

Description**BACKGROUND OF THE INVENTION****5 Field of the Invention**

The present invention relates to a carbon black-containing polyoxymethylene resin composition having excellent contact electrical resistance.

10 Related Art Statement

Polyoxymethylenes which are an engineering resin having balanced mechanical properties and excellent sliding property, are in wide use in various mechanical parts, office automation apparatuses, etc., owing to the excellent sliding property.

15 However, as an electrical insulation and being similarly to other resins, polyoxymethylene resins are poor in removability of the static electricity generated by a sliding action or are poor in conductivity and have not been generally used in applications requiring both sliding property and high conductivity. In recent years, polyoxymethylene resins containing carbon black have been used in the above applications. However, these resins are insufficient in thermal stability and fluidity as well as in surface smoothness of molded material and accordingly these resins have had problems in that they are unable to exhibit the sliding property inherently possessed by polyoxymethylene resins, have large contact electrical resistance, and are unable to exhibit sufficient conductivity.

Various conductive resin compositions containing carbon black have hitherto been known. For example, Japanese Patent Application Kokai No. 8335/1985 discloses a method for producing a conductive resin comprising (a) a thermoplastic resin and (b) a conductive carbon having a dibutyl phthalate absorption of 400 ml/100 g or more and a heavy metal content of 500 ppm or less. Japanese Patent Publication No. 8712/1985 discloses a composition for plating, having a volume electrical resistance of $10^3 \Omega\text{-cm}$ or less, comprising (a) a thermoplastic resin and (b) a carbon black having a dibutyl phthalate absorption of 200 ml/100 g or more. When these techniques are applied to a polyoxymethylene resin, the resulting resin composition has a volume electrical resistance of 200 $\Omega\text{-cm}$ or less. However, the molded material thereof has insufficient thermal stability and a very rough surface. Accordingly, no molded material as intended by the present invention can be obtained.

Hence, various methods were proposed in order to improve the poor thermal stability of carbon black-containing polyoxymethylene resin. For example, Japanese Patent Publication No. 31736/1986 proposes a method of adding carbon black and an amide compound to a polyoxymethylene resin, and Japanese Patent Publication No. 40708/1986 proposes a method of adding carbon black and a low-density polyethylene to a polyoxymethylene resin. Further, Japanese Patent Application Kokai No. 210161/1988 proposes a method of adding carbon black and an epoxy compound to a polyoxymethylene resin. Furthermore, Japanese Patent Application Kokai No. 210162/1988 proposes a method of adding carbon black, an epoxy compound and an organic phosphorus compound to a polyoxymethylene resin. In these techniques as well, however, improvement in thermal stability is insufficient and improvement in more important surface roughness is not at all seen. Accordingly, no molded material as intended by the present invention can be obtained.

Meanwhile, Japanese Patent Application Kokai No. 2785541/1989 proposes the addition of carbon black and an ethylene copolymer to a polyoxymethylene resin to provide a composition with improved fluidity. In this technique, some improvement in surface roughness of molded material is obtained. However, improvement in thermal stability is still insufficient, and moreover, improvements in molded material surface as well as in contact electrical resistance are insufficient.

Accordingly, there remains a need for a resin composition capable of providing a molded material having excellent surface roughness and low contact electrical resistance, which molded material has hitherto been impossible to obtain by the addition of carbon black to a polyoxymethylene resin.

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SUMMARY OF THE INVENTION

The present inventors have conducted an extensive research in order to obtain a molded material having excellent surface roughness and low contact electrical resistance and as a result, they have completed the present invention.

According to the present invention there is provided a highly conductive resin composition comprising:
 (a) 55% by weight or more of a polyoxymethylene resin,
 (b) 5-15% by weight of a carbon black exhibiting a dibutyl phthalate absorption of 300 ml/100 g or more,

- (c) 0.05-10% by weight of an epoxy compound, and
 (d) 5-20% by weight of a polyolefin copolymer of ethylene and an α -olefin of 3-6 carbon atoms.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

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The polyoxymethylene resin constituting the resin composition of the present invention is an oxymethylene homopolymer consisting substantially of an oxymethylene unit, produced from a formaldehyde monomer or a cyclic oligomer such as formaldehyde trimer (trioxane) or formaldehyde tetramer (tetraoxane), or an oxymethylene copolymer containing 0.1-20% by weight of an oxyalkylene unit of 2-8 carbon atoms, produced from the above monomer or oligomer and a cyclic ether such as ethylene oxide, propylene oxide, epichlorohydrin, 1,3-dioxolane, formal of glycol or formal of diglycol. The polyoxymethylene resin further includes a branched oxymethylene copolymer having a branched molecular chain and a block copolymer comprising an oxymethylene repeating unit (50% by weight or more) and another block.

The carbon black used in the present invention is a conductive carbon black which has small particle diameters or a large surface area and a well developed chain structure and provides a dibutyl phthalate (hereinafter referred to as DBP) absorption of 300 ml/100 g or more as measured by ASTM D 2415-65T. A carbon black having particle diameters of 0.05 μ m or less is preferable. A carbon black having a DBP absorption of 400 ml/100 g or more is more preferable.

Specific examples of the carbon black include Ketjen black EC (DBP absorption: 350 ml/100 g), EC-DJ 600 (DBP absorption: 480 ml/100 g) (these are products of Lion Akzo), and Printex XE 2 (DBP absorption: 370 ml/100 g) (a product of Degussa). It is possible to use two or more such carbon blacks in combination.

The carbon black is used in the resin composition of the present invention in an amount of 5-15% by weight, preferably 7-10% by weight. When the amount is smaller than 5% by weight or larger than 15% by weight, the resulting resin composition has increased contact electrical resistance.

The epoxy compound used in the resin composition of the present invention is preferably a mono- or polyfunctional glycidyl derivative, or a compound obtained by oxidizing a compound having unsaturation(s) to form epoxy group(s) therein.

Such a glycidyl derivative or a compound includes, for example, 2-ethylhexyl glycidyl ether, 2-methyloctyl glycidyl ether, lauryl glycidyl ether, stearyl glycidyl ether, behenyl glycidyl ether, ethylene glycol diglycidyl ether, polyethylene glycol diglycidyl ether (ethylene oxide units: 2-30), propylene glycol diglycidyl ether, polypropylene glycol diglycidyl ether, (propylene oxide units: 2-30), neopentyl glycol diglycidyl ether, 1,6-hexanediol diglycidyl ether, glycerine diglycidyl ether, glycerine triglycidyl ether, trimethylolpropane diglycidyl ether, trimethylolpropane triglycidyl ether, bisphenol A diglycidyl ether, hydrogenated bisphenol A diglycidyl ether, sorbitan monoester diglycidyl ether, sorbitan monoester triglycidyl ether, pentaerythritol triglycidyl ether, pentaerythritol tetraglycidyl ether, diglycerine triglycidyl ether, diglycerine tetraglycidyl ether, a condensate between cresol novolac and epichlorohydrin (epoxy equivalent: 100-400, softening point: 20-150°C), glycidyl methacrylate, glycidyl ester of coconut fatty acid and glycidyl ester of soybean fatty acid. Of these epoxy compounds, particularly preferable are a condensate of cresol novolac and epichlorohydrin, and trimethylolpropane triglycidyl ether.

These epoxy compounds may be used alone or in combination of two or more. The amount of the epoxy compound used is 0.05-10% by weight based on the total weight of the resin composition. When the amount is smaller than 0.05% by weight or larger than 10% by weight, the resulting resin composition has increased contact electrical resistance. The amount is preferably 1.0-5.0% by weight.

The resin composition of the present invention can further comprise a curing agent for an epoxy resin. As the curing agent for an epoxy resin, there is generally used a basic nitrogen compound or a basic phosphorus compound. There can also be used any other compound having an epoxy-curing action (including a cure-accelerating action).

Specific examples of the curing agent for an epoxy resin include imidazole; substituted imidazoles such as 1-hydroxyethyl-2-methylimidazole, 1-cyanoethyl-2-heptadecylimidazole, 1-vinyl-2-phenylimidazole and the like; aliphatic secondary amines such as octylmethylamine, laurylmethylamine and the like; aromatic secondary amines such as diphenylamine, ditolylamine and the like; aliphatic tertiary amines such as tri-laurylamine, dimethyloctylamine, dimethylstearylamine, tristearylamine and the like; aromatic tertiary amines such as tritolylamine, triphenylamine and the like; morpholine compounds such as cetylmorpholine, octylmorpholine, p-methylbenzylmorpholine and the like; strongly basic nitrogen compounds such as dicyandiamide, melamine, urea and the like; addition products obtained by adding an alkylene oxide to dicyandiamide, melamine, urea or the like (the number of moles added: 1-20 moles); and phosphorus compounds such as triphenylphosphine, methyldiphenylphosphine, tritolylphosphine and the like. Of these curing agents for epoxy resin, particularly preferable are triphenylphosphine and an addition product obtained by adding ethylene oxide and pro-

pylene oxide to dicyandiamide.

The curing agent for an epoxy resin can be added in an amount of 0.1-10% by weight based on the total weight of the resin composition. When the amount is smaller than 0.1% by weight or larger than 10% by weight, the resulting resin composition has increased contact electrical resistance. The amount is preferably 0.5-5.0% by weight.

In the polyolefin copolymer of ethylene and an α -olefin of 3-6 carbon atoms constituting the resin composition of the present invention, the α -olefin is propylene, 1-butene, 1-pentene, 1-hexene or the like. The polyolefin copolymer has an MI of preferably 30 g/10 min or more, more preferably 40-100 g/10 min as measured by ASTM D 1238/57T, condition E, in view of the surface smoothness of the resulting resin composition. The polyolefin copolymer preferably has an ethylene content of 20 mole % or less.

It is necessary that the α -olefin copolymer be used in an amount of 5-20% by weight based on the total weight of the resin composition. When the amount is smaller than 5% by weight or larger than 20% by weight, no satisfactory contact electrical resistance can be obtained. The amount is preferably 7-15% by weight.

In the present invention, the α -olefin copolymer can be used in combination of two or more such copolymers.

The resin composition of the present invention can be prepared by melt-kneading necessary components at a temperature equal to or higher than the melting point of the polyoxymethylene resin using a known apparatus generally used in kneading of a resin melt, such as kneader, roll mill, extruder or the like. As the melt kneading apparatus, an extruder is most appropriate in view of the oxygen shielding, working environment, etc. There are various types of extruders such as single-screw type, double-screw type, vented type, non-vented type and the like; any of these extruders can be used for preparation of the present resin composition. The mixing temperature is equal to or higher than the melting point of the polyoxymethylene resin used, and extrusion can be effected sufficiently at temperature ranges of 180-240°C generally employed. The time required for kneading is sufficiently 30 seconds to 3 minutes which is about the same as the time required for extruding the polyoxymethylene resin alone.

In the above, the kneading conditions for preparing the present resin composition have been shown. The kneading method and conditions are not restricted to the above, and there can be used any known method and conditions used for preparing a polyoxymethylene resin composition.

The resin composition of the present invention can further comprise additives generally used in plastics, such as oxidation inhibitor or/and light stabilizer or/and inorganic filler or/and pigment. The resin composition can also comprise a polyamide, melamine, a melamine derivative, dicyandiamide, calcium carboxylate, etc. all generally used in polyoxymethylene resins.

The present resin composition can be molded into melt molded materials such as compression molded material, injection molded material and extrusion molded material. Specific examples of the molded materials are injection molded materials such as gear, fly wheel, roller, bearing and the like, extrusion molded materials such as pellet, round rod, sheet, film and the like, and compression molded materials such as sheet, film and the like, all requiring conductivity. Injection molded materials and extrusion molded materials are preferable. Of the extrusion molded materials, a sheet and a film are preferable. A film of 1-200 μ m in thickness is more preferable, and a film of 10-100 μ m in thickness is particularly preferable. When the film thickness is larger than 200 μ m, the film is brittle and tends not to have sufficient strength. When the film thickness is smaller than 1 μ m, the film tends to have no uniform thickness and tends to be anisotropic.

The molded materials of the present invention are specifically used as molded members having very low contact electrical resistance, such as membrane switch, key switch, drum flange for copying machine, drum gear for copying machine, charger for copying machine, igniting member for electronic lighter, and the like. Of these applications, particularly preferable are membrane switch, key switch and drum gear for copying machine.

The present invention has made it possible to provide a carbon black-containing polyoxymethylene resin composition of high conductivity, excellent surface smoothness and low contact electrical resistance, which has hitherto been desired, and accordingly has a very high industrial value.

The molded materials of the present invention exhibits excellent effects in polyoxymethylene applications of recently increasing demand, requiring both sliding property and high conductivity, such as membrane switch, key switch, drum gear for copying machine, and the like.

The present invention is hereinafter described specifically by way of Examples and Comparative Examples. However, the present invention is in no way restricted to them.

The test items in Examples and Comparative Examples were measured as follows.

(1) Volume electrical resistance

Electrodes were applied to a sample at the sample portions coated with a silver paste; a variable DC constant current source (5964 manufactured by Electronics) was connected to the electrodes and a con-

stant current of 1 mA was passed through the sample; the resulting voltage was measured using TR 8651 manufactured by Advantest whereby the volume electrical resistance of the sample was determined. In this case, the pressure applied to the sample and the electrodes was set at 500 g/cm², and the electrode-silver paste contact resistance was set at 10⁻⁴ Ω·cm or less.

(2) Contact electrical resistance

The volume electrical resistance including contact electrical resistance, of a sample was measured according to the above method, with no silver paste coated on the sample; and the contact electrical resistance of the sample was calculated from the following formula.

$$\text{Contact electrical resistance} = (\text{volume electrical resistance including contact electrical resistance}) - (\text{volume electrical resistance})$$

(3) Center line average roughness (Ra)

This was measured in accordance with JIS B 0601-1976, using a surface roughness tester (a tester by tracer method) manufactured by Tokyo Seimitsu. [A silver paste is coated on a sample in the measurement of volume electrical resistance. Ra was measured at the silver paste-coated surfaces (front and back).]

(4) Thermal decomposition-starting temperature

A thermobalance (TGA) containing 30 mg of a sample was subjected to a temperature elevation at a rate of 10°C/min in a nitrogen atmosphere, to measure a temperature at which the sample showed a weight reduction of 1 mg.

Examples 1-16, Comparative Examples 1-11

A powder of a both terminals-acetylated polyoxymethylene homopolymer was prepared according to a known process described in U.S. Patent No. 2998409. The polymer had an intrinsic viscosity of 1.2 as measured at 60°C by dissolving 0.1% by weight of the polymer in a p-chlorophenol solution containing 2% by weight of α-pinene. The polymer also had an MI of 9.0 g/10 min. This polyoxymethylene homopolymer powder was dried at 80°C for 3 hours and mixed with other components shown in Tables 1-5. The mixture was melt kneaded by a double-screw vented extruder set at 190°C (screw revolution: 50 rpm, discharge: 3 kg/hr). The resin temperature was 195°C during the kneading. The pellets obtained from the cutter were again dried by a drier of 80°C for 3 hours and then molded into a sample of 100x100x10 mm by a 3-ounce molding machine (die temperature: 80°C, cooling time: 20 seconds). The molded sample was measured for volume electrical resistance and contact electrical resistance, center line surface roughness and thermal decomposition-starting temperature. The results of Examples 1-16 are shown in Tables 1-3. The results of Comparative Examples 1-11 are shown in Tables 4 and 5.

Table 1

Example	Composition*			
	Polyoxymethylene resin (wt.%)	Carbon black (wt.%)	Epoxy compound (wt.%)	Curing agent for epoxy resin (wt.%)
1	Homopolymer (89.95)	Printex XE2 (5)	Trimethylolpropane triglycidyl ether (0.05)	-
2	" (88.95)	" (5)	" (0.05)	Adduct of dicyandiamide with ethylene oxide (4 moles) (1.0)
3	" (83.95)	" (10)	" (0.05)	" (1.0)
4	" (78.95)	" (15)	" (0.05)	" (1.0)
5	" (82.0)	" (10)	" (2.0)	" (1.0)
6	" (74.0)	" (10)	" (10.0)	" (1.0)

- to be cont'd -

Table 1 (Cont'd)

Composition*	Center line surface roughness (μ)		Volume electrical resistance ($\Omega \cdot \text{cm}$)	Contact electrical resistance ($\Omega \cdot \text{cm}$)	Thermal decomposition-starting temperature ($^{\circ}\text{C}$)
	Front	Back			
Copolymer (monomer composition) (wt.%)					
[Ethylene 10 mole% 1-Butene 90 mole% MI = 30 (5)]	0.6	0.6	200	1000	230
" (5)	0.5	0.5	200	800	240
" (5)	0.6	0.6	10	900	235
" (5)	0.7	0.7	3	1000	230
" (5)	0.5	0.5	10	500	240
" (5)	0.4	0.4	10	600	245

Table 2

Example	Composition*			
	Polyoxymethylene resin (wt.%)	Carbon black (wt.%)	Epoxy compound (wt.%)	Curing agent for epoxy resin (wt.%)
7	Homopolymer (84.95)	Printex XE2 (5)	Trimethylolpropane triglycidyl ether (0.05)	-
8	" (74.95)	" (5)	" (0.05)	-
9	" (82.9)	" (10)	" (2.0)	Adduct of dicyandiamide with ethylene oxide (0.1)
10	" (73)	" (10)	" (2.0)	" (10)
11	" (83)	" (10)	" (2.0)	-
12	" (89.95)	" (5)	" (0.05)	-

- to be cont'd -

Table 2 (Cont'd)

Composition*	Center line surface roughness (μ)		Volume electrical resistance ($\Omega \cdot \text{cm}$)	Contact electrical resistance ($\Omega \cdot \text{cm}$)	Thermal decomposition-starting temperature ($^{\circ}\text{C}$)
	Front	Back			
[Ethylene 10 mole% 1-Butene 90 mole% MI = 30 (10)]	0.4	0.4	200	700	232
" (20)	0.5	0.5	220	800	234
" (5)	0.5	0.5	10	550	238
" (5)	0.5	0.5	10	550	242
" (5)	0.7	0.7	10	950	235
[Ethylene 5 mole% 1-Butene 95 mole% MI = 30 (5)]	0.6	0.6	200	1200	230

Table 3

Example	Composition*			
	Polyoxymethylene resin (wt.%)	Carbon black (wt.%)	Epoxy compound (wt.%)	Curing agent for epoxy resin (wt.%)
13	Homopolymer (89.95)	Printex XE2 (5)	Trimethylolpropane triglycidyl ether (0.05)	-
14	" (89.95)	" (5)	" (0.05)	-
15	" (89.95)	" (5)	" (0.05)	-
16	" (89.95)	" (5)	" (0.05)	-

- to be cont'd -

Table 3 (Cont'd)

Composition*	Center line surface roughness (μ)		Volume electrical resistance ($\Omega \cdot \text{cm}$)	Contact electrical resistance ($\Omega \cdot \text{cm}$)	Thermal decomposition-starting temperature ($^{\circ}\text{C}$)
	Front	Back			
[Ethylene 10 mol% 1-Butene 90 mole% MI = 40 (5)]	0.3	0.3	200	500	232
[Ethylene 10 mole% 1-Butene 90 mole% MI = 100 (5)]	0.3	0.3	200	490	232
[Ethylene 20 mole% 1-Butene 80 mole% MI = 30 (5)]	0.6	0.6	200	1100	230
[Ethylene 25 mole% 1-Butene 75 mole% MI = 30 (5)]	0.7	0.7	200	1400	230

Table 4

Comparative Example	Composition*			
	Polyoxymethylene resin (wt.%)	Carbon black (wt.%)	Epoxy compound (wt.%)	Curing agent for epoxy resin (wt.%)
1	Homopolymer (95)	Printex XE2 (5)	-	-
2	" (94.95)	" (5)	Trimethylolpropane triglycidyl ether (0.05)	-
3	" (90.95)	" (4)	" (0.05)	-
4	" (74.95)	" (20)	" (0.05)	-
5	" (89.97)	" (5)	" (0.03)	-
6	" (78)	" (5)	" (12)	-

- to be cont'd -

Table 4 (Cont'd)

Composition*	Center line surface roughness (μ)		Volume electrical resistance ($\Omega \cdot \text{cm}$)	Contact electrical resistance ($\Omega \cdot \text{cm}$)	Thermal decomposition-starting temperature ($^{\circ}\text{C}$)
	Front	Back			
Copolymer (monomer composition) (wt.%)					
-	1.5	1.5	200	3500	190
-	1.0	1.0	200	3000	210
[Ethylene 10 mole% 1-Butene 90 mole% MI = 30 (5)]	0.6	0.6	600	2500	230
" (5)	1.2	1.2	1	2200	190
" (5)	1.0	1.0	200	2300	228
" (5)	1.1	1.1	210	2500	231

Table 5

Comparative Example	Composition*			
	Polyoxymethylene resin (wt.%)	Carbon black (wt.%)	Epoxy compound (wt.%)	Curing agent for epoxy resin (wt.%)
7	Homopolymer (91.95)	Printex XE2 (5)	Trimethylolpropane triglycidyl ether (0.05)	-
8	" (69.95)	" (5)	" (0.05)	-
9	" (89.95)	Toka black #3750 (DBP: 245ml/100g) (a product of TOKAI CARBON CO., LTD.) (5)	" (0.05)	-
10	" (87.0)	Printex XE2 (10)	" (2.0)	Adduct of dicyandiamide with ethylene oxide (4 moles) (1.0)
11	" (90.0)	" (5)	-	-

Table 5 (Cont'd)

Composition*	Center line surface roughness (μ)		Volume electrical resistance ($\Omega \cdot \text{cm}$)	Contact electrical resistance ($\Omega \cdot \text{cm}$)	Thermal decomposition-starting temperature ($^{\circ}\text{C}$)
	Front	Back			
[Ethylene 10 mole% 1-Butene 90 mole% MI = 30 (3)]	1.0	1.0	200	2200	228
" (25)	1.0	1.0	300	2300	231
" (5)	0.6	0.6	1×10^5	5000	231
-	1.0	1.0	10	2800	233
[Ethylene 10 mole% 1-Butene 90 mole% MI = 30 (5)]	1.2	1.2	10	3300	200

Claims

1. A highly conductive resin composition comprising:
 - (a) 55% by weight or more of a polyoxymethylene resin,
 - (b) 5-15% by weight of a carbon black exhibiting a dibutyl phthalate absorption of 300 ml/100 g or more,
 - (c) 0.05-10% by weight of an epoxy compound, and
 - (d) 5-20% by weight of a polyolefin copolymer of ethylene and an α -olefin of 3-6 carbon atoms.
2. The resin composition according to Claim 1, wherein the dibutyl phthalate absorption of the carbon black is 400 ml/100 g or more.
3. The resin composition according to Claim 1, wherein the epoxy compound is a condensate of cresol novolac and epichlorohydrin (epoxy equivalent: 100-400, softening point: 20-150°C) or trimethylolpropane triglycidyl ether.
4. The resin composition according to Claim 1, 2 or 3, which further comprises a curing agent for an epoxy resin.
5. The resin composition according to Claim 4, wherein the curing agent for an epoxy resin is triphenylphosphine.
6. The resin composition according to Claim 1, wherein the ethylene content of the polyolefin copolymer is 20 mole % or less.
7. The resin composition according to Claim 1, wherein the polyolefin copolymer has an MI of 40-100 g/10 min.
8. A molded material obtained by subjecting the resin composition of any one of claims 1 to 7 to compression molding.
9. A molded material obtained by subjecting the resin composition of any one of claims 1 to 7 to injection molding.
10. A molded material obtained by subjecting the resin composition of any one of claims 1 to 7 to extrusion molding.
11. The molded material according to any one of Claims 8, 9 or 10, which is a film of 1-200 μ in thickness.
12. The molded material according to any one of Claims 8, 9 or 10, which is a film of 10-100 μ in thickness.
13. The molded material according to Claim 9, wherein the molded material is a gear, a fly wheel, a roller or a bearing.

45 Patentansprüche

1. Harzzusammensetzung mit hoher Leitfähigkeit, enthaltend
 - (a) 55 Gew.-% oder mehr eines Polyoxymethylenharzes,
 - (b) 5 bis 15 Gew.-% Ruß mit einer Dibutylphthalat-Absorption von 300 ml/100 g oder mehr,
 - (c) 0,05 bis 10 Gew.-% einer Epoxyverbindung und
 - (d) 5 bis 20 Gew.-% eines aus Ethylen und einem α -Olefin mit 3 bis 6 Kohlenstoffatomen gebildeten Polyolefin-Copolymers.
2. Harzzusammensetzung nach Anspruch 1, wobei die Dibutylphthalat-Absorption des Rußes 400 ml/100 g oder mehr beträgt.
3. Harzzusammensetzung nach Anspruch 1, wobei die Epoxyverbindung ein Kondensationsprodukt von Kresol-Novolac und Epichlorhydrin (Epoxyäquivalent 100 bis 400, Erweichungspunkt 20 bis 150°C) oder



Triméthylolpropantriglycidylether ist.

4. Harzzusammensetzung nach Anspruch 1, 2 oder 3, die zusätzlich ein Härtungsmittel für ein Epoxyharz enthält.
5. Harzzusammensetzung nach Anspruch 4, wobei das Härtungsmittel für ein Epoxyharz Triphenylphosphin ist.
6. Harzzusammensetzung nach Anspruch 1, wobei der Ethylengehalt des Polyolefin-Copolymers 20 Mol-% oder weniger ist.
7. Harzzusammensetzung nach Anspruch 1, wobei das Polyolefin-Copolymer einen MI von 40-100 g/10 min hat.
8. Formkörper, der dadurch erhalten wird, daß die Harzzusammensetzung nach einem der Ansprüche 1 bis 7 dem Formpressen unterworfen wird.
9. Formkörper, der dadurch erhalten wird, daß die Harzzusammensetzung nach einem der Ansprüche 1 bis 7 dem Spritzgießen unterworfen wird.
10. Formkörper, der dadurch erhalten wird, daß die Harzzusammensetzung nach einem der Ansprüche 1 bis 7 dem Extrusionsformen unterworfen wird.
11. Formkörper nach einem der Ansprüche 8, 9 oder 10, der eine Folie einer Dicke von 1 bis 200 µm darstellt.
12. Formkörper nach einem der Ansprüche 8, 9 oder 10, der eine Folie einer Dicke von 10 bis 100 µm darstellt.
13. Formkörper nach Anspruch 9, wobei der Formkörper ein Getriebe, ein Treibrad, eine Walze oder ein Lager ist.

Revendications

1. Composition de résine très conductrice comprenant :
 - (a) 55 % en poids ou plus d'une résine de polyoxyméthylène,
 - (b) de 5 à 15 % en poids d'un noir de carbone présentant une absorption du phtalate de dibutyle de 300 ml/ 100 g ou plus,
 - (c) de 0,05 à 10 % en poids d'un composé époxy, et
 - (d) de 5 à 20 % en poids d'un copolymère de polyoléfine d'éthylène et d'une α -oléfine de 3 à 6 atomes de carbone.
2. Composition de résine suivant la revendication 1, dans laquelle l'absorption du phtalate de dibutyle par le noir de carbone est de 400 ml/100 g ou plus.
3. Composition de résine suivant la revendication 1, dans laquelle le composé époxy est un produit de condensation d'un crésol novolaque et de l'épichlorhydrine (équivalent d'époxy : 100 à 400, point de ramollissement 20 à 150°C) ou d'oxyde de triméthylolpropane triglycidyle.
4. Composition de résine suivant la revendication 1, 2 ou 3, qui comprend un agent de durcissement pour une résine époxy.
5. Composition de résine suivant la revendication 4, dans laquelle l'agent de durcissement pour une résine époxy est la triphénylphosphine.
6. Composition de résine suivant la revendication 1, dans laquelle la teneur en éthylène du copolymère de polyoléfine est de 20 % en moles ou moins de 20 % en moles.
7. Composition de résine suivant la revendication 1, dans laquelle le copolymère de polyoléfine a un indice



de fluidité de 40 à 100 g/10 minutes.

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8. Matière moulée obtenue en soumettant la composition de résine suivant l'une quelconque des revendications 1 à 7 à un moulage par compression.
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9. Matière moulée obtenue en soumettant la composition de résine suivant l'une quelconque des revendications 1 à 7 à un moulage par injection.
11. Matière moulée obtenue en soumettant la composition de résine suivant l'une quelconque des revendications 8, 9 ou 10, qui est une pellicule de 1 à 200 μ d'épaisseur.
- 15
12. Matière moulée obtenue en soumettant la composition de résine suivant l'une quelconque des revendications 8, 9 ou 10, qui est une pellicule de 10 à 100 μ d'épaisseur.
- 20
13. Matière moulée obtenue en soumettant la composition de résine suivant la revendication 9, dans laquelle la matière moulée est un engrenage, un volant, un rouleau ou un palier.
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- 30
- 35
- 40
- 45
- 50
- 55

