

H90 Specification

Architen Tensile Fabric Coverings

TO BE READ WITH TENDER DOCUMENTATION & GENERAL CONDITIONS

ARCHITECTURAL SPECIFICATION

H90.100 CONTRACTOR'S DESIGN

Completion of the design, and the preparation of all production information, shall be carried out by Architen Landrell (the Specialist Contractor) in conjunction with the Design Team.

H90.110 SCOPE OF THE WORKS

Together with the Design team, the Specialist Contractor is responsible for the Detailed Design and installation of the Architen Tensile Fabric Covering including the complete detailed design of all structural interfaces with adjoining trades prior to commencement of manufacture. The Specialist Contractor is also to ensure that all interfaces are fully coordinated prior to commencement.

The Specialist Contractor will complete the detailed design, manufacture, supply, installation and warrant the works whilst complying with the visual intent on the Design Drawings submitted with tender and criteria stated in this specification.

Specified supplier: ARCHITEN LANDRELL (or similar approved)
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MATERIALS

H90.110a PVC coated PES

- Warp and weft: perpendicular to each other with 5° tolerance
- Strength: see specification sheet
- Coating: PVC and PVDF lacquer
- Coverage: 300µm PVC and 10µm PVDA lacquer
- Surface Quality: smooth with no significant discontinuities or blemishes when viewed externally from a distance of 4m in directional sunlight
- Colour: White, manufacturer's standard
- Fire Resistance: BS7837
- Translucency: 6%

Seams:

- HF Welding techniques to maintain 100% fabric strength
- Follow fabric manufacturer's guidelines for abrasion preparation of seam areas for 'non-weldable' fabrics

Fabric Fittings:

- Refer to engineer's drawings or submit alternative proposals

Other Requirements:

- Fabric detailing to observe requirements of rainwater drainage strategy

H90.110b PTFE coated GF

- Warp and weft: perpendicular to each other with 5° tolerance
- Strength: see specification sheet
- Coating: PTFE
- Surface quality: smooth with no significant discontinuities or blemishes when viewed externally from a distance of 4m in directional sunlight
- Colour: White, manufacturer's standard. Manufacturing and fabrication discolouration to be naturally bleached* on site following installation.
- Fire Resistance: According to BS476 - parts 6 and 7
- Translucency: 8-11%

Seams

- High temperature welding with FEP Interlayer techniques to maintain 100% fabric strength

Connection to Supporting Structure:

- Refer to engineer's drawings or submit alternative proposals

Fabric Fittings:

- Refer to engineer's drawings or submit alternative proposals

Other Requirements:

- Fabric detailing to observe requirements of rainwater drainage strategy

H90.110c ePTFE Tenara

- Warp and weft: perpendicular to each other with 5° tolerance
- Strength: see specification sheet
- Coating: PTFE
- Surface quality: smooth with no significant discontinuities or blemishes when viewed externally from a distance of 4m in directional sunlight
- Colour: White, manufacturer's standard.
- Fire Resistance: According to BS476 - parts 6 and 7
- Translucency: 8-11%

* This process may take up to six months.

Seams:

- Follow fabric manufacturer's guidelines for abrasion preparation of seam areas for 'non-weldable' fabrics
- High temperature welding with FEP Interlayer techniques to maintain 100% fabric strength

Connection to Supporting Structure:

- Refer to engineer's drawings or submit alternative proposals

Fabric Fittings:

- Refer to engineer's drawings or submit alternative proposals

Other Requirements:

- Fabric detailing to observe requirements of rainwater drainage strategy

H90.110d Silicone Coated Glass Cloth

- Warp and weft: perpendicular to each other with 5° tolerance
- Strength: see specification sheet
- Coating: clears Silicone to both sides, top lacquered
- Surface quality: smooth with no significant discontinuities or blemishes when viewed externally from a distance of 4m in directional sunlight
- Colour: white, manufacturer's standard.
- Fire Resistance: according to BS476 - parts 6 and 7
- Translucency: see specification sheet

Seams

- High temperature welding with FEP Interlayer techniques to maintain 100% fabric strength

Connection to Supporting Structure:

- Refer to engineer's drawings or submit alternative proposals

Fabric Fittings:

- Refer to engineer's drawings or submit alternative proposals

Other Requirements:

- Fabric detailing to observe requirements of rainwater drainage strategy

H90.110e PVC Coated Glass Cloth

- Warp and weft: perpendicular to each other with 5° tolerance
- Strength: see specification sheet
- Coating: clears PVC to both sides
- Surface quality: smooth with no significant discontinuities or blemishes when viewed externally from a distance of 4m in directional sunlight
- Colour: white, manufacturer's standard.
- Fire Resistance: according to BS476 - parts 6 and 7
- Translucency: see specification sheet

Seams

- HF Welding techniques to maintain 100% fabric strength

Connection to Supporting Structure:

- Refer to engineer's drawings or submit alternative proposals

Fabric Fittings:

- Refer to engineer's drawings or submit alternative proposals

Other Requirements:

- Fabric detailing to observe requirements of rainwater drainage strategy

DESIGN

H90.210 GENERALLY

- Loading requirements: As specified in Clause 4.240 or otherwise calculable
- Architen Landrell will ensure that the tolerances for steelwork are compatible with the attachment and detailing of the membrane roofs, cables, rods, connections etc.

H90.211 EVIDENCE OF PERFORMANCE

Full general arrangement and detail drawings with supporting calculations to be submitted for approval before commencing fabrication detailing

H90.212 TESTING FABRIC MATERIAL

- Material: Architen Landrell's choice, approved by Architect
- Undertake material characteristic tests e.g. uni- and bi-axial tests
- Test Results: Record and submit with project documentation

H90.213 PERFORMANCE

- Roof coverings: Secure, free draining and weather tight
- Deflections and other movements: Make full allowances
- Design life of membrane: Minimum requirement of 20 years. Architen Landrell will submit proposals according to fabric type

H90.214 VERIFICATION OF PERFORMANCE

Submit full analysis report and electronic forms for approval prior to fabrication

H90.215 INTEGRITY: CONTRACTOR DETERMINED PARAMETERS

- Tensile fabric coverings and supporting structure must resist wind loads, dead loads and design live loads and accommodate deflections and thermal movements without damage
- Design wind loads: Calculate in accordance with BS6399-2
- Design snow loads: Calculate in accordance with BS6399-3

H90.216 FACTORS OF SAFETY

Fabric

- The fabric membrane along with all its connection details e.g. seams, keder edges and pockets etc. shall be designed to give minimum factors of safety
- Permanent long term (dead load and pre-stress): 7.5
- Transient short term (dead load, pre-stress and wind load): 2.3
- Medium term (dead load, pre-stress and snow load): 6.0

Cables:

- Wire rope cables will be designed to give minimum factors of safety
- Permanent long term (dead load and pre-stress): 3.0
- Transient short term (dead load, pre-stress and wind load): 2.3
- Medium term (dead load, pre-stress and snow load): 2.5

Steel and aluminium components:

Fabric attachment hardware e.g. membrane plates, clamp plates, extrusion, tie rods etc. will be designed to give minimum factors of safety as per BS 5960 for steel and BS8118 for aluminium.

H90.217 FIRE RESISTANCE OF FABRIC COVERINGS

Refer to fabric specifications clauses 4.110a and 4.110b

H90.218 WATER PENETRATION

- Under site exposure conditions, water must not penetrate through the membrane material, its seams or leak via any connection detail
- Heading apertures can be covered and can be ventilated

H90.219 SOLAR AND LIGHT CONTROL

Tensile fabric covering will have minimum translucency of

PRODUCTS, FABRICATED FITTINGS

H90.220 PRODUCT SAMPLES

- Before commencing detailed design, Architen Landrell will submit labelled samples of the approved fabric
- General: During detailed design, Architen Landrell can submit samples of any type of fixing if requested by the Architect

H90.221 FIXING SAMPLES

General: During detailed design, submit labelled samples of any type of fixing if requested by the Architect

H90.222 CLAMPING PLATES

- Type: Heading clamp plates to Architen Landrell design
- Colour: Refer to drawings
- Radius to corners/edges in contact with fabric: 3mm (minimum)
- Other requirements: Refer to drawings

H90.223 LUFFTRACK EXTRUSION

- Type: Grooved aluminium extrusion
- Finishes and colour: Refer to drawings
- Radius to corners/edges in contact with fabric: 3mm (minimum)
- Other requirements: Refer to drawings

H90.224 RODS

- Type: Structural tie rod. Carbon steel – grade 460
- Size: Refer to engineer's drawings
- Finish: Galvanised or to Architects requirements
- Accessories: Fork ends, locknuts and circlip-fastened pins

H90.225 WIRE ROPES

- Type: Stainless steel, material 316 531 to BS 970: Part 1, manufactured to dimensions and breaking loads conforming to BS MA 29
- Construction: Right-hand ordinary lay 1x19
- Construction stretch: Architen Landrell will take into consideration the construction stretch (measured at 15% MBL) in the manufacture of rope assemblies. Architen Landrell will determine construction stretch by load cycling at 10% to 45% of the MBL until no inelastic stretch is noted. Compensation due to constructional stretch will be provided and recorded by the manufacturer/rope assembler if required. Submit cable making schedules and worksheets if requested
- Accessories: End terminations by StaLock or similar approved. End terminations including swaged and non-swaged terminal fittings to be manufactured from a compatible grade of stainless steel and will be fitted in a rope working shop in accordance with the manufacturer's instruction. Under load testing the rope should fall away from the fitting

H90.226 MEMBRANE PLATES

- Type: Membrane plates to Architen Landrell design
- Colour: Refer to drawings
- Radius to corners/edges in contact with fabric: 3mm (minimum)
- Other requirements: Refer to drawings

H90.227 PINS

- Type: Fabricated pins and washer plates to Architen Landrell design
- Stainless steel – grade 316. Wherever pin connections are employed e.g. fork ends, solid devises, eyes, shackles, etc. Architen Landrell will give particular attention to the assembly detail such that the bending moment applied to the pin remains within the pin's bending capacity. This may be demonstrated by physical test or justified by calculation to BS 5950
- Accessories: All pins shall be fitted with a retaining device capable of sustaining a force along the axis of the pin equal to a minimum of 5% of the cable load, e.g. stainless steel circlip fasteners

H90.228 ROOFLIGHTS

- Type: Heading rooflight to Architen Landrell design.
- Colour: Refer for drawings
- Other requirements: Refer to drawings

MEMBRANE FABRICATION

H90.310 SETTING OUT OF FABRIC COVERINGS

- Warp direction of panel: Along or parallel to the centre line of the roll. Accuracy within 3°
- Cutting out of panel: Accuracy within 1mm of marked line
- Diagonal distortion of weave, faults, small tears or miscuts no permitted

H90.311 FABRICATING CABLE CUFFS ETC

- Type: Keder edges, cover flaps, rainwater upstands to Architen Landrell design
- Width: To Architen Landrell design
- Attachment: Welding
- Additional requirements: All centenary type boundary edges requiring super-imposed pockets, cuff and flaps to have these made from 45° bias cut strips of sample

H90.312 FABRICATING PANELS

Accuracy:

- Maximum tolerance in weft direction: 0.1% of theoretical length
- Maximum in position of cable and belt lines: 5mm

H90.313 FACTORY SEAMING OF PANELS

- Junctions: Minimise number of layers to be joined
- Method: Welding
- Seam:
 - o Width: According to Architen Landrell proposal
 - o Quality: Continuous and of uniform width
- Seam testing: Peel test
- Frequency of testing: Every new roll of fabric. Recorded and included in project documentation (refer to clause 4.930)
- Integrity of coating: Maintain during joining process to exclude water and air

INSTALLATION

H90.410 STABILITY

- Architen Landrell will review, confirm and amplify the erection procedures, in complete detail, with the shop drawings. The erection procedure shall include details of temporary forces that will be applied to the other parts of the structure.
- Architen Landrell will be wholly responsible for the erection of the membrane and its stability during the erection period, until the membrane has been completed, stressed and work completed in accordance with the contract and

will ensure that the fabric is fully protected against damage due to weather conditions. Especially, we shall ensure that the freedom of movement of the membrane, before stressing, is limited, if necessary, by temporary restraints of suitable flexibility to avert damage due to wind and weather conditions.

- Architen Landrell will ensure that connections to foundations and other permanent works have reached their full working capacity before commencing the application of the membrane to the support structure.

H90.411 ADVERSE WEATHER

- Installation of fabric coverings: Architen Landrell will provide details of weather circumstances where erection work on the canopy needs to be suspended.
- Unfinished areas of coverings: protected from wind action.

H90.412 ATTACHING FABRIC MEMBRANE

Canopy loads:

- The values of pre-stress in the fabric and support structure are to be calculated by Architen Landrell and submitted to the Architect for approval.
- Pre-stress verified empirically by monitoring of canopy datum lengths. Mast-jacking loads to be monitored during installation and datum deviations recorded.
- After the final stressing of the canopy there shall remain sufficient adjustment in all connections to allow for future re-stressing. The amount of adjustment required is to be agreed during the shop drawing phase based upon the membrane material stiffness and the sum of the construction tolerances.

COMPLETION

H90.510 INSPECTION

Interim and final covering inspections: Submit reports

H90.511 COMPLIANCE TESTING OF FABRIC

- Standard: To BS EN ISO 1421, submit proposals of relevant tests
- Timing of test: According to Architen Landrell Q/A procedure
- Test results: Submit on completion of testing and include in requirements of clause 4.930

H90.512 DOCUMENTATION

Submit:

- Manufacturer's operation and maintenance instructions
- Guarantees, warranties, test certificates and test results agreed with main contractor

H90.513 COMPLETION

- Cables: Unwrinkled
- Fabric
 - o Colour and translucency: Consistent, free from discontinuities and discolouration

- Surfaces: Clean and smooth, fully sealed, weather tight and free draining.
- Rain water outlets: Clear
- Completed coverings: Protect against damage from adjacent or high level working.