

dialok high performance aralkyl phenol polymers : former xyloc resins

dialok 939P

aralkyl phenol polymer

General Description

DIALOK 939P is a specially formulated phenol-aralkyl resin which has proven to be an outstanding high temperature, thermally stable binder for diamond and CBN grinding wheels.

DIALOK 939P gives a much higher heat resistance than phenolic resins while still curing by the same mechanism.

Applications

DIALOK 939P is utilised in the preparation of grinding wheels for numerous applications including; tool and cutter grinding of hardened steels or tungsten carbide, fast polishing of granite, marble and other decorative stones. Bevelling and edge decorative glass, grinding of new-engineered ceramics and slotting and cutting of semi-conductors.

Key Properties

- Tool and cutter grinding of hardened steels or tungsten carbide
- Fast polishing of granite, marble and other decorative stones
- Bevelling and edge decorative glass
- Grinding of new advanced engineering ceramics
- Slotting and cutting semi-conductors



Specification

DIALOK 939P – polymer specification and supplementary physical and handling properties. Table 1 provides details of some of the product characteristics. The values highlighted by the circular symbols (left hand column of table) are properties tested on a batch basis and reported in the certificate of analysis. All other properties are typical of batch manufacture and are for technical information only. They do not constitute a specification.

Table 1

Physical Property	Units	Method ⁽¹⁾	Minimum	Maximum
● Appearance – [Fine pink powder – FFFM]	⁽²⁾ -	BSMT A 1001-001	ETS ⁽³⁾	-
● Hexamine Content	%	BSMT A 1045-002	10	12
● Pellet Flow - [Mintex]	Mm	BSMT A 1213-003	60	90

Property key

- (1) BSMT – Bitrez Standard Method of Test
- (2) FFFM – Free from Foreign Matter
- (3) ETS – Equal to standard

Solubility

DIALOK 939P is soluble in Methyl Ethyl Ketone (MEK), Industrial Methylated Spirits [IMS] and Methoxy Propanol. – if required.

Bond Mix Formulations

Customers will normally wish to develop their own bond mix formulation with **DIALOK 939P** and various fillers to satisfy particular application and performance requirements. We give below some bond mix formulations, in percentages by weight, as a guideline to customers.

COMPOSITION - PERCENTAGE BY WEIGHT				
	WET GRINDING WHEELS		DRY GRINDING WHEELS	
	DIAMOND	CBN	DIAMOND	CBN
DIALOK 939P	38 – 42	40 – 50	28 – 30	28 – 30
Magnesium or Calcium Oxide	3	3	3	3
Cryolite or P.T.F.E	2.5	2.5	-	-
Graphite	-	-	2.5	2.5
Dentritic Copper Powder [<20 microns]	2.5	2.5	4	4
Silicon Carbide [1000 mesh]	50 - 54	42 - 52	60 - 62	60 – 62

Preparation of Bond Mixes

Our recommended procedure for preparing bond mixes is given below:-

- Weight out the fillers (i.e. silicon carbide, magnesium or calcium oxide, graphite or cryolite and P.T.F.E. as well as copper powder.
- Weigh out the **DIALOK 939P** and add to the filler mix.
- Weigh out the diamond or CBN abrasive, add the **DIALOK 939P** filler mix and stir with spatula for 5 minutes.
- Finally, transfer the bond mix to a small container and give 10 minutes on a Turbula Shaker Mixer.

Notes

- Increasing the **DIALOK 939P** produces a harder bond while decreasing the **DIALOK 939P** gives a more friable bond.
- The replacement of some silicon carbide by fine nickel powder also increases the hardness of the resultant cutting rim. We, must, however, warn that if the diamond wheels are made too hard, then the diamond grit will not microfracture and wear away at a controlled rate. Instead of removal of material from the workplace, it becomes polished.
- The replacement of a few percent of silicon carbide in the bond mix formulation with dentritic copper gives a softer wheel.
- For high speed grinding, it is important to conduct the heat away from the wheel/workpiece interface. This can be achieved by a large replacement of silicon carbide by dentritic copper in the bond mix formulation.
- For wet grinding operations, it is essential to wash away the debris formed and so avoid blocking the cutting rim. A more porous cutting rim can be achieved by introducing some hollow aluminum silicate spheres into the bond mix formulation. The moulding of cutting rims containing hollow spheres should be to a constant volume. This is to avoid crushing the spheres prematurely.
- To achieve high stock removal rates, use grit size 80/100 U.S. mesh while for a good surface finish use 140/170 U.S. mesh grit or finer.

Moulding Methods

The abrasive/bond mix can be used for moulding grinding wheels by one of three methods. In all instances, we recommend moulding in a constant volume mould.

Method 1

Mould cutting rim with abrasive/bond mix. Add the moulding compound for the hub and hot press the complete wheel.

Method 2

Put a pre-formed but un-post cured wheel into the mould. Add the abrasive/bond mix and hot press the complete wheel.

Method 3

This 'One Shot Technique' requires cold pressing of the moulding compound to give a 'Green State' hub. Add the abrasive/bond mix and hot press the complete wheel.

Moulding Conditions

A guideline to moulding conditions is summarised below:-

- Set the platen temperature to between 200°C and 250°C depending on mould size (i.e. 200°C for small moulds and 250°C for very large).
- Fill the constant volume mould with the abrasive bond/mix.
- Allow mould temperature to rise to 60°C without pressure.
- During the mould temperature increase from 60°C to 100°C, apply full pressure (40-800 kg/cm² or 5700 – 11430 lb/in²) but release pressure for intervals of 10 seconds about five or six times to allow volatile by-products to escape.
- During the mould temperature rise above 100°C, maintain full pressure.
- Allow temperature to rise to 175°C.
- At 175°C, remove mould from the press and hot strip.
- Allow finished wheel to cool slowly to room temperature.

The optimum overall moulding time will change with the size of the wheel. As a guide, we recommend at least 20 minutes for wheels up to 200mm diameter and at least 60 minutes for wheels up to 400mm diameter.

Post Cure Schedules

Post-curing of grinding wheels is essential for the DIALOK 939P to become fully cross-lined and so achieve optimum hardness. During the post-curing, the volatile by-products of the curing reaction, namely ammonia gas, slowly diffuses out of the mouldings.

As a general rule, wheels required for wet grinding operations are best made with hubs moulded from mineral and glass fibre filled mould compounds. For example, our grades AR 1004, AR 1011 and AR 1056. These give wheels that should be post-cured to 175°C maximum. A suitable post-curing schedule is given below:-

Post-curing to 175°C Maximum for Wet Grinding Applications

Put wheel in oven at room temperature. Raise temperature to 20°C to 100°C over 1 hour.

Hold at 100°C for 1 hour. Raise temperature from 100°C to 150°C over 1 hour.

Hold at 150°C for 1 hour. Raise temperature from 150°C to 175°C over 1 hour.

Hold at 175°C for between 8 – 25 hours depending on size of the wheel. Cool slowly to ambient.

Post Curing Schedules

For the manufacture of wheels intended for dry grinding operation, the hubs are best made from metal powder filled moulding compounds such as our grades 1022, 0123 or 1027. These give strong heat conducting hubs. Such wheels can be post-cured to temperatures up to 200°C maximum by a suitable post-curing schedule such as the one below:-

Post Curing in 200°C Maximum for Dry Grinding Applications

Put wheel in oven at room temperature. Raise temperature to 20°C to 100°C over 1 hour.

Hold at 100°C for 1 hour. Raise temperature from 100°C to 150°C over 1 hour.

Hold at 150°C for 1 hour. Raise temperature from 150°C to 200°C over 1 hour.

Hold at 200°C for between 8 – 16 hours depending on size of the wheel. Cool slowly to ambient.

If wheels are found to develop blisters, cracks or general swelling during the post-curing operation, then the temperature rise has probably been too rapid. In these circumstances, we recommend you modify the post-curing schedule to attain a slower temperature development. Alternatively, post-cure to a maximum temperature of about 190°C to 200°C.



Packaging

DIALOK 939P is supplied in the following standard pack sizes.

DIALOK 939P standard packaging

200 lt drums – tight head drums @ 200 KG net weight

1000 lt IBC units @ 1000 KG net weight

Storage

DIALOK 939P should be kept in the original containers with the lids tightly affixed. Containers should be stored in a cool, dry place in compliance with the appropriate legislative controls.

Shelf Life

If stored in accordance with the guidelines provided this product has a minimum shelf life of at least **12 months**.

Health and Safety

Prior to using any material supplied by Bitrez Ltd, information should be sought from our general guidance for the safe handling of phenolic polymers and specific safety data reviewed from the Material Safety Data Sheets [MSDS]. MSDS information is periodically updated and revised copies will be forwarded as changes are made.

General

This material is one of a series of specially formulated phenolic resins. In the event that the system detailed herein does not satisfy any particular requirements, either in terms of the physical, mechanical or chemical resistance properties then we would be pleased to discuss alternative grades. In the event that further information is required, our technical sales staff will be pleased to establish if the information is available and offer assistance.

Notice

All information is based upon results gained from experience and is believed to be accurate but is given without acceptance of liability for loss or damage attributable to reliance thereon as conditions of use lie outside our control. Users should always carry out tests to establish the suitability of any products for their intended application. No statements shall be incorporated in any contract unless expressly agreed in writing nor construed as recommending the use of any product in conflict of any patent. All goods are supplied subject to Bitrez LTD's General Conditions of Sale

Bitrez Ltd – a member of Bitrez Group Ltd
Bradley Hall Trading Estate, Bradley Lane, Standish, Nr Wigan WN6 OXQ United Kingdom

- Tel + 44 (0) 1257 425512
- Fax + 44 (0) 1257 422863
- e-mail mail@bitrez.co.uk