



Vitrulan
Textile Glass



TECHNICAL INFORMATION

TESTING AND CERTIFICATIONS | PRODUCTS AND APPLICATION
TECHNICAL PARAMETERS | RESPONSIBILITY AND EXPERTISE

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INTRODUCTION

Over the years, the number of certificates, quality seals, and statutory tests has continued to grow, and with it the bewildering array of information that buyers have to contend with.

Since this affects almost every area of our daily lives, we have decided to shed a little light in the darkness – for our products at least.

So, on the following pages we would like to give customers, painters and decorators, and all other interested individuals a clear and comprehensible overview of the world of Vitrulan wall coverings.

We will demystify the terms and icons used on our labels and explain their purpose. We will also take a closer look at glass fiber wall coverings in general and Vitrulan in particular.

However, we will not focus on individual products in this brochure. If you want detailed information about specific products or product characteristics, please refer to our product brochures or website. Alternatively, just get in touch!

We have greatly simplified the various topics in order to explain complex issues. Thus, we accept no liability for the information in this brochure, which is not intended to be exhaustive. The contents of this brochure are no substitute for seeking expert advice in specific cases.

THE VITRULAN PRODUCT WORLD

In 1931, we produced the first wall covering made from fine glass weave – marking the birth of the glass fiber wall covering! Since then, we have worked tirelessly to optimize, refine, and perfect these versatile wall coverings.

So, what makes glass fiber wall coverings so special and how do they differ from conventional paper or vinyl wall coverings?

Glass fiber wall coverings – especially glass fabric – are extremely hard-wearing and resistant to knocks and abrasion. They reinforce walls, cover cracks, and prevent new cracks forming.

Manufactured from glass – a natural raw material – virtually all our wall coverings are OEKO-TEX-certified and completely non-hazardous to health. Sustainable interior design and premium product quality are hallmarks of all our textile glass wall coverings.

In addition to the many technical benefits, glass fiber wall coverings provide almost limitless scope for creativity when it comes to interior design: from perfectly smooth glass fleece to a wide selection of classical woven textures or opulent large-format motifs, we have the perfect wall covering for all tastes and any style of room.

TECHNICAL BENEFITS



Reaction to fire
B-s1, d0 / A2-s1, d0



Resistant to disinfectants
and cleaning agents



Wall reinforcing
and crack bridging



Non-toxic
and food-safe



Impact and
perforation resistant



Water vapor
permeable



Abrasion and
scrub resistant



Suitable for allergy
sufferers

The characteristics listed here apply to most of our product range and depend on the coating.

SYSTEXX

by Vitrulan

SYSTEXX is the name of our textile glass coverings for walls and ceilings, most of which feature Aqua Technology for highly efficient application. This means the adhesive has already been applied to the back of the fabric and is activated just by adding water. But that's not all: the SYSTEXX range offers a multitude of innovative special solutions for walls and ceilings.

With their combination of aesthetics and functionality, our SYSTEXX products are suitable for an exceptionally wide range of applications. These sophisticated glass wall and ceiling coverings encapsulate innovation and design diversity: any number of looks can be created by combining different textures and finishing options.

THE SYSTEXX PRODUCT RANGE

SYSTEXX Active

SYSTEXX Active wall coverings have special finishes and coatings which provide additional functional benefits. The products range from renovation fabrics, magnetic fabrics and glass fleece to a class A2-rated fire protection solution, a glass fabric that helps clean the air, and the customizable Logo fabric.

SYSTEXX Phantasy

SYSTEXX Phantasy takes you on a journey of imagination deep into the jungle or across vast desert plains. Opulent designs and stunning, large-format patterns turn entire rooms or feature walls into the focal point of any apartment, office or hotel room. Live up your walls and let your imagination run free.

SYSTEXX Pure

SYSTEXX Pure offers boundless scope for creativity. Straight lines, well-defined textures and perfectly smooth surfaces create a calm setting and deliberately enhance the purist look of your walls. In addition, this pared down look also provides the ideal basis for sophisticated stucco techniques or color combinations.



TESTING AND CERTIFICATIONS



CE MARKING

What is a CE marking?

What tests are conducted for the CE marking?

What is a declaration of performance?

First, we would like to dispel a widespread myth: the CE marking is not a quality seal like the GS safety mark or the Blue Angel ecolabel. Unlike quality seals, which are awarded by independent certification bodies, the CE marking is a manufacturer's declaration based on the EU Construction Products Regulation.

In simple terms, by affixing a CE marking to a product, a manufacturer declares that this product meets the requirements of the applicable European standard.

It sounds straightforward enough, but it's not always that easy for the manufacturer to put into practice.

They must establish whether a product is required to carry a CE marking in the first place. If a product is not covered by one of the European harmonized standards which require the CE marking, then the product must not be labeled. In addition, they must define which of the various testing systems applies to their product. Merely explaining the different testing systems would go beyond the scope of this brochure, so we will not address this topic in any more detail.

Most of our products come under standard DIN EN 15102 'Decorative wallcoverings'. This standard specifies a wide range of tests, e.g.:

- | Assessment of fire performance
- | Release and emissions of formaldehyde
- | Migration of heavy metals and specific elements
- | Release of vinyl chloride monomers
- | Sound absorption
- | Thermal resistance

Our products are tested by accredited testing institutes and we issue a 'declaration of performance' to confirm compliance with the requirements. You can find these declarations of performance on our website.

Several of our products are inspected annually by an independent testing institute and our factory is audited to verify that we meet the requirements for CE marking.



VOC

VOCs – VOLATILE ORGANIC COMPOUNDS

VOCs emitted from construction products which then contaminate indoor air are an increasingly critical issue, especially in Europe.

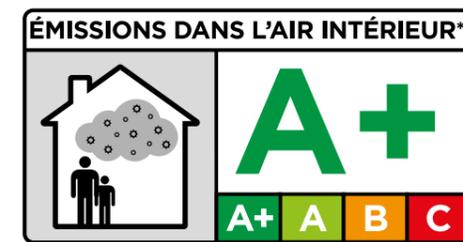
The acronym VOC covers a range of solvents and other organic chemical substances –

including irritants and odorants such as butyl acetate, styrene and hexanal, and the sensitizing substance 3-Carene, which can escape from a wide variety of materials and contaminate the room air.

VOCs can be released not only by paints and vanishes, but by cleaning agents, adhesives, plaster, bitumen paints, and plastic coatings as well. Even cleaning products used in buildings and other solvent-based preparations can be a source of VOCs. Emissions from commercial operations such as paint shops, print shops, or metal-working factories also contribute to increased indoor concentrations of VOCs.

Vitrulan products meet the required limits and therefore have very low emissions.

This symbol appears on our labels:



OEKO-TEX

What does this certificate mean?

Which materials are tested?

What are the different classes?

The **OEKO-TEX Standard 100** is a globally standardized testing and certification system for textile raw materials, intermediaries, and end products at all stages of processing. It certifies that every component of an article is free from harmful substances. Harmful substance tests cover prohibited and regulated substances, chemicals that are harmful to health, and health care parameters.

The tests are conducted only by authorized, independent textile research and testing institutes with the necessary expertise.

Tests are based on the OEKO-TEX modular system: any stage of the textile value-added chain can be certified. A successful test entitles the respective textiles to bear the OEKO-TEX label.

The OEKO-TEX test methodology is based on simulation tests which take account of the possible pathways by which chemicals may enter the body:

- | Absorption via the skin
- | Oral ingestion
- | Inhalation of harmful substances

To ensure that the textiles are harmless to health, the OEKO-TEX testing community works with an extensive list of certification criteria. This list contains over 100 test parameters and is binding for all authorized OEKO-TEX testing institutes.

To be categorized in the OEKO-TEX product classes, the product being certified may be tested for the following characteristics/constituents*:

- | pH value
- | Formaldehyde
- | Extractable heavy metals
- | Sample digestion of heavy metals
- | Pesticides
- | Chlorinated phenols
- | Phthalates
- | Organotin compounds
- | Other residual chemicals
- | Dyes
- | Chlorinated benzenes and toluenes
- | Polycyclic aromatic hydrocarbons (PAHs)
- | Biologically active products (do not occur in Product Class 1)
- | Flame-retardant products
- | Color fastness (fading) (e.g. saliva and sweat)

- | Emission of volatile components
- | Odor test (no unusual odor is detected for Product Class 1)
- | Prohibited fibers (e.g. asbestos)

Tests for harmful substances to OEKO-TEX Standard 100 are always geared to the intended use of the textile. The following principle applies: the closer contact the textile has with the skin (and the more sensitive the skin), the stricter the human-ecological requirements.

OVERVIEW OF PRODUCT CLASSES

Product Class I

Textiles and fabric toys for babies and young children up to the age of three, e.g. underwear, romper suits, bed linen, soft toys etc.

Most of our glass fabric wall coverings comply with the requirements for OEKO-TEX Product Class I.

Product Class II

Textiles which, when used as intended, come into direct contact with the skin to a large extent, e.g. underwear, bed linen, towels and washcloths, shirts, blouses etc.

Product Class III

Textiles which, when used as intended, have no or only minimal contact with the skin, e.g. jackets, coats, outer layers etc.

Product Class IV

Household textiles for decorative purposes such as table linen and curtains as well as textile wall and floor coverings etc.

The OEKO-TEX certificate documents that the articles listed on it have been successfully tested to OEKO-TEX Standard 100 and meet the requirements of a common product class.



**Please note that the criteria and limits sometimes change so this brochure may not necessarily reflect the current situation.*

QUALITY AWARENESS

What's the reasoning behind ISO 9001?

How does it benefit the customer?

What steps are involved to obtain it?

At Vitruvan, we introduced a quality management system in compliance with DIN EN ISO 9001 back in the 1990s to raise quality awareness. Since then, we have continued to refine it as we gain more experience.

WHAT'S THE REASONING BEHIND ISO 9001?

Standard DIN EN ISO 9001 was first published in 1987 and has been revised several times since then. It applies to industry, trade, and services organizations, whether large or small, regardless of their sector. Over one million companies around the world now operate according to this standard.

HOW DOES IT BENEFIT THE CUSTOMER?

The customer and customer satisfaction are the primary focus of DIN EN ISO 9001. We maintain this strong customer focus by using regulated processes for developing products and by ensuring systematic, ongoing quality assurance. We also apply standards to order processing, customer service, and customer complaints.

WHAT STEPS DOES IT INVOLVE?

All relevant processes are laid down in our quality management system. To make these transparent and to ensure consistent working practices, the processes and the responsibility for each process step are described and visually mapped. This enables us to respond nimbly to market requirements and opportunities that present themselves and adapt our processes accordingly.

HOW IS COMPLIANCE WITH THE STANDARD MONITORED?

Independent certification bodies such as TÜV, Dekra, and DQS verify that the provisions of the standard are implemented within the company. To this end, this company is inspected annually by approved auditors who verify that the quality management system complies with requirements and continues to evolve. The certificate is issued for a three-year period.





PRODUCTS AND APPLICATION



THE PRODUCT

■ How are textile glass fibers manufactured?

The basic components of a glass batch are silica sand, limestone, kaolin, and boric acid. These components are fused at approx. 1250°C. The molten glass flows by gravity through the nozzles of a bushing plate made of platinum alloy to form filaments. A surface coating called a 'size' is applied to the individual filaments before they are gathered into a strand. The size largely determines the processing characteristics of the glass fiber material.

We use silica sand to manufacture glass, which is of no interest to the construction industry. This means that we don't exacerbate the shortage of now valuable building sand, which is needed to produce concrete, for example.

GLASS FABRIC

Vitrulan wall and ceiling coverings consist of glass yarns which are woven in the same way as conventional textiles. Because they are made from glass, they are highly resistant. Natural materials such as sand ensure that these products are eco-friendly and comply with requirements for sustainability in the construction industry.

They are mainly used in areas of heavy wear and tear and can help prevent crack formation.

Technical production

Glass fabric is produced by interweaving textile glass yarns. In simple terms, a glass fabric consists of a warp and a weft thread which are woven together using different weaving techniques. The plain weave is one of the basic patterns.

The warp

The warp is the thread that runs lengthwise through the fabric. It is wound onto a warp beam which is attached directly to the loom in the weaving shop.

The weft

The weft is the transverse thread which is woven in and out of the warp. This is done on a 'rapier' or 'air jet' loom (weft insertion method).

GLASS FLEECE

A glass fleece consists of several tiny glass threads (filaments) which are placed on a forming cloth and then compressed – similar to paper production. Since this process does not involve the interweaving of continuous threads, the tear strength of glass fleece is lower than that of a glass fabric. These nonwoven fabrics produce wall coverings which have a virtually seamless, uniform appearance.

Glass fleeces are mainly used to conceal hairline cracks and prevent hairline cracks developing on newly applied smooth plaster finishes. Glass fleece has several other advantages compared with cellulose fleece: it doesn't shrink or stretch, is easy to cut, produces perfect seams, creates the ideal substrate for decorative coatings, and can be repainted time and again.

WEAVING TECHNIQUES AND FINISHES

Weaving is one of humankind's oldest accomplishments, dating back some 32,000 years. So, you might think it wouldn't pose too great a challenge. However, glass weaving is a job for specialists. After all, glass – even when woven – is still glass, so it takes a great deal of experience and a special knack to process this unique raw material.

Shaft loom

This technique uses shafts to control groups of warp threads. The prescribed pattern defines how many and which threads are grouped on each shaft and thus moved up and down together. Simple patterns or striped fabric can be produced with the shaft loom.

Jacquard loom

With Jacquard looms, each individual warp thread can be digitally controlled. This means that virtually any design and pattern can be created to suit customer requirements, e.g. fabric with a customized company logo. Jacquard fabrics have a denser, higher thread count than standard fabrics.

Once woven, the unprocessed fabric is soft like cloth. A finish has to be applied to give the fabric special characteristics and inherent strength.

FINISHES

A finish is a treatment that completely coats the textile fabric. The finish is normally applied using a special technique in which both sides of the unprocessed fabric are impregnated and then dried.

The finish determines essential product characteristics such as stability, warp thread bonding, cutting capability, flexibility, feel, and surface roughness. But finishes can also confer other product characteristics; for example, the reaction to fire rating or the ability to absorb formaldehyde. Basically, the finish primes the surface optimally for subsequent application and painting.

Special pigmented finish

The finish for our pre-pigmented glass fabrics and fleeces contains high quality white pigments. The advantage of this special finish is that in most cases only one coat of white or pastel-colored paint needs to be applied to the fabric to achieve an eggshell sheen. This significantly reduces labor and material costs.

AQUA TECHNOLOGY

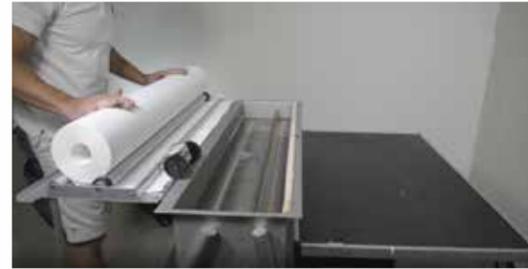
Applying the postage stamp principle to wall coverings.

Aqua Technology was introduced by Vitrulan in 2001. It consists of a uniform layer of adhesive pre-applied to the back of the wall covering in the factory and activated by water. The adhesive complies with the same requirements as conventional dispersion adhesives but with one particular advantage – since the wall covering is pre-pasted with just the right amount of adhesive, there is no danger of missing areas or applying too much.

To activate the adhesive coating, the wall covering is drawn through a water bath, loosely folded (approx. 1 m long folds) and cut to the desired length. After an activation time of 1 to 3 minutes*, the lengths are ready to hang.

The application characteristics and pre-pasted adhesive make Aqua Technology an extremely economical product:

- | No need to purchase, transport, and store adhesive
- | Always the right amount of adhesive: no excess, no missed areas
- | No more time-consuming tool cleaning
- | Less physical effort, easier handling
- | Saves time, improves m² coverage and thus increases efficiency
- | Perfect results



**Recommendation: no more than 1 – 2 sheets should be activated at a time to ensure that the folds can easily be opened. The minimum activation time is one minute for wall applications and three minutes for ceiling applications.*

DEFECT MARKING

Anyone can make a mistake – and we reimburse every single one.

DEFECTS IN THE FABRIC

Our products are made from natural raw materials and have a dynamic vibrancy due to the alignment of the glass fibers and the weaving process.

Slight differences in thickness within the individual thread systems are typical of glass fabric and do not constitute grounds for complaint when evenly distributed. In fact, these differences emphasize the textile nature of the products.

We define defects in the fabric as localized defects or stretched-out defects according to their characteristics.

STRETCHED-OUT DEFECTS

Stretched-out defects have a running length of more than 1 meter.

LOCALIZED DEFECTS

Any defect under 1 meter in length is classed as localized defect. It doesn't matter whether the defect occurs in the longitudinal or transverse direction, or across the full width of the fabric or only in certain areas.

Localized defects are indicated by red adhesive tape or a white label with black horizontal stripes affixed to the edge of the fabric. We assess defects based on the results of practical application tests which have been part of the quality control system at Vitrulan for several years.

The customer receives a 0.5 meter refund for each localized defect. Stretched-out defects are cut out of the fabric during the final goods inspection. The join in the cut fabric roll is indicated by the same

defect mark that we use for localized defects. In this case too, the customer receives a 0.5 meter refund. No more than one join is permitted per roll. The permitted number of localized defects depends on the product and the roll length.

SERIAL NUMBERS

We make every effort to continuously develop and improve our products for the benefit of our customers. We always issue a new serial number to indicate modifications to a product that is already on the market.

Glass fabrics with different serial numbers should under no circumstances be combined. We generally reject claims arising from the combined use of different serial numbers.



SUBSTRATE PREPARATION

A well-prepared substrate has a major impact on the quality of finish obtained on a wall to which glass fabric and paint is subsequently applied. The aim is to ensure that the finished surface is free from visual as well as technical defects. To achieve this, the wall substrate should be inspected visually and manually:

1) Are there any surface irregularities?

Note: the higher the level of gloss in the finish, the more the surface irregularities stand out due to the enhanced effects of light and shade.

So, as a precaution, in poor light conditions we recommend using a spotlight to simulate the effect of light rays.

The finer the texture, the more surface irregularities stand out and so the smoother the substrate must be.

2) Wipe test (by hand)

Is the substrate sandy, dusty, or damp?

Are there any release agents such as oils, waxes, greases, flaking paint, or sandy plaster on the substrate?

3) Absorbency

Does the substrate have high or low absorbency, or has it already been sealed?

4) Scratch test

Is the existing coating sound or is the plaster flaking in some areas? Use a cross-hatch adhesion test to check the adhesion of the existing coating.

5) Unsuitable substrates which adversely affect the texture include:

Surface irregularities of all kinds

Unsanded plaster (plaster must be sanded, brushed down, and primed)

Various textured plasters (peaks must be removed, several coats of leveling plaster may be required before priming)

Poorly filled joints (must be refilled as required)

Highly absorbent substrates (must be primed)

6) Unstable substrates include:

Dust and dirt

Greases, oils, waxes, and soot

Poorly bonded existing coatings (loose or unstable wall coverings and paint must be completely removed).

All substrate preparations are described in detail in our technical datasheets. However, since we cannot cover every problem that may occur in practice, we advise you to refer to the relevant national building regulations as well.

Note: for optimum results, we recommend preparing a patch test first.

Substrate preparation – a few examples

Exposed concrete

1. Deburr roughly
2. Level with filler
3. Sand and prime

Poured concrete, filigree concrete

1. Clean (deburr if necessary)
2. Fill the joints with a levelling compound to achieve a smooth surface finish
3. Skim the entire surface and smooth off
4. Sand and prime

Sandy plaster

1. Remove loose plaster
2. Stabilize the plaster / apply a primer
3. Fill, level and smooth off, if necessary, then prime
4. Sand and prime

Highly textured plaster

1. Clean and deburr
2. Skim the entire surface and smooth off
3. Sand and prime

Highly absorbent plaster (e.g. gypsum plaster)

1. If necessary, skim the entire surface and smooth off
2. Sand and prime

Normally absorbent plaster

1. Sand off any sinter skin and fill with a levelling compound
2. Sand and prime

Lining paper, size, or sealer

1. Dampen the lining paper, size, or sealer to loosen it
2. Scrape off
3. If necessary, skim the entire surface and smooth off
4. Sand and prime

Peelable or dry-strippable wallpapers

1. Completely remove the wallpaper
2. If necessary, skim the entire surface and smooth off
3. Sand and prime

Wallpaper residue (e.g. cellulose)

1. Remove all trace of wallpaper and paste residues
2. If necessary, skim the entire surface and smooth off or make good damaged areas
3. Sand and prime

Flaking old paint

1. Completely remove any unstable, flaking paint (manually or by machine)
2. Apply an intermediate primer if necessary
3. If necessary, skim the entire surface and smooth off
4. Sand and prime

Distemper

1. Remove completely by scraping/wiping
2. Prime

High-gloss paints

1. Rub down or wash with an alkaline cleaner to remove the glossy sheen
2. Apply adhesion promoter if necessary

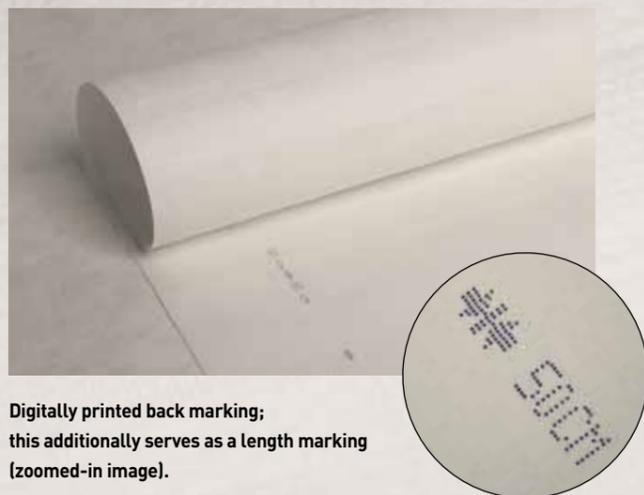
BACK MARKING

The back of the wall covering is marked with grey digitally printed text for convenience and ease of handling.

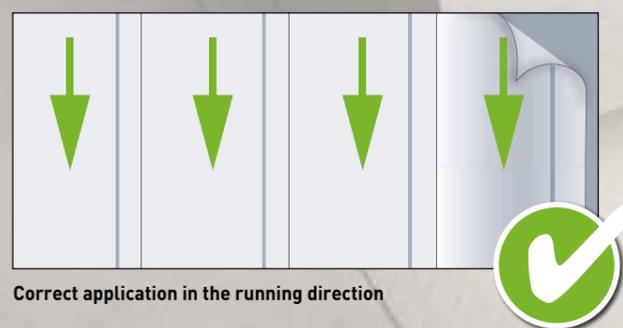
These markings make it easy to distinguish the back of the wall covering from the front. The back marking is always on the pasted side, i.e. the side that faces the wall. This prevents the lengths from being inadvertently hung back to front.

The markings also serve another purpose; the printed arrows are spaced at 50 cm intervals along the roll, which makes it easier to cut individual sheets to length.

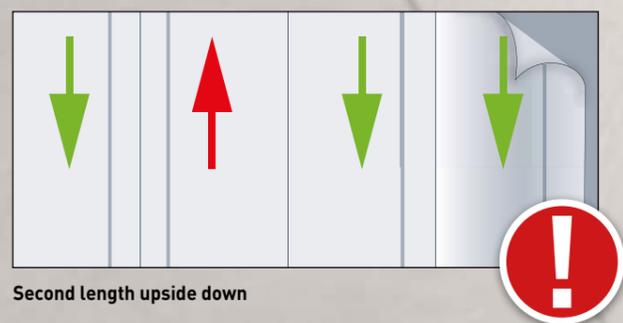
They can also prevent the lengths of wall covering from **being hung upside down**. Since glass fabric is a woven product, it has a running direction which must be adhered to during application. In other words, the lengths must always be applied in the same direction – if a length is hung upside down, its textual appearance will differ from that of other lengths, depending on how the light falls. To avoid hanging lengths upside down, simply make sure that the back markings on the different lengths are always on the same side, i.e. always on the right or the left.



Digitally printed back marking; this additionally serves as a length marking (zoomed-in image).



Correct application in the running direction



Second length upside down

PATTERN REPEAT AND ALIGNMENT GUIDE

PATTERN REPEAT

As the name implies, the term pattern repeat refers to a regularly repeated pattern. Some pattern repeats are very short, while others are very long. Different weaves produce different patterns and therefore different types of pattern repeat.

In principle, all woven fabrics have a 'single-thread' pattern repeat. So the lengths of fabric must be aligned to ensure that the thread path in the weave runs from one length to the next without interruption. The warp thread running lengthways must pass alternately under and over the weft thread in a regular pattern.

If the warp thread passes under or over the weft thread twice in succession, it creates the appearance of a zip fastener.

In addition to the continuous 'single-thread' pattern repeat, which also applies to wall coverings with an alignment guide (see below), the following types of pattern repeat occur in our glass fabrics:

Seamless pattern repeat



No matching is required when applying wall coverings with a seamless pattern repeat. Provided that the single-thread pattern repeat is aligned, the lengths can be freely hung adjacent to one another.

Straight match

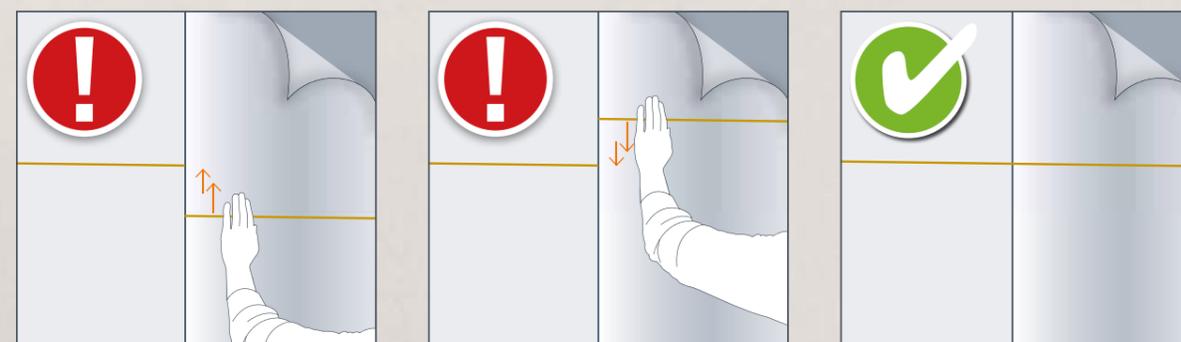


In wall coverings with a straight match, the pattern on individual lengths must be at the same height, i.e. the same pattern must appear at the same height on adjacent lengths. The pattern repeat boundaries (start and end of a pattern or design) must be at the same height, allowing for the single-thread pattern repeat.

ALIGNMENT GUIDE

We weave an alignment guide into wall coverings with large-format repeated patterns to make it easier to align them: a yellow thread which is visible on both sides of the covering.

When applying each consecutive length, simply make sure that the yellow thread is perfectly aligned with the yellow thread in the previous length. This ensures that the design is shown off to its full effect.





TECHNICAL PARAMETERS



FIRE PROTECTION

What are the different classes?

How are they tested?

What do the abbreviations mean?

When it comes to fire protection and fire rating classifications, time and again we find that there is a great deal of uncertainty among processors. This is neither surprising nor shameful when you consider the number of different regulations and wealth of terminology used in this field.

First of all, we need to consider what fire protection really means: PROTECTION. Protection of our property – but far more importantly, protection of our own lives and the lives of others.

Fire protection measures come to our defense when there is a fire. In this case, for example, the fire service intervenes to extinguish the fire as quickly as possible, prevent it spreading to other buildings, and also to minimize fire damage.

But fire protection also has a part to play in advance of any fire. For example, through the construction method, or by reducing flammable materials in buildings. And this is where we come in, as manufacturers of glass fiber wall coverings. We can contribute to preventative fire protection because our products are rated in reaction to

fire class B-s1, d0. But what does that mean? The term 'fire rating' is often used colloquially to refer to the 'building material class'.

To ensure that fire protection was not left to the goodwill of manufacturers and builders, individual countries around the world introduced national regulations and standards which stipulate the performance of fire tests, thereby making them comparable and reproducible.

In 2001, the European standard series EN 13501 was introduced to create a uniform reaction to fire classification procedure for European construction products. This meant that member states had to adapt their existing national building regulations to this new European classification system – which defined EN 13501 Euroclasses and associated European fire tests.

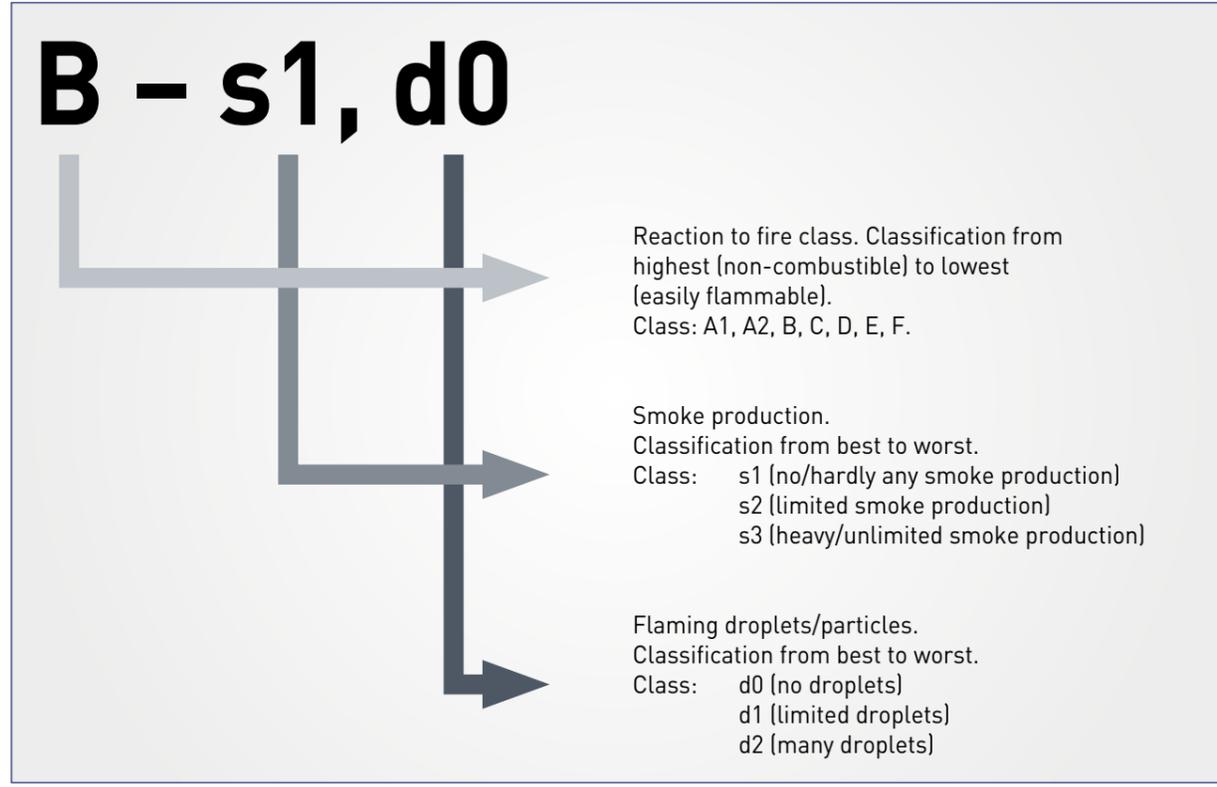
This has already been done for all construction products for which a European product standard exists. However, areas where no European product standard has yet been introduced are still governed by the old national standards. European product standard EN 15102 has applied to wall coverings produced by the Vitrulan Group since 2011, which means that all Vitrulan wall coverings are tested and classified in accordance with the European fire testing procedure.



Glass fabric in the fire test



Glass fabric in the fire test



Caption (diagram): The diagram above explains the meaning of the numbers and letters in the reaction to fire class.

Most Vitrulan products were rated in **reaction to fire class B-s1, d0**, which means:

- | they are flame-retardant,
- | they make very limited contribution to the fire,
- | they produce little or no smoke,
- | they produce no flaming droplets.

Our SYSTEXX Active FireProtect wall covering system even has a **Class A2 rating**, which means that it is non-combustible.

If you take a piece of glass fiber fabric and light it, don't be disappointed if it burns. The reason for this is that our glass fiber wall coverings are tested as a finished construction product under installation conditions, not as a material. In our case this means that the glass fiber wall covering is bonded to plasterboard and ignited in the bonded state. Consequently, the surface which is in contact with atmospheric oxygen is only half that of a wall covering suspended in the air, which has a significant impact on its reaction to fire.



WATER VAPOR PERMEABILITY

What does the s_d -value tell us?

Why is it important?

How is it measured?

The s_d -value (diffusion-equivalent air layer thickness) of a material is a measure of its resistance to vapor diffusion. It is a theoretical value which indicates how thick a stagnant air layer must be to have the same resistance as the material itself.

The lower the value, the less the water vapor is slowed down as it passes from the warm to the cold side, and thus the more breathable the material.

The diffusion-equivalent air layer thickness is obtained by multiplying the water vapor diffusion resistance value (μ) by the layer thickness in meters.

Almost all Vitruvan products have an s_d -value ≤ 0.14 m. This value certifies that our products have extremely good water vapor permeability.

Here is a comparison to put our values in perspective: the vinyl wall covering we tested achieved values of less than 2.3 m!

An s_d -value above 1500 m constitutes a vapor barrier.

Water vapor permeability is measured in accordance with DIN EN ISO 12572 by filling a bowl with dried absorbent, sealing the bowl with the glass fiber wall covering and exposing it to defined climatic conditions. Moisture from the 'moist' environment then diffuses through the wall covering to the dry inside of the bowl where it is absorbed by the absorbent. The bowl is then weighed at regular intervals to determine the resulting increase in weight over a specific time and the s_d -value is calculated from this result.



RESPIRABILITY

How toxic, carcinogenic or respirable is glass fabric?

Many people believe the glass fabrics release fine, respirable and therefore harmful glass fibers. This misconception is based on experiences with mineral insulating materials, some of which do indeed release respirable fibers.

In contrast, the fibers used in our glass fiber wall coverings are respirable neither during the spinning and weaving process nor during subsequent application.

Glass fibers have been thoroughly investigated in several studies (e.g. by German Employers' Liability Insurance Associations, the European Glass Fiber Producers' Association (APFE) and the WHO). The studies conclude that mineral fibers with a length-to-diameter ratio of at least

3:1, a length greater than 5 µm, and a diameter smaller than 3 µm are to be classified as respirable. **However, the evidence clearly showed that 'textile' glass fibers – and these are the only fibers used in the production of our glass fabrics – were non-respirable due to their length and diameter.** The diameter of these fibers is invariably above 7 µm – significantly more than the established limit.

Furthermore, downstream processing does not reduce the diameter of the fibers. Compared with mineral fibers, glass fibers are oriented transverse to the longitudinal axis, i.e. they do not split. As a result, the fibers are non-respirable even during processing.

The studies concluded that textile glass fibers which satisfy the defined length-diameter criteria can be classified as non-hazardous to health and non-carcinogenic.

THERMAL CONDUCTIVITY

What do thermal resistance and thermal conductivity tell us?

How are they measured?

Why are they important?

When combined with other materials, glass fiber wall coverings can also have a positive impact on the thermal insulation of a room. We can measure this impact using the thermal conductivity and thermal resistance values.

Thermal conductivity λ is the ability of a component to transport thermal energy. The rate at which thermal energy is transferred when a temperature difference is present determines the thermal conductivity. The smaller the value the better. Thermal conductivity tells us nothing about the thickness of the product.

Thermal resistance R ($R = d / \lambda$) is calculated from the thermal conductivity and the thickness of the material and

thus describes the **insulating effect** of the construction product. The greater the thermal resistance, the better the insulating effect.

The widely used **U-value** is the reciprocal of the R-value (thermal resistance) and thus expresses the rate of transmission heat loss.

The SYSTEXX Active AcousTherm wall covering developed by Vitruvan is designed to help save energy. Its thermal conductivity at a mean temperature of 10 °C is $\lambda(10) = 0.040$ [W/(m*K)], which is equivalent to that of mineral wool. As a result, a comfortable room temperature is reached more rapidly, which corresponds to a relative saving of 2 degrees.

ACOUSTICS

What is building acoustics? What is room acoustics? And how can wall coverings affect acoustics?

When discussing this topic, it's helpful to understand the difference between building and room acoustics.

Building acoustics = sound insulation

- Building acoustics is concerned with sound propagation from one room to another, or between inside and outside. The only way to reduce noise disturbance from neighbors is to make structural modifications to the building.
- Building acoustics is measured in decibels (dB) and is heavily dependent on frequency.

Room acoustics = sound absorption

- Room acoustics describes sound propagation within a room.
- Room acoustics is measured using alpha values (heavily dependent on frequency) and is expressed as a sound absorption coefficient on a scale of 1 to 0.

Poor room acoustics can cause various problems:

- The room reverberates, and speech can be difficult to understand or even unintelligible.
- Poor audibility leads to reduced concentration.
- Inferior direct sound impairs the understanding of words and sentences, may disrupt concentration and create background noise. When several people talk at once their voices merge together, making it harder to understand what is being said. This prompts each speaker to raise their voice, causing the overall noise level in the room to creep up further.
- A badly designed room with poor room acoustics encourages a permanently high sound level and can have both psychological and physical effects, such as hearing loss.

What impact do building products have on acoustics?

Acoustic products optimize room acoustics and reduce reverberation time. Positioning is important. The speaker's voice can even be enhanced by reflection and absorption.

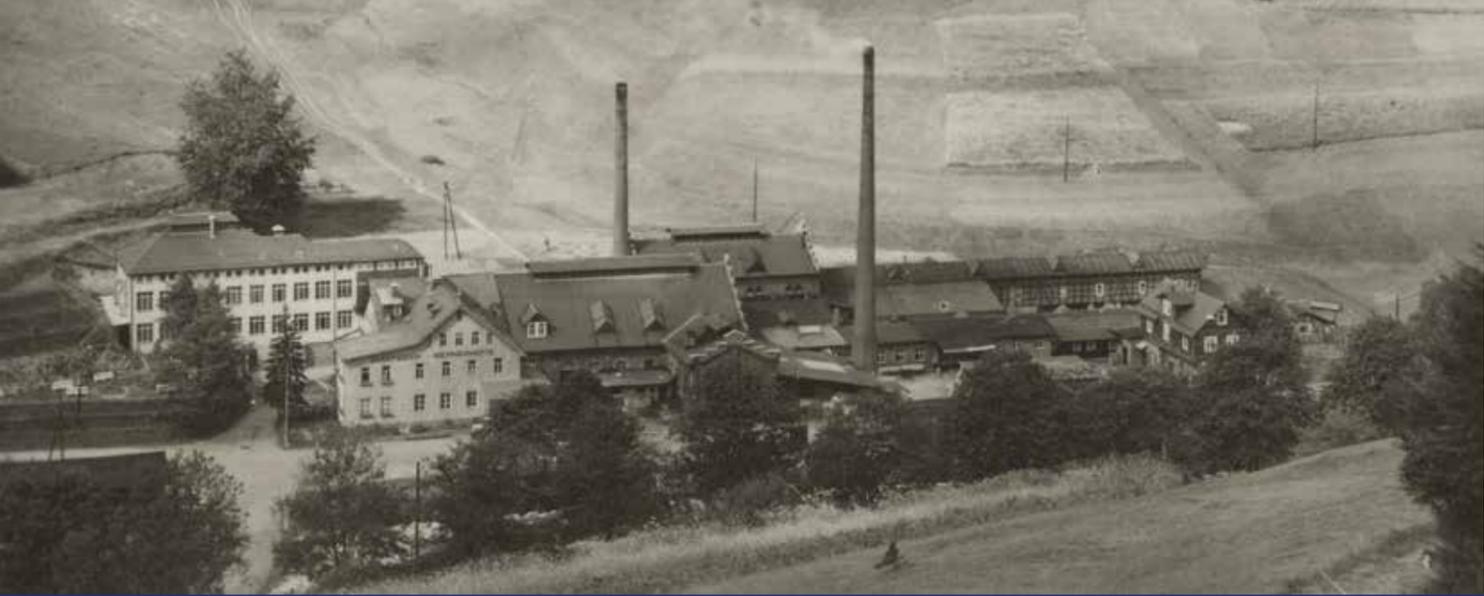
The type of room acoustics required depends on the intended use of the room.

The reverberation time is the time taken for an audible sound event to become inaudible. You can find more information about the reverberation time in DIN 18041. Sound absorption is described by the sound absorption coefficient α .

All acoustic products and building products with acoustic properties are given a weighted sound absorption rating expressed as α_w .

All surfaces essentially have acoustic properties: smooth, hard surfaces reflect 100% of sound, so $\alpha_w = 0$. In contrast, a thick textile cushion is highly sound-absorbing, so in this case $\alpha_w = 1$.

Despite being just 3.0 mm thick, sound-absorbing SYSTEXX Active AcousTherm achieves an α_w value of 0.25 (H) in accordance with DIN EN ISO 354, which puts it in sound absorption class E. It noticeably reduces reverberation, thereby improving room acoustics.



RESPONSIBILITY AND EXPERTISE



MADE IN GERMANY

**Good ideas flourish
best in the countryside**

Some of the greatest developments started life in old garages or abandoned kiosks before achieving worldwide fame. Behind the Vitrulan name lies a company steeped in tradition, founded in 1921 and whose roots go back as far as 1896.

Vitrulan glass fiber wall coverings = Made in Germany.

The extent to which the success of Vitrulan wall coverings can be attributed to the fresh, pure air of the idyllic Bavarian town of Marktschorgast or the Thuringian Forest is a moot point, but it has certainly played a part – and still does. With around 250 employees at the two factories in Germany that produce glass fiber wall coverings, at Vitrulan we are large enough to meet the needs of an international customer base, yet sufficiently down-to-earth and approachable to take a personal interest in our customers.

Our level of quality and service, innovative strength, and reliability have achieved worldwide recognition and are reflected in our products.

The production sites for our premium quality glass fiber wall coverings are part of the international Vitrulan Group, whose headquarters and administrative holding company is based in Marktschorgast in Upper Franconia. Apart from glass fiber wall coverings, the group's core products are technical textiles made from glass, synthetic, and carbon fibers, as well as state-of-the-art infrared surface heating systems based on glass fabrics.



HOW IT ALL BEGAN...



In **1896**, the Haselbach Glass Factory was officially registered in Haselbach, now home to Vitrulan Technical Textiles GmbH. The factory started off manufacturing glass tubes and marbles but by 1901 it was also producing pill bottles and test tubes.



In **1931**, we produced the first wall covering made from fine glass weave and in the same year we trademarked the brand name Vitrulan. The name is derived from the Latin vitrum meaning glass and lana meaning wool.



In May **1958**, a new factory was built in Marktschorgast in Upper Franconia. Now the Group's headquarters, it had only three employees when it first opened.



In **2001**, Vitrulan Textile Glass GmbH introduced glass fiber wall coverings with Aqua Technology. This innovation features an adhesive that is already applied to the wall covering and activated just by adding water.



In **2016**, the Munich-based industrial holding company Adcuram Group AG acquired a 90% stake in the Vitrulan Group. The previous majority shareholder Hans Peter Cordts retains a 10% stake in the operating companies Textile Glass and Technical Textiles.



In **2018**, the newly founded V4heat GmbH became a member of the Vitrulan Group. It designs and sells intelligent infrared heating systems.



On 1 January **2020**, Vitrulan Composites Oy was founded in Mikkeli, Finland. This marked Vitrulan's takeover of the glass fiber reinforcement business from Ahlstrom-Munksjö, adding another strong member to the corporate group.



In July **2021**, the Vitrulan Group acquired a production plant for glass fiber wall coverings which previously belonged to the Preiss-Daimler-Group. This new business now trades under the name Vitrulan Glasfaser Brattendorf and further strengthens the glass fiber wall coverings segment.

ENVIRONMENTAL COMPATIBILITY

We take our responsibility for the environmental compatibility of our products very seriously. Compliance with statutory requirements is a given.

CONSERVING RESOURCES

Our products consist mainly of natural raw materials such as silicate and native starch. We are very conscious of the importance of durability. Even at the developmental stage, we lay the foundations for a long product life. In this way, both we and our customers contribute to resource conservation.

REDUCING CO₂ EMISSIONS

At Vitruvan, the careful use of energy is a primary concern that goes hand-in-hand with the aim of reducing the CO₂ emissions arising from our business. To ensure that we approach this in a sustainable manner, in 2014 we introduced a certified energy management system to DIN EN ISO 50 001. This means that we are committed to increasing energy efficiency.

Each year we produce an energy action plan which outlines projects such as switching to LED lighting, replacing control interfaces and equipment, and much more. Our team of energy experts from various departments work closely together to implement the plan and also work with

employees to raise awareness of energy conservation. We in turn benefit from the ideas put forward by our workforce. We use a detailed system of indicators to monitor the attainment of our CO₂ emission reduction targets.

WASTE REDUCTION

We make every effort to ensure that waste materials arising from our production processes are reused. Fabric and fleece residues are collected separately and recycled in other areas of industry where possible. Production wastewater is treated and returned to the cycle. Exchange systems ensure that transport carriers for raw materials, liquid components, and finished goods are reused multiple times. Over 30 different waste fractions are collected and separated to ensure that the best possible use is made of materials.

DISPOSAL

Since glass fabric and fleece are designed to reinforce walls and ceilings, they are bonded to the fabric of the building. This means that they are disposed of as construction waste. Waste arising from installation can generally be disposed of as household waste since – despite persistent rumors to the contrary – glass fiber wall coverings are NOT classed as special waste.

SUSTAINABILITY

Just as the threads of our fabric are tightly interwoven, we are tightly bound to the concept of sustainability.

We define the term sustainability as the use of renewable resources, and above all, as our responsibility to this and future generations. Thus, we endeavor to put the sustainable conservation of global resources at the heart of all business activities and continually seek to use them more efficiently.

Right from the developmental stage, we always aim to produce durable, resource-friendly products under fair and ethical working conditions.

Our products are designed to make walls stronger and more durable. Thus, the use of glass fiber wall coverings significantly extends the intervals between refurbishment. Instead of needing to be repapered every 3 to 5 years, in some cases walls just need occasional repainting to last the lifetime of the house – saving a huge amount of resources.

Our wall coverings with Aqua Technology are particularly sustainable. We pre-apply just the right amount of adhesive to these coverings in the factory, so painters and decorators don't need to buy, store, and transport it.

In the production process too, we are mindful of the need to use resources as efficiently as possible in the widest range of areas:

When selecting raw materials, we ensure that they contain no substances that are harmful to health, as repeatedly confirmed by the OEKO-TEX certification.

We need a lot of sand to manufacture glass and produce our glass yarn – but there is massive global demand for this raw material fueled by the ongoing construction boom, and it is already in short supply. But we can use silica sand instead, which is of no interest to the construction industry – and thus make a small contribution to conserving this scarce, finite resource.

We save water in the production process by collecting and recycling the water used to clean the coating containers.

With heat exchangers, we recover the waste heat from our production plants and use it to heat the buildings. This enables us to significantly reduce our gas and heating oil consumption.

Our robust energy management system, certified to ISO 50001:2018, ensures that we continuously monitor and optimize our energy expenditure.

We are conscious of the fact that it is a privilege to be able to live and operate in the 'first world'. So, we take very seriously our commitment to those who do not have the fortune to live in a wealthy country. To this end, we support welfare projects overseas as well as in our region, such as a well-building project in Africa.

Of course, in the global context, we can make only small contributions as a company, but we are convinced that every step towards greater sustainability counts, no matter how small.



The Vitrulan Group brings together the four companies based in Germany – Vitrulan Textile Glass, Vitrulan Glasfaser Brattendorf, V4heat, and Vitrulan Technical Textiles – and Vitrulan Composites in Mikkeli, Finland.

Wall coverings made of glass fabrics, modern infrared surface heating systems based on glass fabrics, and technical textiles and composites made of glass, synthetic and carbon fibers make up the core products of the Vitrulan Group.

Vitrulan produces extremely robust, hard-wearing, sustainable, and versatile wall coverings. A wide range of traditional and modern designs are complemented by innovative wall coverings with additional functions. Sustainable interior design and premium product quality together are our number one priority.



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