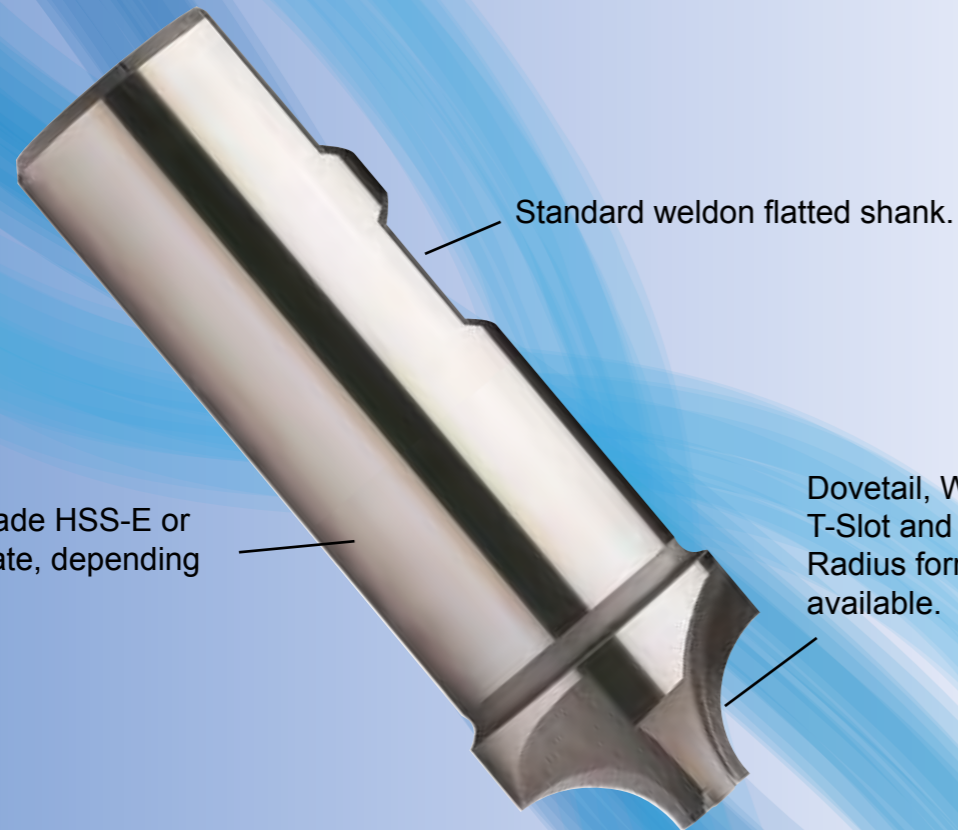


SUPERIOR PERFORMANCE



FORM TOOLS

HSS-E & HSS



Standard weldon flatted shank.

Premium grade HSS-E or HSS substrate, depending on tool type.

Dovetail, Woodruff, T-Slot and Corner Radius forms available.

Tools can be coated to extend tool life if required.

IDEAL FOR MATERIAL GROUPS



APPLICATION

FORM CUTTERS








HSS-E and HSS milling cutters for varying forms on a variety of materials

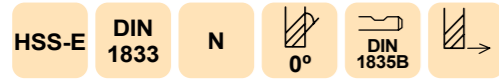


www.europatool.co.uk

●: Excellent ○: Good

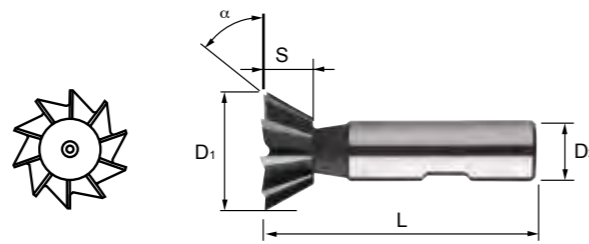
P				H		M			K				S					N							O				APPLICATION FORM CUTTERS							
11	12	13	14	15	16	21	22	23	31	32	33	34	41	42	43	51	52	53	61	62	63	64	71	72	73	74	81	82	83	84	Europa Code	Clarkson Code	Item	Description	Page No.	
○	○	○	○																				○	○	○										Dovetail Cutter HSS-E ø16.0mm - 50.0mm Flatted Shank	P.172
○	○	○	○																				○	○	○										Inverted Dovetail Cutter HSS-E ø16.0mm - 38.0mm Flatted shank	P.173
○	○	○	○																				○	○	○										Woodruff Cutter HSS-E ø10.5mm - 45.5mm Flatted Shank	P.174
○	○	○	○																				○	○	○										T-Slot Cutter HSS-E ø12.5mm - 60.0mm Flatted Shank	P.175
○	○	○	○																				○	○	○										Corner Rounding Cutter HSSCo8 R1.0mm - R20.0mm Flatted Shank	P.176
																																		Cutting Data	P.177	

HSS-E DOVETAIL CUTTERS



Series No. 153116, 154116

▶ cutting conditions : p.178



Cutting Diameter	Width	Angle	Shank Diameter	Overall Length	No. Flutes	EUROPA CODE
						Flatted Shank
16.0	4.0	45°	12	60	6	1531161600
20.0	5.0	45°	12	63	6	1531162000
22.0	6.0	45°	12	67	6	1531162200
25.0	6.3	45°	16	67	8	1531162500
28.0	7.5	45°	16	67	8	1531162800
32.0	8.0	45°	16	71	10	1531163200
38.0	10.0	45°	16	80	12	1531163800

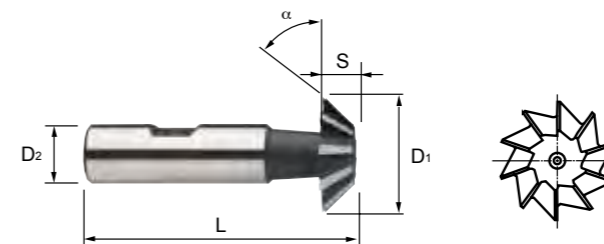
Cutting Diameter	Width	Angle	Shank Diameter	Overall Length	No. Flutes	EUROPA CODE
						Flatted Shank
16.0	6.3	60°	12	60	6	1541161600
20.0	8.0	60°	12	63	6	1541162000
22.0	9.0	60°	12	67	6	1541162200
25.0	10.0	60°	16	67	8	1541162500
28.0	11.0	60°	16	67	8	1541162800
32.0	12.5	60°	16	71	10	1541163200
38.0	16.0	60°	16	80	12	1541163800
40.0	13.0	60°	25	85	12	1541164000
50.0	16.0	60°	25	100	16	1541165000

HSS-E INVERTED DOVETAIL CUTTERS



Series No. 155116, 156116

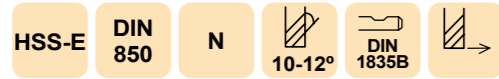
▶ cutting conditions : p.178



Cutting Diameter	Width	Angle	Shank Diameter	Overall Length	No. Flutes	EUROPA CODE
						Flatted Shank
16.0	4.0	45°	12	60	6	1551161600
20.0	5.0	45°	12	63	6	1551162000
22.0	6.0	45°	12	67	6	1551162200
25.0	6.3	45°	16	67	8	1551162500
28.0	7.5	45°	16	67	8	1551162800
32.0	8.0	45°	16	71	10	1551163200
38.0	10.0	45°	16	80	12	1551163800

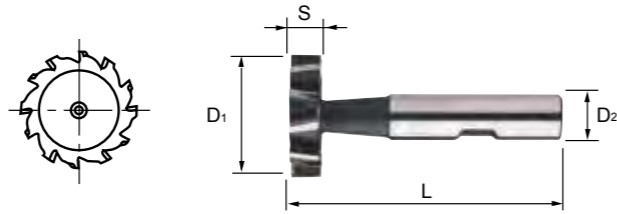
Cutting Diameter	Width	Angle	Shank Diameter	Overall Length	No. Flutes	EUROPA CODE
						Flatted Shank
16.0	6.3	60°	12	60	6	1561161600
20.0	8.0	60°	12	63	6	1561162000
22.0	9.0	60°	12	67	6	1561162200
25.0	10.0	60°	16	67	8	1561162500
28.0	11.0	60°	16	67	8	1561162800
32.0	12.5	60°	16	71	10	1561163200
38.0	16.0	60°	16	80	12	1561163800

HSS-E WOODRUFF KEYSEAT CUTTERS



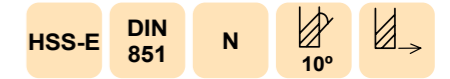
Series No. 158116

▶ cutting conditions : p.178



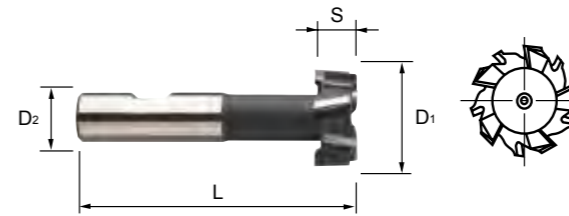
Cutting Diameter	Width	Shank Diameter	Overall Length	No. Flutes	EUROPA CODE
					Flatted Shank
10.5	2.0	6	50	8	1581161050
10.5	2.5	6	50	8	1581161051
10.5	3.0	6	50	8	1581161052
13.5	2.0	10	56	8	1581161350
13.5	2.5	10	56	8	1581161351
13.5	3.0	10	56	8	1581161352
13.5	4.0	10	56	8	1581161353
16.5	2.5	10	56	8	1581161650
16.5	3.0	10	56	8	1581161651
16.5	4.0	10	56	8	1581161652
16.5	5.0	10	56	8	1581161653
19.5	3.0	10	56	8	1581161950
19.5	4.0	10	63	8	1581161951
19.5	5.0	10	63	8	1581161952
19.5	6.0	10	63	8	1581161953
22.5	4.0	10	63	10	1581162250
22.5	5.0	10	63	10	1581162251
22.5	6.0	10	63	10	1581162252
22.5	8.0	10	63	10	1581162253
25.5	5.0	10	63	10	1581162550
25.5	6.0	10	63	10	1581162551
25.5	7.0	10	63	10	1581162552
25.5	8.0	10	63	10	1581162553
28.5	5.0	10	63	10	1581162850
28.5	6.0	10	63	10	1581162851
28.5	7.0	10	63	10	1581162852
28.5	8.0	10	63	10	1581162853
28.5	10.0	12	71	10	1581162854
32.5	5.0	12	71	12	1581163250
32.5	6.0	12	71	12	1581163251
32.5	7.0	12	71	12	1581163252
32.5	8.0	12	71	12	1581163253
32.5	10.0	12	71	12	1581163254
38.5	7.0	12	71	12	1581163850
38.5	8.0	12	71	12	1581163851
38.5	9.0	12	71	12	1581163852
38.5	10.0	12	71	12	1581163853
45.5	10.0	12	71	14	1581164550

HSS-E T-SLOT CUTTERS



Series No. 152116

▶ cutting conditions : p.179



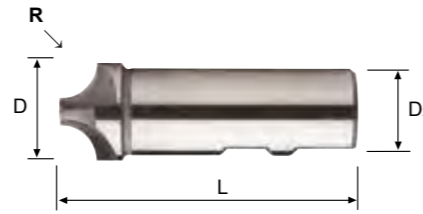
Bolt Size	Cutting Diameter	Width	Shank Diameter	Overall Length	No. Flutes	EUROPA CODE
						Flatted Shank
M6	12.5	6.0	10	57	6	1521161250
M8	16.0	8.0	10	62	6	1521161600
M10	18.0	8.0	12	70	6	1521161800
M10	19.0	9.0	12	71	6	1521161900
M12	21.0	9.0	12	74	6	1521162100
M12	22.0	10.0	12	75	6	1521162200
M14	25.0	11.0	16	82	6	1521162500
M16	28.0	12.0	16	83	6	1521162800
M18	32.0	14.0	16	90	8	1521163200
M20	36.0	16.0	25	103	8	1521163600
M22	40.0	18.0	25	108	8	1521164000

HSS-E 4 FLUTE CORNER ROUNDING CUTTERS



Series No. 159102

© cutting conditions : p.179



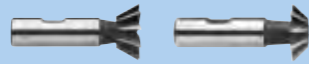
Radius	Outside Diameter	Shank Diameter	Overall Length	EUROPA CODE
				Flatted Shank
R1.0	8.0	10	60	1591020100
R1.5	9.0	10	60	1591020150
R2.0	10.0	10	60	1591020200
R2.5	11.0	10	60	1591020250
R3.0	12.0	12	60	1591020300
R3.5	13.0	12	60	1591020350
R4.0	14.0	12	60	1591020400
R4.5	15.0	12	60	1591020450
R5.0	16.0	12	60	1591020500
R5.5	19.0	16	67	1591020550
R6.0	20.0	16	67	1591020600
R6.5	21.0	16	71	1591020650
R7.0	22.0	16	71	1591020700
R7.5	23.0	16	71	1591020750
R8.0	24.0	16	71	1591020800
R8.5	25.0	25	85	1591020850
R9.0	26.0	25	85	1591020900
R9.5	27.0	25	85	1591020950
R10.0	28.0	25	85	1591021000
R10.5	31.0	25	90	1591021050
R11.0	32.0	25	90	1591021100
R12.0	34.0	25	90	1591021200
R12.5	41.0	25	100	1591021250
R13.0	42.0	25	100	1591021300
R14.0	44.0	25	100	1591021400
R15.0	46.0	25	100	1591021500
R16.0	48.0	25	100	1591021600
R18.0	52.0	32	112	1591021800
R20.0	56.0	32	112	1591022000

APPLICATION FORM CUTTERS CUTTING DATA

APPLICATION FORM CUTTERS CUTTING CONDITION



153116, 154116, 155116, 156116
(Dovetail Cutter)



MATERIAL GROUP	HRc		Size (mm)						
			16.0	20.0	25.0	32.0	40.0	50.0	
P	11 12	< 20	v _c (m/min)	15	15	15	15	15	15
			n	305	255	190	155	125	100
			f _z	0.031	0.036	0.031	0.041	0.043	0.025
			f (mm/min)	57	55	47	64	64	42
	11 12	20-30	v _c (m/min)	10	10	10	10	10	10
			n	215	180	135	100	90	75
			f _z	0.031	0.035	0.028	0.04	0.042	0.03
			f (mm/min)	40	38	30	40	45	36
	13 14	30-40	v _c (m/min)	8	8	8	8	8	8
			n	160	125	100	80	60	50
			f _z	0.021	0.02	0.02	0.02	0.022	0.02
			f (mm/min)	20	15	16	16	16	16
N	71 72 73	v _c (m/min)	95	85	90	90	95	85	
		n	1850	1350	1150	920	765	550	
		f _z	0.03	0.04	0.029	0.041	0.042	0.03	
		f (mm/min)	336	324	270	375	387	265	

158116 (Woodruff Cutter)



MATERIAL GROUP	HRc		Size (mm)								
			10.5	13.5	16.5	19.5	22.5	28.5	32.5	45.5	
P	11 12	< 20	v _c (m/min)	20	20	20	20	20	20	20	20
			n	600	470	380	320	280	220	190	130
			f _z	0.01	0.01	0.025	0.035	0.04	0.05	0.06	0.07
			f (mm/min)	48	38	76	90	112	110	137	127
	11 12	20-30	v _c (m/min)	15	15	15	15	15	15	15	15
			n	480	370	300	260	220	180	155	110
			f _z	0.01	0.01	0.025	0.035	0.04	0.05	0.06	0.07
			f (mm/min)	480	370	300	260	220	180	155	110
	13 14	30-40	v _c (m/min)	10	10	10	10	10	10	10	10
			n	300	230	190	160	140	110	90	70
			f _z	0.01	0.01	0.025	0.035	0.04	0.05	0.06	0.07
			f (mm/min)	24	18	38	45	56	55	65	69
N	71 72 73	v _c (m/min)	100	100	100	100	100	100	90	100	
		n	3000	2300	1900	1600	1400	1100	900	700	
		f _z	0.01	0.01	0.025	0.035	0.04	0.05	0.06	0.07	
		f (mm/min)	240	184	380	448	560	550	648	686	

APPLICATION FORM CUTTERS CUTTING CONDITION



152116 (T-Slot Cutter)



MATERIAL GROUP	HRc		Size (mm)										
			12.5	16.0	18.0	19.0	21.0	22.0	25.0	28.0	32.0	40.0	
P	11 12	< 20	v _c (m/min)	15	15	15	15	15	15	15	15	15	15
			n	380	300	270	250	230	220	190	170	150	120
			f _z	0.007	0.011	0.012	0.013	0.016	0.019	0.026	0.037	0.035	0.035
			f (mm/min)	16	19	20	20	22	25	30	38	42	33
	11 12	20-30	v _c (m/min)	10	10	10	10	10	10	10	10	10	10
			n	270	210	195	180	160	150	135	120	100	80
			f _z	0.005	0.007	0.01	0.014	0.017	0.019	0.022	0.028	0.025	0.025
			f (mm/min)	8	9	12	15	16	17	18	20	20	16
	N	71 72 73	v _c (m/min)	90	90	95	90	95	90	90	90	90	95
			n	2350	1830	1680	1540	1430	1330	1170	1040	910	750
			f _z	0.008	0.013	0.015	0.017	0.019	0.021	0.026	0.034	0.034	0.034
			f (mm/min)	110	140	150	160	165	170	180	210	250	200

159102 (Corner Rounding Cutter)



MATERIAL GROUP	HRc		RADIUS (mm)												
			1.0	1.5	2.0	2.5	3.0	4.0	5.0	6.0	8.0	10.0	12.0	16.0	
P	11 12	< 20	v _c (m/min)	15	15	15	15	15	15	15	15	15	15	15	15
			n	600	470	470	390	390	330	260	230	190	155	130	95
			f _z	0.015	0.016	0.016	0.019	0.019	0.023	0.029	0.033	0.039	0.04	0.048	0.053
			f (mm/min)	35	30	30	30	30	30	30	30	30	25	25	20
	11 12	20-30	v _c (m/min)	10	10	10	10	10	10	10	10	10	10	10	10
			n	480	380	380	315	315	270	210	185	155	125	105	75
			f _z	0.018	0.023	0.02	0.024	0.024	0.023	0.03	0.034	0.04	0.05	0.048	0.05
			f (mm/min)	35	35	30	30	30	25	25	25	25	25	20	15
	N	71 72 73	v _c (m/min)	90	80	90	85	90	90	80	90	90	85	85	90
			n	3500	2800	2800	2400	2400	2000	1600	1400	1200	950	800	600
			f _z	0.018	0.021	0.02	0.023	0.022	0.025	0.031	0.034	0.038	0.045	0.05	0.058
			f (mm/min)	245	230	220	220	210	200	200	190	180	170	160	140

v_c - cutting speed (m/min)
n - RPM (rev/min)
f_z - feed rate (mm/tooth)
f - feed rate (mm/rev)
z - No. of teeth
a_p - axial depth of cut
a_e - radial depth of cut

$$\text{To calculate RPM from cutting speed: } n = \frac{v_c \cdot 1000}{\pi \cdot \phi}$$

$$\text{To calculate cutting speed from RPM: } v_c = \frac{n \cdot \pi \cdot \phi}{1000}$$

All recommendations are based on ideal machining conditions. Adjustments may need to be made according to your set-up. The recommendations for speeds, feeds and other parameters presented in this chart are nominal recommendations and should be considered only as good starting points.