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**Diamond/CBN products—
Diamond or CBN electroplated tools**

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Foreword

This translation has been made based on the original Japanese Industrial Standard revised by the Minister of Economy, Trade and Industry through deliberations at the Japanese Industrial Standards Committee as the result of proposal for revision of Japanese Industrial Standard submitted by Industrial Diamond Association of Japan (IDA-J)/Japanese Standards Association (JSA) with the draft being attached, based on the provision of Article 12 Clause 1 of the Industrial Standardization Law applicable to the case of revision by the provision of Article 14.

Consequently **JIS B 4140:1997** is replaced with this Standard.

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Diamond/CBN products— Diamond or CBN electroplated tools

1 Scope This Japanese Industrial Standard specifies diamond or CBN electroplated tools used for such processing as form grinding, internal grinding, jig grinding or other grindings, slicing, dicing, fluting, cutting on hardened steel or other materials, cemented carbide, cermet, semiconductor materials, ceramics, glass, carbon, rubber, plastics, FRP and the like or conditioning of polishing pads (hereafter referred to as “electroplated tool”). This Standard does not apply to electroplated tools used for dental equipment.

2 Normative references The following standards contain provisions which, through reference in this text, constitute provisions of this Standard. The most recent editions of the standards (including amendments) indicated below shall be applied.

JIS B 0401-2 *ISO system of limits and fits—Part 2: Tables of standard tolerance grades and limit deviations for holes and shafts*

JIS B 0405 *General tolerances—Part 1: Tolerances for linear and angular dimensions without individual tolerance indications*

JIS B 4130 *Diamond/ CBN Products—Grain sizes of diamond or cubic boron nitride*

JIS B 4131 *Diamond/ CBN Products—Diamond or CBN grinding wheels*

JIS B 4142 *Diamond/ CBN products—Safety requirements*

JIS B 7153 *Measuring microscopes*

JIS B 7420 *Plain limit gauges*

JIS B 7502 *Micrometer callipers*

JIS B 7503 *Dial gauges*

JIS B 7507 *Vernier, dial and digital callipers*

JIS G 4051 *Carbon steels for machine structural use*

JIS G 4305 *Cold-rolled stainless steel plate, sheet and strip*

JIS G 4313 *Cold rolled stainless steel strip for springs*

JIS G 4401 *Carbon tool steels*

JIS H 4040 *Aluminium and aluminium alloy rods, bars and wires*

3 Terms and definitions For the purposes of this Standard, the terms and definitions in **JIS B 4131** and the following apply.

- a) **electroplated tools** tools with diamond or CBN abrasive grains retained and fixed on a base metal surface of steel, cemented carbide, aluminium, aluminium alloy and the like formed into a specific shape by electroplating and/or chemical plating

There are some types with base metal removed.

b) **electroplating method** a process of making electroplated tools that make a disposition of nickel layer(s) on the base metal, through passing an electric current between both poles of the base metal as cathode and a nickel plate as anode in electrolyte solution, to retain and fix the abrasive grains

c) **chemical plating method** a process of making electroplated tools that retain and fix the abrasive grains through a reduction and disposition of nickel ion by reductant contained in plating solution

It is also referred to as “electroless plating method”.

d) **grinding wheel** wheels for grinding, whose base metal, with abrasive grains fixed on the outside or side surface of base metal which has been formed into a specific shape

There are plain wheels, formed wheels, cup wheels and shank type wheels.

e) **plain wheel** grinding wheels with diamond or CBN abrasive grains fixed on the outside surface of the base metal which has been formed into circular plate shape

It is also referred to as “straight wheel”.

f) **formed wheel** wheels processed in a straight, arc, curve, angle or a shape of their combination, corresponding to each complete shape of worked subject

g) **cup wheel** generic term to refer to cup-shaped grinding wheels having diamond or CBN abrasive grain layer

h) **shank type wheel** wheels having shank part for attaching to a turning axle of machine

These are to be used by mounting on an internal cylindrical grinding machine, jig grinding machine, portable grinder and the like. Those used for internal grinding processing are also called “internal wheels”.

i) **ID blade (inner diameter blade)** inner type cutting blade with abrasive grains on the inner periphery of doughnut-shaped base metal of stainless steel sheet

j) **hub type blade** blade for precise cutting or fluting, with abrasive grain layer on the outer side of periphery of hub metal of aluminium alloy sheet

k) **ring shape blade** blade for precise cutting or fluting, the whole surface of which is covered with abrasive grain layer by itself without base metal

It is also called an “all-blade type”.

l) **base plate type blade** grinding blade for cutting or fluting, with abrasive grains fixed on a part of the outside or side surface of doughnut-shaped thin base plate

It is also called an “electroplated cutter”.

m) **pad conditioner** tool to condition the surface of grinding pads made of polyurethane, etc. used for such polishing as CMP (chemical mechanical polishing) or others

It can also be referred to as a “pad dresser”, “CMP dresser” or “CMP conditioner”.

- n) **profile tolerance** the tolerance on shape of abrasive working face of grinding wheel

Usually it is expressed by the profile tolerance of replica method.

- o) **base metal** parent material made of metal, to which the abrasive grains are fixed

Depending on the type of the electroplated tool, it can also be referred to as “body”, “core”, “base plate”, “axle”, “shank” or “mandrel”.

- p) **monolayer electroplated tools** electroplated tools with single layer of abrasive grains fixed on the base metal

- q) **multilayer electroplated tools** electroplated tools with two or more layers of abrasive grains fixed on the base metal

- r) **runout measuring face** a representative part on the base metal to measure the runout of abrasive grain layer

- s) **nodule** protrusive plating metal caused on the electroplated part

- t) **overhang** length of the shaft of the shaft type wheel protruding from the clamp face when it is mounted on machine (excluding the abrasive grain layer)

- u) **re-electroplating** to produce the electroplated tool by reuse of base metal obtained by removing the abrasive grain layer from the used electroplated tools

4 Classification and grades

4.1 Classification according to use The electroplated tools shall be classified according to use as given in table 1.

Table 1 Division of use and classification

Division	Classification	Base metal
Grinding wheel	Plain wheel	Exist
	Formed wheel	
	Cup wheel	
	Shank type wheel	
Inner diameter cutting blade	ID blade (inner diameter blade)	Exist
Outer diameter cutting blade	Hub type blade	Exist
	Ring shape blade	Non
	Base plate type blade	Exist
Pad conditioner	Pad conditioner	Exist

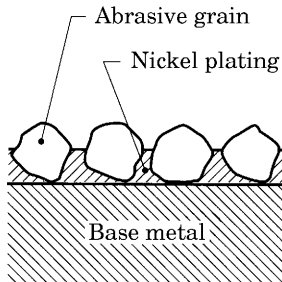
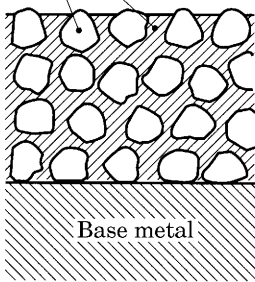
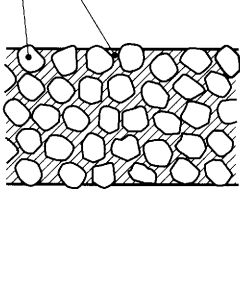
4.2 Classification according to abrasive grains The classification according to abrasive grains shall be as given in table 2.

Table 2 Classification of abrasive grains

Type of abrasive grain		Symbol
Diamond	Natural diamond	D
	Synthetic diamond	SD
CBN	Cubic boron nitride	BN

4.3 Layered state of abrasive grains and type of electroplated tool The layered state of abrasive grains and type of electroplated tool shall be as shown in table 3.

Table 3 Layered state of abrasive grains and type of electroplated tool

Layered mode of abrasive grains				
Division and classification of electroplated tools	Division	Monolayer electroplated tool	Multilayer electroplated tool	
	Classification	Grinding wheel, base plate type blade, pad conditioner	ID blade (internal diameter blade)	Hub type blade, ring shape blade

4.4 Grade The electroplated tools shall be classified into four grades according to the grade of the grinding wheel.

The runout of the base metal shall be tested in accordance with 7.3.

Table 4 Classification according to grade of grinding wheel

Unit: mm

Item	Super precision grade	Precision grade		Normal grade
	Grade 1	Grade 2	Grade 3	Grade 4
Profile tolerance	0.01	0.04	0.1	Over 0.1
Runout tolerance of base metal	0.005	0.01	0.02	Over 0.02
Tolerance on hole diameter (except for shank type wheel)	+0.005 0	H6	H7	Over H7

NOTE : The tolerance on hole diameter shall be in accordance with JIS B 0401-2.

5 Quality

5.1 Base metal

5.1.1 Material The material of base metals shall be as given in table 5 or those of at least the equivalent quality in use.

Table 5 Material of base metal

Division or classification of electroplated tool	Material of base plate
Grinding wheel	JIS G 4051, JIS G 4401, JIS G 4305
ID blade (internal diameter blade)	JIS G 4305, JIS G 4313
Hub type blade	JIS H 4040
Base plate type blade	JIS G 4051, JIS G 4401, JIS G 4305
Pad conditioner	JIS G 4051, JIS G 4401, JIS G 4305

5.1.2 Appearance The base metal shall be free from flaws or nicks on the datum clamp face, clamping bore, pre-plated face and runout measuring face of base metal when the appearance is tested in accordance with 7.1. The base metal of inner peripheral edged wheel shall be free from distortion or wrinkling.

5.2 Abrasive grain layer

5.2.1 Grain size of abrasive grain The grain size of abrasive grains shall be as given in **JIS B 4130**.

5.2.2 Plating The plating shall be nickel plating.

5.2.3 Appearance When the appearance is tested in accordance with 7.1, the abrasive layer shall be free from nodules, unevenness of colour, flaws or burrs detrimental to use. The distribution of abrasive grains shall be uniform.

5.3 Safety The safety shall be in accordance with **JIS B 4142**.

6 Shape and dimensions

6.1 General The shape and dimensions shall depend upon the classification of use. The dimensions shall be in accordance with tables 6 to 19 when tested in accordance with 7.2.

When not specified, the dimensional tolerances m (middle class) specified in **JIS B 0405** shall be applied.

6.2 Grinding wheel

6.2.1 Plain wheel and formed wheel The shape and dimensions of typical plain wheel, among the plain wheel and formed wheel, are given in table 6.