

# ZCC



Cemented Carbide

# Anvils & Pressure Cylinders



Zhuzhou Cemented Carbide Group Corp. Ltd.  
[www.zccamerica.com](http://www.zccamerica.com)

# World's Tools, Sharp Tools for Wealth.

## Enterprise Spirit

Pursuing a Perfect Mastery. Aiming at Unlimited Progress.

## Key Philosophy

Good Faith Creates Values.



# Introduction of ZCC

Zhuzhou Cemented Carbide Group Corp. Ltd. (ZCC) has been a leading manufacturer of cemented carbide products in China since it was built in 1954. It produces about 5,000 tons of Cemented Carbides, more than 10,000 tons of APT, Tungsten Powder, Tungsten Carbide Powder, Ready to Press Powder, and 800 tons of Cobalt Powder annually. Meanwhile, ZCC also owns separate plants to produce Molybdenum, Tantalum and Niobium Products.

ZCC has different business sectors which are for Hard Material, Cutting Inserts and Tools, Tungsten & Molybdenum, Cobalt, Tantalum & Niobium Products.

The Hard Material Sector is the biggest one in ZCC. Its annual production capability is around 600 tons of Carbide Rolls and Anvils, 1,000 tons of Carbide Rods, 600 tons of Mining and Road Milling Buttons, 500 tons of Carbide Molds & Dies, a few hundred tons for Special Products and Wear Parts.

The “Diamond Brand” trademark has been named as “China’s Renowned Trademark” since 1999, and “Diamond Brand” cemented carbide has been awarded as “China’s Famous Brand” since 2004.

ZCC has established a global sales network since 1988. With branches in America, Europe, HongKong, and a liaison office in India, ZCC has been providing better local services for our customers around the world:

America: Zhuzhou Cemented Carbide Works USA Inc.  
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R & D Center

ZCC



Testing Center

ZCC



Accepted by China National Accreditation Board for Laboratories. (Equivalent to ISO/IEC17025)

# Production Plants ZCC



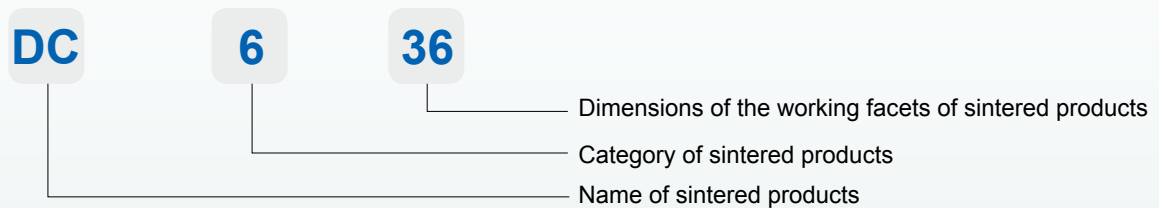
## Grades, properties and recommended applications of cemented carbide anvils and pressure cylinders

Grade	Density (g/cm <sup>3</sup> )	Hardness (HRA)	Transverse Rupture Strength (MPa)	Recommended applications
YL10.3	14.95	91.0	2600	Special grade for 2-facet anvils.
YL20.5	14.73	90.8	3400	Universal grade for 6-facet anvils with a higher hardness and TRS.
YL30.3	14.41	88.5	3400	Special grade for manufacturing pressure cylinders.

## Code key for the description of anvils and pressure cylinders

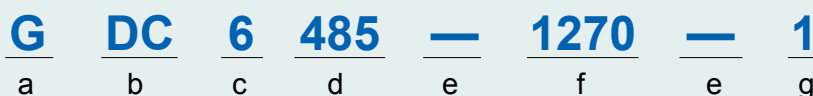
The description of anvils and pressure cylinders consists of codes of letters and numerals of a given meaning that are arranged in a certain order.

### 1. Code key for the description of sintered products



- The first part is 2 Chinese phonetic alphabets indicating the name of sintered products. For example, DC indicates anvils and DG indicates pressure cylinders.
- The second part is one numeral indicating the category of sintered products. For example, 6-facet anvils are indicated by 6 and 2-facet anvils and pressure cylinders are indicated by 2.
- The third part with 2 numerals indicates the dimensions of the working facets of the anvils or the dimensions of the cavity of the pressure cylinders with only integers.

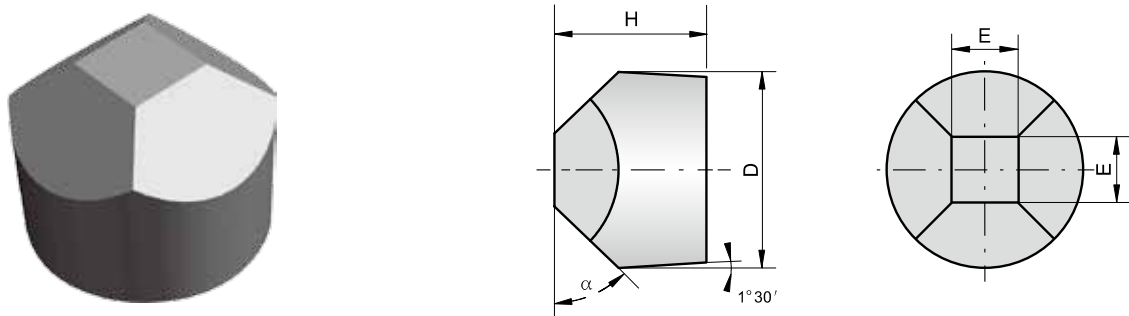
### 2. Code key for the description of finish machined products



- The first part is 1 Chinese phonetic alphabet indicating finish machined products
- The second part is 2 Chinese phonetic alphabets indicating the name of the finish machined products, for example, DC stands for anvils and DG for pressure cylinders
- The third part is 1 numeral indicating the category of finish machined products, for example, 6-facet anvils are indicated by 6 and 2-facet anvils and pressure cylinders are indicated by 2.
- The fourth part are 3 numerals indicating the dimensions of the working facets of the anvils or the dimensions of the cavity of the pressure cylinders. The dimensions are multiplied by 10. For example, 485 stands for a dimension of 48.5.
- The fifth part is a division mark
- The sixth part is 3 to 4 numerals indicating the maximum diameter of the conical part of finish machined anvils and the diameter is multiplied by 10. For example, 1270 stands for a maximum diameter of "127.0".
- The eighth part is 1 numeral indicating the different product specifications with the same working sizes( if necessary)

### 3. Types and dimensions and tolerances of sintered products

Types and main parameters of 6-facet anvils as sintered should comply with what is shown in Figure 1 and Table 1

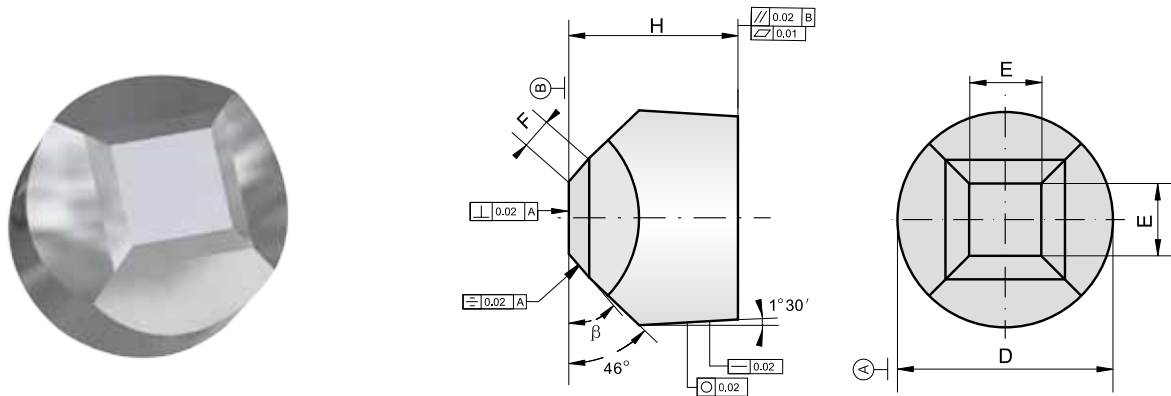


mm

Type	D		E		H		$\alpha$
	Nominal size	Tolerances allowed	Nominal size	Tolerances allowed	Nominal size	Tolerances allowed	$46^\circ$
DC636	105.5	+1.5 -0.5	35.6	$\pm 0.5$	76	+1.5 -0.5	$46^\circ$
DC643	116	+1.7 -0.5	43	$\pm 0.6$	82.5	+2.0 +0.5	$46^\circ$
DC645—2	129	+2.0 0	44.5	$\pm 0.5$	96	+2.5 +0.5	$46^\circ$
DC647—2	122	+2.0 +0.7	47	$\pm 0.5$	90	+2.0 +0.7	$46^\circ$
DC648	129	+3.6 +1.6	48	$\pm 0.5$	101	+1.0 0	$46^\circ$
DC648—6	129	+2.0 0	47.5	$\pm 0.5$	96.4	+1.0 0	$46^\circ$
DC652	129	+1.5 -0.5	52	$\pm 0.5$	93	+2.0 +1.0	$46^\circ$
DC661	160	+2.5 +1.5	61	$\pm 0.5$	115	+2.5 +1.5	$46^\circ$
DC668	175	+3.0 +1.2	67.4	$\pm 0.5$	92	+3.3 +1.0	$46^\circ$

#### 4. Types and dimensions and tolerances of finish machined 6-facet anvils.

Types and main parameters of 6-facet anvils as sintered should comply with what is shown in Figure 2 and Table 2



mm

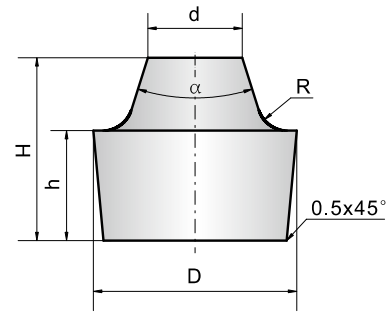
Series	Type	Dimensions				
		D	E	H	F	$\beta$
Ø103	GDC6325-1030~1050-1	103.0~105.0	32.5	76.0	12.5	41°
	GDC6325-1030 ~1050-2	103.0~105.0	32.5	83.0	11.5	41°
	GDC6325-1030 ~1050-3	103.0~105.0	32.5	77.0	12.5	41°
	GDC6330-1030 ~1050-1	103.0~105.0	33.0	77.0	12.5	41°
	GDC6335-1030 ~1050	103.0~105.0	33.5	77.0	12.5	41°
Ø110	GDC6380 1102	110.2	38.0	80.0	13	41°
	GDC6390-1100~1103	110.0~110.3	39.0	80.0	13	41.5°
Ø114	GDC6395-1146~1149	114.6~114.9	39.5	82.5	13	41.5°
Ø115	GDC6365-1150~1155	115.0~115.5	36.5	82.5	12.5	41.5°
	GDC6380-1150~1154	115.0~115.4	38.0	82.5	12.5	41°
	GDC6385-1150~1151	115.0~115.1	38.5	82.5	14	41.5°
	GDC6390-1150~1156	115.0~115.3	39.0	82.5	13	41.5°
	GDC6395-1150~1153	115.0~115.6	39.5	82.5	13	41.5°
	GDC6400-1150~1159	115.0~115.9	40.0	82.5	13	41.5°
	GDC6400-1152	115.2	40.0	84	13	41°
	GDC6410-1150~1152	115.0~115.2	41.0	82.5	13	42°
	GDC6410-1150	115.0	41.0	82.5	13	41.5°



Series	Type	Dimensions				
		D	E	H	F	$\beta$
Ø122	GDC6415-1220~1225	122.0~122.5	41.5	90	13	41.5°
	GDC6430-1220~1223	122.0~122.3	43	90	12	41°
	GDC6430-1220~1223-2	122.0~122.3	43	90	13	41°
	GDC6430-1220~1224	122.0~122.4	43	91	13	41.5°
	GDC6435-1221	122.1	43.5	90	12	41°
	GDC6435-1220~1228	122.0~122.8	43.5	90	13	41.5°
Ø127	GDC6435-1270~1275	127.0~127.5	43.5	95	13	41.5°
	GDC6435-1270~1278	127.0~127.8	43.5	93	13	41°
	GDC6440-1270~1273	127.0~127.3	44	93	13	41.5°
	GDC6440-1270~1274	127.0~127.4	46	95	13.5	41.5°
	GDC6470-1270~1276	127.0~127.6	47	95	12	41.5°
	GDC6470-1270~1272	127.0~127.2	47	93	13	41.5°
	GDC6475-1275~1278	127.5~127.8	47.5	95	13	42°
	GDC6480-1270~1271	127.0~127.1	48	94	12.5	41.5°
	GDC6480-1270~1275	127.0~127.5	48	95	12	42.5°
	GDC6485-1271~1272	127.1~127.2	48.5	94	12	42°
Ø128	GDC6435-1280	128.0	41.5	93	12.5	41°
	GDC6460-1280~1282	128.0~128.2	46	93	13.5	41.5°
Ø142	GDC6490-1420	142.0	49	102	15	41.5°
Ø149	GDC6540-1491	149.1	51	108	15	41.5°
Ø160	GDC6610-1600~1603	160.0~160.3	59.5	110	15	41.5°
Ø175	GDC6632-1753	175.3	63.2	102	15	41°

Note: All of the above is the recommended specifications and sintered and finish machined products of other specifications are available based on customers' drawings or samples.

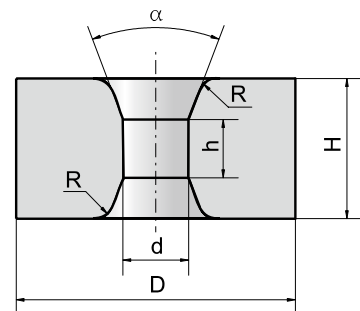
## 2-facet cemented carbide anvils as sintered



Type	Dimensions					
	D	H	d	h	$\alpha$	R
DC235	83.0	76.5	35.5	47.75	60	25.4
DC242	111.2	88.5	42.5	51.4	60	24.5
DC260	145.5	107.5	60.5	65.0	50	30.0

Note: All of the above is the recommended specifications and sintered and finish machined products of other specifications are available based on customers' drawings or samples.

## Cemented carbide pressure cylinders as sintered



Type	Dimensions					
	D	H	d	h	$\alpha$	R
DG250-1	171.5 <sup>+2.5</sup> <sub>-0.5</sub>	111.5 <sup>+2.0</sup> <sub>0</sub>	49.0 <sup>0</sup> <sub>-2.0</sub>	54	59	24.5
DG250-2	207.5 <sup>+2.5</sup> <sub>-0.5</sub>	121.0 <sup>+2.5</sup> <sub>0</sub>	49.0 <sup>0</sup> <sub>-2.0</sub>	51	11	30.6
DG241	181.5 <sup>+2.5</sup> <sub>-0.5</sub>	108.0 <sup>+2.5</sup> <sub>0</sub>	40.0 <sup>0</sup> <sub>-2.0</sub>	50	11	30.0
DG256	219.5 <sup>+2.5</sup> <sub>-0.5</sub>	112.0 <sup>+2.5</sup> <sub>0</sub>	55.0 <sup>0</sup> <sub>-2.0</sub>	54	59	24.5
DG268	281.5 <sup>+3.5</sup> <sub>-0.5</sub>	141.0 <sup>+2.5</sup> <sub>0</sub>	67.5 <sup>0</sup> <sub>-2.0</sub>	65	82	25.0

## The operating instructions

### Characteristics of the product

Our corporation is a leading manufacturer of cemented carbide anvils in China and its development of new products has always taken the lead in the industry. Its "Diamond Brand" cemented carbide anvils are characteristic of stable quality, good compactness and high comprehensive performances. It is an optimal brand for 6-facet anvils. The conventional grade for anvils is YL20.5. Cemented carbide anvils belong to the category of brittle materials with a high impact strength but with less shear strength. Anvils of different specifications suit different synthesization cavities and processes in manufacturing artificial diamond powder.

### Handling and storage of anvils

Anvils are easy to be damaged by collision and as a result after unpacking they should be individually placed in strong wooden cases or in wooden cases with partitions with one in each partition during inspection, machining and storage. They should be stored separately without any overlapping or contact with each other during assembling and installation. In the operations above precautions should be taken to avoid injuries from impact or squashing. Contamination and moisture should be avoided.

### Precautions in the operations of anvils

#### Elimination of internal residual stress

Before the use of anvils the anvils should undergo an ageing process to eliminate internal residual stress. They can be aged naturally for more than one month and the longer the better. They can be alternatively baked or oil bathed at a temperature of 180-220°C. Good results can not be achieved if the temperature is too low, and oxidation will occur on the surface of anvils if the temperature is too high. The recommended ageing time is around one week.

#### Instruction for assembling anvils

The steel ring and the anvil should be installed with a rational shrinkage range and their conicity should be identical with a contact area of over 90% in order that the anvils stay in a state of elasticity while under a high pressure. Other parts that are in contact with the anvils during installation shall be in contact with the facets of the anvils instead of point and line contacts to avoid the local concentration of stress.

#### Requirements for the equipment using anvils

The recommended system's pressure shall not exceed 85 MPa. The equipment for synthesization must have good manufacturing and adjusting precision and the stability of presses should be insured without any leakage in the system. The synchronism and centricity must be guaranteed with a deviation of not more than 0.2mm.

#### Requirements for related components

It is advisable to use steel rings of 45NiCrMoVA (or equivalent) steel, since it has a suitable hardness after heat treatment, and a good finish of the inner surface is required with no deformation. The precision of big and small machined pads must meet the requirements and the surfaces of the pads must be even and smooth and the material for the pads is GCr15 (or equivalent) steel with a moderate hardness. Pyrophyllite shall not have too much water and the baking temperature and time must be moderate in order to prevent air bleeding or air blasting in the synthesization due to the moisture and the bad pressure transfer of pyrophyllite. Baked pyrophyllite must be stored in a thermostat chamber. The sealing electric conducting steel rings must be of good quality without any rust and they are to be baked at 150°C and stored without any contact with moisture.

#### Requirements for the synthesizing process

The anvils require a synthesizing process that is compatible with cavities for synthesization.

### Suggestions for reducing the consumption of anvils

A non-continuous operation should be avoided. Some small tests must be done when optimizing and adjusting the process. When the process of a single piece of equipments is stable, then it can be applied to other equipments. Lower temperature and pressure are better to the lifetime of anvils. Measures should be taken to improve the cooling efficiency of the anvils and the heating system to reduce the temperature of the anvils.

## How to find us



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