pdtools
SUPERABRASIVES

DIAMOND PASTES

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Diamond pastes are used for the finishing and polishing of ferrous and nonferrous metals, steels and semiconductors, alloyed steels, cast irons, ceramics, metal ceramics, carbide, sapphire, glass, semiconductors, and drawing dies.
Paste made of synthetic diamond ACH micropowders, grit size M40, with normal diamond volume content and washable by water would be marked as follows:
ACH M40 N W L.

Diamond pastes act on the workpiece surface chemically and mechanically. They form fine-dispersion emulsions that allow for a smoother distribution of diamonds over the workpiece surface. The paste also contains active surface agents, which make washing easier and help to remove slightly flammable liquids, chips and slag generated by the lapping process.

Pastes are produced with normal (N), higher (H) and extra-high concentration (E), depending on the volume content of diamonds and their grit size.

Volume content of diamond powder in diamond pastes

Diamond powder grit size	Volume content of diamond in pastes, ct			Color of paste and label
	N	H	E	
D126-D76	40	60	-	Lilac
D64-054	20	40	-	
M63-M40	8	20	40	Red
M25-M16	6	15	30	Blue
M10-M4	4	10	20	Green
M2,5-M1	2	5	10	Yellow
1/0,5-0,1/0 µm	2	5	10	Not colored

We can also produce pastes with other diamond volumes, without color and with non-standard diamond grit sizes. Pastes are delivered to consumers in syringes of 5, 10, and 20 grams, in containers of 50 and 100 grams, or in cans of 500 or 1000 grams. On request other packing is possible.

Depending on their ingredients, pastes are classified as follows:

(O) can be washed by organic solvents such as kerosene, petrol, alcohol, etc.
(W) can be dissolved and washed off by water.
(WO) can be washed off by water and by organic solvents, such as alcohol, industrial oils, petrol, kerosene.

Depending on grit size, pastes can be used for different finishes

Diamond powder grit sizes	Surface roughness, Ra, µm		Operation
	Before	After	
D126-D54	-	-	Rough finishing
M63-M40	0,4 - 0,2	0,195 - 0,155	
M25-M16	0,16 - 0,1	0,12 - 0,075	Semi- finishing
M10-M4	0,08 - 0,05	0,06 - 0,038	Fine finishing
M2,5-M1	0,04 - 0,025	0,03 - 0,02	Preliminary polishing
1/0,5-0,1/0 µm	-	-	Polishing

Abrasive capabilities of pastes

Diamond grit size	Abrasive paste quality, mg, not less than		
	N	High	Extra-high
M63	67	127	175
M40	62	123	163
M25	57	112	157
M20	52	102	153
M16	47	97	148
M10	42	93	143
M6.3	37	82	137
M4.0	32	65	108

Applications of diamond pastes

Type of paste	Rinseability	Application
Г (G)	О	Machining of ferrous and non-ferrous metals, alloys, non-metal materials, steels and semiconducting materials.
Л (L)	ВО	Machining of alloyed steels, cast iron, ceramics, cermet, tungsten carbide, ferrite, sapphire.
Х (H)	В, ВО	Machining of glass, semiconducting materials, carbide tools, dyes.
Э (E)	ВО	Machining of glass, semiconducting materials, carbide tools.

Attention! PDTools Superabrasives produces titanium carbide (TiC) pastes.

TiC abrasive pastes are used for the finishing and polishing of machine parts in the aviation industry, precision ball bearings, shut-off brake equipment, pneumatic equipment (plugs, valves, hydrocyclones), fuel equipment (seat plugs, valves), and tooling.

CUBIC BORON NITRIDE PASTES

Cubic Boron Nitride Pastes is produced for semi-finishing and finishing operations. It is used for finishing and polishing operations of carbon and alloy steel, chilled iron.

Past composition is next: cubic boron nitride powder, filler with organic oils, fatty acids, carbons of paraffin series and its derivate, polymer material, Cubic Boron Nitride Paste affects on processed surface with chemical and mechanical influence. The past composition consists of surface active materials, they help with washing workpieces, and output the slags from the processing surface.
It increases productivity and the roughness of the surface.

The paste divides:

"**N**"-normal consistency
"**H**"- higher consistency
"**E**"-extra-high consistency

We use the organic solvent: kerosene, engine oil, alcohol. The data for grit correspondence and abrasive facilities and roughness are in the table.

Grit size of CBN powder	The color of the paste and label	Abrasive capacity of steel processing HRC			Surface roughness (Ra), μm, not more	
		N	H	E	Before processing	After processing
B213; B151		-	-	-	-	-
B126-B91		-	-	-	-	-
60/40 μm	Red	67	127	175	0,4	0,195
40/28 μm		62	123	163	0,2	0,155
28/20 μm	Blue	57	112	157	0,16	0,12
20/14 μm		52	102	153	0,125	0,095
14/10 μm		47	97	148	0,1	0,075
10/7 μm	Green	42	93	143	0,08	0,06
7/5 μm		37	82	137	0,063	0,045
5/3 μm		32	65	108	0,05	0,038
3/2 μm	Yellow	-	-	-	0,04	0,03
2/1 μm		-	-	-	0,32	0,23
1/0 μm		-	-	-	0,25	0,02

The paste is delivered to the customers in container of 40, 50 and 100 grams.

The other package for pastes is possible according to client's request.

Storage temperature 25±5°C.

CARBIDE TITANIUM PASTES

Abrasive Carbide Titanium Paste - consists of composition of classified according to carbide titanium powders grit sizes and surface-active materials.

The pastes are used for finishing and polishing of details for aerotechnics, high-precision bearing, blocking devices and pneumatic motor (cranes, faucets, hydraulic cyclones), fuel injection equipment (plunger pairs, valves), tool outfits and rough grinding of details and knots.

Abrasive pastes have grit sizes: micro grits D426-D54; micro powders M63-M4.0.

The paste concentration in accordance with part of carbide titanium powder are:

"**N**" - normal consistency
"**H**" - higher consistency
"**E**" - extra-high consistency

In accordance with consistence carbide titanium paste divide into:

"**M**" - salvelike
"**T**" – hard

The selection of grit size depends on type of processing

Type of processing	Grit size of paste, μm	Expenditure of paste, gr/sm²	Roughness of surface (Ra), μm	
			Before processing	After processing
Rough processing	630/500-50/40	0,8-1,5		0,32
Semi-finishing processing	60/40-14/10	0,4-0,9		0,10
Finishing processing	14/10-3/2	0,2-0,6		0,032
Polishing	3/2-1/0	0,1-0,4		0,020

For diluting of pastes with oil base is recommended to use engine and aero oil, kerosene, gasoline; paste with water-washable base - alcohol, water.

The lap should be made of cast iron, latten, glass, wood (birch, oak, beech), felt etc.

The Abrasive capacity of pastes and the roughness of processed surface are in the table.

Grit size of carbide titanium paste	Abrasive capacity of paste, mg, not less		Roughness of surface (Ra), μm	
	N	H	Before processing	After processing
160/125	50	55	-	-
125/100	45	50	-	-
100/80	40	45	-	-
80/63	37	43	-	-
63/50	34	40	-	-
50/40	30	38	-	-
60/40	28	36	0,32	0,25
40/28	26	34	0,25	0,20
28/20	24	32	0,20	0,16
20/14	21	30	0,16	0,125
14/10	18	27	0,125	0,10
10/7	15	27	0,10	0,08
7/5	12	18	0,08	0,063
5/3	10	14	0,063	0,05
3/2	-	-	0,05	0,04
2/1	-	-	0,04	0,032

CHOICE OF MATERIAL FOR LAPS

Cast iron, steel, brass, bronze, wood, leather, and felt can be used as laps. The choice of a material for a lap depends on the material of the workpiece, its hardness and the required surface quality.

Cast iron has very high removal rates and can achieve the necessary surface geometry, but it gives a rougher finish than softer laps. Cast iron is used for lapping the very hardest materials with pastes of coarse grit sizes. The laps are produced with fine cast iron grit with low porosity.

Steel is used instead of cast iron when the hardness of cast iron is inadequate for a lap with a small cross section. Steel is used only for the removal of large volumes.

Brass and copper are best used with diamond paste made with medium grit sizes. To increase the hardness of the lap, steel cores are used. Bronze laps tend to load up at high temperatures and need to be moistened.

Wood of various types-from hard (hornbeam, beech, oak) to soft (birch, linden) hold diamond grains well and reduce the amount of paste used. Laps are made from cross sections of wood.

Glass is recommended for the polishing of semi-precious stones, corundum, granite, etc.

Fiber is used for laps that need to hold their shape when used with pastes of medium and fine grit sizes. The roughness of the surface finish with fiber laps is very low.

Leather and felt should be used only with pastes made of fine grit sizes for final surface finishing and for polishing to a mirror finish. These can used in the form of revolving discs, mandrels or inserts with a back and forth motion.

In order to perform the finishing operations it is necessary for the lap to be charged so that the abrasive grain presses into its surface.

In one carat of diamond powder there are anywhere from several ten thousands to hundreds of billions of grains, therefore it is necessary to apply the optimal amount of paste to the lap, thus also keeping costs down. For each paste of a specific grit size it is necessary to use a separate lap. When going from a paste with coarse grits to one with fine grits, the workpiece must be thoroughly rinsed.