GRAPHICARB PRODUCTS
AN ISO 9001-2008 COMPANY

About us

In 1974 a visionary named Usmangani R Shaikh, with science academic background identified the unfulfilled needs of then flourishing textile industries of Ahmedabad for carbon products used for electircal and mechanical applications.

Instantaneously making the most of his technical flair, management skills and risc taking attitude and available team, he embarked on a project to manufacture carbon components like carbon brushes, seal rings and all the carbon products required for various textile machineries of then period. The project named **GUJARAT CARBON PRODUCTS** started in a small room and with a single work station but with a broad vision, well defined mission, set goals and accurate planning and controlling.

This was earliest impetus by someone in this industry toward which very few people were familiar. Raw material procurement was the biggest problem and equally problematic was the availability of tools and machinery to be used for this unfamiliar material. Striving through these known and numerous unknown problems he succeeded in satisfying the customer need and could establish himself as a pioneer in manufacturing and supplying industrial carbon products in entire Gujarat state.

In 1995 second generation equipped with fresh talent and modern skills and inheriting the experience and know-how of parent, commenced additional project with a new company to provide a thrust which still continues.

Progression was now at the forefront and still continues. By day and night, months and years the affair which started in a small room, have snowballed today into an organisation named **GRAPHICARB PRODUCTS- AN ISO 9001-2008** certified company which is the only and the biggest company in Gujarat-INDIA to make carbon products for mechanical and electrical application for all the industries and having stretched value chain from raw material to finished product stage.

Today **Graphicarb Products** boasts of manufacturing all the products made out of carbon-graphite using minutely selected raw material, state of art machineries, well defined standard operating procedures, best possible factory layout, adequate land space, precision and accurate measuring instruments and stringent quality policy.

Company today looks ahead for a bright future and is commited in serving the needs of its customers satisfactorily. Every day with continual improvement policy, organisation is making every effort towards betterment and success through one and only one policy "Growth through customer satisfaction"

Infrastructure

Pressing

Carbon and graphite materials are manufactured form raw materials such as petroleum cokes, pitch cokes, pitch cokes, carbon black and graphite. The mixed ingredients are formed into what are often known as green shapes by a process of die moulding, this may be carried out at a range of pressures at specially designed hydraulic presses which achieve homogeneous, structure and density. The green carbon performs are then baked.

Sintering

The green carbon performs are then baked. The baking process will decompose the binder into volatile components and carbon, the resulting binder coke ensuring the integrity of the finished ring. In this form the material is known as carbon/graphite or hard carbon. Resistance to chemical attack or temperature cycling are required.

Impregnation

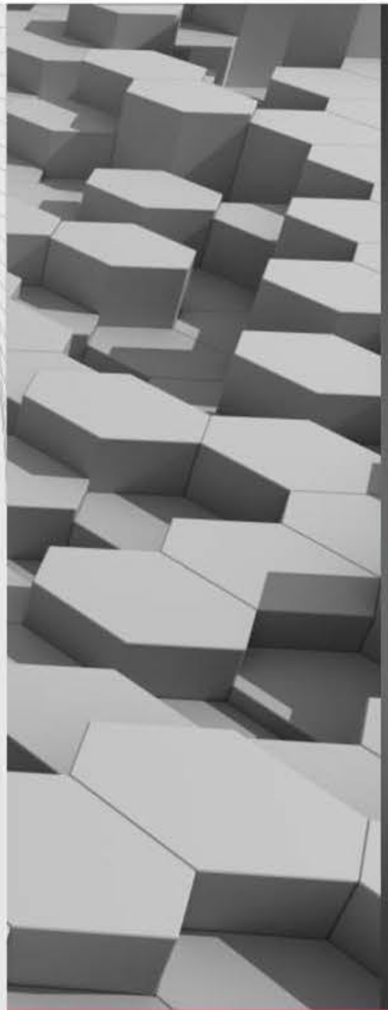
The majority of carbons are then impregnated to improve their properties. It is very common to impregnate the seals with synthetic resins to convert the porous structure into a low permeability material an increase in hardness and strength together with improved conductivity.

Quality Control

To accomplish a Job that Meets the Quality Policy, We Carry out Inspection at Every Stage with Suitable and Calibrated Instruments and Equipments by Skilled & trained employees to ensure defect-free progress and supply of material.

Stock

Adequate inventory of carbon blanks is the strength of our company. We maintain carefully planned cycle stock and a generously decided safety stock to avoid delay in executing the orders that may arises in case of some external factors.



Our Product Range

- CARBON BLANKS
- CARBON SEAL RING
- CARBON THRUST BEARINGS
- CARBON VANES
- CARBON BLOCKS

Manufacturing Plant & Regd. Office

BUREAU VERITAS

UKAS QUALITY MANAGEMENT 008

D&B

SMERA

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Machinable Carbon Blanks

" Gentle when machining
Tough when functioning "

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Introduction

Carbon and graphite materials are a proven method for the sealing of shafts and their bearings. The special physical and mechanical properties of carbon and graphite, in particular their low coefficient of friction, hard wearing and excellent thermal resistance offer solutions to many mechanical engineering and manufacturing problems. Bearings, sealing rings and vanes made of carbon and graphite may be used for dry or wet running applications. Their use is recommended where the following conditions prevail:

- The use of hydro carbon lubricants is prevented by high operating temperatures
- Oil or other lubricating contamination must be restricted
- Chemical attack prohibits the use of other materials
- Minimum servicing requirement
- Dry running and high pressure demands a mechanically sound material with sufficient self lubricating capability, good thermal conductivity and low coefficient of expansion
- Bearings are situated vertically or at an angle in the machine thus making lubricant retention Difficult.

Bearings and sealing elements made from Carbon-graphite materials give the designer many opportunities for solving difficult bearing and sealing problems.

General Application Information

Physical & Mechanical Properties

- Good dimensional stability (Low thermal coefficient of expansion)
- Good heat conductivity
- Good corrosive resistance
- Good temperature resistance
- Good self-lubrication
- Good frictional characteristics
- Good machining characteristics
- Low weight

Operating Temperature

The temperature resistance in an oxidizing atmosphere can be specified as 500°C maximum for Graphite. Temperature resistance is also affected by various impregnations.
In the case of resin impregnation the maximum operating temperature is 180°C, for lead impregnation 200°C and antimony impregnation 500°C.

Chemical Resistance

Carbon and particularly graphite are characterised by excellent chemical resistance to almost all organic and inorganic media. Exceptions to this are some strongly oxidising acids, alkaline solutions, halogens and alkali molten metal.

Frictional Behaviour

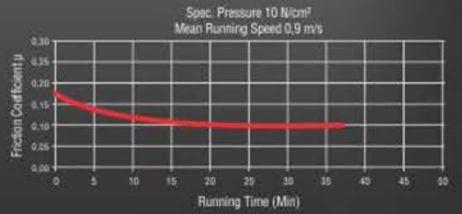
Graphite has self-lubricating properties because of its crystalline structure. The low friction coefficient is a function of the low bonding between the structural lattice planes. Dislocation of one against the other is therefore easy. The friction coefficient is particularly low if traces of water or other vapours are present. The friction coefficient is greatly increased when a vacuum is created. Because of the varying conditions of application, no exact data can be given for friction coefficients. In general the following values can be expected for sliding friction:

- Dry friction 0.10...0.30
- Mixed friction 0.05...0.10
- Hydraulic friction 0.01 ... 0.05

The frictional behaviour of carbon and graphite is also affected by the following factors:

- Running in
- Specific pressure
- Running speed

When running in carbon and graphite bearings, the friction coefficient drops until a constant value is reached once the surfaces are smoothed. The coefficient of friction also drops in the case of constant specific strain and increasing running speed, or at the inverse.



Manufacturing Process and Properties of Carbon and Graphite Materials

Elemental carbon exists naturally in many parts of the world in the forms of graphite and diamond. When mined, Graphite is not particularly useful as an engineering material, because of its softness, high impurity level and limited size. The manufacture of carbon and graphite has developed for over three-quarters of the century with the properties of the resulting products being considerably improved over those of the natural material. Carbon has been long established as a prime material for one of the rubbing pairs in a mechanical seal, bearings and many sliding applications of dry and wet running conditions. Continuous developments have kept pace with the increasingly severe requirements of the application.

By judicious selection of raw materials, and by using a variety of manufacturing processes, carbon and graphite can be Modified to give a range of properties suitable for different sliding applications. The raw materials are selected from Naturally occurring graphites, from which some or all of the inorganic impurities have been removed. The original Materials include coke derived from coal sources, residues taken from oil distillation (petroleum cokes), and carbon Blacks which are obtained from the burning of oils and gases in limited supplies of air.

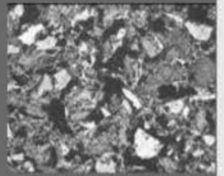
The raw materials are powdered and bonded together with a pitch or tar, and then moulded under pressure to form a Convenient size and shape. The resulting product is fired in a protective atmosphere, to approximately 1000°C. During This process, the tar and pitch are converted to a coke, thereby cementing the particles of the other raw materials Together to form a cohesive mass. Such a product is known as carbon-graphite.

Carbon and Graphite materials that are produced by this means are porous. The properties however are modified by impregnation with synthetic resins or metals. The impregnants confer increased strength, lower permeability and Improved wear resistance characteristics to the basic carbons. Impregnation with oxidation inhibitors will improve the Oxidation resistance and with some base materials both reduce and stabilize friction.

Structure & Bonding

Based on the special bonding characteristics of the carbon atoms in the graphite lattice, graphite crystallizes in a hexagonal layer structure. The enhanced sliding properties, the anisotropy of electrical and thermal conductivity as well as the coefficient of thermal expansion are characteristics which depend on structure and bonding of the graphite.
The chemical properties of carbon materials are also determined by the bonding conditions of the carbon atoms within the lattice. Due to the high strength of the covalent bonds within the lattice layer, carbon materials exhibit a high resistance to acids, bases, gases, melts, etc.
The resistance of carbon materials is only limited by strongly oxidizing media and oxygen. In oxidizing atmospheres carbon graphite materials are stable up to 350°C (660°F). Up to these temperature limits at least the short term service will not be restricted by oxygen attack.

Properties
In addition to the properties depending on structure and bonding, carbon materials show characteristics which are related to the manufacturing process. Carbon manufactured according to the production method shown will have a polygranular and polycrystalline microstructure. Frequently, the microcrystallites already present in the grains of the solid starting materials are randomly oriented, so that nearly no remaining anisotropy of the crystallites is measurable.
Porosity is a property particularly influenced by the manufacturing method and can be varied between 0 and 20%. The porosity can be defined by the pore volume and the pore size distribution, both being characteristic for different material and production methods. In general, there are both open and closed porosity. Open porosity can be filled by impregnants, whereas closed porosity cannot.
Due to the porosity and the different graphitizability of various carbon materials, all industrially manufactured polycrystalline carbons exhibit a lower bulk density than that which is calculated theoretically based on the ideal crystal structure of the graphite. Depending on the production method, bending strength and compressive strength can be varied within wide limits. The bending strength may vary from 10 to 150 MPa.



Porosity before Impregnation (Black Voids)

Porosity after Impregnation (Black Voids)

Tribology of carbon

The friction and wear of carbon has been the subject of extensive research for a number of applications in addition to mechanical seal, brushes of electrical machines and carbon aircraft brakes. The carbon creates a complex boundary lubrication mechanism. Initial wear of the carbon face creates very fine particles of carbon debris. As very fine particles they are extremely reactive and can link to form a protective carbon particle layer. A similar but much thinner layer may also form on the counter-face.

However, it has been found that the formation of this layer is dependent on the local environment ; it will not occur in a vacuum, but happens much more readily in the presence of moisture, air and hydrocarbons. Research into mechanical seal face properties has shown that while a seal is operating this boundary layer film will gradually build up and then break down. The distinguishing property of a good seal face material is the ability to establish the carbon boundary layer. In normal lubricated operation, with design face loading, this build up and breakdown phenomena will occur very gradually. During upset conditions or transient dry running the breakdown may occur rapidly. The quality of the carbon will control whether it will recover from the upset. Tests have shown that good quality seal carbons will survive dry running and upset conditions and re-establish a stable film. Materials with a less optimum carbon structure or less degree of impregnation will wear rapidly during an upset and may not recover to a stable boundary layer film conditions.

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Carbon Seal Ring

Sliding Seal Ring

Mechanical Seal Ring Materials require high strength and a relatively high modulus of elasticity to withstand deformation at the interface. Carbon-graphite seal materials provide the strength and rigidity which are especially important in high pressure, high vacuum, high temperature and zero leakage mechanical end-face seals. High thermal conductivity is essential in removing heat from the interface.

Pure carbon graphite is strictly speaking a ceramic material, but in the form that it is used for seals it will usually be impregnated with other materials that are provided to variously improve the sealing. By reducing porosity, wear performance or strength is increased. It is widely used, not only as one of the face pair on the vast majority of mechanical seals, but also found as the most popular material for segmented circumferential seals and for piston rings in dry or marginally lubricated conditions.

Impregnation of Carbon-Graphite Seals

Impregnation of carbon seals can be done with a variety of materials to control permeability. In addition to thermoset resins, other types of impregnants include thermoplastics, metals, and inorganic salts or glasses. The temperature limit of the impregnant places an upper limit on the operating temperature of the carbon parts.

Metals such as antimony, silver, copper, nickel, and babbitt can improve the strength, thermal conductivity, and tribological characteristics of the materials. Impregnants made of inorganic salts usually phosphate or borate - and glasses are used in high temperature applications. Carbons impregnated with soluble salts must be handled carefully to avoid exudation, especially under humid conditions, but loss of impregnant rarely affects any physical property of a seal other than permeability.

Mechanical seal primary rings can be supplied as per customer drawings and specifications. The rings can be supplied plain, shrink fitted or cemented in metal retaining rings. Mechanical seal rings can also be supplied with the sealing face lapped flat to one helium light band.

Guidelines for the Installation & Design of Carbon Seals Rings

Solid Carbon Rings

Normally the seal rings are used in solid form machined from suitable size of carbon blank. The shape and size of the rings vary according to the design of mechanical seals which are designed for its respective operating conditions. Since carbon- graphite are stable at high temperature, majority of the seal ring designs constitute of solid rings.

Cold Pressing

For a cold press fit in steel, where the application is lower than 100°C steel housings made to H7 bore tolerance are normally recommended. If the housing material has a higher coefficient of thermal expansion than steel the temperature limitation is normally lower. When pressing the bearing into its housing a mandrel with collar whose diameter is approximately three tolerances be-low the drilling tolerance of the carbon bearings as supplied should be used to press the bearings in. The bore diminishes by 70 - 85% of the pressing over-dimension according to the quality and dimension of the housing.

Shrinking

We recommend shrinking carbon seal rings directly into the metal housing which are to be used at operational temperatures of over 100°C. To shrink in the bearings, experience has shown that the tolerance overlap should be in the range corresponding to H7/x8 ... z8. The selected heating temperature for mounting must be sufficiently high to allow the cold bearing to be easily inserted. On shrinking, the carbon bearing bore diminishes by approximately 80 ... 100 % of the shrinking overdimension. In the case of the above mentioned shrink fits H7/x8 ... z8, this diminishes according to the wall thickness ratio. In order to keep to exact tolerances it is advisable to machine the bearing bore to size after shrinking.

Adhesives

Adhesives are only suitable for bearings which are subject to low temperatures (up to 200°C). Bonding to the housing with commercially available adhesives is possible. For higher temperatures, thermal setting, adhesives should be used.

Suitable Counter Face Materials

Suitable : Plain steel, alloyed steel (chrome steel), hard metal, ceramic & glass.
Suitable under certain conditions : Nonferrous heavy metal, chrome nickel steel, chromium plate materials.
Unsuitable : Aluminium and its alloys.

Surface Quality of The Counter Face Materials

The surface quality of the counter face materials has an important influence on the durability of car-bon and graphite. Counter face surfaces with a maximum surface roughness of Sr <1 ʍm are recom-mended. For high pressure lapped and superfinished counter faces with a maximum surface rough-ness of Sr<0.5 ʍm are necessary.

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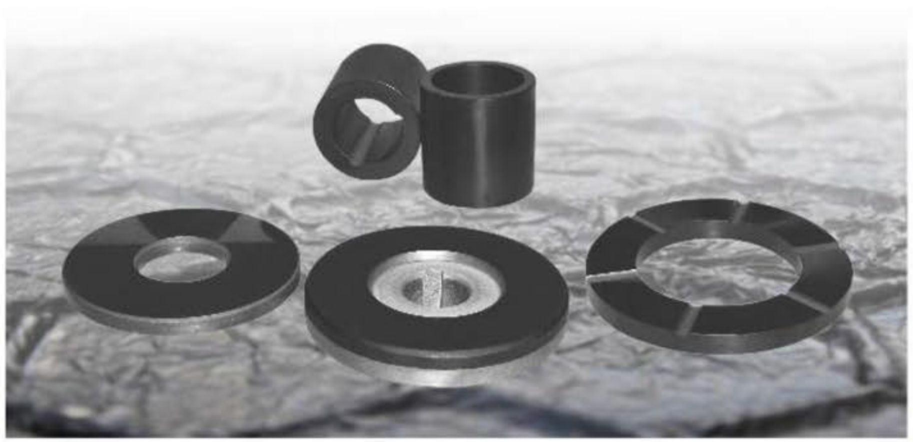
Carbon Thrust Bearings



At high temperatures, plastic and composite bearings are subject to other problems such as softening, melting, deformation and may extrude out of the bearing area all together. Because the carbon graphite matrix is very strong, it is not subject to the deformation, melting, or even softening that can occur with plastic bearings at these elevated temperatures.

Operating Temperature

The temperature resistance in an oxidizing atmosphere can be specified as 400°C maximum for G10 bearing qualities. In a non-oxidizing atmosphere the temperature resistance is determined by the final graphitizing treatment of each individual grade (e.g. upper application limit for graphite is approximately 3000°C). Temperature resistance is also affected by various impregnations. In the case of resin impregnation the maximum operating temperature is 180°C, for lead impregnation 200°C and antimony impregnation 500°C.

Frictional Behaviour

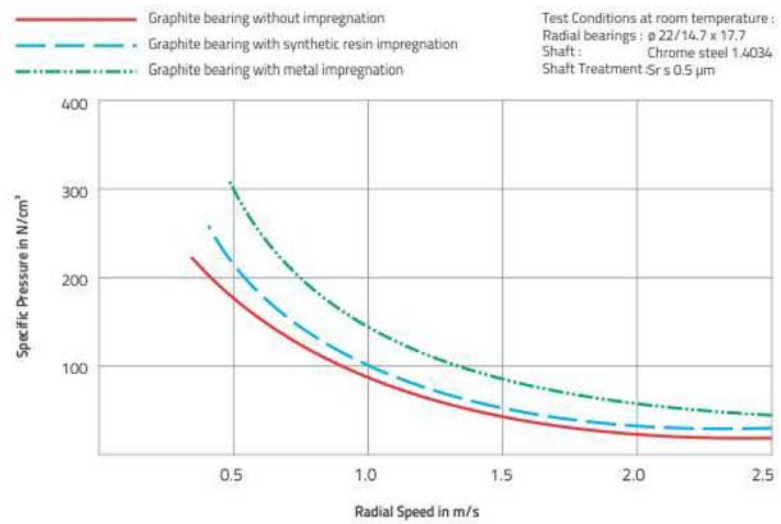
Graphite has self-lubricating properties because of its crystalline structure. The low friction coefficient is a function of the low bonding between the structural lattice planes. Dislocation of one against the other is therefore easy. The friction coefficient is particularly low if traces of water or other vapours are present. The friction coefficient is greatly increased when a vacuum is created. Because of the varying conditions of application, no exact data can be given for friction coefficients. In general the following values can be expected for sliding friction:

- Dry friction 0.10... 0.30
- Mixed friction 0.05 ...0.10
- Hydraulic friction 0.01 ... 0.05

The frictional behavior of carbon is also affected by the following factors:

- Running in • Specific pressure • Running speed

When running in carbon and graphite bearings, the friction coefficient drops until a constant value is reached once the surfaces are smoothed. The coefficient of friction also drops in the case of constant specific strain and increasing running speed, or inverse.



The permissible bearing pressure is determined by the surface speed of the shaft and the friction ratio of the carbon or graphite bearings. The permissible pressure values for dry-running bearings have been determined by laboratory trials. The corresponding values can be seen in the following v-diagram. The permissible bearing wear rate was selected as 1 (chrome steel) µm/h. In practice the media often increases lubrication. This means that the values in the p • v-diagram can be increases considerably whilst wear remains constant.

Advantages of using Carbon Thrust Bearing in Submersible Motors

- **Helps the pump to run in dry condition.**
- **Low generation of heat due to self lubricating property.**
  When carbon is used as material for sliding purpose, there is no generation of heat in that area due to excellent self lubrication available from carbon. This helps to improve the life of thrust bearing as well as other parts of the pump which may be damaged due to high temperature.
- **Contributes in saving of power.**
  As the electricity goes costlier day by day, carbon is the best solution for decreasing running cost of the pump.
- **Runs with low input power as compared to ferro asbestos/teflon.**
  As ferro asbestos is a breaking materials, it cause friction between the thrust pad and bearing resulting in higher requirements of power where as the carbon causes a free movement and the pump starts & runs with minimum energy.
- **The motor with carbon thrust bearing and bush does not seize even after prolonged rest.**
  Even if the pump is not in use for a long period, the pump with carbon bearing starts immediately with the supply of power.
- **The low hp pump with carbon provides same output as high hp pump with ferro asbesotos, teflon or nylon.**
  Due to excellent self lubricating properties of carbon, there is no friction between the thrust pad and bearing and as result there is no energy loss and so the pump gives the maximum output.
- **The pump with carbon bearing starts at lower voltage compared to the pump with ferro asbestos or other bearing materials which require higher voltage to start.**
  As there is a shortage of electricity and problems of the voltage drop in the villages and urban areas, carbon enables the pump to start at low voltage available whereas ferro-asbestos or other materials fails to start the pump at low voltage of power.

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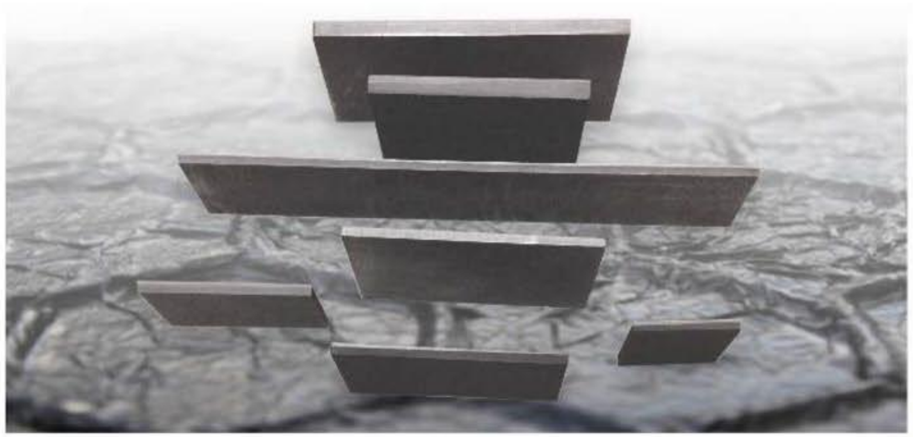
Carbon Vanes



Carbon-graphite materials are used extensively for vanes, rotors, and end plates in rotary vane pumps pumping both liquids and gases. Carbon graphite vanes can withstand the rubbing of the vane tip against the housing bore and the rubbing of the side of the vane against the slots in the rotor. Carbon graphite rotors are light in weight to save energy and can also withstand the rubbing of the vane against the end plates.

Carbon-graphite vanes, rotors and end plates are used for pumping liquids with poor lubrication properties (low viscosity) such as water, gasoline and beverages. They are also used for pumping strong chemicals that attack metals.

Carbon-graphite vanes, rotors and end plates are also used to pump gases such as air, vacuum, combustion products and gasoline vapors.

Graphicarb Products supplies carbon-graphite vanes, rotor, and end plates to rotary pump and compressor manufacture and rebuilders. The vanes, rotors and end plates can be supplied to customer prints and specifications.

Specifications

Advantages of Carbon Material	• Chemically resistant • Compatibility with foods & beverages (FDA) (If PTFE Impregnated) • Dimensionally stability • High strength to weight ratio • Impermeability (pressure tight) • Light weight (low centrifugal force) • Low wear rate running in gas atmospheres • Low wear rate running in low viscosity liquids
Dry Running Applications	• Auto anti smog pumps • Chemical Pumps • Gasoline vapor pick up pumps • Oil free air pumps • Paint spray pumps • Pumps for automobile locking devices • Rotary Compressors for fresh air (breathable air) • Vacuum Pumps for aircraft gyroscopes • Vacuum Pumps for milking machines
In-Liquid Applications	• Beverage pumps (vending machine) • Fuel pumps • Liquid chemical pumps • Medical liquid pumps • Metering pumps or volumeters

Physical Properties of Carbon Vanes

Produce Number	Bulk Density > g/cm^3	Compressive Strength kgf/cm^2	Flexural Strength kgf/cm^2	Shore Hardness (HSD)	Ash Content/ Purification ppm	Average Granularity µ m	Coefficient of Thermal Expansion x 10^{-6}/°C	Young's Modulas kgf/cm^2
GP1-IA	1.85	900	460	60	500/50	22	4.3	11.5×10^3

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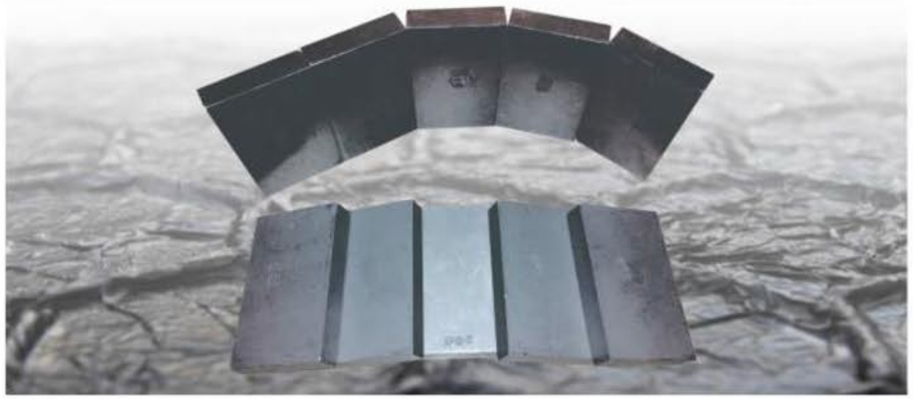
Carbon Blocks for Fractional Horsepower Brushes



Professional power tools place the highest demands on electric motors. Carbon brushes of these equipments are compelled to work under difficult situations such as:

- High current densities
- Vibration
- Dust formation
- High rotational speeds
- Exposure to weather conditions etc.

G35 grade carbon block is specially made to work under such conditions. Carbon brushes made from G35 grade carbon blocks have shown excellent performance in this field. In addition to research and development, it is the right materials choice combined with superior process technology in our mixing plant with our modern production technology which ensures the high quality of our products.

Carbon brushes made of G35 grade carbon blocks experience a long operating life and high operational reliability. In addition to long life, carbon brushes made from G35 also possesses extra qualities such as

- Not to damage commutator,
- Lower level of radio interference,
- To endure vibration, impact and in some cases, even electric brakes work.

With G35 grade excellent test results have been achieved with small and large angle grinders. Some of the noteworthy results seen are:

- Remarkable increase in lifetime of brush and commutator.
- Low commutator wear
- Lower operating temperatures
- Low RFI

G35 grade is used to make carbon brush for:

Power tools

Carbon brush is used in the power tool such as drill, circular saw and grinder, etc.

Home appliances

Carbon brush is used in the electrical vacuum cleaner, juicer, mixer, hair dryer, and health apparatus etc.

G35 Grade Standard available sizes of Carbon blocks (L X W X THK)
1) 127 X 77 X 18MM 2) 127 X 77 X 20MM

G35 GradeTechnical properties (as tested in ERDA)			
Apparent Density	Resistivity	Hardness	Transverse Strength
1.57 gm/cc	40000-60000 miro ohm-cm	32-37 HSD (scleroscope)	250 Kg/cm^2

Moreover carbon blocks can also be supplied upto 45mm thickness if required.

Commutator Problems & Solutions

The purpose of this guide is to promote awarenessof undesirable carbon brush operation. Early recognition and corrective action can help avoid costly unscheduled down time. The commutator film condition is a primary indicator of the performance of any motor or generator. A consistent color over the entire commutator in the brown tones from light tan to dark brown indicates a satisfactory film condition. In these cases, sufficient film exists for low friction operation, while there is not excessive film to restrict proper flow of current.Inconsistent film color and deformation of the commutator surface are warning signs for developing trouble conditions with fast brush and commutator wear.

Fast Wear : Accelerated brush wear due to a variety of conditions causing excessive dusting or arcing.
Cause – All of the definitions listed below will contribute to fast wear. Also, roughness or irregularity of the commutator surface such as high bars, mica or burrs, or an out-of-round contact surface condition will cause radial movement and resulting arcing and chatter.
Recommendations – Check that commutator is in good condition, that spring pressure is adequate at the face of the brush, and that the proper number of brushes are in use based on operating current densities.

Light Load : Low current density for the grade in use or inadequate filming or high friction conditions.
Cause – Equipment is set for the maximum loads and the product dictates operation at less than nameplate resulting in light load, high friction, brush dust, and eventual threading.
Recommendations – Increase current density by removing brushes or consider light load filming grade.

Threading : The copper transfer from the rotating surface to the brush face and the resulting wear on the contact surface from metal to metal abrasion.
Cause – Often due to low current density and inadequate spring pressure. May also be worsened by contamination.
Recommendations – Verify actual operating nloads and spring pressure to be sure they are in the proper range for the grade in use. If possible, eliminate any contamination present.

Grooving : The result of abrasiveness or excessive electrical wear of contact surface or ring surface.
Cause – Most commonly due to poor electrical contact resulting in arcing and electrical machining of the commutator. Can also be due to mechanical wear or overly abrasive grade. Inadequate spring pressure, low current densities, or excessive current are also possible causes.
Recommendations – Check the contact surface that roundness is within .002" with less than .0003"variation from bar to bar. Vibration should be less than 6 mils. Check current density and spring pressure.

Arcing : Arcing and burning at the brush face.
Cause – Due to poor electrical contact, inadequate spring pressure (see chart), rough commutator, or ring deposits or burrs in brush holder.
Recommendations – Contact surface should be round within .002". Check spring pressure to ensure that it is 4-6 psi for industrial DC applications and remove any deposits in holders.

Chipping : Brushes chipping or breaking at the face.
Cause – Roughness or irregularity of commutator surface, high bars, mica or burrs can break the entering edge of the brush, and cause brush bounce or chatter.
Recommendations – Check contact surface condition to be sure it is within tolerance, check spring pressure, and running loads.

Spring Pressure : The most common cause of unsatisfactory film condition is inadequate spring pressure. For reference, the chart below indicates the recommended ranges of spring pressure for various applications and the method for calculating spring pressure from the measured spring force.

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Thrust Bearing Assembly

Using Carbon Thrust Bearing in Sub Motor (G10Z Grade Carbon)

- Saves electricity upto 10%
- Increases Pump efficiency upto 5%
- Starts & runs the Pump even at low/fluctuating voltage
- Motor runs ar full RPM
- Gives upto 10% more output of water in LPM as compared to teflon/fibre
- Makes pump rotates freely & silently
- The motor does not get locked even offer prolonged rest

Submersible motors are fitted with Hydrodynamic Self Adjusting Tilting Shoe Thrust Bearings to take the axial 'down thrust" from the pump. These are a complex and clever part of a reliable submersible motor and probably not understood very well.

Principle

The Hydrodynamic thrust bearing transmits the rotating shaft's axial thrust load to the frame of the motor, which is mechanically supported in the well. The axial thrust load is transmitted through the bearing on a self-renewing film of lubricant, which is water in most motors. The pressure in the fluid film supports the load without the thrust disc or pivot shoes making contact.

Theory

Fluids tend to stick to most surfaces due to viscosity, and in the case of loose segments thrust bearing, we rely on the fluid sticking to the surface on the rotating thrust disc. This fluid is then dragged between the thrust bearing disc and the face of the pivot shoe by centrifugal force, and forms a wedge shaped film. This wedge shaped film is essential for the successful operation of the thrust bearing. When the bearing is operating correctly there is no contact between the disc and the face of the pivot shoe. The only time there is contact is when the motor is stopping or starting. This means there should be only negligible wear between the faces – and no wear while the motor is operating.

Infrastructure for Making Carbon Thrust Bearing Assembly

Store

CNC

Carbon Machining

Broaching

Accuracy Checking

Lapping

Quality Checking

Packing & Dispatch

Our Speciality

Surface finish of the carbon thrust Bearing disc is machined flat and exactly perpendicular to the shaft with negligible runout on the face. The surface is lapped to give a very smooth flat finish. The surface of the face of the pivot shoes is also ground and lapped to give a very smooth flat finish, and in addition the height of each pivot shoe in a set is identical and the base of the pivot leg is spherical so that the pivot shoes are free to pivot and share the load equally. Due to mechanical tolerances there will always be some variations in dimensions, but in general they are tightly controlled. The design of the thrust bearing allows the whole thrust bearing assembly to swivel on the thrust button, which also allows the pivot shoes to share the load more evenly.

GRAPHICARB PRODUCTS
AN ISO 9001-2008 COMPANY

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