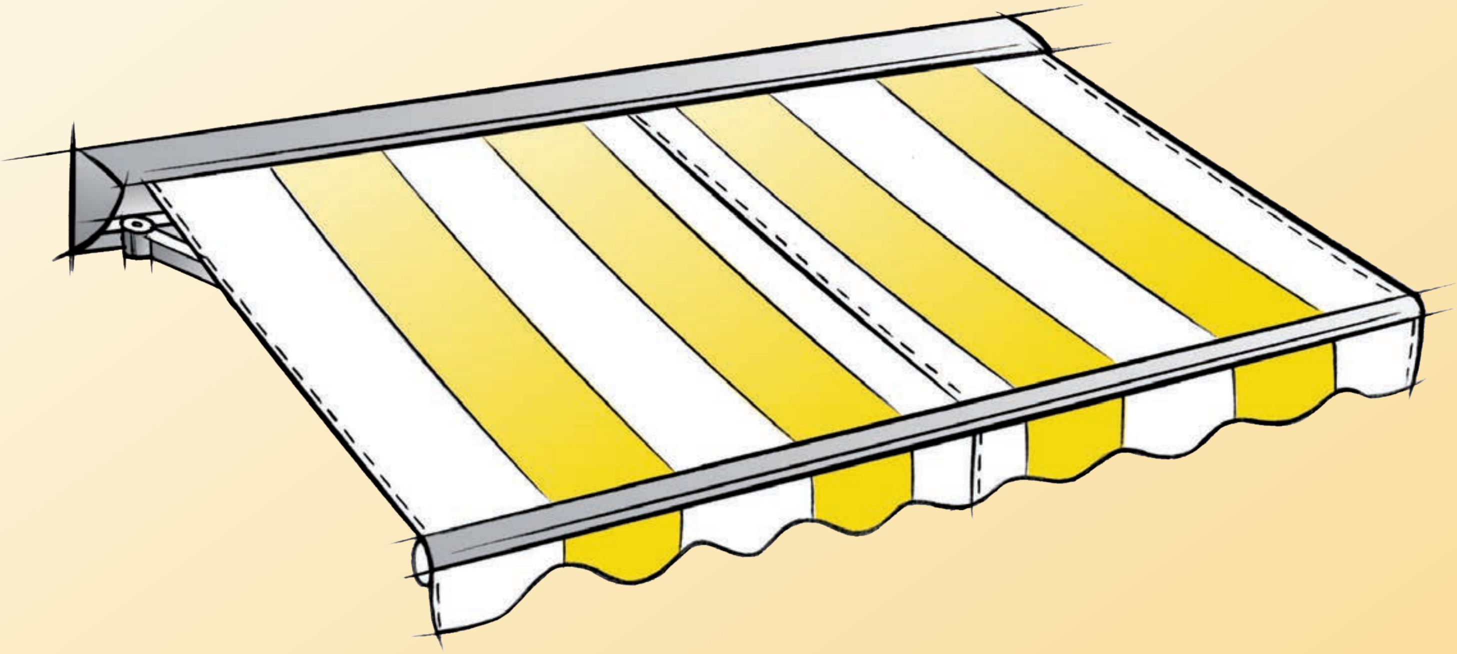
Guideline

for assessment of manufactured awning cloth



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Overview of contents

1. Introduction

This guideline is intended to serve as a basis for specialist dealers to recognize the quality and technical limits of awning cloth when providing advice to customers and to convey to the user of the sunshade system the product's specific characteristics.
It will assist experts in assessing the limits of weaving technology, fabric manufacturing and the usage limits of awning cloth. In addition, it should help prevent disputes and differences of opinion.

This guideline describes the current state of the art for the most important applications. It is not possible to summarize the entire scope of the different characteristics, as new materials and processing techniques are constantly in development.

This applies in particular to the field of adhesive technology, which is why individual processes such as hotmelt (liquid adhesive), adhesive tape, high-frequency welding, ultrasound welding etc. need not be explained at the moment. These and other new procedures are constantly in development.

The aim of this guideline is to illustrate the product-specific characteristics for the purposes of manufacturing and machining. These characteristics represent a set of standards for normal usage of sunshade systems.

The standards illustrated in these guidelines are the result of manufacturing and machining requirements created by leading manufacturers.

This guideline has been created by ITRS in collaboration with other associations of sunshade system manufacturers, weavers and fabricators in the European region, alongside an expert consultancy office.

2. Awning cloth made from technical fabric – General information

Awning cloth made from technical fabric has both a functional and a decorative role. The core function of awning cloth used for sun protection is self-explanatory: to provide protection from excessive heat and sunlight.

Sun protection fabric must meet strict technical requirements and is subjected to extensive laboratory testing in the production process. Parameters such as the surface weight, maximum tensile strength, maximum tensile elongation, tear propagation force, water pressure resistance, hydrophobicity, fastness to weathering, solar energy behaviour and other characteristics are measured according to internationally recognised standards. These values are documented and guaranteed in the technical datasheets of the respective fabric manufacturers.

Even though only high-quality technical fabric is used for the manufacture of awning cloth, and this fabric is subjected to ongoing quality controls in all phases of the production process, it is nevertheless impossible to rule out slight irregularities in a piece of cloth in the form of so-called "blemishes". These blemishes, however, have no influence on the usage characteristics.

Nowadays, sun protection systems are manufactured with very large dimensions and their cloth surfaces are proportionately ample in size. For the most commonly used fabric types, a piece of awning cloth with a surface of, for example, 6 x 3.50 m, contains more than 100,000 linear metres of yarn. Where volumes are this large, potential irregularities resulting from the spinning and weaving process are unavoidable, leading to optical abnormalities such as inclusions or small knots.

By way of example, this guideline shows several photos and illustrations that reflect the current state of the art (see 9.1 to 9.4).
The fabric is rendered dirt- and water-repellent and antifungicidal by means of chemical surface treatment. The cloth strips generally have a width of approx. 120 cm and are sewn together, welded or adhered and seamed along the side, depending on the manufacturer and the application. The widths of hems and overlaps can vary depending on the manufacturer and application. The seams of the cloth strips mostly run in the direction of projection.

For waterproof textile fabrics, an additional coating is applied on one side. It must, as a rule, be located on the side facing away from the sun. If an additional sunlight-reflective coating is to be used, then this must, as a rule, be located on the side facing the sun.

For special usage requirements, awning materials can also be designed as (half-) transparent or perforated.

The applicable technical data and (where applicable) special machining requirements can be found in the data sheets provided by the respective manufacturers.

3. Awning cloth fabrics

3.1 Fabric made of spun-dyed polyacrylic
Awning materials made from polyacrylic are today the most widely used fabric type for high-quality sun protection. The fibres of the yarn that is used are spun-dyed, i.e. pigments are embedded in the especially hard-wearing plastic of the fibres and protected from damage, particularly from UV radiation. As a result, these fabrics are particularly weather- and UV-resistant. The colours are particularly rich and long-lasting.

3.2 Polyester fabrics
Fabrics made from this raw material is increasingly being used in German-speaking territories for the manufacture of awning cloth. The employed fabrics come in piece-dyed, yarn-dyed or spun-dyed form, depending on the supplier. For these fabrics it is essential that the fibres feature an effective and reliable UV blocker so as to protect the colours and fibres.
In addition, polyester fabrics are notable for their high levels of tear resistance and abrasion resistance, in addition to a high degree of resilience.

3.3 Seamless fabric for awnings (broadcloth)
Broadcloth awning cloth is generally machined horizontally and without seams. Here, the filling thread runs in the direction of projection and the warp thread runs horizontally. In a typical weaving structure, the cloth has considerably greater rigidity in the warp direction when compared to the fill direction. This can facilitate a sagging of the cloth (“canopy effect”).

3.4 PVC-coated fabrics
These fabrics consist of a so-called backing fabric, mostly composed of high-tensile polyester thread. After the weaving process, this backing yarn is pretensioned in both directions and covered with a PVC coating. This process increases the dimensional stability of the cloth while simultaneously reducing elongation behaviour. The widths of fabric strips vary depending on the manufacturer. Machining can be performed in both transverse and longitudinal directions. The weight of this cloth is generally considerably greater than that of other materials and limitations are therefore required as regards the maximum dimensions. The greater surface weight generally facilitates very conspicuous cloth sagging and often impairs winding behaviour. Due to the applied coating, the fabrics can be welded. “Lateral hems” are generally not necessary for horizontal machining. The manufacturer’s machining specifications apply here, in particular.

3.5 Screen fabrics
The manufacture of screen fabrics can deviate from that of traditional awning cloth. Here, the manufacturer’s information, in addition to the type and dimensions of the respective system, are particularly important.
For example, fabrics can be machined with transverse or longitudinal seams.
The side edges are then optionally manufactured with or without a hem.
The hems for the cloth roller and the front rail can be sewn, welded or bonded, depending on the material type. Screen fabrics are frequently used in cases where there are special requirements for the transparency of the cloth.

3.5.1 PVC-coated glass-fibre screen fabrics
To manufacturer these fabrics, glass-fibre strands are coated with a PVC layer. Using the thread produced with this method, fabrics are made in varying widths. This is followed by a fusing-through-heating process, which causes the fabric to melt internally. This brings about a high degree of diagonal stability in the PVC webbing while simultaneously providing a high level of transparency.

This manufacturing method requires, alongside the welding of the sheets, the stabilisation of the side edges using welded sealing strips. The manufacturer's machining specifications apply here, in particular. The requirements for winding behaviour, as caused by the extreme weight of up to 500g per square metre, must be given special attention for the use of these fabrics. These fabrics are preferably used for vertical systems. Here, the relevant specifications of the system manufacturer must be observed.

3.5.2 PVC-coated polyester screen fabrics
These fabrics are produced from high-tensile polyester yarn. After the weaving process, the fabric is pretensioned in both directions and covered with a PVC coating. This process gives the fabric a high degree of dimensional stability and particularly minimal elongation behaviour. They are thus also suitable for providing shade for larger surface areas. The requirements for winding behaviour, as caused by the extreme weight of up to 500g per square metre, must be given special attention for the use of these fabrics.

3.5.3 PVC-free polyester screen fabrics
After weaving, high-tensile polyester thread is specially coated under high pretension, impregnated or reflective particles are applied. These fabrics are preferably used for vertical systems.

4. General explanations regarding cloth, manufacture and systems

4.1 Cloth tensioning

4.1.1 Horizontally and diagonally hanging cloth with spring tension

Here, cloth tension is generally generated through the use of tensioning elements such as articulated arms or counterweight tensioning systems, e.g. through weighting of inclined systems of 25° and upwards. Due to structural design reasons, cloth sagging occurs for all applications. In cases where there is a minimal pitch angle and a large cloth surface area, this cloth sagging is compounded, particularly by the cloth's self-weight, as well as additional influences such as damp and wind, for example. In every case, there is quite clearly visible sagging in the centre of the cloth surface or in the individual strips of material (Figure 9.1.15 and 9.1.16). In cases where broadcloth is used in the transverse direction, cloth sagging occurs across the entire surface area.
An increase in cloth tension can lead to over-elongation of the fabric, particularly in the area of the seams. This over-elongation creates quite clearly visible winding creases when the cloth is wound. When winding creases are laid on top of underlying material (Figure 9.1.12 and Figure 9.1.13) they can produce visible offset runs beside seams and in the individual strips of material, causing features such as honeycomb patters (4.2.4.2), for example. These features are compounded by damp and are quite clearly visible in a range of lighting conditions. These effects are compounded by large cloth projections and/or greater cloth tension. In the case of broadcloth in the transverse direction with larger cloth widths and projections, running creases and overlapped-winding creases may occur due to the lack of stabilising seams. The use of supporting backings at certain points is not permissible for broadcloth without taking special precautions (reinforcing tape etc.).

4.1.2 Vertically hanging cloth without spring tension

Depending on the manufacturer, the cloth or fabric can be machined with transverse or longitudinal seams. Here, the relevant instructions of the system manufacturer must be observed. For cloth with longitudinal seams, winding crease formation in the area of the seams and the outer hems becomes particularly visible, since the seam tension cannot be compensated by a reduced cloth tension.

4.1.3 The influence of wind

Wind loads – both wind suction and wind pressure – are to a great extent absorbed by the cloth, and to a lesser extent transferred to the awning structure. To protect the cloth and the awning, it is necessary to retract the awning when the wind exceeds the wind resistance class stated by the manufacturer. The instruction manual provided by the manufacturer is of particular importance here. In the case of automatic controllers, these predefined limit values must be set. Exceeding the permissible wind speeds leads to damage to the cloth and to the awning frame. The wind resistance classes and additional mandated characteristics must be specified for each individual product using the CE marking that was stipulated on 01/03/2006 in accordance with DIN EN 13561.

4.2 The cloth winding process and its effects

4.2.1 The cloth roller

The choice of the diameter of the cloth roller is very important, since this determines the cloth roller's sag. It can generally be assumed that the sag is between 0.1 and 0.3 % (L/300) of the total length (depending on the type of awning structure).

4.2.2 Supporting rails and centre bearings

Supporting rails and centre bearings prevent sagging of the cloth roller to the greatest possible extent, and thus the sagging of the cloth itself. The supporting bearing must be positioned in the area of the seams or the reinforcement strips. As a result of increased friction there is a risk of premature wear of the material and the sewing thread, as dependent on the particular application and the presence of automatic control systems with increased operating cycles. A staining or chalking/marking of the cloth occurs in every case in the area of the supporting bearings. If PVC-coated fabric and screen fabric are used, then only supporting bearings approved by the manufacturer for the specific system may be used. If supporting bearings are used to reinforce certain points, then a suitable right-angled alignment in relation to the cloth roller axis is absolutely essential so as to avoid increased wear. Generally speaking, the lifespan of awning cloth is reduced by the use of supporting bearings applied at certain points.

4.2.3 Awning cloth sag

Due to system-based characteristics, the cloth can only be held under tension between the cloth roller and the front rail. As a result, the lateral hems may fall inwards, thereby causing trough-shaped sagging of the cloth all the way to the centre. This effect is generally referred to as "dishing". In the case of large cloth surface areas (preferably large cloth projections) with a small pitch angle, overlapping of the material may occur when winding up the cloth. This effect is compounded when awnings are used as rain protection. If the run-off of rain is not guaranteed because the pitch angle is too flat, then one or several water pockets can form in the area of the front third of the awning. The use of an awning as rain protection can cause damage to the cloth and the awning frame. In this case it is particularly important to observe DIN EN 13561 (Use of awnings in case of rainfall).

4.2.4 Hems and seams sewn, bonded or welded into awning cloth (all fabric qualities)

4.2.4.1 Lateral hems

Generally speaking, this cloth is manufactured longitudinally in several cloth strips (depending on the material). Every seam and hem acts as a reinforcement. At the same time, they are the most heavily loaded areas of the cloth. Lateral hems can be produced using the methods mentioned above. This leads to greater thickness of the cloth in this area.

When wound up, the wound seams and hems are doubled up on top of each other, thus creating a large diameter at these points. As a result of the winding difference between the upper and lower material layers, tension arises within the strips of material even without the influence of tensioning systems, weighting etc. If a material thickness of approx. 0.5 mm is used as a basis, then a difference of 3.14 mm occurs per cloth roller rotation between the upper and lower material layers in the area of the seam (Figure 9.1.11).

This effect leads to varying over-elongation values in the lateral hems and the seams, and thus to unavoidable sagging in this area. The effect becomes apparent due to rippling in the affected area and is unavoidably compounded by the influence of wind. However, it does not affect the quality, functionality or lifespan of the cloth (Figure 9.1.9).

For broadcloth, lateral hems are generally not manufactured, rather the outer edges of the fabric are fastened using various welding processes etc.

4.2.4.2 Seam in the direction of projection / running direction (all fabric qualities)

Awning cloth in the form of broadloom is sewn, bonded or welded in the direction of projection or running direction. For awning cloth with vertical seams, a symmetrical arrangement of the seams is usually selected. The outer cloth strips must generally have a minimum width of 25 cm.

The advantage here lies in the fact that the tensile stress is distributed more evenly in strip-based products due to the greater quantity of warp threads, in contrast to transversely machined broadcloth. In a typical weaving structure, the cloth has considerably greater rigidity in the warp direction when compared to the fill direction.
As a result of this manufacturing technique, and due to the effects and winding difference mentioned in Section 4.2.4.1, the material is displaced and diagonal creases occur to the left and right of the seam, which can then leave a honeycomb-pattern imprint (Image 9.1.8). The more cloth layers that are rolled up (i.e. the larger the load and height of the awning layer), the greater the overall displacement of the strips amongst each other, with increased honeycomb formation (Figure 9.1.10) and potential cloth buckling (Figure 9.1.12).

These effects can be made significantly more visible by unfavourable incidence of light. Honeycomb formation is also accelerated and compounded by the influence of moisture (air humidity, rain). If the wet cloth thus becomes “soft” as a result and is then retracted, the honeycomb patterns and creases become particularly large. The effects described above do not affect the quality, functionality or lifespan of the cloth.

However, an overlapping of the cloth resulting in highly pronounced winding creases is impermissible.

4.2.4.3 Upper and lower hem, sewn

As a general rule, the upper and lower hems are sewn, bonded or welded using the classic method. If special welts are used (magnetic welds, quick-assembly welts etc.) then the manufacturer’s instructions on assembly must be observed (for safe winding).

4.2.5 Special considerations for hems and seams for acrylic and polyester fabrics

4.2.5.1 Lateral hems

The cloth is generally manufactured from several strips that are approx. 120 cm in width. Lateral hems can be manufactured using both a sewing method or a bonding method. When being wound up, the wound seams and hems are doubled up on top of each other (Figure 9.1.11).

4.2.5.2 Seam in the direction of projection / running direction

Awning cloth made of 120-cm-wide broadloom is sewn or bonded in the direction of projection or running direction.
As a result of this manufacturing technique, and depending on weather conditions and the size of the cloth, so-called “honeycomb formation” occurs (Figure 9.1.10), as described in 4.2.4.1. Due to the winding difference effects mentioned in Section 4.2.4.1, the material is displaced and diagonal creases occur to the left and right of the seam, which can then leave a honeycomb-pattern imprint. This effect has no influence on the quality, functionality or lifespan of the cloth.

4.2.6 Special considerations for hems and seams made of PVC-coated fabric

4.2.6.1 Lateral hems and seams

Depending on the application, this cloth is manufactured from various different strips. Generally speaking, the individual strips are welded and then preferably machined in the direction of projection. In exceptional cases they are bonded or sewn. The winding-difference effects described in Section 4.2.4.1 and the honeycomb formation described in Section 4.2.4.2 also occur here. This effect has no influence on the quality, functionality or lifespan of the cloth. Lateral seams are generally not necessary in the transverse direction when machining.

4.2.6.2 Seam in the direction of projection

The PVC-coated fabrics with their especially rigid characteristics tend to form creases when wound on rollers. In individual cases the cloth may even form overlapping creases. This phenomenon is on the one hand the result of the minimal elasticity of this cloth, and on the other hand the result of higher weight and the associated increased loading of the systems.
As a result of this manufacturing technique, and depending on weather conditions and the size of the cloth, so-called “honeycomb formation” occurs (Figure 9.1.10), as described in 4.2.4.1.
This honeycomb formation can extend to the centre of the fabric strip. Even if these fabrics have no transverse seams or no overlapping welded seams in the direction of projection, the cloth still tends to sag in the centre due to its self-weight. This results in potentially “excessive” overlapping of cloth in the centre and formation of impermissible creasing.
PVC-coated fabrics are therefore not usable in all versions and sizes for all sun protection systems. The effects stated above do not affect the quality, functionality or lifespan of the cloth.

4.2.7 Special considerations for hems and seams for fibre-glass screen cloth

Generally speaking, this cloth is manufactured longitudinally or transversely from several strips. The lateral hems can be equipped with a reinforcing tape, depending on the application. If reinforcing tape is used, then it is generally applied to the inner side of the cloth.
For longitudinal seams, the rolled up seams and hems are doubled up on top of each other (Figure 9.1.14). This results in the winding difference described in Section 4.2.4.1.
For transverse seams, the winding difference effect does not occur. However, V-shaped ripples (Figure 9.4.6). can arise due to tension during cloth machining (welding or sewing). Due to the attachment of the cloth to the roller, and as a result of the transverse seams, an increase in thickness occurs at these points. This can result (due to winding) in a transverse impression in the cloth (Figure 9.4.4) and is technically unavoidable. These effects have no influence on the quality, functionality or lifespan of the cloth.

Fibre-glass screen cloth is usually used on the faces of vertical systems. For horizontal systems, special measures are necessary to guarantee problem-free winding.

4.2.8 Special considerations for hems and seams for polyester screen cloth

As a general rule, this cloth is manufactured longitudinally or transversely from strips. The lateral trimmed edges are generally not sewn for the purposes of manufacture with a seam arrangement in the transverse direction, or for seamless machining in the longitudinal direction.
For longitudinal seams, the rolled up seams and hems are doubled up on top of each other (Figure 9.1.14). For polyester screen cloth, this also results in the previously described winding difference, with the associated effects (see 4.2.4.1.). For transverse seams, the winding difference effect does not occur. However, creases can arise due to tension during cloth machining (welding or sewing) (see 4.2.7). This effect has no influence on the quality, functionality or lifespan of the cloth.

4.3 Explanations of terms

4.3.1 Kink creases and laying creases

These occur due to the unavoidable rolling of the individual cloth strips and the awning cloth itself in the production process, and when attaching the cloth to the awning system. These kink and laying streaks appear darker against backlight. For brighter materials in particular, they give the impression of staining (Figure 9.1.6). These effects do not reduce the quality of the awning cloth in any way. In line with today’s common standard methods, the manufacture and transportation of cloth in rolled form reduces these effects considerably. For cloth with a width and projection of over 600 cm, creasing cannot, however, be avoided for shipping-based reasons. In the case of new coverings and repairs, it is not possible to avoid creasing and handling of the cloth. The kink and laying points that occur here are also unavoidable, comply with the recognised technical regulations and do not affect the quality, functionality or lifespan of the cloth.

4.3.2 Chalking / marking effect
These are bright streaks on the fabric surface caused by the impregnation medium. They occur due to handling during manufacture and from the assembly of systems. These effects cannot be completely avoided in spite of the most careful cloth treatment, especially in the case of dark cloth colours. This effect (Figure 9.1.5) complies with the recognised technical regulations and has no influence on the quality, functionality or lifespan of the cloth.

4.3.3 Differences in colour between cloth strips
Slight deviations in colour can arise as part of the surface treatment of polyacrylic or other comparable fabrics in various manufacturing stages. These become visible within the fabric rolls themselves and across different batches. Handmade samples or photos of fabrics may show minor deviations compared to subsequent deliveries. This effect complies with the recognised technical regulations and has no influence on the quality, functionality or lifespan of the cloth.

4.3.4 Water pressure resistance
Polyacrylic cloth or cloth made of other comparable fabrics without an additional coating are not completely water-resistant. Polyacrylic fabric and other comparable fabrics have a water-resistant impregnation and are tested according to EN 20811 in a Schopper test. The water resistance of polyacrylic or other comparable fabrics is > 32 mbar in the new condition. The areas of the seams have a significantly reduced water resistance due to the perforations that result from the sewing process. This effect complies with the recognised technical regulations and has no influence on the quality, functionality or lifespan of the cloth. For bond seams, water resistance in the seam area is not impaired.

4.3.5 Honeycomb formation
See 4.2.4.1 and 4.2.4.2. This effect complies with the recognised technical regulations and has no influence on the quality, functionality or life span of the cloth.

4.3.6 Cloth buckling
See 4.2.4.2. As long as this effect does not lead to functional impairment of the awning, it complies with the recognised technical regulations and has no influence on the quality, functionality or lifespan of the cloth.

4.3.7 Edge binding on the valance
Due to the different materials, the associated surface structures and the deliverable colour palettes for edge binding as compared to awning cloth, differences in colour and/or the surface structure are unavoidable. This effect complies with the recognised technical regulations and has no influence on the quality, functionality or lifespan of the cloth.

4.3.8 Colour deviations from photo collections in sample catalogues
A photographic print is only an approximate representation of an awning cloth pattern. An exact reproduction of the colour is not possible. These photos serve only as an example illustration of the division of the strips and their repeating pattern. Minor deviations in the illustration compared to the original comply with the recognised technical regulations.

4.3.9 Colour deviations from colour sample collections
Minor deviations in the sample collection as compared to the awning are unavoidable because samples and cloth may originate from different production stages (see also 4.3.3.). Minor deviations from the original comply with the recognised technical regulations.

4.3.10 Colour deviations with different incidences of light
Depending on the perspective and incidence of light (particularly backlight), clear differences can arise in the colour effect of the fabric, which in some cases is also desirable. Therefore it is also recommended that you inspect the chosen material and the different perspectives. Potential colour deviations from the relevant perspective (including viewing through a see-through surface) comply with the recognised technical regulations.

4.3.11 Special considerations for printed patterns
For fabrics that are printed on one side (Figure 9.1.4), the design in the awning cloth can be machined either from the inside or the outside. The translucency of the print on the non-printed side is technically possible and in some cases also desired. For fabric that is printed on both sides, a slight offset of the design between the top and bottom sides in unavoidable. A potential offset of the print designs complies with the recognised technical regulations.

4.3.12 Special considerations for digital printing
This guideline explicitly does not apply to digitally printed awning cloth.

4.3.13 Special considerations for Jacquard-woven cloth
This weaving technique leads in every case to different visual perceptions of the top and bottom sides of the awning cloth. This effect complies with the recognised technical regulations.

4.3.14 Light spots and translucency effects
These occur as the result of standard commercial irregularities in weaving thread and the subsequent machining. They become apparent when looking through the material with backlight. They are unavoidable for weaving-based technological reasons. This effect complies with the recognised technical regulations.

4.3.15 Specially manufactured products
For specially manufactured products, an irregular seam run may occur due to the given shape. This effect complies with the recognised technical regulations.

4.3.16 Sagging of the awning cloth
This occurs as the result of the self-weight of the cloth and is technically unavoidable, as described in 4.2.4.1. Sagging is compounded considerably by adverse weather conditions such as wind and the increase in self-weight caused by moisture and the associated absorption of rainfall. Insofar as the manufacturer’s respective operating instructions are observed, this effect has no influence on the quality, functionality or lifespan of the cloth.

4.3.17 Sewing thread
As a result of the various different materials and deliverable colour palettes, differences in the colour combinations of sewing thread and cloth are unavoidable. Basic tones should be adapted to the greatest possible extent. Potential colour deviations comply with the recognised technical regulations. Examples of quality levels include polyester thread and, alternatively, PTFE thread, which generally have a higher UV resistance.

4.3.18 Bonding methods
At the time of publishing, the following are the most important and most common bonding methods:
1. Gluing using moisture-cross-linked adhesives (hotmelt, liquid glue)
2. High-frequency welding with adhesive tape
3. Ultrasound welding with moisture-cross-linked adhesive tape

4.3.19 Interlinked awning systems
Pattern-based deviations can arise between the awning cloths and their slot covers in the horizontal or vertical direction. Potential pattern-based deviations are permissible.

4.3.20 Bearing inserts
Depending on the version and design of the awning system, isolated and continuous bearings can be used to support the cloth roller and cloth covering in order to improve the sagging effects or to optically hide the cloth covering. Isolated bearing inserts can lead to increased wear and to staining in the area of the respective bearing insert as a result of environmental influences on the surface of the cloth covering and due to considerably greater friction. Significant staining in the area of the bearing is particularly unavoidable in the case of interlinked systems with a continuous covering. As a general rule, isolated bearing inserts should always be located on a seam or a reinforcing strip.

4.3.21 Use of awning as rain protection
The use of awnings in rainy weather is regulated by DIN EN 13561 and must be observed. Non-observance of this standard can cause damage to fabric and to the awning system due to accumulation of water on the cloth surface (water pocket formation). Cloth that is rolled in while wet should be dried at the next opportunity so as to avoid mould formation etc. (see 6.2).

5. Waterproofing

5.1 Polyacrylic and polyester awning cloth

Awning cloth is not waterproof (see also 4.3.4.). As with any fabric, small, microporous holes exist between the crossover points of the threads.
Awning cloth is treated with an impregnation specially developed for outdoor applications that is water-resistant, dirt-repellent and oil-repellent. As a result, drops of water roll off new awning cloth at the respective pitch angle without any obstruction. This treatment-based effect is reduced by weather and environmental influences and thus leads over time to higher absorption of moisture by the awning cloth. If a higher level of water resistance is required, the use of a coated fabric is recommended. The seams can be additionally sealed as part of the traditional sewing process, while bond seams can be designed as waterproof as part of the machining process itself.

5.2 PVC-coated fabrics

Due to their special composition, PVC-coated fabrics are permanently impermeable to water.

5.3 Fibre-glass and polyester screen fabric

Due to their porous composition, fibre-glass screen fabrics and polyester screen fabrics are permeable to water.

6. Weather resistance of awning cloth

6.1 Colour resistance and colour differences for fabrics and their treatments

Fastness to weathering is measured as per DIN EN ISO 105 B04 using the grey scale method and must have a value of at least 4 (highest possible value is 5). After 1000 hours of artificial weathering, the deviation from the new condition is assessed and documented in the datasheets of the respective fabric manufacturer.

Manufacturers strive to keep the deviations between consecutive batches within narrower and more acceptable limits. However, differences in colour can arise between production runs, and the colour of the awning cloth can deviate from the colour of the selected pattern. These differences are within the tolerance limits and comply with the recognised technical regulations.

6.2 Rot resistance and environmental influences

Awning cloth is generally manufactured from synthetic fibres. There are no biodegradable elements in these fabrics. This means that they remain unsusceptible to rotting. The accumulation of dirt and organic substances on the fabric surface, along with moisture, creates an ideal breeding ground for algae and fungal cultures. Nowadays, anti-fungicidal treatments cannot fully prevent this, since legal environmental protection requirements have prohibited the use of chemicals that were used in the past.

If cloth is rolled up while moist, then the moisture located in the fabric and between the fabric layers is unable to dry out. This leads, on the one hand, to discolouration caused by water spots, but also to fungal accumulation in the form of mould stains. These cannot be totally prevented by anti-algae and anti-fungal-culture treatments as a result of the strict environmental protection requirements. Wet cloth also compounds the “honeycomb effect”, as described in 4.3.5. It is important, therefore, to extend the cloth at the next opportunity so that it can dry. Damage resulting from non-observance of these instructions is generally irreparable and corresponds to the recognised technical regulations.

7. References, guidelines and manufacturer datasheets

7.1 References

7.1.1 Overview table of textile standards for awning fabrics, page 37+38

7.1.2 Overview table for DIN EN 1356139, page 39

7.2 Guidelines

7.2.1 Richtlinien zur technischen Beratung, zum Verkauf und zur Montage von Gelenkarmmarkisen (Guidelines on Technical Consultation, Sales and Installation of Extending-Arm Awnings, ITRS)

7.2.2 Richtlinien Sicherheitshinweise in Montage- und Bedienungsanleitungen für Markisen (Guidelines on Safety Instructions in Installation and Operating Instructions for Awnings, ITRS)

7.2.3 Richtlinien Windlasten zur Konstruktion von Abschlüssen und Markisen im eingefahrenen Zustand (Guidelines on Wind Loads for Design of Blinds and Shutters in the Retracted Condition, ITRS)

7.2.4 Richtlinien Pflegehinweise für Markisentücher (Guidelines on Care Instructions for Awning Cloth ITRS)

7.3 Manufacturer datasheets

Product characteristics, performance characteristics and machining information on various fabrics should be requested from the manufacturer as a specific datasheet in each case.

8. Conclusion

The typical product characteristics described in this guideline are predominantly optical phenomena and are not limited to certain products. They correspond to the recognised technical regulations at the time of publication and do not impair the functionality or use of awning cloth.

9. Illustrations: photos and drawings

The following photos and drawings are intended to provide a better understanding of the previously described information. Due to technical printing limitations, the figures may deviate from the original. The scale used for the photos is only intended as a rough representation of the dimensions of the situations illustrated in each case. It is not possible to derive the maximum size of the various blemishes from these images.

9.1 Awning cloth

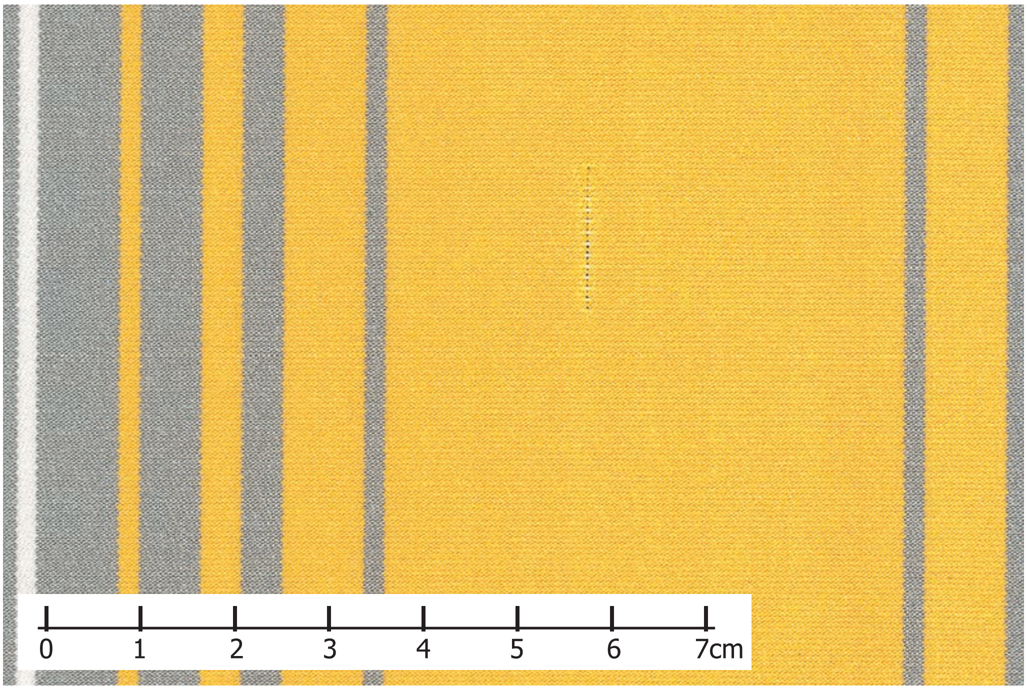


Figure 9.1.1 Permissible (short) thread breakage with transparency

Cause: Tension-induced tearing of warp thread or filling thread during weaving

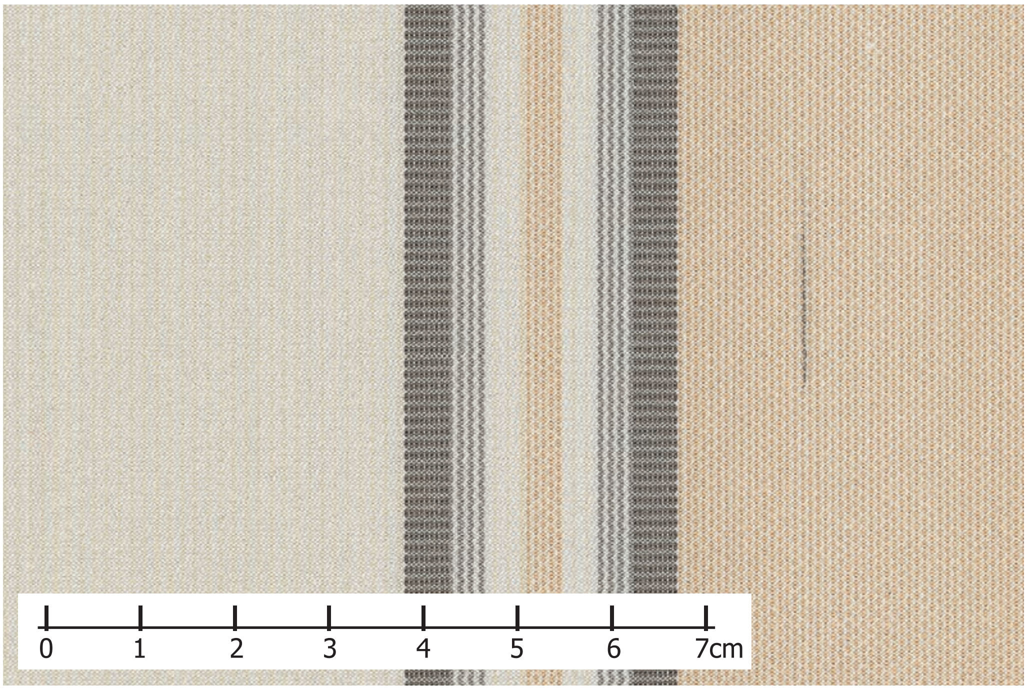


Figure 9.1.2 Permissible foreign fibres woven into fabric

Cause: Lint of a different colour worked into the fabric during spinning or weaving.

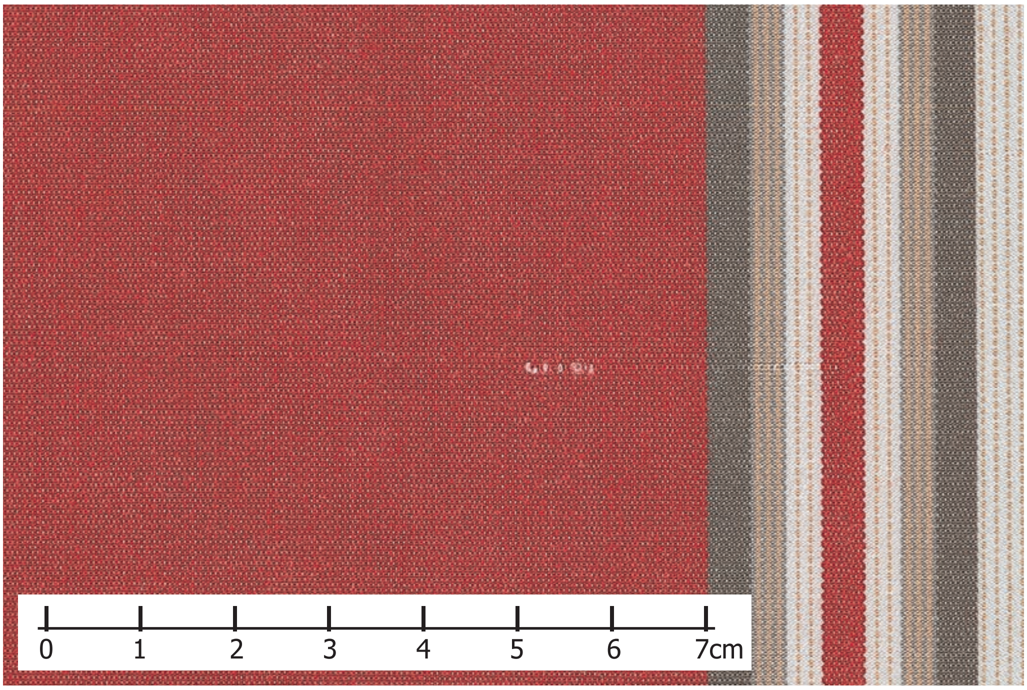


Figure 9.1.3 Permissible slub
Cause: Slubs arise through the accumulation of fibre bristle during the spinning, threading or weaving process.

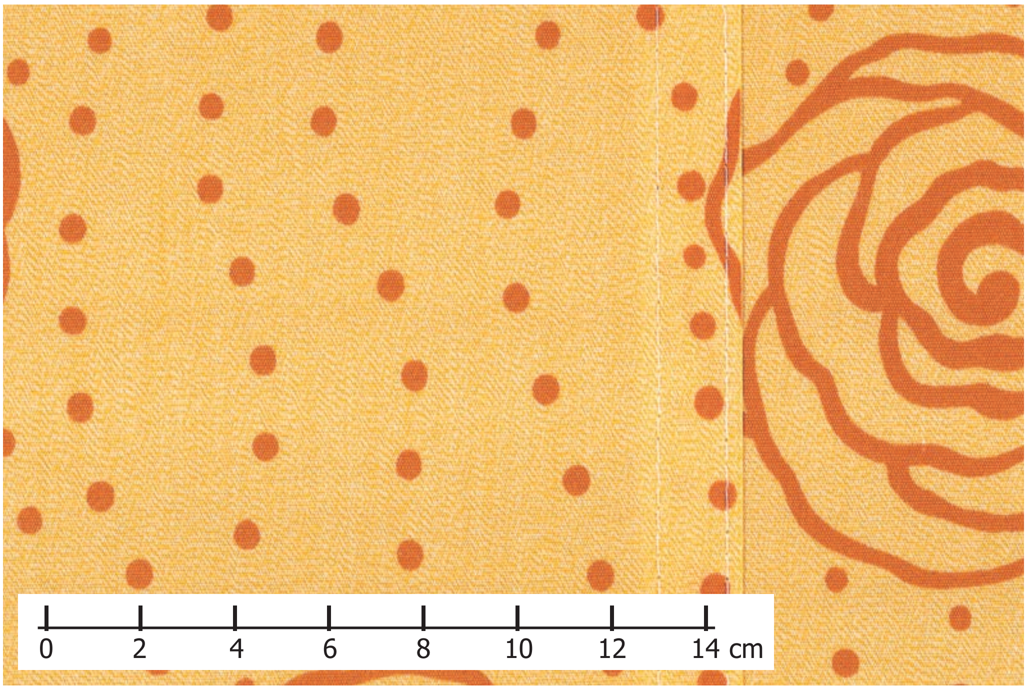


Figure 9.1.4 Permissible pattern offset in printed materials
Cause: Occurs for technical reasons when material strips are joined together.

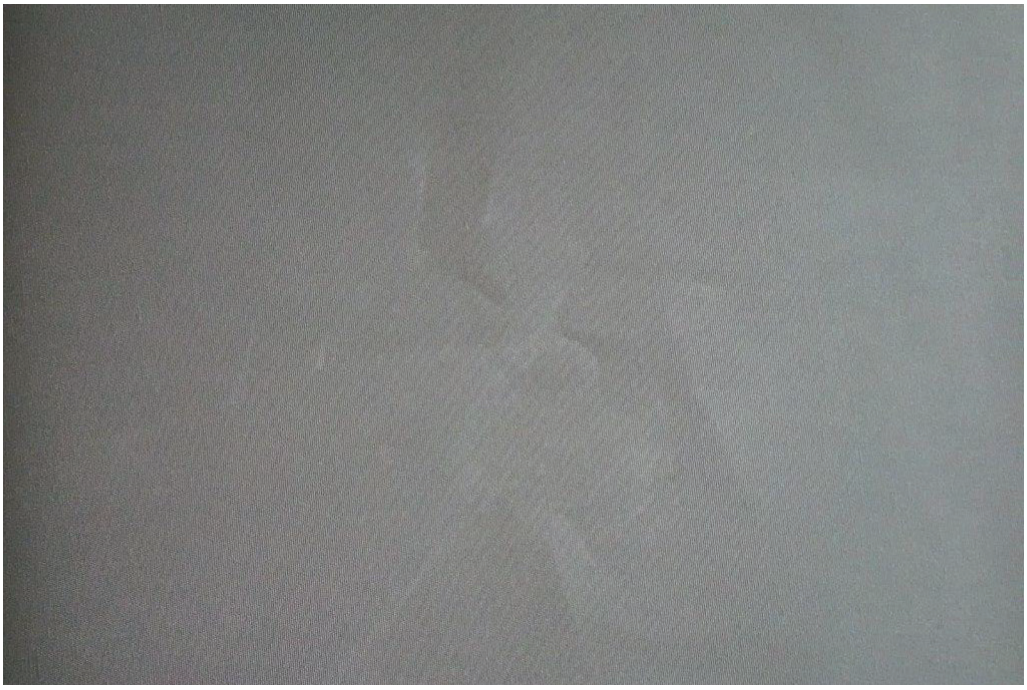


Figure 9.1.5 Permissible chalking and marking effect
Cause: Bright streaks on the fabric surface caused by the impregnation medium.

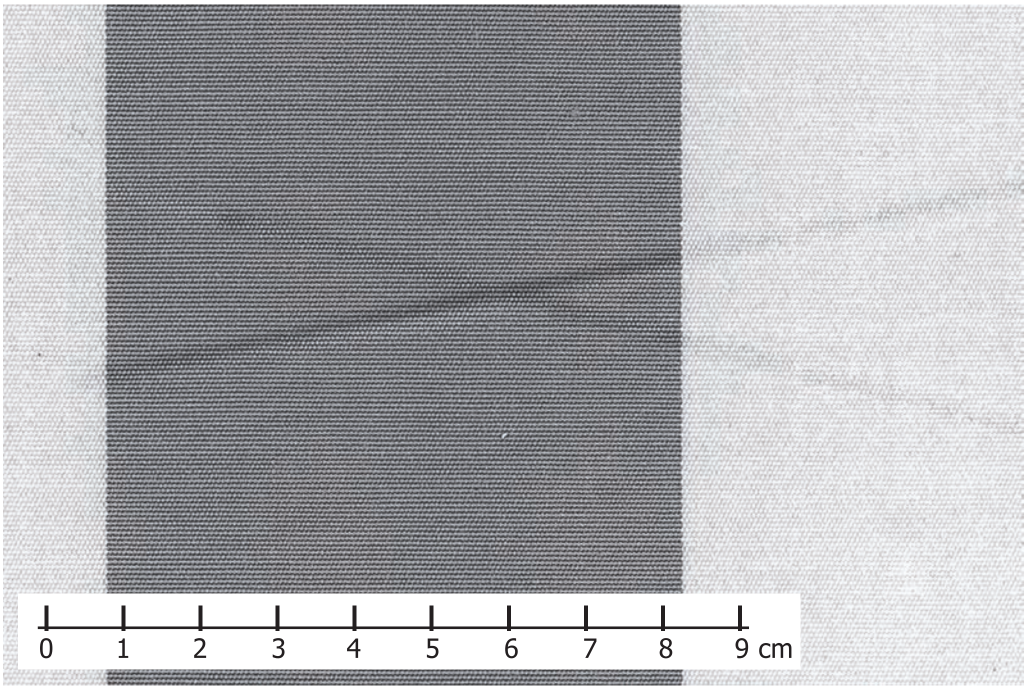


Figure 9.1.6 Permissible kink creases and laying creases
Cause: Pigment alterations that are caused by kinks or creases in the manufacturing process, during shipping or during covering or re-covering and that become visible in the case of bright materials, particularly when looking through them (see 4.3.1.)

Figure 9.1.7 Bearing inserts
Cause: Depending on the version and design of the awning system, isolated and continuous bearings can be used to support the cloth roller and cloth covering (see 4.3.20.)

Figure 9.1.8 Permissible rippling in the seam area (honeycomb formation)
Cause: see 4.2.4.2

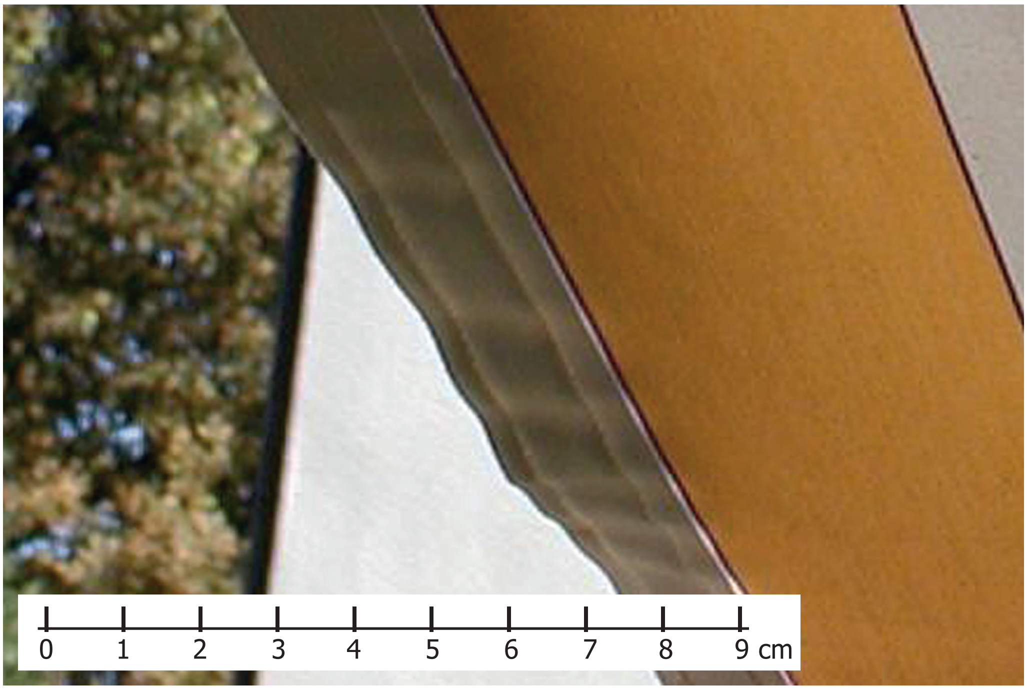


Figure 9.1.9 Permissible rippling and over-elongation in the area of the hem
Cause: see 4.2.4.1

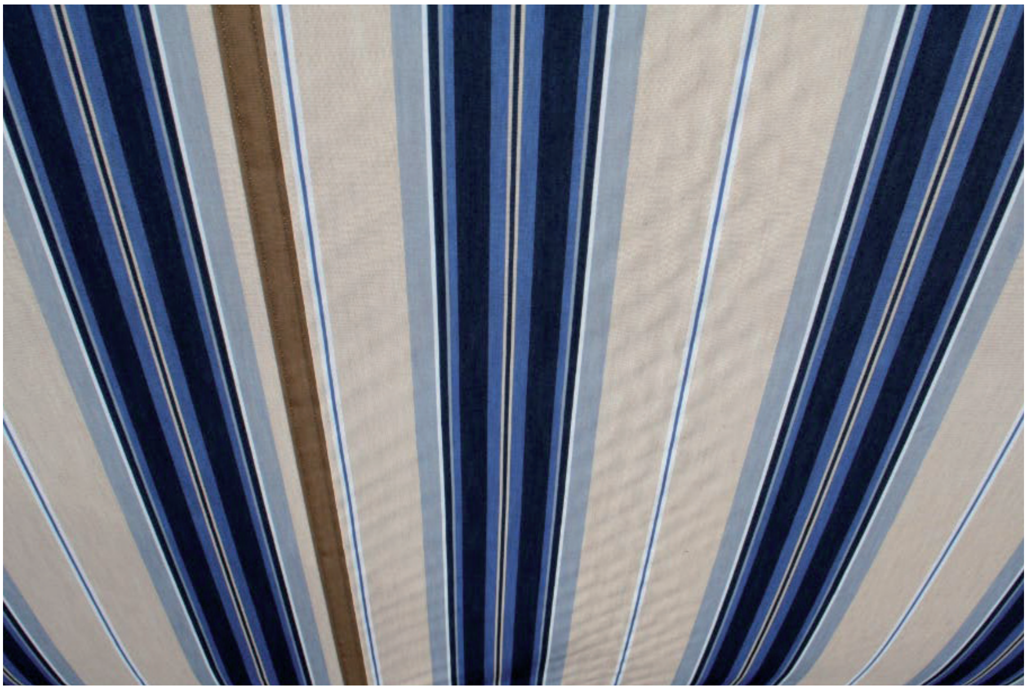


Figure 9.1.10 Permissible rippling in the strip area (honeycomb formation)
Cause: see 4.2.4.2, 4.2.4.2 and 4.2.6.2

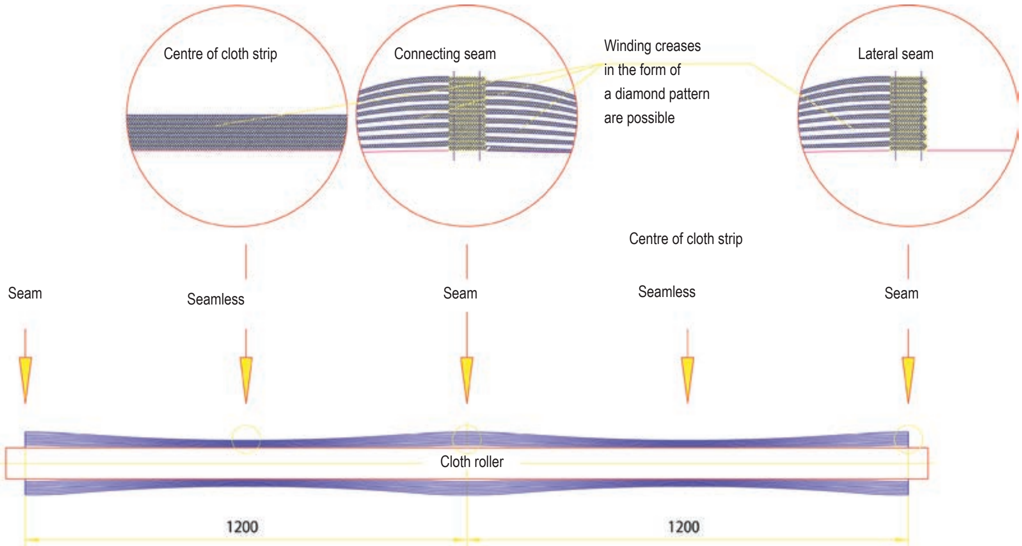


Figure 9.1.11 Varying winding diameters in the seam and hem area
Cause: see 4.2.5.1

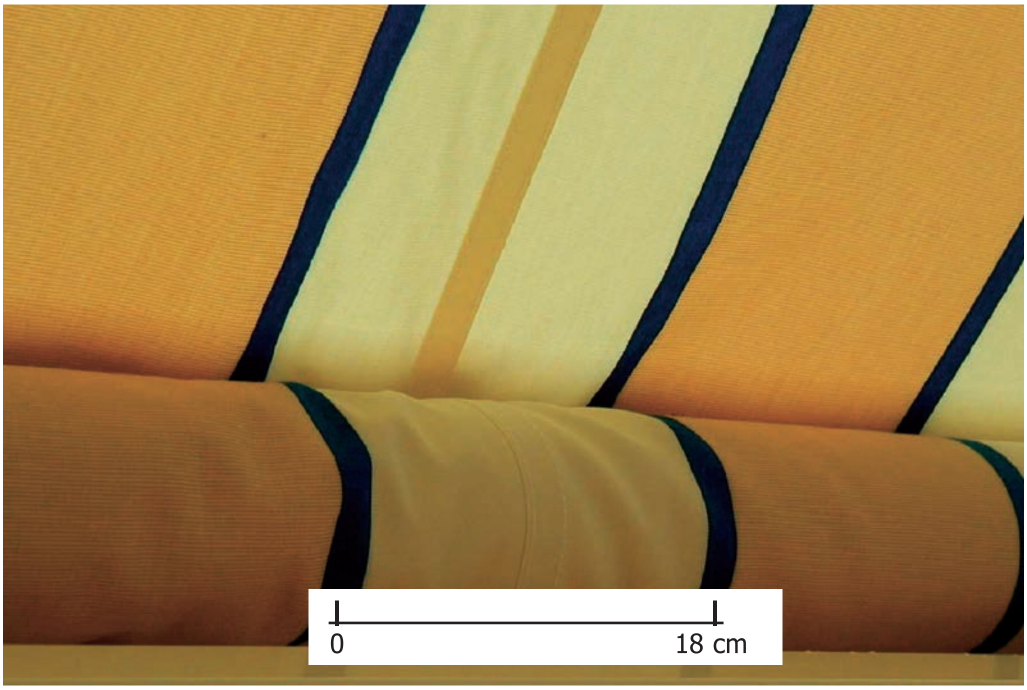
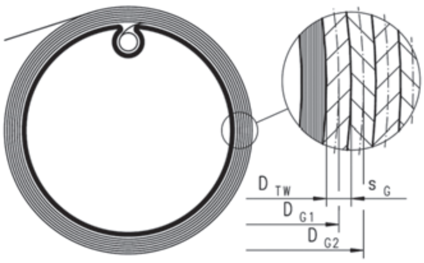


Figure 9.1.12 Permissible buckling and winding creases on the cloth roller
Cause: see 4.1.1 and 4.2.4.2

Figure 9.1.13 Illustration of superimposition of winding creases
Cause: see 4.1.1

Difference in length between an upper and lower fabric layer in the seam and hem area for one complete winding of the cloth on the cloth roller (independent of the winding diameter).



D_{TW} = Diameter of cloth roller
D_{G1} = Central diameter of lower fabric layer
D_{G2} = Central diameter of upper fabric layer
S_G = Fabric thickness

Circumference of lower fabric layer = D_{G1} x 3.14

Diameter of upper fabric layer = D_{G1} + 2 x BG

Circumference of upper fabric layer D_{G2} = D_{G2} x 3.14

Difference in length between lower and upper fabric layer = 2 x S_G x 3.14

The difference in length between upper and lower fabric layer is dependent on the fabric thickness. By connecting two fabric layers (seam, hem), the displacement of the fabric layers is blocked and tension occurs in the cloth.

For acrylic fabric the fabric thickness is S_G = 0.5 mm.

Per complete winding, the difference in length is 2 x 0.5 x 3.14 = **3.14 mm!**

Figure 9.1.14 Double fabric layer in the seam and hem area
Cause: see 4.2.4.1

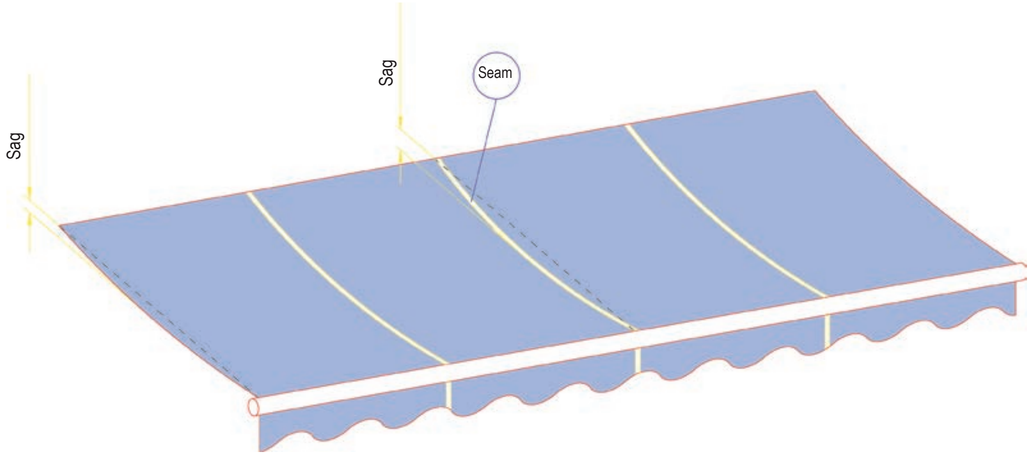


Figure 9.1.15 Possible sagging of the awning cloth
Cause: see 4.1.1

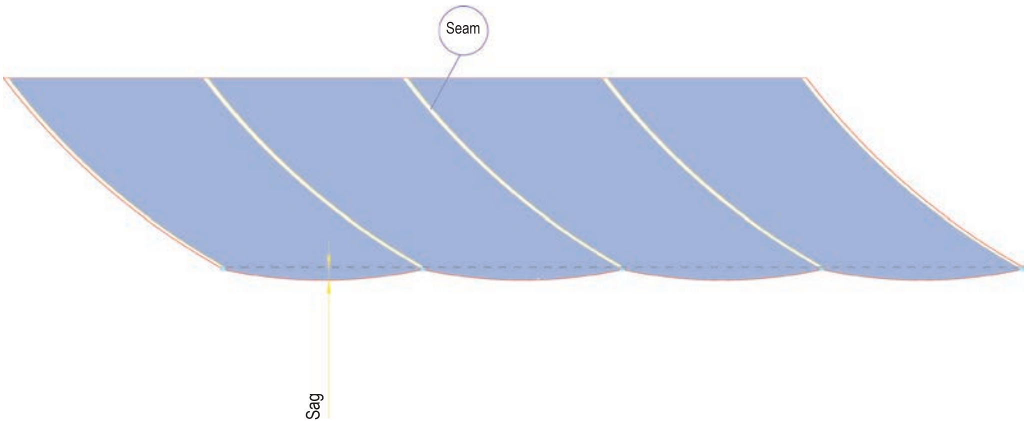


Figure 9.1.16 Possible sagging of the individual strips of material
Cause: see 4.1.1

Figure 9.1.17 Handling creases for polyester awning cloth
Cause: Unavoidable movements of material during manufacturing process and cloth assembly

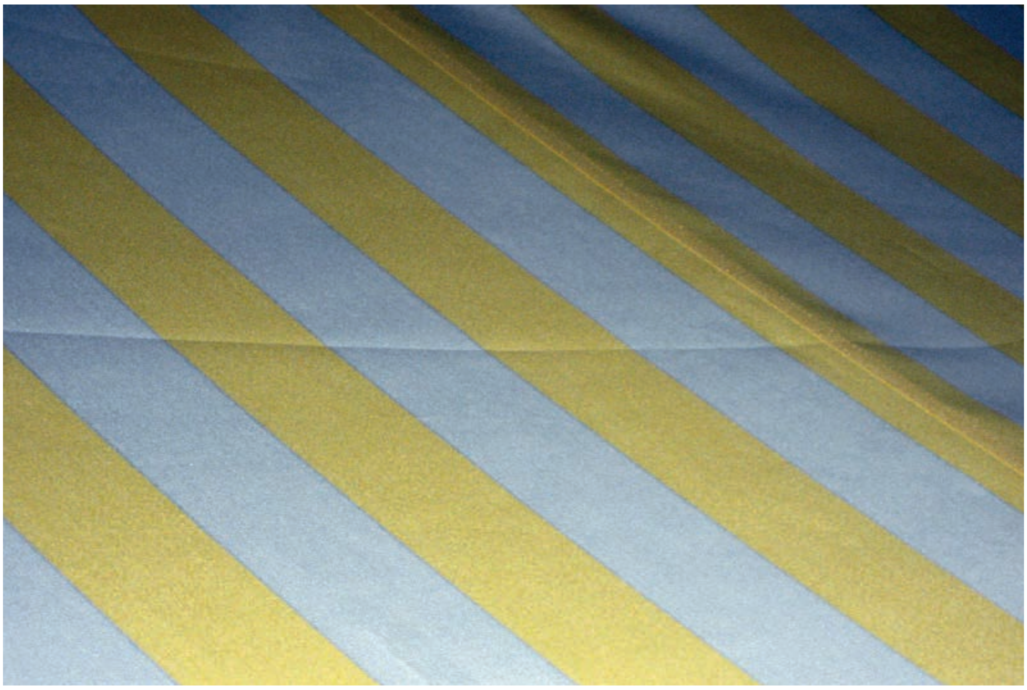


Figure 9.1.18 Technically induced handling creases from transport or assembly
Cause: Cloth must be folded for assembly or transport purposes.

Figure 9.1.19 Permissible packaging-based crease formation in the area of the valance

9.2 Awning cloth (bonded longitudinal seam)

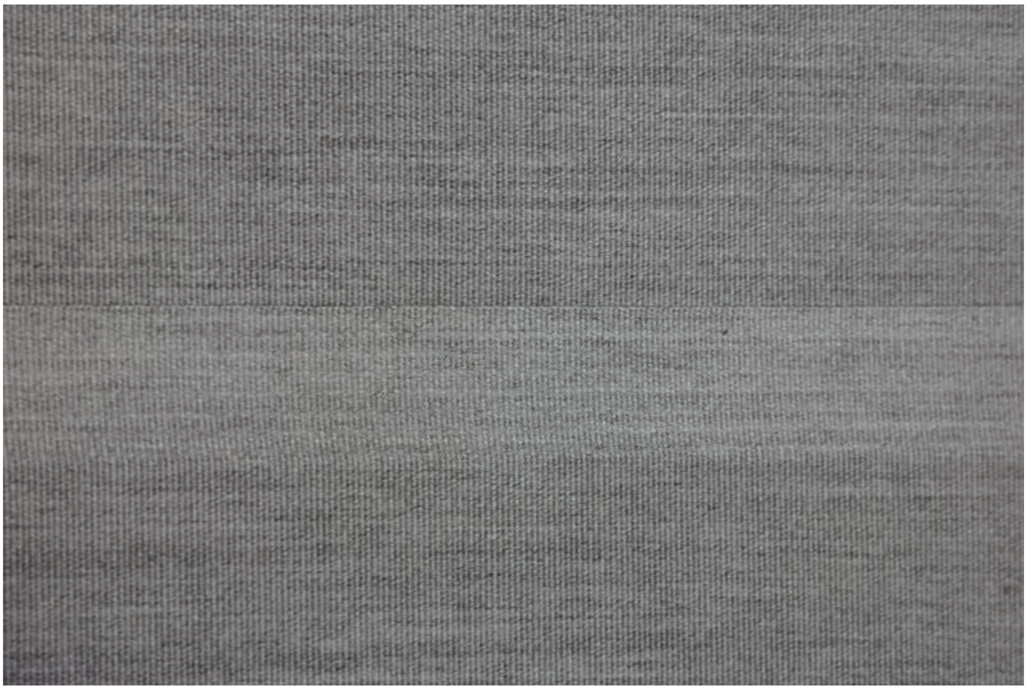


Figure 9.2.1 Illustration of visible seam contours for bonding method
Barely visible seam contours for bonding method. No glue or adhesive tape may escape when using the bonding method.

Figure 9.2.2 Illustration of bleedthrough where there is use of adhesive tape
The visible bleedthrough may be more visible depending on the design and / or light conditions. Irregular discolouration of the seam caused by glue or adhesive tape is not permissible.

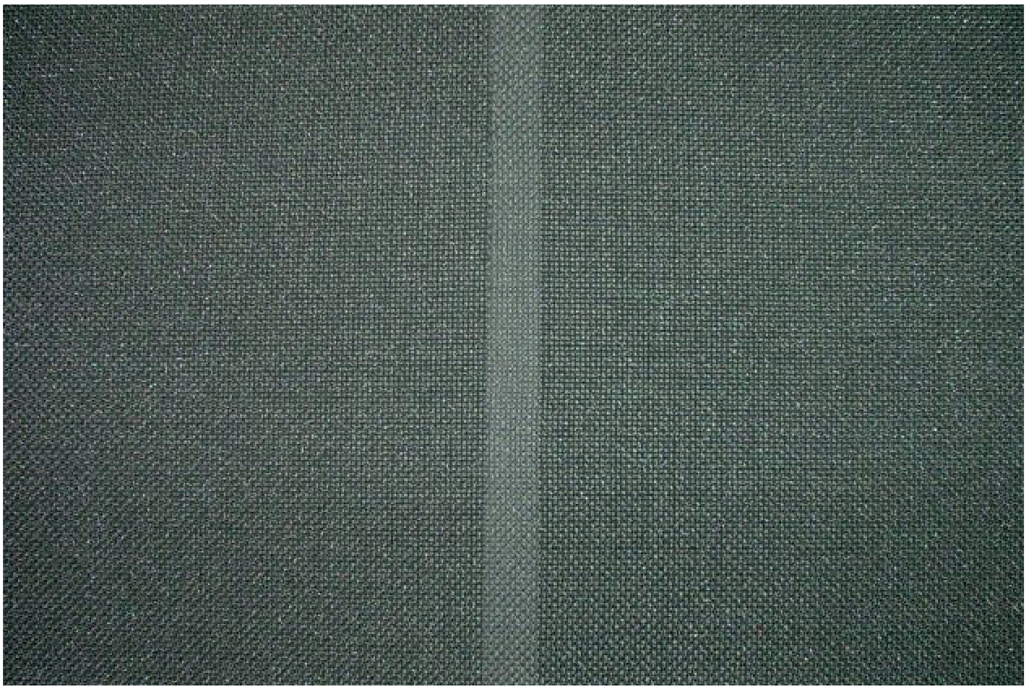


Figure 9.2.3 Possible optical changes in the area of bond seams

9.3 PVC / screen awning cloth

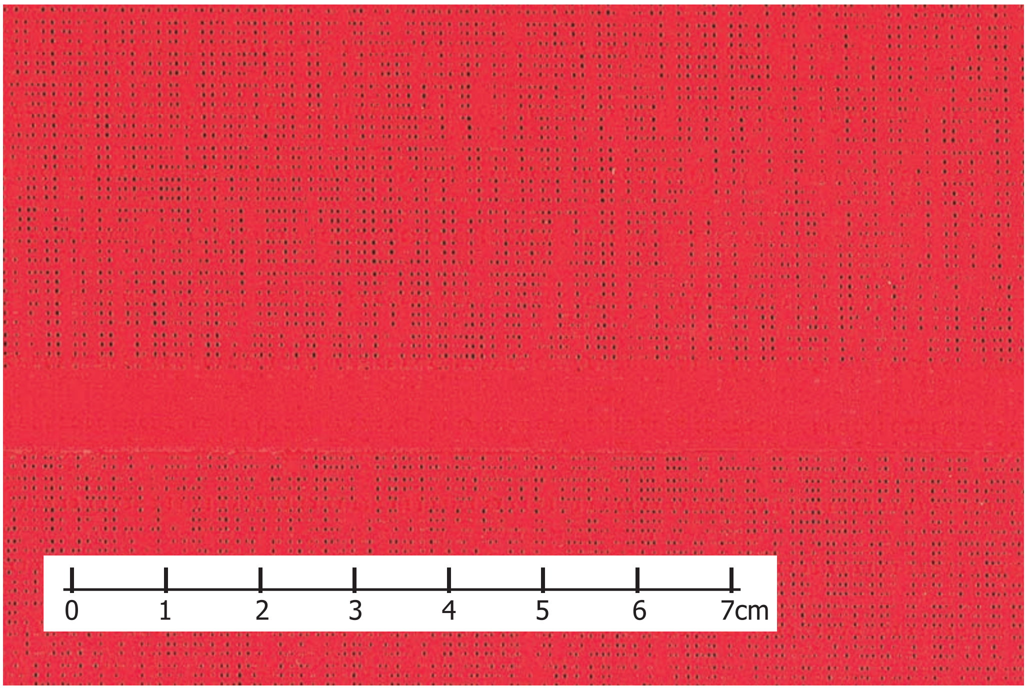


Figure 9.3.1 Permissible view of a high-frequency weld seam
Cause: Material compaction where there is welding of individual strips is permissible.

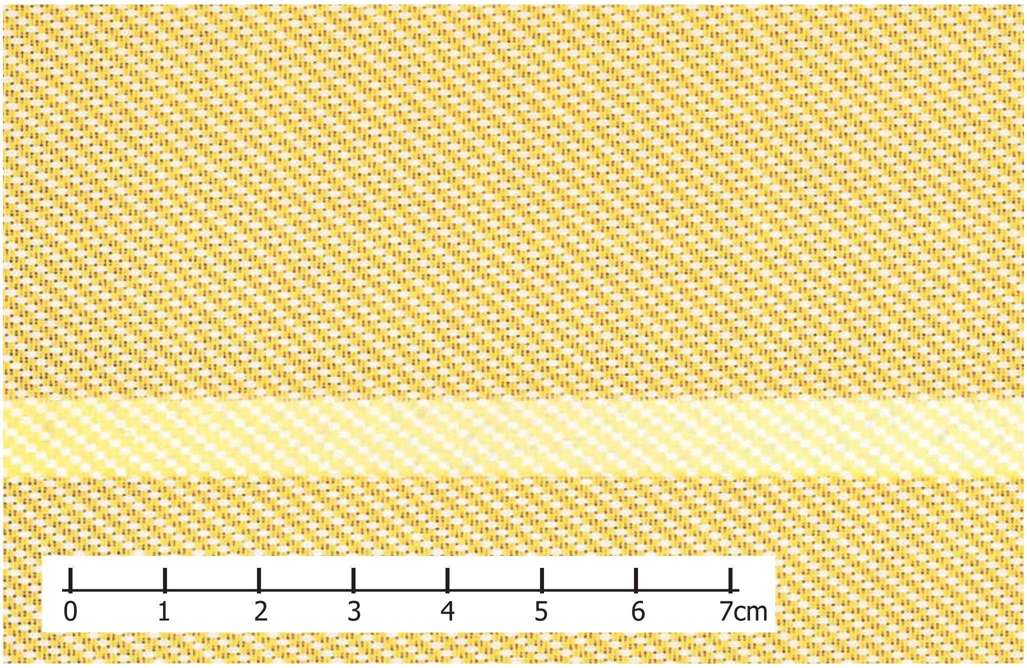


Figure 9.3.2 Glossy effect on the rear side of a high-frequency weld seam
Cause: Occurs due to material compaction depending on the electrode surface.

9.4 Zip-guided awnings (zip systems)

Figure 9.4.1 Possible permissible crease formation for zip systems in the lateral hem area (transition to zip)
Zip-guided cloth features slight creases, particularly at the edges. This can occur because the cloth and zip lie on top of one another and travel along different paths when wound. This causes the cloth, when rolled, to fold up several times and move beyond the edge. This is visible as a crease or ripple.
This phenomenon is compounded by adverse weather conditions.

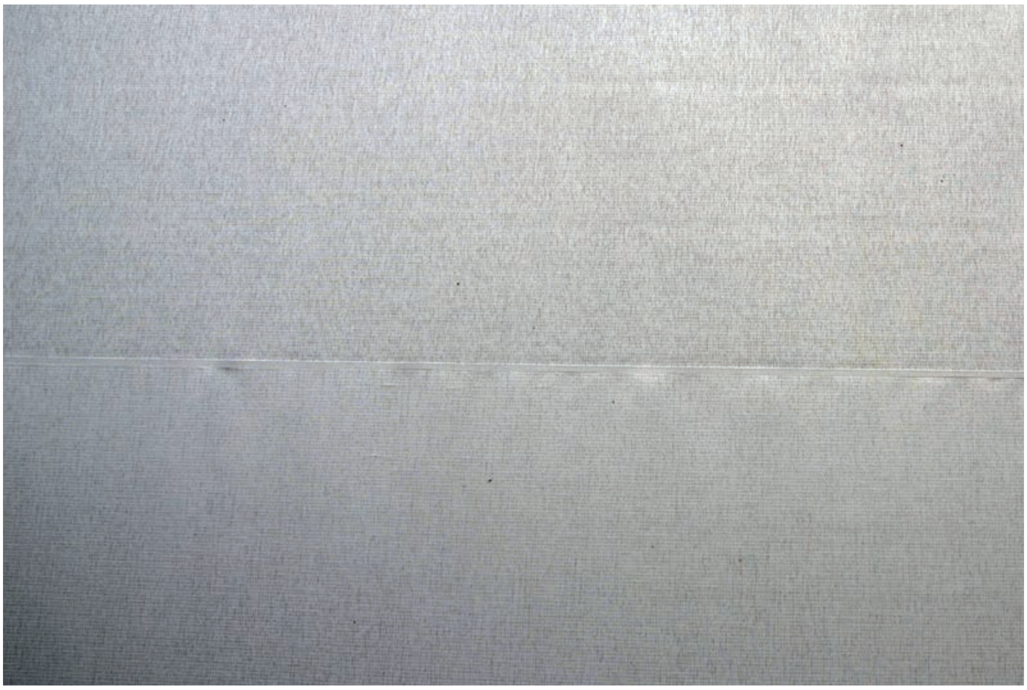


Figure 9.4.2 Possible permissible wrinkle formation for zip systems in the seam and hem area

For transversely manufactured cloth, light crease formation or gathering can occur in the area of the transverse seams.

Figure 9.4.3 Possible permissible deformation in the cloth surface for zip systems

Figure 9.4.4 Transverse impressions from winding onto the cloth roller may be visible in the cloth, in addition to transverse seam formation, see 4.2.7

Figure 9.4.5 PVC-viewing panels may develop score marks and scratches along with transverse streaks
Electrostatic charges can occur with greater frequency and attract greater amounts of dirt particles in the process.

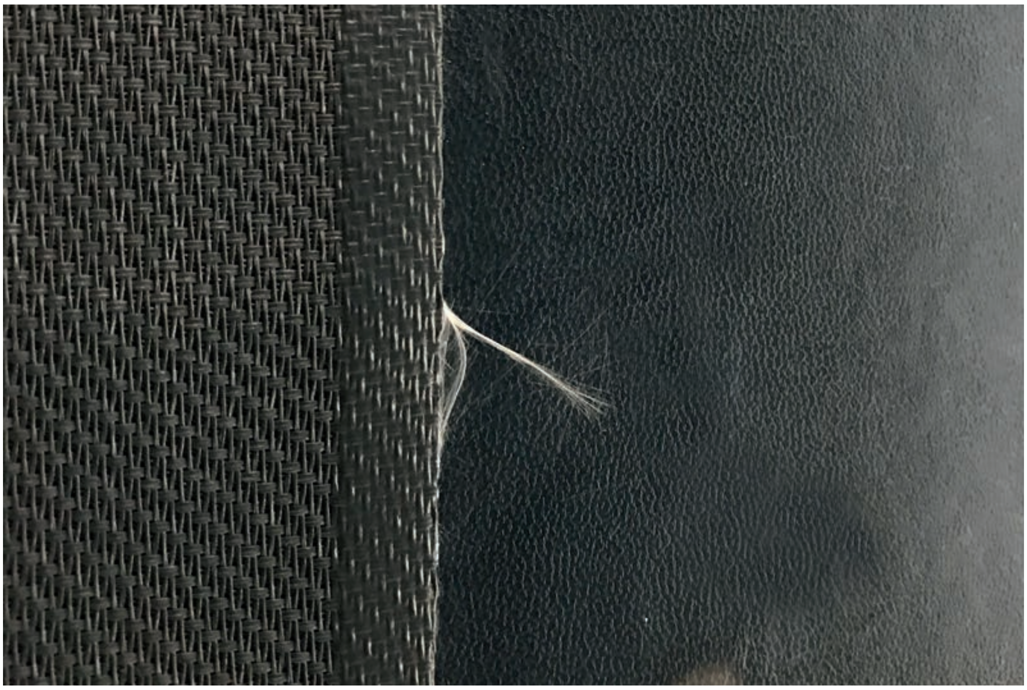


Figure 9.4.6 Cloth with viewing panel
Depending on temperatures, the various different physical characteristics of sun protection fabrics and PVC viewing panels can lead to ripple formation, fraying, curvature at the transition points and squeaking noises.

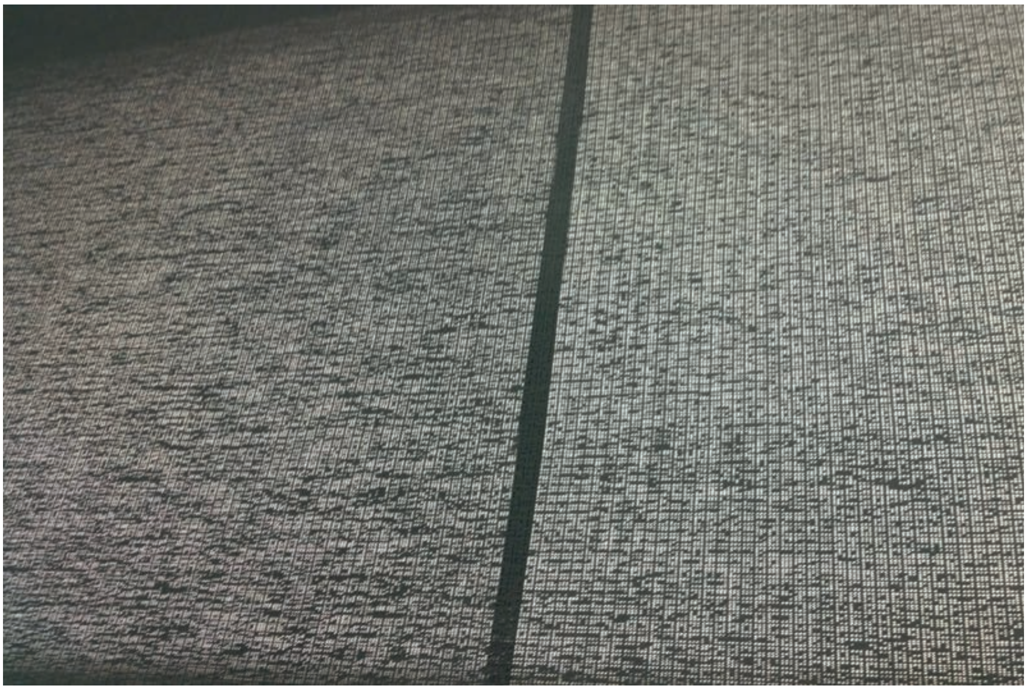


Figure 9.4.7 Transverse and vertical seams
Depending on the width of the product, for transverse seams in the normal case, beginning from below comprising full strips, for vertical seams: inverse manufacture. Seam positions are dependent on the product width. Varying fabric thickness in the area of the weld seams can lead to different incidences of light, i.e. against backlight, a part of the cloth can look darker / brighter.

Figure 9.4.8 V-shaped ripples
Cause: see 4.2.7

10. Legal notice

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Overview table for textile standards for awning fabrics

Main designation	Textilnorm	Standard for coated textiles
Tear propagation resistance (tongue-shaped test specimen method)	EN ISO 13937-4 Textiles – Tear properties of fabrics – Part 4: Determination of tear force of tongue-shaped test specimens (Double tear test) (ISO 13937-4:2000); German version EN ISO 13937-4:2000	- see Textilnorm
Water pressure resistance	EN ISO 20811 Standard, 1992-08 Determination of resistance of textile fabrics to water penetration; hydrostatic pressure test (ISO 811:1981); German version EN 20811:1992	DIN EN 1734 Standard, 1997-02 Rubber- or plastics coated fabrics – Determination of resistance to water penetration – Low pressure method; German version EN 1734:1996
Fastness to light	EN ISO 105-B02 Standard, 2002-07 Textiles – Tests for colour fastness – Part B02: Colour fastness to artificial light: Xenon arc fading lamp test (ISO 105-B02:1994 + Amd. 1:1998 + Amd. 2:2000); German version EN ISO 105-B02:1999 + A1:2002	- see Textilnorm
Fastness to weathering	EN ISO 105-B04 Standard, 1997-05 Textiles – Tests for colour fastness – Part B04: Colour fastness to artificial weathering: Xenon arc fading lamp test (ISO 105-B04:1994); German version EN ISO 105-B04:1997	- see Textilnorm
Resistance to water	EN 24920 Standard, 1992-08 Textiles; determination of resistance to surface wetting (spray test) (ISO 4920:1981); German version EN 24920:1992	- see Textilnorm
Climactic conditions for laboratory	EN ISO 139 Standard, 2005-04 Textiles – Standard atmospheres for conditioning and testing (ISO 139:2005); German version EN ISO 139:2005	- see Textilnorm

Main designation	**Textilnorm**	**Standard for coated textiles**
Material designation	ISO 2076 Standard, 2001-05 Textiles – Man-made fibres – Generic names (2001-05)	- see Textilnorm
Length and width	EN 1773 Standard, 1997-03 Textiles – Fabrics – Determination of width and length; German version	EN ISO 2286-1 Standard, 1998-07 Rubber- or plastics-coated fabrics – Determination of roll characteristics – Part 1: Methods for determination of length, width and net mass (ISO 2286-1:1998); German version EN ISO 2286-1:1998
Surface weight	EN 12127 Standard, 1997-12 Textiles – Fabrics – Determination of mass per unit area using small samples; German version	EN ISO 2286-1 Standard, 1998-07 Rubber- or plastics-coated fabrics – Determination of roll characteristics – Part 1: Methods for determination of length, width and net mass (ISO 2286-1:1998); German version EN ISO 2286-1:1998
Maximum force and elongation	EN ISO 13934-1 Standard, 1999-04 Textiles – Tensile properties of fabrics – Part 1: Determination of maximum force and elongation at maximum force using the strip method	EN ISO 1421 Standard, 1998-08 Rubber or plastics-coated fabrics – Determination of tensile strength and elongation at break (ISO 1421:1998); German version EN ISO 1421:1998
Tear propagation resistance (trouser-shaped test method)	EN ISO 13937-2 Textiles – Tear properties of fabrics – Part 2: Determination of tear force of trouser-shaped test specimens (single tear method) (ISO 13937-2:2000); German version EN ISO 13937-2:2000	- see Textilnorm

Overview table for DIN EN 13561

Main designation	Textilnorm	Standard for coated textiles
Colour fastness	EN ISO 105-A02 Standard, 1994-10 Textiles – Tests for colour fastness – Part A02: Grey scale for assessing change in colour (ISO 105-A02:1993); German version EN 20105-A02:1994	- see Textilnorm
Climactic conditions for laboratory	EN ISO 139 Standard, 2005-04 Textiles – Standard atmospheres for conditioning and testing (ISO 139:2005); German version EN ISO 139:2005	- see Textilnorm
Water pressure resistance	EN ISO 20811 Standard, 1992-08 Determination of resistance of textile fabrics to water penetration; hydrostatic pressure test (ISO 811:1981); German version EN 20811:1992	DIN EN 1734 Standard, 1997-02 Rubber- or plastics coated fabrics – Determination of resistance to water penetration – Low pressure method; German version EN 1734:1996
Fastness to weathering	EN ISO 105-B04 Standard, 1997-05 Textiles – Tests for colour fastness – Part B04: Colour fastness to artificial weathering: Xenon arc fading lamp test (ISO 105-B04:1994); German version EN ISO 105-B04:1997	- see Textilnorm
Maximum force and elongation	EN ISO 13934-1 Standard, 1999-04 Textiles – Tensile properties of fabrics – Part 1: Determination of maximum force and elongation at maximum force using the strip method	EN ISO 1421 Norm , 1998-08 Rubber or plastics-coated fabrics – Determination of tensile strength and elongation at break (ISO 1421:1998); German version EN ISO 1421:1998

The following guidelines and recommendations are available from **ITRS e.V.**:

- Richtlinie Sicherheitshinweise in Montage- und Bedienungsanleitungen für Markisen (Guideline on Safety Instructions in Installation and Operating Instructions for Awnings)
- Richtlinie zur technischen Beratung, zum Verkauf und zur Montage von Gelenkarmmarkisen (Guideline on Technical Consultation, Sales and Installation of Extending-Arm Awnings)
- Richtlinie zur Reinigung und Pflege von Markisentüchern (Guideline on Cleaning and Care of Awning Cloth)
- Verbandsempfehlung zu Funk in der Gebäudeautomation (Association Recommendation for Use of Radio Technology in Building Automation)
- Richtlinie zur Beurteilung der Produkteigenschaften von Raffstoren / Außenjalousien (Guideline for Evaluating Product Characteristics of External Venetian Blinds)
- Richtlinie zur Beurteilung der Produkteigenschaften von Markisen (Guideline for Evaluating Product Characteristics of Awnings)
- Guideline: Lehrinhalte, Zertifikat, Bestellung und Bescheinigung zur Elektrofachkraft für festgelegte Tätigkeiten im Rollladen- und Sonnenschutztechniker-Handwerk (Instructional Content, Certificate,Order and Verification for Electrical Specialists for Specified Duties in the Field of Skilled Shutter and Sun Protection Work)
- Verbandsempfehlung Lastannahmen durch Wind- / Sogkräfte auf den Randbereich von Werbebannern, die bei der Konfektion zu berücksichtigen sind (Association Recommendation for Load Assumptions Pertaining to Wind / Suction Forces that Must be Taken into Consideration for Manufacturing)
- Sun protection along emergency evacuation routes
- Verbandsempfehlung zur Bemessung von Fenstern mit Aufsatzrolllädenkästen (Association Recommendation for Measuring Windows with Attached Shutter Boxes)

In collaboration with:
Bundesverband Rollladen + Sonnenschutz e.V.
Hopmannstraße 2 • 53177 Bonn
Phone: 0228 95 210-0
Fax: 0228 95 210-10
e-mail: info@rs-fachverband.de
Homepage: www.rs-fachverband.de

Postal address:
Heinrichstr. 79 • D-36037 Fulda
Phone: 0661 90 19 60 11
Fax: 0661 90 19 63 20
e-mail: info@itrs-ev.com
Homepage: www.itrs-ev.com

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