



-En enklere arbeidsdag!

## BRAKE AND BEARING SERVICES

*Bearings, Bushes, Slide pads, Washers, Sphericals  
Woven and Moulded brake lining, Friction materials and Custom-made parts*



BBS INDUSTRIE BV

Veersedijk 103

3341 LL

Hendrik-Ido-Ambacht

The Netherlands

**WWW.BB-S.NL**

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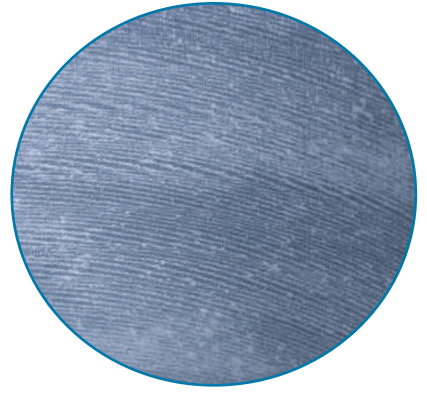
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## WHAT IS TECLITE?

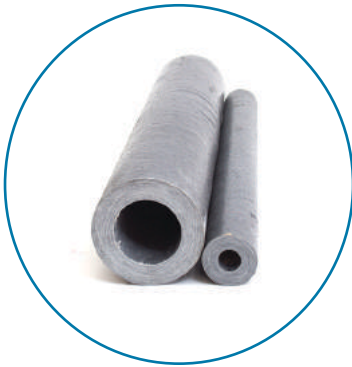
Teclite is a composite engineering material manufactured from synthetic fibres and thermosetting resins. All grades of Teclite are available with incorporated solid lubricant.

By varying the fabric reinforcement and the resin used, the physical and chemical properties of the material can be adjusted to suit a wide range of applications.

Teclite is highly recommended for use where other forms of lubricant are either undesirable, too erratic, intermittent or non-existent.



### WHAT ARE THE BENEFITS OF USING TECLITE?

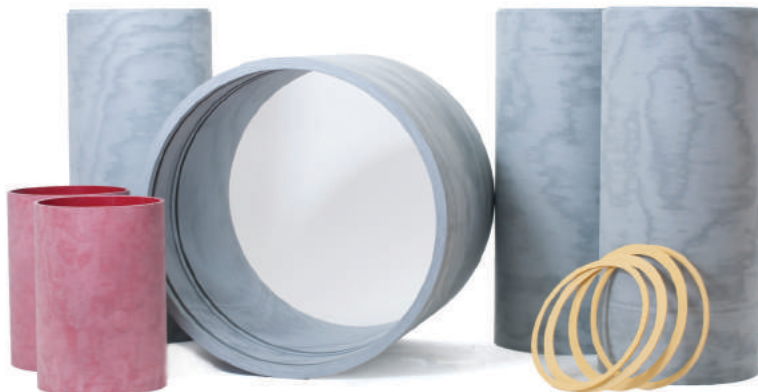


- *Self-lubricating*
- *Environmentally friendly*
- *Low coefficient of friction*
- *Low wear rate*
- *Low thermal expansion rate*
- *High edge load / High shock load capabilities*
- *Exceptional dimensional stability, even in wet conditions*
- *1/6 weight of steel*

Teclite composites are widely used to replace more traditional bronze, babbitt and nylon bearing materials.

Teclite is ideally suited for high load and low speed applications. Teclite composites are designed to operate without external lubrication, while still offering smooth, quiet performance. Teclite composite offers a higher load capacity and better dimensional stability than other non-metallic materials.

When high strength, low friction and low wear are essential, Teclite is the best possible choice.



# BEARING TECHNOLOGY PRODUCTS

## BEARINGS & BUSHES



### PLAIN BEARINGS

The vast majority of bearings produced by BBS Industrie are of the plain bearing type. We are able to manufacture bearings in a range of sizes, from as small as 8mm to more than 1 metre. We supply a full range of material grades, engineered to suit a very wide choice of applications. For more information about the different types of Teclite composite, turn to page 8.

Teclite bearings are excellent for applications with high loads and low speeds. They are available for dry running, grease lubrication, running in water or immersed in various other mediums. In many instances, when BBS Industrie composite bearings are used to replace conventional bronze bearings, they offer significant performance advantages in operation.



### BUSHES

BBS Industrie bushes are produced from composite fabric materials of finely woven plastic fabrics, impregnated with special thermosetting polyester resins.

To improve their mechanical properties - in particular the friction coefficient - the resin is mixed with various additives.

The wide range of materials available, each with different mechanical and chemical properties, makes these bushes suitable for a large number of specific applications.

### FLANGED BUSHES

BBS Industrie flanged bearing bushes are widely used and are the ideal solution for machined housings not equipped to accept a regular bearing.

Flanged bushes can be used in automotive, agricultural and industrial applications, thanks to their long service life and low maintenance requirements.

Flanged bushes can be impregnated with a variety of lubricants, do not hesitate to contact us for more information or advice.

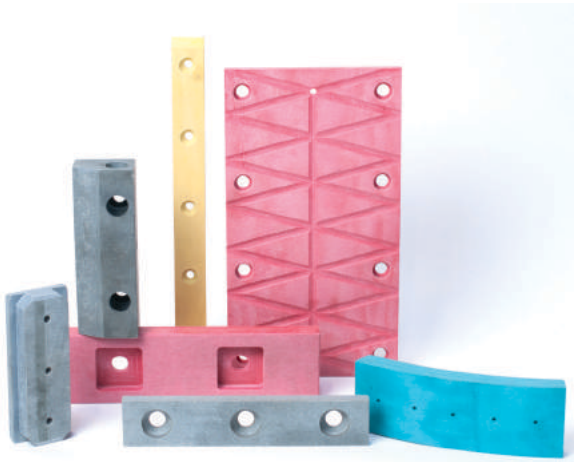


### *We supply a wide range of bearings:*

- Flange Bearings
- Plain Bearings & Bushings
- Thrust Bearings
- Insulating Bushes
- Bridge Bearings
- Structural Bearings
- Rudder Bearings
- Custom Designed Bearing Applications
- Spherical Bearings
- Bearing Pads
- Shell Bearings
- Plummer Block Bearings

## WEAR PADS

Teclite wear pads are used in slide bearings, conveyor guides, scrapers and friction plates.



Wear pads are predominantly used in the Textiles, Food, Rail and Marine industries.

They can be produced from any of our range of material grades, and are also available as self-lubricating variants, thanks to the incorporation of lubricants such as PTFE, Molybdenum and Graphite. Wear pads can be drilled and grooved to meet the customer's specific requirements, to facilitate lubrication and fixing.

## WASHERS

Teclite thrust washers are dry sliding thrust bearings, produced from sheet material.

These washers can be used for axially compact bearing locations where oscillating and rotational movements can occur. Teclite thrust washers are maintenance-free thereby eradicating the risk of lubrication starvation occurring in locations where lubricant application is difficult.

We can supply these products in a wide range of sizes and thicknesses, and in our full range of material grades.

## WEAR STRIPS

Teclite standard wear rings and wear strips can be supplied in thicknesses of between 1mm and 5+mm, and in widths of up to 50mm.

We can produce strips up to a maximum length of 5 metres. Our strips are machined to precisely controlled and accurate tolerances and can be produced in various grades of Teclite material.

Teclite strips ensure low slip characteristics while delivering excellent performance in non-standard chemical applications with low swell.

Teclite stock strip is ideal for breakdown repairs.



## WEAR RINGS

Teclite wear rings produced from fabric composite materials are used in Hydraulic Cylinders subject to high loads, such as those occurring in mobile hydraulic systems and press construction.

The high compressive strength, excellent sliding characteristics and exceptional wear resistance of the Teclite rings ensure a long service life.

Teclite prevents metal-to-metal contact between piston / rod and bore / gland, as well as absorbing high transverse loads.



## SPHERICAL BEARINGS

BBS Industrie Teclite spherical bearings are used in a wide variety of applications, often in dry or partially lubricated conditions, and in applications subject to shock loads.

Teclite spherical bearings can be fitted as a direct replacement for conventional steel spherical bearings or custom-designed to suit individual customer requirements.

They offer numerous significant advantages in respect of conventional and other non-metallic spherical bearings, thanks to their ability to be used in challenging environmental and operating conditions.

We can offer a variety of bearing assembly formats including composite housing with a composite ball, composite housing with a stainless-steel ball, or stainless steel ball with a Teclite bushing in the I.D of the ball. Inner rings can be split either before or after machining.

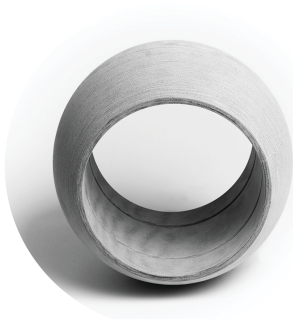
Sphericals can also be drilled and grooved for applications requiring additional oil lubrication. Teclite sphericals are ideal for marine applications, as they are saltwater-proof.

Bearing design is often dependent on the loads involved in the application.

We are capable of producing spherical bearings in a wide range of sizes. Please contact our office directly, to discuss your requirements.

### **Advantages:**

- Self-lubricating
- No maintenance
- High strength to weight ratio
- Minimal swell in water
- Low friction
- Easy installation



## APPLICATIONS

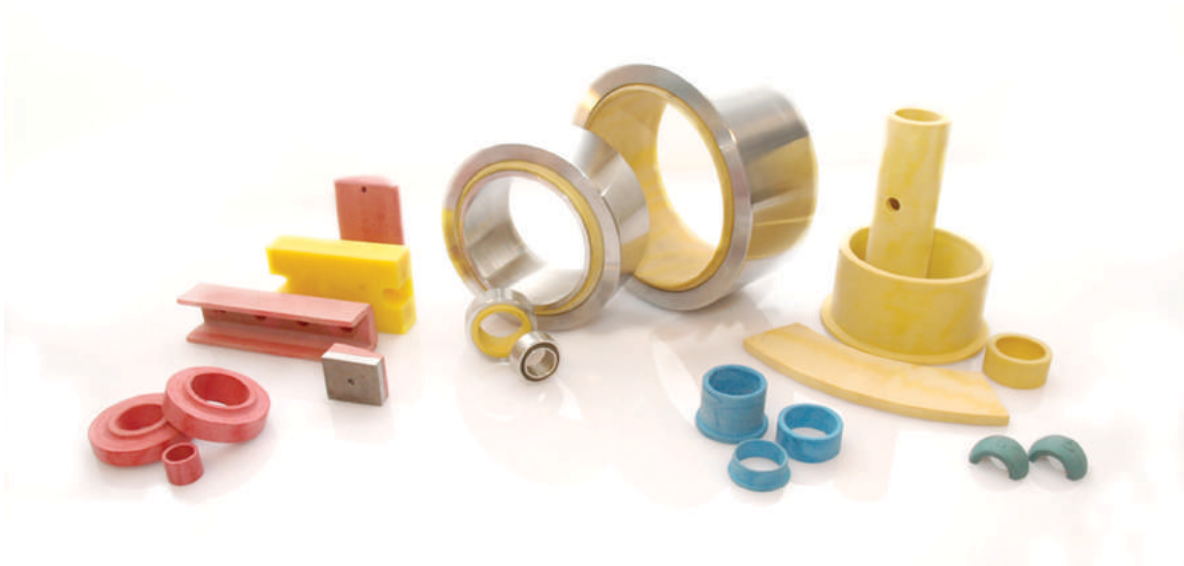
***Teclite composite is ideal in a wide range of applications including:***

- Commerical Solar farm equipment
- Agricultural Equipment
- Deck Cranes
- Cylinder Eye Ends
- Hydro power equipment
- Water treatment equipment



## CUSTOM -MADE PARTS

We are able to produce custom-made components to match our customer's designs. All these parts can be produced from our full range of TecLite grades, on the basis of the most efficient or most preferred product type (e.g. tube, rod or sheet).



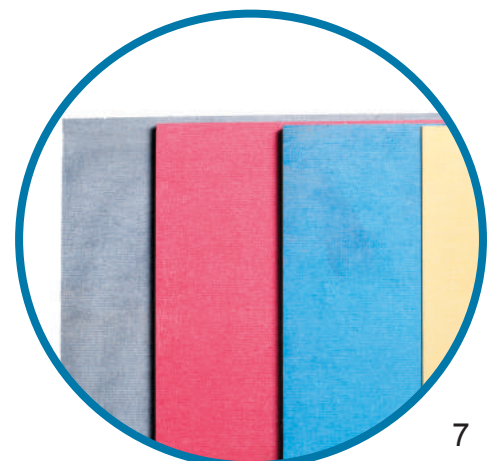
## SEMI-FINISHED PRODUCTS

Semi-finished products are available in a variety of sizes and colours as required by the customer. Tubes can be supplied with either a thin wall or thick wall, offering the customer easier and more cost-effective machining; this saves both time and money in terms of machine operation.









## SHEETS, TUBES & RODS

We supply raw material tubes, laminates and rods for customers wishing to reduce their delivery times and who wish to have the machining carried out either in house or via an external contractor.



# TECLITE COMPOSITE MATERIALS

TYPE	COLOUR	APPLICATION	PROPERTIES
 Teclite 100	Blue	Suitable for replacing metal (bronze) or plastic products including slide bearings. -maintenance free-	Self-lubricating bearing material for the most common applications. -long life in dry environments-
 Teclite 100M	Grey	Suitable for replacing metal (bronze) or plastic products including slide bearings. -maintenance free-	Self-lubricating bearing material for the most common applications. -long life in wet and dry environments-
 Teclite 100MP	Grey	Suitable for replacing metal (bronze) or plastic products including slide bearings in the Marine sector. -maintenance free-	Self-lubricating bearing material for Marine environments. -low friction-
 Teclite 300	Red	Suitable for replacing metal (bronze) or plastic products including slide bearings for abrasive environments. -maintenance free-	High wear-resistant self-lubricating bearing material capable of withstanding 120 degrees centigrade.
 Teclite 600	Yellow	Suitable for replacing metal (bronze) or plastic products including slide bearings for abrasive environments. -maintenance free-	Superior chemical resistance. Self-lubricating bearing material for chemical environments.
 Teclite 600R	Yellow + PTFE layer	Suitable for replacing metal (bronze) or plastic products including slide bearings. -maintenance free- -extremely low to no stick slip-	Special PTFE layer incorporated in the wearing surface which Creates a very low coefficient of friction and prevents stick slip.



# TECLITE 100MP MARINE MANUAL

In addition to our basic material grades, we also offer Teclite 100MP. This grade of material has been specially designed for use in marine environments.

Our Teclite 100M, which has also amply demonstrated its suitability for use in marine environments, has been further engineered to create our Teclite 100MP material, which fulfils all requirements imposed for the awarding of official approval by Lloyd's Register (among others).



## LLOYDS APPROVED

Together with Det Norske Veritas (Norway), the American Bureau of Shipping (USA), Bureau Veritas (France) and RINA (Registro Italiano Navale, Italy), Lloyd's Register is one of the leading classification societies worldwide.

Lloyds has successfully tested the Teclite 100MP material grade and approved this grade for classification as officially Lloyd's approved. This Statement of approval confirms that Teclite 100MP is entered in the LR list of Approved Synthetic Rudder Bearing Materials - Group 1(B), Provisional Approval, for a maximum bearing pressure of 10N/mm<sup>2</sup>.



### *Products in teclite 100MP for marine environments:*

- Rudder Bearings
- Stabiliser Bearings
- Deck Machinery Bearings
- Bushes, Slide pads, Washers
- Custom-made parts

## APPLICATION

Teclite 100MP composite has been specifically formulated for use in the marine environment.

It is ideally suited to the operating conditions and working environment for rudder bearings and pintle bushes, which include water, oil or grease lubrication, and dry running conditions.

## DESIGN

**HOUSING** - Teclite marine bearings require radial support from the bearing housing. Under normal operating conditions, the quoted interference fit is adequate for retaining the bearing in its housing. The use of a retaining ring or a shouldered housing bore is recommended while lead-in chambers are required on the bearing housing, to prevent shaving of the bearing during fitting.

**SHAFT** - The external diameter of the shaft must be constant over the length of the bearing operating surface. The surface finish should be not more than 1.6 Ra.

## INSTALLATION

The bearings can either be pressed into the housing or freeze fitted. For recommendations on freeze fitting, please do not hesitate to contact our office for our freeze fitting protocol.

Great care must be taken at all times to avoid damaging the bush during the fitting process. Bore sizes must be thoroughly checked along all axes, at ambient temperature, to ensure that the minimum shaft clearance has been maintained. Beside our basic material grades we also have our Teclite 100MP, this grade has been specially designed for marine environments.





## **BEARING DESIGN INFORMATION**

The following information has been issued in good faith and is intended to provide design data for Rudder Bearings only.

For more specific information on different applications, please do not hesitate to contact us.

## **RUNNING CLEARANCE**

The recommended minimum running clearance (R-CL) must comply with the requirements of the relevant classification society with which the vessel is registered.

However, if such information is either not provided or unavailable, the following formula may be applied.

$R-CL = 0.0015 \times \text{Rudder Shaft Dia} + 1\text{mm}$ , although the minimum clearance may not fall below 1.3mm.

The maximum swell in water of Teclite100MP composite is 0.1%. Typically, no allowance need be made when calculating the final running clearance.

## **MINIMUM BEARING WALL THICKNESS**

Minimum wall thickness for Teclite100MP rudder bearings

Minimum wall thickness =  $0.035 \times \text{Rudder shaft Dia} + 2\text{mm}$ .

The formula is suitable for both rudder stock and pintle bearings, in applications where press fitting, freeze fitting or bonding are to be employed.

## BEARING CALCULATION

The following Information is required for correctly determining the machining dimension.

### HARDWARE DIMENSIONS:

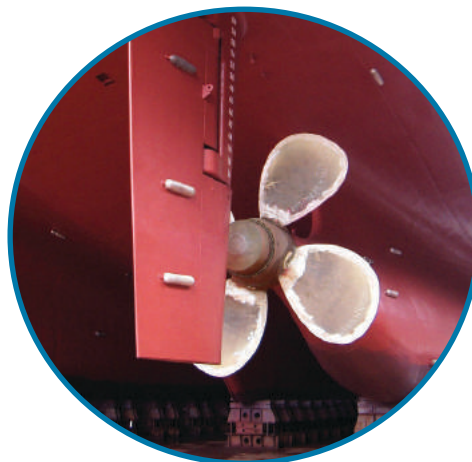
Housing diameter Max

Housing diameter Min

Shaft Diameter Max

Shaft Diameter Min

Machining Tolerance



Minimum operating temperature for vessel (this temperature will determine the interference fit)

### BEARING DIMENSIONS FOR MACHINING

Bearing outside Dia min = Housing Max + Interference fit (see chart on page 13)

Bearing outside Dia max = Minimum Bush OD + Machining tolerance

Bearing Inside dia min = Maximum shaft dia + running

Bearing Inside Dia max = Bearing ID Min + Machining Tolerance.

Following fitting, the bearing will have at least the minimum operating clearance as specified in the classification rules. ( See chart on page 13 )

### *BENEFITS– STABALISER BEARINGS*

- *Can be operated in seawater or in an enclosed unit with grease or oil lubrication*
- *Low noise and vibration characteristics*
- *Suitable for replacing existing bearings*
- *Tolerant for misalignment and shaft deflections.*

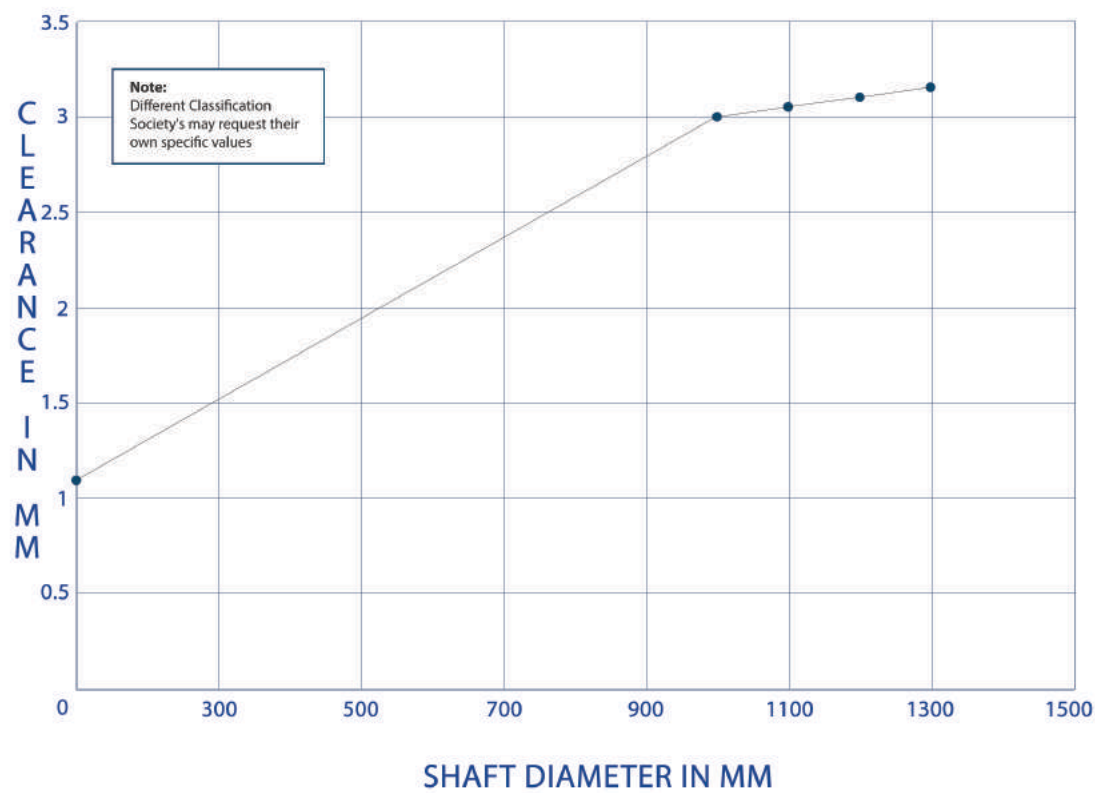
### *BENEFITS – RUDDER BEARINGS*

- *Water-lubricated*
- *Can be fitted using a press, jacks or freeze fitted*
- *Suitable for filtered or open water applications*
- *No additional retention method required*

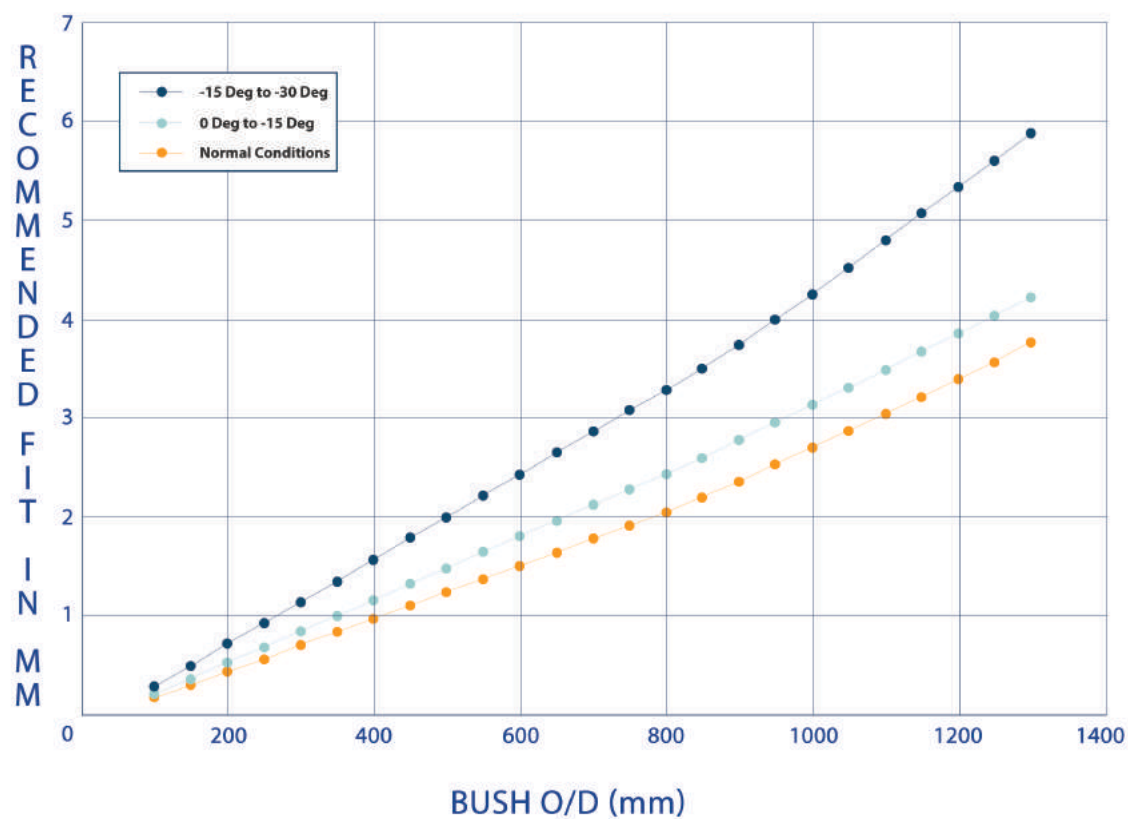
*Teclite100MP offers exceptional performance in low speed, boundary lubrication conditions.*



# OPERATING CLEARANCES TECLITE 100MP COMPOSITE



# INTERFERENCE CHART TECLITE 100MP COMPOSITE



## SERVICES

We offer a full range of machining services including Milling, Turning, Boring, Drilling and Finishing.

As a result, we are able to design and manufacture any size, shape or application, in compliance with our clients' exacting standards.



Most sizes can be handled by our own workshop. For exceptional sizes, contact our sales department.



### EXTERNAL LUBRICATION

Teclite composites can be used with external lubrication if required. We are able to custom design bearings and wear pads with lubrication grooves for water, grease or oil.

Should you opt for external lubrication, we recommend the use of water or synthetic oils/greases.

### SPECIAL PRODUCTS

Special components can be manufactured according to customer drawings, from all grades of Teclite.

In addition to special wear pads, bearings and bushes, also plain spherical bearings can be manufactured in Teclite, to solve misalignment problems.

It is also possible to produce spherical bearings with a combination of metallic and Teclite materials.

For applications subject to fire risk, a Teclite material can be supplied with exceptional fire-retardant properties.



## Contact us

Contact our offices directly to discuss your requirements.

[info@bb-s.nl](mailto:info@bb-s.nl)

+ 31 (0)10 - 43 700 65

[www.bb-s.nl](http://www.bb-s.nl)

# INDUSTRIES AND APPLICATIONS

## MARINE & DREDGING

Lloyds approved rudder bearings,  
Lloyds approved pintle rudder bearings,  
Hatch cover pads, Stern tube bearings,  
Stabiliser bearings, Deck machinery bearings.



### *Benefits of Rudder bearings:*

- *Minimal swell in water*
- *Dry running capability due to self-lubrication*
- *Protect housings against corrosion*
- *Non-conductive; protect against electrolytic corrosion*
- *Tolerant to misalignment and shaft deflections*
- *Raw material tubes can be manufactured in a short period*
- *Easily machined on site without the use of coolant*
- *Elasticity reduces the effects of hammering*



## MINING, OIL & GAS

Wear sheaves, Coal cutting machinery,  
Cable guide rollers, Pulley blocks,  
Anchor sheave Bearings, Fulcrum bearings,  
Piston rings for hydraulic pit props, Conveyor rollers,  
Gears, Derrick Bushes.

### *The properties of Teclite material:*

- *Fire-retardant, self-extinguishing grade of resin*
- *Minimum wear*
- *Ideal replacement for conventional wooden chocks*

## OTHER MARKET SECTORS

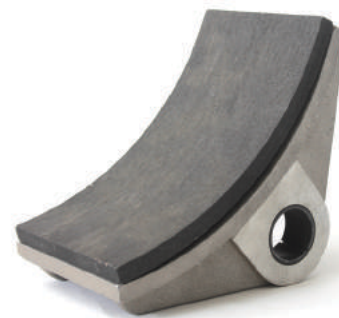
- |                       |                        |                              |
|-----------------------|------------------------|------------------------------|
| • Automotive          | • Contractor Plant     | • Steel Rolling Mills        |
| • Agriculture         | • Fluid Handling       | • Textiles Printing & paper  |
| • Chemical Industries | • Food Industry        | • Bridge and Sluice building |
| • Civil Engineering   | • Mechanical Handwling | • Wind Energy                |

# BRAKE AND FRICTION TECHNOLOGY

## BRAKE BANDS AND BRAKE SHOES

Brake bands and brake shoes are the key area in which overhaul is required in brake technology. For overhaul work or recoating of brake bands and brake shoes, BBS Industrie is capable of delivering rapid and excellent quality service. In particular in the shipping industry, brake linings are still often attached using nuts and bolts. We remove these brake linings at our own facilities before efficiently grit-blasting the brake bands so that both brake bands and brake shoes are once again as good as new. Following this preparation work, the bands are ready for recoating or vulcanisation. Our own very large vulcanisation oven means that we are able to vulcanise overhauled brake bands from small to very large. As required. The parts can be secured additionally with rivets or nuts and bolts. Vulcanisation alone is sufficient as a means of attaching the brake bands and brake shoes. Moreover, vulcanisation offers the additional advantage of preventing rust between brake liners and brake bands, a problem commonly experienced in the past.

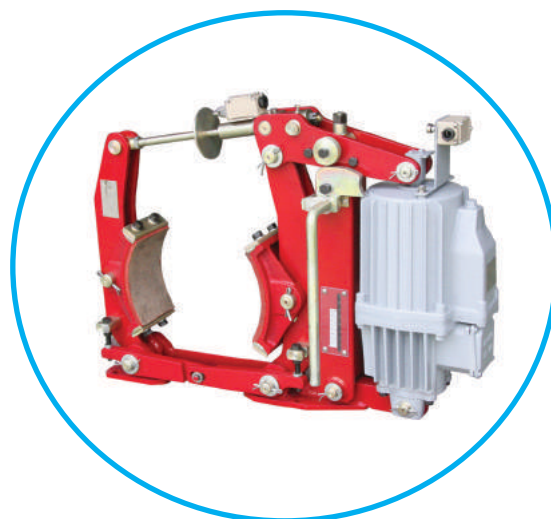
In addition to the overhaul of used brake bands and brake shoes, as required, we are also able to produce new brake bands and brake shoes. BBS Industrie contributes its own ideas and if necessary will contact the client if a brake band and/or brake shoe is in such poor condition that failure is a risk in the future. In consultation with the client, we will offer advice on the best possible solutions.



## BRAKE SYSTEMS

BBS Industrie BV also supplies new brake systems, including brake systems for cranes. BBS are dealers for Huawu brakes, market leaders in brake systems often already fitted in every ZPMC crane.

In addition to new brake systems, we also supply new brake and wear parts for practically all makes and types of brake system in the crane industry. In many cases, overhaul of brake parts and wear parts is perfectly possible. BBS Industrie can offer all the necessary advice.





## BRAKE PADS AND BRAKE DISCS

Brake systems come in all shapes and sizes. In addition to brake systems for cranes, BBS Industrie is able to supply refurbished and new parts for brake materials and/or new wear parts for brake systems in a wide variety of other applications. These include yaw brakes, tension brakes, caliper brakes, industrial press blocks, airflex couplings and much more.



## BRAKE LININGS

Brake linings are used for recoating brake bands and brake shoes. On board ships, in addition to the overhaul or replacement of brake parts, a replacement stock of additional brake linings will be required for carrying out emergency repairs in other countries or at sea. To meet this demand, BBS supplies loose brake linings. Our brake linings are of high quality and are available in variety of types specially developed for such applications as anchor winches and industrial couplings (e.g. cone coupling). Depending on the situation and application, our brake linings can be used for a wide variety of other applications. All our brake linings are asbestos-free.



## MOUNTING MATERIALS

Brake linings can be mounted according to several different methods including vulcanisation, cold gluing, riveting and with nuts and bolts. In most cases, brake linings are mounted using vulcanisation glue.



According to this technique, the brake bands and shoes are placed in a hot-air oven, that activates the gluing process. If gluing has to be carried out on location due to specific circumstances, we can ensure excellent results using cold gluing, without the requirement of a vulcanising oven. If additional fastening of the brake linings is required or recommended, this is possible with rivets, DIN7338B or nuts and bolts DIN936. We are fully qualified to also carry out this work, after the brake parts have been vulcanised, although additional fastening can be carried out by yourself, on location. We supply all the necessary mounting tools including riveting sets, counter sink drills (for rivets/ nuts and bolts) and vulcanisation and cold glue. All these materials are always available on stock.



## WR251 WOVEN ROLL

WR251 is a closely-woven, semi-flexible friction material. It is based on a yarn spun from a blend of glass and synthetic fibres combined with a fine brass wire to enhance strength and heat dissipation properties. The impregnant has been specially developed to give it good frictional properties, in combination with a high degree of flexibility. It offers a high coefficient of friction and performs well in wet, oil and damp environments, making the material ideally suited for use in marine applications.

To assist during fitting to brake shoes and bands, it can be softened and made more pliable by heating in a bonding oven to between 150 – 200 degrees Celsius for sufficient time to allow heat to penetrate the fabric.

This material is oil resistant.

PROPERTY	UNIT	
Density	$\text{g/cm}^3$	1.08
Tensile strenght	$\text{N/mm}^2$	30
Compressive strength	$\text{N/mm}^2$	44
Shear strenght	$\text{N/mm}^2$	13
Rivet holding capacity	$\text{N/mm}^2$	75
Maximum continuous temperature	$^{\circ}\text{C}$	90
Maximum intermittent temperature	$^{\circ}\text{C}$	130
Maximum temperature	$^{\circ}\text{C}$	180
Recommended mating surface	-	> HB180



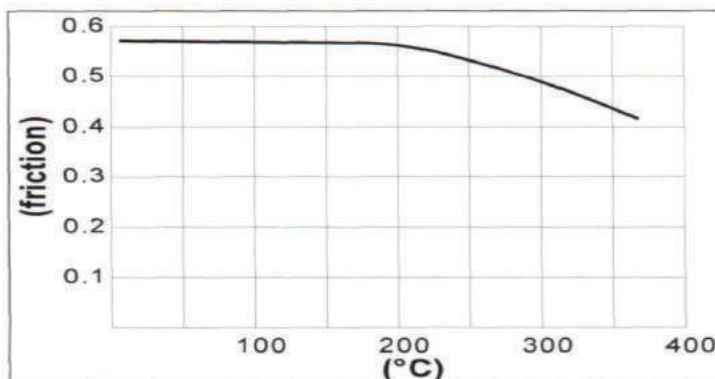
**Availability:** in rolls and finished components and in rigid sheet.

**Roll length:** up to 10 m.

**Sheet size:** maximum 400 x 1000 mm.

**Thicknesses:** 5 to 32 mm, in both metric and imperial sizes.

**Width:** up to 400 mm



*Above information is based on a brake drums made from ST52. Any other material can have a slightly different result.*

## WR252 WOVEN ROLL

WR252 is a semi-flexible, asbestos-free brake lining, manufactured from a solid woven cotton fabric, impregnated with special resins to produce a brake lining, which combines strength and flexibility together with a high coefficient of friction.

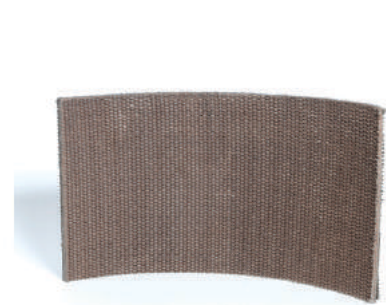
It is designed for low temperatures and high friction applications.

The material has excellent rivet-holding strength and is suitable for bonding.

It has limited oil resistance and is not recommended for use in oil-immersed applications. The main areas of application include brake systems where a high coefficient of friction is required but where temperatures do not rise too high.

Examples include static winches, clamp systems and cone clutches for hoists.

PROPERTY	UNIT	
Density	$\text{g/cm}^3$	1.08
Tensile strenght	$\text{N/mm}^2$	30
Compressive strength	$\text{N/mm}^2$	44
Shear strenght	$\text{N/mm}^2$	13
Rivet holding capacity	$\text{N/mm}^2$	75
Maximum continuous temperature	$^{\circ}\text{C}$	90
Maximum intermittent temperature	$^{\circ}\text{C}$	130
Maximum temperature	$^{\circ}\text{C}$	180
Recommended mating surface	-	> HB180



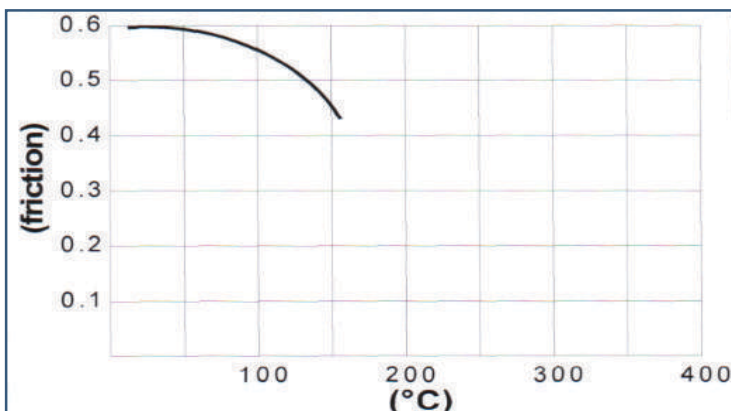
**Availability:** in rolls and finished components and in rigid sheet.

**Roll length:** up to 10 m.

**Sheet size:** maximum 400 x 1000 mm.

**Thicknesses:** 5 to 25 mm, in both metric and imperial sizes.

**Width:** up to 410 mm



*Above information is based on a brake drums made from ST52. Any other material can have a slightly different result.*

MR70 MOULDED ROLL

MR70 is a fully cured, extremely flexible, asbestos-free, moulded friction material. It is free from steel and other metal inclusions, making it very friendly for the counter face material.



The absence of metal inclusions does not influence the temperature capability of the material. In fact, maximum continuous and peak temperatures are relatively high. It is a general-purpose friction material suitable for bonding and riveting and thanks to its flexibility and high shear strength, it can be bonded into practically any conceivable shape or radius. When the material is subjected to heat, either from vulcanisation or in use, the flexibility is reduced without affecting the other characteristics.

MR70 is suitable for use in oil, although in that situation, the dry friction values no longer apply.

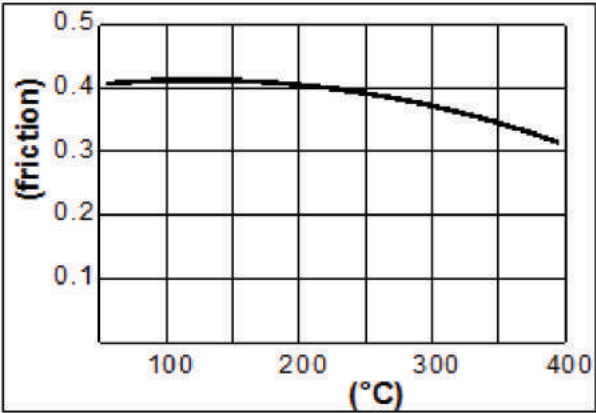
PROPERTY	UNIT	
Density	g/cm <sup>3</sup>	2.20
Tensile strength at 20 °C	N/mm <sup>2</sup>	10
Tensile strength at 250 °C	N/mm <sup>2</sup>	6.4
Compressive strength at 20 °C	N/mm <sup>2</sup>	52
Shear strength at 20 °C	N/mm <sup>2</sup>	8
Oil resistance	-	good
Average dry friction coefficient	-	0.40
Specific thermal capacity at 20 °C	kJ/kgK	1.20
Maximum continuous temperature	°C	250
Maximum intermittent temperature	°C	400
Recommended mating surface	-	> HB180

**Availability:** in rolls and finished component.

**Roll length:** up to 8 m.

**Thicknesses:** 4 to 12 mm

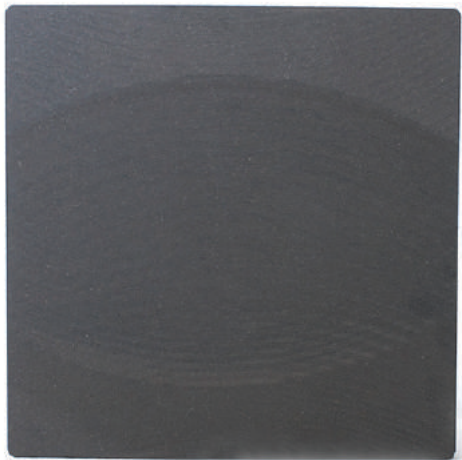
**Width:** up to 210 mm





**MS92 MOULDED SHEET MATERIAL**

MS92 is a general-purpose friction material. Suitable for light to medium duty, wet and dry industrial applications. In recent years, it has become a highly regarded material. Its success can be attributed to its hardness, offering excellent wear and tensile strength, while still achieving average and stable friction levels. The material is also oil resistant.

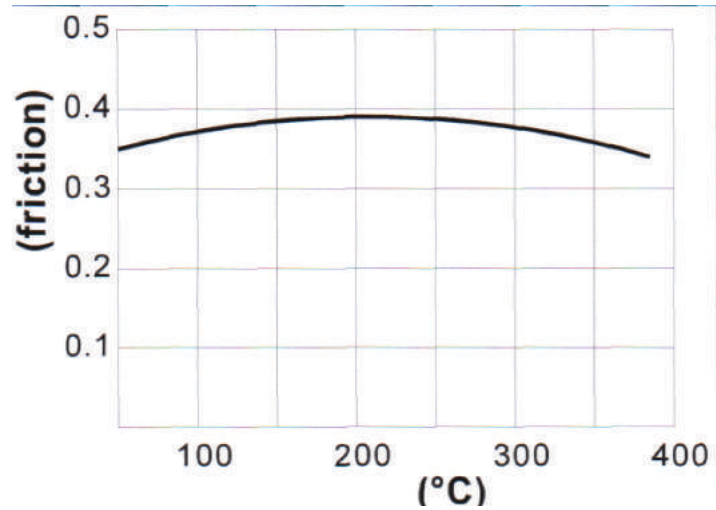


PROPERTY	UNIT	
Density	g/cm <sup>3</sup>	1.88
Tensile strength	N/mm <sup>2</sup>	25
Shear strength	N/mm <sup>2</sup>	25
Compressive strength	N/mm <sup>2</sup>	171
Hardness Rockwell R	-	82
Thermal conductivity	W/mK	0.9
Maximum continuous temperature	°C	250
Maximum intermittent temperature	°C	350
Maximum temperature	°C	400
Recommended mating surface	-	> HB200

**Availability:** in flat sheets, finished components and moulded blocks (for many popular presses and machine tools moulds are available)

**Sheet size:** maximum 500 x 500 mm.

**Thicknesses:** sheets 3 to 25 mm, moulded blocks up to 65 mm



**MS11 SINTERED MOULDED SHEET MATERIAL**

MS11 is a rigid, moulded, asbestos-free friction material. It contains a mix of friction modifiers to give the material high friction values throughout its entire temperature range. The resin system was specially developed for this unique material, and marks a considerable increase in allowable temperatures and resistance against fading, for this kind of material.

The friction characteristics, high allowable temperatures and wear resistance make MS11 an excellent substitute for sinter bronze brake pads, in many applications.

However, this material can be bonded and riveted. As a rule, material is positioned as a 'severe duty material', suitable for applications including high load industrial disc brakes, selected vehicle disc brakes, high load clutches and brake discs, etc. In contrast to most other 'high temperature - high friction' materials, it is friendly for the counter face material. MS11 was not specifically developed for operation in oil; oil will reduce friction values but will not physically degrade the material. The key properties of the material are summarised in the following table:

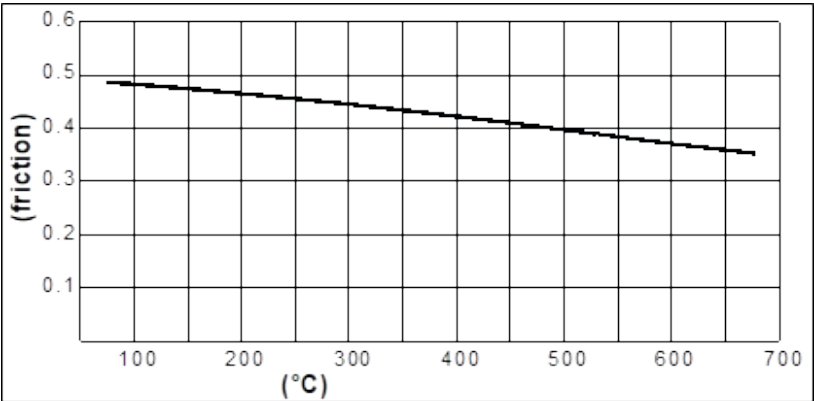
PROPERTY	UNIT	
Density	g/cm <sup>3</sup>	3.00
Compressive strength	N/mm <sup>2</sup>	60
Shear strength	N/mm <sup>2</sup>	9.5
Thermal conductivity	W/mK	1.4
Maximum continuous temperature	°C	275
Maximum intermittent temperature	°C	400
Maximum temperature	°C	650
Recommended mating surface	-	> HB200



**Availability:** in flat sheets, finished components and moulded blocks

**Sheet size:** maximum 762 x 762 mm.

**Thicknesses:** 3,2 to 28 mm



# ABOUT BBS INDUSTRIE BV

BBS Industrie BV are specialists in the field of mechanical engineering components. As a technical partner for all our business relations, we stand out from the competition thanks to our product range, knowledge, level of quality and service provision. We understand better than anyone the language of our customers. Where others see problems we see challenges. Creativity and flexibility are an integral part of our basic skill set.

## RANGE OF PRODUCTS

The range of products at BBS Industrie BV is based on motion and wears processes. Composite bearings/slide pads, brake and friction materials and cylinders are supplied both as OEM parts and for the overhaul market. Our components are manufactured both in Ferrous and Non-Ferrous and high-synthetic materials. Our experience means we are able to deliver sound guidance in making the right choices. Modern technology and the facilities we have at our disposal (including the largest and most up-to-date vulcanisation oven in the Netherlands) mean guaranteed efficient, high-quality production.

## TECHNICAL ADVISE

We fully realise that our individual business relations each have their own unique questions and problems that demand equally unique and specific solutions. Together with them, we translate technical challenges into tailor-made solutions. At BBS, optimum service comes as standard. BBS Industrie BV can also offer huge expertise in the field of bearing and friction engineering. We combine extensive material knowledge with broad-based experience of specific applications.

## INTERNATIONAL APPROACH

From our base of operations in Rotterdam, our products are transported all-round the world. As a result, the experience we have accrued in a broad range of applications is equally international in character.

## STOCKS

We maintain considerable stocks of our standard materials. As a result we can guarantee short delivery times to our customers. The short lines to production and processing mean we can keep lead times to a minimum.

## OUTSTANDING

We at BBS Industrie BV aim to stand out from the competition and constantly strive to prove our worth. Driven by boundless ambition, we aim to maintain satisfied customers. The innovative work approach and ground-breaking thinking within our organisation make us the ideal partner now and in the future.



### Jørgen Strand

Produktansvarlig:

- Transmisjoner
- Kjeder
- El-motorer
- Teknisk plast
- Kompositt materialer

Dir: 38 12 91 15

Mob: 91 83 74 99

[strand@sletteboe.no](mailto:strand@sletteboe.no)





BBS Industrie BV  
Veersedijk 103  
3341 LL Hendrik-Ido-Ambacht  
The Netherlands

00 31 (0)10 43 700 65  
info@bb-s.nl  
www.bb-s.nl



Skibåsen 38  
4636 Kristiansand

Telefon: 38 12 91 00  
Vakttelefon: 913 40 952  
Fax: 38 02 11 09  
E-post: post@sletteboe.no  
Internettside: www.sletteboe.no

Åpningstider Industrivarehuset  
Man-fre. 07.00 – 16.00

IBAN NL79RABO0305964569  
VAT nr. NL855420133B01  
CC 63832607