

## Designation

CIP Composites™ are represented by three (3) digits based on the chosen textile, lubricant and resin.

### CIP X X X

Textile	Lubricant	Resin
<b>100</b> Polyester	<b>000</b> None Electrical insulators	<b>001</b> Standard
<b>200</b> Poly/PTFE combination	<b>010</b> Graphite Dry conditions	<b>002</b> Marine
<b>300</b> Nomex®	<b>020</b> Moly (MoS <sub>2</sub> ) Wet or dry conditions	<b>003</b> High Temp
	<b>030</b> PTFE Wet or dry conditions needing lower friction than moly	
	<b>040</b> Graphite & PTFE Dry conditions needing lower friction	
	<b>050</b> Moly & PTFE Wet or dry conditions needing lower friction	
	<b>000A</b> Enhancement A™ Increases strength and lower friction	
	<b>000B</b> Enhancement B™ Reduces stick slip and noise in slow oscillating applications	



## Common Materials

CIP Composites™ popular material combinations.

<b>CIP Hydro™</b>	Polyester/PTFE Textile Proprietary Lubrication Polyester Resin	Ideal for situations requiring the lowest possible friction without grease. Targeted for hydroelectric applications. <i>Tested by Power Tech Labs</i>	<b>CIP 131</b>	Polyester Textile PTFE Lubrication Polyester Resin	For less critical situations requiring wet or dry operation.
<b>CIP Marine™</b>	Polyester Textile Proprietary Lubrication Marine Resin	For wet environments typically used as strut bearings and rudder bushings. <i>Marine Type Approved</i>	<b>CIP 121</b>	Polyester Textile Moly Lubrication Polyester Resin	Low friction and negligible water swell, this is ideal when moisture may be present (wet).
<b>CIP 151A</b>	Polyester Textile PTFE & Moly Lubrication Polyester Resin Enhancement A™	Used in wet and dry situations, offers additional strengths, low friction.	<b>CIP 251A</b>	Poly / PTFE Textile PTFE & Moly Lubrication Polyester Resin Enhancement A™	For situations where low friction is critical, possibly oscillating motion in wet or dry environments.



Johnson Metall AB is the Nordic countries biggest manufacturer of sliding bearings, hollow bars and mould components made of bronze. Manufacturing unit is located in Sweden, and sales companies in Denmark and Norway. The head office is in Örebro.

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## CIP Composites™

Self lubricating bearings  
Textile reinforcement





## CIP Composites™ For light weight high pressure low speed

CIP Composites™ are self lubricated bearing and wear materials. It is a highly engineered textile reinforced composite used to reduce lubrication systems and maintenance.

Manufactured by Columbia Industrial Products (CIP), USA, products are custom designed and fabricated to customer's specifications.

Johnson Metall AB is the Scandinavian distributor of CIP Composites™ since 2004.

### Function

CIP Composites™ are high quality self lubricated bearing materials with exceptional mechanical and physical properties. Used in applications requiring high performance custom bearings and wear pads. CIP Composites™ are ideal for high load, low speed operations, especially when reducing friction and where weight is critical.



### Design

All parts are custom designed and manufactured based on the application. CIP offers customers bearing diameters up to 1.52 meters and sheets up to 152 mm thick.

### Solid lubricants

CIP Composites™ are laminated polymer materials made by impregnating textiles with thermosetting resins. Solid lubricants are added to the resin to provide evenly dispersed lubrication throughout the material, inherently eliminating the need for external lubrication. CIP offers customers an array of different textile, lubricant and resin combinations. Working with CIP and Johnson Metall customers, we determine the best combination based on application and environment.

### Properties

**Physical Properties** Tests performed on CIP100 Series sheet material.

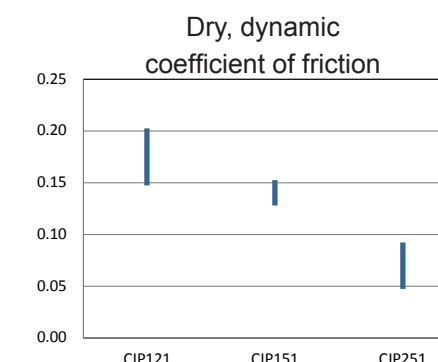
Compressive Strength (ASTM D695)	
Ultimate	345 MPa
Yield	103 MPa
Parallel	93 MPa
Modulus	3,447 MPa
Tensile Strength (ASTM D638)	
Tensile Modulus of Elasticity (ASTM D638)	3,240 MPa
Poisson's Ratio (ASTM D3039-08)	0.231
Shear Strength (ASTM D2344)	82 MPa
Flexural Modulus of Elasticity (ASTM D790)	1,793 MPa
Hardness Rockwell M (ASTM D785)	100
Density (ASTM D792)	1.3 g/cm <sup>3</sup>
Water Swell (ASTM D570)	<0.15%

### Thermal Properties

	001&002 Resin	003 Resin
Operating Temperatures	-40° to 93° C	-40° to 204° C
Coefficient of Thermal Expansion	20° to 93° C	20° to 204° C
Normal to Laminate	1.9 x 10 <sup>-5</sup> /Δ°C	2.2 x 10 <sup>-5</sup> /Δ°C
Parallel to Laminate	1.0 x 10 <sup>-5</sup> /Δ°C	1.1 x 10 <sup>-5</sup> /Δ°C

### Friction

The coefficient of friction for CIP Composites™ range from 0.05-0.20. Actual friction values vary with respect to the application parameters: shaft material, surface finish, load, speed, environment and external lubrication. The lowest values are obtained with the addition of Enhancement A (for example: CIP151A).



### Machining

CIP Composites™ are readily machinable by conventional machining techniques and, as a general guide, may be treated as bronze, but should be machined dry without coolant. Our materials are non-toxic although it is advisable to use adequate dust extraction when machining.

For turning, tungsten carbide-tipped tools should be used to obtain a fine finish. High speed steel tools can be used for machining where accuracy below 0.005" (0.12 mm) is not required and for small quantity production.



### Installation Methods

#### Bearings & Wear Pads

CIP Composite™ bearings can be designed for press-fit, freeze-fit or glue-in installation. Shoulders, bolt on rings, other rings, or keepers can be used to prevent the bearing from moving over time. Flat components such as wear pads can be retained by countersunk screws or metal inserts and located by keeper plates where high lateral or shearing loads are anticipated.



### Counter Surface

The counter surface finish of the mating operating component has a major effect on the performance of the composite. Surface finish should be from 4-32 micro-inches (0.7 Ra) and hardness of Rockwell 80B. Suitable materials for shafts, thrust faces, etc., would be hardened steels or stainless. Hard chrome plated steel surfaces cause high wear rates under certain conditions, and burnishing or other surface finish treatments should be considered as an alternative. The main criteria is that the mating surface should be free from cutting edges, and lubrication grooves or holes.

### External Lubrication

CIP Composites™ can be used with external lubricants if desired. We can custom design bearings and wear pads with lubrication grooves for water, grease or oil. The material performs excellently in both fresh and salt water. Although most lubricants will not harm CIP Composites™, we do recommend the use of synthetics.



### Hydro - Marine - Oil & Gas - Industrial

