

**Morgan Advanced Materials (Group)**

Established in 1856  
A global advanced materials company  
Headquartered in Windsor, United Kingdom  
Listed on the London Stock Exchange

**Morgan AM&T(Shanghai) Co.,Ltd.**

Morgan AM&T(Shanghai) Co.,Ltd.  
Established in 1992  
Joint venture between  
Morgan Advanced Materials plc.  
and Shanghai Prime Machinery Co., Ltd.

**What differentiates us?**

Advanced materials science and processing capabilities  
Extensive applications engineering experience  
Consistent and reliable performance  
A strong history of innovation and reinvention  
A truly global footprint

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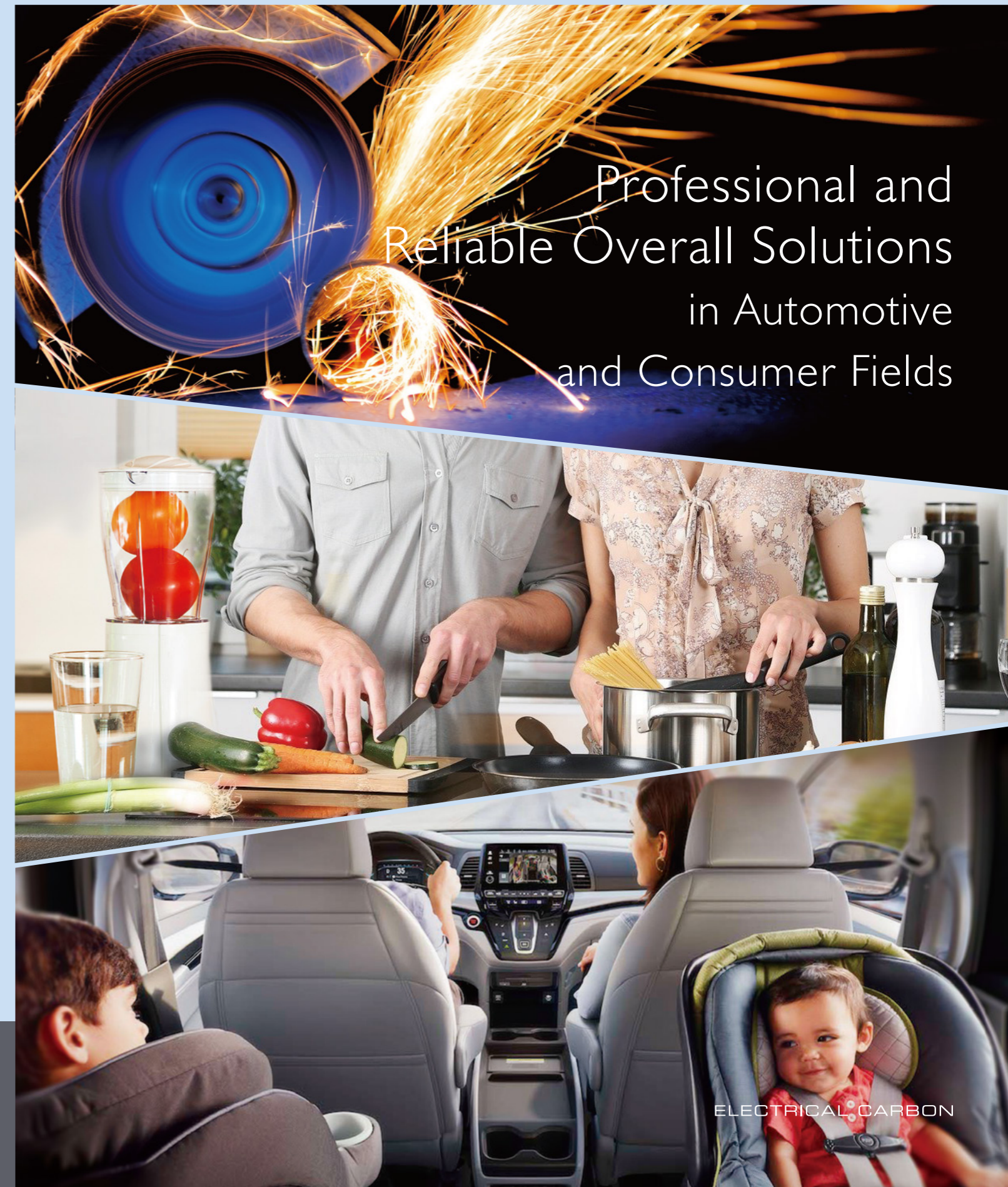
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Professional and  
Reliable Overall Solutions  
in Automotive  
and Consumer Fields

We specialize  
in addressing various motor  
application challenges  
in the automotive and consumer fields.

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More professional solutions

By understanding the specific needs of automobile and consumption sectors, as well as the opportunities and challenges faced in the industry, Morgan is committed to provide professional solutions to improve motor performance and prolong its service life. Based on hundreds of years' experience on material science and application practice, complete team of experts and service system, we provide our world-renowned partners in automobiles, electric tools, and household appliances with carbon brushes and components suitable for various motor applications, and customized solutions in accordance with customer needs.

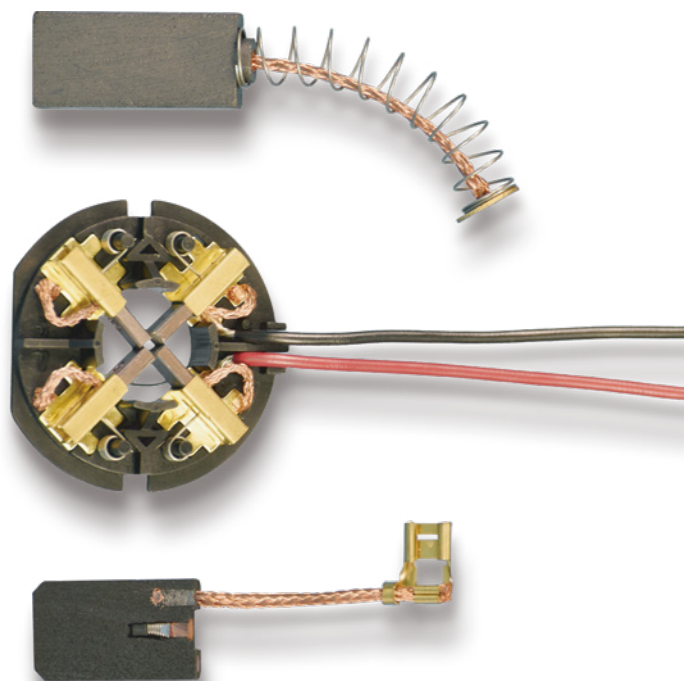


Morgan Applied Materials Classification

Grade	Description	Contact drop	Friction coefficient	Applications
MH Epoxy resin bonded	High contact and outstanding commutating ability	Medium to very high	Very low	120V&230V tools with low current density & home appliance with high speed
MF Phenolic resin bonding type	Low resistivity with capability to withstand a wide range of current density	Medium	Low	Lower than 120V AC&DC motor & home appliance with high current density and BEV motor
CH Electrographite type	High thermal and electrical conductivity; has good strength and filming properties, very resistant to effects of electrical discharges	Low	Low	120V professional tools with high current density
MG Metal graphite type	Low resistivity to cover high current, low voltage applications.	Low	Medium to high	12V&24V DC motors, automotive motors, portable appliances; 120V&230V DC motors with high current density
MP Asphalt bonding type	High contact resistance without using a resin binder, less affected by sparking and overloading	Medium to high	Medium to high	120V&230V professional tools with medium to high current density

## Carbon brush for automobile and consumption applications

Morgan carbon brush has become an industry model by virtue of reliable performance that relies on its scientific research experience over 160 years in carbon and graphite materials, its global operation network, advanced testing equipment and instruments, and rich material knowledge and application experience. Aiming at their characteristics and application conditions of motors in different industries such as automobiles, electric tools, and household appliances, Morgan can provide customized overall solutions to help customers reduce total costs and improve motors' overall performance.



### Product features:

- Reliable material performance
- Unique and exclusive formula
- Excellent product compatibility
- Good commutation performance
- Stable ability to suppress spark
- Nice noise resolution

### Main advantages:

- A century's professional experience in manufacture and application of carbon brushes
- Advanced R&D and design ability
- Complete manufacturing equipment and operation capability
- Advanced test facility and detecting instruments
- Professional technical team and global application support
- Complete service system and quick response support
- Customized according to customers' specific needs

### Benefits to customers:

- An excellent overall solution
- Timely pre-sales and post-sales services
- Professional technical applications support

## Performance Recommendation Form of Carbon Brush for Household Appliances

	Grade	Resistivity $\mu\Omega\text{m}$	Bending strength MPa	Shore hardness	Density $\text{g}/\text{cm}^3$	Contact voltage drop V	Friction coefficient	Rated current density $\text{A}/\text{cm}^2$	Allowable circumferential speed $\text{m}/\text{s}$	Typical applications
Personal Care and Smart Home	MG1032	0.15	44.0	22	4.18	L	L	45	30	1.8-7.2V shaver, smart door lock
	MG1033	0.10	66.0	23	4.30	L	L	45	30	1.8-7.2V shaver, smart door lock
	MG958	0.08	50.5	20	3.74	L	L	45	30	3V-9V robotic vacuum
	MG950	0.22	40.9	19	3.47	L	L	40	30	3V-9V robotic vacuum
	MG1043	0.65	34.0	23	2.92	L	L	40	30	12-18V cordless hair dryer
	MG970	1.65	21.0	23	2.35	L	L	20	30	18-24V cordless hair dryer
	MF904	28.0	24.5	32	1.75	L	L	13	35	120V hair dryer
	MF900	165	17.5	30	1.62	L	L	13	35	100V motor for massage chair
	MH908	350	25.0	25	1.70	M	VL	12	50	120V hair dryer
	MH981	900	19.6	23	1.56	M	VL	12	50	120V/240V hair dryer
Floor Care	MH906	1522	13.6	22	1.41	H	VL	9	50	120V/240V hair dryer
	MP900J	940	18.0	35	2.00	M	L	13	30	220V hair dryer, 120V/240V hand dryer
	MG910	0.59	25.2	23	3.17	L	L	40	30	9-14V cordless vacuum cleaner
	MG972	0.53	24.8	23	2.65	L	L	30	30	14-18V cordless vacuum cleaner/floor brush
	MG953	1.29	21.4	23	2.41	L	L	35	30	18-24V cordless vacuum cleaner/floor brush
	MG986	2.59	17.2	18	2.32	L	L	25	30	18-24V cordless vacuum cleaner/floor brush
	MG931A	31.3	23.8	30	2.13	L	L	25	30	18-36V cordless vacuum cleaner

Friction coefficient		Contact voltage drop	
Very Low	$\leq 0.10$	Low	0.8~1.3V
Low	0.10~0.22	Medium	1.3~2.3V
Medium	0.22~0.40	High	2.3~3.6V
High	$\geq 0.40$	Very High	$\geq 3.6V$

### Quality assurance

Morgan took the lead in passing the ISO9001:2015 quality system certification in the electric carbon industry in China, ensuring that the production process conforms to international quality and safety standards.

### Disclaimer

The product technical parameters are subject to change without prior notice. Please consult the sales representative for the specifications of actual shipment. The user takes sole charge of the safe use of the product as the actual use conditions of the product are beyond the control of Morgan Advanced Materials (Shanghai) Co., Ltd. This product manual has no legal effect, nor is it regarded as any patent invention license or suggestion under the condition of no license. It is only for reference, research and verification.

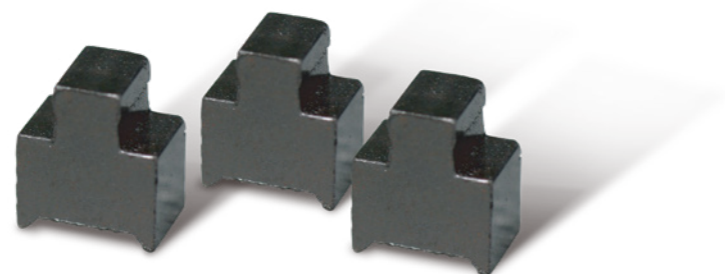


Performance Recommendation Form of Carbon Brush for Household Appliances

	Grade	Resistivity $\mu\Omega\text{m}$	Bending strength MPa	Shore hardness	Density g/cm <sup>3</sup>	Contact voltage drop V	Friction coefficient	Rated current density A/cm <sup>2</sup>	Allowable circumferential speed m/s	Recommended applications
Floor Care	MH927	330	30.0	22	1.59	M	VL	12	50	120V vacuum cleaner
	MH907	460	25.5	22	1.65	M	VL	13	50	120V vacuum cleaner
	MH931	505	26.2	22	1.65	M	VL	12	50	120V vacuum cleaner
	MH981	900	19.6	23	1.56	M	VL	12	50	120V/240V vacuum cleaner
	MH917	1100	19.6	22	1.52	H	VL	12	50	120V/240V vacuum cleaner
	MH906	1522	13.6	22	1.41	H	VL	9	50	120V/240V vacuum cleaner
	MG916	126	25.7	20	2.01	L	L	13	40	120V/240V high-voltage DC appliances
Kitchen appliances	MF900	165	17.5	30	1.62	L	L	13	35	120V blender
	MH901	194	29.0	30	1.75	L	VL	13	40	120V blender
	MH927	330	30.0	22	1.59	M	VL	12	50	120V vacuum cleaner
	MH908	350	25.0	25	1.70	M	VL	12	50	120V blender/high speed blender
	MH905	781	15.0	22	1.45	M	VL	12	50	120V blender
	MH900	1400	22.0	23	1.56	H	VL	10	50	120V blender
	MH906	1522	13.6	22	1.41	H	VL	9	50	120V blender
	MP954	1470	25.4	32	1.88	H	L	12	25	220V high-voltage DC blender
	MP949	1900	18.0	26	1.51	H	L	12	30	230V blender with E-brake

Performance Recommendation Form for Carbon Brushes of Electric Tools

	Grade	Resistivity $\mu\Omega\text{m}$	Bending strength MPa	Shore hardness	Density g/cm <sup>3</sup>	Contact voltage drop V	Friction coefficient	Rated current density A/cm <sup>2</sup>	Allowable circumferential speed m/s	Recommended applications
Power tool drill	MG958	0.08	50.5	20	3.74	L	L	45	30	3-9V DC cordless electric tools, DC motors
	MG910	0.59	25.2	23	3.17	L	L	40	30	9-14V DC cordless electric tools
	MG945	1.13	20.2	23	2.89	L	L	40	30	9-14V DC cordless electric tools
	MG972	0.53	24.8	23	2.65	L	L	30	30	14-18V DC cordless electric tools
	MG953	1.29	21.4	23	2.41	L	L	35	30	18-24V DC cordless electric tools
	MG986	2.59	17.2	18	2.32	L	L	25	30	18-24V DC cordless electric tools
	MG931A	31.3	23.8	30	2.13	L	L	25	30	36-60V DC cordless electric tools
	CH937	68.0	30.0	70	1.64	L	L	15	40	110V drill, hammer drill, impact drill
	MF900	165	17.5	30	1.62	L	L	13	35	110V drill, impact drill, hammer drill
	MH955	1500	11.8	20	1.42	H	VL	9	50	230V impact drill
	MH906	1522	13.6	22	1.41	H	VL	9	50	230V drill, impact drill
	MP900	940	18.0	35	2.00	M	L	13	25	230V drill, impact drill, hammer drill
	MP933D	1100	20.0	26	1.68	H	L	12	30	230V drill
	MP946F	1200	16.4	23	1.66	H	L	12	30	230V impact drill, electric screwdriver
	MP916B	2100	18.0	26	1.50	H	L	10	25	230V drill, impact drill, hammer drill
MP945D	2200	8.0	18	1.53	H	L	10	25	230V impact drill	



Performance Recommendation Form for Carbon Brushes of Electric Tools

	Grade	Resistivity	Bending strength	Shore hardness	Density	Contact voltage drop	Friction coefficient	Rated current density	Allowable circumferential speed	Recommended applications
		$\mu\Omega\text{m}$	MPa		$\text{g}/\text{cm}^3$	V		$\text{A}/\text{cm}^2$	m/s	
Garden electric tools	<b>MG958</b>	0.08	50.5	20	3.74	L	L	45	30	3-9V DC cordless power tool
	<b>MG910</b>	0.59	25.2	23	3.17	L	L	40	30	9-14V DC cordless power tools
	<b>MG945</b>	1.13	20.2	23	2.89	L	L	40	30	14-18V DC cordless power tools
	<b>MG972</b>	0.53	24.8	23	2.65	L	L	30	30	14-18V DC cordless power tools
	<b>MG953</b>	1.29	21.4	23	2.41	L	L	35	30	18-24V DC cordless power tools
	<b>MG986</b>	2.59	17.2	18	2.32	L	L	25	30	18-24V DC cordless power tools
	<b>MG931A</b>	31.3	23.8	30	2.13	L	L	25	30	36-60V DC cordless power tools
	<b>MF907</b>	23.0	26.0	32	1.73	L	L	13	35	60-110V DC brush cutter, lawn mower
	<b>MF900</b>	165	17.5	30	1.62	L	L	13	35	110V brush cutter, hedge trimmer, lawn mower, chain saw
	<b>MP903</b>	760	20.0	34	1.57	M	L	13	25	230V chain saw, jig saw
Power tool grinder	<b>CH940</b>	66.0	15.8	50	1.60	L	VL	15	40	110V angle grinder, polishing machine
	<b>MF904</b>	28.0	24.5	32	1.75	L	L	13	35	110V belt sander, sander
	<b>MH917</b>	1100	19.6	22	1.52	H	VL	12	50	110V belt sander, 230V angle grinder and polisher
	<b>MH955</b>	1500	11.8	20	1.42	H	VL	9	50	120V/230V angle grinder
	<b>MP903</b>	760	20.0	34	1.57	M	L	13	25	230V belt sander, chain saw, jig saw, 110V/230V electric circular saw, cutting machine
	<b>MP911</b>	810	22.0	34	1.66	M	L	13	30	110V/230V angle grinder and polisher, 230V belt sander and polisher
	<b>MP902</b>	980	21.0	34	1.62	M	L	12	25	230V angle grinder, polishing machine
	<b>MP933D</b>	1100	20.0	26	1.68	H	L	12	30	230V belt sander, grinder, angle grinder
	<b>MP946F</b>	1200	16.4	23	1.66	H	L	12	30	230V angle grinder
	<b>MP958X</b>	1838	12.8	24	1.63	H	L	12	30	230V angle grinder
<b>MP949</b>	1900	18.0	26	1.51	H	L	12	30	230V angle grinder	

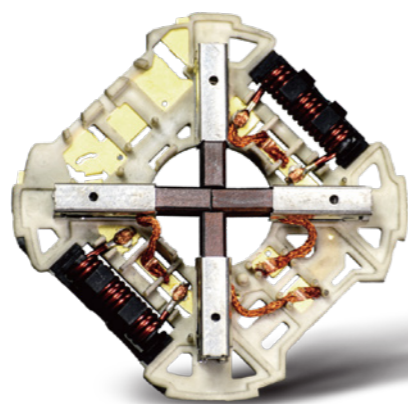
Performance Recommendation Form for Carbon Brushes of Electric Tools

	Grade	Resistivity	Bending strength	Shore hardness	Density	Contact voltage drop	Friction coefficient	Rated current density	Allowable circumferential speed	Recommended applications
		$\mu\Omega\text{m}$	MPa		$\text{g}/\text{cm}^3$	V		$\text{A}/\text{cm}^2$	m/s	
Power tool saw	<b>MG958</b>	0.08	50.5	20	3.74	L	L	45	30	3-9V DC cordless power tool
	<b>MG910</b>	0.59	25.2	23	3.17	L	L	40	30	9-14V DC cordless power tools
	<b>MG945</b>	1.13	20.2	23	2.89	L	L	40	30	14-18V DC cordless power tools
	<b>MG972</b>	0.53	24.8	23	2.65	L	L	30	30	14-18V DC cordless power tools
	<b>MG953</b>	1.29	21.4	23	2.41	L	L	35	30	18-24V DC cordless power tools
	<b>MG970</b>	1.65	21.0	23	2.35	L	L	20	30	18-24V DC cordless power tools
	<b>MG986</b>	2.59	17.2	18	2.32	L	L	25	30	18-24V DC cordless power tools
	<b>MG931A</b>	31.3	23.8	30	2.13	L	L	25	30	36-60V DC cordless power tools
	<b>CH940</b>	66.0	15.8	50	1.60	L	VL	15	40	110V circular saw and cutting machine
	<b>MH917</b>	1100	19.6	22	1.52	H	VL	12	50	110V saw
High-pressure washer/air compressor/other tools	<b>MP903</b>	760	20.0	34	1.57	M	L	13	25	230V jig saw, 110V/230V electric circular saw, cutting
	<b>MP911</b>	810	22.0	34	1.66	M	L	13	30	110V circular saw and cutting machine
	<b>MP946F</b>	1200	16.4	23	1.66	H	L	12	30	230V circular saw
	<b>MP958X</b>	1838	12.8	24	1.63	H	L	12	30	230V profiles cutting machine
	<b>MP916B</b>	2100	18.0	26	1.50	H	L	10	25	230V circular saw
	<b>MH907</b>	460	25.5	22	1.65	M	VL	13	50	110V jetting machine, air compressor
	<b>MH910</b>	700	14.0	22	1.50	M	VL	12	50	110V air compressor
	<b>MH929</b>	1400	14.2	22	1.45	H	VL	12	50	230V air compressor
	<b>MH906</b>	1522	13.6	22	1.41	H	VL	9	50	230V air compressor/jetting machine
	<b>MP951X</b>	240	21.6	24	1.76	L	L	12	30	110V air compressor
<b>MP946F</b>	1200	16.4	23	1.66	H	L	12	30	230V jetting machine	
<b>MP958X</b>	1838	12.8	24	1.63	H	L	12	30	230V jetting machine	



Performance Recommendation Form of Automobile Carbon Brush

	Grade	Resistivity $\mu\Omega\text{m}$	Bending strength MPa	Shore hardness	Density $\text{g/cm}^3$	Contact voltage drop V	Friction coefficient	Rated current density $\text{A/cm}^2$	Allowable circumferential speed m/s	Recommended applications
Heating ventilation and air conditioning	MG902	0.89	21.0	24	2.57	L	L	35	30	12V blower motor
	MG936	1.03	21.6	24	2.62	L	L	35	30	12V blower motor
	MG977	1.15	22.0	23	2.62	L	VL	35	30	12V blower motor
	MG900	1.79	21.9	22	2.50	L	L	25	30	24V blower motor
	MG948	2.06	15.6	20	2.55	L	VL	35	30	24V low noise blower motor
	MG983	2.14	14.9	18	2.67	L	VL	30	30	12V/24V low noise blower motor
	MG933	2.56	22.7	22	2.48	L	L	25	30	24V heater/air blower motor
	Engine cooling fan motor	MG926	0.41	29.7	23	3.02	L	L	40	30
MG902		0.89	21.0	24	2.57	L	L	35	30	12V engine cooling fan motor
MG936		1.03	21.6	24	2.62	L	L	35	30	12V engine cooling fan motor
MG933		2.56	22.7	22	2.48	L	L	25	30	12V engine cooling fan motor
DC pump motor	MG950	0.22	40.9	19	3.47	L	L	40	30	12V stretching oil pump
	MG903	0.46	44.3	19	3.41	L	L	40	30	12V stretching oil pump
	MG901	0.51	44.0	22	3.75	L	L	40	30	12V stretching oil pump
	MG923 GT	0.56	22.2	10	5.38	L	L	45	30	12V stretching oil pump
	MG900	1.79	21.9	22	2.50	L	L	25	30	24V/48V DC pump, swimming pool washer

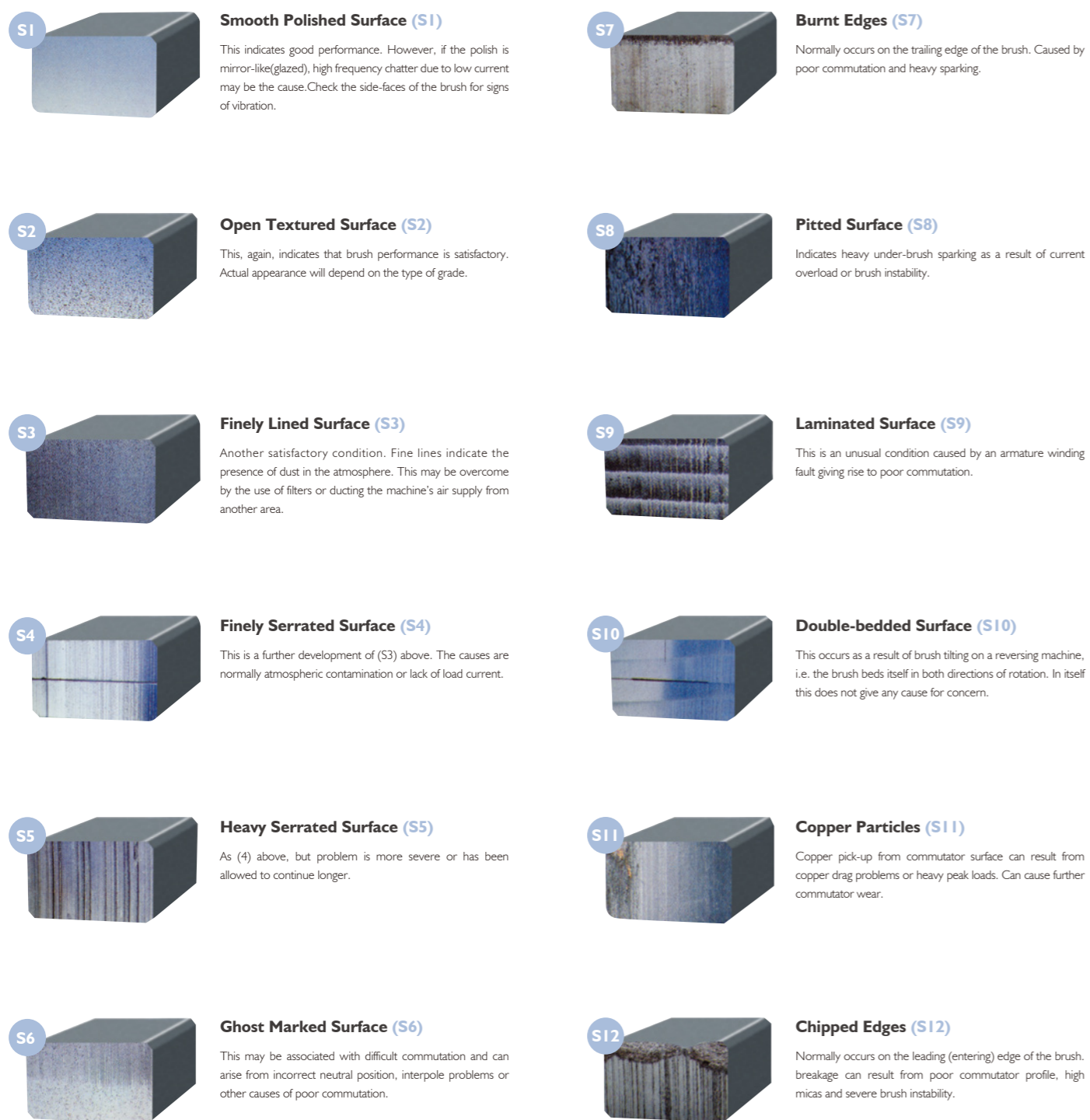


Performance Recommendation Form of Automobile Carbon Brush

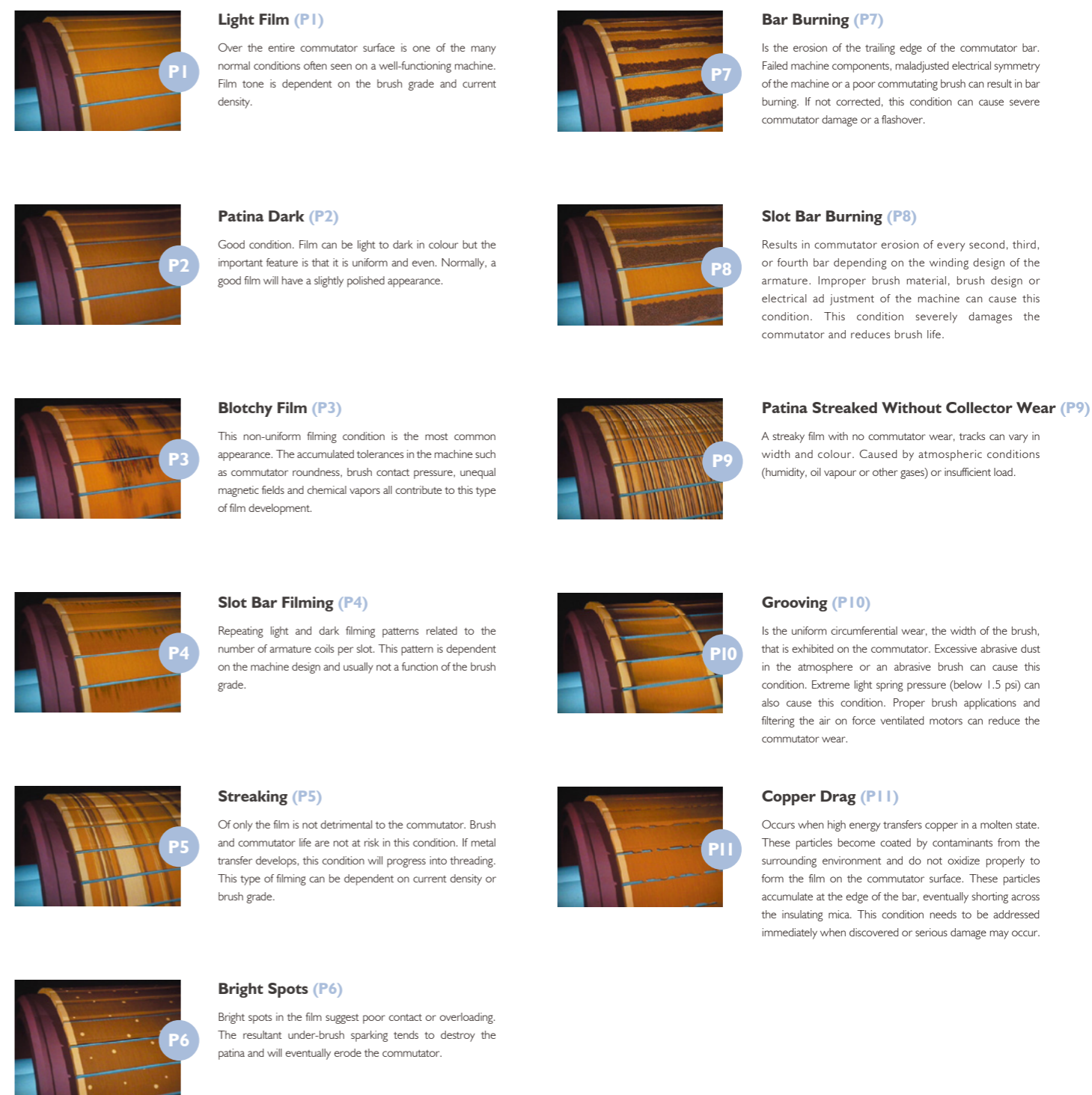
	Grade	Resistivity $\mu\Omega\text{m}$	Bending strength MPa	Shore hardness	Density $\text{g/cm}^3$	Contact voltage drop V	Coefficient of Friction	Rated current density $\text{A/cm}^2$	Allowable circumferential speed m/s	Recommended applications
Alternator	MG942	1.72	33.8	24	2.62	L	L	30	30	12-24V alternator
	CH935	20	34.0	60	1.63	L	L	18	30	Long life of 24V alternator
Starter	MG950	0.22	40.9	19	3.47	L	L	40	30	12V starter, motorcycle starter
	MG903	0.46	44.3	19	3.41	L	L	40	30	24V Starter
	MG901	0.51	44.0	22	3.75	L	L	40	30	12V starter, snowmobile starter
	MG955	0.80	30.0	22	3.45	L	L	35	30	12V Starter
Fuel pump motor	MF910 GT	50.0	13.0	19	2.00	L	VL	15	35	12V Fuel pump motor
ABS motor	MG926	0.41	29.7	23	3.02	L	L	40	30	12V ABS motor
	MG977	1.15	22.0	23	2.62	L	VL	35	30	12V ABS motor
Motor of new-energy vehicles	MG911	2.04	32.6	23	2.90	L	L	30	40	48-72V electric vehicle motor, traction motor
	CH935	20.0	34.0	60	1.63	L	L	18	30	48V BSG starter generator
	MF907	23.0	26.0	32	1.73	L	L	13	35	24-100V BEV motor
	CH937	68.0	30.0	70	1.64	L	L	15	40	72-100V BEV motor
Other motor applications	MG926	0.41	29.7	23	3.02	L	L	40	30	12V window-lift motor
	MG948	2.06	15.6	20	2.55	L	VL	35	30	12V brake vacuum booster motor
	MG983	2.14	14.9	18	2.67	L	VL	30	30	12V wiper motor, sunroof motor
	MG1004	2.85	30.0	23	2.45	L	L	25	30	24V wheelchair motor



## Surface appearance of brushes



## Patina



### Chart of common difficulties on rotating electrical machines

Note: Collector means slip ring or commutator

SYMPTOM		SYMPTOM																											
M	Serration and grooving of collector														N	Wear of slip ring on one polarity	O	Copper picking in brush face											
L	Excessive collector wear-surface blackened														P	Brush chatter	Q	Collector surface streaky											
K	Copper dragging														R	Collector has unsymmetrical burn marks	S	Collector has symmetrical burn marks											
J	Excessive collector wear or slip ring wear-bright surface														T	Collector has wavy pattern	U	Ghost marks on steel slip rings											
I	Unequal brush wear														V	Glazed contact surface of brush	W	Pitted contact surface of brush											
H	Rapid brush wear- while commutation good														X	Chipping of brush edges or brush breakage	Y	Failure to develop a protective skin											
G	Flexible burnt out or discoloured														Z	Insufficient voltage on self exciting machines													
F	Brushes and brush holders too hot																												
E	Collector-slip ring-too hot																												
D	Sparking vicious and trailing around collector																												
C	Green in sparks																												
B	Sparking at entering edge																												
A	Sparking at leaving edge																												
Probable Cause Of Trouble		A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	Remedy	
1	Interpole field too strong		x	x											x				x				x					Weaken interpole by divert or by increase gap	1
2	Interpole field too weak	x		x								x			x				x									Strengthen interpole fields by reducing air gap	2
3	Interpole air gap too small		x	x											x				x					x				Enlarge air gap to decrease effective interpole flux	3
4	Interpole air gap too large	x		x								x			x				x									Reduce air gap to increase effective interpole gap	4
5	Air gaps uneven (bearings worn?)	x	x							x					x				x				x					Renew bearings and realign machine	5
6	Overload machine	x				x	x	x		x	x				x						x		x					Reduce and limit load on machine	6
7	Vibration from external causes, i.e. Prime mover: Nearby forge hammer etc	x								x	x	x	x		x	x	x		x	x	x	x		x	x	x	Locate and remove cause of vibration or mount machine on shock absorbers	7	
8	Vibration from internal causes, i.e. out of balance, poor alignment etc	x								x	x	x	x		x	x			x	x	x	x		x	x		Balance armature and check for bearing wear	8	
9	Quasi electrolytic wear of slip ring														x							x						Reverse the polarity of rings periodically	9
10	Oil and dirt on collector									x	x		x						x	x					x	x		Clean collector	10
11	Resistance between brushes and brush arms not uniform									x	x	x							x					x				Clean and tighten the connections	11
12	Grains of abrasive in brush contact face																											Re-bed and clean the brush face	12
13	Faults in armature winding or equaliser connections	x				x													x	x				x				Locate and cure fault or consult manufacturer	13
14	Mica proud	x		x	x								x		x	x			x					x	x	x		Recess mica, or use more abrasive brush	14
15	Collector eccentric	x								x			x	x	x	x			x	x		x						Turn or re grind preferably at near rated speed	15
16	Collector riser connections open circuited	x	x	x	x														x									Re-solder connections	16
17	High or low collector segments	x		x															x	x				x				Tighten collector, turn, or re-grind	17
18	Collector loose	x		x	x										x	x	x	x			x							Tighten collector, re-mica if necessary, turn or re-grind	18
19	Flats on collector	x	x	x											x	x								x	x			Locate and remove cause of flattening, turn or re-grind	19
20	Spring pressure too low	x					x	x	x	x	x	x	x	x	x	x	x	x	x	x			x	x				Adjust spring pressure to that recommended for brush grade	20
21	Spring pressure too high							x	x		x	x	x															Adjust spring pressure to that recommended for brush grade	21
22	Spring pressure unequal	x									x	x			x	x	x	x			x			x				Adjust spring pressure uniformly to that recommended for brush grade	22
23	Brush grade unsuitable for machine duty	x													x									x	x	x	x	Select one of our alternative grades or ask for our recommendation	23
24	Brush arc of contact excessive	x	x	x											x									x				Reduce the effective thickness of brush, preferably consult manufacturer	24
25	Brush arc of contact insufficient	x	x	x											x													Apply suitable circumferential stagger, preferably consult manufacturer	25
26	Brush flexible connection faulty																											Fit a new brush with a sound flexible connection	26
27	Brush flexible too short or too stiff	x																										Use brushes with flexible of correct length & flexibility	27
28	Imperfect brush bedding in	x	x																									Bed brushes by our recommended method	28
29	Radial brush holders mounted at small reaction angle	x													x													Adjust holders to a radial position, & correct distance from comm	29
30	Reaction type holder mounted trailing	x	x	x											x													Reverse holders or direction of rotation	30
31	Brush sticking or sluggish in brush holder	x	x												x													Check that brush size is correct, clean brushes and holders, remove any burrs	31
32	Brushes too loose in brush holder(holders worn?)																											Replace holders, or order brushes of correct dimension	32
33	Terminal connections loose or dirty																											Clean terminals and terminal block. Tighten screws	33
34	Brush holder mounted too far from collector														x													Adjust holder to be 3mm from collector	34
35	Incorrect brush position	x	x	x											x													Adjust holders to correct position	35
36	Unequal brush holder spacing or alignment	x	x	x	x										x													Correct spacing and alignment of holders	36
37	Humidity of atmosphere low																											Humidify the cooling air or draw air from normal humidity source	37
38	Humidity of atmosphere excessive																											Enclose machine or draw cooling air from normal humidity source	38
39	Dusty atmosphere																											Remove cause if possible or install filter	39
40	Gas or acid fumes in atmosphere																											Arrange clean air cooling	40
41	Long periods of low or steady loads	x													x	x												Change brush grade, ask for recommendation	41