



MADE FOR LIFE UNDER THE SUN



# Before You Approve the Material

---

**A guide to what outdoor structures are made of**

What outdoor structures are made of, why the differences matter, and what to ask before the material is agreed.

MEMBRANES · FABRICS · STEEL · COATINGS · METALS · CONNECTIONS

**Performance Beyond Installation.**

## CONTENTS

# What is in this guide

Twenty-seven sections in five parts. It is written to be read straight through once and then used as a reference — one section per material, always in the same order.

### PART ONE — HOW TO THINK ABOUT MATERIALS

- 01** Why materials matter
- 02** A material is not a system
- 03** Fit for purpose, not price
- 04** What materials face in this region

### PART TWO — THE COVERING LAYER

- 05** Shade fabric or structural membrane?
- 06** PVC-coated polyester
- 07** PTFE-coated glass fibre
- 08** HDPE knitted shade fabric
- 09** Awning and tent fabrics
- 10** When the covering is a rigid sheet

### PART THREE — MEMBRANE BEHAVIOUR

- 11** Material is part of geometry
- 12** Patterning, compensation and fabrication

### PART FOUR — THE STRUCTURE BENEATH

- 13** Steel: more than thickness and appearance
- 14** Corrosion protection and coating systems
- 15** Aluminium and architectural metal
- 16** Stainless steel, cables and tension components
- 17** Fasteners and the details that matter
- 18** Foundations and material interfaces

### PART FIVE — LIVING WITH THE CHOICE

- 19** What you see and what you cannot
- 20** How materials age
- 21** Material compatibility
- 22** Choosing for the life of the asset
- 23** Comparing material proposals

- 24** Maintainability, repair and replacement
- 25** Conscious material selection
- 26** Common material myths
- 27** The material decision checklist

## HOW TO USE THIS GUIDE

# Two levels, one document

This guide serves a homeowner deciding what to accept in a quotation and a procurement manager reviewing a material submittal. Rather than write two documents, it is written at two depths.

| ELEMENT                              | WHO IT IS FOR                     | WHAT IT DOES                                                                                                                                      |
|--------------------------------------|-----------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------|
| The running text                     | Everyone                          | Plain language, no assumed knowledge. Read every section start to finish and you will understand the material and why it matters.                 |
| "For facility and procurement teams" | Technical and procurement readers | Specification language: what to require, what to verify, what to hold at handover. A general reader can skip every one of these and lose nothing. |
| "Questions to ask"                   | Everyone                          | Three or four questions that work as well across a kitchen table as across a tender review.                                                       |

## Where this guide sits

ZIL Shades publishes a connected set of guides. Each answers a different question:

| GUIDE                                        | THE QUESTION IT ANSWERS                                                                                                 |
|----------------------------------------------|-------------------------------------------------------------------------------------------------------------------------|
| Before You Buy Shade                         | Should I add an outdoor structure at all, what type suits my situation, and what should I ask before I sign?            |
| Before You Issue the RFQ                     | How do I specify, procure, evaluate and hand over the asset?                                                            |
| Before You Approve the Material — this guide | What is the asset made of, why does that matter, and what should I understand before the material decisions are agreed? |
| The Maintenance Guide                        | How should the asset be inspected, maintained and managed across its life?                                              |



**ZIL**  
SHADES

MADE FOR LIFE UNDER THE SUN

BEFORE YOU APPROVE THE MATERIAL

#### WHAT THIS GUIDE DOES NOT CONTAIN

No grades, coating thicknesses, fire ratings, strength values, service lives, warranty periods or standards are stated here. Those belong to a manufacturer's data sheet or a project specification, and a number invented for a guide would be worse than no number at all.

What you will find instead is how each material behaves, what attacks it, what it needs, and the questions that get you a real answer from whoever is proposing it.



# How to think about materials

---

A structure does not perform according to the quality of its most impressive material. It performs according to the behaviour of the complete system.

- 
- 01 Why materials matter
  - 02 A material is not a system
  - 03 Fit for purpose, not price
  - 04 What materials face in this region

## 01 Why materials matter

Two car park shades stand a hundred metres apart. Same span, same colour, same shape. One was installed six years ago and still looks close to new. The other went up two years ago and is already streaked, slack and rusting at the base plates.

Nothing about their appearance on the day they were handed over would have told you which was which. The difference was decided earlier — in the fabric that was chosen, the coating on the steel, the grade of the fixings, and how well those choices suited the place they were going.

This is why material decisions deserve attention even from people with no interest in materials. They are the decisions that determine what an asset looks like in year five, how much it costs to keep, whether it can be repaired when something goes wrong, and whether it is still standing when you expected it to be.

This guide is written to make those decisions legible — not to make you a materials engineer.

## 02 A material is not a system

It is tempting to think of an outdoor structure as a list of materials: so much steel, so much fabric, some bolts. But no material performs on its own.

A tensile shade is a membrane, its edge details, its cables, the plates and bolts that hold them, the steel members, the coating on that steel, the connections, the foundations and the route the water takes off the whole thing. Each element behaves in a way that depends on the others. Change the membrane and you change the forces in the steel. Change the coating and you change how long the connections last. Block the drainage and you change what the fabric is carrying.

THE PRINCIPLE THIS GUIDE IS BUILT ON

**A structure does not perform according to the quality of its most impressive material. It performs according to the behaviour of the complete system.**

An excellent membrane on an under-designed frame is not an excellent structure. A well-engineered frame with the wrong fasteners at the coast is not a well-engineered structure either.

Every material in this guide is therefore described in terms of the job it does within a system. To keep that consistent, each one is examined through the same seven layers.

| LAYER                    | WHAT IT DOES                                 | MATERIALS COVERED HERE                                                |
|--------------------------|----------------------------------------------|-----------------------------------------------------------------------|
| Covering                 | Keeps sun, rain and dust off the space below | Coated membranes, shade fabrics, awning and tent fabrics, rigid sheet |
| Primary structure        | Carries load down to the ground              | Steel and aluminium members                                           |
| Tension and connection   | Transfers force between elements             | Cables, fittings, plates, bolts, edge details                         |
| Protection               | Keeps the structure from degrading           | Galvanising, paint, powder coating, anodising                         |
| Ground interface         | Resists uplift and overturning               | Foundations, base plates, anchors                                     |
| Water management         | Controls where water goes                    | Gutters, outlets, drainage details                                    |
| Secondary and decorative | Appearance, comfort and finish               | Louvres, trims, fascias                                               |

### 03 Fit for purpose, not price

There is a habit of thinking about materials as a ladder: cheap at the bottom, expensive at the top, better as you climb. It is a poor guide to good decisions.

A heavy architectural membrane over a temporary compound is money spent on a life nobody will use. A light shade cloth over a hospital entrance is a different kind of error, and a more serious one. Neither material is wrong in itself. Both are wrong where they were put.

## THE PRINCIPLE

Materials should not be chosen because they are the cheapest, the most expensive, the most fashionable, or because they were used on another project. They should be chosen because they are appropriate to the asset, its environment, its structural role and its expected life.

To make that assessable rather than intuitive, every material in this guide is examined through the same five questions, always in this order.

| # | QUESTION                                                                        | WHY IT DECIDES THINGS                                                                                                                                                                                     |
|---|---------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1 | What is its structural role — decorative, protective, or structurally critical? | A decorative element that fails is a nuisance. A structurally critical one that fails is an incident. The two do not warrant the same level of attention or documentation.                                |
| 2 | What in this environment attacks it?                                            | Ultraviolet light, heat, dust, moisture and salt do different things to different materials. A material is only durable relative to what it is exposed to.                                                |
| 3 | How long does it last relative to the asset?                                    | Some materials are meant to last as long as the structure. Others are planned replacements within its life. Confusing the two is one of the most common and expensive misunderstandings in this category. |
| 4 | Can it be maintained, repaired or replaced on its own?                          | A component that can only be renewed by dismantling the structure turns routine maintenance into a project.                                                                                               |
| 5 | What happens if it fails?                                                       | Nuisance, operational disruption, or structural consequence. This is what determines how much rigour the choice deserves.                                                                                 |

#### THE IDEA IN QUESTION THREE, SPELLED OUT

Most buyers assume every part of a structure has the same life. They do not. In a well-made shade structure the frame and foundations are usually the long-life elements, while the covering is closer to a consumable — expected to be renewed at some point within the life of the asset it sits on.

That is not a defect and it is not bad news. It is a planning fact. It means the right question about a membrane is not only “how long will it last?” but “when it is replaced, can it be replaced without rebuilding everything under it?”

## 04 What materials face in this region

A material specification that would be entirely sensible in a temperate climate can be the wrong answer here. Five conditions do most of the work, and they act together rather than in turn.

| CONDITION                   | WHAT IT DOES TO MATERIALS                                                                                                                                                                                   | WHAT IT ARGUES FOR                                                                                                                                 |
|-----------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------|
| Ultraviolet light           | Breaks down polymers, fades pigments, chalks coatings, embrittles unprotected plastics. It acts continuously through the year, not seasonally.                                                              | Materials with genuine UV stabilisation or inherently UV-stable coatings; colour and finish chosen knowing they will change.                       |
| Heat and thermal cycling    | Everything expands and contracts, daily and by a large margin between night and afternoon. Different materials move by different amounts.                                                                   | Connections that allow movement; fixings that do not rely on a rigid fit; awareness of where two materials with different movement meet.           |
| Dust                        | Settles in every joint, fills drainage outlets, holds moisture against metal, and abrades fabric wherever anything moves against anything else.                                                             | Surfaces that shed dirt rather than hold it; drainage that can be reached and cleared; finishes that survive cleaning.                             |
| Moisture, humidity and salt | Drives corrosion. Near the coast, salt-laden air changes what an adequate protection system looks like — two identical structures a few kilometres apart may not need the same coating or the same fixings. | Protection specified for the actual location, not for the region in general; particular care at connections, cut edges and anywhere water can sit. |

| CONDITION                | WHAT IT DOES TO MATERIALS                                                                                           | WHAT IT ARGUES FOR                                                                               |
|--------------------------|---------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------|
| Wind and rare heavy rain | Wind fatigues, loosens and abrades over time. Rain arrives seldom and then tests every drainage assumption at once. | Materials and details that tolerate repeated movement; water paths designed rather than assumed. |

#### FOR FACILITY AND PROCUREMENT TEAMS

Two implications for specification. First, **exposure should be stated in the enquiry**, particularly coastal proximity — it changes coating systems, fastener selection and sometimes the covering itself, and a supplier who is not told will price for the general case. Second, **thermal movement is an interface question**: where the structure meets an existing building, or where two different metals meet, ask how movement has been accommodated rather than assuming it has.



# The covering layer

---

Not every fabric that provides shade is suitable to be part of an engineered structure.

- 
- 05 Shade fabric or structural membrane?
  - 06 PVC-coated polyester
  - 07 PTFE-coated glass fibre
  - 08 HDPE knitted shade fabric
  - 09 Awning and tent fabrics
  - 10 When the covering is a rigid sheet

## 05 Shade fabric or structural membrane?

This is the most useful distinction in the guide, and the one most often missed.

Some fabrics are made to provide shade. They cut sunlight, they are usually permeable — air and water pass through them — and they are held up by a frame or by cables that do the structural work.

Other fabrics are coated membranes. They are impermeable, they are tensioned into a specific three-dimensional shape, and the fabric itself is part of the structure. The curvature and the tension in the cloth are doing engineering work; the shape is not decoration.

Both are legitimate. Both are widely used. But they are not interchangeable, and a quotation that says only “fabric” has not told you which one is being proposed.

|                    | SHADE FABRIC                                         | STRUCTURAL MEMBRANE                                                       |
|--------------------|------------------------------------------------------|---------------------------------------------------------------------------|
| What it does       | Reduces sunlight and glare                           | Forms part of the structure and carries load                              |
| Water              | Generally permeable — rain passes through            | Impermeable — water must be drained somewhere                             |
| Wind               | Air passes through, reducing load on the frame       | Catches wind; load goes into the structure and the foundations            |
| Shape              | Follows the frame or the cables                      | The shape is engineered, and the tension holds it                         |
| Typical use        | Car park shading, play areas, sail shades, screening | Tensile canopies, feature structures, weatherproof cover                  |
| Failure looks like | Tearing, sagging, UV degradation, seam failure       | Slackness, ponding, tearing at boundaries — and load changes in the frame |



#### WHY IT MATTERS COMMERCIALY

A structure covered with permeable shade fabric and a structure covered with a coated membrane impose different loads on their frames and foundations. They are not the same asset, and a price difference between them may be entirely legitimate.

**Not every fabric that provides shade is suitable to be part of an engineered structure.**

If a proposal changes the covering type, it has changed the structure, and the engineering should follow.

#### QUESTIONS TO ASK

Is the covering a shade fabric or a coated structural membrane? · Does rain pass through it, or does it have to be drained? · If the covering type changed during design, was the structure re-checked?

## 06 PVC-coated polyester

The most widely used structural membrane in the region, and the one most people are looking at when they see a tensile shade or a car park canopy.

It is a woven polyester base cloth coated on both faces with PVC. The polyester provides the strength; the PVC makes it weatherproof, gives it its colour and protects the fibres from ultraviolet light. A thin surface lacquer is usually applied on top of the PVC to improve how the surface resists dirt and holds its colour.

Its practical virtues are that it can be welded rather than sewn, which makes for strong, weatherproof seams; it is repairable, often by welding a patch; it is produced in a range of weights and finishes; and it is comparatively economical for the performance it delivers.

Its limits are equally practical. The PVC and the surface lacquer are the parts exposed to sunlight, and they are what age. Over years, colour shifts, surfaces collect dirt, and the material becomes less flexible than it was. Cheaper grades and thinner lacquers age faster and less gracefully. Dirt pickup is very visible on light colours — which is an appearance question, not a structural one, but it is the one clients notice.



#### FOR FACILITY AND PROCUREMENT TEAMS

This is a family of products, not a single material, and the differences between grades within the family are larger than most buyers assume. A submittal should identify **the manufacturer, the product reference, the weight class, the coating and the surface treatment**, and be accompanied by the manufacturer's own data sheet and warranty – which is separate from the installer's warranty and should be assigned to you where possible.

Where a proposal offers an equivalent to a specified product, the comparison should be made on the same set of published characteristics rather than on the word “equivalent”.

#### QUESTIONS TO ASK

Which manufacturer and which product? · What surface treatment does it carry, and what does that do? · Is there a manufacturer warranty separate from the installation warranty? · If a panel is damaged in year four, can it be repaired in place?

## 07 PTFE-coated glass fibre

The material used where a membrane structure is expected to be permanent and to look permanent. It is a woven glass fibre cloth coated with PTFE.

Both components are unusually stable. Glass fibre does not degrade in sunlight the way a polymer does, and PTFE is chemically inert and very resistant to ultraviolet light. The surface is also extremely low-friction, so it tends to shed dirt rather than hold it, and rain does a substantial part of the cleaning. Structures made from it typically hold their appearance for a long time, which is why it appears on landmark buildings and high-profile public spaces.

What it asks in return is care and money. Glass fibre is strong in tension but does not like being folded sharply – the material must be handled, transported and installed with more discipline than a polyester membrane, and creasing can damage it permanently. Fabrication is a specialist operation. Repairs are more constrained than on PVC-coated polyester, and the material itself is considerably more expensive.

It is therefore not a better material in general. It is the appropriate material where long life, appearance retention and low ongoing attention justify a higher initial cost and a more

demanding installation — and the wrong choice where a structure may be modified, relocated or replaced within a shorter period.

#### FOR FACILITY AND PROCUREMENT TEAMS

Because handling matters so much, the **installation method statement is part of the material decision** here in a way it is not for polyester. Ask who is fabricating it, whether they have done this material before, and how it will be transported and unfolded on site.

Establish the repair position before award, not after damage: what can be repaired in place, what requires a panel replacement, and who is able to do either.

#### QUESTIONS TO ASK

Why is this material being proposed here rather than a coated polyester? · Who is fabricating it and what have they done in it before? · What happens if a panel is damaged after installation?

## 08 HDPE knitted shade fabric

The familiar material of car park shades, school play areas and sail shades: a knitted cloth of high-density polyethylene monofilaments, stabilised against ultraviolet light.

It is knitted rather than woven for a practical reason — a knitted structure resists a tear running away across the fabric, so a small puncture is less likely to become a long split. It is permeable, so rain passes through it and wind passes through it too, which reduces the load it transfers to the frame. It is comparatively light, comparatively economical, and available in a wide range of colours and shade densities.

What it is not is a weatherproof membrane. It provides shade and reduces glare; it does not keep the space below dry, and it should not be described as if it does. It also ages: ultraviolet exposure gradually embrittles the polymer, and the rate depends heavily on the quality of the stabilisation package in the material. The visible signs are fading, then stiffening, then splitting — usually starting at edges, corners and anywhere the cloth has been rubbing.

Within its role it is an excellent, sensible material, and for many car parks it is exactly the right answer. The mistake is not choosing it. The mistake is choosing it while expecting a membrane's performance.



#### FOR FACILITY AND PROCUREMENT TEAMS

Shade fabrics vary widely in quality and the differences are not visible on a sample. Grade, weight, knit construction, shade factor and the ultraviolet stabilisation package all differ between products that look identical on a table. Ask for the **manufacturer's data sheet and warranty terms**, and note that a fabric warranty usually depends on the fabric being installed and tensioned as the manufacturer intends.

Edges, seams and fixing points are where these fabrics fail first. Reinforcement at those locations is a specification item worth naming rather than assuming.

#### QUESTIONS TO ASK

Is this expected to keep rain off, or only sun? · Which manufacturer and grade, and what does the warranty cover? · How are edges and fixing points reinforced? · What does the fabric look like after several summers here — can we see one?

## 09 Awning and tent fabrics

Retractable awnings and relocatable tents use different fabrics again, and for good reasons.

### Awning fabrics

Retractable awnings are usually covered in a woven acrylic cloth. The better ones are solution-dyed, meaning the colour pigment is added to the fibre before it is spun rather than applied to the surface afterwards — so the colour runs through the fibre and holds up far better under sunlight. The cloth is typically treated to repel water rather than to be fully waterproof, and it is breathable, which keeps the space beneath more comfortable than a sealed surface would.

The consequence is worth understanding before it becomes a complaint: an acrylic awning is designed for sun and light rain, not as a roof. In sustained heavy rain, water may pass through or pool in the fabric, and most retractable systems are intended to be retracted in strong wind. Where a genuinely weatherproof cover is required, a coated fabric is the more appropriate choice.

The awning is also the one product in this category with moving parts. Arms, springs, rollers, brackets and, where fitted, a motor all belong to the material decision, because they are what will need attention first.

### Tent fabrics

Relocatable and event structures are generally covered in coated fabrics, most commonly PVC-coated polyester, because they must be weatherproof, they must be handled repeatedly, and they must be repairable in the field. The demands are different from a permanent membrane: the same panel may be tensioned, folded, transported and re-erected many times, so seam quality, edge reinforcement and the ease of repair matter more than long-term appearance retention.

#### FOR FACILITY AND PROCUREMENT TEAMS

For awnings, treat the **mechanism as part of the specification**: frame material and finish, arm and spring type, motor and control where fitted, and whether spare parts and service will be obtainable. The fabric usually outlives the client's patience with a mechanism nobody can service.

For relocatable structures, ask how many erection cycles the covering is expected to tolerate, how it is stored between uses, and how field repairs are made.

#### QUESTIONS TO ASK

Is this fabric water-repellent or waterproof — and which do we actually need? · Is the colour solution-dyed? · Who services the mechanism, and are parts obtainable? · For a tent, how is it stored and repaired between uses?

## 10 When the covering is a rigid sheet

Some structures are not covered in fabric at all. Entrance canopies, walkway covers and many pergola roofs use rigid sheet — most often polycarbonate, sometimes profiled metal or an insulated panel.

**Polycarbonate** is tough, light and available clear, tinted or in multiwall form. Two practical points matter more than any other. First, it carries an ultraviolet-protective layer on one face, and that face must be installed outward — sheets fitted the wrong way round degrade far



sooner, and the error is invisible on the day. Second, it moves a lot with temperature, so fixing holes must be oversized and fixings must allow that movement; a sheet screwed down tight will eventually crack around the fixings. Over years, clear sheets tend to yellow or haze, and multiwall sheets can collect dust and moisture internally if the ends are not properly sealed and drained.

**Profiled metal and insulated panels** are durable and cheap to maintain, but they are noisy in rain, they radiate heat unless insulated, and their cut edges and fixing penetrations are where corrosion begins. As with steel, the coating and the treatment of cut edges matter more than the sheet itself.

Rigid sheet is the right answer where a genuinely weatherproof, walkable-under roof is needed at modest span, and the wrong answer where a large area must be covered lightly and elegantly.

#### FOR FACILITY AND PROCUREMENT TEAMS

For polycarbonate, ask the submittal to confirm **which face carries the ultraviolet protection and how installation ensures it faces outward**, how thermal movement is accommodated at fixings, and how multiwall ends are sealed and drained. For metal sheet, ask how cut edges and fixing penetrations are protected.

#### QUESTIONS TO ASK

Does this need to be fully weatherproof, or is shade enough? · How is thermal movement handled at the fixings? · What will it look like, and sound like in rain, in five years?



# Membrane behaviour

---

A membrane structure is designed as a three-dimensional form, but it is made from flat pieces of cloth.

- 
- 11 Material is part of geometry
  - 12 Patterning, compensation and fabrication

## 11 Material is part of geometry

In most construction, material and shape are separate decisions: you design a beam, then you choose what to make it from. In a tensile membrane structure they are the same decision, and this is the single idea that makes these structures behave differently from everything else on a site.

A membrane is flexible. On its own it can carry almost nothing. What makes it structural is being pulled taut into a doubly curved shape — a saddle, a cone, an arch form — where the curvature runs in two directions at once. That curvature is what allows a piece of cloth to resist wind lifting it and rain loading it.

Two consequences follow, and both are commercially relevant.

| TERM       | IN PLAIN LANGUAGE                                                                             | WHY IT MATTERS                                                                                                                   |
|------------|-----------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------|
| Form       | The three-dimensional shape the membrane is pulled into.                                      | The shape is structural. A flatter shape is usually cheaper to fabricate and is usually the one that ponds water.                |
| Curvature  | How much the surface curves, and in how many directions.                                      | Curvature in two directions is what gives the surface stability. Reduce it for appearance and you reduce performance.            |
| Prestress  | The tension deliberately built into the membrane so it holds its shape and does not go slack. | Too little and the fabric flaps, wears and collects water. How prestress is specified, achieved and verified is a fair question. |
| Boundaries | The edges — cables, belts, clamped edges or rigid frames — where load leaves the fabric.      | Most membrane problems begin at a boundary, not in the middle of a panel.                                                        |

The first consequence is that **the parts are not independent**. Change the geometry and you change the prestress; change the prestress and you change the forces in the steel, the connections and the foundations; change the membrane and you may change all of it. A proposal that alters the shape “to suit the site” without any accompanying engineering has changed a structural system, not a styling detail.

The second is that **material selection cannot be separated from the design**. Asking “which fabric is best?” without reference to the geometry it will be tensioned into is like asking which size of shoe is best. The right answer depends on the shape, the spans, the exposure and the intended life.

#### QUESTIONS TO ASK

What shape is this, and why that shape? · How much curvature does it have, and what stops water sitting on it? · How is prestress specified and how will it be verified on site? · If the shape changed during design, was the frame re-checked?

## 12 Patterning, compensation and fabrication

Here is the fact that surprises most people the first time they hear it. A membrane structure is designed as a three-dimensional curved form, but the material arrives as flat rolls of cloth. Somebody has to work out which flat pieces, cut to which shapes, will become that curved surface once they are joined and tensioned.

### Patterning

That process is called patterning: developing the flat panels required to produce the intended three-dimensional form. It is a design and engineering activity, carried out with specialist software, and it is where the shape is actually created. Two structures can be specified with the same fabric and the same steel and still behave differently because one was patterned properly and the other was approximated.

Patterning errors do not usually announce themselves. They appear as wrinkles that never come out, as tension that is uneven across the surface, as a corner that sits slightly wrong, and then — over years — as wear concentrated where the material is working harder than it should.

### Compensation

Membrane materials stretch when they are tensioned. If the flat panels were cut to the exact developed size, the finished surface would end up larger and slacker than intended once it was pulled taut. Compensation is the allowance made for this during fabrication, so that panels are cut slightly undersized and reach the intended geometry and tension when installed.



How much compensation is appropriate depends on the material and how it behaves, and it is determined by the people responsible for the fabrication rather than by a universal rule. What matters to a buyer is simply that it is a deliberate, engineered decision. Too little and the structure cannot be tensioned to its design condition. Too much and it is over-stressed reaching it.

## Fabrication and welding

Coated membranes are joined by welding rather than sewing — heat and pressure fuse the coatings together, producing a seam that is weatherproof and, done properly, as strong as the material around it. Seam quality depends on clean material, correct temperature, correct pressure and correct dwell time. It is a controlled factory process, and it is one of the meaningful differences between fabricators.

### WHY THIS SECTION EXISTS

A membrane structure is often bought as though the fabric were the product. It is not. The fabric is a raw material; the product is a patterned, compensated, welded, tensioned assembly. **The shape is created at the cutting table**, long before anything arrives on site.

This is why two quotations naming the same membrane can represent genuinely different assets — and why “we will use the same fabric” is not the same statement as “we will build the same structure”.

### FOR FACILITY AND PROCUREMENT TEAMS

For a structure of any significance, ask **who is doing the patterning**, what software and process is used, and whether patterning and shop drawings will be submitted for approval before fabrication begins. Ask how compensation is determined for the proposed material.

Ask how prestress will be achieved and checked at installation, and require that the installation record forms part of the handover package — every future intervention on the structure depends on knowing how it was tensioned in the first place.



**ZIL**

SHADES

MADE FOR LIFE UNDER THE SUN

BEFORE YOU APPROVE THE MATERIAL

#### QUESTIONS TO ASK

Who patterns this, and will we see the patterning before fabrication? · How is compensation decided for this material? · How are seams made, and how is seam quality controlled? · What record will we hold of how it was tensioned?



# The structure beneath

---

A heavier-looking structure is not automatically a better engineered one. A visually light structure is not weak.

- 
- 13** Steel: more than thickness and appearance
  - 14** Corrosion protection and coating systems
  - 15** Aluminium and architectural metal
  - 16** Stainless steel, cables and tension components
  - 17** Fasteners and the details that matter
  - 18** Foundations and material interfaces

## 13 Steel: more than thickness and appearance

Steel is the most common structural material in these assets, and the most commonly misjudged.

The misjudgement is understandable. Thickness and weight are the only properties a non-engineer can assess by looking, so they become proxies for strength. They are poor proxies. A structure's capacity comes from the shape and size of its members, the grade of steel, how those members are arranged, how they are connected, how they are restrained against buckling, and how load finds its way to the ground.

A hollow section carries load very differently from a solid bar of the same weight. A member perfectly adequate in one arrangement will buckle in another. A frame with generous members and poor connections is weaker than a lighter frame with properly designed ones, because the connections are where load actually transfers.

### TWO STATEMENTS THAT ARE BOTH TRUE

**A heavier-looking structure is not automatically a better-engineered structure.** Extra steel in the wrong places adds cost, adds wind load, adds coating area to maintain, and adds nothing to capacity.

**A visually light structure is not necessarily weak.** Efficient geometry, appropriate sections and well-designed connections can produce a slender structure that outperforms a heavier one.

What separates them is engineering, and engineering is visible in drawings and calculations rather than in photographs.

Two further points that matter more than steel choice itself. The first is that steel in this environment is only as good as what protects it – which is the subject of the next section, and is where most steel actually fails. The second is that fabrication quality is part of the material: how members are cut, how welds are made and inspected, whether holes are drilled or burned, and how the assembly is handled and transported all affect how the finished structure performs.

#### FOR FACILITY AND PROCUREMENT TEAMS

A meaningful steel specification names **section sizes and shapes, grade, and total declared tonnage**, and is accompanied by fabrication drawings. Tonnage is worth requiring in every enquiry: it is the one quantity that lets you compare structural proposals on a common basis and see when one bidder is proposing materially less structure than the others.

Ask how welding is carried out and checked, and whether mill certificates for the steel will be provided at handover.

#### QUESTIONS TO ASK

What sections and grade, and what total tonnage? · Who designed this, and can we see the calculations? · How are the connections designed? · How is the steel protected, and how are welds and cut edges treated?

## 14 Corrosion protection and coating systems

If a steel outdoor structure disappoints its owner, corrosion is the most likely reason. Not collapse — staining, rust bleeding down a column, blistered paint, a base plate quietly deteriorating where nobody looks.

The important shift in thinking is this: corrosion protection is not a property of the steel. It is a system, and every part of the system has to work.

| PART OF THE SYSTEM    | WHAT IT INVOLVES                                                                                             | WHAT GOES WRONG                                                                                                                                                                      |
|-----------------------|--------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Surface preparation   | Cleaning the steel before anything is applied — removing mill scale, rust, oil and dust.                     | The most commonly skimped step, and the one that most reliably causes early coating failure. A good coating on a poorly prepared surface fails at the interface, not at the surface. |
| The protective system | Hot-dip galvanising, a paint system, powder coating, or a combination of galvanising with a coating over it. | Systems are specified for an exposure. One chosen for a mild inland site may be inadequate a few kilometres from the sea.                                                            |

| PART OF THE SYSTEM     | WHAT IT INVOLVES                                                                                                      | WHAT GOES WRONG                                                                                                                 |
|------------------------|-----------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------|
| Application            | Applied under controlled conditions, to the specified thickness, with adequate curing.                                | Thin, uneven or badly cured coatings look identical on handover day and behave very differently two years later.                |
| Detailing              | Avoiding places where water and dust sit; allowing enclosed sections to drain; treating the inside of hollow members. | Water traps are the most common cause of localised corrosion. Rain rarely causes trouble; water that cannot leave does.         |
| Damage and making good | Transport, handling, site drilling and welding all break the protection.                                              | A cut edge or a site-drilled hole is bare steel unless it is deliberately made good. This is where corrosion very often starts. |
| Maintenance            | Cleaning, inspection, touching up damage before it spreads.                                                           | Coatings are consumables with long lives, not permanent finishes.                                                               |

## What the common systems actually do

**Hot-dip galvanising** immerses the fabricated steel in molten zinc, forming a metallurgically bonded zinc layer. Its particular virtue is that zinc protects sacrificially: at a small scratch, the surrounding zinc corrodes in preference to the steel, so minor damage does not immediately become a rust spot. Thicker coatings last longer, and coating life depends heavily on the exposure. Galvanising happens after fabrication, so the design has to allow the zinc to flow in and drain out — which is a detailing matter, not an afterthought.

**Paint systems** are applied in coats, each doing a job — adhesion, barrier, colour and ultraviolet resistance. They can be specified for almost any exposure and are the easiest system to repair in place. They are also the most dependent on surface preparation and application conditions, which is why the same paint can perform superbly or badly.

**Powder coating** produces a hard, even, attractive finish that is excellent for appearance and colour consistency. It is a barrier coating: where it is intact it performs very well, but it does not protect sacrificially, so a chip or a scratch exposes bare metal and corrosion can spread beneath the film. It is often the right choice for aluminium and for architectural components, and it is frequently applied over galvanised steel — a combination that gives the barrier and the sacrificial protection together.

Naming a system is not the same as specifying it. “Galvanised” and “painted” describe a category, not a level of protection.

#### FOR FACILITY AND PROCUREMENT TEAMS

A specification should state the **protection system, the exposure it is designed for, and how cut edges, welds, site-drilled holes and transport damage will be made good**. Ask for the coating record at handover — in five years it is what tells you how the structure should be maintained and recoated.

Where a proposal offers a different system from the one specified, the comparison is not paint against galvanising in the abstract. It is whether the offered system suits this exposure, this detailing and this maintenance regime.

#### QUESTIONS TO ASK

What is the full protection system, and what exposure was it chosen for? · How is the steel prepared before coating? · What happens to cut edges and site-drilled holes? · Are we near the coast, and was that taken into account? · Can it be repaired and recoated in place?

## 15 Aluminium and architectural metal

Aluminium appears in pergola frames, louvre roofs, awning frames and arms, trims, fascias and architectural components. It is light, it does not need galvanising, and it takes a fine finish — which is why it dominates the more architectural end of the range.

It also comes with a persistent myth attached: that aluminium does not corrode. It does. What aluminium does is form a thin, tough oxide layer almost immediately, and that layer protects the metal beneath. Where that layer is maintained, aluminium performs extremely well outdoors for a long time.

Where it is compromised, aluminium corrodes like anything else — and there are three common ways to compromise it. **Contact with dissimilar metals** in the presence of moisture sets up galvanic corrosion, and aluminium is usually the metal that suffers. **Trapped moisture and salt**, particularly in crevices and under fixings near the coast, produce

localised pitting. And **damaged coatings** on a coated section expose the metal underneath in a way that is slow to show and awkward to repair invisibly.

Two other properties shape how aluminium is used. It moves with temperature roughly twice as much as steel does, so connections and long runs must allow for that movement — this is why a well-detailed aluminium pergola has slotted fixings and expansion allowances where a naive one has rigid bolts and eventually distortion. And it is not as stiff as steel for a given section, so members are often deeper or more heavily profiled to achieve the same result, which is a design consequence rather than a weakness.

Finishes are usually anodising, which thickens the natural oxide layer and integrates with the metal, or powder coating, which lays a decorative barrier over it. Anodising is very durable and limited in colour; powder coating offers any colour and depends on the coating remaining intact.

#### FOR FACILITY AND PROCUREMENT TEAMS

Aluminium is not one material. Ask for the **alloy and temper, the section profile, and the finish specification** — anodised or powder coated, and to what standard of preparation. For louvre and pergola systems, establish whether the system is proprietary, because that determines whether spare blades, brackets, motors and seals will be obtainable in ten years.

Where aluminium meets steel or stainless fixings, ask how the two have been isolated.

#### QUESTIONS TO ASK

Which alloy and which finish? · How is thermal movement accommodated? · Where aluminium meets other metals, how are they separated? · Is this a proprietary system, and will parts still be available?

## 16 Stainless steel, cables and tension components

Stainless steel appears where corrosion resistance matters and appearance is on display: cables, cable end fittings, turnbuckles, shackles, membrane plates, architectural fixings and visible bolts.

The first thing to understand is that stainless steel is a family, not a material. Different grades contain different alloying elements and behave very differently in salt-laden air. The two most commonly encountered in this kind of work are conventionally described as suited to general and to more corrosive service respectively, and the difference between them near the coast is not academic. Which grade is appropriate for a given location and detail is a design decision — but **which grade has been supplied is a question every buyer can ask**, and the answer should be in a document rather than in someone's memory.

The second is that stainless steel is not maintenance-free. It resists corrosion by maintaining a passive surface film, and that film needs oxygen and a reasonably clean surface. In crevices, under deposits, beneath accumulated dust and salt, or where ordinary steel particles have been left on the surface by grinding or nearby fabrication, that film can break down and localised staining or pitting follows. Washing exposed stainless components is genuine maintenance, not cosmetic housekeeping.

### **Cables and tension components**

In a tensile structure a cable is not an accessory. It is a structural member carrying sustained load, and everything about it matters: the cable construction, the end terminations, how it is tensioned, and how it is protected.

Terminations deserve particular attention, because they are both the most highly stressed part of the assembly and the place where water and dust collect. Most cable problems begin at a fitting rather than in the middle of a free length. They are also, usefully, the part that can be inspected — which is why access to terminations is worth thinking about at design stage rather than discovering it is impossible in year four.

#### FOR FACILITY AND PROCUREMENT TEAMS

Require the **grade of stainless for cables, fittings and fasteners to be stated in the submittal**, together with the manufacturer of the cable and fittings. Where the site is coastal, state that in the enquiry so the selection is made knowingly.

Ask how cables will be tensioned and whether tension will be recorded, and confirm that terminations are accessible for inspection. Both belong in the handover documentation.



#### QUESTIONS TO ASK

Which grade of stainless, and why that grade for this location? · Who makes the cables and fittings? · How will cables be tensioned, and will the tension be recorded? · Can the terminations be reached for inspection?

## 17 Fasteners and the details that matter

Bolts, anchors, screws, washers, clamps, plates and fittings are usually a small fraction of a project's cost and a large fraction of its problems.

The reason is structural rather than commercial. A structure transfers load through its connections. However well the members are designed, force has to pass through the fixings — so a fastener that is the wrong grade, the wrong material for its environment, incorrectly installed or incorrectly tightened becomes the limiting element of everything around it.

#### THE PRINCIPLE

**The smallest component can become the weakest link in a large system.** A bolt costing a few dirhams can take an expensive structure out of service, and a fastener chosen without regard to the metals it joins can quietly corrode for years before anyone looks at it.

Four things decide whether fixings behave.

- **Material compatibility.** Where two different metals are in contact and moisture is present, one of them corrodes preferentially. Fastener material should be chosen with the metals it joins in mind, and isolated where necessary.
- **Corrosion resistance appropriate to the location.** A fixing adequate inland may be a poor choice near the sea, and fixings are frequently the first thing to show that a coastal environment was not considered.
- **Installation.** Correct tightening or tensioning is part of the design, not a matter of feel. Under-tightened connections work loose; over-tightened ones damage what they clamp.
- **Access and replacement.** A fixing that cannot be reached cannot be inspected, and one that cannot be replaced without dismantling half the structure turns a minor repair into a major one.

A practical field observation worth passing on: bolts that will not stay tight at the same joint are rarely a maintenance problem. Repeated loosening in one place usually means something in the design or the execution is moving, and it deserves an engineer rather than another spanner.

#### FOR FACILITY AND PROCUREMENT TEAMS

Fasteners are often the least specified item in a submittal and the most worth specifying. Ask for **material and grade for structural bolts, anchors and fittings**, together with how connections are to be tightened or tensioned and whether that will be recorded.

Where anchors are being installed into existing concrete, ask what the anchor selection is based on and whether the existing substrate has been verified — this is a common and avoidable weak point in replacement projects.

#### QUESTIONS TO ASK

What material and grade are the structural fixings? · Where two different metals meet, how are they separated? · How will bolts and cables be tightened, and is it recorded? · Can every fixing be reached for inspection later?

## 18 Foundations and material interfaces

The visible structure is only part of the asset. Below it sit foundations, base plates and anchors, and around it sit the places where the structure meets something that was already there.

Foundations matter here for a reason particular to these structures: tensile and cantilever forms often pull upward as much as they push down. A foundation adequate for a heavy building column may be inadequate for a light structure that generates uplift, because it is resisting a different action. The concrete, the reinforcement, the embedment of the anchors and the ground itself all participate.

The material interface that causes the most trouble is the base plate — where coated steel, concrete, fixings and, very often, standing water and accumulated dust all meet in one place



a few centimetres above ground. It is the single most common location for corrosion to begin on an otherwise sound structure, and it is usually the least inspected.

## Reusing an existing foundation

On a replacement project there is a strong temptation to reuse what is already there. Sometimes that is entirely reasonable. Often it is the riskiest assumption in the project, because a new structure may have different geometry, different loads, different support reactions and different uplift from the one that stood there before — and because the reason the previous structure came down may be sitting in the ground.

### THE PRINCIPLE

**A new structure should not assume an old foundation is suitable simply because something previously stood there.** Whether it can be reused is an engineering assessment, and it should be priced as an assessment rather than assumed as a saving.

### FOR FACILITY AND PROCUREMENT TEAMS

Where existing foundations are to be reused, the enquiry should say so explicitly and ask each bidder **what verification they propose and what happens if the assessment concludes the foundations are unsuitable.** Leaving this unstated produces a low bid that becomes a variation.

Ask how water is kept away from base plates, and whether base details can be inspected without excavation.

### QUESTIONS TO ASK

Are the foundations new or existing, and who confirmed they suit this structure? · Does this structure lift as well as push down? · How is water kept away from the bases? · Can the base connections be inspected?



# Living with the choice

---

The question is not whether a material will change. It is whether the change is understood, acceptable and manageable across the life of the asset.

- 
- 19** What you see and what you cannot
  - 20** How materials age
  - 21** Material compatibility
  - 22** Choosing for the life of the asset
  - 23** Comparing material proposals
  - 24** Maintainability, repair and replacement
  - 25** Conscious material selection
  - 26** Common material myths
  - 27** The material decision checklist

## 19 What you see and what you cannot

Buyers compare what is visible: colour, shape, fabric appearance, the look of the steel, the area covered. Those are real qualities and it is reasonable to care about them. But they are a thin slice of what determines how the asset behaves.

| WHAT YOU CAN SEE                    | WHAT YOU CANNOT SEE                                                              |
|-------------------------------------|----------------------------------------------------------------------------------|
| The colour and finish of the fabric | Its base cloth, coating, weight class and surface treatment                      |
| That the steel looks substantial    | Section sizes, grade, and whether the connections were designed                  |
| That it is painted or galvanised    | Surface preparation, system, thickness, and how cut edges were treated           |
| The shape of the canopy             | Whether it was patterned and compensated, or approximated                        |
| That the fabric is taut             | Whether it was tensioned to a specified prestress, and whether that was recorded |
| Bolts and fittings in place         | Their material, grade, and whether dissimilar metals were isolated               |
| A tidy base plate                   | The foundation beneath it, and what it was designed to resist                    |
| That water runs off                 | Where it goes, and what happens when the outlet blocks                           |



A BALANCED READING OF THIS

**Not every hidden difference is a defect.** Two suppliers may make different but equally valid choices, and a lighter structure with better engineering can outperform a heavier one.

But hidden details are where meaningful differences in design, performance and long-term behaviour actually live. Which is why the answer is not suspicion — it is documentation. Ask for the specification, the drawings and the data sheets, and compare those rather than photographs.

## 20 How materials age

Every outdoor material changes. That is not a defect, a warning or a reason for anxiety; it is the condition of being outdoors in a demanding climate. The purpose of this section is to set realistic expectations, so that normal change is not mistaken for failure — and so that genuine failure is not dismissed as normal change.

| MATERIAL         | WHAT NORMAL AGEING LOOKS LIKE                                                                     | WHAT IS NOT NORMAL                                                                          |
|------------------|---------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------|
| Coated membranes | Gradual colour shift, dirt pickup, a surface that is less bright and less flexible than when new. | Tearing, seam separation, persistent ponding, slackness that returns after re-tensioning.   |
| Shade fabrics    | Fading, gradual stiffening, some loss of shade density.                                           | Splitting at edges or fixings, tears that run, brittleness that cracks when handled.        |
| Coated steel     | Dulling and chalking of the finish, minor marks from use and cleaning.                            | Blistering, rust bleeding from a joint, corrosion at base plates or inside hollow sections. |
| Galvanised steel | The bright finish weathering to a matt grey — this is the zinc behaving as intended.              | Red rust across an area, rather than at an isolated scratch.                                |
| Aluminium        | Slight dulling of anodising; gradual fading of powder coating.                                    | White powdery deposits, pitting, staining where it meets another metal.                     |



| MATERIAL             | WHAT NORMAL AGEING LOOKS LIKE                                      | WHAT IS NOT NORMAL                                                             |
|----------------------|--------------------------------------------------------------------|--------------------------------------------------------------------------------|
| Stainless components | Surface tea-staining in coastal air, removable by cleaning.        | Pitting, deep discolouration, or staining that returns quickly after cleaning. |
| Rigid sheet          | Some yellowing or hazing of clear sheet; accumulated surface dust. | Cracking around fixings, moisture inside multiwall sheet, brittleness.         |

#### THE PRINCIPLE

**The question is not whether a material will change. It is whether the expected change is understood, acceptable and manageable across the intended life of the asset.**

A material that ages predictably and can be cleaned, repaired or renewed is often a better asset than one that looks flawless for three years and then cannot be touched.

## 21 Material compatibility

Materials do not sit politely side by side. They touch, they move against each other, they share water, and sometimes they react.

- **Dissimilar metals.** Where two different metals are in contact with moisture present, one corrodes preferentially. This is the mechanism behind a surprising share of outdoor corrosion, and it is entirely avoidable through material selection or isolation.
- **Water and drainage.** Water that cannot leave is more damaging than water that arrives. Details that hold water against a coating, a joint or a fabric edge will produce a problem eventually, however good the materials are.
- **Differential movement.** Two materials that expand at different rates and are rigidly fixed to each other will work against one another through every hot day and cold night. Aluminium against steel is the common case.
- **Abrasion.** Fabric moving against a bracket, a cable against an edge, a sheet against a fixing — anywhere something rubs, with dust as an abrasive, wear follows.
- **Sealants and cleaning products.** Not every sealant is compatible with every coating or membrane, and not every cleaning product is safe on the surface it is used on. Aggressive cleaning has ruined more finishes than weather has.

## THE PRINCIPLE

**A good material used in an incompatible system can still create problems.**

Compatibility is a design responsibility, but it is also a fair thing for a buyer to ask about — particularly at interfaces, where responsibility is easiest to lose.

## FOR FACILITY AND PROCUREMENT TEAMS

Interfaces are where compatibility questions belong in an enquiry: where the structure meets an existing building, where two metals meet, and where the covering meets its supports. Ask what has been done at each, and require **cleaning and care instructions to be part of the handover**, so that maintenance does not become the thing that damages the finish.

## 22 Choosing for the life of the asset

The right material depends less on the material and more on how long, and how critically, the asset has to serve. The same three tiers used in the procurement guide work here.

| ASSET HORIZON                                                           | WHAT TO PRIORITISE IN MATERIAL SELECTION                                                                                                                      | WHAT NOT TO PAY FOR                                                                   |
|-------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| Short term — temporary, relocatable, leased or uncertain                | Practicality, safety, ease of installation and removal, reusability, components that survive being handled repeatedly.                                        | Long-life coatings and premium coverings for a life nobody will use.                  |
| Medium term — a defined period of several years                         | Durability balanced against cost; repairability; adaptability; materials that can be cleaned and maintained without specialist access.                        | Complexity that adds nothing over the period, or finishes needing constant attention. |
| Long term or critical — owned, high-consequence, disruptive to maintain | Environmental resistance appropriate to the actual exposure, maintainability, repairability, replaceable components, obtainable materials, and documentation. | Decoration that adds cost without adding life, usefulness or maintainability.         |

Two errors sit either side of this table, and both are expensive.

**Overbuilding for a temporary requirement** spends money on a life that will not be used, and often produces a structure that is harder to remove or relocate than it needed to be.

**Underbuilding for a long-term requirement** produces an asset that is bought twice — once in capital and again in disruption, replacement and waste.

#### CONSEQUENCE SETS THE FLOOR

Expected life determines how much durability is worth paying for. Consequence of failure determines the minimum that is acceptable regardless.

**A temporary structure does not have permission to fail.** A shorter-life solution must still be appropriate for its use and its environment. The distinction between the tiers is permanence, durability and lifecycle investment — never safety.

## 23 Comparing material proposals

When two proposals name different materials, or when one offers an equivalent to what was specified, the comparison should be made on the same set of characteristics rather than on the word “equivalent”.

| CONSIDERATION             | WHAT TO ESTABLISH                                                                                                            |
|---------------------------|------------------------------------------------------------------------------------------------------------------------------|
| Intended use              | Is the material appropriate for what this structure actually has to do — shade, weatherproofing, or both?                    |
| Structural role           | Is it decorative, protective, or structurally critical? The answer changes how much scrutiny the rest of this list deserves. |
| Identification            | Manufacturer, product reference and grade — not a category name. “PVC membrane” and “galvanised steel” are categories.       |
| Environmental suitability | What was it selected for: this exposure, this proximity to the coast, this level of dust and heat?                           |
| Expected ageing           | How does it change over time, and is that change acceptable in this location?                                                |

| CONSIDERATION      | WHAT TO ESTABLISH                                                                                  |
|--------------------|----------------------------------------------------------------------------------------------------|
| Maintenance        | What does it need, how often, and can that be done without closing the area below?                 |
| Repair             | Can it be repaired in place, and by whom?                                                          |
| Replacement        | Can it be replaced on its own, or does replacement mean dismantling the structure?                 |
| Availability       | Will the material and its components still be obtainable in ten years?                             |
| Compatibility      | How does it interact with the materials it touches?                                                |
| Documentation      | What data sheets, records and warranties come with it, and who holds them?                         |
| Lifecycle position | Is this element expected to last as long as the asset, or is it a planned renewal within its life? |

#### FOR FACILITY AND PROCUREMENT TEAMS

A useful discipline when an equivalent is offered: ask the proposer to complete the table above **for both the specified material and the alternative**. A capable supplier will do it readily, and the exercise usually settles the question without an argument.

Specifications should describe what the asset needs to achieve rather than copying a product name from another project. A performance description with named acceptable products is more robust than either alone.

## 24 Maintainability, repair and replacement

Whether an asset can be looked after is decided long before anyone tries to look after it.

#### THE PRINCIPLE

**Maintainability is a design decision before it becomes a maintenance responsibility.**

By the time a structure is standing, most of the questions below have already been answered — by the choices made in specification, detailing and material selection.

The questions worth asking while they can still be influenced:

- Can surfaces, joints and terminations be reached safely, and without closing the space below?
- Can drainage outlets be reached and cleared?
- Can the covering be replaced without dismantling the frame?
- Can a single panel, blade, fitting or component be replaced on its own?
- Will the material still be identifiable in ten years — and obtainable?
- Can the coating be repaired and recoated in place?
- Are connections inspectable, or are they buried?

### Four kinds of change, which should not be confused

| CATEGORY                  | WHAT IT IS                                                                                        | WHAT IT CALLS FOR                                                                           |
|---------------------------|---------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------|
| Cosmetic ageing           | Fading, dulling, dirt pickup, weathering of a finish.                                             | Cleaning and realistic expectations. Not a repair.                                          |
| Repairable damage         | A tear, a scratch through a coating, a damaged panel, a failed fitting.                           | Prompt repair, before it becomes something else. Most of these are cheap when caught early. |
| Progressive deterioration | Corrosion spreading, fabric embrittlement, coating breakdown across an area, recurring slackness. | Assessment rather than patching — something is driving it, and patching treats the symptom. |
| Structural concern        | Movement, foundation cracking, repeated loosening at a joint, a member out of position.           | Stop and obtain a qualified structural assessment. Do not tension, tighten or repair first. |

Detailed inspection routines, intervals and procedures belong to the Maintenance Guide rather than to this one. What belongs here is the principle: the materials chosen determine what maintenance will be possible, how much it will cost, and whether it will be done at all.

## 25 Conscious material selection

Every material carries a history and a future. It was extracted, processed, manufactured and transported before it arrived; it will be maintained, perhaps replaced, and eventually removed.

It is tempting to reduce this to labels — to look for a material with a green credential and consider the matter closed. That is not where most of the impact sits in this category.

### THE PRINCIPLE

**Sustainability here is less about choosing a material with a particular label, and more about avoiding unnecessary construction, premature failure and repeated replacement.**

A structure that fails early is bought twice — once in capital, and again in disruption, replacement and waste. The most environmentally significant decision in most of these projects is simply whether the asset lasts as long as it should.

Which turns conscious material selection into a short set of questions, none of which requires an environmental specialist to answer:

- **Do we need this structure at all**, or is there a simpler way to solve the problem?
- **Is the material appropriate to the life required** — neither overbuilt for a temporary need nor underbuilt for a permanent one?
- **Will this choice cause premature replacement**, and has that been weighed against the saving that produced it?
- **Can the asset be maintained and refurbished**, or is replacement the only future available to it?
- **Can components be reused, relocated or recovered** at the end of its life?

On recovery, honestly: structural steel and aluminium have well-established recycling routes, and metal components generally have a recovery path. Coated fabrics and membranes are more complicated — recovery options vary considerably by material type, and the position should be confirmed with the manufacturer rather than assumed. It is better to say that plainly than to make a general claim that will not hold.

And the decision that matters most is usually earlier than any of this. A structure designed so its covering can be renewed, its coating recoated and its components replaced individually will consume far less over twenty-five years than one that must be removed and rebuilt because a single element could not be reached.

## 26 Common material myths

| WHAT IS OFTEN SAID                                    | WHAT IS ACTUALLY TRUE                                                                                                                                                                                                     |
|-------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| "All shade fabrics are basically the same."           | They differ in construction, grade, weight, shade factor and ultraviolet stabilisation — and none of that is visible on a sample. Two fabrics that look identical can behave very differently after several summers here. |
| "Thicker steel means a stronger structure."           | Capacity comes from section geometry, grade, arrangement, restraint and connections. Extra steel in the wrong place adds cost, wind load and coating area, and no capacity.                                               |
| "Galvanised means it will never corrode."             | Galvanising is a zinc layer that protects sacrificially and is consumed over time at a rate that depends on exposure. It is excellent protection with a finite life, not immunity.                                        |
| "Stainless steel needs no maintenance."               | Stainless resists corrosion by maintaining a passive surface film. Trapped dust, salt deposits and contamination can break that film down. Washing is genuine maintenance.                                                |
| "Powder coating is automatically better."             | It gives an excellent, even finish and is often the right choice — but it is a barrier coating without sacrificial protection, so damage can allow corrosion to spread beneath the film.                                  |
| "Aluminium does not corrode."                         | Aluminium protects itself with an oxide layer. In contact with dissimilar metals, in trapped moisture, or where a coating is damaged, it corrodes like any other metal.                                                   |
| "If two structures look the same, they are the same." | Appearance reveals almost nothing about section sizes, coating systems, membrane grade, patterning, prestress, fixings or foundations.                                                                                    |
| "A new material means no maintenance."                | It means no maintenance yet. Every outdoor material has a maintenance requirement; the useful question is what it is and whether it can be done.                                                                          |

| WHAT IS OFTEN SAID                                        | WHAT IS ACTUALLY TRUE                                                                                                                                                |
|-----------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| "The most expensive material is the best choice."         | It is the best choice where the asset's life, exposure and consequence justify it. On a temporary structure it is simply money spent on a life nobody will use.      |
| "A temporary structure does not need proper engineering." | Consequence of failure does not fall because a structure is temporary. Permanence and safety are different questions.                                                |
| "It has a warranty, so we do not need to inspect it."     | Most material warranties depend on correct installation, reasonable maintenance and prompt reporting. Neglect is the most common reason a warranty does not respond. |

## 27 The material decision checklist

Use it before accepting a quotation, approving a submittal, or agreeing a change of material.

### Purpose and role

- ☐ I understand what this material is for.
- ☐ I know whether it is decorative, protective or structurally critical.
- ☐ I know whether the covering is a shade fabric or a structural membrane.

### Environment and life

- ☐ The actual exposure has been considered, including proximity to the coast.
- ☐ The expected life of the asset is stated, and the material suits it.
- ☐ I understand how this material is expected to age here.
- ☐ I know which elements are long-life and which are planned replacements.

### Identification

- ☐ The material is identified by manufacturer, product and grade — not by category.
- ☐ The protection or coating system is specified, not just named.
- ☐ The grade of stainless steel for cables, fittings and fasteners is stated.
- ☐ Data sheets and manufacturer warranties have been provided.

## System and compatibility

- ☐ Interfaces with existing structures have been addressed.
- ☐ Dissimilar metals in contact have been identified and isolated.
- ☐ Thermal movement has been accommodated at connections.
- ☐ Cut edges, welds and site-drilled holes will be made good.
- ☐ Water paths and drainage have been designed, not assumed.

## Life after installation

- ☐ Surfaces, connections and drainage can be reached for inspection.
- ☐ The covering can be replaced without dismantling the structure.
- ☐ Individual components can be replaced on their own.
- ☐ Materials will still be identifiable and obtainable in future.
- ☐ Cleaning and care instructions will be handed over.

## Judgement

- ☐ The selection matches the consequence and importance of the asset.
- ☐ I am not choosing purely on lowest initial price.
- ☐ I am not over-specifying a temporary or changing requirement.
- ☐ I have considered what happens to these materials at the end of the asset's life.

## IN CLOSING

# Materials are decisions, not line items

A material appears in a quotation as a short phrase and a number. What it actually determines is how safe the structure is, how it performs, how it looks in year five, what it will need, whether it can be repaired, when it will be replaced, what that replacement will cost and disrupt, and what is left behind when it finally comes down.

None of that is visible at the point of decision, which is why the decision deserves a few more questions than it usually gets. Not more suspicion — more documentation, and a willingness to ask what something is rather than accepting what it is called.

The engineering question is not only **what can we build this with?** It is also: **why are we choosing this material, what will it experience, how long should it serve, what will it ask of the people who come after us, and what will we leave behind when its purpose is complete?**

### ABOUT THIS GUIDE

ZIL Shades designs, engineers and installs awnings, car parking shades, tensile shades and tents — and then inspects, maintains, repairs, refurbishes and eventually decommissions them. Material decisions are made against that whole span rather than against installation day, which is why this guide is written the way it is.

Detailed inspection routines and maintenance procedures are covered in the ZIL Shades Maintenance Guide. How to specify and procure the asset is covered in Before You Issue the RFQ.

Performance Beyond Installation.

### SCOPE OF USE

This guide is general educational material about how outdoor construction materials behave. It states no material properties, strength values, fire ratings, coating thicknesses, design lives, warranty periods, standards or environmental classifications, and it is not a substitute for manufacturer data or for project-specific engineering assessment. Material suitability for a particular structure, location and use should be determined by appropriately qualified professionals on the basis of actual project conditions, and confirmed against current manufacturer information.

# ZIL SHADES

MADE FOR LIFE UNDER THE SUN



Materials are not items listed  
in a quotation. They decide how  
an asset performs, ages, and ends.

---

**Performance Beyond Installation.**

ZIL Shades is a brand of SHADES HOUSE TENTS & SHEDS TR L.L.C.S.P,  
licensed in the United Arab Emirates.

[zilshades.com](https://zilshades.com)