TECHNICAL DATA | **TECHNISCHE DATEN** | **DATOS TÉCNICOS** | **DONNÉES TECHNIQUES** | **DATI TECNICI**

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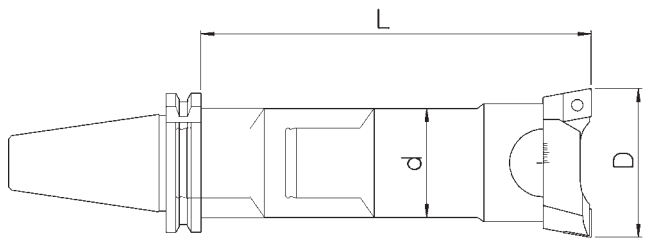
MODULHARD'ANDREA

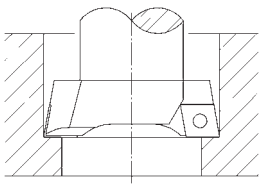
Recommended cutting conditions for roughing operations with double-bit boring bars

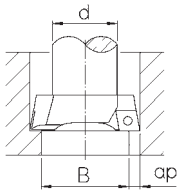
Dati di taglio consigliati per sgrossatura di fori con bareni bitaglienti

material materiale	*boring bar dimensions* dimensioni bareno	*working conditions* condizioni di lavoro	*cutting speed Vc= m/min.* velocità di taglio Vc= m/min. *diameter* diametro			*feed f= mm/rev (twin cutters)* avanzamento f= mm/giro (due taglienti) *insert radius* raggio inserto		
			D < 38	D = 38~120	D > 120	R = 0.2	R = 0.4	R = 0.8
carbon steel acciaio al carbonio HB ≤ 200	L / d = 2.5	*good* buona	120 - 180	140 - 200	160 - 250	-	0.2 - 0.4	0.3 - 0.5
	L / d = 4	*normal* normale	100 - 160	120 - 180	140 - 200	-	0.2 - 0.4	0.3 - 0.5
	L / d = 6.3	*difficult* difficile	70 - 100	70 - 100	70 - 100	0.15 - 0.3	0.2 - 0.4	-
carbon steel acciaio al carbonio HB > 200	L / d = 2.5	*good* buona	100 - 160	120 - 180	140 - 200	-	0.2 - 0.4	0.3 - 0.5
	L / d = 4	*normal* normale	80 - 140	100 - 160	120 - 180	-	0.2 - 0.4	0.3 - 0.5
	L / d = 6.3	*difficult* difficile	60 - 90	70 - 100	70 - 100	0.15 - 0.3	0.2 - 0.4	-
stainless steel acciaio inox AISI 304 - 316	L / d = 2.5	*good* buona	80 - 110	90 - 120	100 - 140	-	0.2 - 0.4	0.3 - 0.5
	L / d = 4	*normal* normale	70 - 100	80 - 110	90 - 120	-	0.2 - 0.4	0.3 - 0.5
	L / d = 6.3	*difficult* difficile	60 - 90	60 - 90	60 - 90	0.15 - 0.3	0.2 - 0.4	-
cast iron ghisa	L / d = 2.5	*good* buona	90 - 120	100 - 140	120 - 160	-	0.2 - 0.4	0.3 - 0.5
	L / d = 4	*normal* normale	70 - 100	90 - 120	100 - 140	-	0.2 - 0.4	0.3 - 0.5
	L / d = 6.3	*difficult* difficile	60 - 90	60 - 90	60 - 90	0.15 - 0.3	0.2 - 0.4	-
aluminium alluminio	L / d = 2.5	*good* buona	160 - 250	200 - 300	250 - 350	-	0.3 - 0.5	0.4 - 0.6
	L / d = 4	*normal* normale	140 - 200	160 - 250	200 - 300	-	0.3 - 0.5	0.4 - 0.6
	L / d = 6.3	*difficult* difficile	100 - 150	100 - 150	100 - 150	0.2 - 0.4	0.3 - 0.5	-



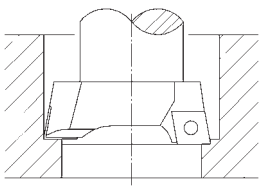
Twin cutters at the same cutting diameter
Due taglienti sullo stesso diametro



cutting depth profondità di passata ap = mm	*working range* campo di lavoro Ø = mm	*max. cutting depth* max. profondità di passata *steel* acciaio	*cast iron, aluminium* ghisa, alluminio
	18 - 28	1.5 - 2	2 - 2.5
	28 - 50	2 - 3	2.5 - 3.5
	50 - 68	3 - 4	3.5 - 5
	68 - 200	4 - 5	5 - 7
	200 - 500	5 - 6	6 - 8

It's advisable to start with B hole ≥ the boring bar diameter d.
È consigliabile che il preforo B sia ≥ al diametro del bareno d.

Twin cutters at different cutting diameters
Due taglienti su diametri diversi

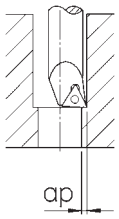


ATTENTION: ***For boring operations at different diameters, reduce to a half the feed indicated on the above table.***

ATTENZIONE: Per lavorare con un solo tagliente o con differenti diametri di taglio, dimezzare l'avanzamento indicato in tabella.

Recommended cutting conditions for boring operations with Testarossa and micrometric boring bars

Dati di taglio consigliati per l'alesatura con Testarossa e bareni micrometrici

material materiale	*boring bar dimensions* dimensioni bareno	*working conditions* condizioni di lavoro	*cutting speed Vc= m/min.* velocità di taglio Vc= m/min.	*feed f= mm/rev* avanzamento f= mm/giro *insert radius* raggio inserto			*quality insert* qualità inserto	*cutting depth* profondità di passata
				R = 0.0	R = 0.2	R = 0.4		
carbon steel acciaio al carbonio HB ≤ 200	L / d = 2.5	*good* buona	200 - 300	-	0.05 - 0.08	0.07 - 0.1	DC100	 0.1-0.25 mm
	L / d = 4	*normal* normale	160 - 250	-	0.05 - 0.08	0.07 - 0.1		
	L / d = 6.3	*difficult* difficile	70 - 100	0.05 - 0.08	0.05 - 0.08	-	DP300	
carbon steel acciaio al carbonio HB > 200	L / d = 2.5	*good* buona	160 - 250	-	0.05 - 0.08	0.07 - 0.1	DC100	
	L / d = 4	*normal* normale	150 - 200	-	0.05 - 0.08	0.07 - 0.1		
	L / d = 6.3	*difficult* difficile	70 - 100	0.05 - 0.08	0.05 - 0.08	-	DC010	
stainless steel acciaio inox AISI 304 - 316	L / d = 2.5	*good* buona	120 - 160	-	0.05 - 0.08	0.07 - 0.1	DP300	
	L / d = 4	*normal* normale	100 - 140	-	0.05 - 0.08	0.07 - 0.1		
	L / d = 6.3	*difficult* difficile	70 - 100	0.05 - 0.08	0.05 - 0.08	-		
cast iron ghisa	L / d = 2.5	*good* buona	120 - 160	-	0.05 - 0.08	0.07 - 0.1	DC100	
	L / d = 4	*normal* normale	100 - 140	-	0.05 - 0.08	0.07 - 0.1		
	L / d = 6.3	*difficult* difficile	70 - 100	0.05 - 0.08	0.05 - 0.08	-	DK100	
aluminium alluminio	L / d = 2.5	*good* buona	300 - 400	-	0.05 - 0.08	0.07 - 0.1	DK100	
	L / d = 4	*normal* normale	250 - 350	-	0.05 - 0.08	0.07 - 0.1		
	L / d = 6.3	*difficult* difficile	100 - 150	0.05 - 0.08	0.05 - 0.08	-		
steel acciaio HCR > 50	L / d = 2.5	*good* buona	80 - 100	-	0.04 - 0.06	0.05 - 0.07	D20CBN	
	L / d = 4	*normal* normale	80 - 100	-	0.04 - 0.06	0.05 - 0.07		

CALCULATION FORMULAS FOR BORING
FORMULA DI CALCOLO PER ALESATURA

Vc ***cutting speed (m/min.)***
velocità di taglio (m/min.)

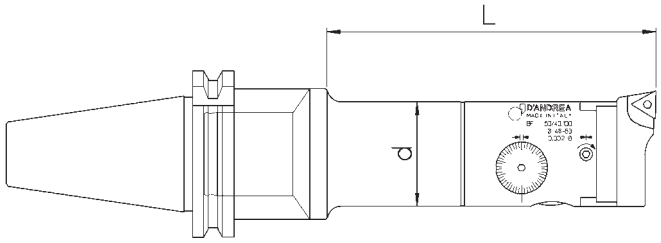
D ***diameter of workpiece (mm)***
diametro del pezzo da lavorare (mm)

n ***number of revolutions / min' (giri/min)***
numero di giri al minuto (giri/min.)

Vf ***feed rate (mm/min.)***
velocità avanzamento (mm/min.)

fn ***feed / rev. (mm/rev)***
avanzamento al giro (mm/giro)

π ***3.14***



$$Vc = \frac{\pi \cdot D \cdot n}{1000}$$

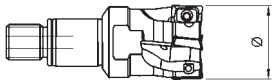
$$n = \frac{Vc \cdot 1000}{\pi \cdot D}$$

$$Vf = n \cdot fn$$

Recommended cutting conditions for milling

Dati di taglio consigliati per fresatura

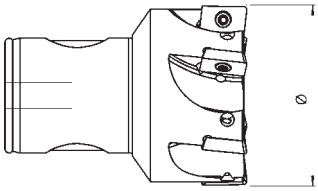
F-MHD AP



Ø	d
16	6.7
20	6.7
25	6.7
32	6.7

APKT

MHD AP



Ø	d
42	9.44
52	9.44
66	9.44

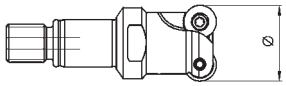
ISO		HB	fz = mm		Vc = m/min.			
					DP200 R		DP250 P	
			d = 6.7	d = 9.44	d = 6.7	d = 9.44	d = 6.7	d = 9.44
P	*Unalloyed steel* Acciaio non legato	125 - 300	0.10 - 0.25	0.20 - 0.35	325 - 255	270 - 225	250 - 210	210 - 190
	Low-alloyed steel Acciaio poco legato	180 - 350	0.10 - 0.25	0.20 - 0.35	275 - 235	220 - 205	200 - 190	180 - 170
	Alloyed steel Acciaio molto legato	200 - 325	0.10 - 0.25	0.20 - 0.35	255 - 205	240 - 180	180 - 160	160 - 140
M	*Stainless steel* Acciaio inossidabile	180 - 230	0.10 - 0.25	0.20 - 0.35	195 - 120	160 - 105	150 - 95	125 - 80
K	*Grey cast iron* Ghisa grigia	180 - 260	0.10 - 0.25	0.20 - 0.35	305 - 240	255 - 220	235 - 200	195 - 170
	Nodular cast iron Ghisa nodulare	160 - 250	0.10 - 0.25	0.20 - 0.35	255 - 220	205 - 200	195 - 180	175 - 150
	Malleable cast iron Ghisa malleabile	130 - 230	0.10 - 0.25	0.20 - 0.35	235 - 190	185 - 170	165 - 150	155 - 130
N	*Aluminium* Alluminio	-	-	-	-	-	-	-
S	*High-temperature alloys* Leghe resistenti calore	-	-	-	-	-	-	-
	Titanium alloys Leghe di titanio	-	-	-	-	-	-	-
H	*Hardened steel* Acciaio temprato	-	-	-	-	-	-	-

Recommended cutting conditions for milling

Dati di taglio consigliati per fresatura

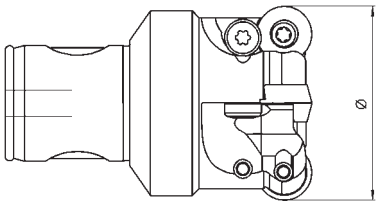
F-MHD RD

RDHX



Ø	d
16	7.00
20	7.00
25	10.00
32	10.00

MHD RD



Ø	d
42	12.00
52	12.00
66	16.00

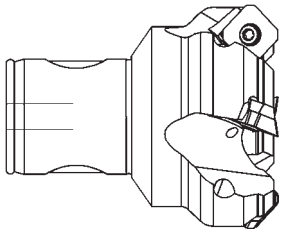
ISO		HB	fz = mm		Vc = m/min.			
					DP100 P		DP300 P	
			d = 7 - 10	d = 12 - 16	d = 7 - 10	d = 12 - 16	d = 7 - 10	d = 12 - 16
P	*Unalloyed steel* Acciaio non legato	125 - 300	0.10 - 0.35	0.15 - 0.50	290 - 240	280 - 240	325 - 255	265 - 225
	Low-alloyed steel Acciaio poco legato	180 - 350	0.10 - 0.35	0.15 - 0.50	240 - 220	235 - 220	275 - 235	215 - 205
	Alloyed steel Acciaio molto legato	200 - 325	0.10 - 0.35	0.15 - 0.50	220 - 190	210 - 190	255 - 205	195 - 175
M	*Stainless steel* Acciaio inossidabile	180 - 230	0.10 - 0.35	0.15 - 0.50	170 - 110	165 - 110	195 - 120	155 - 105
K	*Grey cast iron* Ghisa grigia	180 - 260	0.10 - 0.35	0.15 - 0.50	275 - 230	265 - 230	305 - 240	250 - 200
	Nodular cast iron Ghisa nodulare	160 - 250	0.10 - 0.35	0.15 - 0.50	225 - 210	215 - 200	255 - 220	200 - 180
	Malleable cast iron Ghisa malleabile	130 - 230	0.10 - 0.35	0.15 - 0.50	205 - 180	195 - 180	235 - 190	180 - 165
N	*Aluminium* Alluminio	-	-	-	-	-	-	-
S	*High-temperature alloys* Leghe resistenti calore	-	-	-	-	-	-	-
	Titanium alloys Leghe di titanio	-	-	-	-	-	-	-
H	*Hardened steel* Acciaio temprato	-	-	-	-	-	-	-

Recommended cutting conditions for milling

Dati di taglio consigliati per fresatura

MHD SE

SEET



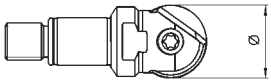
ISO		HB	fz = mm	Vc = m/min.	
				DP200 R	DP250 P
P	*Unalloyed steel* Acciaio non legato	125 - 300	0.17 - 0.40	235 - 205	230 - 190
	Low-alloyed steel Acciaio poco legato	180 - 350	0.17 - 0.40	200 - 185	190 - 170
	Alloyed steel Acciaio molto legato	200 - 325	0.17 - 0.40	180 - 155	170 - 150
M	*Stainless steel* Acciaio inossidabile	180 - 230	0.17 - 0.40	140 - 90	135 - 90
K	*Grey cast iron* Ghisa grigia	180 - 260	0.17 - 0.40	220 - 185	215 - 180
	Nodular cast iron Ghisa nodulare	160 - 250	0.17 - 0.40	185 - 165	180 - 160
	Malleable cast iron Ghisa malleabile	130 - 230	0.17 - 0.40	165 - 145	160 - 140
N	*Aluminium* Alluminio	-	-	-	-
S	*High-temperature alloys* Leghe resistenti calore	-	0.10 - 0.25	-	65 - 50
	Titanium alloys Leghe di titanio	-	0.10 - 0.25	-	45 - 30
H	*Hardened steel* Acciaio temprato	-	0.10 - 0.25	45 - 30	45 - 30

Recommended cutting conditions for milling

Dati di taglio consigliati per fresatura

F-MHD RA

RAD



Ø	d
16	16
20	20
25	25
32	32

ISO		HB	fz = mm				Vc = m/min.	
			d = 16	d = 20	d = 25	d = 32	DP100 P	DP300 P
P	*Unalloyed steel* Acciaio non legato	125 - 300	0.10 - 0.40	0.10 - 0.40	0.10 - 0.50	0.10 - 0.50	290 - 190	310 - 200
	Low-alloyed steel Acciaio poco legato	180 - 350	0.10 - 0.40	0.10 - 0.40	0.10 - 0.50	0.10 - 0.50	250 - 170	260 - 180
	Alloyed steel Acciaio molto legato	200 - 325	0.10 - 0.40	0.10 - 0.40	0.10 - 0.50	0.10 - 0.50	200 - 150	240 - 150
M	*Stainless steel* Acciaio inossidabile	180 - 230	0.10 - 0.30	0.10 - 0.30	0.10 - 0.30	0.10 - 0.30	180 - 100	200 - 100
K	*Grey cast iron* Ghisa grigia	180 - 260	0.10 - 0.30	0.10 - 0.30	0.10 - 0.30	0.10 - 0.30	270 - 170	285 - 180
	Nodular cast iron Ghisa nodulare	160 - 250	0.10 - 0.30	0.10 - 0.30	0.10 - 0.30	0.10 - 0.30	230 - 150	245 - 160
	Malleable cast iron Ghisa malleabile	130 - 230	0.10 - 0.30	0.10 - 0.30	0.10 - 0.30	0.10 - 0.30	190 - 140	225 - 140
N	*Aluminium* Alluminio	-	-	-	-	-	-	-
S	*High-temperature alloys* Leghe resistenti calore	-	-	-	-	-	-	-
	Titanium alloys Leghe di titanio	-	-	-	-	-	-	-
H	*Hardened steel* Acciaio temprato	-	-	-	-	-	-	-

General formulas

Formule generali

$$Vc = \frac{\pi \cdot D \cdot n}{1000}$$

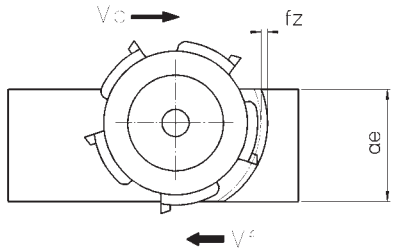
$$n = \frac{Vc \cdot 1000}{\pi \cdot D}$$

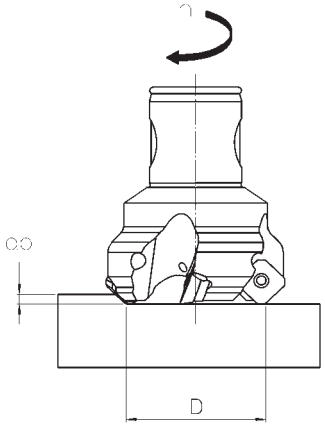
$$Vf = fz \cdot n \cdot z$$

$$fn = fz \cdot n$$

$$fz = \frac{Vf}{n \cdot z}$$

$$Q = \frac{ae \cdot ap \cdot Vf}{1000}$$





ae *cutting-parting width (mm)*
larghezza della fresatura *(mm)*

ap *depth of axial cutting (mm)*
profondità della fresatura *(mm)*

D *milling diameter (mm)*
diametro della fresa (mm)

fn *feed / rev. (mm/rev)*
avanzamento al giro *(mm/giro)*

fz *feed per tooth (mm/tooth)*
avanzamento al dente *(mm/dente)*

n *number of revolutions / min' (giri/min)*
numeri di giri al minuto *(giri/min)*

Q *volume of chip removed (cm^3/min)*
volume del truciolo asportato *(cm^3/min)*

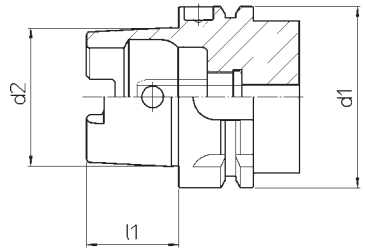
Vc *cutting speed (m/min.)*
velocità di taglio (m/min.)

Vf *feed rate (mm/min.)*
velocità avanzamento (mm/min.)

z *number of teeth*
numero denti della fresa

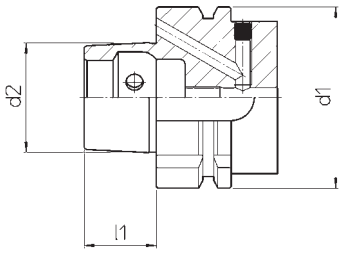
HSK DIN 69893

A



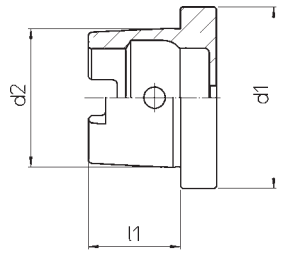
HSK-A	d1	d2	l1
32	32	24	16
40	40	30	20
50	50	38	25
63	63	48	32
80	80	60	40
100	100	75	50

B



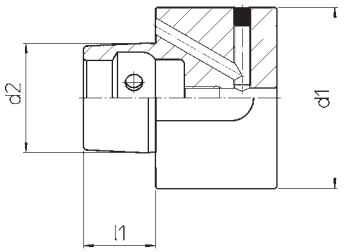
HSK-B	d1	d2	l1
-	-	-	-
40	40	24	16
50	50	30	20
63	63	38	25
80	80	48	32
100	100	60	40

C



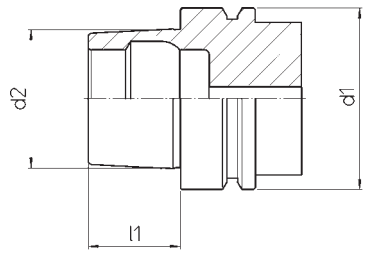
HSK-C	d1	d2	l1
32	32	24	16
40	40	30	20
50	50	38	25
63	63	48	32
80	80	60	40
100	100	75	50

D



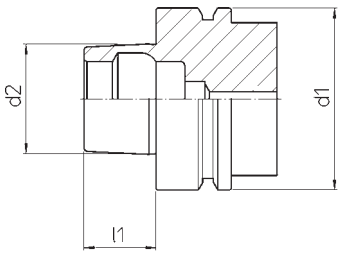
HSK-D	d1	d2	l1
-	-	-	-
40	40	24	16
50	50	30	20
63	63	38	25
80	80	48	32
100	100	60	40

E



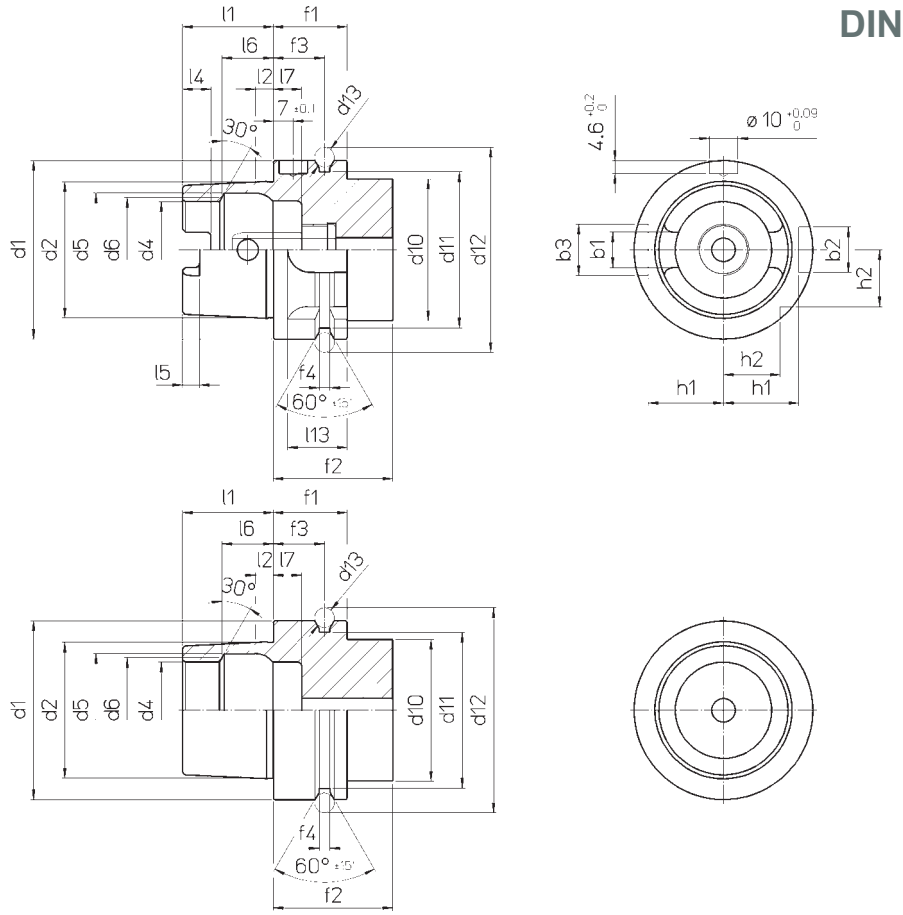
HSK-E	d1	d2	l1
32	32	24	16
40	40	30	20
50	50	38	25
63	63	48	32
-	-	-	-

F



HSK-F	d1	d2	l1
-	-	-	-
-	-	-	-
50	50	30	20
63	63	38	25
80	80	48	32

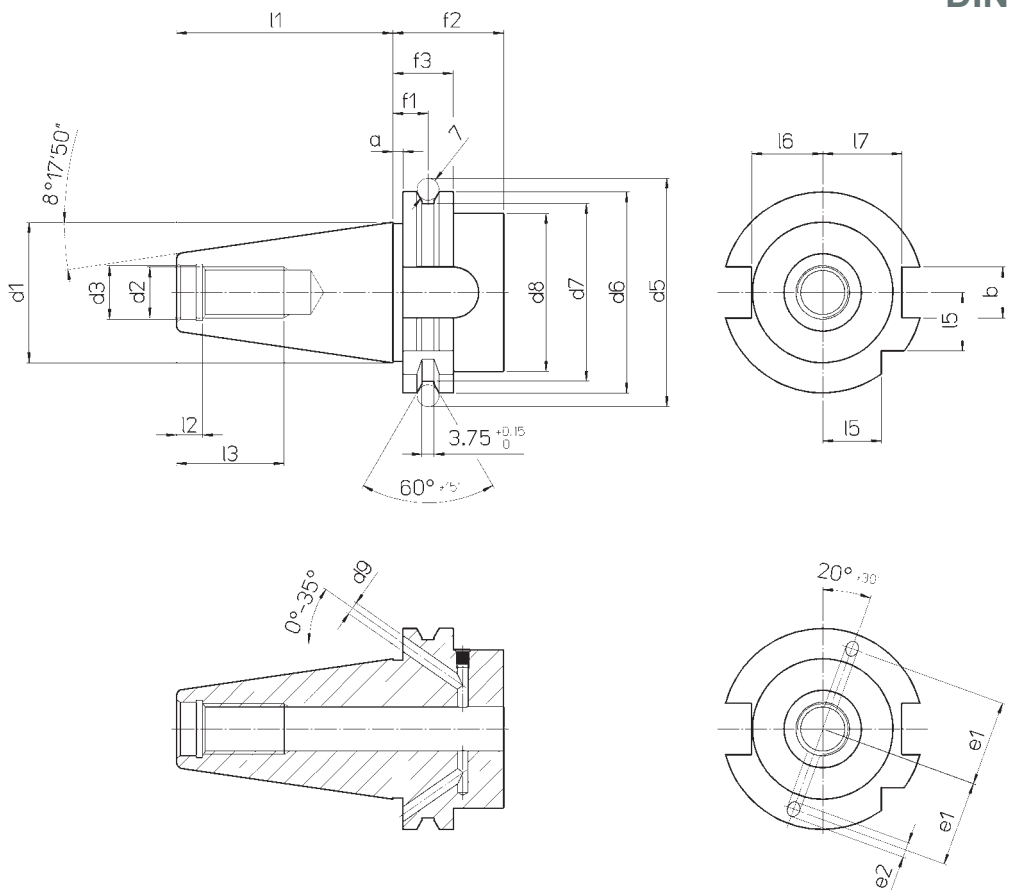
DIN 69893 A-E



HSK	32	40	50	63	80	100
b1 $^{+0.04}_{-0.04}$	7.05	8.05	10.54	12.54	16.04	20.02
b2 H10	7	9	12	16	18	20
b3 H10	9	11	14	18	20	22
d1 H10	32	40	50	63	80	100
d2	24 $^{+0.007}_{+0.005}$	30 $^{+0.007}_{+0.005}$	38 $^{+0.009}_{+0.006}$	48 $^{+0.011}_{+0.007}$	60 $^{+0.013}_{+0.008}$	75 $^{+0.015}_{+0.009}$
d4 H10	17	21	26	34	42	53
d5 H11	21	25.5	32	40	50	63
d6	19	23	29	37	46	58
d10 max.	26	34	42	53	67	85
d11 $^{0}_{-0.1}$	26.5	34.8	43	55	70	92
d12 $^{0}_{-0.1}$	37	45	59.3	72.3	88.8	109.75
d13	4	4	7	7	7	7
f1 $^{0}_{-0.1}$	20	20	26	26	26	29
f2 min.	35	35	42	42	42	45
f3 ± 0.1	16	16	18	18	18	20
f4 $^{+0.15}_{0}$	2	2	3.75	3.75	3.75	3.75
h1 $^{0}_{-0.2}$	13	17	21	26.5	34	44
h2 $^{0}_{-0.13}$	9.5	12	15.5	20	25	31.5
l1 $^{0}_{-0.2}$	16	20	25	32	40	50
l2	3.2	4	5	6.3	8	10
l4 $^{+0.2}_{0}$	5	6	7.5	10	12	15
l5 $^{+0.2}_{0}$	3	3.5	4.5	6	8	10
l6 JS10	8.92	11.42	14.13	18.13	22.85	28.56
l7 $^{0}_{-0.1}$	8	8	10	10	12.5	12.5
l13	12	12	19	21	22	24

DIN 69871

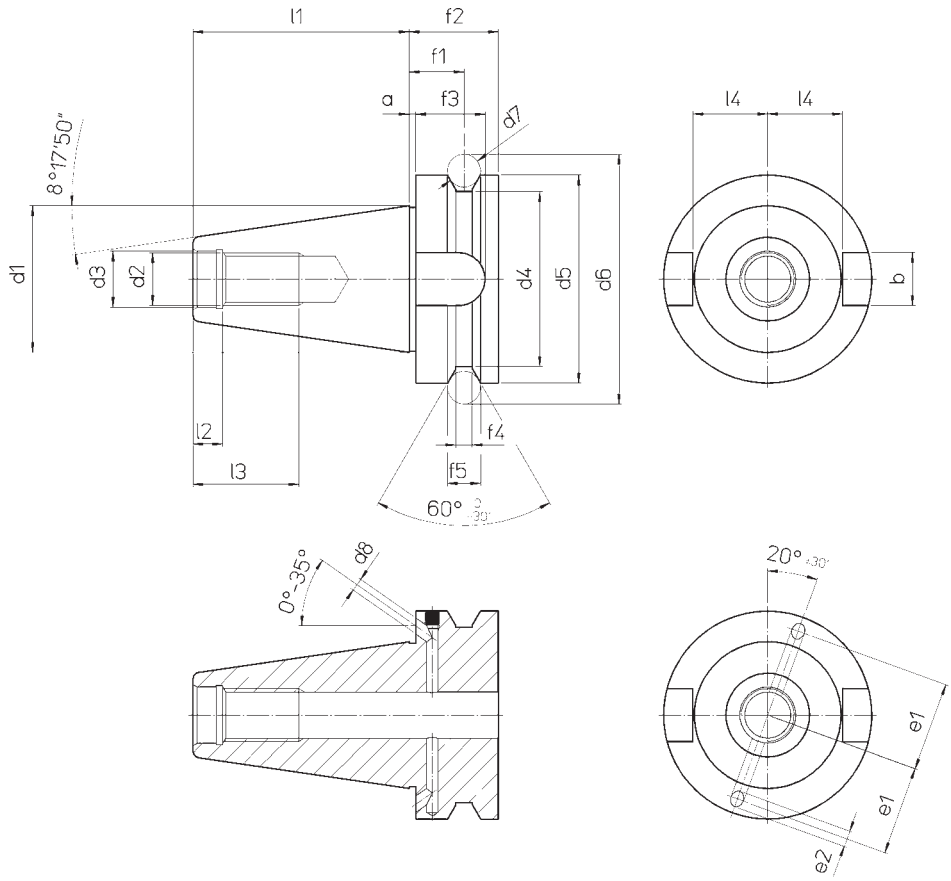
DIN 69871 A-B



ISO	30	40	45	50
a ±0.1	3.2	3.2	3.2	3.2
b H12	16.1	16.1	19.3	25.7
d1	31.75	44.45	57.15	69.85
d2	M12	M16	M20	M24
d3 H7	13	17	21	25
d5 ±0.05	59.3	72.3	91.35	107.25
d6 $^{0}_{-0.1}$	50	63.55	82.55	97.50
d7 $^{0}_{-0.5}$	44.3	56.25	75.25	91.25
d8 max.	45	50	63	80
d9	4	4	5	6
e1 ±0.1	21	27	35	42
e2 max.	5	5	6	7
f1 ±0.1	11.1	11.1	11.1	11.1
f2 min.	35	35	35	35
f3 $^{0}_{-0.1}$	19.1	19.1	19.1	19.1
l1 $^{0}_{-0.3}$	47.8	68.4	82.7	101.75
l2 $^{+0.5}_{0}$	5.5	8.2	10	11.5
l3 min.	24	32	40	47
l5 $^{0}_{-0.3}$	15	18.5	24	30
l6 $^{0}_{-0.4}$	16.4	22.8	29.1	35.5
l7 $^{0}_{-0.4}$	19	25	31.3	37.7

MAS 403 BT

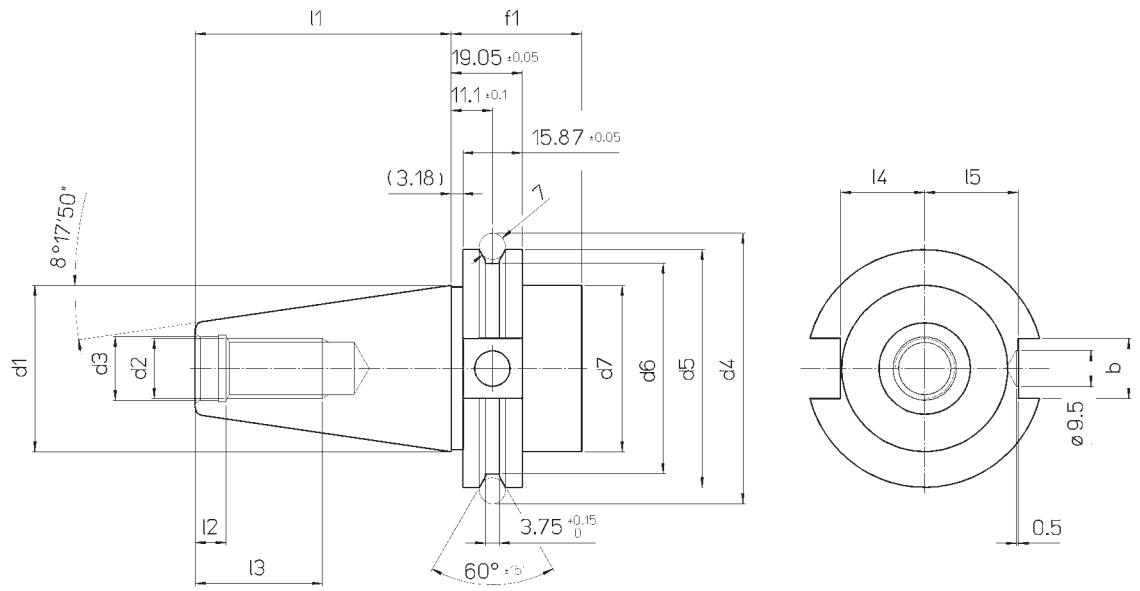
MAS 403 BT A-B



ISO	30	35	40	45	50
a ±0.4	2	2	2	3	3
b H12	16.1	16.1	16.1	19.3	25.7
d1	31.75	38.10	44.45	57.15	69.85
d2	M 12	M 12	M 16	M 20	M 24
d3 H8	12.5	12.5	17	21	25
d4	38	43	53	73	85
d5 H8	46	53	63	85	100
d6	56.144	65.680	75.679	100.215	119.019
d7	8	10	10	12	15
d8	4	4	4	5	6
e1 ±0.1	21	23	27	35	42
e2 max.	5	5	5	6	7
f1 ±0.1	13.6	14.6	16.6	21.2	23.2
f2	22	24	27	33	38
f3 min.	17	20	21	26	31
f4	4	5	5	6	7
f5 $^{+0.1}_{0}$	8	10	10	12	15
l1 ±0.2	48.4	56.4	65.4	82.8	101.8
l2 $^{+0.5}_{0}$	7	7	9	11	13
l3 min.	24	24	30	38	45
l4 $^{0}_{-0.2}$	16.3	19.6	22.6	29.1	35.4

ANSI/CAT METRIC - CAT INCH

Arbors standards	Normen für Grundaufnahmen	Normas acoplamientos base	Normes mandrins	Norme attacchi base



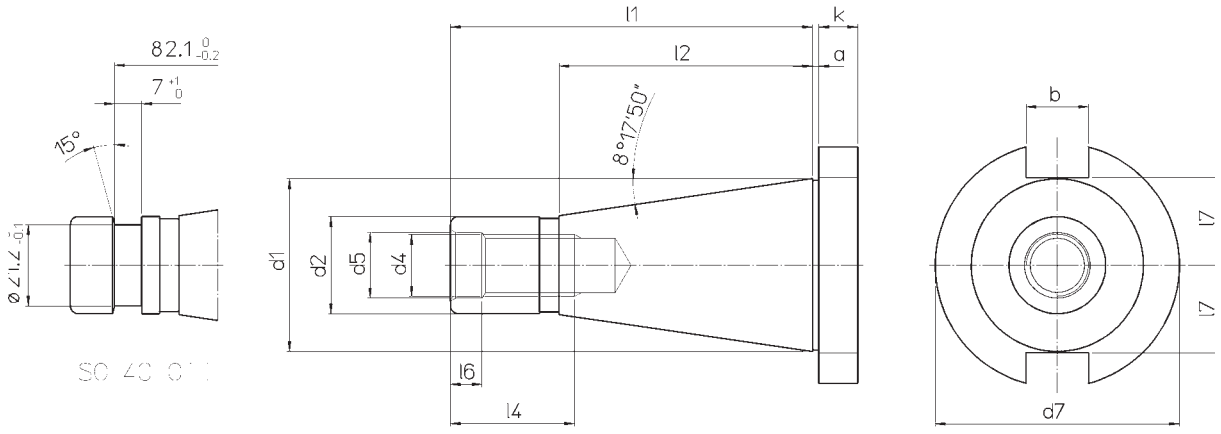
ANSI/CAT METRIC

ISO	40	45	50
b $^{+0.2}_{0}$	16.1	19.3	25.7
d1	44.45	57.15	69.85
d2	M 16	M 20	M 24
d3 H7	17	21	25
d4 ±0.05	72.3	91.35	107.25
d5 $^{0}_{-0.1}$	63.55	82.55	98.45
d6 $^{0}_{-0.5}$	56.25	75.25	91.25
d7 ±0.25	44.45	57.15	69.85
f1 ±0.25	35	35	36.5
l1 $^{0}_{-0.3}$	68.4	82.7	101.75
l2 $^{+0.5}_{0}$	4.75	5.25	5.75
l3 min.	30	38	45
l4 $^{0}_{-0.4}$	22.8	29.10	35.50
l5 $^{0}_{-0.4}$	26	32.5	40.40

CAT INCH

ISO	40	45	50
b $^{+0.2}_{0}$	16.1	19.3	25.7
d1	44.45	57.15	69.85
d2	UNC 5/8-11	UNC 3/4-10	UNC 1-8
d3 $^{+0.4}_{0}$	16.3	19.45	26.2
d4 ±0.05	72.3	91.35	107.25
d5 $^{0}_{-0.1}$	63.55	82.55	98.45
d6 $^{0}_{-0.5}$	56.25	75.25	91.25
d7 ±0.25	44.45	57.15	69.8
f1 ±0.25	35	35	36.5
l1 $^{0}_{-0.3}$	68.4	82.7	101.75
l2 $^{+0.5}_{0}$	4.75	5.25	5.75
l3	30	38	45
l4 $^{0}_{-0.4}$	22.8	29.10	35.50
l5 $^{0}_{-0.4}$	26	32.5	40.40

DIN 2080 - NMTB

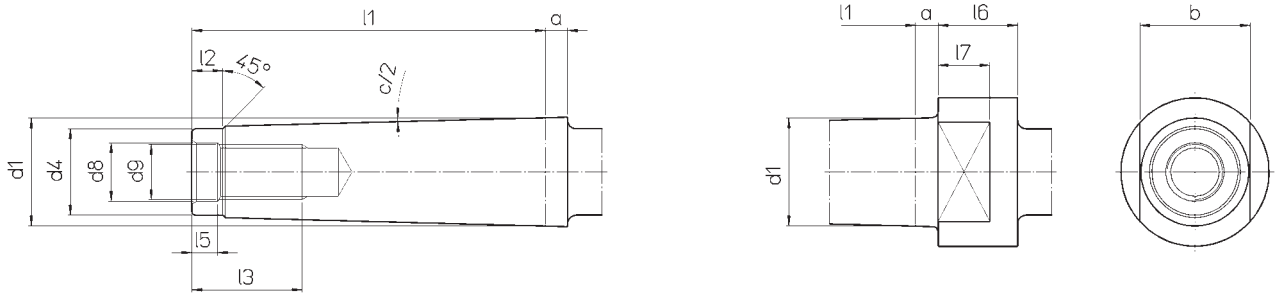


DIN 2080				
ISO	30	40	45	50
a ±0.2	1.6	1.6	3.2	3.2
b H12	16.1	16.1	19.3	25.7
d1	31.75	44.45	57.15	69.85
d2 a10	17.4	25.3	32.4	39.6
d4	M 12	M 16	M 20	M 24
d5	13	17	21	26
d7 0 -0.4	50	63	80	97.5
k ±0.15	8	10	12	12
l1	68.4	93.4	106.8	126.8
l2	48.4	65.4	82.8	101.8
l4	24	32	40	47
l6 +0.5 0	5.5	8.2	10	11.5
l7 max.	16.2	22.5	29	35.3

NMTB		
ISO	40	50
a ±0.2	1.6	3.2
b H12	16.1	25.7
d1	44.45	69.85
d2 a10	25.3	39,6
d4	UNC 5/8-11	UNC 1-8
d5 +0.15 0	16.5	26
d7 0 -0.4	63	97.5
k ±0.15	10	12
l1	93.4	126.8
l2	65.4	101.8
l4	28.5	44.5
l6 +0.5 0	5	11
l7 max.	22.5	35.3
-	-	-

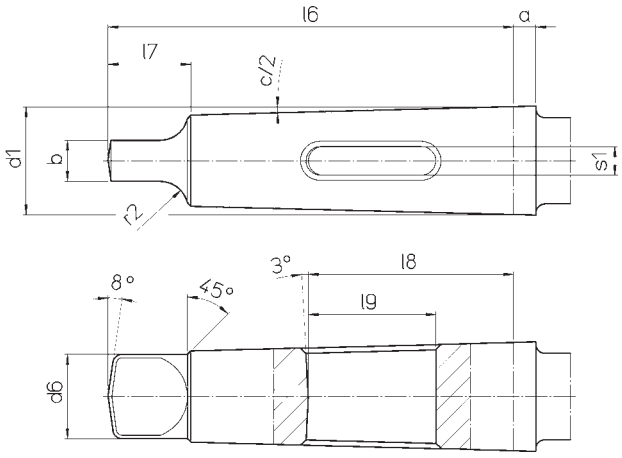
DIN 228/A

DIN 2207



MORSE	4	4 SIP
a	6.5	6.5
b d9	32	32
c/2	1°29’15”	1°29’15”
d1	31.267	31.267
d4 max.	25	25
d8	17	17
d9	M 16	M 14
l1 max.	102.5	102.5
l2	9	9
l3 min.	32	45
l5 $^{+0.5}_{0}$	8.2	8.5
l6	15	15
l7	23	23

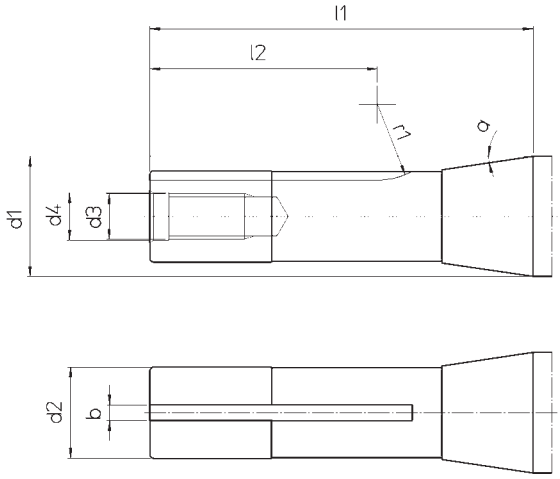
DIN 228/B DIN 1806



MORSE	4	5
a	6.5	6.5
b H13	11.9	15.9
c/2	1°29’15”	1°30’26”
d1	31.267	44.399
d6 max.	24.5	35.7
l6 $^{0}_{-1}$	117.5	149.5
l7 max.	24	29
l8	59.5	64
l9	37	42
r2	8	10
s1	8.3	12.4

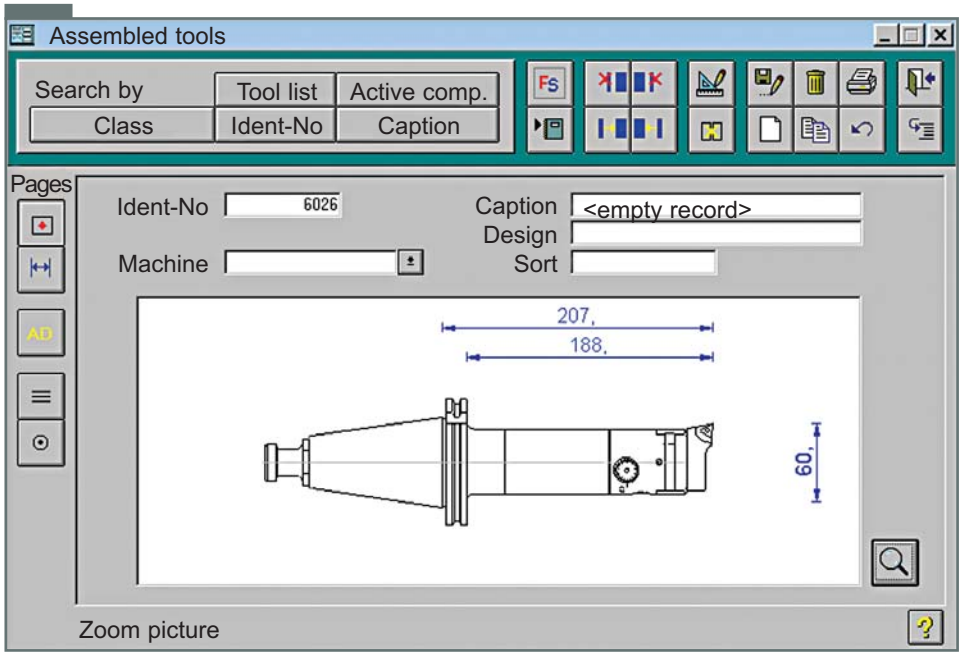
R8 METRIC / INCH

R8



R8	METRIC	INCH
a	8°25’30”	8°25’30”
b ± 0.1	4.2	4.2
d1	31.750	31.750
d2	24.109	24.109
d3 -0.007 -0.020	M 12	UNF 7/16-20
d4	12.5	12.5
l1	101	101
l2 min.	60	60
r1	20	20

WINTOOL



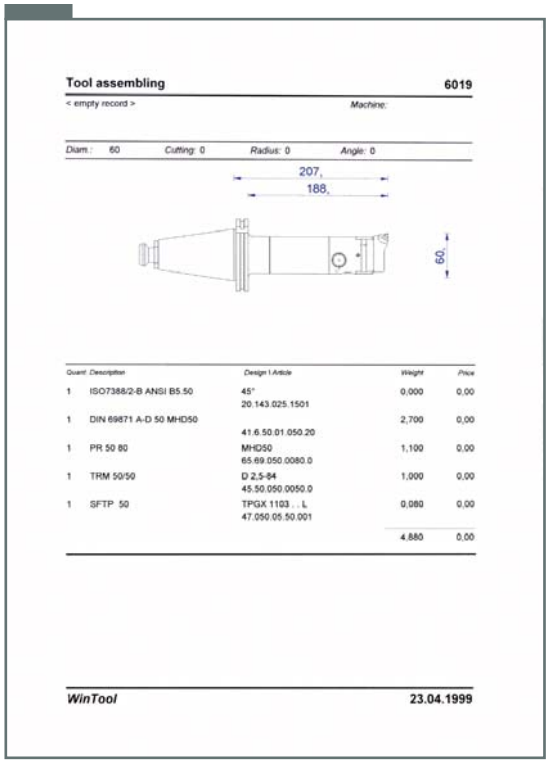
It allows to be graphically constructed in a short period of time, showing the complete composition of the MODULHARD'ANDREA tools, including dimensions, weight and the list of components.

Der Grafikgenerator ermöglicht in kurzer Zeit das Zusammenstellen kompletter Werkzeuge mit MODULHARD'ANDREA-Elementen, indem er die Abmessungen, das Gewicht und die Liste der Bauteile angibt.

Generador gráfico que permite componer en breve tiempo herramientas completas con elementos del MODULHARD'ANDREA, indicando las dimensiones, el peso y la lista de los componentes.

Générateur graphique qui permet de composer, en peu de temps, des outils complets avec des éléments du MODULHARD'ANDREA, tout en indicant les dimensions, le poids et la liste des composants.

Generatore grafico che permette di comporre in breve tempo utensili completi con elementi del MODULHARD'ANDREA, indicando le dimensioni, il peso e la lista dei componenti.


Tool assembling 6019

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207,
188,
60,

Quant.	Description	Design | Article	Weight	Price
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1	PR 50 80	MHD50 65.69.050.0080.0	1,100	0,00
1	TRM 50/50	D 2,5-84 45.50.050.0050.0	1,000	0,00
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			4,880	0,00

WinTool 23.04.1999