BAKELITE Molding News

GREATEST VARIETY — LARGEST RESOURCES — FOR PLASTICS KEYED TO YOUR NEED

SEPTEMBER 1954 VOL. 1 No. 5

Greater Uniformity—Versatility—Savings Possible with New Brown Phenolic

PLAINTIFF'S EXHIBIT

UC-5312

BAKELITE Phenolic Molding Material BMG-5000 Brown 15 Offers Fast Production, Fewer Rejects, Better Appearance

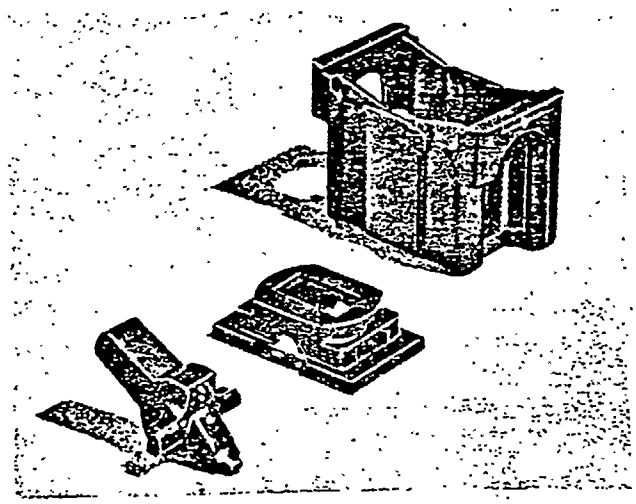
BAKELITE phenolic BMG-5000 Brown 15 offers the molder a brown general purpose phenolic molding material with the same type of excellent properties and molding characteristics which have helped make BMG-5000 Black 25 the fastest growing general-purpose phenolic on the market. Specifically designed for the wiring device industry, this new molding material makes possible fast production, few rejects, and more pieces per pound.

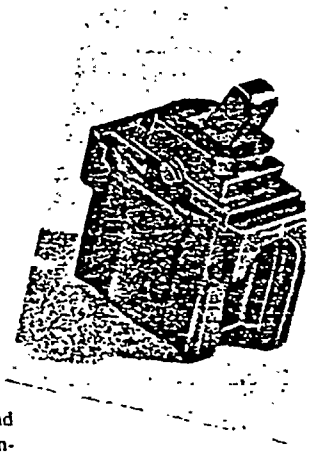
Molding to an attractive rich brown color of unusual depth, BAKELITE BMG-5000 Brown 15 produces molded parts possessing high gloss and excellent uniformity of surface finish free from burns and lubricant smear, as well as gas marks and weld lines. Due to its excellent dimensional stability when discharged after molding, BMG-5000 Brown 15 can be used to mold pieces having intricate thick and thin sections. These charactertistics make it well suited for such electrical components as wall plates and receptacles and for such applications as handles for appliances and luggage.

Like its black counterpart, BMG-5000 Brown 15 may be preheated using a wide range of preheat temperatures. In addition, it can be molded using cold preforms and no preheat with the same excellent results. This new molding compound also offers increased flow and more rapid cure.

Molding Latitude and Speed of Cure

In BMG-5000 Brown 15, Bakelite Company has achieved an excellent balance of molding latitude and speed of cure in a brown phenolic molding material. It can be molded by compression, transfer and plunger methods. This versatility was displayed in several field tests in which variations in preheat time and mold closing speeds had no effect on the molding time or on the surface appearance when

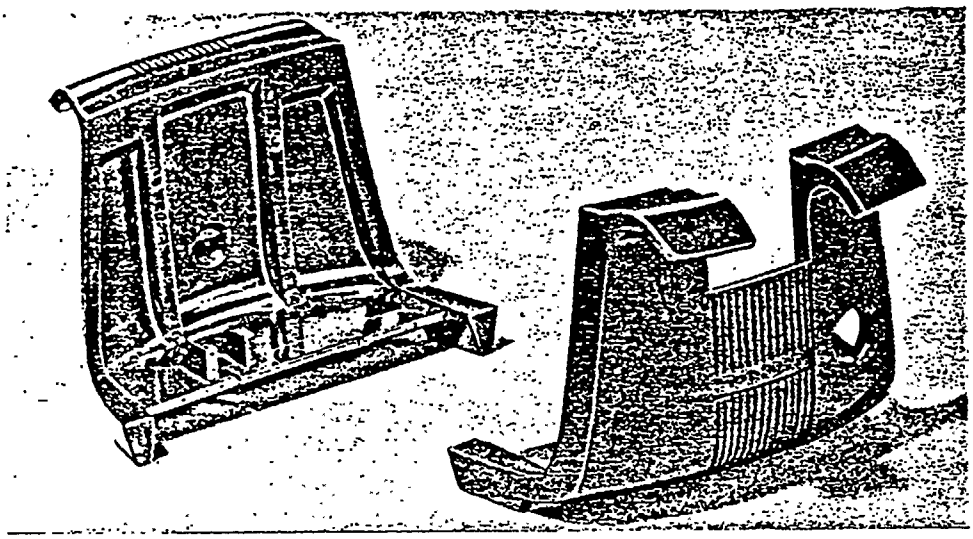




Switch Components

The components of this switch box assembly illustrate the three-fold molding properties of BMG-5000 Brown 15: (1) more production per cavity—the outcome of a material having a minimum cure, (2) easy release of molded part from deep or intricate cavities, and (3) accurate uniformity in dimensions to ensure ready interchangeability and production assembly. Parts molded by The Bryant Electric Company.

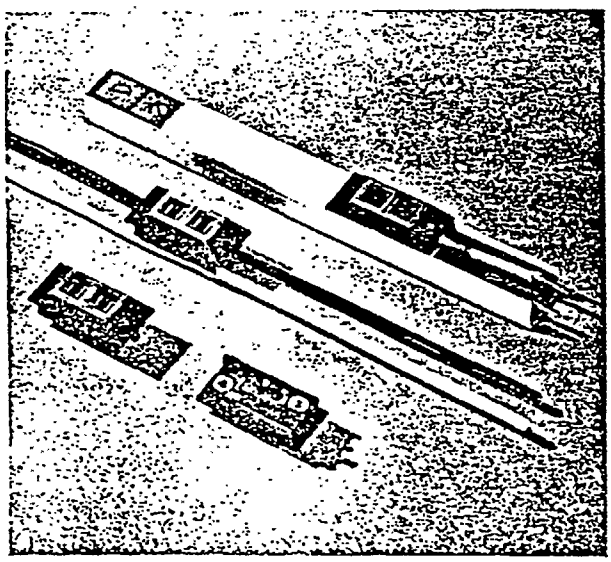
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Appliance Parts

These handles for the Toastmaster toaster, an attractive combination of brown phenolic and chrome, offers an excellent illustration of the rich molded color and smooth surface appearance of BMG-5000 Brown 15.

A 2.5 per cent savings in weight of charge was realized in molding these pieces due to the lower molded specific gravity of BMG-5000 Brown 15. In addition, the length of cure was reduced 20 per cent through the use of this new brown phenolic. Handles molded by The Minneapolis Plastic Molders, Inc.



Reduction of Molding Cycle

A 15 per cent reduction in molding cycle time was effected by the use of BMG-5000 Brown 15 in the manufacture of this "Plug-mold" receptacle. The part was molded in a twelve cavity, top ram plunger press, with cam operated side plates used to form undercut grooves on the sides of the piece. Using electronically heated preforms, the molder was able to reduce his total molding cycle to two minutes. These receptacles are molded by Colts Manufacturing Co. for The Wiremold Company.

BAKELITE phenolic BMG-5000 Brown 15 was used. In one test, the use of this new material reduced the minimum cure time 20 per cent over that needed for the material previously used. Optimum cure can be obtained by raising the mold temperatures from 310 to 360 deg. F. Excellent cutoff and good flash release are further recommendations for using this versatile molding compound.

Its Quality is Controlled

Quality controlled from the raw material to the finished molding material, BAKELITE phenolic BMG-5000 Brown 15 ensures a uniform molding material. Thus, the molder can be sure that each shipment he receives has the same plasticity, speed of cure, molding latitude and color as the previous order. This uniformity makes BMG-5000 Brown 15 ideally suited for the molding of items having interchangeable parts, such as wall plates, light switches, duplex outlets, lamp sockets and two-piece outlet receptacles.

Recommended for Electrical Parts

BAKELITE phenolic BMG-5000 Brown 15 possesses excellent thermal and electrical insulating properties which make this an excellent material for molding not only small wiring devices but also larger applications. These larger

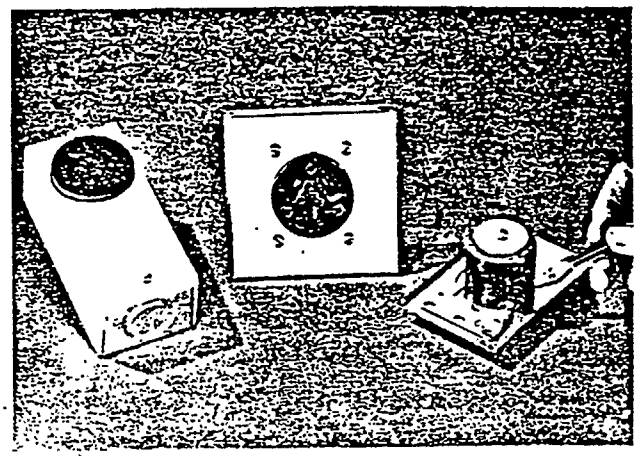
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applications may include switch gear for circuit breakers, power panels and control parts in industrial equipment, and terminal strips, fuse boxes and similar parts in elevator mechanisms.

More Molded Pieces Per Pound

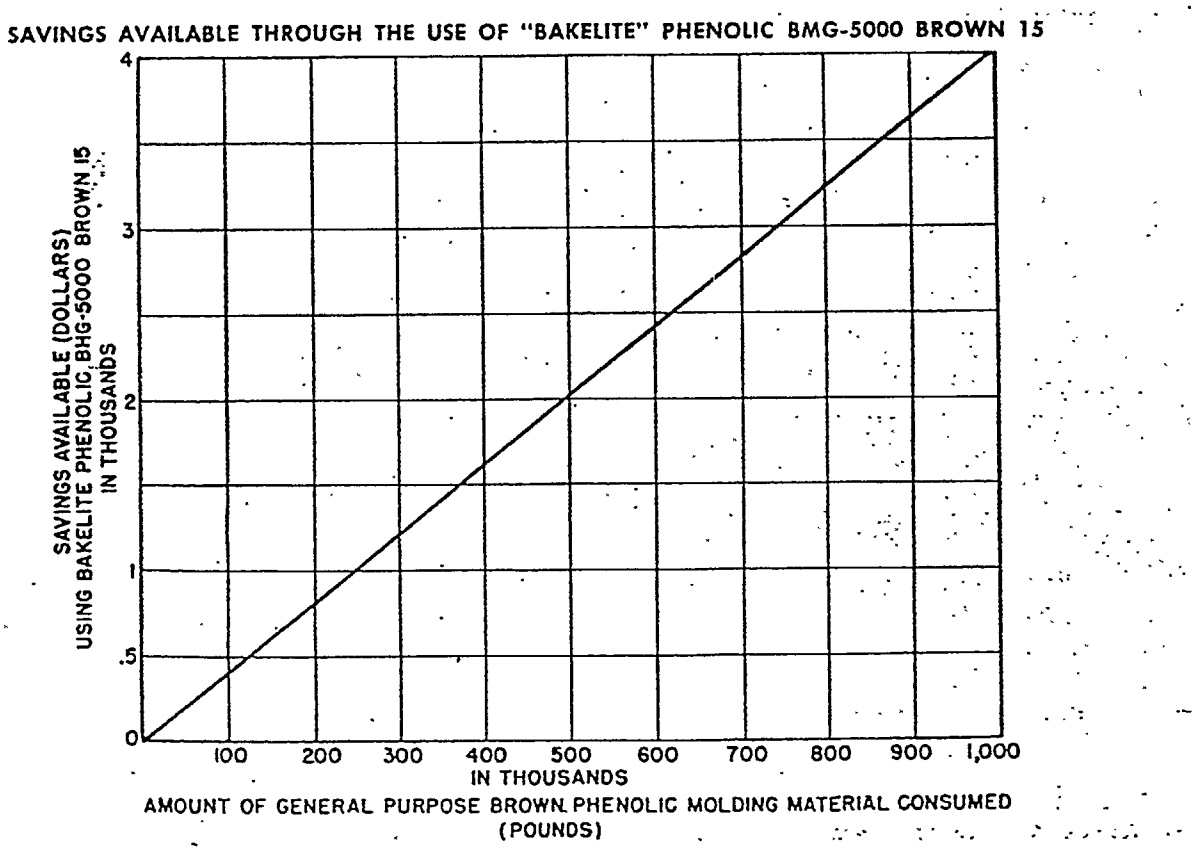
Every penny counts in such a highly competitive business as the manufacture of wiring devices. Realizing this, Bakelite Company through its extensive development program, has produced a brown phenolic molding material having a specific gravity averaging 1.37—BMG-5000 Brown 15 possesses one of the lowest specific gravities of any general-purpose brown phenolic. This means greater savings to the molder since it offers more molding material per pound. This saving can be realized more fully by examining the chart given below.

It can be noted that a molder who consumes 100,000 pounds of general-purpose brown phenolic, having an average specific gravity of 1.40, would realize a saving of $400 by using BMG-5000 Brown 15 instead of his previous material.



Good Surface Finish + Moldability

Excellent surface appearance, good moldability, speed of cure—these are the characteristics of BAKELITE phenolic BMG-5000 Brown 15 which recommend it for molding these 3-pole receptacles. This new phenolic molding material preforms well on electronic preheaters. The receptacles were molded by Formold Plastics Company for Ben P. McKinley Company.



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"BAKELITE" General-Purpose Phenolic

TRADE-MARK

Molding Material BMG-5000 Brown 15

PROPERTIES*

Values Relating to Fabrication		AVERAGE VALUES
Granulation, mesh (D392-38)	16	16
Bulk Factor (D392-38)	2.7 maximum	2.4
Tabletting Quality— Can be tabletted satisfactorily in the usual tabletting equipment		
Pourability, seconds (D392-38)	20 maximum	17
Molding Shrinkage, in./in. (WC-56-F)	0.0035-0.0055	0.0046
Plasticity— (WC-540-C) Will be supplied in grades 6, 9, 12, 15		

Values from Electrical Tests		
Dielectric Strength (D149-44) Short time, volts per mil	300 minimum	350
Volume Resistivity, megohm-cms. (D257-46)	5×10^5 minimum	3.0×10^6
Dielectric Constant (D150-47T)		
60 cycles	8 maximum	5.9
1,000 cycles	7 maximum	5.4
1,000,000 cycles	5 maximum	4.7
Power Factor (D150-47T)		
60 cycles	0.100 maximum	0.070
1,000 cycles	0.060 maximum	0.046
1,000,000 cycles	0.045 maximum	0.035

Values from Miscellaneous Tests		AVERAGE VALUES
Molded Specific Gravity (D392-38)	1.36-1.39	1.37
Heat Distortion Temp. (D648-45T), deg. F.	290 min.	340
Heat Resistance— Molded parts ordinarily should not be exposed to temperatures in excess of 300 deg. F.		
Water Absorption (D570-42), per cent gain in weight	0.6 maximum	0.42
Saturation Constant (WC-78B)	—	8.2
Diffusion Constant (WC-78E)	—	1.1

Values from Mechanical Tests		
Izod Impact Strength, ft. lb./inch of notch (D256-47T)	0.26 minimum	0.29
Compressive Strength (D695-44T), psi	30,000 minimum	36,000
Tensile Strength (D651-48) (⅛"), psi	7,000 minimum	9,000
Flexural Strength (D790-45T), psi	9,000 minimum	10,300
Flexural Work to Break (WC-91-C), ft. lb.	—	.50
Modulus of Elasticity in Flexure (D790-45T), psi	9.0×10^5 minimum	9.8×10^5

*These properties meet the tentative specifications on this material.

The data contained in this brochure are based on tests conducted at Bakelite Company Laboratories and at the manufacturers' plants. Each user must establish for himself the most suitable mold conditions, production methods, and control tests to ensure the uniformity and quality of his product. Bakelite Company has highly trained engineers in the field ready to serve you, and these technical representatives will be glad to discuss your problems.

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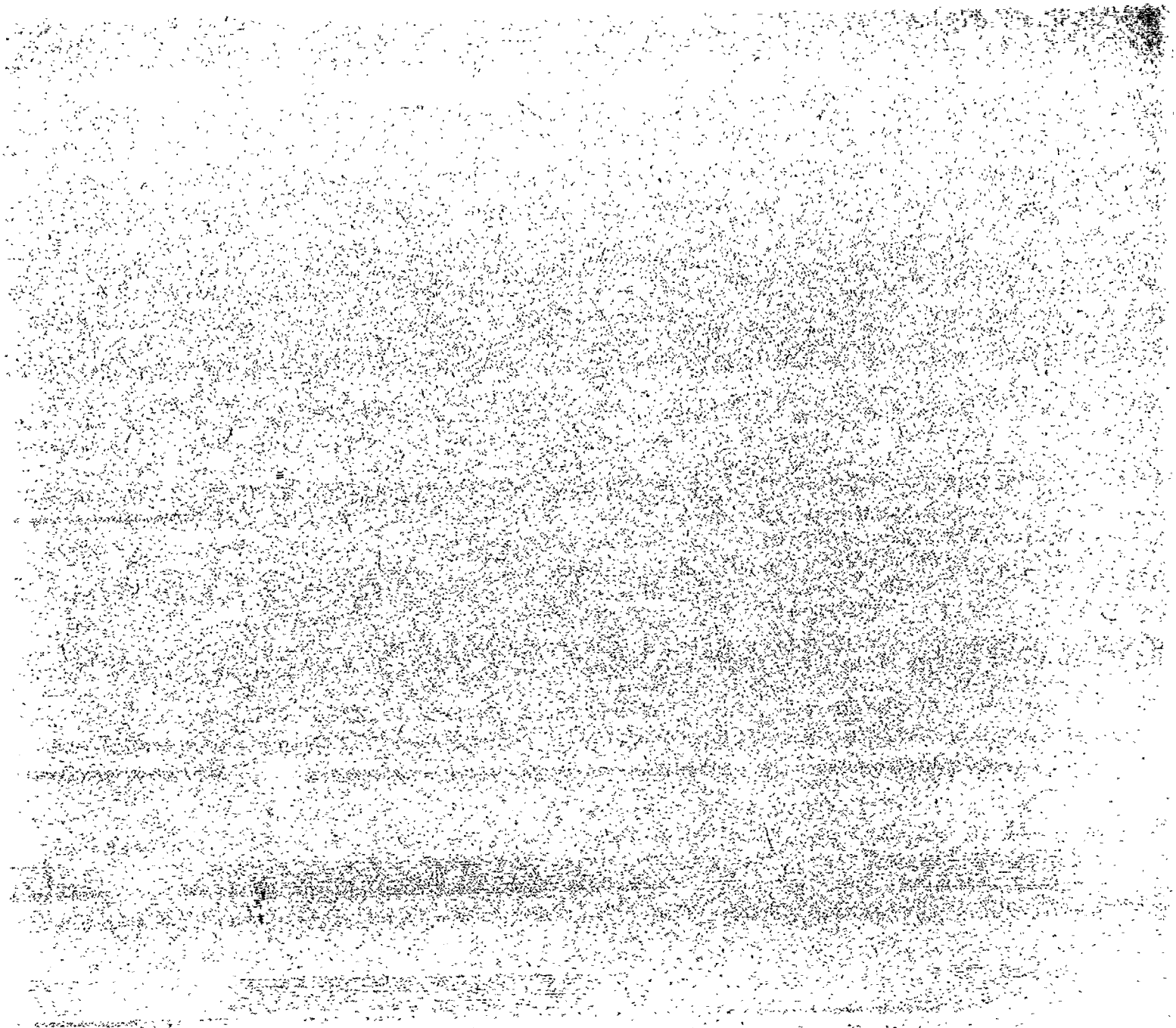
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BAKELITE TRADE MARK Molding News

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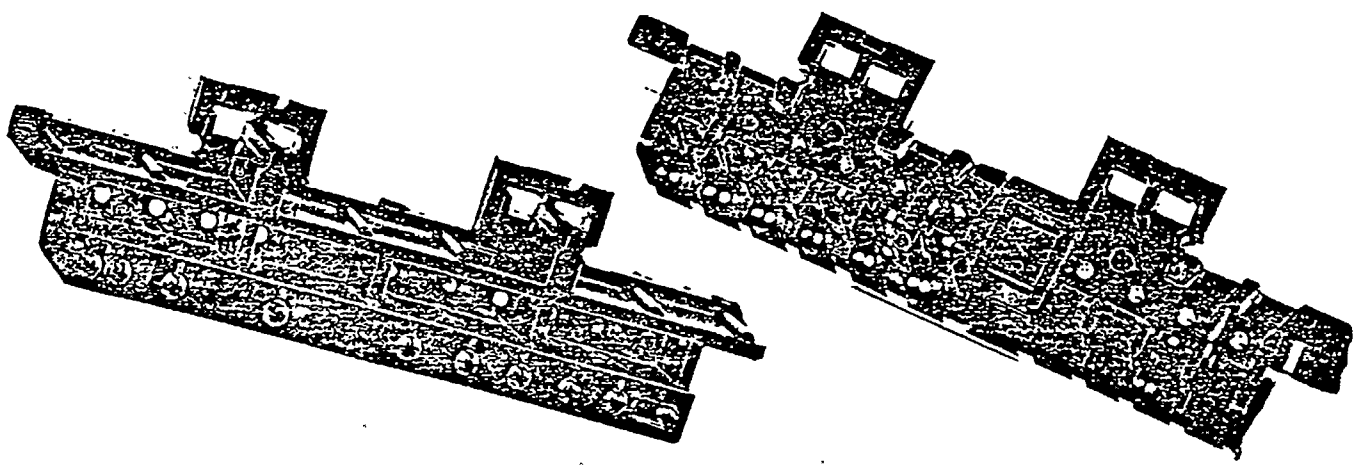
Molding Material Uniformity = Decreased Down Time = Greater Saving

BAKELITE Phenolic BMG-5000—Black 25—The Answer to An Age-Old Problem

PRODUCED by Bakelite Company on new specially engineered, semi-continuous equipment, BAKELITE BMG-5000—Black 25, a general-purpose phenolic molding compound, overcomes one of the major causes of press shutdowns, that is, variations in the molding material used.

The outstanding blend-to-blend uniformity of this new material coupled with increased molding latitude and all-round utility, ensures the molder of greater economy and maximum production output.

Bakelite Company specifically designed BMG-5000—Black 25 to answer the long-standing problems of the plastic molding industry. The qualifications which this new molding compound should possess were outlined at the start of the development program. Versatility was of prime importance so that this material would be suitable for compression, transfer or plunger molding. It must not be too sensitive to handle while preheating, nor must it cure too slowly in the mold. In addition, the molded piece must be rigid at hot discharge and be freely ejected from the cavity. Finally, the finished product, possessing minimum uniform shrinkage characteristics, must present a good appearance, free from warpage and blisters. Molders wanted such a material. BAKELITE Phenolic BMG-5000—Black 25 is the answer.



Plunger Molding at its Best

This terminal strip with its numerous holes and intricate shape illustrates the successful results obtained with BMG-5000—Black 25. The excellent flow properties of this new material make possible total mold fill-out resulting in greater freedom from weld lines and strained sections. The overall dimensional stability of this material ensures the molder of precise shape retention both during production and after the piece is removed from the mold.

PLAINTIFF'S EXHIBIT

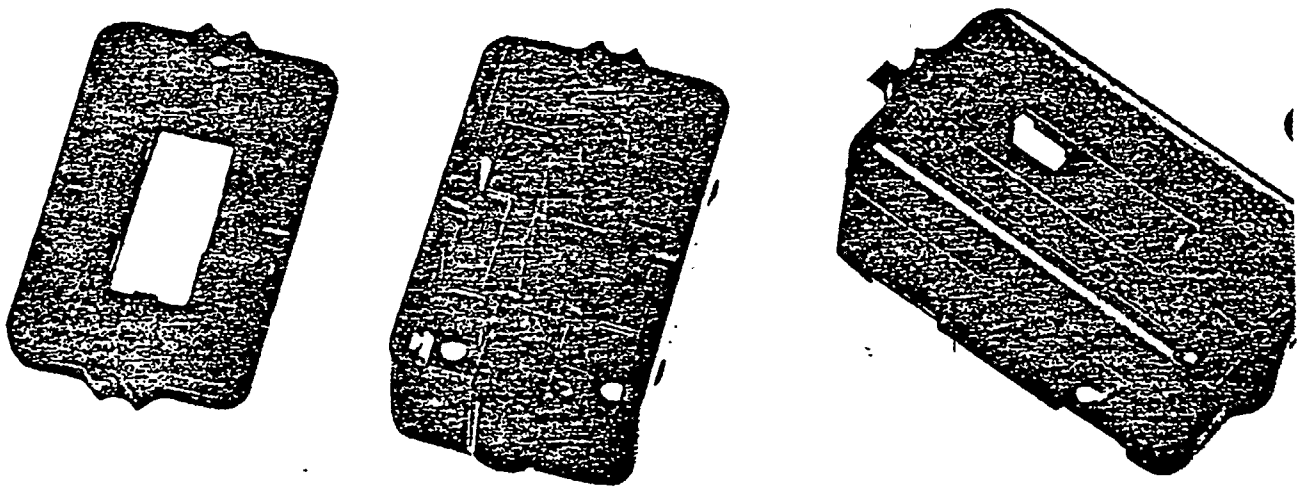
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BMG-5000—Black 25 is Quality Controlled

During the manufacture of BMG-5000—Black 25, samples are periodically checked to ascertain that the molding qualities of each blend will be uniform. Modern statistical control charts maintained on each property are evaluated so that any tendency to drift from normal can be detected immediately and the product kept within established limits. Similiar statistical control methods are applied to the manufacture of the resins used in the preparation of this molding material. The primary aim of this rigid control is to ensure the uniformity of proper plasticity, speed of cure and molding latitude. Finally, samples of the finished material tested to be sure that the physical and electrical properti meet the specifications.

Thus, a quality product is produced with the best raw m terials and the most up-to-date manufacturing techniqu Carefully controlled and maintained from the time the res and fillers are compounded and milled till the finished ma rial is packaged for shipment, BMG-5000—Black 25 off maximum press output, maintenance of critical dimensio tolerances in the molded piece, and a good lustrous bl surface of excellent high gloss.

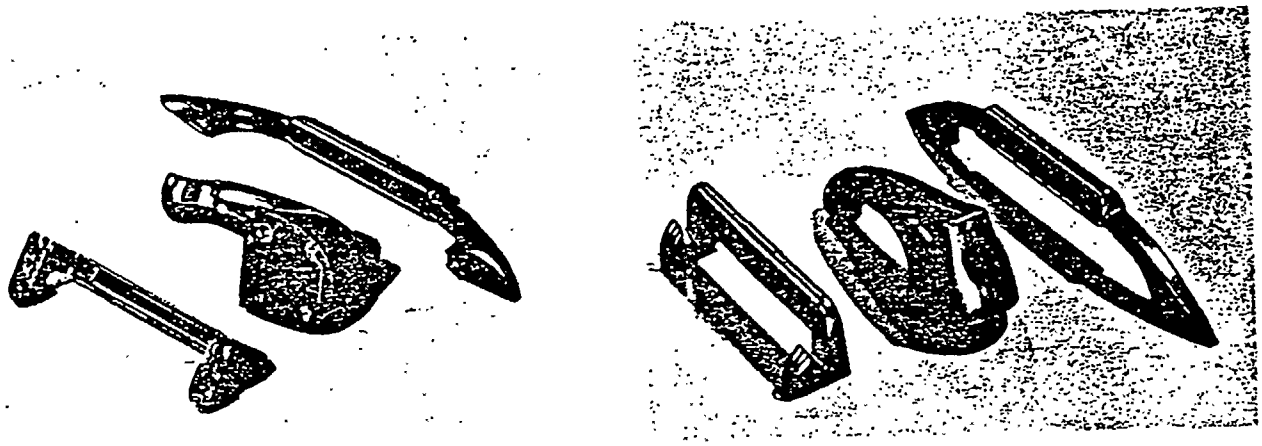


Production Economy for Small Parts and Wiring Devices

This switch box case was plunger molded while its cover was compression molded—both using BMG-5000 —Black 25. Illustrative of the myriad electrical wiring devices in use today, these pieces typify the long-draw, stagnant area molding problems encountered in the design of this type of product. Since these are mass production items, production economy is a ruling factor and the lower specific gravity of BMG-5000—Black 25 makes possible more pieces per pound.

BAKELITE phenolic BMG-5000—Black 25 is ideally suited for these interchangeable parts since it offers uniformity of molding material, minimum amount of flash, and rapid release from mold cavity and from plungers and followers.

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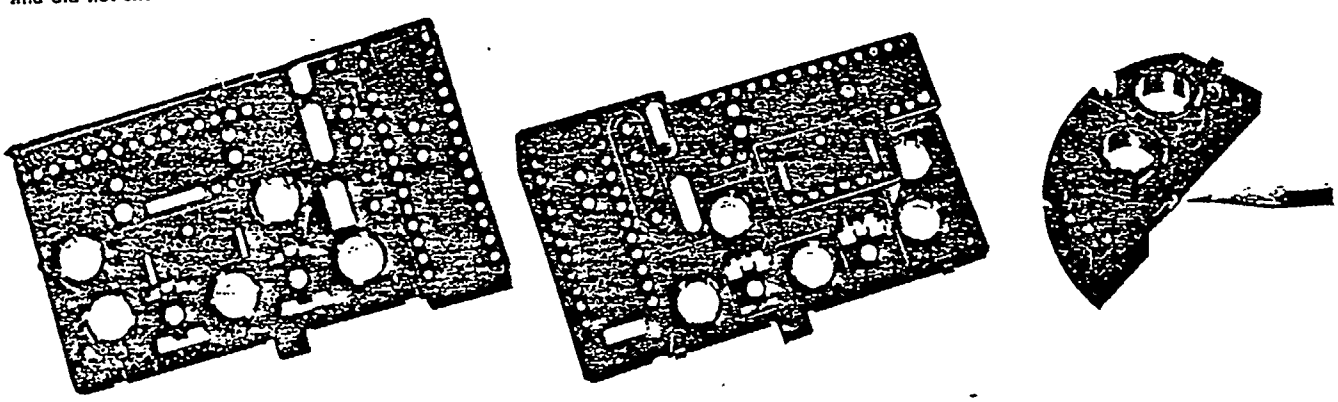
Rapid Cure—Excellent Preheat—Dimensional Stability Recommend BMG-5000—Black 25 for Molding All Types of Handles

For decorative and protective reasons, general-purpose phenolic materials have been used as handles for kitchen utensils, for electric roasters, grills, toasters, and other appliances, for hardware, and many other applications.

Three interesting examples of handles molded with BMG-5000—Black 25 are illustrated here. The large roaster handle (right) cured blister-free in 21 seconds instead of 30 seconds as was necessary with the molding material formerly used. It was rigid at discharge and did not stick to the mold cavity.

Handles for electric irons, such as pictured (center), have always presented a problem of cure, due to the relatively thick and thin sections of the piece. The handle shown was molded blister-free in 46 seconds. Experimentally, the preheat time was increased to as high as 188 seconds and still produced perfect molded pieces.

If not properly cured, handles having thick and thin sections similar to the small roaster handle pictured (left) will warp. No warping was encountered when the handle was molded with BMG-5000—Black 25.



Good Mechanical Strengths and No Weld Lines on Intricate Molded Pieces

The excellent results possible in using BMG-5000—Black 25 to mold intricate and complicated pieces are indicated in the radio chassis pictured. Measuring 6⅜ inches long, 3⅝ inches wide, and 1¾ inches at its highest point, it contains 100 holes and depressions. No weld lines are visible and the piece exhibits excellent mechanical strengths—noteworthy points considering the small sprue nozzle used. (Note Picture.)

The chassis was molded in an overall time of approximately two minutes in a plunger-type mold. A charge of 146.5 grams of BMG-5000—Black 25 was transferred through the runners to the cavity by way of a ⅛-inch diameter orifice. The material flowed freely around each core pin. The closing time was 10 seconds. Borderline cure (no blistering on opening of the clamp) was obtained in 23.5 seconds. Production cure was obtained in 29.5 seconds.

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Lower Specific Gravity Decreases Volume Cost

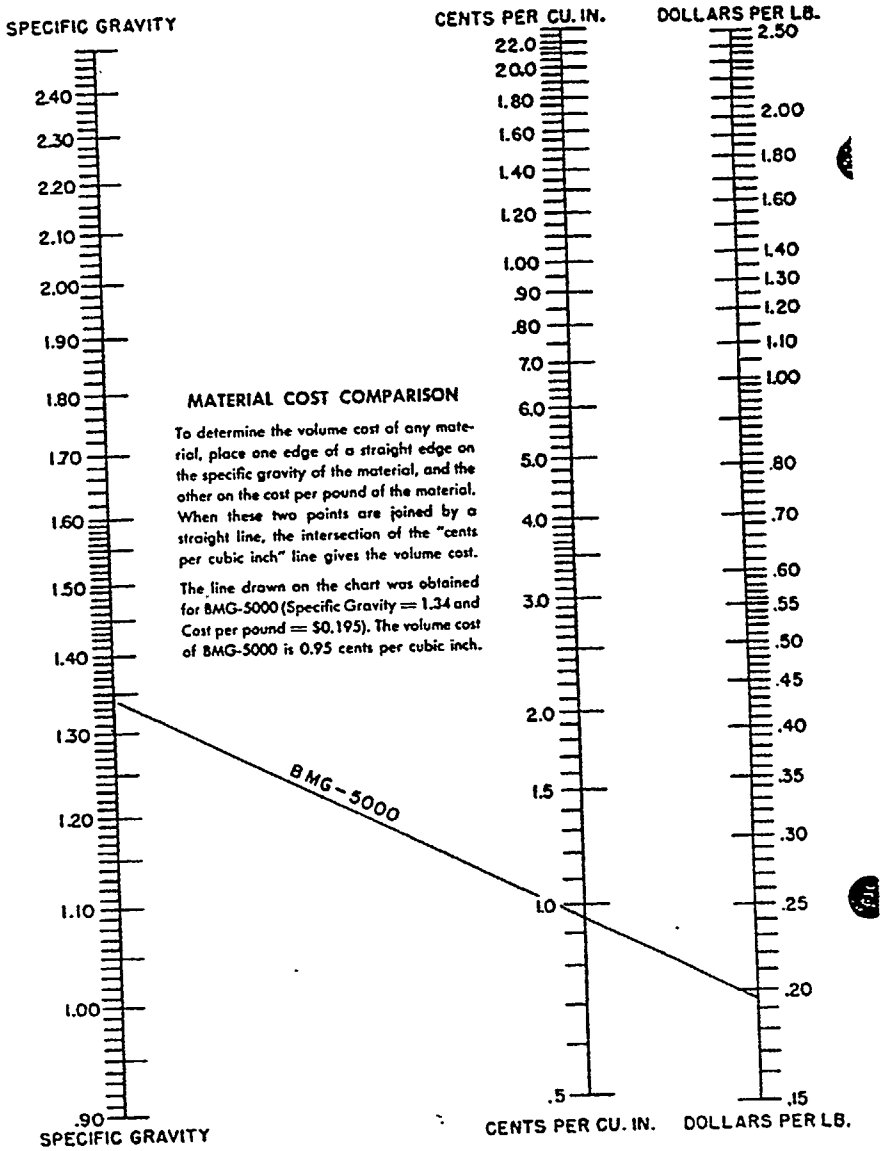
Lower specific gravity means lower costs per molded piece. BAKELITE Phenolic BMG-5000—Black 25 has one of the lowest specific gravities of any general-purpose phenolic molding compound and, thus, offers the molding industry another saving.

The following table provides a means of comparing the economics of molding with BMG-5000—Black 25 (Specific Gravity= 1.34**) with that of your present phenolic molding material. This comparison is based on the molding of 1000 cubic inches of material.

** Average Value = 1.34
Range = 1.33 to 1.35

Specific Gravity	Weight (lb.) Per 1000 Cubic Inches	Material Cost* Per 1000 Cubic Inches
1.34	48.3	$ 9.42
1.35	48.6	9.47
1.36	49.0	9.56
1.37	49.3	9.61
1.38	49.7	9.69
1.39	50.1	9.77
1.40	50.4	9.83
1.41	50.8	9.91
1.42	51.1	9.96
1.43	51.5	10.04
1.44	51.9	10.12
1.45	52.2	10.18
1.46	52.6	10.26

* Based on the current market price of general-purpose phenolic materials of $0.195 per pound.



MATERIAL COST COMPARISON

To determine the volume cost of any material, place one edge of a straight edge on the specific gravity of the material, and the other on the cost per pound of the material. When these two points are joined by a straight line, the intersection of the "cents per cubic inch" line gives the volume cost.

The line drawn on the chart was obtained for BMG-5000 (Specific Gravity = 1.34 and Cost per pound = $0.195). The volume cost of BMG-5000 is 0.95 cents per cubic inch.

The data contained in this brochure are based on tests conducted at Bakelite Company Laboratories and at the manufacturers plants. Each user must establish for himself the most suitable mold conditions, production methods, and control tests to insure the uniformity and quality of his product. Bakelite Company has highly trained engineers in the field ready to serve you, and these technical representatives will be glad to discuss your problems.

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