

High-Performance Plastics for Water management

Molding compounds for Water Industry

SBHPP a solution provider



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to water management industry

Cost Effective Engineering Solutions through Material Technology

Trends in today's Water industry see a renewed emphasis on durability as well as a continued drive to meet requirements for potable water. But these market trends need to be achieved in a cost effective way. The key characteristics of the SBHPP portfolio are centered around Phenolic chemistry which has a unique position on the cost/performance curve. Durability in terms of Heat and Chemical resistance are a perfect fit for Water Management systems. Cost performance vs Thermoplastics with the same properties provides a significant economic advantage.



Innovative Global Resources deliver new technology in partnership with customers

Thanks to our extensive R&D resources, SBHPP is an industry leader in metal-to-plastic conversion. The combination of a wide portfolio of resins systems & fibers and up to industry standards simulation capabilities allows us responding to the challenges of the water industry's most innovative engineers.



SBHPP is a business unit of Sumitomo Bakelite Co., Ltd. and is a global leader in the high performance plastics solutions and support.

Phenolic technology is the foundation of our business through history for over 100 years.

With manufacturing, sales, support and administrative offices spanning across the globe - operating in 10 countries, 20 production sites, 5 R&D centers - our team answers all questions and finds solutions for any project.

SUMITOMO BAKELITE CO., LTD.

The information and guidelines contained in this page are intended to assist you in the selection of resins and engineering molding compounds from SBHPP. Status: v1.0 Date: 27 July 2016

Introduction

Thermosetting plastics

Among the PLASTICS family, though thermoset-plastics and thermoplastics sound similar, they have very different properties and applications.

Thermoset plastics are so named because they experience a chemical change during processing and become hard solids. Thermosets are highly cross-linked polymers that have a three-dimensional molecular mesh or network of polymer chains. Thermoset plastics, because of their tightly crosslinked structure, resist higher temperatures and provide greater dimensional stability than do most thermoplastics. Thermosets undergo a chemical as well as a phase change when they are heated. Once cured they cannot be melted or remolded and are resistant to solvents.

Thermosets are tough, durable with high temperature performance, and have found applications in a wide variety of fields.



Phenolic 3D Structure



UNIQUE PROPERTIES

PROVEN HIGH PERFORMANCE MATERIALS

Applications throughout a broad range of industries since more than 100 years.

STRONG CROSS-LINKED STRUCTURE

Non fusible, high glass transition temperature (Tg).

HIGH STIFFNESS

E-modulus up to 35 GPa. Mechanical properties are maintained from negative to elevated temperatures.

HIGH CONTINUOUS END-USE TEMPERATURE

Compound and Composite with Phenolic matrix; 150-200°C continuous, up to >300°C peak (post-cured).

HIGH CREEP & FATIGUE RESISTANCES

High creep and fatigue resistances especially at elevated temperatures and under high loads.

CORROSION FREE

Broad chemical resistance without attack or degradation.

DIMENSIONAL STABILITY

Low molding shrinkage, very low coefficient of thermal expansion (linear).

HARDNESS, ABRASION RESISTANCE

High surface hardness that provides an excellent abrasion resistance.

HIGH DESIGN FREEDOM

Better than metal and thermoplastics. Thickness variations allowed.

EXCELLENT STABILITY IN PROCESSING

Multiple industrial processing methods available (injection, injectioncompression, transfer, compression).

High Performance Materials Fulfill Demanding Requirements for Water Management Systems

Because they maintain excellent strength and toughness during exposure to hot fluids and to hot air, high performance thermoset-plastics can make durable, functional components for water management systems and other demanding applications.

SBHPP PORTFOLIO vs THERMOPLASTICS





Sanitary components



SBHPP thermoset-plastics are ideal for use in water system applications, especially as a cost-saving substitute for metals.

Glass fiber-reinforced grades provide great design freedom and allow for the integration of different functions in various components.

Faucets and shower components

SBHPP compounds can provide low cost, high performance and innovative solutions for a broad range of sanitary taps and shower components.

Faucets and shower decorative parts

With a high class surface finishing (pure resin, free of fibers), the injected parts made in SBHPP glass fiber compounds are an exceptional substrate for PVD plating techniques.

PVD coating directly on SBHPP thermoset plastics can be used to create a scratch-resistant and shiny surface on decorative plastic products. The low coefficient of thermal expansion of SBHPP material substrates enhances the durability requirements of PVD plating.



Compared to thermoplastics, SBHPP thermosets can be produced without sink marks even in presence of thick wall thicknesses.

Their high thermal insulation insures a higher safety protection for children against hot surfaces compared to brass components.

In addition, their relative high density (around 2.0) gives a very good "weight value perception" almost identical to coated brass components and far better than coated thermoplastics.

For instance the SBHPP glass beads and fibers phenolic grade,

VYNCOLIT® BXE650W, meets all NSF/ANSI 61, KTW and other EU regulations. It can offer additional benefits in hot water applications including superior mechanical properties and dimensional stability vs. thermoplastics.



Tap components

DISCS FOR TAP CARTRIDGES

Thermoset discs can subsitute ceramic discs offering cost advantage without compromise on properties.

Since many years the mineral and glass fibers reinforced phenolic grade, **VYNCOLIT®X659W**, is replacing ceramic discs in water cartridges. It provides excellent dimensional stability even at high temperatures, mechanical performances (high E-modulus, creep resistance), hardness, corrosion, and abrasion resistances.

Compared to ceramic discs, the manufacturing process of thermoset discs is easier and suitable for mass production. The discs are directly injection molded (multi-cavities) at the final dimensions, just requiring a face lapping to achieve flatness and roughness.

The material has a homogeneous density that provides dimensional accuracy from batch to batch and contains additives to improve sliding performances.

Product Focus

VYNCOLIT®X659W, meets all NSF/ANSI 61, KTW and other EU regulations.



DISC CARTRIDGE HOUSINGS

In order to ensure durable sealing, the discs should be maintained under pressure by the housing cartridge.

When made in thermoplastics the housing, submitted to temperature variations, often warps/elongates over long term (due to poor creep resistance of thermoplastics). This permanent deformation results in faucet leakage, the discs being no more maintained close together.

Thermosets materials offer a sharp advantage vs. thermoplastics. Thanks to their tridimensional chemical structure, the creep resistance of SBHPP thermoset compounds is incomparably higher than thermoplastics, similar to aluminum alloys.

☑ Product Focus

VYNCOLIT® BXE650W provides high mechanical characteristics and creep resistance and meets all NSF/ANSI 61, KTW and other EU regulations.

INTERNAL FAUCET PARTS

SBHPP thermosetting plastics rival brass and largely supersede engineering thermoplastics creep resistance (PPS, PSU, PPE, etc.).

Creep is the tendency of a material to deform when stress is applied over a long period of time. It can have a significant effect on the longterm performance of a plastic component, especially when operating under significant stress like for faucet internal parts. The long term mechanical performance and creep resistance of thermoset-plastics has been proven in multiple automotive drive train related applications. Numerous high performance parts (e.g. oil pumps, pulleys, valve blocks...) are fastened with bolts without using inserts.

Designing adapter or base fixation internal faucet parts with thermosetplastics is much easier than with thermoplastics. Thermoset-plastics doesn't require to be designed with equal wall thicknesses which is simplifying the conception and give freedom to the engineers.

ADAPTER

Adapters made in thermoset-plastics exhibit hydrolytic stability, great strength, high temperature and creep resistance.

✓ Product Focus

VYNCOLIT® BXE650W, meets all NSF/ANSI 61, KTW and other EU regulations.

BASE FIXATION

Faucet fixation parts made in thermoset-plastics offer design flexibility and function integration at a lower overall cost than conventional design.

Product Focus

VYNCOLIT®X6952 provides high mechanical characteristics and creep resistance





CONCEALED PARTS

In concealed in-wall applications that require long-lasting performance SBHPP thermoset composite materials can provide creep resistance, consistent hydrolytic stability, excellent mechanical properties and design freedom (integration, wall thickness) to economically replace low-lead brass casting bodies and internal parts.

Compared to low-lead brass foundry, the manufacturing process of thermoset-concealed-components doesn't require extensive machining operations. Components can be often directly injection molded at the final required dimensions that ensure a long-lasting sealing. For legacy purpose (fitting features), brass or metal inserts can be easily overmolded when necessary.

☑ Product Focus

VYNCOLIT® BXE650W provides high mechanical characteristics and creep resistance and meets all NSF/ANSI 61, KTW and other EU regulations.





Water pumps

In components such as water pump housings, inlet & outlet covers, bushings and impellers, SBHPP thermosetting plastics allow to reduce system cost, integrate functions and improve efficiency.

Material selection depends on specific operating conditions.

Bushings

Self-lubricating SBHPP thermoset plastics can deliver a longer service life than most metal bearings and offer a part cost reduction at the same time.

Dry running capabilities are much better for thermoset plastics compared to metal bearing solutions. Thermoset plastics have excellent antifriction and low-wear characteristics that produce a self-lubricating effect. Dry run conditions accelerate wear in metal bearings whereas plastic bearings run "lubricated" from the start.

Product Focus

VYNCOLIT® X689 combines low coefficient of friction, high mechanical characteristics and creep resistance.

Housings & impellers

SBHPP thermoset-plastics can deliver excellent hydrolytic stability to pump applications where parts are constantly exposed to water. Glass bead & fiber-reinforced products such as VYNCOLIT BXE650W grade can provide reliable dimensional accuracy & stability, long term creep and material fatigue requirements of parts such as housings and impellers.

☑ Product Focus

VYNCOLIT® BXE650W provides high mechanical characteristics and creep resistance and meets all NSF/ANSI 61, KTW and other EU regulations.

Another clear advantage of thermoset plastics compared to thermoplastic materials is the high design freedom. Thermoset materials allow designing with huge variations in wall thickness. The typical effects of sink marks and part warpage as a result of wall thickness variation in thermoplastic material do not apply for thermoset materials.

Additionally whatever filler reinforcement is being used in the thermoset-plastic a high quality surface can be achieved with molded parts. The top layer (a few μ m) of the molded part is constituted out of resin without arising fiber. Upon molding the part takes over the surface of the mold, a high quality polished mold surface results into a high quality part surface.



The coefficient of thermal expansion of thermoset-plastics is low – close to copper alloys - and almost isotropic (parallel and perpendicular to the molding flow). It provides a reliable dimensional accuracy over the application temperature range and avoids warpage that often occurs with thermoplastics.



Water meters & hot water systems

When long-term dimensional stability is a key requirement, such as for water meters, then thermoset plastics from SBHPP are the material of choice.

Thermoset plastics withstand exceptionally well repeated exposure to high temperatures in combination with high pressure over a long time. The three dimensional chemical structure of thermoset material is naturally non fusible and dimensional stable in a wide temperature range. In addition SBHPP grades exhibit tight molding tolerances, very low and constant coefficient of thermal expansion from cold to hot water temperature that ensure a long lasting stability and accuracy of metering systems.

Glass fiber-reinforced grades provide great design freedom and allow for the integration of different functions in various components.

With consistent physical structure and elevated glass transition temperature (>190°C on cured molded part) SBHPP glass fiber-reinforced grades can be used on ultrasonic metering systems providing a constant signal transmission over the range of operating temperatures.

Material selection depends on specific operating conditions.

☑ Product Focus

VYNCOLIT® X6320 shows long term resistance in hot water media.



Fitting and valves

SBHPP materials are used in small to large size fitting and valve systems that transport fresh water, grey water, black water, sprinkler systems or even mild chemical media at high working pressure (up to 10 bars) and elevated temperatures.

Such systems are designed for industrial applications such as commercial buildings, oil, energy & petrochemical industries, manufacturing & process industries and marine applications.

Fitting

Fitting systems made of SBHPP glass fiber-reinforced thermoset-plastics exhibit high strength properties, light weight and corrosion resistance compared to conventional metal systems. It reduces the risk of bacterial growth due to smooth and non-porous surfaces.

SBHPP material reduces need for maintenance and replacement in corrosive environments.

☑ Product Focus

VYNCOLIT®X6952 provides high mechanical characteristics and creep resistance

Ball valves

Thermoset-plastics offer an outstanding solution to large size ball valves where thermoplastics (POM, Polyamide) cannot perform.

The ability of thermoset-plastics to be molded in large thickness and large thickness variation allow to obtain the ball directly from molding at the right shapes (sphere) and dimensions – particularly for the largest size.

Moreover the creep resistance and the sliding performance of thermoset grade - like VYNCOLIT X659W improve the valve operation and prevent leakage.

✓ Product Focus

VYNCOLIT®X659W, meets all NSF/ANSI 61, KTW and other EU regulations.





Agency approvals

For water applications, SBHPP offers materials which meet or exceed the stringent worldwide regulations for water contact. There are regional differences for the certification of materials, parts and products having direct contact with potable water.

In USA, the requirements are defined by NSF 61.

In Europe, the dominant national requirements for potable water are KTW & W270 for Germany, ACS for France and WRAS for UK.

Furthermore the requirements become more stringent. The new requirements introduced by the European Union (EU), applicable beginning January 2016, change the types of glass additives for polymers that are allowed to be in contact with food and therefore with potable water. Typically materials are tested at elevated temperatures in order to validate the stability in water. The release of organic and inorganic components is measured. In addition the water used during material validation is tested for odor and flavor to ensure water quality.

SBHPP has validated the drinking water grades using test parts. Copies of the documents are available for our customers on request and can be used for submittals.

In the end, parts & products needs to be tested and certified by the OEM for the specific end-use.

The SBHPP materials have been thoroughly tested and validated to ensure an easy and almost risk-less final certification.



Application grades overview

Following is an overview of the most frequently encountered thermosetplastics grades in water management industry, their main properties, benefits, and typical applications.

Main properties

MOLDING COMPOUNDS FOR WATER MANAGEMENT SYSTEMS

ltems	Unit	VYNCOLIT X659W	VYNCOLIT BXE650W	VYNCOLIT X6952	VYNCOLIT X6320	VYNCOLIT X689
Resin		Phenolic Novolac	Phenolic Novolac	Phenolic Novolac	Phenolic Novolac	Phenolic Novolac
Main reinforcement		Mineral & Glass fibers	Glass beads & fibers	Glass fibers	Glass fibers	Glass beads & fibers
Agency approvals		YES	YES	-	-	-
Applications		Tap discs, valves	Concealed plumbing ele- ments, car- tridge hous- ings, water pump hous- ings	Structural parts, fittings	Water meters & hot water systems	Water pump bushings
Advantages		Excellent me- chanical and electrical prop- erties, good di- mensional sta- bility, heat and chemical re- sistance.	Excellent me- chanical and thermal prop- erties, higher isotropic prop- erties and good dimen- sional stability.	Excellent di- mensional sta- bility and high electrical insu- lation proper- ties. UL94- listed.	Excellent di- mensional sta- bility, especially in media which contain water.	Excellent tribo- logical, me- chanical & thermal prop- erties and lower thermal expansion co- efficient.
Density	g/cm ³	2.06	2.0	1.7	1.85	1.69
Tensile Modulus	GPa	29	24	18	21	14
Tensile strength	MPa	89	135	132	88	104
Flexural modulus	GPa	26	22	17	19	11
Flexural strength	MPa	163	245	255	168	179
Compressive strength	MPa	269	400	300	311	271
Charpy Impact resistance (unnotched)	Kj/m²	9.6	14.5	21	7.7	10.4
Alternative						

Properties determined with injection molded test specimens.



Innovation team

SBHPP can offer support and assistance from initial idea generation, the creation of new innovative concept and further through the many development and validation steps towards industrialization and eventually mass production.

Supporting innovations

SBHPP's broad knowledge and extensive material expertise is helping customers around the world to choose the optimal material and create the best possible designs.

CONCEPT GENERATION

Our team operates in a flexible way to meet innovation objectives and bring new concept to life.

▲ MATERIAL EXPERTISE

Backed by a proud heritage of advanced thermoset knowledge, SBHPP team brings an unrivaled material expertise to the industry.

□ FINITE ELEMENT ANALYSIS

Using computer-aided engineering systems, SBHPP application development center assists customers in FE stresses analysis to design the optimal systems. SBHPP's technical market development center (TMDC) located in Ghent – Belgium Europe offers a broad spectrum of technical services.

FLOW SIMULATION

In parallel with FEA, SBHPP Team provides rheological simulations that enable the optimum mold design to be determined to meet the specifications.

PROTOTYPING

SBHPP Technical Material Development Center (TMDC) offers various possibilities for prototyping at reduced tooling cost and short lead times.

MASS PRODUCTION

SBHPP Industrialization team, as systemprovider, helps customers to setup the complete and optimal processing mass production workshop unit, from raw materials to delivery-logistics.



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NOTE

The data contained in this publication are based on our current knowledge and experience. In view of the many factors that may affect processing and application of our product, these data do not relieve user from carrying out own investigations and tests neither do these data imply any guarantee for certain properties nor the suitability of the product for a specific purpose. Any descriptions, drawings, photographs, data, proportions, weights etc. given herein may change without prior information and does not constitute the agreed contractual quality of the product. It is the responsibility of the recipient of our products to ensure that any proprietary rights and existing laws and legislation are observed. (July 2016)







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