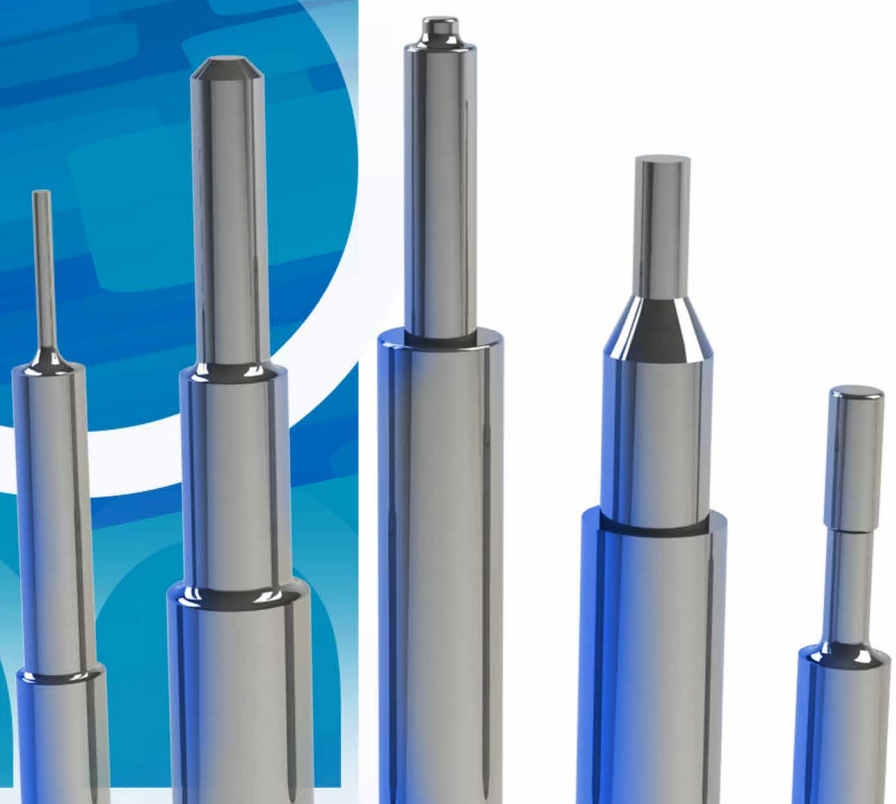
PM BOYUN

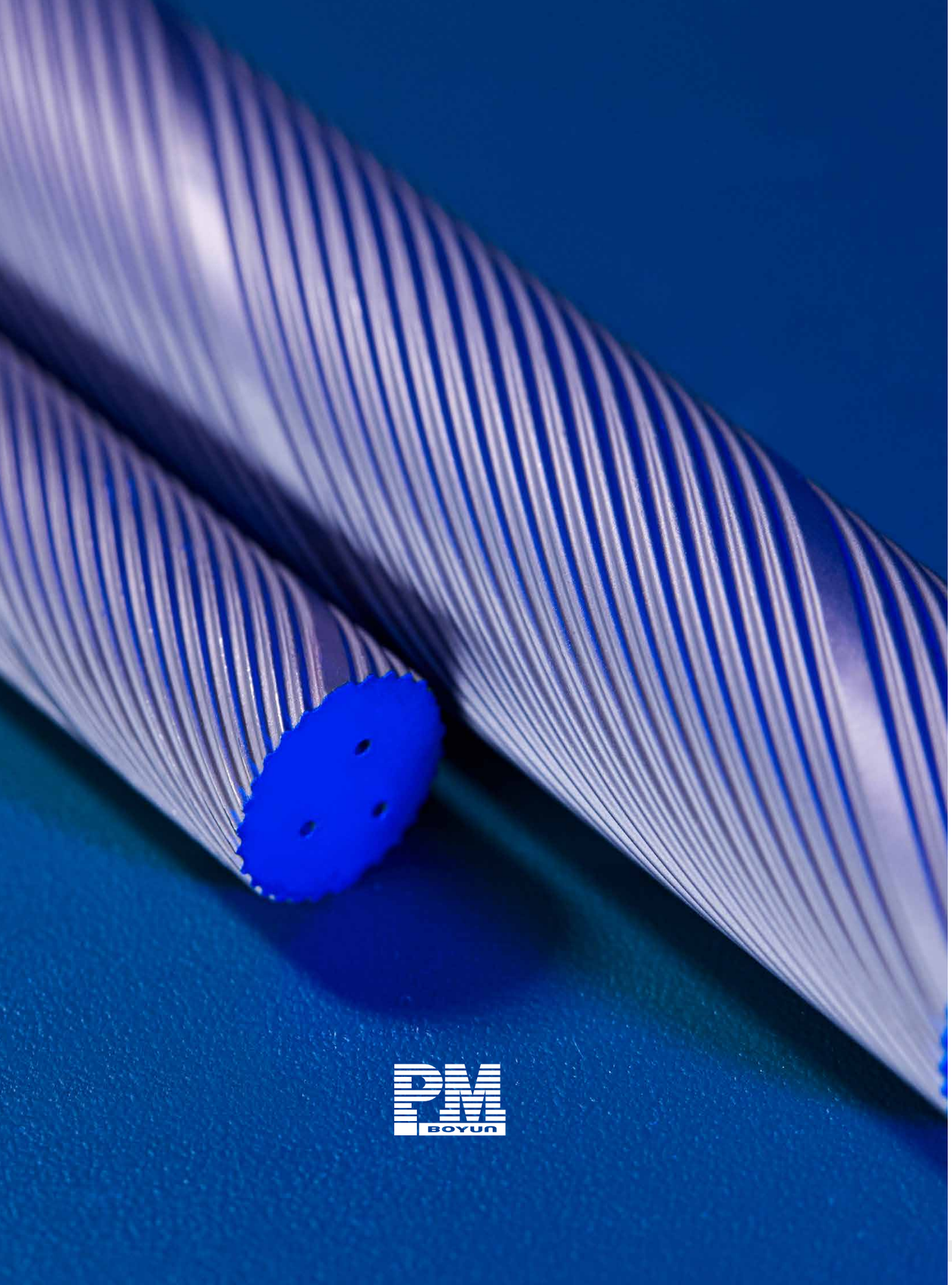
CARBIDE
MOLD MATERIAL

BOYUN

#2 CARBIDE - MOLD MATERIAL



INNOVATION MAKES DREAMS COME TRUE



CONTENTS

Our Company

Hunan Boyun Dongfang Powder Metallurgy Co., Ltd. was founded in 1994 by the Institute of powder metallurgy of Central South University of Technology (now the research center of powder metallurgy engineering of Central South University) and Hunan Yinzhou Co., Ltd. (now the wholly-owned member company of China Dongfang asset management company, Bangxin Asset Management Co., Ltd.),now it is the holding subsidiary of Hunan Boyun New Material Co., Ltd. (Stock Code: 002297), with a registered capital of 307 million yuan. The company is a national high-tech enterprise with Academician Huang Boyun, the top material scientist in China, as the chief scientist and honorary chairman of the board, integrating domestic and foreign talents and technological advantages, integrating production, learning, research and application, engaged in the research, development, production and sales of high-performance cemented carbide. Company is medium-sized enterprises to become state-level technologically advanced 'little giant' enterprises. The member of China Tungsten Industry Association, China mold industry association, China machinery industry metal cutting tool technology association.

With strong support from Central South University, State Key Laboratory of Powder Metallurgy, National Engineering Research Center of Powder Metallurgy, national key laboratory of light and high strength structural materials, Quality Supervision and Inspection Center of Powder Metallurgy Products of Chinese Nonferrous Material Industry , the Company has played leading role in three projects of "National High Technology Research and Development Program (863 plan)".

Chief Scientist

Academician of Chinese Academy of Engineering
Winner(1st) of China National Technological Invention Award (2005)
Former president of Central South University
Member of Twelfth National People's Congress Standing Committee
Vice-Chairman, Chinese Association for Science

ACADEMICIAN HUANG BOYUN

Honorary Chairman, Chief Scientist

COMPANY INTRODUCTION

Specialty One: Owned complete discipline system on non-ferrous materials while established top classes of non-ferrous metallurgy in the world.
Specialty Two: Conducted over 60 years of high education and R&D in rail transit system and made vital contributions to major projects including Qinghai-Tibet railway, high-speed railway, urban rail and helped to increase speed of all Chinese trains (six times).

1 GEOLOGY

4 METALLURGY

2 MINING

5 MATERIAL

3 ORE DRESSING

6 MECHANICAL

FEATURE SUBJECTS OF CENTRAL SOUTH UNIVERSITY

The University participated in the "Qinghai-Tibet Railway Project"
The series of railway aerodynamics are widely used in the speeding of western railways and the construction of high-speed railways.

INSTITUTE OF POWDER METALLURGY

Among 31 colleges of CSU, the Institute of Powder Metallurgy is a comprehensive base of high education, R&D and industrialization of new materialsvv in China.

P / M Research Institute has established four national level P / M material and technology research and development bases:
State Key Laboratory of Powder Metallurgy
Supervision and Testing Center of Products of Powder Metallurgy of Chinese Nonferrous Metals Industry
National Engineering Research Center of Powder Metallurgy

Company Introduction

GLORIOUS HISTORY OF POWDER METALLURGY RESEARCH INSTITUTE

Established at 1958,

First Powder Metallurgy discipline in China.

In 1989,
Expansion, Solidification of fundamental theory and technology and frontier of PM.

In 1995,
Open up, civil-military integration and innovation-driven strategies to meet major national needs.

In 2003,

EXCELLENT State Key Laboratory

In 2004,

First Prize of National Technology Invention Award.

In 2008,
EXCELLENT State Key Laboratory.

In 2011,

First Prize of National Science and Technology Progress.

In 2017,
C919 took her maiden flight.

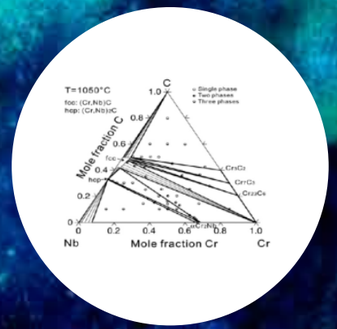
In 2018,
project 2011" Nonferrous Metals Advanced Structural Materials and Manufacturing Cooperative Innovation Center" was passed the acceptance.

2019

Company Introduction

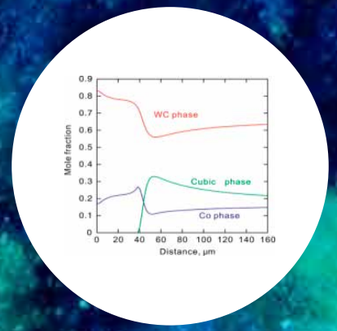
INSTITUTE OF POWDER METALLURGY

Basic research on Application of special PM materials



Thermodynamics database

$$V_{Co} = \frac{u^{S}_{Co} \cdot V^{m}_{Co}}{\left(1-u^{S}_{Co}\right) \cdot V^{m}_{WC} + u^{S}_{Co} \cdot V^{m}_{Co}}$$



Dynamics database

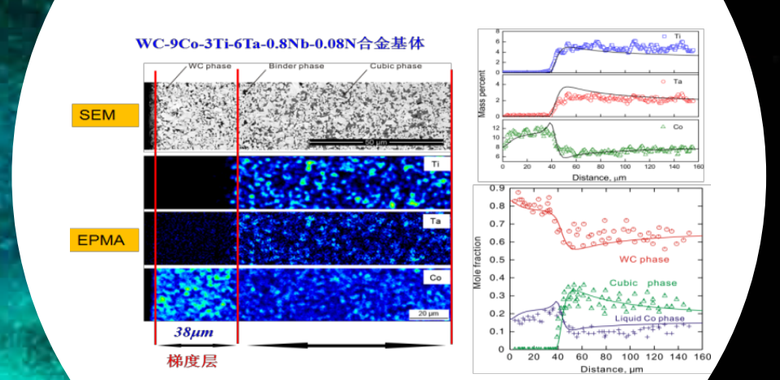
The Institute of powder metallurgy has built the most complete database of thermodynamics and dynamics of muti-component cemented carbide in the world, which can accurately predict the distribution of phases and elements in the gradient layer of cemented carbide. Base on this database, a series of new gradient cemented carbide have been developed by integrated calculation.

Propose the Symplectic Du formula to achieve efficient prediction of liquid phase diffusion coefficient 16-component cemented carbide thermodynamic and dynamics database.

Using the database, quantitative description of Phase and Element Distribution in Cemented Carbide Gradient.

Gradient cemented carbide composition

Comparison of predictions and experimental results



Structure Characterization and Quantitative Description of Element Distribution of Gradient Cemented Carbide

Company Introduction

COMPANY BRAND AND MARKET

Protection of Intellectual Property RightsProfessional

Besides registered in China, "PM" trademark has also been registered in the United States and the European Union.

Business Area

The company's business has expanded to many countries and regions around the world.

Company Introduction

CEMENTED CARBIDE

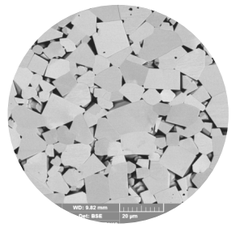
Cemented carbide is a kind of composite material which is made of refractory metal hard compounds (WC, TiC, etc.) and bonding metals (CO, Ni, Fe, etc.) by powder metallurgy. Cemented carbide have high hardness, high wear resistance, high strength, high modulus of elasticity, low coefficient of thermal expansion, high red hardness and stable chemical properties.

Classification of Grain Size of Cemented Carbide (ISO4499-2-2008)

Category	Grain size of WC(μm)
Nano	＜0.2
Ultrafine	0.2～0.5
Submicron	0.5～0.8
Fine	0.8～1.3
Medium	1.3～2.5
Coarse	2.5～6.0
Extra coarse	＞6.0

Nano cemented carbide which means the WC grain size is less than 0.2 μm cemented carbide, nano cemented carbide has higher hardness and strength than normal cemented carbide, at the same time ,effectively solves the problem of ultra-high speed cutting of hard to machine materials such as superalloy, titanium alloy, composite material, hardened steel, etc., greatly improves the machining efficiency, and is the preferred tools material in the aerospace field and high-end equipment manufacturing industry.

Extra coarse-grained cemented carbide is a kind of cemented carbide with WC grain size larger than 6μm, compared with coarse grained cemented carbide, it has better toughness, thermal fatigue resistance and higher wear resistance. It is widely used in shield, mining, stamping die, cold heading die, roll and other industries under extreme working conditions, and the product reliability is greatly improved.



SEM micrograph of extra coarse grained cemented carbide (2000X)

Company Introduction

TECHNICAL ADVANTAGES

R & D Team

Academician Huang Boyun is the chief scientist, relying on the Central South University, and in combination with the premium customer WOLF group in Germany, the largest shield equipment manufacturer in China, China railway construction heavy industry group, and the first industrial Internet in China Brand Foxconn industrial Internet Co., Ltd. consists of a strong interdisciplinary R & D team.

Company Introduction

TECHNICAL ADVANTAGES

Ultrafine / Nano Cemented Carbide

Since 2002, Boyun-Dongfang has been cooperating with Central South University to continuously carry out the research and development and preparation of ultra-fine / nano cemented carbide with the support of the National Innovation Fund for small and medium-sized science and technology enterprises and the national high-tech research and development plan-(863 Program).

Extra Coarse-Grained Cemented Carbide

The company developed the extra coarse-grained cemented carbide with WC grain size greater than 9μm has better toughness, better thermal fatigue resistance and higher wear resistance than the traditional extra coarse-grained cemented carbide. It is widely used in shield, mining, stamping die, cold upsetting die, roll and other industries under extreme working conditions, and the product reliability is greatly improved.

Have independent intellectual property rights and advanced self-activation high temperature reduction high temperature carbonization extra coarse-grained tungsten carbide powder preparation technology.

Company Introduction

DEVELOPMENT HISTORY

Established in 1994

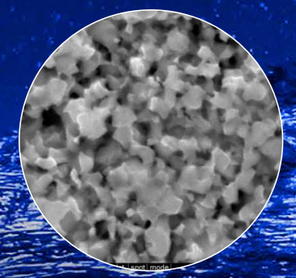
IN 2003
0.4μm

IN 2008
0.3μm

IN 2016
The company developed the grain size less than 0.2μm.

IN 2018

IN 2019



SEM Image of Nano Size Carbide(30000X)

Ultrafine / Nano Cemented Carbide development history

TECHNICAL ADVANTAGES

Coating

Coating technology reaches the international leading level

- Unique droplet suppression
- Unique decorating process
- High Adhesion
- Precise Control of Thickness, With Guaranteed Accuracy
- High Wear Resistance

We are the strategic partner of eifeler and wolf in China

We are eifeler's demonstration plant in China

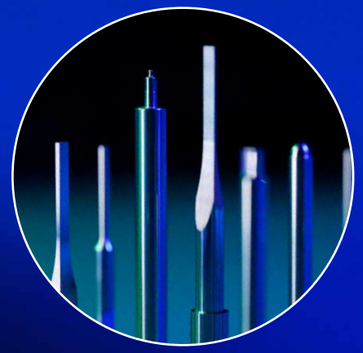
Our coating products have the same performance level as Germany

Company Introduction

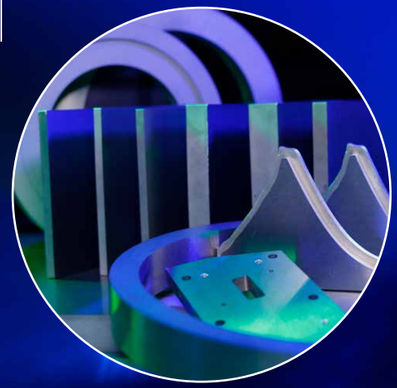
MAIN BUSINESS

The main business is the R & D, producing and sales of high-performance cemented carbide products. The main products are high-performance ultra-fine / nano cemented carbide rods, high-performance cemented carbide mold materials, high-performance extra coarse grain size cemented carbide in engineering and mining, refined and deep processed cemented carbide products (parts / components), etc. Our products are widely used in aerospace, automobile, metallurgy, engineering & mining, microelectronics and other industrial fields, and have been well known by our customers.

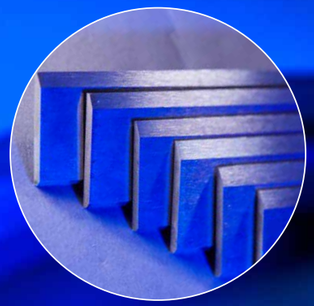
Coating



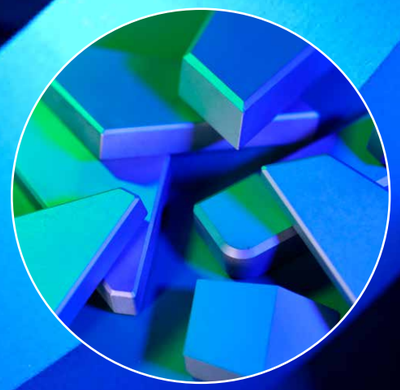
Finished Products



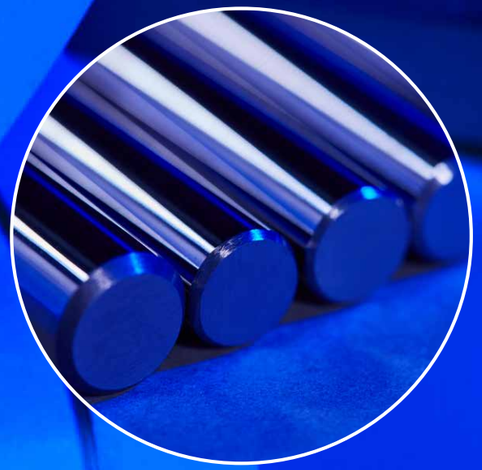
Molds



Special Tools



Shield Cutter



Rods

Cemented Carbide Molds Material

OUR PRODUCT

C A R B I D E

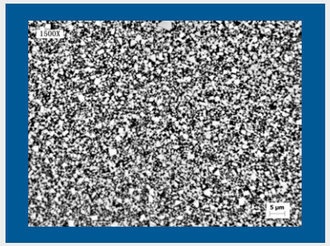
Grade Of Precision Cemented Carbide Stamping Molds

Grade Of Precision Cemented Carbide Stamping Molds									
Grade	Co	Grain Size of WC	Hardness		Density	Flexural Strength	Fracture Toughness	Elastic Modulus	Coefficient of Thermal Expansion
	Co%		HRA	HV_{30}	g/cm³	MPa	N/mm²	GPa	10^{-6}/°C
MD36C	15	Nano	92.0	1670	13.8	4800	10	430	6.3
MD36B	15	Ultra-fine	91.5	1570	13.8	4200	11	430	6.3
MD15	12	Ultra-fine	92.4	1740	14.1	5100	10	470	5.7
MD10	10	Sub-Micron	91.7	1620	14.4	4300	11	490	5.4
MD33A	12	Sub-Micron	90.3	1440	14.2	3700	14	470	5.7
MD20	13	Sub-Micron	90.6	1470	14.1	4100	15	460	5.8
MD36	15	Sub-Micron	89.4	1330	13.8	3900	16	430	6.3
MD16	6	Fine	90.5	1460	14.8	3200	12	530	4.9
MD40B	12	Fine	89.5	1340	14.2	3600	17	470	5.7
MD40C	12	Fine	89.7	1370	14.1	3800	16	470	5.7
MD55	20	Fine	86.4	1060	13.5	3100	-	390	6.8
MD40A	12	Medium	88.9	1280	14.2	3500	-	470	5.7
MD45A	15	Medium	87.9	1190	13.9	3500	-	430	6.3

Grade Comparison Table

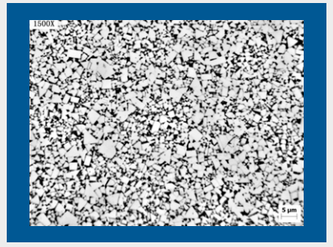
Grade Comparison Table						
PM	EVERLOY	CERATIZIT	KENNAMETAL	FUJILLOY	SANALLOY	SANDVIK
MD15	EF10	CF-H25S+	-	F10	FD25	12UF
MD10	KD10	-	KR855	VF12	FD15	H10F
MD36	WD20	-	CD650	F20	-	H15F
MD16	MC20	-	-	D20	RD20	-
MD20	KD20	CTS24	KR887	VD45	RF20	H12F
MD40C	-	CF-H40S+	KR466	-	-	-
MD40A	G4	CTF30	-	D50	RD50	H12N
MD45A	G5	CTM30	-	D60	RD60	-

New Grade Introduction



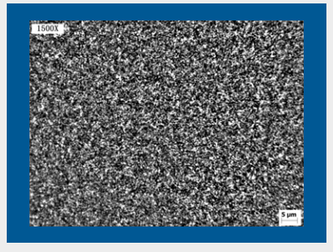
MD40C

Excellent wear resistance, toughness, versatility, and widely application



MD16

Low cobalt, low affinity with iron, copper and other metal materials, it is suitable for processing pure iron, copper and other good ductility metal materials.



MD36C

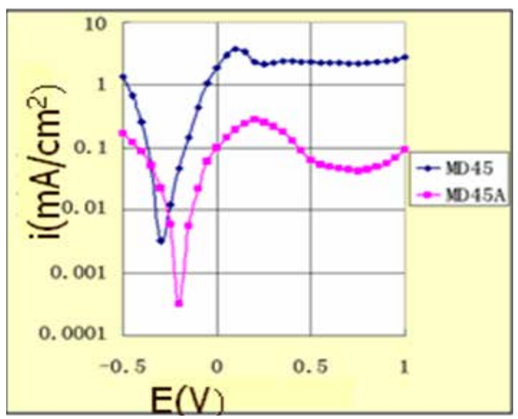
Nano cemented carbide with Grain size less than 0.2μm, it has high hardness and strength.

Technical Features

High performance cemented carbides for molding

1.Tunable residual stress

2.Electrochemical corrosion resistance

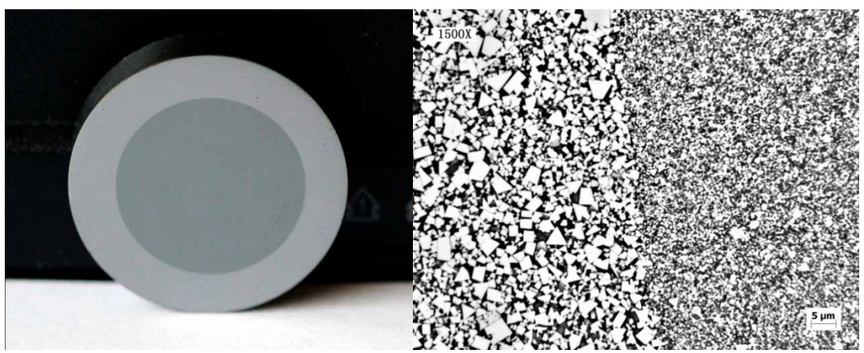


Polarization Curve

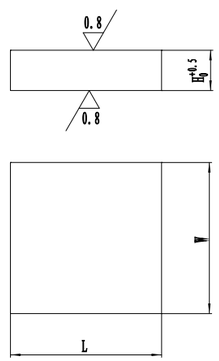
corrosion current reduced, corrosion rate decreased significantly, corrosion resistance improved significantly

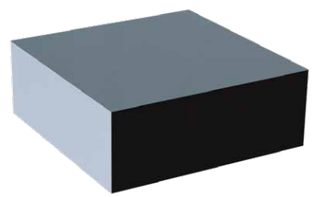
multi-layer cemented carbide

Produce variable mechanical properties to satisfied different working conditions. {Patent No 201120053687.7}



Standard Specification For Square Material





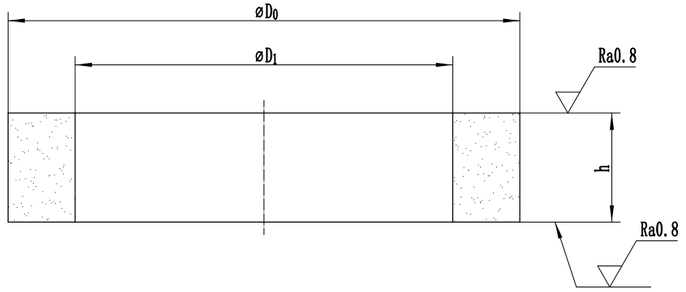
Standard Specification For Square Material

Tolerance Specifications	Tolerance of L/W	Thickness dimension(Tolerance 0～+0.5)				
		1.5～5.0	> 5.0～10.0	> 10.0～15.0	> 15.0～40.0	> 40.0～70.0
100*100	+5.0	√	√	√	√	—
105*105	+5.0	√	√	√	√	√
100*150	+5.0	—	√	√	√	√
120*120	+5.0	—	√	√	√	—
150*150	+8.0	—	√	√	√	√
150*250	+10.0	—	√	√	√	—
200*200	+10.0	—	—	√	√	√
200*250	+10.0	—	—	√	√	—
250*250	+10.0	—	—	—	√	—
300*300	+10.0	—	—	—	√	—
400*400	+15.0	—	—	—	√	—

We can also provide customized services for other size products.

Standard Specifications Of The Rings

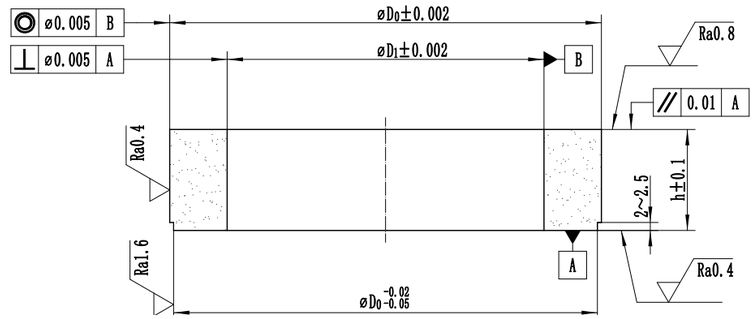
Blank Part



Unit:mm

Standard Specifications of the Blank Ring and Tolerance			
NO.	D0×D1×h	NO.	D0×D1×h
1	$43^{+1.0}_{+0.4}\times25^{0}_{-1.5}\times26\pm0.4$	19	$155^{+1.2}_{+0.4}\times115^{0}_{-1.8}\times26^{+0.6}_{-0.4}$
2	$49^{+1.0}_{+0.4}\times30^{0}_{-1.5}\times26\pm0.4$	20	$160^{+1.4}_{+0.5}\times120^{0}_{-1.8}\times26^{+0.8}_{-0.4}$
3	$54^{+1.0}_{+0.4}\times35^{0}_{-1.5}\times26\pm0.4$	21	$165^{+1.4}_{+0.5}\times125^{0}_{-1.8}\times26^{+0.8}_{-0.4}$
4	$60^{+1.0}_{+0.4}\times40^{0}_{-1.5}\times26\pm0.4$	22	$170^{+1.4}_{+0.5}\times130^{0}_{-2.0}\times26^{+0.8}_{-0.4}$
5	$67^{+1.1}_{+0.4}\times45^{0}_{-1.5}\times26\pm0.4$	23	$175^{+1.4}_{+0.5}\times135^{0}_{-2.0}\times26^{+0.8}_{-0.4}$
6	$73^{+1.1}_{+0.4}\times50^{0}_{-1.5}\times26\pm0.4$	24	$185^{+1.4}_{+0.5}\times140^{0}_{-2.0}\times26^{+0.8}_{-0.4}$
7	$80^{+1.1}_{+0.4}\times55^{0}_{-1.5}\times26\pm0.4$	25	$190^{+1.6}_{+0.5}\times145^{0}_{-2.0}\times26^{+1.0}_{-0.4}$
8	$85^{+1.1}_{+0.4}\times60^{0}_{-1.5}\times26\pm0.4$	26	$195^{+1.6}_{+0.5}\times150^{0}_{-2.0}\times26^{+1.0}_{-0.4}$
9	$92^{+1.1}_{+0.4}\times65^{0}_{-1.5}\times26\pm0.4$	27	$200^{+1.6}_{+0.5}\times155^{0}_{-2.0}\times26^{+1.0}_{-0.4}$
10	$98^{+1.1}_{+0.4}\times70^{0}_{-1.5}\times26\pm0.4$	28	$206^{+1.6}_{+0.5}\times160^{0}_{-2.0}\times26^{+1.0}_{-0.4}$
11	$103^{+1.1}_{+0.4}\times75^{0}_{-1.5}\times26\pm0.4$	29	$212^{+1.6}_{+0.5}\times165^{0}_{-2.0}\times26^{+1.0}_{-0.4}$
12	$109^{+1.2}_{+0.4}\times80^{0}_{-1.8}\times26^{+0.6}_{-0.4}$	30	$218^{+1.6}_{+0.5}\times170^{0}_{-2.0}\times26^{+1.0}_{-0.4}$
13	$115^{+1.2}_{+0.4}\times85^{0}_{-1.8}\times26^{+0.6}_{-0.4}$	31	$224^{+1.6}_{+0.5}\times175^{0}_{-2.0}\times26^{+1.0}_{-0.4}$
14	$122^{+1.2}_{+0.4}\times90^{0}_{-1.8}\times26^{+0.6}_{-0.4}$	32	$230^{+1.6}_{+0.5}\times180^{0}_{-2.0}\times26^{+1.0}_{-0.4}$
15	$128^{+1.2}_{+0.4}\times95^{0}_{-1.8}\times26^{+0.6}_{-0.4}$	33	$235^{+1.6}_{+0.5}\times185^{0}_{-2.0}\times26^{+1.0}_{-0.4}$
16	$136^{+1.2}_{+0.4}\times100^{0}_{-1.8}\times26^{+0.6}_{-0.4}$	34	$243^{+1.6}_{+0.5}\times190^{0}_{-2.0}\times26^{+1.0}_{-0.4}$
17	$145^{+1.2}_{+0.4}\times105^{0}_{-1.8}\times26^{+0.6}_{-0.4}$	35	$250^{+1.6}_{+0.5}\times195^{0}_{-2.0}\times26^{+1.0}_{-0.4}$
18	$150^{+1.2}_{+0.4}\times110^{0}_{-1.8}\times26^{+0.6}_{-0.4}$	36	$258^{+1.6}_{+0.5}\times200^{0}_{-2.0}\times26^{+1.0}_{-0.4}$

Grind Part



Unit:mm

Standard Specifications of the Grind Ring Part and Tolerance			
NO.	D0×[D1~(D1+5)]×h	NO.	D0×[D1~(D1+5)]×h
1	43×(25~30)×25.5	19	155×(115~120)×25.5
2	49×(30~35)×25.5	20	160×(120~125)×25.5
3	54×(35~40)×25.5	21	165×(125~130)×25.5
4	60×(40~45)×25.5	22	170×(130~135)×25.5
5	67×(45~50)×25.5	23	175×(135~140)×25.5
6	73×(50~55)×25.5	24	185×(140~145)×25.5
7	80×(55~60)×25.5	25	190×(145~150)×25.5
8	85×(60~65)×25.5	26	195×(150~155)×25.5
9	92×(65~70)×25.5	27	200×(155~160)×25.5
10	98×(70~75)×25.5	28	206×(155~160)×25.5
11	103×(75~80)×25.5	29	212×(155~160)×25.5
12	109×(80~85)×25.5	30	218×(155~160)×25.5
13	115×(85~90)×25.5	31	224×(155~160)×25.5
14	122×(90~95)×25.5	32	230×(155~160)×25.5
15	128×(95~100)×25.5	33	235×(155~160)×25.5
16	136×(100~105)×25.5	34	243×(155~160)×25.5
17	145×(105~110)×25.5	35	250×(155~160)×25.5
18	150×(110~115)×25.5	36	258×(155~160)×25.5

OUR PRODUCT

C A R B I D E

PRE-FORMED PARTS

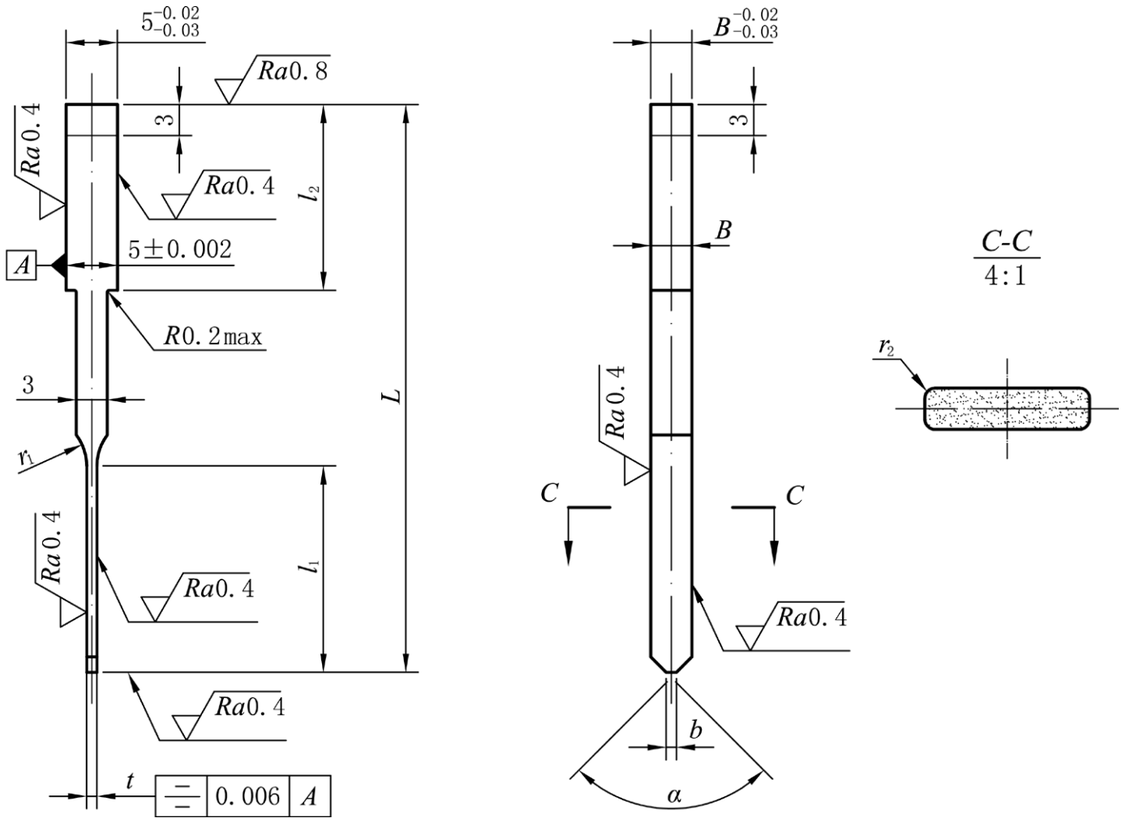
OUR PRODUCT

C A R B I D E

STANDARD
PUNCHING PARTS

Stacking Punchs

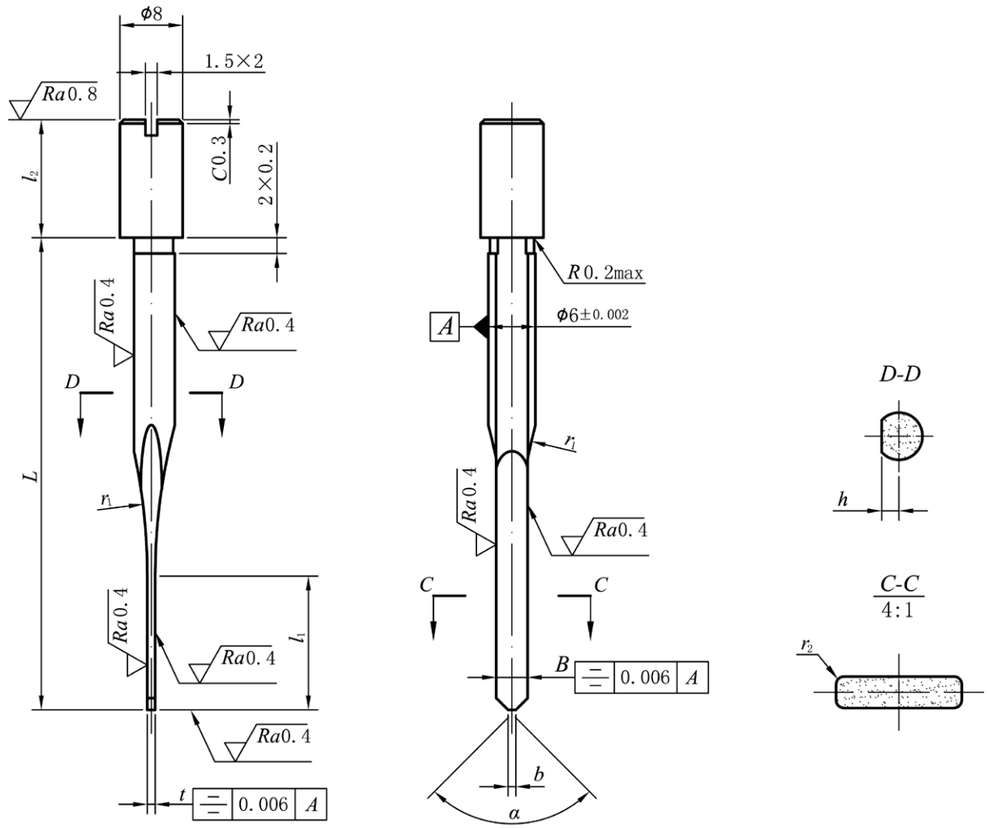
TYPE A



TYPE A				
t±0.002	B±0.002	L+0.5 +0.3	l1	l2 ±0.02
1.0	3	55	18、20	18、20
1.2	3	55、60	18、20	18、20
1.5	3	60	20	20
1.0	4	55	18	18、20
1.2	4	55、60	18、20	18、20
1.5	4	60	20	20
1.0	5	55	18	18、20
1.2	5	55、60	18、20	18、20
1.5	5	60	20	20

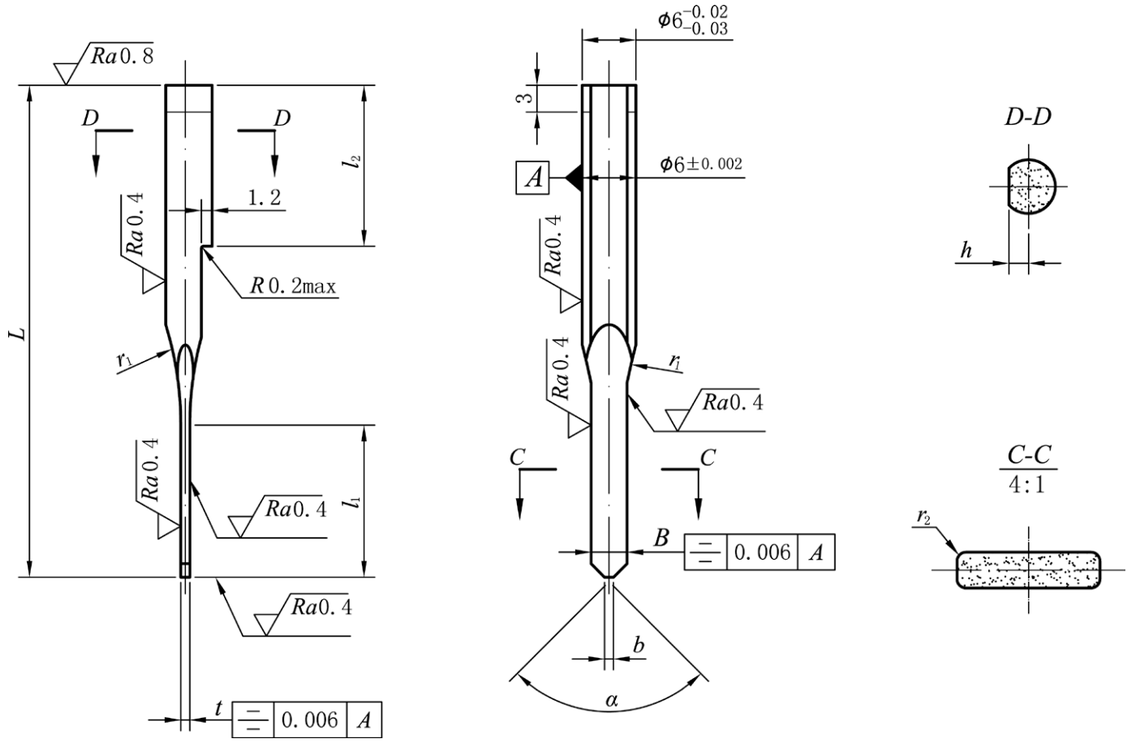
The surface roughness is Ra1.6μm.
r1、b、a are determined by the manufacturer.
The r2 should be matched with the corresponding size of the female die to ensure the requirements of the total gap of cutting.

TYPE B



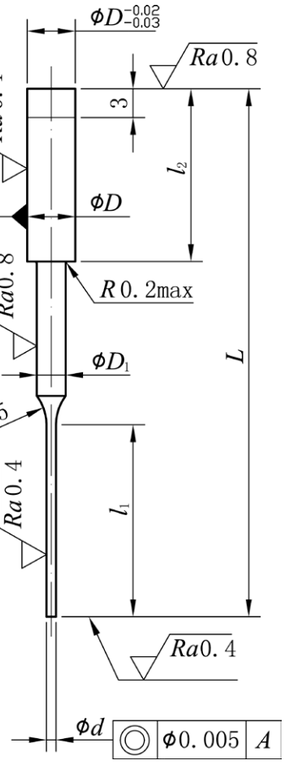
TYPE B					
t ±0.002	B±0.002	L+0.5 +0.3	h ±0.002	l1	l2 ±0.02
0.7	2	60、65	1.7	17	15
0.7	2	80	1.7	18	10
0.8	2	60、65	1.9	17	15
0.8	3	80	1.9	18	10
1.0	3	60、65	2.2	18	15
1.0	3	80	2.2	18、20	10
1.2	3	80	2.2	20	10
1.0	4	60、65	2.2	18	15
1.0	4	80	2.2	20	10
1.2	4	60、65	2.2	18、20	15
1.2	4	80	2.2	20	10
1.5	4	80	2.2	22	10
1.0	5	80	2.2	20	10
1.2	5	80	2.2	20	10
1.5	5	80	2.2	22	10

TYPE C



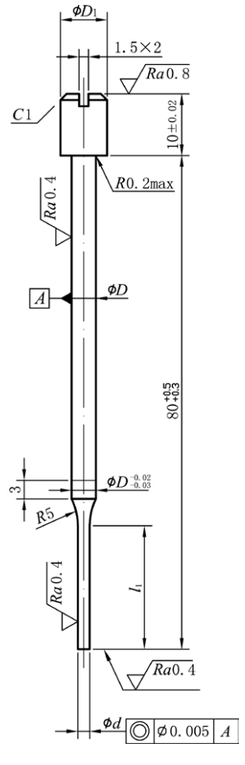
TYPE C				
t±0.002	B±0.002	L+0.5 +0.3	l1	l2 ±0.02
0.7	2	55、60	18	18、20
0.8	2	55、60	20	18、20
1.0	3	55	18	18
1.2	3	55、60	18、20	18、20
1.5	3	60	20	20
1.0	4	55、60	18	18、20
1.2	4	55、60	18、20	18、20
1.5	4	60	20	20
1.0	5	55	18	18、20
1.2	5	55、60	18、20	18、20
1.5	5	60	20	20

TYPE D



TYPE D					
d ±0.002	D±0.002	D1±0.05	L+0.5 +0.3	l1	l2 ±0.02
1.0	5.5	3.5	55、60	18、20	18、20
1.2	5.5	3.5	55、60	18、20	18、20
1.5	5.5	3.5	55、60	18、20	18、20
1.8	6.0	4.0	55、60	18、20	18、20
2.0	6.0	4.0	55、60	18、20	18、20

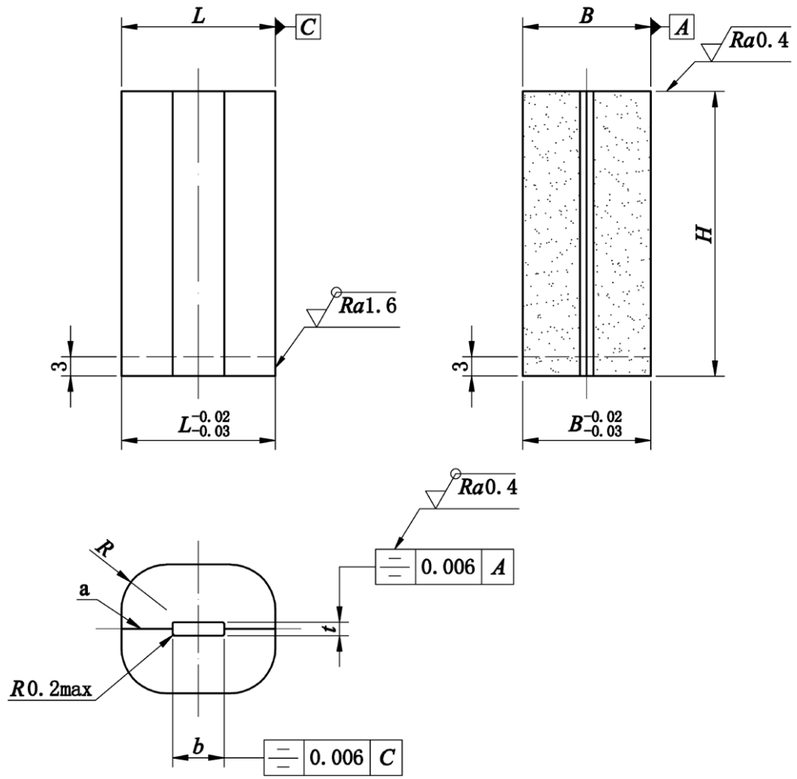
TYPE E



TYPE E			
d±0.002	D±0.002	D1±0.05	l1
1.0	3.5	6	18
1.2	3.5	6	18
1.5	3.5	6	18、20
1.8	4.0	8	20
2.0	4.0	8	20

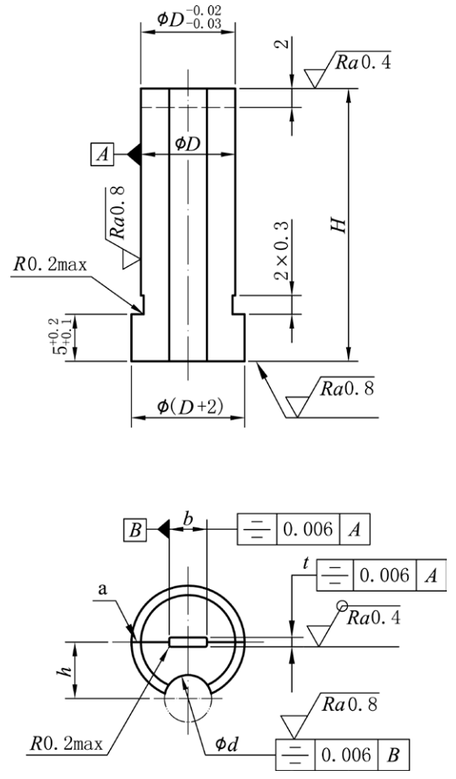
Stacking Dies

TYPE A



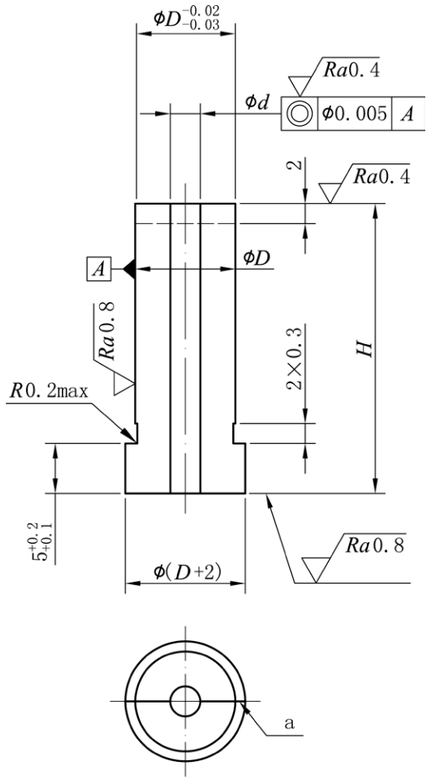
TYPE A					
t±0.002	b±0.002	L+0.005 +0.003	B+0.005 +0.003	H±0.02	R
1.012	3.02	10	8	25、27、29、32	3.0
1.212	3.02	12	10	25、27、29、32	3.5
1.512	3.02	12	10	25、27、29、32	3.5
1.012	4.02	10	8	25、27、29、32	3.0
1.212	4.02	12	10	25、27、29、32	3.5
1.512	4.02	12	10	25、27、29、32	3.5
1.012	5.02	10	8	25、27、29、32	3.0
1.212	5.02	12	10	25、27、29、32	3.5
1.512	5.02	12	10	25、27、29、32	3.5
When machining with EDM process, R shall be determined by the manufacturer.					

TYPE B



TYPE B					
t±0.002	b±0.002	D+0.002 0	H±0.02	h±0.002	d+0.002 0
0.715	2.06	8	25、27、29、32	5	4
0.815	2.06	8	25、27、29、32	5	4
0.815	3.06	8	25、27、29、32	5	4
1.020	3.06	8	25、27、29、32	5	5
1.220	3.06	8	25、27、29、32	5	5
1.520	3.06	8	25、27、29、32	5	5
1.020	4.02	10	25、27、29、32	6	6
1.220	4.02	10	25、27、29、32	6	6
1.520	4.02	10	25、27、29、32	6	6
1.020	5.02	12	25、27、29、32	7	6
1.220	5.02	12	25、27、29、32	7	6
1.520	5.02	12	25、27、29、32	7	6

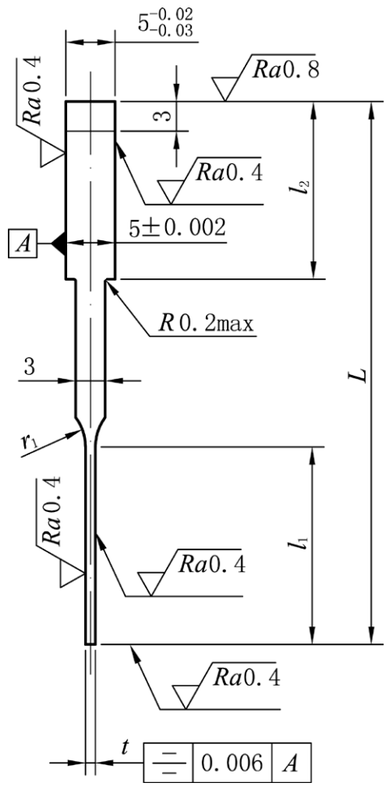
TYPE C

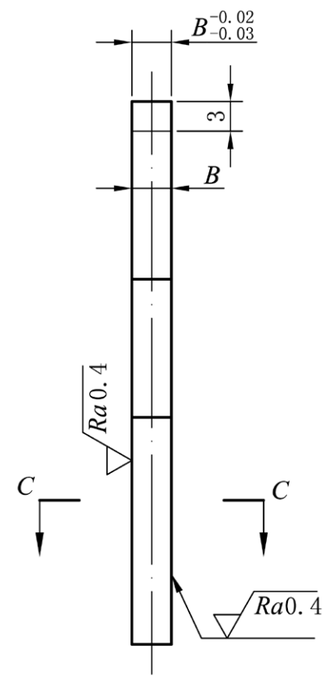


TYPE C		
d±0.002	D+0.002 0	H±0.02
1.01	6	25、27、29、32
1.21	6	25、27、29、32
1.21	7	25、27、29、32
1.51	6	25、27、29、32
1.51	7	25、27、29、32
1.51	8	25、27、29、32
1.81	8	25、27、29、32
1.81	10	25、27、29、32
2.01	8	25、27、29、32
2.01	10	25、27、29、32

Counting Punches

TYPE A

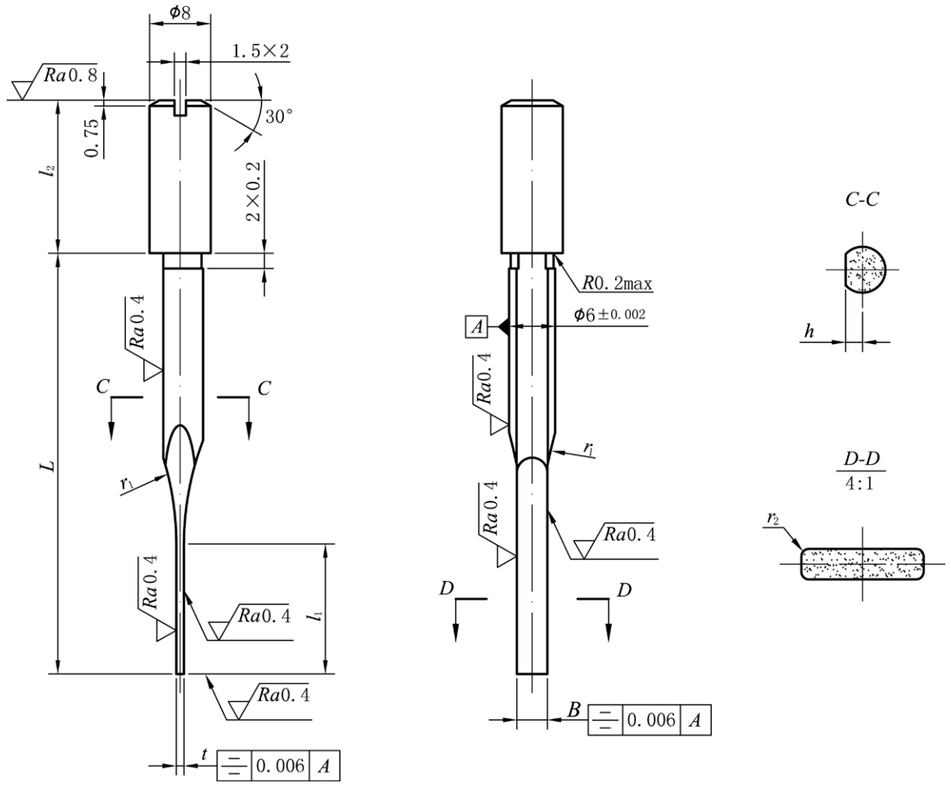




TYPE A				
t ±0.002	B±0.002	L+0.5 +0.3	l1	l2±0.02
1.0	3	55	18、20	18、20
1.2	3	55、60	18、20	18、20
1.5	3	60	20	20
1.0	4	55	18、20	18、20
1.2	4	55、60	18、20	18、20
1.5	4	60	20	20
1.0	5	55	18、20	18、20
1.2	5	55、60	18、20	18、20
1.5	5	60	20	20
When machining with EDM process, R shall be determined by the manufacturer.				

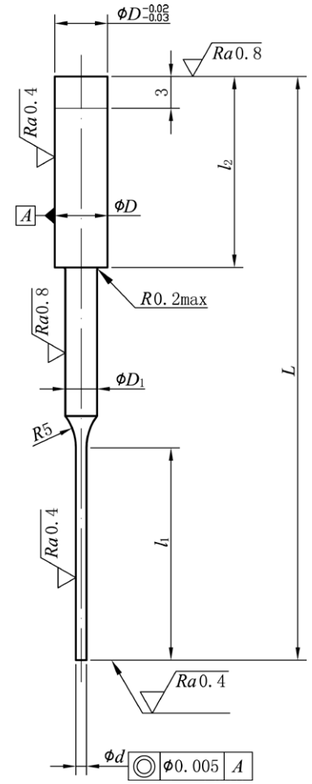
The surface roughness is Ra1.6μm.
r1、b、a are determined by the manufacturer.
The r2 should be matched with the corresponding size of the female die to ensure the requirements of the total gap of cutting.

TYPE B



TYPE B					
t±0.002	B±0.002	L+0.5 +0.3	h±0.002	l1	l2±0.02
0.7	2	60、65	1.7	17	15
0.7	2	80	1.7	18	10
0.8	2	60、65	1.7	17	15
0.8	2	80	1.7	18	10
0.8	3	60、65	1.9	17	15
0.8	3	80	1.9	18	10
1.0	3	60、65	2.2	18	15
1.0	3	80	2.2	18、20	10
1.2	3	60、65	2.2	18、20	15
1.2	3	80	2.2	20	10
1.5	3	80	2.2	22	10
1.0	4	60、65	2.2	18	15
1.0	4	80	2.2	20	10
1.2	4	60、65	2.2	18、20	15
1.2	4	80	2.2	20	10
1.5	4	80	2.2	22	10
1.0	5	80	2.2	20	10
1.2	5	80	2.2	20	10
1.5	5	80	2.2	22	10

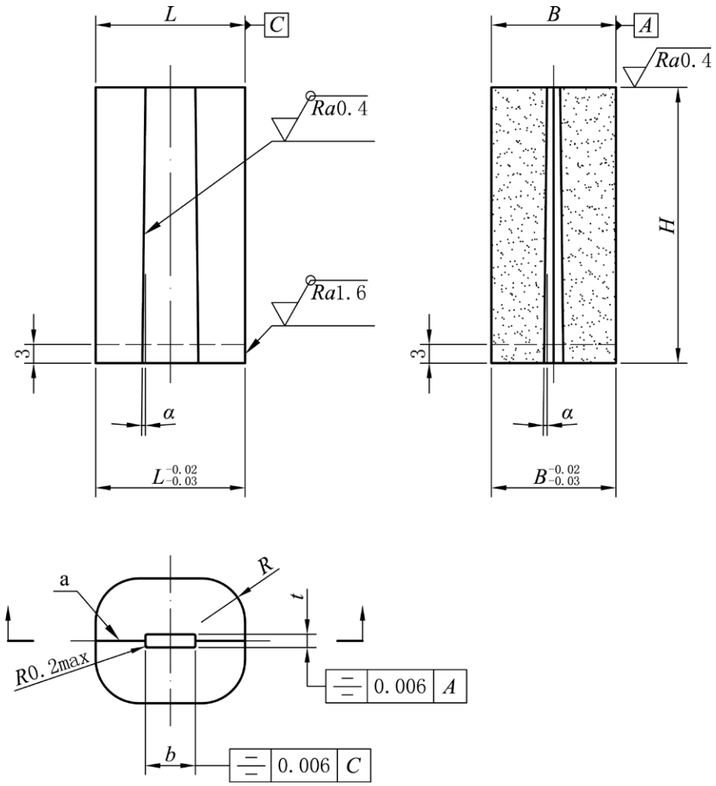
TYPE C



TYPE C					
d±0.002	D±0.002	D1±0.05	L+0.5 +0.3	l1	l2±0.02
1.0	5.5	3.5	55、60	18、20	18、20
1.2	5.5	3.5	55、60	18、20	18、20
1.5	5.5	3.5	55、60	18、20	18、20
1.8	6.0	4.0	55、60	18、20	18、20
2.0	6.0	4.0	55、60	18、20	18、20

Counting Dies

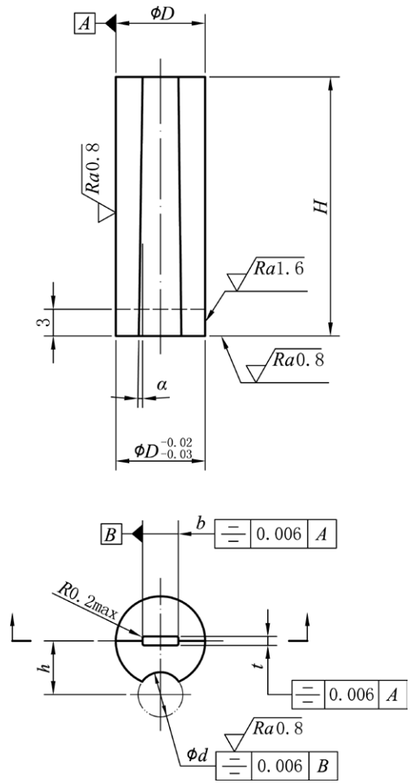
TYPE A



TYPE A					
t±0.002	b±0.002	L+0.005 +0.003	B+0.005 +0.003	H±0.02	R
1.08	3.08	10	8	25、27、29、32	3.0
1.28	3.08	12	10	25、27、29、32	3.5
1.58	3.08	12	10	25、27、29、32	3.5
1.08	4.08	10	8	25、27、29、32	3.0
1.28	4.08	12	10	25、27、29、32	3.5
1.58	4.08	12	10	25、27、29、32	3.5
1.08	5.08	10	8	25、27、29、32	3.0
1.28	5.08	12	10	25、27、29、32	3.5
1.58	5.08	12	10	25、27、29、32	3.5
When machining with EDM process, R shall be determined by the manufacturer.					

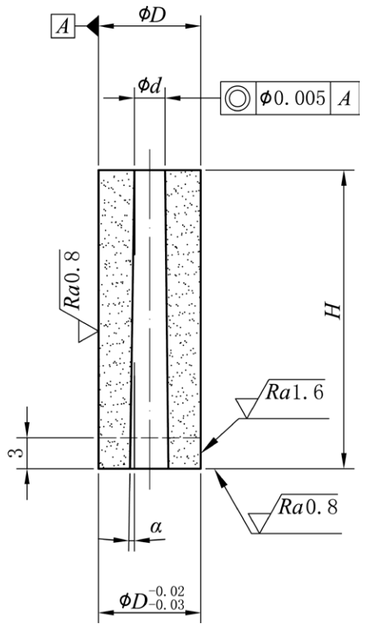
The unmarked surface roughness is Ra1.6μm.
α is determined by the manufacturer, and the recommended value is 6 ' - 10 '.
a surface roughness Ra0.4μm.

TYPE B



TYPE B					
t±0.002	b±0.002	D+0.002 0	H±0.02	h±0.002	d+0.002 0
0.715	2.05	8	25、27、29、32	5	4
0.815	2.05	8	25、27、29、32	5	4
0.855	3.05	8	25、27、29、32	5	4
1.055	3.05	8	25、27、29、32	5	5
1.255	3.05	8	25、27、29、32	5	5
1.555	3.05	8	25、27、29、32	5	5
1.065	4.06	10	25、27、29、32	6	6
1.265	4.06	10	25、27、29、32	6	6
1.565	4.06	10	25、27、29、32	6	6
1.065	5.06	12	25、27、29、32	7	6
12	5.06	12	25、27、29、32	7	6
1.265	5.06	12	25、27、29、32	7	6
1.565	5.06	12	25、27、29、32	7	6

TYPE C

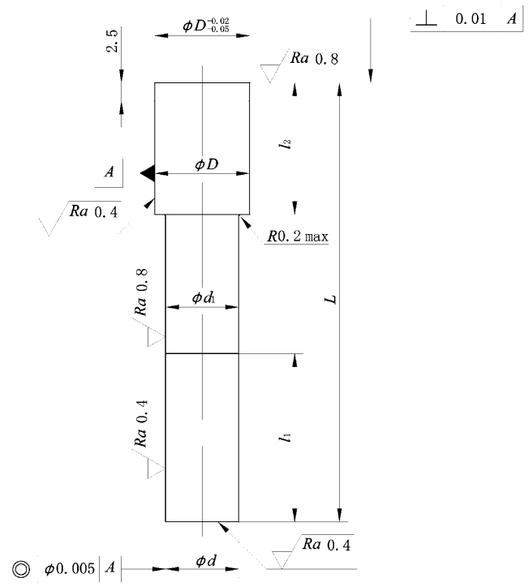


TYPE C

d±0.002	D+0.002 0	H±0.02
1.06	6	25、27、29、32
1.26	6	25、27、29、32
1.26	7	25、27、29、32
1.56	6	25、27、29、32
1.56	7	25、27、29、32
1.56	8	25、27、29、32
1.86	8	25、27、29、32
1.86	10	25、27、29、32
2.06	8	25、27、29、32
2.06	10	25、27、29、32

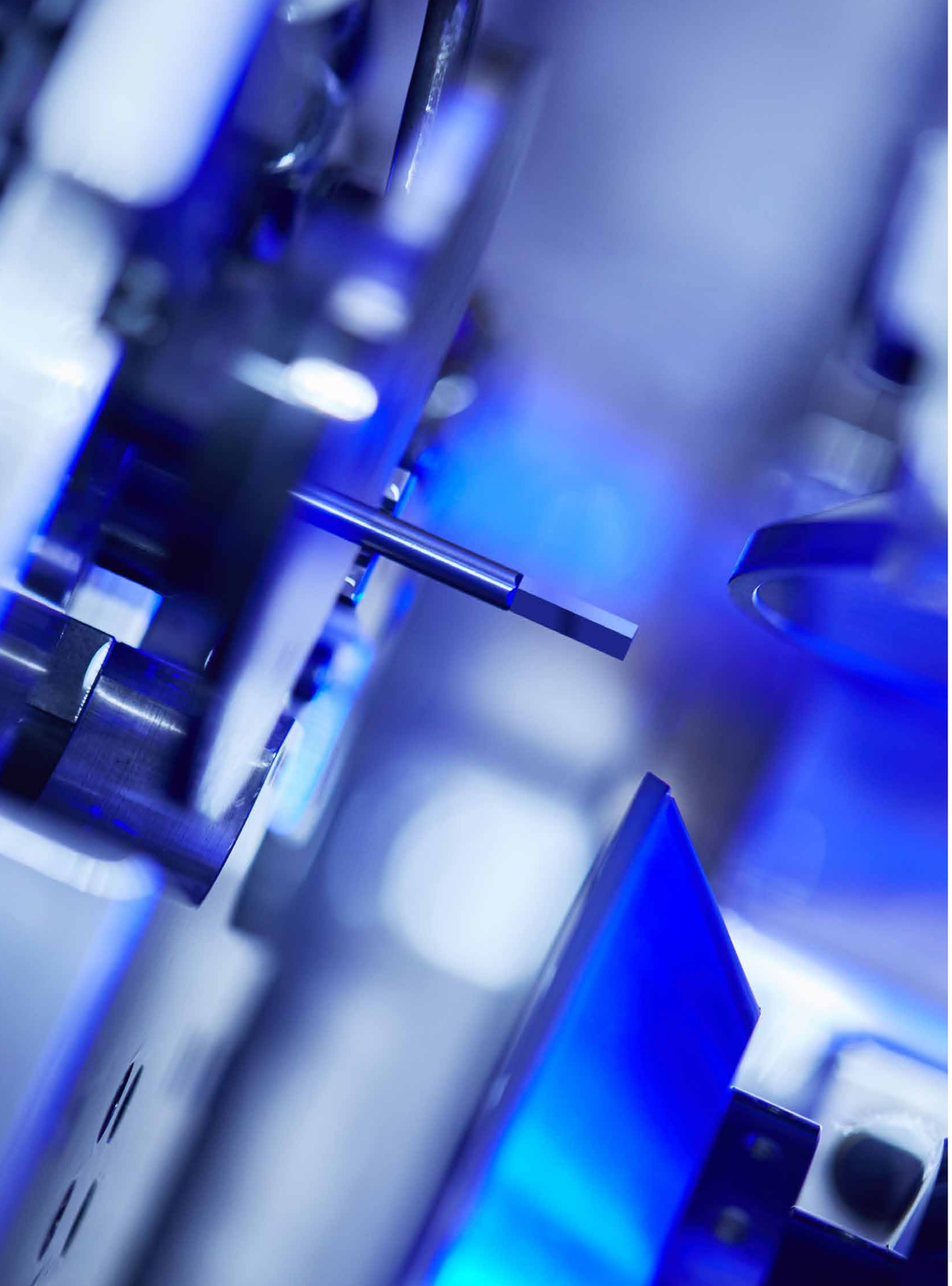
Round Punches

TYPE A

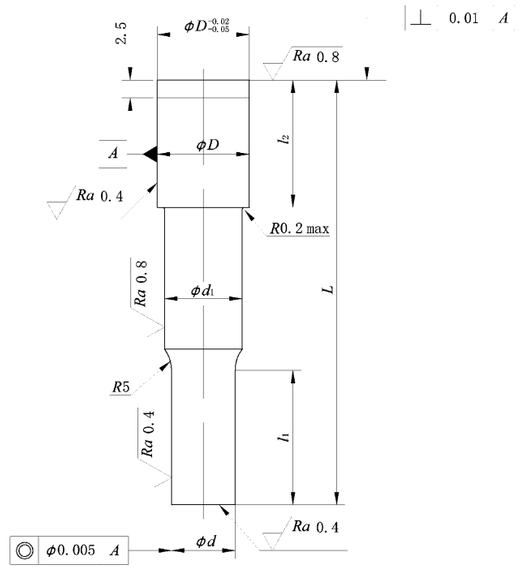


TYPE A

d ±0.002		D ±0.002	L +0.5 +0.3	l1	l2 +0.2 0	d1 ±0.05
>	to					
6	7	9	55	21~24	18	d+0.1
6	7	9	60	21~24	20	d+0.1
7	8	10	55	21~24	18	d+0.1
7	8	10	60	21~24	20	d+0.1
8	9	11	55	21~24	18	d+0.1
8	9	11	60	21~24	20	d+0.1
9	10	12	55	21~24	18	d+0.1
9	10	12	60	21~24	20	d+0.1
10	11	13	55	21~24	18	d+0.1
10	11	13	60	21~24	20	d+0.1
11	12	15	55	21~24	18	d+0.1
11	12	15	60	21~24	20	d+0.1
12	13	16	55	21~24	18	d+0.1
12	13	16	60	21~24	20	d+0.1
13	14	17	55	21~24	18	d+0.1
13	14	17	60	21~24	20	d+0.1
14	15	18	55	21~24	18	d+0.1
14	15	18	60	21~24	20	d+0.1
15	16	19	55	21~24	18	d+0.1
15	16	19	60	21~24	20	d+0.1
16	17	20	55	21~24	18	d+0.1
16	17	20	60	21~24	20	d+0.1
Recommend d = 6.02、8.02、10.02、12.02 is the value of the punching hole of the die.						



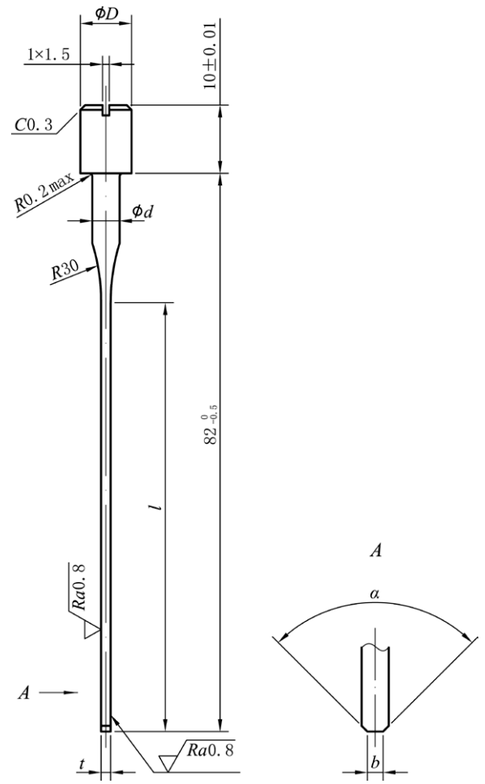
TYPE B



TYPE B						
d ±0.002		D ±0.002	L +0.5 +0.3	l1	l2 +0.2 0	d1 ±0.05
>	to					
1	2	5	55	10~15	18	D-2
1	2	5	60	10~15	20	D-2
2	3	6	55	15~19	18	D-2
2	3	6	60	15~19	20	D-2
3	4	7	55	19~23	18	D-2
3	4	7	60	19~23	20	D-2
4	5	8	55	19~23	18	D-2
4	5	8	60	19~23	20	D-2
5	6	9	55	19~23	18	D-2
5	6	9	60	19~23	20	D-2
Recommend d = 4.02、5.02 is the value of the punching hole of the die.						

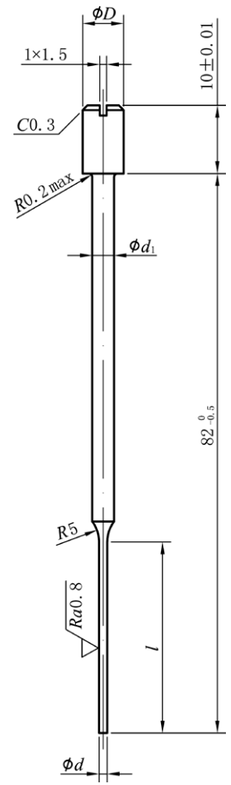
Stacking Pressure Rods

TYPE A



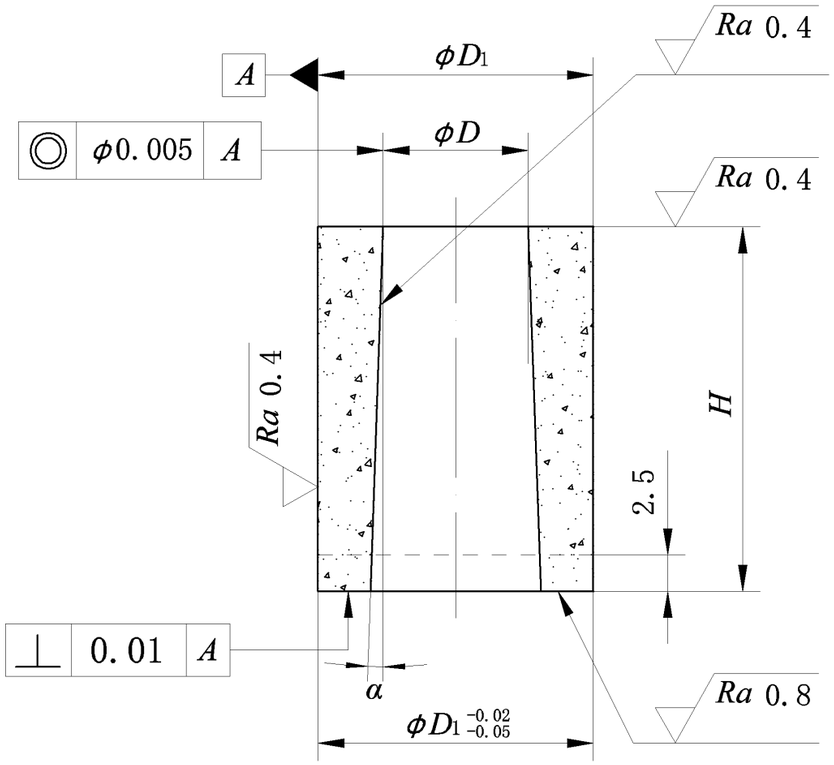
TYPE A			
t-0.09 -0.11	d-0.09 -0.11	l	D
0.8	3	28、58、63	7.5
1.0	3	28、58、63	7.5
1.2	3	28、58、63	7.5
1.5	3	28、58、63	7.5
1.0	4	28、58、63	7.5
1.2	4	28、58、63	7.5
1.5	4	28、58、63	7.5
1.0	5	28、58、63	9.0
1.2		28、58、63	
1.5		28、58、63	

TYPE B



TYPE B			
d-0.09 -0.11	d1±0.01	l	D
1.0	3.5	28、58、63	7.5
1.2	3.5	28、58、63	7.5
1.5	3.5	28、58、63	7.5
1.8	4.0	28、58、63	7.5、9
2.0	4.0	28、58、63	7.5、9

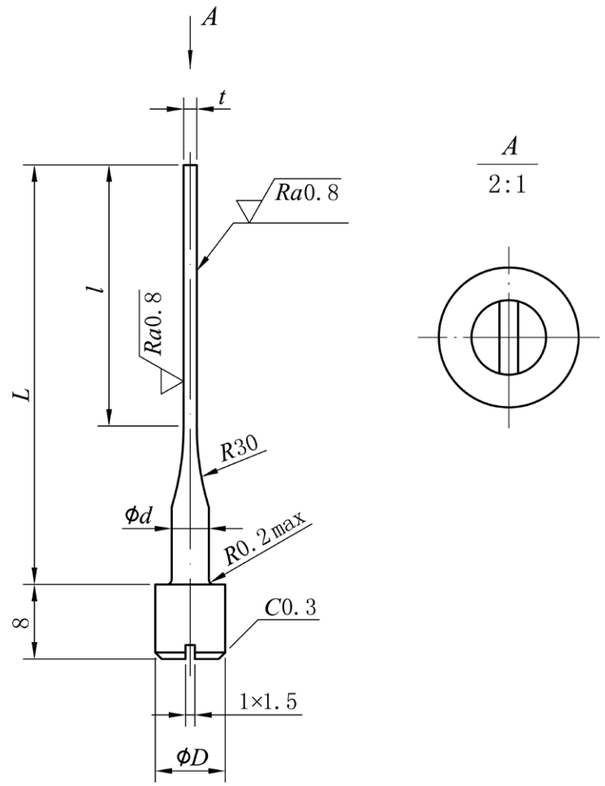
Round Dies



Round Dies					
d	D ±0.002			D1 +0.004 +0.002	H
	t =0.35	t =0.5	t =1.0		
＞3~6	d+0.05	d+0.08	d+0.14	D +6	25、27、29、32
＞6~10	d+0.05	d+0.08	d+0.14	D +8	25、27、29、32
＞10~16	d+0.05	d+0.08	d+0.14	D +12	25、27、29、32
＞16~20	d+0.05	d+0.08	d+0.14	D +12	25、27、29、32
＞20~24	d+0.05	d+0.08	d+0.14	D +14	25、27、29、32
＞24~28	d+0.05	d+0.08	d+0.14	D +14	25、27、29、32
＞28~32	d+0.05	d+0.08	d+0.14	D +16	25、27、29、32
Recommend d = 4.02、5.02、6.02、8.02、10.02、12.02 is the value of the punching hole of the die.					
Remark 1: d is the edge diameter of round punch.					
Remark 2: t is the thickness of stamping material.					

The unmarked surface roughness is Ra1.6μm.
α is determined by the manufacturer, and the recommended value is 6 ′ - 10 ′.

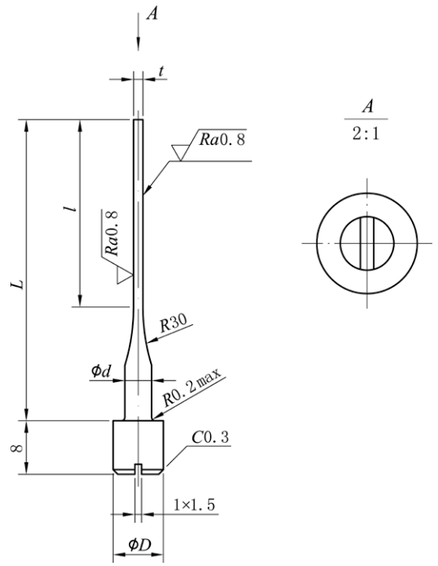
Stacking Ejector Pins TYPE A-1



TYPE A-1				
t-0.05 -0.10	d-0.05 -0.10	L±0.5	l	D
0.8	3	46	28	7.5
0.8	3	48	30	7.5
0.8	3	50	32	7.5
0.8	3	53	35	7.5
1.0	3	46	28	7.5
1.0	3	48	30	7.5
1.0	3	50	32	7.5
1.0	3	53	35	7.5
1.2	3	46	28	7.5
1.2	3	48	30	7.5
1.2	3	50	32	7.5
1.2	3	53	35	7.5
1.5	3	46	28	7.5
1.5	3	48	30	7.5
1.5	3	50	32	7.5
1.5	3	53	35	7.5

Stacking Ejector Pins

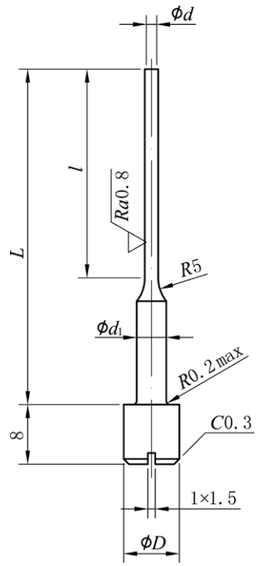
TYPE A-2



TYPE A-2

t-0.05 -0.10	d-0.05 -0.10	L±0.5	l	D
1.0	4	46	28	7.5
1.0	4	48	30	7.5
1.0	4	50	32	7.5
1.0	4	53	35	7.5
1.2	4	46	28	7.5
1.2	4	48	30	7.5
1.2	4	50	32	7.5
1.2	4	53	35	7.5
1.5	4	46	28	7.5
1.5	4	48	30	7.5
1.5	4	50	32	7.5
1.5	4	53	35	7.5
1.0	5	46	28	9.0
1.0	5	48	30	9.0
1.0	5	50	32	9.0
1.0	5	53	35	9.0
1.2	5	46	28	9.0
1.2	5	48	30	9.0
1.2	5	50	32	9.0
1.2	5	53	35	9.0
1.5	5	46	28	9.0
1.5	5	48	30	9.0
1.5	5	50	32	9.0
1.5	5	53	35	9.0

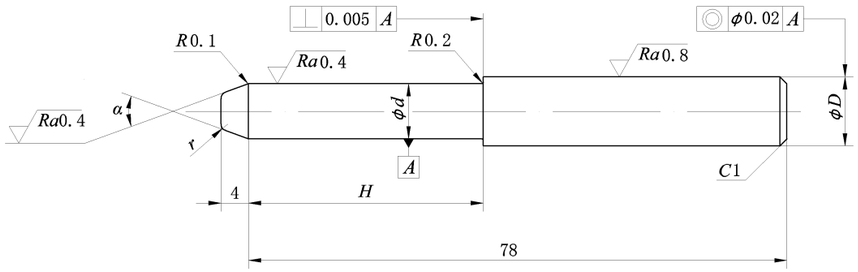
TYPE B



TYPE B

d-0.05 -0.10	d1±0.02	L±0.5	l	D
1.0	3.5	46	28	6.0、7.5
1.0	3.5	48	30	6.0、7.5
1.0	3.5	50	32	6.0、7.5
1.0	3.5	53	35	6.0、7.5
1.2	3.5	46	28	6.0、7.5
1.2	3.5	48	30	6.0、7.5
1.2	3.5	50	32	6.0、7.5
1.2	3.5	53	35	6.0、7.5
1.5	3.5	46	28	6.0、7.5
1.5	3.5	48	30	6.0、7.5
1.5	3.5	50	32	6.0、7.5
1.5	3.5	53	35	6.0、7.5
1.8	4.0	46	28	7.5、9.0
1.8	4.0	48	30	7.5、9.0
1.8	4.0	50	32	7.5、9.0
1.8	4.0	53	35	7.5、9.0
2.0	4.0	46	28	7.5、9.0
2.0	4.0	48	30	7.5、9.0
2.0	4.0	50	32	7.5、9.0
2.0	4.0	53	35	7.5、9.0

Pilot Pins



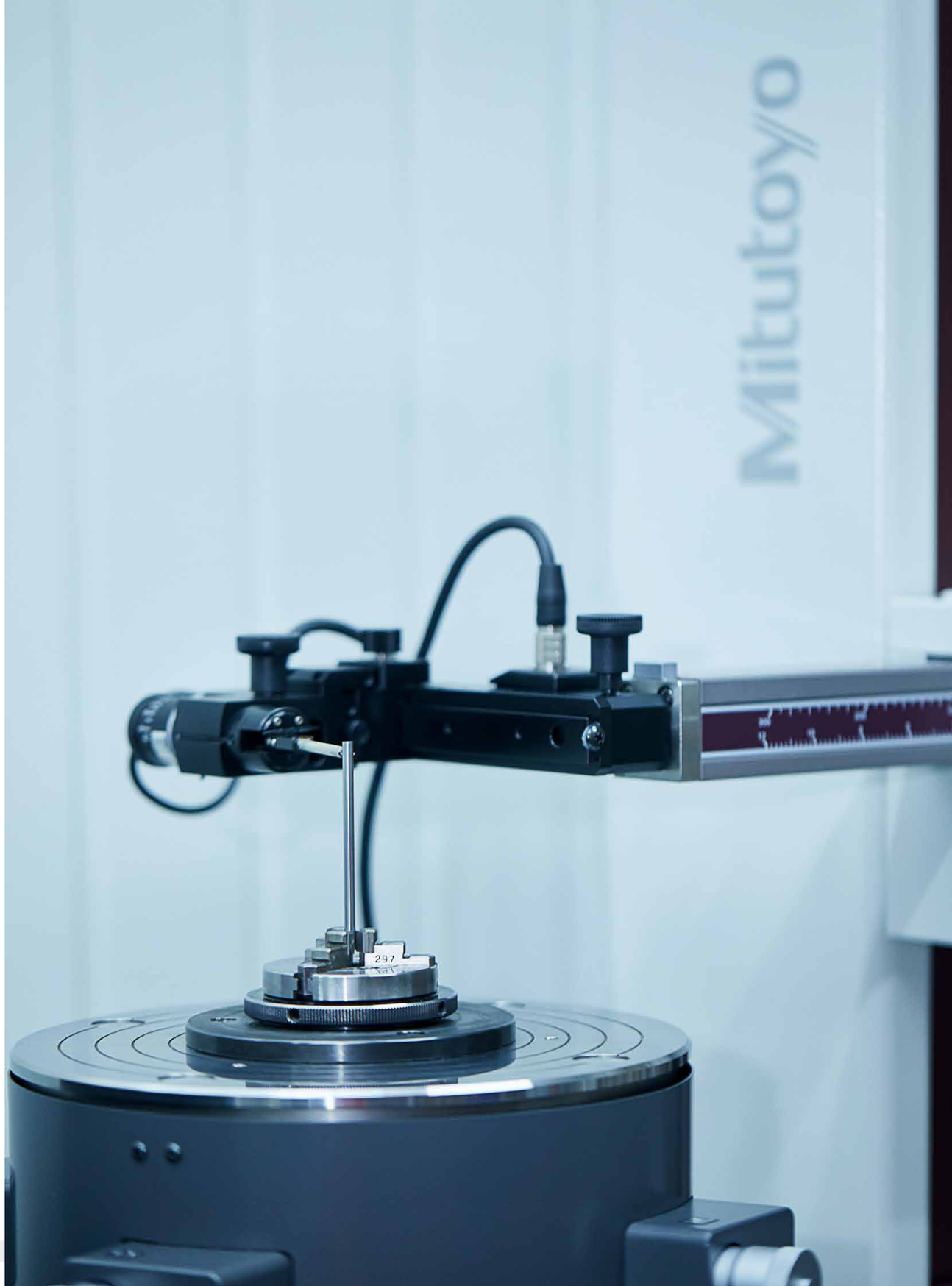
Pilot Pins			
d +0.005 0	D±0.01	H±0.15	r
4	7	18.5、32.0	0.5
5	8	19.0、32.0	0.5
6	9	19.5、32.0	0.5
8	11	22.5、32.0	1.0
10	13	24.5、32.0	1.0
12	15	26.0、32.0	1.0

The unmarked surface roughness is Ra1.6μm.
α should be 30 ° or 40 °.

Recommend Grade Of Standard Parts Of The Punch

Grade Recommendation Of Mold Standard Punch									
Grade	Co	Grain size	Hardness		Density	Flexural Strength	Fracture Toughness	Elastic Modulus	Coefficient of Thermal Expansion
	Co%		HRA	HV_{30}	g/cm³	MPa	$MNm^{-3/2}$	GPa	10^{-6}/℃
MD40A	12	Medium	88.9	1310	14.2	3700	27	470	5.7
MD45A	15	Medium	87.9	1200	13.9	3600	-	430	6.3

Provide you with other grade and sizes of products.



INTEGRITY
COOPERATION
INNOVATION

HUNANBOYUN-DONGFANG
POWDER METALLURGY CO., LTD.

HUNAN BOYUN-DONGFANG POWDER METALLURGY CO., LTD.
Address: Boyun Innovation Industrial Zone, 346# Leifeng Ave,
Yuelu Distric, Changsha, Hunan, China
Tel: 86-0731-88122808
Fax: 86-0731-88122998
Web: www.csu-pm.com
Email: bydf@csu-pm.com