Rame legato in bassa percentuale	2.0070 SE-Cu, 2.1020 CuSn6, 2.1096 G-CuSn5ZnPb	≤400	○	80	0.125	0.160	0.160	0.200	0.250	0.315	0.315	0.400	0.400	0.500	0.500
Brass, short-chipping	Ottone, a truciolo corto	2.0380 CuZn39Pb2, 2.0401 CuZn39Pb3, 2.0410 CuZn43Pb2	≤600	○	120	0.160	0.200	0.200	0.250	0.315	0.400	0.400	0.500	0.500	0.630	0.630
long-chipping	a truciolo lungo	2.0250 CuZn20, 2.0280 CuZn33, 2.0332 CuZn37Pb0,5	≤600	○	120	0.125	0.160	0.160	0.200	0.250	0.315	0.315	0.400	0.400	0.500	0.500
Bronze, short-chipping	Bronzi, a truciolo corto	2.1090 CuSn7ZnPb, 2.1170 CuPb5Sn5, 2.1176 CuPb10Sn	≤600	○ ●	40	0.125	0.160	0.160	0.200	0.250	0.315	0.315	0.400	0.400	0.500	0.500
		2.0790 CuNi18Zn19Pb	>600-850	●		0.100	0.125	0.125	0.160	0.200	0.250	0.250	0.315	0.315	0.400	0.400
Bronze, long-chipping	Bronzi, a truciolo lungo	2.0916 CuAl5, 2.0960 CuAl9Mn, 2.1050 CuSn10	≤850	●	40	0.100	0.125	0.125	0.160	0.200	0.250	0.250	0.315	0.315	0.400	0.400
		2.0980 CuAl11Ni, 2.1247 CuBe2	>850-1000	●		0.100	0.125	0.125	0.160	0.200	0.250	0.250	0.315	0.315	0.400	0.400

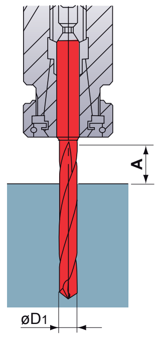
OPERATIONAL GUIDANCE
GUIDA OPERATIVA

DRILL HOLDING
MANDRINO DI TENUTA

Thrust bearing type collet chuck holds the drill securely
La vite di regolazione del mandrino blocca la punta in modo sicuro



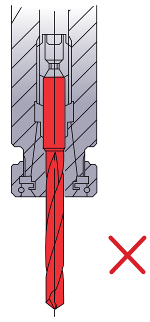
DRILL LENGTH
LUNGHEZZA PUNTA



A > D1 x 2

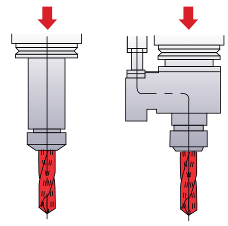
DRILL INSTALLATION
MONTAGGIO PUNTA

Do not clamp on the flutes
Non bloccare la punta sull'elica



THROUGH COOLANT TYPE
TIPO PASSAGGIO REFRIGERANTE

Spindles Through Coolant Type Mandrino con refrigerante interno	RevolvingCoolant Machine Type Mandrino rotante con refrigerante interno



Recommebded coolant pressure: 40 BAR

La pressione del refrigerante è di circa 40 BAR

RECOMMENDATIONS
CONSIGLI

For safety reasons it is very important, that a drill does not exceed a speed of n = 6,000 rev./min when unsupported. The centrifugal forces can break these long tools before reaching the workpiece surface!

Molto importante è che,per motivi di sicurezza, nessuna punta possa girare libera, con numero di giri superiore a n = 6.000 giri/min.
In caso contrario, le forze centrifughe potrebbero causare la rottura del lungo utensile prima ancora che esso entri in contatto con la superficie da lavorare.

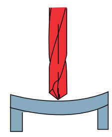
Application recommendations for 8xD, 10xD and 12xD drills: Pilot holes are necessary for extra length SL drills ≥7xD:
1.) the pilot hole can be produced with a short, rigid drill. The diameter should be 0.01 - 0.02 mm larger than the diameter of the SL drill, the drilling depth > 1 x D.

Consigli per l'impiego per punte elicoidali 8xD, 10xD e 12xD: Perprofondità di foro superiori a 7 x D è necessario un foro pilota:
1. Il foro pilota può essere prodotto con una punta corta, rigida, il cui diametro sia di 0,01-0,02 mm superiore al diametro della punta. Profondità del foro pilota > 1 x D.

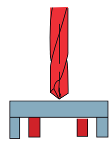
2.) alternatively SL drills can produce their own pilot hole. Cutting speed and feed rate should be reduced by 30-40%. The recommended minimum coolant pressure is 40 bar.

2. In alternativa, la stessa punta può produrre il foro pilota. In questo caso bisogna ridurre del 30%-40% sia velocità di taglio che avanzamento.
La pressione minima del refrigerante consigliata è di 40 bar.

THIN WORKPIECE
PEZZI SOTTILI

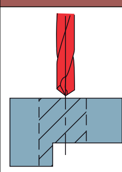


If Bending Occurs
Se tende a flettere
×



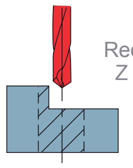
Support the Workpiece
Supporti per il pezzo
○

INTERRUPTED CUTTING
TAGLIO INTERROTTO



One process
Z Lower the feed when drilling the interruted part.

Processo
Z Ridurre l'avanzamento quando si fora sulla parte con taglio interroto.



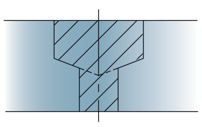
Requires prior machining
Z Spot face with an end mill prior to drilling.

Richiede una precedente lavorazione
Z Praticare un impronta piana con fresa prima della foratura.

STEPPED HOLES
FORATURA A GRADINO

Z Divide the machining into two processes.
X Drill the larger hole first.
* Tools for chamfering and spot faging can be produced to order.

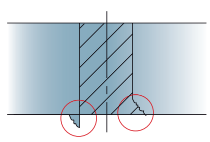
Z Dividere la lavorazione in due processi.
X Praticare prima il foro più grande.
* La punta che realizza i due diametri comtemporaneamente, può essere fatta a disegno.



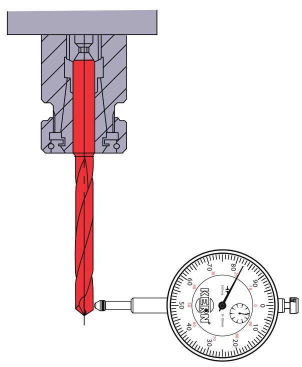
BURRING AND WORKPIECE CHIPPING
BAVE E SCHEGGIATURE SUL PEZZO

Z Lower the feed rate when breaking through, add a chamfer.
X Change the point angle.

Z Ridurre la velocità di avanzamento prima dell' uscita della punta dal foro.
X Variare l'angolo della punta.

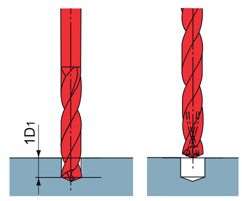


INSTALLATION TOLERANCE
TOLLERANZA DI LAVORAZIONE



Runout < 0.025

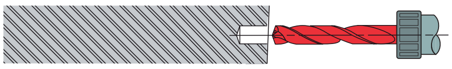
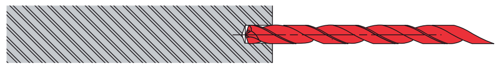
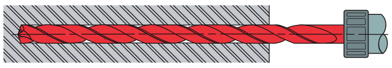
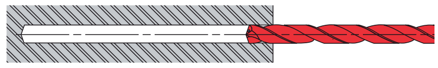
DRILL HOLE
FORO PUNTA



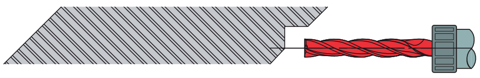
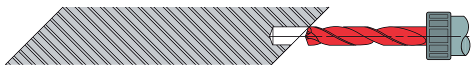
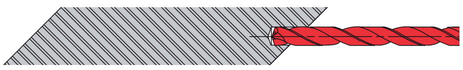
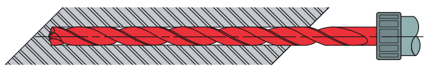
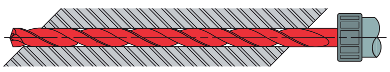
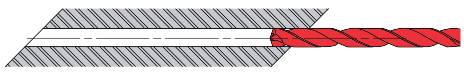
1) For pilot hole drilling, 1D1.
2) Use the prepared hole as a guide when using a drill with an oil hole.

1) Realizzare un foro pilota di circa 1D1 (D1: diametro punta) usando una punta più corta.
2) Usare il foro pilota come guida per la punta lunga.

Flat Face Drilling a Drilling a blind hole
Foratura per superfice piana e foratura di un foro cieco

1. Drilling a pilot hole	2. Initial cutting with the long type drill
1. Foratura di un foro pilota	2. Taglio iniziale con punta di tipo lungo
 z Use the SB type drill. x Ensure a high precision hole is drilled for the guide. c Drill depth : Approx 1D. z Utilizzare una punta con un angolo tra i taglienti maggiore (più piatta) rispetto al tipo più lungo. Usare l'elica più corta possibile. x Assicurarsi che la punta esegua un foro guida ad elevata precisione. c Profondità di foratura: circa 1D o superiore. (Regolare la profondità del foro pilota in base alla lunghezza del tipo più lungo.)	 z Penetrate the pilot hole at a low revolution. (Revolution speed 1000min^{-1}, feed rate 0.2−0.3mm/rev) x Stop the long type drill 0.5−1.0mm short of the pilot hole bottom. z Inserire la punta lunga nel foro pilota ad un numero di giri ridotto. Giri 1000min^{-1}, avanzamento 0.2mm−0.3mm/giro. x Fermare la punta lunga a 0.5mm–1mm dal fondo del foro pilota.
3. Drill the deep hole	4. Drill retraction
3. Foratura in profondità	4. Arretramento della punta
 z Start cutting at the recommended speed and feed with a non-peck (continuous feed) cycle. z Iniziare il taglio alla velocità consigliata e ava avanzamento continuo.	 z After drilling, lower the cutting revolution about 0.5−1.0mm short of the hole end. (Revolution speed of around 1000min^{-1}) x Retract the drill to the pilot hole depth starting point at a feed rate of 3000mm/min. c Finally clear the hole at a cutting speed of 20−30m/min and feed rate of 0.2−0.3mm/rev. z Dopo aver praticato la foratura, ridurre il numero di giri del tagliente fino a circa 0.5mm-1mm dalla fine del foro. (Giri di circa 1000 min^{-1}) x Arretrare la punta fino al punto di inizio del foro a una velocità di avanzamento pari a 3000mm/min. c Infine, liberare il foro a una velocità di taglio pari a 20m-30m/min e una velocità di avanzamento pari a 0.2mm-0.3mm/giro.

Interruped Drilling a Drilling and breaking through on irrgular faces or angles
Foratura interotta a foratura passante con interuzzione o su superfici irregolari con piani inclinati.

1. Spot facing	2. Drilling a pilot hole
1. Spianatura	2. Foratura di·un foro pilota
 z Machine a flat on the irregular face by using an end mill or slot drill capable of spot facing. Make the spot face diameter the same size as the required deep hole diameter. z Eseguire una superficie piana utilizzando una fresa frontale o una fresa per cave in grado di spianare. Realizzare il diametro della spianatura della stessa dimensione del diametro del foro profondo richiesto.	 z Use a drill with a larger (flatter) point angle than the long type. The MWS-SB type is recommended. x Ensure a high precision hole is drilled for the guide. c Drill depth : Approx 1D. z Utilizzare una punta con un angolo tra i taglienti maggiore (più piatta) rispetto al tipo più lungo. Usare l'elica più corta possibile. x Assicurare che la guida pratichi un foro a elevata precisione. c Profondità di foratura: circa 1D o superiore. (Regolare la profondità del foro pilota in base alla lunghezza del tipo più lungo.)
3. Initial cutting with the long type drill	4. Drill the deep hole
3. Taglio iniziale con punta di tipo lungo	4. Foratura in profondità
 z Penetrate the pilot hole at a low revolution. (Revolution speed 1000min^{-1}, feed rate 0.2−0.3mm/rev) x Stop the long type drill 0.5−1.0mm short of the pilot hole bottom. z Inserire la punta lunga nel foro pilota ad un numero di giri ridotto. Giri 1000min^{-1}, avanzamento 0.2mm−0.3mm/giro. x −1mm dal fondo del foro pilota.	 z Start cutting at the recommended speed and feed with a non-peck (continuous feed) cycle. z Iniziare il taglio alla velocità consigliata e avanzare con un ciclo ad avanzamento continuo.
5. Breaking through	6. Drill retraction
5. Sfondamento	6. Ritrazione della punta
 z When breaking through, the cutting edge can be damaged. x Feed rate should be half the normal feed. z Il tagliente potrebbe essere danneggiato in fase di sfondamento. x Ridurre la velocità di avanzamento al momento dell' uscita dell' utensile sull' inclinato.	 z Retract the drill to the pilot hole depth starting point at a feed rate of 3000mm/min. x Finally clear the hole at a revolution speed of 1000min^{-1} and feed rate of 0.2−0.3mm/rev. z Infine, liberare il foro a una velocità di taglio pari a 20m-30m/min e una velocità di avanzamento pari a 0.2mm-0.3mm/giro. x Ritrarre la punta dal punto di inizio del foro a una velocità di avanzamento pari a 3000mm/min.

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The information and technical characteristics can be subject to variations without prior notice. The technical data contained herein are to be considered, errors and omissions excepted. Images and texts can therefore be subject to variations compared to what is present on the catalogue.

Safe use of cutting tools

- ●Use safety cover, safety glasses and safety shoes during operation.
- ●Do not touch cutting edges with bare hands.
- ●Do not touch cutting chips with bare hands. Chips will be hot after cutting.
- ●Stop cutting when the tool becomes dull.
- ●Stop cutting operation immediately if you hear any strange cutting sounds.
- ●Do not modify tools.
- ●Please use correct tools for the operation.Check dimensions to ensure proper selection.

安全にお使いいただくために

- ●工具を使用する時は、破損する危険があるので、必ずカバー・保護メガネ・安全靴等を使用してください。
- ●切れ刃は素手でさわらないで下さい。
- ●切りくずは素手でさわらないで下さい。
- ●工具の切れ味が悪くなったら使用を中止して下さい。
- ●異常音・異常振動が発生したら、直ちに使用を中止して下さい。
- ●工具には手を加えないで下さい。
- ●加工前に工具の寸法確認を行って下さい。

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