

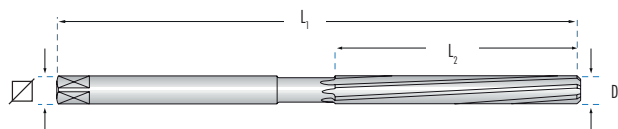
**BLUE-MASTER®**  
by *celesa*



REAMERS

**HSS HAND REAMERS DIN 206B**

Ref. EM1

**DIN**  
**206B**
**HSS**
**TOL**  
**H7**


EM1					EM1					EM1					EM1				
D1 mm	L1 mm	L2 mm	∠	€	D1 mm	L1 mm	L2 mm	∠	€	D1 mm	L1 mm	L2 mm	∠	€	D1 mm	L1 mm	L2 mm	∠	€
1,00	34	13	-	<b>56,39</b>	7,00	107	54	5,60	<b>25,61</b>	16,50	175	87	12,50	<b>110,80</b>	32,50	265	133	25,00	<b>393,17</b>
1,50	41	20	1,12	<b>34,12</b>	9/32"	107	54	5,60	<b>47,86</b>	17,00	175	87	12,50	<b>93,56</b>	33,00	265	133	25,00	<b>330,38</b>
1,60	44	21	1,25	<b>34,12</b>	7,25	107	54	5,60	<b>44,77</b>	17,50	188	93	14,00	<b>123,67</b>	33,50	265	133	25,00	<b>412,32</b>
1,70	44	21	1,25	<b>34,12</b>	7,50	107	54	5,60	<b>27,08</b>	18,00	188	93	14,00	<b>112,18</b>	34,00	284	142	28,00	<b>335,86</b>
2,00	50	25	1,60	<b>24,53</b>	7,75	115	58	6,30	<b>44,77</b>	18,50	188	93	14,00	<b>132,82</b>	34,50	284	142	28,00	<b>425,53</b>
2,10	50	25	1,60	<b>32,54</b>	5/16"	115	58	6,30	<b>44,57</b>	19,00	188	93	14,00	<b>114,11</b>	35,00	284	142	28,00	<b>340,95</b>
2,20	54	27	1,80	<b>32,54</b>	8,00	115	58	6,30	<b>27,08</b>	3/4"	201	100	16,00	<b>151,93</b>	35,50	284	142	28,00	<b>465,05</b>
2,25	54	27	1,80	<b>31,03</b>	8,25	115	58	6,30	<b>47,00</b>	19,50	201	100	16,00	<b>143,71</b>	36,00	284	142	28,00	<b>357,09</b>
2,30	54	27	1,80	<b>32,54</b>	8,50	115	58	6,30	<b>28,45</b>	20,00	201	100	16,00	<b>121,35</b>	36,50	284	142	28,00	<b>502,87</b>
2,40	58	29	2,00	<b>32,54</b>	8,75	124	62	7,10	<b>47,00</b>	20,50	201	100	16,00	<b>175,41</b>	37,00	284	142	28,00	<b>413,96</b>
2,50	58	29	2,00	<b>24,53</b>	9,00	124	62	7,10	<b>31,24</b>	13/16"	201	100	16,00	<b>149,15</b>	37,50	284	142	28,00	<b>539,21</b>
2,60	58	29	2,00	<b>32,54</b>	9,25	124	62	7,10	<b>49,04</b>	21,00	201	100	16,00	<b>126,67</b>	38,00	305	152	31,50	<b>414,01</b>
2,70	62	31	2,25	<b>32,54</b>	9,50	124	62	7,10	<b>38,25</b>	21,50	215	107	18,00	<b>189,64</b>	38,50	305	152	31,50	<b>539,21</b>
2,75	62	31	2,25	<b>31,03</b>	3/8"	133	66	8,00	<b>50,35</b>	22,00	215	107	18,00	<b>131,16</b>	39,00	305	152	31,50	<b>414,01</b>
2,80	62	31	2,25	<b>32,54</b>	9,75	133	66	8,00	<b>49,04</b>	7/8"	215	107	18,00	<b>212,68</b>	39,50	305	152	31,50	<b>539,21</b>
2,90	62	31	2,25	<b>32,54</b>	10,00	133	66	8,00	<b>32,28</b>	22,50	215	107	18,00	<b>203,42</b>	40,00	305	152	31,50	<b>414,01</b>
3,00	62	31	2,25	<b>24,53</b>	10,25	133	66	8,00	<b>63,85</b>	23,00	215	107	18,00	<b>136,89</b>	40,50	305	152	31,50	<b>621,59</b>
1/8	66	33	2,50	<b>36,68</b>	10,50	133	66	8,00	<b>42,79</b>	23,50	215	107	18,00	<b>233,90</b>	41,00	305	152	31,50	<b>498,92</b>
3,25	66	33	2,50	<b>36,00</b>	10,75	142	71	9,00	<b>63,85</b>	24,00	231	115	20,00	<b>151,62</b>	41,50	305	152	31,50	<b>678,06</b>
3,50	71	35	2,80	<b>25,72</b>	11,00	142	71	9,00	<b>36,40</b>	24,50	231	115	20,00	<b>257,73</b>	42,00	305	152	31,50	<b>498,92</b>
3,75	71	35	2,80	<b>36,00</b>	7/16"	142	71	9,00	<b>68,55</b>	25,00	231	115	20,00	<b>160,84</b>	42,50	305	152	31,50	<b>702,60</b>
5/32"	76	38	3,15	<b>38,40</b>	11,25	142	71	9,00	<b>68,70</b>	1"	231	115	20,00	<b>222,84</b>	43,00	326	163	35,50	<b>596,53</b>
4,00	76	38	3,15	<b>24,53</b>	11,50	142	71	9,00	<b>48,07</b>	25,50	231	155	20,00	<b>281,53</b>	43,50	326	163	35,50	<b>857,20</b>
4,25	76	38	3,15	<b>37,67</b>	11,75	142	71	9,00	<b>68,70</b>	26,00	231	115	20,00	<b>175,51</b>	44,00	326	163	35,50	<b>596,53</b>
4,50	81	41	3,55	<b>25,61</b>	12,00	152	76	10,00	<b>47,82</b>	26,50	231	115	20,00	<b>303,75</b>	44,50	326	163	35,50	<b>857,50</b>
4,75	81	41	3,55	<b>37,67</b>	12,50	152	76	10,00	<b>61,20</b>	27,00	247	124	22,40	<b>191,05</b>	45,00	326	163	35,50	<b>630,95</b>
3/16"	87	44	4,00	<b>38,70</b>	1/2"	152	76	10,00	<b>108,60</b>	27,50	247	124	22,40	<b>311,05</b>	45,50	326	163	35,50	<b>918,05</b>
5,00	87	44	4,00	<b>25,61</b>	13,00	152	76	10,00	<b>61,20</b>	28,00	247	124	22,40	<b>197,33</b>	46,00	326	163	35,50	<b>708,57</b>
5,25	87	44	4,00	<b>37,67</b>	13,50	163	81	11,20	<b>65,89</b>	28,50	247	124	22,40	<b>327,07</b>	46,50	326	163	35,50	<b>1.008,47</b>
5,50	93	47	4,50	<b>25,61</b>	14,00	163	81	11,20	<b>65,34</b>	29,00	247	124	22,40	<b>305,66</b>	47,00	326	163	35,50	<b>774,30</b>
5,75	93	47	4,50	<b>37,67</b>	9/16"	163	81	11,20	<b>114,70</b>	29,50	247	124	22,40	<b>363,13</b>	47,50	326	163	35,50	<b>1.234,47</b>
6,00	93	47	4,50	<b>25,61</b>	14,50	163	81	11,20	<b>84,49</b>	30,00	247	124	22,40	<b>261,81</b>	48,00	347	174	40,00	<b>846,12</b>
6,25	100	50	5,00	<b>37,67</b>	15,00	163	81	11,20	<b>71,37</b>	30,50	265	133	25,00	<b>404,66</b>	48,50	347	174	40,00	<b>1.080,95</b>
1/4"	100	50	5,00	<b>37,68</b>	15,50	175	87	12,50	<b>91,95</b>	31,00	265	133	25,00	<b>310,69</b>	49,00	347	174	40,00	<b>863,04</b>
6,50	100	50	5,00	<b>25,61</b>	5/8"	175	87	12,50	<b>129,12</b>	31,50	265	133	25,00	<b>437,52</b>	49,50	347	174	40,00	<b>1.124,04</b>
6,75	107	54	5,60	<b>37,67</b>	16,00	175	87	12,50	<b>77,63</b>	32,00	265	133	25,00	<b>315,02</b>	50,00	347	174	40,00	<b>936,25</b>

**DECIMAL HAND REAMERS**

EM1	
D1 mm	€
3,10 - 3,90	<b>36,00</b>
4,10 - 6,90	<b>37,67</b>
7,10 - 7,90	<b>44,77</b>
8,10 - 8,90	<b>47,00</b>
9,10 - 9,90	<b>49,04</b>
10,10 - 10,90	<b>63,85</b>
11,10 - 11,90	<b>68,70</b>
12,10 - 12,90	<b>108,60</b>

**H7 TOLERANCE (in μ m)**

1-3	3-6	6-10	10-18	18-30	30-50	50-80	80-120	120-180
+8	+10	+12	+15	+17	+21	+25	+29	+34
+4	+5	+6	+8	+9	+12	+14	+16	+20

**FINE TOLERANCE (en μ m)**

1,00-6	6,01-12
+4	+5
+0	+0



Centesimal precision reamers available on request

**HSS PARIS TYPE HAND REAMERS**

Ref. EMA

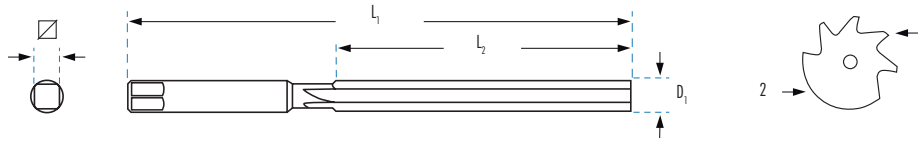
**NFE  
74112**

**HSS**

**TOL  
K7**



1.- Straight teeth  
2.- Support side



EMA					
	D1 mm	L1 mm	L2 mm	∠	€
EMA0300	3,00	85	50	2,24	44,11 *
EMA0400	4,00	100	60	3,15	44,11 *
EMA0500	5,00	112	67	4,00	45,38 *
EMA0600	6,00	118	71	4,50	45,38 *
EMA0700	7,00	132	80	5,60	45,38 *
EMA0800	8,00	140	85	6,30	49,91 *
EMA0900	9,00	150	90	7,10	56,86 *
EMA1000	10,00	160	95	8,00	56,86 *
EMA1100	11,00	170	100	9,00	65,86 *
EMA1200	12,00	180	106	10,00	65,86 *
EMA1300	13,00	180	106	10,00	73,49 *
EMA1400	14,00	190	112	11,20	73,49 *
EMA1500	15,00	190	112	11,20	88,73 *
EMA1600	16,00	200	118	12,50	88,73 *
EMA1700	17,00	200	118	12,50	101,22 *

EMA					
	D1 mm	L1 mm	L2 mm	∠	€
EMA1800	18,00	212	125	14,00	101,22 *
EMA1900	19,00	212	125	14,00	117,86 *
EMA2000	20,00	224	132	16,00	117,86 *
EMA2100	21,00	224	132	16,00	135,88 *
EMA2200	22,00	236	140	18,00	135,88 *
EMA2300	23,00	236	140	18,00	158,83 *
EMA2400	24,00	250	150	20,00	174,71 *
EMA2500	25,00	250	150	20,00	174,71 *
EMA2600	26,00	250	150	20,00	195,38 *
EMA2700	27,00	265	160	22,40	195,38 *
EMA2800	28,00	265	160	22,40	214,92 *
EMA2900	29,00	265	160	22,40	242,65 *
EMA3000	30,00	265	160	22,40	242,65 *
EMA3200	32,00	280	170	25,00	275,93 *
EMA3400	34,00	300	180	28,00	331,54 *

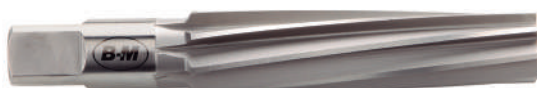
\* Till end of stock

**HAND REAMER FOR MORSE TAPER SHANK**

Ref. ECM

**DIN  
204D**

**HSS**



**PRIOR NPT THREADING HAND REAMER**

Ref. EMNPT

**1:16**

**HSS**

**NPT**



ECM					
	MT	∅ mm min. x max.	L1 mm	L2 mm	€
ECM0	0	6,547 - 9,722	93	61	86,86
ECM1	1	9,571 - 12,863	102	66	88,85
ECM2	2	14,733 - 18,679	121	79	122,57
ECM3	3	20,010 - 24,829	146	96	193,19
ECM4	4	26,229 - 32,410	179	119	332,00
ECM5	5	37,873 - 45,767	222	150	702,17

EMNPT						
	NPT Thread	∅ mm min. x max.	L1 mm	L2 mm	€	
EMNPT1/16	NPT1/16	6,20	5,915 - 6,978	70	17	145,62
EMNPT1/8	NPT1/8	8,50	8,022 - 9,085	70	17	148,64
EMNPT1/4	NPT1/4	11,00	10,283 - 11,971	80	27	160,64
EMNPT3/8	NPT3/8	14,50	13,703 - 15,391	85	27	180,29
EMNPT1/2	NPT1/2	17,80	16,913 - 19,101	95	35	212,03

**HSS HAND TAPER PIN REAMERS DIN 9B**

Reamers

Pink

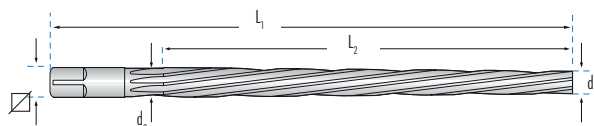
Ref. EM2

TOL  
H9DIN  
9B

HSS

2%  
1:50

FOR TAPER PINS DIN 1



Sizes Ø 1-1,20-1,50-2 and 2,50  
are manufactured with straight flutes

	D mm	Ø mm d1 x d2	L1 mm	L2 mm	∠	EM2 €
EM20100	1,00	0,95 x 1,46	46	28	2,50	81,01
EM20120	1,20	1,15 x 1,74	50	32	2,50	81,01
EM20150	1,50	1,40 x 2,14	57	37	2,50	61,40
EM20200	2,00	1,90 x 2,86	68	48	2,50	44,56
EM20250	2,50	2,40 x 3,36	68	48	2,50	53,24
EM20300	3,00	2,90 x 4,06	80	58	3,15	42,47
EM20350	3,50	3,40 x 4,66	87	63	3,15	65,67
EM20400	4,00	3,90 x 5,26	93	68	4,00	43,31
EM20450	4,50	4,40 x 5,80	95	70	4,00	61,21
EM20500	5,00	4,90 x 6,36	100	73	5,00	41,25
EM20550	5,50	5,40 x 7,20	118	90	5,00	58,26
EM20600	6,00	5,90 x 8,00	135	105	6,30	50,15
EM20650	6,50	6,40 x 8,60	140	110	6,30	71,58
EM20700	7,00	6,90 x 9,40	160	125	6,30	60,98
EM20800	8,00	7,90 x 10,80	180	145	8,00	80,61
EM21000	10,00	9,90 x 13,40	215	175	10,00	91,40
EM21200	12,00	11,80 x 16,00	255	210	11,20	117,78
EM21300	13,00	12,80 x 17,00	255	210	11,20	128,39
EM21400	14,00	13,80 x 18,00	255	210	11,20	175,34
EM21600	16,00	15,80 x 20,40	280	230	14,00	177,64
EM22000	20,00	19,80 x 24,80	310	250	18,00	254,50
EM22500	25,00	24,70 x 30,70	370	300	22,40	397,43
EM23000	30,00	29,70 x 36,10	400	320	25,00	865,50
EM24000	40,00	39,70 x 46,50	430	340	31,50	1.426,55
EM25000	50,00	49,70 x 56,90	460	360	40,00	2.229,48

**HSSCo CHUCKING TAPER PIN REAMERS**

Ref. EM29

TOL  
H9DIN  
2179E

HSSCo

2%  
1:50

FOR TAPER PINS DIN1



	D1 mm	D2 mm	Ø mm min. x max.	L1 mm	L2 mm	EM29 €
EM290150	1,50	2,00	1,40 - 2,14	70	37	71,73
EM290200	2,00	3,00	1,90 - 2,86	68	48	73,17
EM290250	2,50	3,00	2,40 - 3,35	86	48	81,42
EM290300	3,00	4,00	2,90 - 4,06	100	58	65,50
EM290400	4,00	5,00	3,90 - 5,26	112	68	63,04
EM290500	5,00	6,50	4,90 - 6,36	122	73	58,99
EM290600	6,00	8,00	5,90 - 8,00	160	105	56,60
EM290700	7,00	9,00	6,90 - 9,40	160	125	90,40
EM290800	8,00	10,00	7,90 - 10,80	207	145	104,27
EM291000	10,00	12,50	9,90 - 13,40	245	175	141,76
EM291200	12,00	16,00	11,80 - 16,00	290	210	214,99


**HSSCo MACHINE CHUCKING REAMERS**

Ref. EM3

**DIN  
212B**

**HSSCo**



EM3				
MATERIAL				HSSCo
NORM				DIN 212B
TOLERANCE				TOL H7
HELIX ANGLE				 8°
D1 mm	L1 mm	L2 mm	D2 mm	€
1,00	34	7	1,00	61,07
1,20	34	7	1,20	54,27
1,40	40	8	1,40	50,46
1,50	40	8	1,50	33,01
1,60	43	9	1,60	33,26
1,70	43	9	1,70	32,98
1,80	46	10	1,80	31,14
1,90	46	10	1,90	31,14
2,00	49	11	2,00	23,55
2,10	49	11	2,10	26,31
2,20	53	12	2,20	26,31
2,30	53	12	2,30	26,31
2,40	57	14	2,40	26,31
2,50	57	14	2,50	23,96
2,60	57	14	2,60	26,31
2,70	61	15	2,70	26,31
2,80	61	15	2,80	26,31
2,90	61	15	2,90	26,31
3,00	61	15	3,00	23,55
3,10	65	16	3,10	31,81
3,20	65	16	3,20	31,81
3,30	65	16	3,30	31,81
3,40	70	18	3,40	31,81
3,50	70	18	3,50	23,92
3,60	70	18	3,60	31,81
3,70	70	18	3,70	31,81
3,80	75	19	4,00	31,81
3,90	75	19	4,00	31,81
4,00	75	19	4,00	23,92
4,10	75	19	4,00	31,81

EM3				
D1 mm	L1 mm	L2 mm	D2 mm	€
4,20	75	19	4,00	31,81
4,30	80	21	4,50	31,81
4,40	80	21	4,50	31,81
4,50	80	21	4,50	23,92
4,60	80	21	4,50	31,81
4,70	80	21	4,50	31,81
4,80	86	23	5,00	31,81
4,90	86	23	5,00	31,81
5,00	86	23	5,00	23,92
5,10	86	23	5,00	34,17
5,20	86	23	5,00	34,17
5,30	86	23	5,00	34,17
5,40	93	26	5,60	34,17
5,50	93	26	5,60	23,92
5,60	93	26	5,60	36,74
5,70	93	26	5,60	36,74
5,80	93	26	5,60	36,74
5,90	93	26	5,60	36,74
6,00	93	26	5,60	26,21
6,10	101	28	6,30	37,44
6,20	101	28	6,30	37,44
6,30	101	28	6,30	37,44
6,40	101	28	6,30	37,44
6,50	101	28	6,30	30,77
6,60	101	28	6,30	37,44
6,70	101	28	6,30	37,44
6,80	109	31	7,10	37,44
6,90	109	31	7,10	37,44
7,00	109	31	7,10	29,88
7,10	109	31	7,10	40,23
7,20	109	31	7,10	40,23
7,30	109	31	7,10	40,23
7,40	109	31	7,10	40,23
7,50	109	31	7,10	31,73
7,60	117	33	8,00	40,52
7,70	117	33	8,00	40,52
7,80	117	33	8,00	40,52
7,90	117	33	8,00	40,52
8,00	117	33	8,00	30,75

EM3				
D1 mm	L1 mm	L2 mm	D2 mm	€
8,10	117	33	8,00	45,19
8,20	117	33	8,00	45,19
8,30	117	33	8,00	45,19
8,40	117	33	8,00	45,19
8,50	117	33	8,00	33,08
8,60	117	33	9,00	49,79
8,70	125	36	9,00	49,79
8,80	125	36	9,00	49,79
8,90	125	36	9,00	49,79
9,00	125	36	9,00	35,01
9,10	125	36	9,00	49,79
9,20	125	36	9,00	49,79
9,30	125	36	9,00	49,79
9,40	125	36	9,00	49,79
9,50	125	36	9,00	41,58
9,60	125	36	10,00	50,09
9,70	133	38	10,00	50,09
9,80	133	38	10,00	50,09
9,90	133	38	10,00	50,09
10,00	133	38	10,00	35,42
10,50	133	38	10,00	61,49
11,00	142	41	10,00	41,87
11,50	142	41	10,00	81,57
12,00	151	44	10,00	42,80
12,50	151	44	10,00	83,58
13,00	151	44	10,00	70,32
13,50	151	44	12,50	113,60
14,00	160	47	12,50	71,99
15,00	160	47	12,50	73,42
16,00	162	50	12,50	78,62
17,00	170	52	14,00	90,66
18,00	175	54	14,00	94,53
19,00	182	56	16,00	100,43
20,00	189	58	16,00	101,16
21,00	195	60	18,00	147,48
22,00	225	60	18,00	148,86
23,00	230	60	18,00	161,91
24,00	240	60	20,00	182,71
25,00	245	60	20,00	207,05

**CENTESIMAL CHUCKING REAMERS**

EM3	
D1 mm	€
2,37 - 2,65	58,38
2,66 - 3,35	54,05
3,36 - 4,25	60,68
4,26 - 5,30	60,68
5,31 - 5,95	60,78
5,96 - 6,70	61,36
6,71 - 7,29	67,58
7,30 - 8,50	75,99
8,51 - 9,25	85,76
9,26 - 10,60	97,90
10,61 - 11,25	110,58
11,26 - 12,02	113,51
12,03 - 13,02	156,12
13,03 - 14,02	189,86
14,03 - 15,02	231,47
15,03 - 16,02	247,80

**EXTRA-FINE TOLERANCE (µm)**

1,00-6	6,01-12
+4	+5
+0	+0

**MACHINE CHUCKING REAMERS**
**HSSCo LONG SERIES**


Ref. EM44

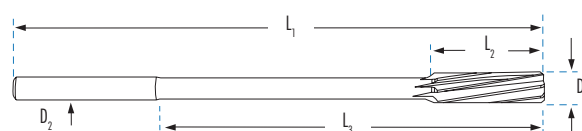


EM44

	D1 mm	D2 mm	L1 mm	L2 mm	L3 mm	€
EM440150	1,50	1,50	55	12	35	149,22
EM440200	2,00	2,00	65	14	45	118,05
EM440250	2,50	2,50	75	14	55	134,78
EM440300	3,00	3,00	90	14	70	103,02
EM440350	3,50	3,50	90	14	70	153,08
EM440400	4,00	4,00	105	16	80	103,02
EM440450	4,50	4,50	105	16	80	158,84
EM440500	5,00	5,00	115	16	90	108,78
EM440550	5,50	5,50	115	16	90	168,48
EM440600	6,00	6,00	130	16	100	112,63
EM440650	6,50	6,00	130	16	100	174,25
EM440700	7,00	7,00	140	18	110	121,29
EM440750	7,50	7,00	140	18	110	178,10
EM440800	8,00	8,00	160	18	130	117,44
EM440850	8,50	8,00	160	18	130	180,03
EM440900	9,00	9,00	175	18	140	132,85
EM440950	9,50	9,00	175	18	140	188,69
EM441000	10,00	10,00	190	20	150	134,78
EM441100	11,00	11,00	200	20	160	157,89
EM441200	12,00	12,00	210	20	160	149,22

**HSSCo EXTRALONG SERIES**


Ref. EM33



EM33

	D1 mm	D2 mm	L1 mm	L2 mm	L3 mm	HSSCo €
EM330200	2,0	2,0	90	11	70	136,68
EM330300	3,0	3,0	120	15	100	136,68
EM330400	4,0	4,0	140	19	115	144,14
EM330500	5,0	5,0	170	23	140	147,07
EM330600	6,0	5,6	200	26	175	149,82
EM330700	7,0	7,0	250	35	220	189,95
EM330800	8,0	8,0	250	33	220	213,25
EM330900	9,0	9,0	250	35	220	212,45
EM331000	10,0	10,0	250	38	220	234,23
EM331200	12,0	10,0	250	44	220	281,59

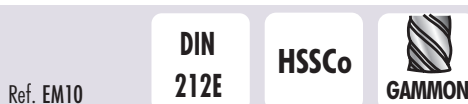
**SOLID CARBIDE CHUCKING REAMERS**


Ref. EM35

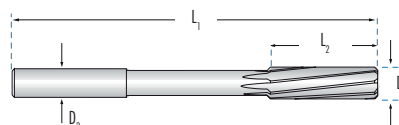


EM35

	D1 mm	D2 mm	L1 mm	L2 mm	€
EM350200	2,00	2,00	49	11	70,60
EM350250	2,50	2,50	57	14	81,19
EM350300	3,00	3,00	61	15	77,06
EM350350	3,50	3,50	70	18	86,30
EM350400	4,00	4,00	75	19	81,85
EM350450	4,50	4,50	80	21	94,10
EM350500	5,00	5,00	86	23	86,68
EM350550	5,50	5,50	93	26	105,35
EM350600	6,00	6,00	93	26	104,28
EM350650	6,50	6,00	101	28	127,89
EM350700	7,00	7,00	109	31	134,80
EM350750	7,50	7,00	109	31	148,29
EM350800	8,00	8,00	117	33	154,04
EM350850	8,50	8,00	117	33	177,17
EM350900	9,00	9,00	125	36	176,53
EM350950	9,50	9,00	125	36	197,72
EM351000	10,00	10,00	133	38	195,75
EM351050	10,50	10,00	133	38	219,24
EM351100	11,00	10,00	142	41	292,06
EM351150	11,50	12,00	142	41	321,26
EM351200	12,00	12,00	151	44	308,18

**HSSCo MACHINE CHUCKING REAMERS**


Ref. EM10



EM10


	D1 mm	D2 mm	L1 mm	L2 mm	€
EM100300	3,00	3,00	61	15	33,01
EM100400	4,00	4,00	75	19	33,01
EM100500	5,00	5,00	86	23	33,62
EM100600	6,00	5,60	93	26	33,62
EM100700	7,00	7,10	109	31	34,22
EM100800	8,00	8,00	117	33	37,60
EM100900	9,00	9,00	125	36	44,81
EM101000	10,00	10,00	133	38	46,20
EM101100	11,00	10,00	142	41	53,80
EM101200	12,00	10,00	151	44	57,35
EM101300	13,00	10,00	151	44	86,62
EM101400	14,00	12,50	160	47	90,73
EM101500	15,00	12,50	160	47	94,39
EM101600	16,00	12,50	162	50	110,45
EM101700	17,00	14,00	170	52	132,64
EM101800	18,00	14,00	175	54	159,41



Special sizes on request

HSSCo TAPER SHANK REAMERS

**DIN 208**



Ref. EM7



DIN 208B

Ref. EM9



DIN 208C



					EM7	EM9
MATERIAL					HSSCo	HSSCo
NORM					DIN 208B	DIN 208C
TOLERANCE					TOL H7	TOL H7
HELIX					10°	38°
D1 mm	L2 mm	L3 mm	L1 mm	MT	€	€
4,00	19	58	129	1	62,96	
5,00	23	62	133	1	48,88	84,00
5,50	26	67	138	1	64,07	
6,00	26	67	138	1	47,37	84,00
6,50	28	73	144	1	65,34	
7,00	31	79	150	1	48,45	84,00
7,50	31	79	150	1	66,83	
8,00	33	85	156	1	50,05	84,00
8,50	33	85	156	1	70,87	
9,00	36	91	162	1	53,39	80,97
9,50	36	91	162	1	76,84	
10,00	38	97	168	1	52,28	80,97
10,50	38	97	168	1	77,86	
11,00	41	104	175	1	53,27	84,55
11,50	41	104	175	1	82,01	
12,00	44	111	182	1	53,27	84,55
12,50	44	111	182	1	89,56	
13,00	44	111	182	1	67,34	125,76
13,50	47	118	189	1	92,20	
14,00	47	118	189	1	69,19	129,67
14,50	50	118	204	2	97,10	
15,00	50	118	204	2	71,45	141,97
15,50	52	124	210	2	102,06	
16,00	52	124	210	2	77,79	148,79
16,50	54	128	214	2	113,37	
17,00	54	128	214	2	87,59	161,09
17,50	56	133	219	2	129,34	

					EM7	EM9
D1 mm	L2 mm	L3 mm	L1 mm	MT	€	€
18,00	56	133	219	2	91,73	171,11
18,50	58	137	223	2	138,01	
19,00	58	137	223	2	97,37	181,50
19,50	60	142	228	2	147,20	
20,00	60	142	228	2	96,22	190,89
20,50	62	146	232	2	153,13	
21,00	62	146	232	2	114,49	206,25
21,50	64	151	237	2	198,47	
22,00	64	151	237	2	127,85	220,17
22,50	66	155	241	2	198,47	
23,00	66	155	241	2	133,75	236,01
23,50	66	163	241	3	230,57	
24,00	68	163	268	3	141,12	248,95
24,50	68	163	268	3	238,26	
25,00	68	163	268	3	153,51	264,30
25,50	70	168	273	3	277,86	
26,00	70	168	273	3	178,69	278,94
26,50	70	168	273	3	294,35	
27,00	71	172	277	3	206,30	376,06
28,00	71	172	277	3	190,61	308,35
29,00	73	176	281	3	215,65	423,58
30,00	73	176	281	3	207,33	327,50
31,00	75	180	285	3	283,47	
32,00	77	187	317	4	285,83	534,10
33,00	77	187	317	4	460,10	
34,00	78	191	321	4	312,10	803,73
35,00	78	191	321	4	359,52	
36,00	79	195	325	4	461,92	897,72
37,00	79	195	325	4	633,62	
38,00	81	199	329	4	491,83	1.021,09
39,00	81	199	329	4	848,16	
40,00	81	199	329	4	501,80	1.079,49
41,00	82	203	333	4	848,16	
42,00	82	203	333	4	896,92	
44,00	83	206	336	4	975,18	
45,00	83	206	336	4	975,87	
48,00	86	214	344	4	1.033,88	
50,00	86	214	344	4	1.098,73	

**HSSCo TAPER SHANK REAMERS, LONG SERIES**

Ref. EM41

DIN  
208B/L

HSSCo

TOL  
H7

EM41

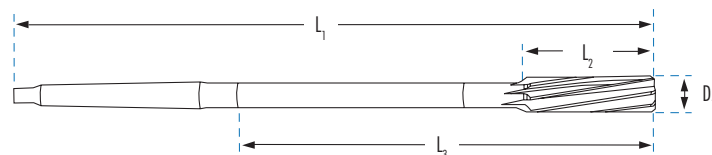
	D <sub>1</sub> mm	L <sub>2</sub> mm	L <sub>3</sub> mm	L <sub>1</sub> mm	MT	€
EM411300	13	22	180	245	1	192,60
EM411400	14	22	180	245	1	192,60
EM411500	15	25	180	260	2	203,43
EM411600	16	25	180	260	2	227,23
EM411800	18	28	180	260	2	235,89
EM412000	20	28	190	270	2	255,37
EM412200	22	32	200	280	2	287,82
EM412400	24	32	200	300	3	376,56
EM412500	25	32	220	320	3	456,62
EM412600	26	32	230	330	3	536,69
EM412800	28	36	240	340	3	541,02
EM413000	30	36	250	350	3	551,85
EM413200	32	36	250	375	4	638,41
EM413400	34	40	250	375	4	742,28
EM413600	36	40	250	375	4	766,88
EM413800	38	40	270	395	4	823,61
EM414000	40	40	270	395	4	869,84
EM414200	42	40	280	405	4	918,15
EM414500	45	45	280	405	4	1.077,85
EM415000	50	45	290	415	4	1.296,35

**HSSCo TAPER SHANK REAMERS, EXTRALONG SERIES**

Ref. EM42

DIN  
208B/XL

HSSCo

TOL  
H7

EM42

	D <sub>1</sub> mm	L <sub>2</sub> mm	L <sub>3</sub> mm	L <sub>1</sub> mm	MT	€
EM421200	12	40	250	315	1	311,93
EM421400	14	40	250	315	1	340,80
EM421600	16	45	270	350	2	356,20
EM421800	18	45	270	350	2	385,55
EM422000	20	45	270	350	2	408,20
EM422200	22	45	270	350	2	548,76
EM422400	24	70	350	450	3	625,78
EM422500	25	70	350	450	3	664,28
EM422600	26	70	350	450	3	770,19
EM422800	28	70	350	450	3	847,20
EM423000	30	70	350	450	3	914,59
EM423500	35	70	350	475	4	1.155,28
EM424000	40	70	350	475	4	1.347,83

**HSS BRIDGE REAMERS**

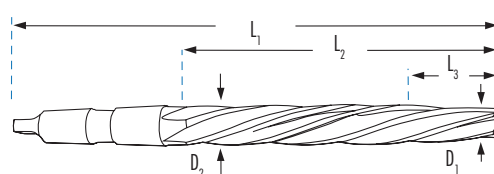
Ref. EM8

DIN  
311

HSS

TOL  
H7

FOR BOIL WORKS

Conicity  
1:10 on L<sub>3</sub>

EM8

	D <sub>2</sub> mm	D <sub>1</sub> mm	L <sub>1</sub> mm	L <sub>2</sub> mm	L <sub>3</sub> mm	MT	€
EM81000	10,00	6,6	171	95	38	1	84,10
EM81100	11,00	7,0	176	100	40	1	86,41
EM81200	12,00	7,8	199	105	42	2	89,50
EM81300	13,00	8,8	199	105	42	2	97,44
EM81400	14,00	9,4	209	115	46	2	106,36
EM81500	15,00	10,0	219	125	50	2	112,80
EM81600	16,00	10,6	229	135	54	2	118,40
EM81700	17,00	11,6	251	135	54	3	132,66
EM81800	18,00	12,2	261	145	58	3	143,68
EM81900	19,00	13,2	261	145	58	3	162,73
EM82000	20,00	13,8	271	155	62	3	165,70
EM82100	21,00	14,8	271	155	62	3	182,29
EM82200	22,00	15,4	281	165	66	3	190,27
EM82300	23,00	16,4	281	165	66	3	204,01
EM82400	24,00	16,8	296	180	72	3	218,26
EM82500	25,00	17,8	296	180	72	3	232,64
EM82600	26,00	18,8	296	180	72	3	254,06
EM82700	27,00	19,2	311	195	78	3	272,72
EM82800	28,00	20,2	311	195	78	3	297,88
EM82900	29,00	21,2	311	195	78	3	319,76
EM83000	30,00	22,2	311	195	78	3	320,34
EM83100	31,00	23,2	326	210	78	3	325,71
EM83200	32,00	23,6	354	210	84	4	354,57
EM83300	33,00	24,6	354	210	84	4	473,28
EM83400	34,00	25,6	364	220	88	4	582,02
EM83600	36,00	27,2	364	220	88	4	611,13



**SOLID CARBIDE 3 FLUTES DRILL-REAMERS**

Ref. BC45

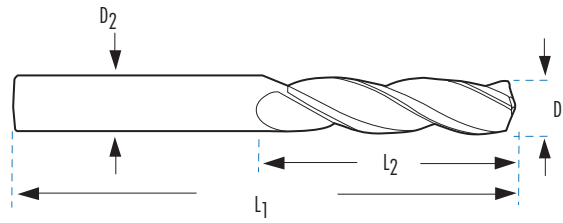
**3Z**

**DIN  
1897**

**SOLID  
CARBIDE**



**TOL  
H8**



BC45					
	D1 mm	D2 mm	L1 mm	L2 mm	€
BC450350	3,5	3,5	52	20	29,55 *
BC450400	4,0	4,0	55	22	30,46 *
BC450500	5,0	5,0	62	26	34,28 *
BC450550	5,5	5,5	66	28	43,35 *
BC450600	6,0	6,0	66	28	41,49 *
BC450650	6,5	6,5	70	31	60,03 *
BC450700	7,0	7,0	74	34	58,47 *
BC450800	8,0	8,0	79	37	68,68 *
BC450850	8,5	8,5	79	37	72,77 *
BC450900	9,0	9,0	84	40	88,91 *
BC451050	10,5	10,5	89	43	111,50 *
BC451100	11,0	11,0	95	47	128,22 *
BC451150	11,5	11,5	95	47	132,93 *
BC451350	13,5	13,5	104	54	281,01 *
BC451400	14,0	14,0	107	54	205,68 *
BC451450	14,5	14,5	111	56	319,18 *
BC451500	15,0	15,0	111	56	243,41 *
BC451550	15,5	15,5	115	58	276,17 *
BC451600	16,0	16,0	115	58	300,29 *
BC451650	16,5	16,5	119	60	429,14 *
BC451700	17,0	17,0	119	60	441,55 *
BC451750	17,5	17,5	123	62	451,78 *
BC451800	18,0	18,0	123	62	492,65 *
BC451850	18,5	18,5	127	64	536,89 *
BC451900	19,0	19,0	127	64	546,93 *
BC451950	19,5	19,5	131	66	587,86 *
BC452000	20,0	20,0	131	66	581,65 *

\* Till end of stock

## HSS DRILL REAMERS

### STRAIGHT SHANK

**3Z**
**DIN  
344**
**HSS**

**TOL  
H8**

Ref. EM22

### TAPER SHANK

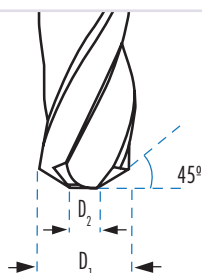
**3Z**
**DIN  
343**
**HSS**

**TOL  
H8**

Ref. EM23

**APPLICATIONS:** Specially recommended to enlarge holes and compensate non concentric holes.

The finishing obtained with 3 fluted drill reamers is better than with conventional drills which are not recommended to enlarge holes, to avoid cutting edge damage.


**EM22**

	D1 mm	D2 mm	L1 mm	L2 mm	€
EM220500	5,00	3,00	108	74	37,50
EM220600	6,00	4,00	116	80	37,50
EM220700	7,00	5,00	133	93	37,50
EM220800	8,00	5,60	142	100	39,55
EM220900	9,00	6,30	151	107	46,68
EM221000	10,00	7,00	162	116	48,74
EM221100	11,00	7,70	173	125	53,75
EM221200	12,00	8,40	184	134	57,71
EM221300	13,00	9,10	184	134	73,58
EM221400	14,00	9,80	194	142	78,65
EM221500	15,00	10,50	202	147	85,85
EM221600	16,00	11,20	211	153	92,20

**EM23**

	D1 mm	D2 mm	L1 mm	L2 mm	MT	€
EM230900	9,00	6,30	162	81	1	88,58
EM231000	10,00	7,00	168	87	1	79,29
EM231100	11,00	7,70	175	94	1	82,00
EM231200	12,00	8,40	182	101	1	84,89
EM231300	13,00	9,10	182	101	1	88,65
EM231400	14,00	9,80	189	108	1	93,93
EM231500	15,00	10,50	212	114	2	95,72
EM231600	16,00	11,20	218	120	2	106,77
EM231700	17,00	11,90	223	125	2	116,19
EM231800	18,00	12,60	228	130	2	126,11
EM231900	19,00	13,30	233	135	2	148,41
EM232000	20,00	14,00	238	140	2	152,01
EM232100	21,00	15,00	243	145	2	163,72
EM232200	22,00	15,50	248	150	2	177,02
EM232300	23,00	16,00	253	155	2	182,66
EM232400	24,00	17,00	281	160	3	193,01
EM232500	25,00	17,50	281	160	3	207,43
EM232600	26,00	18,00	286	165	3	222,89
EM232700	27,00	19,00	291	170	3	250,70
EM232800	28,00	19,50	291	170	3	284,29
EM233000	30,00	21,00	296	175	3	314,67
EM233200	32,00	22,00	334	185	4	374,27
EM233400	34,00	24,00	339	190	4	414,21
EM233500	35,00	25,00	339	190	4	435,73
EM233600	36,00	25,50	344	195	4	457,60
EM233800	38,00	26,50	349	200	4	517,35
EM234000	40,00	28,00	349	200	4	558,27
EM234500	45,00	31,00	359	210	4	667,90
EM235000	50,00	34,50	369	220	4	953,56

**HSSCo SHELL REAMERS**

**DIN  
219**



Ref. EM17



Ref. EM18



**TAPER SHANK ARBORS FOR SHELL REAMERS**

**DIN  
217**

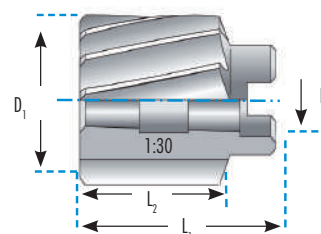


Ref. EM19

				EM17		EM18	
MATERIAL				HSSCo		HSSCo	
NORM				DIN 219B		DIN 219C	
TOLERANCE				TOL H7		TOL H7	
HELIX ANGLE				10°		38°	
D1 mm	D2 mm	L1 mm	L2 mm	€	€	€	€
25,00	13,00	45	32	EM172500	140,26	EM182500	222,98
26,00	13,00	45	32	EM172600	141,44	EM182600	225,45
27,00	13,00	45	32	EM172700	157,96	EM182700	231,52
28,00	13,00	45	32	EM172800	160,08	EM182800	236,27
30,00	13,00	45	32	EM173000	161,57	EM183000	242,90
32,00	16,00	50	36	EM173200	172,39	EM183200	250,86
34,00	16,00	50	36	EM173400	193,01	EM183400	259,10
35,00	16,00	50	36	EM173500	195,76	EM183500	284,19
36,00	19,00	56	40	EM173600	201,26	EM183600	296,85
38,00	19,00	56	40	EM173800	213,43	EM183800	313,16
40,00	19,00	56	40	EM174000	224,11	EM184000	341,35
42,00	19,00	56	40	EM174200	238,53		
45,00	22,00	63	45	EM174500	253,29	EM184500	407,56
47,00	22,00	63	45	EM174700	317,47	EM184700	475,91
48,00	22,00	63	45	EM174800	317,47		
50,00	22,00	63	45	EM175000	319,01		
52,00	27,00	71	50	EM175200	337,30	EM185200	534,12
55,00	27,00	71	50	EM175500	365,95	EM185500	594,75
58,00	27,00	71	50	EM175800	413,38		
60,00	27,00	71	50	EM176000	428,97	EM186000	662,51
62,00	32,00	80	56	EM176200	492,75	EM186200	711,88
65,00	32,00	80	56	EM176500	549,33	EM186500	723,39
70,00	32,00	80	56	EM177000	669,66	EM187000	741,24
72,00	40,00	90	63	EM177200	748,06	EM187200	786,13
75,00	40,00	90	63	EM177500	804,34		
80,00	40,00	90	63	EM178000	876,02	EM188000	931,04
85,00	40,00	90	63	EM178500	1.017,36		
90,00	50,00	100	71	EM179000	1.108,78		
95,00	50,00	100	71	EM179500	1.272,15		
100,00	50,00	100	71	EM1710000	1.450,77		

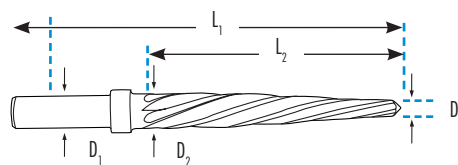
				EM19	
	D2 mm	L1 mm	MT	€	
EM19CM313X300	13,00	300	3	198,27	
EM19CM316X300	16,00	300	3	220,61	
EM19CM419X300	19,00	300	4	261,74	
EM19CM419X400	19,00	400	4	369,88 *	
EM19CM419X500	19,00	500	4	414,05 *	
EM19CM422X300	22,00	300	4	327,79	
EM19CM422X400	22,00	400	4	410,10 *	
EM19CM422X500	22,00	500	4	460,31 *	
EM19CM422X600	22,00	600	4	487,49 *	
EM19CM527X350	27,00	350	5	467,47	
EM19CM527X450	27,00	450	5	545,85 *	
EM19CM527X550	27,00	550	5	630,72 *	
EM19CM527X650	27,00	650	5	675,22 *	
EM19CM532X350	32,00	350	5	574,72	
EM19CM532X400	32,00	400	5	692,29 *	
EM19CM532X500	32,00	500	5	735,66 *	
EM19CM532X600	32,00	600	5	808,82 *	
EM19CM540X450	40,00	450	5	815,56	
EM19CM540X550	40,00	550	5	868,90 *	
EM19CM540X650	40,00	650	5	907,10 *	
EM19CM540X750	40,00	750	5	976,99 *	
EM19CM540X850	40,00	850	5	1.029,52 *	
EM19CM540X950	40,00	950	5	1.103,42 *	
EM19CM550X450	50,00	450	5	1.053,93	
EM19CM550X550	50,00	550	5	1.042,23 *	
EM19CM550X650	50,00	650	5	1.088,26 *	
EM19CM550X750	50,00	750	5	1.140,33 *	
EM19CM550X850	50,00	850	5	1.217,09 *	
EM19CM550X950	50,00	950	5	1.254,15	

\* Till end of stock



**5 FLUTES HSS REAMERS**
**5Z**

Ref. EM14

**HSS**
**10%**  
**1:10**
**25°**


							EM14
	D <sub>2</sub> mm	Ø mm	D <sub>1</sub> mm	D <sub>3</sub> mm	L <sub>1</sub> mm	L <sub>2</sub> mm	€
EM141000	10,00	6,00 - 10,00	9,50	5,20	127	76	157,57
EM141200	12,00	7,00 - 12,00	12,70	5,60	152	102	173,27
EM141400	14,00	9,00 - 14,00	12,70	7,80	152	102	183,76
EM141800	18,00	10,00 - 18,00	12,70	9,20	178	125	225,80
EM142200	22,00	14,00 - 22,00	12,70	13,00	184	132	267,79
EM142600	26,00	18,00 - 26,00	12,70	17,20	184	132	288,84

**HSSCo SPRUE REAMERS 45° HELIX**

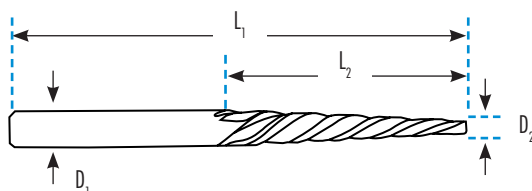
Ref. EM30

Ref. EM31

Ref. EM32

**HSSCo**
D<sub>2</sub>D<sub>1</sub>L<sub>1</sub>L<sub>2</sub>
**TOL**  
**± 0,05**
**TOL**  
**h8**
**TOL**  
**± 1**
**TOL**  
**± 2**

FOR MOULDS


**5%**  
**1:20**
**8%**  
**2:25**
**10%**  
**1:10**
**EM30**
**EM31**
**EM32**

D <sub>1</sub> mm	D <sub>2</sub> mm	L <sub>1</sub> mm	L <sub>2</sub> mm	€
6,00	3,00	110	60	134,32
8,00	4,00	130	80	185,16
10,00	5,00	155	100	219,82
12,00	6,00	180	120	268,67
14,00	7,00	200	140	342,45

D <sub>1</sub> mm	D <sub>2</sub> mm	L <sub>1</sub> mm	L <sub>2</sub> mm	€
8,00	3,00	110	62	134,32
10,00	4,00	130	75	175,87
12,00	5,00	150	90	203,72
14,00	6,00	160	100	296,48

D <sub>1</sub> mm	D <sub>2</sub> mm	L <sub>1</sub> mm	L <sub>2</sub> mm	€
8,00	3,00	100	50	127,45
10,00	4,00	115	60	134,32
12,00	5,00	130	70	164,59
14,00	6,00	140	80	284,79

**HSS EXTENSIBLE REAMERS**
**HSS WITH GUIDE**


TOL H11	Ø mm	Ø mm min. x max.	EM4G	EM4-6C	EM4-6T
			REAMERS €	BLADES €	SCREWS €
EM4G0800	8,00	8,00 - 9,00	144,62*	80,02*	3,60*
EM4G0900	9,00	9,00 - 10,00	144,62*	80,02*	3,60*
EM4G1000	10,00	10,00 - 11,00	144,62*	80,02*	3,60*
EM4G1200	12,00	12,00 - 13,50	147,48*	80,08*	3,81*

\* Till end of stock

**HSS REINFORCED**


TOL H11	Ø mm	Ø mm min. x max.	EM6	EM4-6C	EM4-6T
			REAMERS €	BLADES €	SCREWS €
EM60640	6,40	6,40 - 7,20	123,19*		
EM60720	7,20	7,20 - 8,00	123,19*		
EM60800	8,00	8,00 - 9,00		80,02*	3,60*
EM60900	9,00	9,00 - 10,00	123,19*	80,02*	3,60*
EM61000	10,00	10,00 - 11,00	123,19*	80,02*	3,60*
EM61100	11,00	11,00 - 12,00	123,19*	80,02*	
EM61200	12,00	12,00 - 13,50	123,19*	80,08*	3,81*
EM61350	13,50	13,50 - 15,50	123,19*	80,08*	3,81*
EM61550	15,50	15,50 - 18,00	131,09*	83,89*	4,21*
EM61800	18,00	18,00 - 21,00	135,71*	86,80*	
EM62100	21,00	21,00 - 24,00	157,91*	99,90*	4,21*
EM62400	24,00	24,00 - 27,50	171,92*	105,19*	4,41*
EM62750	27,50	27,50 - 31,50			4,61*
EM63150	31,50	31,50 - 37,00	245,06*	142,30*	4,61*
EM63700	37,00	37,00 - 45,00	365,40*		4,61*
EM64500	45,00	45,00 - 55,00			4,88*
EM65500	55,00	55,00 - 67,00		524,13*	4,88*
EM66700	67,00	67,00 - 80,00		796,37*	4,88*

\* Till end of stock

**CUTTING SPEED & FEED CHART FOR REAMERS**

	C/S	m/min	DIAMETER Ø (mm)											
			2	3	5	7	10	12	15	18	20	22	25	30
STEEL EM3	12	RPM	1911	1274	764	546	382	318	255	212	191	174	153	127
	mm / rev mm / min	FEED	0,10	0,10	0,11	0,12	0,15	0,18	0,20	0,22	0,23	0,24	0,25	0,29
			191	127	84	66	57	56	51	47	44	42	38	37
HARDENED STEEL EM3+TiAlN	7	RPM	1115	743	446	318	223	186	149	124	111	101	89	74
	mm / rev mm / min	FEED	0,08	0,080	0,08	0,09	0,10	0,11	0,12	0,15	0,20	0,21	0,22	0,26
			89	59	36	29	22	20	18	19	22	21	20	19
STAINLESS STEEL EM3+TiN	5	RPM	796	531	318	227	159	133	106	88	80	72	64	53
	mm / rev mm / min	FEED	0,08	0,08	0,09	0,10	0,10	0,12	0,14	0,16	0,18	0,20	0,21	0,24
			64	42	29	23	16	16	15	14	14	14	13	13
ALUMINIUM EM3	37	RPM	5892	3928	2357	1683	1178	982	786	655	589	536	471	393
	mm / rev mm / min	FEED	0,15	0,16	0,18	0,20	0,21	0,23	0,25	0,28	0,29	0,30	0,35	0,38
			884	628	424	337	247	226	196	183	171	161	165	149
CAST IRON EM3+TiCN	9	RPM	1433	955	573	409	287	239	191	159	143	130	115	96
	mm / rev mm / min	FEED	0,15	0,16	0,18	0,18	0,20	0,22	0,24	0,26	0,28	0,29	0,30	0,33
			215	153	103	74	57	53	46	41	40	38	34	32
BRASS EM3	17	RPM	2707	1805	1083	773	541	451	361	301	271	246	217	180
	mm / rev mm / min	FEED	0,10	0,12	0,14	0,18	0,20	0,25	0,28	0,28	0,30	0,30	0,35	0,41
			271	217	152	139	108	113	101	84	81	74	76	74

**REMARKS:**

- If we know the reamer size and workpiece material, the speed and feed are quickly found.

Example:

Material: Steel RPM= 382

Ø reamer: 10 mm. Vf= 57 mm/min

- After several holes you must adjust the speed and feed again.

**EASY USING CHART FOR DRILLING THE CORRECT DIAMETER BEFORE REAMING**

REAMING Ø	DRILL DIAMETER		
	STEEL	STAINLESS STEEL	ALUMINIUM
1<Ø<10 mm	Ø final - 0,2 mm	Ø final - 0,2 mm	Ø final - 0,3 mm
11<Ø<20 mm	Ø final - 0,3 mm	Ø final - 0,3 mm	Ø final - 0,4 mm
21<Ø<30 mm	Ø final - 0,4 mm	Ø final - 0,4 mm	Ø final - 0,45 mm
Ø>30 mm	Ø final - 0,5 mm	Ø final - 0,5 mm	Ø final - 0,6 mm