

Visual Characteristics of Nordic Products

Introduction

Wood is a natural material. While growing, trees continuously adapt to numerous environmental factors, including climate, ecosystems, and gravity. This natural process results in multiple visual characteristics. Additionally, certain visual characteristics of Nordic products stem from the manufacturing process and should not be confused with structural defects. To ensure the highest visual standards, Nordic Structures adheres to stringent criteria when selecting wood elements for its mass timber products, supported by meticulous quality control at every stage of production. For more information on quality control and quality assurance, refer to technical note [NS-NT203](#).

This technical note aims to delineate the requirements for the visual characteristics of Nordic products at the time of manufacturing.

Nordic Products

Nordic Lam+ glued-laminated timber (glulam) consists of small wood laminations bonded together in parallel using structural adhesives to form beams and columns.

Nordic X-Lam cross-laminated timber (CLT) consists of at least three orthogonal layers of graded sawn lumber that are laminated by gluing with structural adhesives to form large panels.



Sample of Nordic Lam+



Sample of Nordic X-Lam

Appearance Grades

Appearance grades describe the extent of natural growth and manufacturing characteristics that are visible on the finished product. These grades are purely visual and do not affect the structural performance of the products. Nordic Lam+ and Nordic X-Lam products are typically manufactured with an architectural appearance grade.

Notes:

1. Visual inspections must be conducted at eye level and under standard lighting conditions.
2. Inspectors should maintain a reasonable distance from the item being examined.
3. Deviation from the following requirements is allowed up to 5% of the visible surface.

Natural Visual Characteristics

The natural growth cycle of trees results in multiple visual characteristics, which are considered in grading rules. It's worth noting that the National Grading Rule for Dimension Lumber (NGR) allows a maximum tolerance of 5% below grade.

Variation in colour within the same lamella

Variations in colour within the same lamella are marked variations from the natural colour, often appearing as irregularly shaped patches. Neither stained heartwood nor stained sapwood has any impact on mechanical properties. However, they do influence the appearance to different extents.

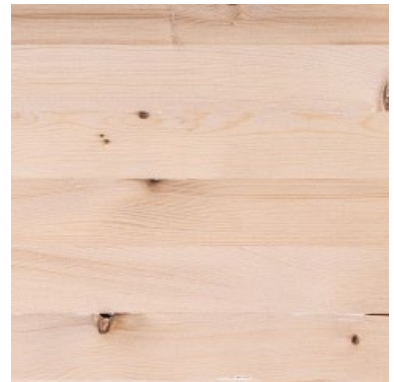
Requirement(s): No requirements. Variation in colour is an intrinsic characteristic of wood.



Variation in colour between lamellae

Nordic Lam+ is primarily made of black spruce, whereas Nordic X-Lam is made of spruce, pine, and fir. Variations in color can be observed both between lamellae of different species and within lamellae of the same species.

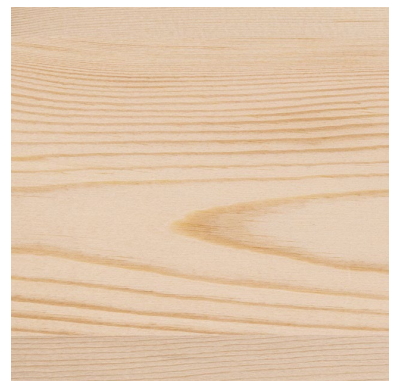
Requirement(s): No requirements. Variation in colour is an intrinsic characteristic of wood.



Wood grain

Annual rings are concentric circles on the cross-section of a tree trunk, formed each year by the cambium. They become visible due to the contrasting colours of the latewood and earlywood. Annual rings are visible on the tangential faces of sawn wood, constituting the wood grain.

Requirement(s): No requirements. Wood grain is an intrinsic characteristic of wood.



Wane

Wane is bark or lack of wood, for whatever cause, at the corner of a square-edged piece. Appearance requirements typically limit the presence of wane in structural lumber. Although the wood is trimmed to remove bark and minimize wane, it is often observed in black spruce lumber.

All occurrences of wane of approximately 9.5 mm (3/8 in.) in width are repaired, regardless of length. Wane up to a maximum length of 203 mm (8 in.) can be repaired using filler. For wane longer than 203 mm (8 in.), wood inserts are used for repairs.

Requirement(s): Unrepaired occurrences of wane must be less than 9.5 mm (3/8 in.).

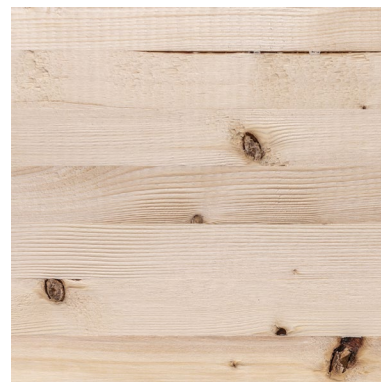


Knot

A knot is the portion of a branch or limb that has been surrounded by subsequent growth of the trunk or other portion of the tree.

Black spruce, the primary species used in Nordic products, is a slow-growing conifer, characterized by its long straight trunk and dense, short branches. These branches result in numerous small knots, commonly seen in Nordic products.

Requirement(s): No requirements. Sound knots are not a structural concern.



Knot hole

Knot holes form when a knot loosens from the surrounding wood. These holes may extend either partially or completely through the element. Holes that only partially penetrate the element are also known as surface holes.

In exposed surfaces, holes longer than 38 mm (1-1/2 in.) are repaired. Individual holes may exceed 38 mm (1-1/2 in.) in length if their area does not exceed 6.45 cm² (1 in.²).

Requirement(s): In exposed surfaces, unrepaired holes must be less than 38 mm (1-1/2 in.) in length or have an area less than 6.45 cm² (1 in.²).



Bark pocket

Bark pockets are openings between growth rings that contain or that have contained bark.

Requirement(s): No requirements. Bark pockets are not a structural concern.



Pitch pocket

Pitch pockets are openings extending parallel to the annual growth rings containing, or that have contained, pitch, either solid or liquid.

Coniferous species contain significant amounts of resin. When heated, the resin can liquefy into pitch and seep through the finish, causing it to drip from the wood in hot weather. Once the resin hardens, it can be easily scraped off with a sharp edge. Soft pitch can be removed using turpentine or mineral spirits. Sanding the wood surface and reapplying the finish may be necessary afterward.

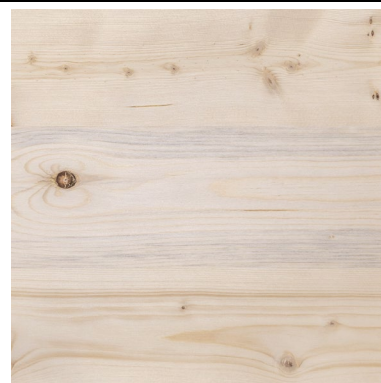
Requirement(s): No requirements. Pitch pockets are not a structural concern.



Blue stain fungus

Blue stain fungi are a bluish or grayish discoloration of the sapwood caused by the growth of certain dark-coloured fungi on the surface and in the interior of the wood which is not accompanied by deterioration of the wood.

Requirement(s): No requirements. In dry-service conditions, blue stain fungi are not a structural concern.



Check

Checking is a naturally occurring consequence of the seasoning process of wood. The outer fibres lose moisture to the surrounding atmosphere and attempt to shrink, but the inner portion of the timber member loses moisture at a much slower rate. The different rates of shrinkage can cause the wood to check or split. The checking (and shrinkage) process will stabilize as the moisture content of the member reaches equilibrium with the surrounding environmental conditions.

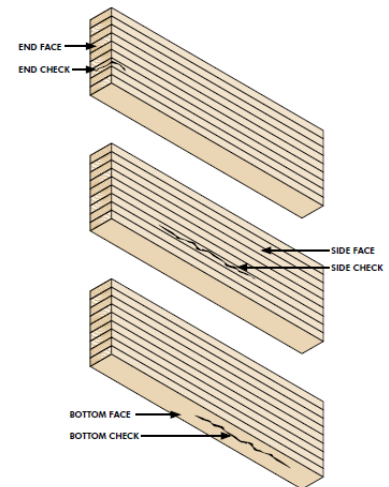
Nordic Lam+ glued-laminated timber is manufactured by bonding together small pieces of wood, roughly 1 x 2 inches (nominal), to create individual lamellas, which are then glued on their faces to form the final member.

Checks near bond lines should not be confused with delamination. Checks are openings that occur parallel to the natural grain of the laminations. They show the separated wood fibre on each exposed surface at the check openings. Delamination is the separation of layers in a laminate due to the failure of the adhesive, either in the adhesive itself or at the interface between the adhesive and the adherend. With delamination, the surfaces of the laminations at the opening are smooth. Delamination is highly unlikely in mass timber products.

Although checks are generally not a structural concern, they can alter the visual appearance of the member. If necessary, they can be addressed by following the guidelines outlined in the maintenance guide [NS-GE2](#).

Requirement(s):

- Members in compression (e.g., column or post) – Partial checking is not a structural concern. The only time a check becomes a structural concern is if it develops into a full-length (the entire height of the column or post, on both sides of the member). In this very unusual case, the structural capacity of the member should be confirmed by a qualified design professional.
- Members in bending
 - o End checks (end splits) – End checks with a length less than half the depth of the member pose no structural concern. For other cases, consult a qualified design professional.
 - o Side checks – Side checks that are no greater than one-third the width and one-third the length of the member have a negligible effect on the structural performance of the member. Side checks can appear at any depth of the member. For other cases, consult a qualified design professional.
 - o Bottom checks – Bottom checks parallel to the natural grain of the lumber are not considered to be of structural significance, even if they are the full depth of the face lamination. For other cases, consult a qualified design professional.

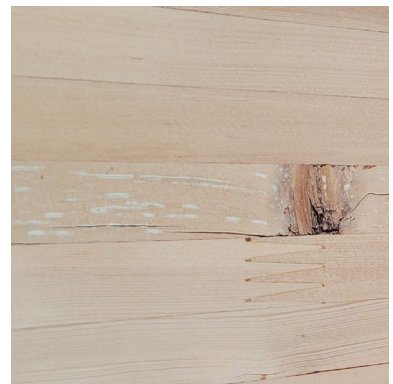


Reference: APA F450

White specks

White specks are caused by a fungus and generally have a negligible effect on the structural performance of the member. This fungus is not harmful and no longer grows when the wood is dry.

Requirement(s): White specks must remain occasional. In dry-service conditions, white specks are not a structural concern.

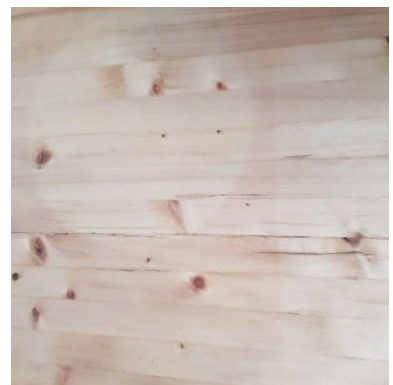


Discolouration

Discolouration can result from wood exposure to ultraviolet (UV) rays. The type and intensity of discolouration vary depending on the level of exposure.

To minimize discolouration, Nordic products are packaged for protection during transport. Additionally, a clear and penetrating protective undercoat is applied at the factory, unless otherwise noted. For more information on finishing Nordic products, refer to technical note [NS-NT205](#).

Requirement(s): No requirements. Discolouration is not a structural concern.



Manufacturing Visual Characteristics

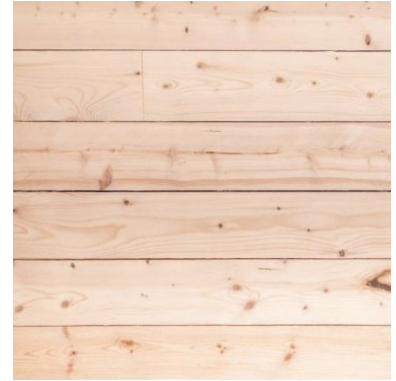
Certain visual characteristics of Nordic products stem from the manufacturing process and should not be confused with structural defects.

Gap between adjacent lamination edges – Face layers

Product(s): Nordic X-Lam

Laminations of Nordic X-Lam cross-laminated timber (CLT) are not edge glued. At the time of manufacturing, laminations in the face layers are tightly fit, and the gaps between adjacent laminations edges are minimal. However, these gaps can become more noticeable when the product is exposed to a dry environment.

Requirement(s): Edge joint gaps in face layers shall not exceed 6.4 mm (1/4 in.).

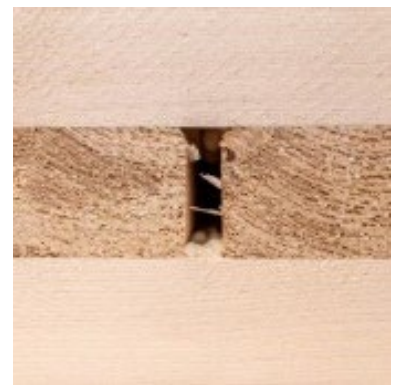


Gap between adjacent lamination edges – Other layers

Product(s): Nordic X-Lam

Laminations of Nordic X-Lam cross-laminated timber (CLT) are not edge glued. Gaps between adjacent lamination edges in layers other than the face layers are usually more pronounced and visible along the panel edges. It's important to note that the panel edges are not intended to be exposed.

Requirement(s): Edge joint gaps in layers other than the face layers shall not exceed 9.5 mm (3/8 in.).



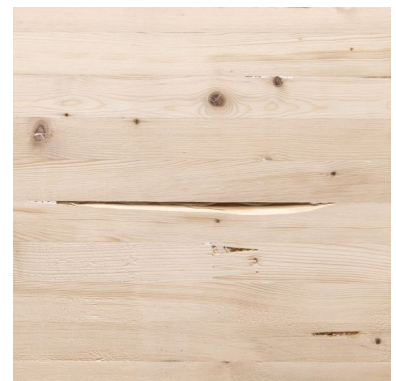
Miss

Product(s): Nordic Lam+ and Nordic X-Lam

Misses are cavities in laminations that occur when a section of wood or a dry resin pocket detaches during the planing process.

In exposed surfaces, misses longer than 38 mm (1-1/2 in.) are repaired. Individual misses may exceed 38 mm (1-1/2 in.) in length if their area does not exceed 6.45 cm² (1 in.²).

Requirement(s): In exposed surfaces, unrepaired misses must be less than 38 mm (1-1/2 in.) in length or have an area less than 6.45 cm² (1 in.²).



Torn joint

Product(s): Nordic Lam+ and Nordic X-Lam

Torn joints are sections of finger joints that are torn off during the jointing, planing, or sanding process.

In exposed surfaces, torn joint longer than 38 mm (1-1/2 in.) are repaired. Individual torn joints may exceed 38 mm (1-1/2 in.) in length if their area does not exceed 6.45 cm² (1 in.²).

Requirement(s): In exposed surfaces, unrepaired torn joints must be less than 38 mm (1-1/2 in.) in length or have an area less than 6.45 cm² (1 in.²).

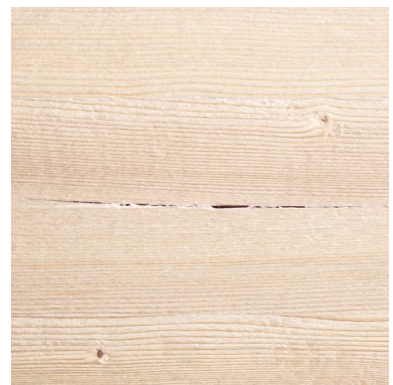


Non-lamination

Product(s): Nordic Lam+

Non-laminations are planing irregularities that prevent laminations from fully bonding together.

Requirement(s): A non-lamination, less than 300 mm (12 in.) in length and limited to one per bond line, can be considered as a check (refer to Natural Visual Characteristics – Checks). For other cases, contact Nordic Structures.



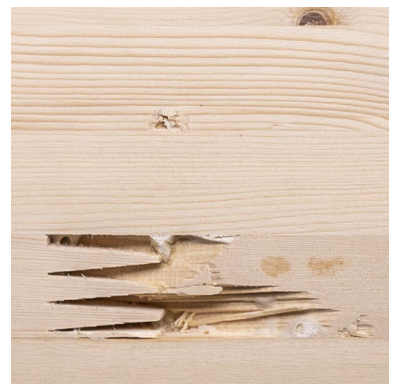
Void in finger joint

Product(s): Nordic Lam+ and Nordic X-Lam

Voids in finger joints are caused by crushing during the jointing process.

In exposed surfaces, voids longer than 38 mm (1-1/2 in.) are repaired. Individual voids may exceed 38 mm (1-1/2 in.) in length if their area does not exceed 6.45 cm² (1 in.²).

Requirement(s): In exposed surfaces, unrepaired holes in finger joint must be less than 38 mm (1-1/2 in.) in length or have an area less than 6.45 cm² (1 in.²).

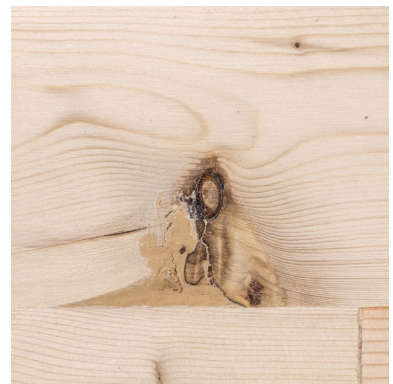


Wood-tone coloured filler repair

Product(s): Nordic Lam+ and Nordic X-Lam

Small holes may be filled with wood-tone coloured filler that blends with the final product.

Requirement(s): Wood-tone coloured filler repairs must remain occasional.

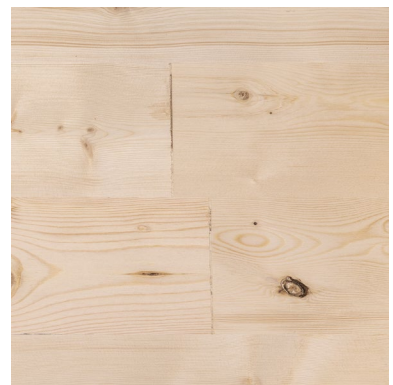


Edge joint

Product(s): Nordic Lam+ and Nordic X-Lam

The adhesives used in Nordic products have light beige-brown tint. Therefore, edge joints may be visible. In exposed surfaces, voids greater than 2 mm (1/16 in.) wide in edge joints are repaired.

Requirement(s): In exposed surfaces, unrepaired voids must be less than 2 mm (1/16 in.) wide.



Tearing off

Product(s): Nordic Lam+ and Nordic X-Lam

Tearing off occurs when there is a deviation in the grain or a small defect in the wood. It is typically caused by planing and sanding equipment. It can also be noticed around machined areas and edges.

In exposed surfaces, tears longer than 38 mm (1-1/2 in.) are repaired. Individual tears may exceed 38 mm (1-1/2 in.) in length if their area does not exceed 6.45 cm² (1 in.²).

Requirement(s): In exposed surfaces, unrepaired tears must be less than 38 mm (1-1/2 in.) in length or have an area less than 6.45 cm² (1 in.²).



Non-visible face mark

Product(s): Nordic Lam+

The non-visible faces of glued-laminated timber elements are marked with an X at the factory. These faces have an industrial appearance grade; thus, the previously mentioned criteria do not apply.

Requirement(s): X markings must be applied at the factory and be located on surfaces not exposed to view at final completion.

