RAAFT®

TECHNICAL MAINTENANCE & SERVICE MANUAL

TECHNICAL DATA SHEET

Project:

Client:

Date:

Last updated:
22.09.2025

TECHNICAL MAINTENANCE & SERVICE MANUAL

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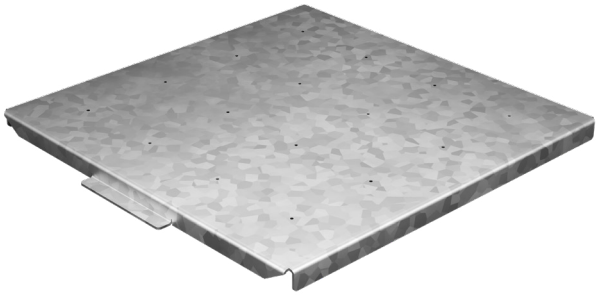

Adjustable Pedestal Systems

The system is designed to be maintenance-free; however, jet washing can be performed if desired. We recommend cleaning our adjustable pedestal products whenever they become accessible, such as during routine maintenance operations. Cleaning can be accomplished using compressed air or water hosing to remove dust and debris from the pedestals.

Floor Structure Panels

The Roof Tray product is typically made from pre-galvanised steel sheet. If the galvanised coating becomes chipped or the steel is exposed during installation, it is advisable to apply a galvanised paint to the affected areas to prevent corrosion.

For installations in areas subject to foot traffic, routine cleaning and maintenance may be necessary. Roof Tray products are cleaned to remove dirt, ensuring there is no crunching sound beneath the tiles. During routine maintenance operations, when the trays are accessible, general cleaning can be performed using laundry soap. To remove paint, white spirits are effective. After using white spirits, it is essential to rinse the surface thoroughly with water to ensure proper cleanliness and avoid residue.

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Surfaces

Atria, Farrino and Genova tiles

General Information

These instructions are designed to help you install all surfaces properly, safely and economically. Please refer to the Atria install guide for installation guidance.

Storage and Handling

To ensure safe delivery, tiles are securely packed in cardboard boxes to prevent movement during transit. Depending on the size and weight of the shipment, the boxes may be palletised. Until installation, the tiles should remain fully packed and stored in a dry environment. Please note: pallets should not be stacked on top of one another.

Disposal

Waste material may be disposed of with commercial waste. Larger quantities may be disposed of with bulk waste or taken directly to an appropriate waste disposal site. If in doubt, please contact your city and/or municipal administration to discuss appropriate methods of disposal.

Cleaning and Care

Our surfaces are easy to clean and resistant to most chemicals. They are UV stable and have a porosity of 0.01%. We recommend that porcelain tile products should have a cleaning program in place to ensure the product keeps a clean facial appearance. We would suggest this takes place once or twice a year although this can vary depending on the severity of localised weather and climate conditions.

Cleaning can be carried out using a high pressure cleaner with a fan-shaped beam at a distance of at least 20cm, in a lengthwise profile direction. Alternatively, tiles may be scrubbed using mild all-purpose cleaner and water.

To keep tiled areas clean on a day-to-day basis, we recommend regular sweeping followed by rinsing and brushing with water, a soft brush, and a mild all-purpose cleaner or suds.

Tile Breakage

A ceramic tile may fracture on impact if a heavy object falls on it from any significant height. Therefore we recommend you check the specific intended use before starting the installation and in certain conditions reinforcing must be applied to the back of the tiles. Failure to comply with these recommendations may lead to improper use of the product and could cause serious damage or injury. Raaft does not accept any liability caused by improper use or defective installation.

Warning: Wind uplift can cause loose-laid porcelain tiles to lift and move.

All roofs are subjected to the effects of wind uplift as the wind moves across them. The effects of this will depend upon a number of factors including location, height, size, roof shape and relationship to the surrounding area. In extreme cases, 2cm thick porcelain tiles have been lifted and propelled over a balustrade. It is therefore critical that a roof is analysed by a certified wind consultant and any concerns addressed with the necessary by the wind resistant solutions. For more information, please contact our technical advisers.

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Atria, Farrino and Genova tiles

Ground & Sub-base Suitability

The ground must be stable and properly compacted. If the ground is not sufficiently stable, this may lead to instability and potential damages to the construction and persons or property thereon.

Permissible Loads

Atria tiles have a breaking strength of >1500N and a breaking load class of U11 and T11. Further information can be found in the relevant data sheet. Misapplication may lead to damage to property or person. Please consult with an authorized stress analyst or structural engineer to check suitability of proposed application.

Installation of Atria tiles should be completed in compliance with all Health and Safety regulations pertaining to the application.

Technical Questions?

These installation instructions are designed for standard applications . Due to an unlimited variety of design options it is impossible to discuss all feasible options. If further questions or additional technical details are required please contact us by email at sales@raaft.co or by phone on +44 (0)20 3146 7879.

Validity

Our installation instructions are drawn up on the basis of current knowledge and may be adapted at any time and without prior notice. Please check if you have the most currently released version or if an update is available at raaft.co in the Specifier Hub.

Handling and Hazards

Heavy segments
Requires two persons to lift each segment or mechanical lifting device.

Sharp corners and edges
Wear gloves.

Heavy items
Wear steel toe protection.

Be safe
Wear high visibility clothing, hard hats and any other PPE required on site.

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Fire Rating

BS EN 13501-5 is the **British Standard (BS)** version of the **European Standard EN 13501-5**, which deals with the **fire performance of external thermal insulation composite systems (ETICS)** used in building construction. **Broof(t4)** is a specific classification within the **BS EN 13501-5** standard The term **Broof(t4)** refers to a **classification of the fire performance of a roof system** when exposed to fire from outside the building.

Breaking Down the Terms

- **B:** The **B** in **Broof (t4)** signifies the fire performance classification of the roofing system according to the European standard **BS EN 13501-5.** This standard categorizes roofs based on their resistance to external fire exposure, with **B** representing a high level of performance.
- **roof:** Refers specifically to the **roof system**, which includes the materials and insulation used on the exterior of the building.
- **t:** This refers to the **test method for external fire exposure**, meaning it is specifically related to the fire resistance of the roof when exposed to flames from **outside** the building, rather than fire starting from within the building.
- **4:** The **(4)** represents a **specific test criterion**. It indicates that the roof system has been tested under **severe fire conditions** that involve **flame spread** and **external fire exposure for up to 60 minutes.**

Key Points about Broof(t4)

1. **Broof(t4)** indicates that the roof system is **resistant to external fire exposure** for a certain amount of time (usually up to 60 minutes), meaning it will not allow the fire to spread quickly or lead to the ignition of the building's structure.
2. **Fire resistance:** In practical terms, a **Broof(t4)** classification means that the roof system has undergone fire testing that simulates an external fire scenario, such as **a fire spreading across a neighboring building's roof**, and the system has been shown to limit the spread of fire or prevent it from reaching the interior of the building.

Conclusion

In summary, **BS EN 13501-5 Broof(t4)** refers to a **fire performance classification for roof systems** that are designed to resist the spread of fire when exposed to flames from outside the building. It provides a measure of safety, ensuring that the roof system can withstand fire for up to 60 minutes without compromising the integrity of the building or allowing fire to spread. This classification is essential for building safety and compliance with fire regulations, especially in multi-story or densely packed urban environments.

A common source of confusion among people when it comes to **BS EN 13501-1** and **BS EN 13501-5** is understanding the differences in their application, particularly in relation to **roof terraces**.

Many mistakenly think that **BS EN 13501-1** applies to **roof terraces**,
but this is not the case. **BS EN 13501-1** classifies the **fire performance** of individual building materials when tested for **reaction to fire.** However, it doesn't specifically address the **fire performance of roofing systems** or **external applications** such as **roof terraces.**

In contrast, **BS EN 13501-5** and its classification **Broof(t4)** is designed specifically for **roofing systems.** This classification provides a **fire performance evaluation for roof systems exposed to external fire.** In particular, **Broof(t4)** ensures that the roof system can withstand external fire exposure and prevent flame spread for up to **60 minutes**, which is critical for **safety** on roof terraces.

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Slip Rating

When designing or assessing roof terraces for safety, particularly in relation to slip resistance, compliance with appropriate standards is crucial to prevent accidents, especially in wet or icy conditions. The required slip resistance ratings for roof terraces often depend on the type of surface material used and the specific usage of the space. These ratings are generally guided by **BS 7976-2:2002** (which measures slip resistance using a pendulum test) and **BS EN 13036-4:2011**, among others.

In general, there are two main systems used to classify slip resistance:

Pendulum Test

The **pendulum test** is one of the most common methods used to measure slip resistance. The test provides a **Pendulum Test Value (PTV)**, which correlates to the potential for slipping under various conditions (e.g., wet surfaces).

The **PTV** is given as a number (typically between 0 and 100), with **higher values indicating better resistance to slipping.**

- **PTV of 36+**: This is considered a **low risk** surface. Surfaces with a PTV of 36 or more are considered safe under typical wet conditions.
- **PTV of 25-35:** This is considered a **medium risk** surface. It may be acceptable for some roof terraces but should be used with caution in areas that are frequently exposed to water.
- **PTV of below 25:** This represents **high risk** for slips. Surfaces with a PTV below 25 are considered dangerous for use in wet conditions, and they should generally be avoided for roof terraces, especially in areas where water might accumulate.

Classification Based on Slip Resistance

The slip resistance classification is often defined by **BS 7976**.

Slip Resistance Categories:

- **R9 (Low):** This rating indicates a low level of slip resistance. These are generally not recommended for outdoor or wet areas.
- **R10 (Medium):** Suitable for areas with occasional water exposure, but may still present risks under wet or icy conditions.
- **R11 (Medium-High):** These are typically used in commercial outdoor spaces and may be acceptable for roof terraces, particularly those in sheltered or less frequently wet locations.
- **R12 (High):** Ideal for surfaces that will be frequently exposed to water, ensuring excellent slip resistance. This rating is usually the minimum requirement for roof terraces and other areas prone to water accumulation.
- **R13 (Very High):** Surfaces with this classification are suitable for environments that require the highest slip resistance, such as industrial areas, outdoor public spaces, and areas where water can pool.

Specific Recommendations for Roof Terraces

For roof terraces, especially those exposed to weather elements such as rain, snow, or frost, it's important to use materials that provide **high slip resistance.** Ideally, you should aim for **R12** rated materials to ensure safety, especially in wet or icy conditions. Additionally, the **PTV** should generally be **36 or higher** to minimize slip risk.

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Steel planters

Corten A Steel Planter Systems

We recommend that Corten products should have a cleaning program in place to ensure the product keeps a clean facial appearance. We would suggest this should take place twice a year although this can vary depending on the severity of localised weather and climate conditions.

Cleaning can be carried out using compressed air or water hosing to free dust and debris from the structure. Any surfaces not accessible for inspection and maintenance must be painted or coated. Painted Corten products should follow the 'Powder Coated Planter Systems' protocol below.

Untreated Steel Planter Systems

Untreated products should be maintained in the same manner as Corten products.

Powder Coated Planter Systems

Once powder coated planters arrive on site it is important to store them indoors or under shelter in a cool, dry environment out of direct sunlight and rain whilst it is in a packaged state. This will ensure that there is no discolouration or transfer of carefully applied protective packaging.

Powder coatings can be treated like most other paints and will benefit from regular washing. If the powder coating is chipped or the steel is exposed in any way, it is recommended that this should be 'touched up' using external grade paint.

Cleaning should take place every 6 months. A mild detergent applied by cloth, sponge or soft brush should be used. The aesthetic life will be prolonged by waxing or polishing with good quality car shampoos and waxes.

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Planters and integrated benches

Planter care & maintenance: CorTen® steel

The following information is intended as a brief technical reference guide to CorTen steel.

How CorTen Works

In the presence of water and air, all low alloy steels rust at various rates according to the amount of oxygen present in the atmosphere. With conventional steels, the rust layer becomes non-adherent and detaches from the metal surface – reducing the thickness of the material and consequently the effectiveness of the steel.

With CorTen steel, the process of rusting is initiated in the same way but the alloying elements used, e.g. chrome and copper etc., react to produce a 'patina' or (oxide film) which is much more dense
and therefore adheres tightly to the base metal. As the oxidation process develops over time, the 'patina' impedes the access of oxygen and moisture to the metal surface, thus reducing the 'rusting
process' considerably, giving increased performance to the steel.

The rapidity with which the steel develops its protective oxide film depends mainly upon the nature of the environment and exposure to the elements. In an industrial atmosphere, the weathering process will be quicker (particularly in the presence of sulphur), and the colour of the 'patina' darker than in a rural atmosphere.

Owing to the warming and drying action of the sun, metal surfaces exposed to the south and west (in the Northern Hemisphere) develop a smoother, more uniform 'patina' than those facing east and north. Higher temperatures permit more rapid conversion/dehydration of the corrosion products, whereas surfaces exposed away from the sun react more slowly; where the 'patina' may exhibit a somewhat granular texture.

Using CorTen Unpainted

CorTen is not a completely maintenance-free material. It should be inspected periodically according to its design and conditions of use to see that all joints and surfaces are performing satisfactorily. If necessary, maintenance is usually by cleaning with compressed air or water hosing to free dust and debris from the structure. Any surfaces not accessible for inspection and maintenance must be painted or coated.

- CorTen has been designed and manufactured to give excellent performance in particular and demanding applications. To obtain optimum performance from CorTen in the unpainted condition, the following points should be noted:
- To provide a sound, uniform surface for the formation of the protective 'patina', all exposed, unpainted CorTen surfaces (including welded areas) must be suitably prepared. The hot-rolled products should be blasted clean or pickled. Cold reduced and pickled sheets need only be cleaned to remove grease, oil or foreign products.
- Design features that could or will collect or retain water must be avoided such as pockets, crevices etc.
- Since any interruption in the surface can cause the oxide coating to develop unevenly, designers should consider the effect of the system construction, e.g. welding (see section on welding).

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Planter care & maintenance: CorTen® steel

- Moisture dripping from the steel, especially during the early years of exposure, will contain soluble iron salts which can stain or streak adjacent materials. This run off is particularly concentrated during the early years of 'patina' formation. This natural process in no way affects the performance of the steel. Designers have used gutters, pipes and dripping rims for the systematic drainage of this natural solution. Materials subject to minimal staining include glass, ceramic tile, glazed brick, porcelain coatings, washable air-drying and thermosetting organic coatings, extruded neoprene, and stainless steels. Materials subject to severe staining are concrete and stucco, galvanized steel, unglazed brick, matte porcelain enamels, stone, and wood.
- Damp debris on CorTen or contact with any materials which may retain moisture will accelerate corrosion.
- Interior surfaces of CorTen structures must be protected as though the material were ordinary-carbon steel.
- Unpainted CorTen is not suitable for severe marine or industrial environments.
- Applications which involve total submersion must be protected in a way which extends well above the ground line or high water line.
- Overlapping joints which may be subject to capillary action should be painted or sealed.
- Sealants that perform satisfactorily with CorTen are readily available.
- It may be necessary to paint CorTen which is in contact with other structural materials if galvanic reaction is a possibility.
- Materials used to mark CorTen for identification purposes should contain non-indelible compounds, or CorTen should be marked in areas that will be hidden after completion. Otherwise, marks will remain visible for many years unless blast cleaned after construction.
- The interior and all other unexposed surfaces of weather-resistant steel fascias can be prone to moisture accumulation from numerous sources including capillary action and condensation. The designer must therefore exercise great care in the detailing of such elements, ensuring that they are well ventilated and self-draining with no possibility of moisture entrapment.

Painting and Protection

In certain circumstances, which prevent the 'patina' forming, CorTen will require the same paint procedure as for carbon steel. It has been shown that CorTen prevents under-creep at areas of damage or degradation of the paint film. This will be beneficial as the areas of touch-up and repaint will not grow to any great extent, even after a prolonged period of time. Any damaged areas of bare metal will be protected by the subsequent forming of the protective oxide 'patina'.

Environmental Considerations

CorTen has been extensively used throughout the world where environmental considerations have been of prime importance such as the necessity to blend high strength steel structures with the natural environment. There are, however, a number of environments where CorTen cannot be used in its unpainted condition.

- In atmospheres where high concentrations of strong chemical or industrial fumes are present.
- Submerging in water or underground. In both cases, the performance will be the same as with carbon manganese steels.
- Conventional methods of protection such as concrete encasements, cathodic protection or a high quality paint system extended well above the water line and ground level can be used.
- Where the steel would be exposed to high concentrations or chloride ions which would occur from salt-water spray, salt fogs or airborne salts from a coastal environment.
- Salt adversely affects the 'patina' and because of its hygroscopic nature maintains a continuously damp environment on the metal surface.

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Planter care & maintenance: Fabrication

Cold Forming

CorTen steel sheet/plate can be formed using conventional means with good fabrication practices. The higher strength of CorTen means that it is necessary to use slightly greater forming pressures with more liberal bending radii than those normally used for mild steel to accommodate increased spring-back.

For sheet and plate up to 6mm thick, the minimum recommended internal forming radius is twice the thickness of the material.

For plate from 6mm to 13mm thick, the minimum recommended internal forming radius is three times the thickness of the material.

Cutting

Flame cutting e.g. oxy-acetylene, oxy-propane or plasma arc cutting can be carried out using the same procedures as with high yield carbon manganese steels of similar CEV and thickness. To avoid excessive hardening of the flame cut edges, and hence the danger of cracking; as a general rule, preheat temperatures similar to those of welding should be used.

Welding

CorTen has been used extensively in welded structures throughout the world. CorTen may be welded with the same facility as ordinary mild steel. However, its greater strength should be considered when selecting a welding procedure. For all welding procedures, appropriate minimum preheat temperatures should be used.

Although welding is straightforward, special procedures may be necessary to give matching weathering properties of the weld when the sheets/plates are to be used in exposed conditions.

In general, single pass welds can be carried out with carbon steel electrodes since there is usually sufficient pick-up of alloying from the parent material to give matching weathering characteristics. If multi-pass weld procedures are to be applied, special electrodes are required.

High Temperature Applications

Although CorTen steel was not developed for high temperature applications, subsequent test data has shown that the elevated temperature properties of CorTen steel are superior to those of plain carbon structural steels. CorTen A and, to a lesser extent, CorTen B have been used successfully in a number of non-critical applications that have not required specific pressure vessel alloy steels such as Cr-Mo.

CorTen A is of a greater interest than CorTen B for high temperature applications such as ductwork, chimneys and incinerators. Even in the absence of moisture at temperatures above 400°C, the 'patina' will still form. At temperatures of about 425°C and higher, CorTen A exhibits much better elevated temperature ductility than CorTen B. Tension, creep, and creep rupture tests conducted on CorTen A steel containing 1% chromium showed that the steel exhibits attractive high temperature properties up to 540°C (1000°F).

Examination of oxidation behaviour shows that there is an improvement by some 50 degrees Celsius in oxidation resistance of CorTen in the 500-700°C range for the same conditions. For example, under conditions which give 1mm/year oxidation loss on carbon or carbo/manganese steels, the temperature to give this loss on CorTen would be 50°C higher.

The precise improvement obtained with weather resistant steels is greatly dependent on the heating cycle experienced by the material and upon the environmental conditions prevailing.

NB. CorTen is not suitable for use in significant load bearing members above 450°C (approx.).

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Planters and integrated benches

Steel corrosion data

Description

The table below displays corrosion data applicable to the Raaft range of steel edgings and planters. The values show the amount of mm that “disappear” over a set number of years (5, 25, 50, 75, 100). These numbers are based on flat standard construction steel sheet S235, in contact with damp soil on one side. The results for CorTen A steel will be equal or better. Soil type is a key factor. The more aggressive the soil, the greater the levels of erosion.

SOIL TYPE	SINGLE SIDED EROSION (MM) – INTENDED LIFESPAN				
	5 YEARS	25 YEARS	50 YEARS	75 YEARS	100 YEARS
Dense clean soils	0.00	0.30	0.60	0.90	1.20
Contaminated loose soil	0.15	0.75	1.50	2.25	3.00
Acidic soil	0.20	1.00	1.75	2.50	3.25
Very dense soil (e.g. clay)	0.18	0.70	1.20	1.70	2.20
Aggressive soil	0.50	2.00	3.25	4.50	5.75

June 2017, Information source: Clusta vzw, Technologiepark 935, 9052 Zwijnaarde, +32 9 280 93 41

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Timber

Iroko

Iroko is a highly durable hardwood that is both insect and rot resistant, making it the ideal type of wood for street furniture products.

In external applications, Iroko wood should be left untreated without oiling to weather naturally as this will ensure best durability and consistency.

European oak

European oak is a premium hardwood renowned for its strength, durability, and attractive grain pattern. With excellent resistance to wear, decay, and weathering, it is a versatile choice for both indoor and outdoor applications, blending beauty with long-lasting performance.

Sapele

Sapele is a dense, durable hardwood prized for its rich reddish-brown colour and fine, interlocking grain. It offers excellent stability and resistance to wear, making it ideal for integrated benches.

European redwood

European redwood is a versatile softwood valued for its strength, workability, and natural warmth. With a pale reddish-brown hue and fine, straight grain, it is commonly used for furniture and integrated benches. It offers moderate durability and can be treated to enhance its resistance to weather and decay.

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Timber

how do i clean timber?

Durable timbers like European Oak and Iroko are best left untreated, requiring only the simplest future maintenance. As with all natural timber products exposed to the elements, the appearance of the surface will age and change with the seasons. Sunlight, wind, and rain will alter the timber's colour and texture, particularly during the first year after installation. Over time, the timber will develop a silver-grey patina when dry, darkening slightly when wet.

The moisture content of the timber will fluctuate with the seasons, ranging from over 20% in winter to as low as 10% in warmer, drier months. During the drying process in spring and summer, small cracks and fissures may appear, especially on the end grain. These features are natural characteristics of the timber and do not indicate deterioration or defects.

In rare cases, a more significant split may occur. If this happens, please notify us, as the affected component might need repair or replacement.

Maintenance is optional and generally limited to occasional cleaning. A suitable timber cleaning agent, such as a decking cleaner, works well and is widely available. To restore some of the original colour, a restoration product like Osmo Wood Reviver Power Gel can be used.

If the timber is in a north-facing or shaded area, especially near foliage or beneath overhanging trees, organic matter may accumulate on the surface. When wet, this residue might require scrubbing or careful scraping with a suitable bladed tool to remove it effectively.

cracks and splits

We recommend all external joints, gaps and end-grain are inspected and any defects repaired. If joints have opened, reseal them with break joint and end-grain sealers and if surface splits have opened; patch repair the protective coating with the appropriate topcoat.

why does the timber change colour and how can I stop it?

Timber naturally greys and discolours in sunlight regardless of the coating system applied or how much 'UV protection' the coating claims to offer. A light tint in the coating helps to disguise this "greying" and mask the patchy appearance which can be evident in the early stages as the sunlight bleaches the timber surface.

Discolouration usually results from moisture ingress either through open joints and gaps or where the timber surface has split; disrupting the protective coating. When this occurs the surface of the underlying timber will turn black as the moisture reacts with timber's naturally occurring tannic acid. The blackening is not rot, and does not affect the structural integrity of the timber, but it can be visually unappealing. Where only localised 'blackening' has occurred, a detailed sander, is often the quickest way to remove the affected layer. Feather back the sanded area into the surrounding unaffected area then reinstate the coating system. If more extensive blackening has occurred, chemical treatment will be necessary.

The discolouration is typical of that caused by moisture reacting with the natural acidic tannins in the oak surface and occurs where the protective coating is mechanically disrupted either by joints opening, the surface splitting, or warping or twisting of the wood section. If staining is extensive, the black colour can be removed using a solution of Oxalic acid. This treatment will return the timber surface to an even tone similar to its original colour and the protective finish can then be reapplied once any remedial work on joints etc. has been completed.

Before treatment, remove the protective coating from the affected timber. This is best done with a detail sander using a coarse, then fine, grit pad. Oxalic acid is supplied as dry crystals and is available from most hardware stores or on the internet. To treat discoloured timber, make up a saturated solution of the crystals in a plastic bucket using approximately 4 tablespoons of Oxalic acid crystals to 1 pint of hot water.

Treatments will raise the grain of the wood, which must be allowed to dry thoroughly (at least overnight) before sanding down the raised grain with a fine grade sanding pad.

Repair any defects in the joinery, and reinstate the protective coating system, remembering to reseal all joints and end grain.

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Warranty

"Warranty Period" (i) twelve (12) months or (ii) in relation to the following manufacturers' products supplied as the Goods or as part of the Goods, as follows:

- "Preventa" and "Versajack" products – 30 years;
- "Structa" products – 15 years;
- Surfaces (in the following styles: Atria, Farrino, Genova and Nova) – 15 years; and
- "Planterline" Bespoke Products – 3 years.

"Writing": includes facsimile transmission, electronic mail and other comparable means of communication and "Written" shall be construed accordingly.

Goods Warranty

12.1 The Seller warrants that on installation and for the relevant Warranty Period the Goods shall:

12.1.1 conform in all material respects with their description and the specification set out in the Quotation;

12.1.2 be free from material defects in design, material and workmanship; and

12.1.3 be of satisfactory quality (within the meaning of the Sale of Goods Act 1979).

12.2 Subject to clause 12.3, if:

12.2.1 the Buyer gives notice in Writing to the Seller during the Warranty Period and within 30 days of discovery that some or all of the Goods do not comply with the warranties set out in clause 12.1;

12.2.2 the Seller is given a reasonable opportunity of examining such Goods; and

12.2.3 the Buyer (if asked to do so by the Seller) returns such Goods to the Seller's place of business at the Seller's cost, the Seller shall, at its option, repair or replace any Goods that are found to be in breach of clause 12.1, or refund the price of such defective Goods in full.

12.3 The Seller shall not be liable for the Goods' failure to comply with the warranties set out in clause 12.1 above, in any of the following events:

12.3.1 the Buyer has not paid for the Goods supplied under any Contract by the due date or is otherwise in breach of the Seller's Terms and Conditions of Sale or any other contract made with the Seller;

12.3.2 the Seller or its servants or agents are denied full and free right of access to the allegedly defective Goods in order to examine the Goods in accordance with clause 12.2.2.

12.3.3 the defect or failure is as a result of, or caused by, wilful damage (including an act of vandalism), dirt, negligence, mis-use;

12.3.4 the defect arises as a result of or in respect of any paint, sealant, coating (including powder coating) or other product applied to the Goods;

12.3.5 the defect arises as a result of fair wear and tear or abnormal storage or working conditions;

12.3.6 accidental damage to the Goods has been caused by the Buyer or any member of the public;

12.3.7 the defect arises because the Buyer failed to follow the Seller's oral or written instructions as to the storage, commissioning, installation, use and maintenance of the Goods or (if there are none) good trade practice regarding the same;

12.3.8 the Buyer alters or repairs such Goods without written consent of the Seller;

12.3.9 the defect or failure arises as a result of any inaccurate or incomplete information or details supplied by the Buyer or as a result of any defect or inaccuracy in any patterns, equipment or other property of the Buyer;

12.3.10 the Buyer makes any further use of such Goods after giving notice of defects in accordance with clause 12.2;

12.3.12 a force majeure event occurs as set out in Clause 17;

12.3.13 the Goods differ from their description and/or specification as a result of changes made to ensure they comply with applicable statutory or regulatory requirements.

12.4 The Seller's only liability to the Buyer if the Goods fail to comply with the warranties set out in clause 12.1 is as set out in clause 12.2.

12.5 The terms implied by sections 13 to 15 of the Sale of Goods Act 1979 are, to the fullest extent permitted by law, excluded from the Contract.

12.6 The terms of this clause 12 shall continue and apply to any repaired or replacement Goods supplied by the Seller, but only to the extent of the Warranty Period as set out in clause 12.1.

12.7 The Supplier warrants to the Buyer that the Services will be provided using reasonable care and skill and that the Services will be provided in accordance with the Contract in all material respects.

12.8 The Supplier has given commitments as to compliance of the Services with the Contract in clause 12.7. In view of these commitments, the terms implied by sections 3, 4 and 5 of the Supply of Goods and Services Act 1982 are, to the fullest extent permitted by law, excluded from the Contract.

12.9 A reference to 'Goods' in this clause 12 is to the Goods as a whole or to the relevant product within the Goods where a Warranty Period is stated to apply to a particular product in clause 1.1.1.

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