

# Attwater – Range of Laminates

## Glass Based Laminates (SRBG)

For copies of our datasheets please refer to our website [www.attwater.com](http://www.attwater.com)

Bakelaque technical laminates are manufactured to exacting quality standards using modern high pressure laminating techniques, which ensure consistently high quality and performance. Traditionally known for outstanding electrical insulating properties, glass reinforced sheets also have high mechanical strength, high rigidity and excellent chemical resistance. The sheets are relatively lightweight with a density of between 1.8 and 2.0, and can be machined into complex shapes to close tolerances. The thermosetting resins used to manufacture glass reinforced laminates perform well at elevated temperatures and exhibit low coefficients of thermal expansion. Selected resins and specially treated grades of woven glass cloth are employed in the production of these high performance materials. High electrical strength, low moisture absorption, good dimensional stability and excellent mechanical strength are their main attributes.

### Bakelaque B30 Phenolic Glass

Bakelaque B30 phenolic glass laminate is brown in colour and exhibits good electrical insulation properties coupled with high mechanical strength and low water absorption. The product is suitable for general purpose use in a wide range of sectors and applications. When subjected to a flame, the product exhibits low smoke emission and low toxicity. LUL Approved (SE970). B30 is manufactured to comply with type BSEN 60893- 3-4-PFGC201.

### Bakelaque B32 Silicone Glass

Bakelaque B32 Silicone glass laminate is off white in colour and exhibits high temperature stability. The laminate exhibits moderate mechanical strength, high electrical strength and very low moisture absorption as well as low dielectric loss and high insulation resistance. B32 is widely used in many sectors and applications, particularly where temperature resistance is important. These include furnace insulation and components in H.F radar and microwave applications. The laminate is resistant to burning (VO) with minimal smoke emission / toxicity. LUL approved (SE970). B32 is manufactured to comply with type BSEN 60893-3-6-SIGC201 & 202.

### Bakelaque B34 Polyimide Glass

Bakelaque B34 polyimide glass laminate is dark brown in colour. The laminate incorporates a high performance bismaleimide resin system which has excellent high temperature stability. This is a high performance laminate which was originally developed for aerospace applications requiring good dimensional stability, electrical and mechanical strength, chemical resistance and rigidity at elevated temperatures. Polyimide glass laminate is capable of intermittent use at 250°C or higher whilst maintaining a high degree of mechanical strength, and is suitable for use in a wide range of sectors and applications. B34 is manufactured to comply with type BSEN 60893-3-7-PIGC301.

### Bakelaque B36 Epoxy Glass

Bakelaque B36 epoxy glass laminate is greenish-yellow in colour and exhibits high strength and rigidity, coupled with excellent electrical properties. This combination lends itself to many uses ranging from slot wedges in small motors to major components in turbo-alternators and electronic applications. B36 has excellent electrical and mechanical properties, good dimensional stability and machines well. B36 is manufactured to comply with type BSEN 60893-3-2-EPGC203.

### Bakelaque B38 Epoxy Glass

Bakelaque B38 epoxy glass flame retardant laminate which is a pale green/yellow colour. This grade, incorporating a brominated resin system, exhibits self-extinguishing properties (V0) and has excellent electrical characteristics, combined with good mechanical properties at normal ambient temperature. B38 can be machined into intricate parts. Commonly used in a wide range of electromechanical and electronic applications across a wide range of sectors. B38 is manufactured to comply with type BSEN 60893-3-2-EPGC202.

### Bakelaque G10 Epoxy Glass

Bakelaque G10 is a general purpose epoxy glass laminate which is green in colour with excellent all-round electrical and mechanical characteristics. Commonly used in a wide range of electromechanical and electronic applications across a wide range of sectors. A good general purpose material G10 is the most moderately priced of our epoxy glass products. G10 is manufactured to comply with type BSEN 60893-3-2-EPGC201.

### Bakelaque B48 Epoxy Glass

Bakelaque B48 epoxy glass laminate is greenish yellow in colour which is similar to grade B36 but with enhanced mechanical properties at elevated temperatures. Exhibits improved flexural strength at 150°C after heat ageing. Uses include high speed rotating machinery and applications where improved heat distortion characteristics are important. B48 is manufactured to comply with type BSEN 60893-3-2-EPGC203.

## Fabric Based Laminates (SRBF)

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The fabric used in the manufacture of the Attwater range of SRBF laminate is woven from 100% cotton yarn and is of high quality. The weave varies from 40 threads per cm (very fine weave) to 16 threads per cm. The finer weave grades such as B10 and B10S exhibit improved surface finish, good electrical and physical strength and excellent machining characteristics. All grades have better load bearing characteristics than SRBP types and are used in a wide range of mechanical applications. Phenolic Cotton grades are golden brown, which darkens with age to mid brown.

### Bakelaque B10

Very fine weave cotton phenolic laminate with good electrical and mechanical properties. This type can be machined to a fine finish and is suitable for instrument gears and other intricate machined components and used extensively in the aerospace sector. B10 is manufactured to comply with types BSEN 60893-3-4-PFCC305.

### Bakelaque B10S

Fine weave enhanced cotton phenolic laminate with better electrical strength than B10 and low water absorption. This type can also be machined to a very fine finish for the production of precision components. B10S is manufactured to comply with type BSEN 60893-3-4-PFCC204.

### Bakelaque B11

A cost effective cotton phenolic laminate made from a fine weave cotton fabric. B11 exhibits good electrical and mechanical properties and can be machined to a good finish. Consequently it finds widespread use in applications such as the production of fine gears, wedges, terminal boards and mounting blocks, particularly where a finer machined finish to the medium weave grades is needed. Similar to Bakelaque B10 but slightly coarser weave and manufactured to comply with BSEN 60893-3-4- PFCC203

### Bakelaque B12

Medium weave cotton phenolic laminates for general purpose usage and is the most cost effective and widely used of the SRBF product range. B12 can be easily machined and finds widespread use in applications such as the production of gears, bearings, rubbing strips, packing and mounting blocks etc. The product is widely used in low voltage electrical insulation applications. B12 is lightweight and relatively easy to machine. B12 is manufactured to comply with type BSEN 60893-3-4-PFCC203.

### Bakelaque B12 F2

This imported material is offered as a low cost alternative to the commercial grade B12. The grade is available in a wide range of thicknesses and is also available to order in a larger sheet size of 2440 x 1220.

### Bakelaque B12S

Medium weave enhanced cotton phenolic laminate with improved mechanical and electrical properties. Suitable for packing blocks in large rotating machines, water lubricated bearings and pump rotor vanes. B12S is manufactured to comply with type BSEN60893-3-4-PFCC202.

### Bakelaque B42

Fine weave scoured cotton epoxy laminate. Light cream / light beige in colour. This laminate can be easily machined to a fine finish. The epoxy cotton exhibits good tracking resistance coupled with high mechanical and electrical strength. B42 is manufactured to comply with type BSEN60893-3-4-EPCC301.

# Phenolic Paper Laminates (SRBP)

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Bakelaque technical laminates are manufactured to exacting quality standards using modern high pressure laminating techniques, which ensure consistently high quality and performance. Traditionally known for outstanding electrical insulating properties, Bakelaque SRBP sheets also have good electrical and mechanical characteristics. The sheets are relatively lightweight and can be readily machined into complex shapes to close tolerances. The thermosetting resins used to manufacture Bakelaque laminates perform well at moderately elevated temperatures and exhibit low coefficients of thermal expansion. Being the most cost effective types, SRBP grades are used widely across many industry sectors to produce low cost mechanical and electromechanical parts.

## Bakelaque B1

This grade was originally produced to meet the requirements of the MOD (Navy DG Ships). It exhibits excellent electrical strength - both in air and immersed in oil - and good mechanical properties, low water absorption and high insulation resistance. B1 is often used in medium voltage applications including switchgear, terminal panels and busbar supports. B1 is manufactured to comply with type BSEN 60893-3-4-PFCP206.

## Bakelaque B3

This grade was originally designed for oil immersed and medium voltage applications but also finds extensive use in a wide range of electrical and mechanical applications. This type exhibits better oil absorption than grade B1 and good electrical and mechanical properties. B3 is manufactured to comply with type BSEN 60893-3-4-PFCP202.

## Bakelaque B4

This grade is a high quality commercial type designed for normal temperature and low voltage electromechanical and mechanical applications. B4 is used in a myriad of applications including the production of flash barriers, secondary insulation in switchgear, jigs, fixtures and mechanical components. This laminate may be hot punched and a solid black (B4B) version is also available. B4 is manufactured to comply with type BSEN 60893-3-4-PFCP201.

## Bakelaque B4PQ

This grade is designed to permit cold / warm punching and is produced in thicknesses up to 3mm. B4PQ is widely used for punching small components such as fluorescent lamp cap insulators, terminal strips, coil formers and washers. B4PQ is manufactured to comply with type BSEN 60893-3-4-PFCP207 and also meets type PFCP201.

## Bakelaque B5

This imported material is offered as a low cost alternative to the commercial grade B4, where cosmetic appearance is less critical. The grade is available in a wide range of thicknesses and is also available to order in a larger sheet size of 2440 x 1220. This material is supplied in the "natural brown" colour but is also available in black (B5B).