sentrel
AUSTRALIA

Sentrel Aluminium Balustrade

Vertical Cable Balustrade System

Certifier Information Pack

Engineering & Compliance Information

Sentrel Australia Pty Ltd
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1. Product and system description

The Sentrel Aluminium Balustrade is a continuous vertical cable balustrade system comprising extruded, powder-coated aluminium top and bottom rails with vertical 316 marine-grade stainless steel cables, supported on 65 × 65 × 3 mm extruded aluminium posts. The vertical cable arrangement presents no near-horizontal climbable elements. Panels are supplied pre-assembled; the posts and pre-assembled panels are fixed together and to the substrate on site per the Sentrel installation instructions.

2. Scope of supply and limitations

Supply only — Sentrel does not install. Sentrel Australia supplies factory-fabricated barrier systems — cable pool fence and balustrade panels are supplied pre-assembled, while iRail is assembled on site — which are then fixed in place onsite by the customer or their builder, following the Sentrel installation instructions supplied with the system. Sentrel does not provide an installation service for this product and is not the installer of record. On advice received from NSW Fair Trading, the onsite fixing of the supplied system does not of itself require a contractor licence; parties should confirm licensing requirements applicable in their own jurisdiction and project context.

Compliance coverage — from the posts up. The evidence summarised in this pack covers the Sentrel system from the posts upward, including the post fixing in the configurations described below. Two tiers of fixing coverage apply, and they are kept distinct throughout this pack: (a) fixing to concrete is supported by independent NATA test evidence; (b) fixing to timber and other substrates is supported by Sentrel's engineering assessment, provided the connection develops the required design actions. See Section 2.1.

Site-specific matters remain with the certifier / project engineer. Wind region and site wind speed, bushfire attack level (BAL), barrier heights and non-climbable zones relative to finished ground and surrounding structures, boundary-barrier situations, the adequacy of the supporting slab or structure, and any equipotential bonding or earthing required by AS/NZS 3000 (to be carried out by a licensed electrical contractor) are site-specific and are not certified by Sentrel. Sentrel can provide tested capacities, drawings and supporting documentation for these assessments on request.

2.1 Fixing coverage — concrete (tested) and timber / other (by assessment).

Concrete — test evidence. The Sentrel post and base plate have been load-tested fixed to a concrete substrate and this configuration is supported by the NATA test reports cited in the compliance summary. The adequacy of the concrete itself (thickness, strength, edge distance, reinforcement and condition) remains a site matter for the project engineer or certifier.

Timber and other substrates — Sentrel engineering assessment. Fixing the Sentrel post to timber (or to other substrates) is not covered by the NATA test reports, which relate only to the samples tested on concrete. It is instead supported by Sentrel's own engineering design basis, provided as an engineering assessment rather than as laboratory test evidence. On that basis, fixing to a timber substrate is supported provided the connection develops the required barrier design actions — a concentrated design action of $P^* = 1.65$ kN and a distributed design action of $w^* = 1.125$ kN/m (domestic barrier loads to AS 1170.1), resolved through the base plate at a 110 mm lever arm — with timber withdrawal capacities to AS 1720.1.

Specified timber fastener. The recommended timber fastener is the Bremick XTP 18g washer-head construction screw (T40 drive, TechnoGuard coated) — a structural screw that drives without coach-screw effort and whose large washer head bears across the 10 mm base-plate hole without an added washer. For coastal or pool environments the equivalent is the SPAX 8 mm washer-head screw in 316 stainless steel (drive without an impact driver). Capacity is taken from the XTP published pull-out data (mean ultimate 12.6 kN in F17/JD3 hardwood and 7.3 kN in F5/JD4 pine at 35 mm embedment), reduced by a 0.34 design knock-down and scaled linearly with penetration. The loaded-row pattern is two screws in hardwood (JD3 and denser) and three screws in pine/LVL (JD4). Screw length is sized so the thread penetrates the structural bearer (not decking alone) by the depth in the table below; where the post sits over a decking or packer gap, that gap is added to the screw length. The substrate document covers this same post system — the 65 × 65 mm aluminium post on its 112 × 112 mm aluminium base plate, independently load-tested on concrete in AZT0257.23 — and is available on request. This is an engineering assessment by Sentrel, not an independent test result.

Timber / pattern	XTP 18g screw	Penetration	Max span	kN req.	kN ach.	Wind rating
JD3 hardwood & denser — 2 screws	100 mm	83 mm	1.9 m	19.4	20.3	**N4**
JD3 hardwood & denser — 2 screws	125 mm	108 mm	2.5 m	25.6	26.4	**N4**

Timber / pattern	XTP 18g screw	Penetration	Max span	kN req.	kN ach.	Wind rating
JD3 hardwood & denser — 2 screws	150 mm	133 mm	3.0 m	30.7	32.6	**N3**
JD3 hardwood — 3 screws	100 mm	83 mm	2.9 m	29.7	30.4	**N3**
JD3 hardwood — 3 screws	125 mm	108 mm	3.0 m	30.7	39.5	**N3**
JD4 pine / LVL — 3 screws	100 mm	83 mm	1.7 m	17.4	17.7	**N6**
JD4 pine / LVL — 3 screws	125 mm	108 mm	2.2 m	22.5	23.0	**N4**
JD4 pine / LVL — 3 screws	150 mm	133 mm	2.7 m	27.6	28.3	**N3**

Table values are for the screw thread fixed directly into the structural bearer. For a decking or packer gap g, increase the screw length by g. kN required = 10.23 × span (design tension on the loaded row); kN achieved = number of screws × design withdrawal × penetration. Wind rating = the highest AS 4055 wind class the panel width (= span) stays within the tested post capacity for (N1–N3 ≤ 3,030 mm; N4 ≤ 2,590 mm; N5–N6 ≤ 1,830 mm — see the wind section); all spans are capped at the 3.0 m maximum panel length.

Steel and other substrates. The demand is unchanged — the loaded-row fixings must develop T* = 10.23 × span (kN), e.g. 30.7 kN total at 3.0 m spacing. The valid fixing (tapped 8.8 set screw or through-bolt in thick steel; rated self-drilling structural screws or weld studs in thinner steel; with galvanic isolation of the aluminium plate) is selected and verified by the project engineer against the per-fixing capacity table in the Substrate Requirements & Limitations document.

Wind loading — the balustrade span table governs, not wind. For a balustrade the governing action is the AS 1170.1 imposed (people) load of 1.125 kN/m at the top rail — roughly three times the wind demand at the same panel width — so the panel width is set by the fixing capacity in the span table above, not by a wind width table. (A shorter balustrade panel does experience less wind than a taller pool fence, but because the people-load governs, that does not translate into extra width.) Wind actions remain site-specific: the project engineer or certifier confirms the site wind classification per AS 4055 / AS/NZS 1170.2 and checks it against the tested post and base-plate capacities, which stay within the span-table envelope. Sentrel can provide the full test reports and tested-sample dimensions to support that assessment.

3. Compliance summary

Requirement	Standard / clause	Evidence document	Result
Balustrade panel imposed actions — top edge 1.5 kN/m horizontal, 0.75 kN/m vertical, 0.6 kN point; infill 1.5 kPa and 1.5 kN	AS/NZS 1170.1:2002, Clause 3.6 / Table 3.3	PearlStreet ETRS Report 4207-2100, tested 14/12/2007, issued 07/01/2008	Pass — suitable for all Table 3.3 occupancy types except C5
Building Code compliance of balustrade panel	BCA 2008, Part 3.9.2	PearlStreet ETRS compliance letter, L. Solley, 26/05/2008	Complied — wire passes over smooth 80 mm sections, no permanent wire deformation
Post installation — fixing to concrete (horizontal point loads at top of post)	AS 1657-2018, Appendix B test method	Test Report AZT0257.23, Azuma Design, NATA Lab 15147, tested 07/07/2023	Pass — 600 N deflection and 1200 N ultimate; weld shear at 2720 N
Suitability at heights over 4 m (no horizontal climbable elements 150–760 mm above floor)	BCA Clause 3.9.2.5 (and NCC successor provisions)	Sentrel Compliance Statement (manufacturer's statement)	Stated by manufacturer — vertical cable infill; certifier to verify against current NCC
Electrical continuity / earthing of cable system	AS/NZS 3000 (bonding by licensed electrician)	Sentrel AS/NZS 3000 certification letter (October 2025)	Refer letter — conditional on installation per instructions

Notes for the certifier. (1) The PearlStreet panel testing was conducted in 2007 against AS/NZS 1170.1:2002 and reported against BCA 2008 clause numbering; the imposed actions in Table 3.3 remain the reference loads, and the certifier should map the results to the corresponding provisions of the current NCC. (2) The tested panel was the Sentrel cable balustrade; the cable infill, cable pitch and load path are common to the aluminium-rail system. The full report is available so the certifier can assess applicability to the project configuration. (3) The system did not pass the 3 kN/m crowd loading and is not suitable for occupancy type C5 (areas susceptible to overcrowding).

4. Key tested details

Panel loads achieved	Top edge: 1.5 kN/m horizontal, 0.75 kN/m vertical, 0.6 kN in any direction. Infill: 1.5 kPa horizontal and 1.5 kN any direction. All pass (Report 4207-2100, Table 1)
Occupancy types	Suitable for AS/NZS 1170.1 Table 3.3 occupancy types A, B, E, C1/C2, C3, D and F/G; not suitable for C5
Wire detail	Vertical cables pass over smooth 80 mm diameter sections; no permanent wire deformation after testing (PearlStreet letter, 26/05/2008)
Post (tested)	65 × 65 × 3 mm extruded aluminium box section, 1000 mm high, welded aluminium base plate 112 × 112 mm, tested 10 mm / production 12 mm (AZT0257.23)
Post fixing to concrete (tested)	4 × M6 × 75 mm screw bolts per post, holes at 94 mm centres (AZT0257.23)
Post fixing performance	600 N at top of post: 9.29 mm deflection under load, 0.83 mm permanent (pass). 1200 N: 4.17 mm permanent, nil damage (pass). Peak capacity 2720 N (AZT0257.23)

5. Site compliance — installer / certifier checklist

The items below are site-dependent and are the responsibility of the installer and certifier under the NCC and AS/NZS 1170.1 — they are not controlled by the supplied product and are not certified by Sentrel. A product compliant as supplied can still fail if these are not met on site.

Barrier height	Minimum barrier height for the application per NCC (commonly 1000 mm for floors/landings, 865 mm on stairs), measured above finished floor level along the whole barrier.
Opening / infill spacing	Where the fall is more than 1 m, no opening may allow a 125 mm sphere to pass (NCC). Confirm cable/infill spacing as installed meets this for the building classification.
Climbable elements	For required barriers protecting a fall, the NCC limits horizontal or near-horizontal climbable elements between 150 mm and 760 mm above the floor. The vertical cable infill has no such elements; confirm no climbable rails, transoms or fixings are introduced on site within that zone.
Objects near the barrier	Confirm furniture, planters or fixtures adjacent to the barrier do not create a climbable foothold that defeats the barrier within the protected zone.
Occupancy / loading	Confirm the building's occupancy category falls within the tested range for this product (see Section 3). Crowd / assembly categories requiring higher loads need separate engineering.
Match the certified product	Confirm the installed product (post, panel, infill spacing, fixing) matches the tested, certified configuration and the substrate-fixing requirements in this pack.

6. Conditions and exclusions

The test results relate to the samples tested in the configurations described in the reports. The system must be assembled in accordance with Sentrel installation instructions, including onsite cable tensioning rules, without modification or substitution of components.

Barrier height above finished floor level, openings below the barrier, and any requirements arising from the building classification are to be confirmed by the certifier per the Section 5 checklist.

Any equipotential bonding or earthing required by AS/NZS 3000 must be completed by a licensed electrical contractor; the system must not be modified in a way that interrupts electrical continuity.

Excluded from current evidence: occupancy type C5; and the adequacy of the supporting structure or slab. Fixing to substrates other than concrete is supported by Sentrel engineering assessment (Sections 7–12), not by the test reports.

7. Post fixing — substrate requirements (engineering assessment)

This section is Sentrel's engineering design basis for fixing the post to timber, steel and other substrates. It is a Sentrel engineering assessment — not independent laboratory test evidence — provided to support the certifier and project engineer. Fixing to concrete is the exception: it is backed by NATA test evidence (AZT0257.23), summarised below.

Two load cases. Case 1 — balustrade (fall protection): the AS 1170.1 barrier load w* = 1.125 kN/m governs and drives the span table. Case 2 — pool fence: a much lighter post load (AS 1926.1 330 N proof), with the installed fixing normally governed by site wind. Where a pool fence also protects a fall (Case 1 + 2), the heavier balustrade case governs — fix it as a balustrade. Use the case that applies; do not interchange them.

Post and base plate. 65 × 65 × 3 mm extruded aluminium (6063 T5); welded aluminium base plate 112 × 112 mm with 10 mm holes at 94 mm corner spacing — current production 12 mm thick, tested at 10 mm per AZT0257.23 (production equals or exceeds tested). Lever arm to the loaded row 110 mm; minimum substrate width 150 mm in the load direction.

8. Concrete substrate (NATA test evidence)

Fixing to concrete is the one substrate backed by independent NATA test evidence. In AZT0257.23 the post and 112 × 112 mm aluminium base plate were fixed to concrete with 4 × M6 × 75 mm screw bolts at 94 mm corner spacing and load-tested: 600 N serviceability (9.29 mm deflection, 0.83 mm permanent — pass), 1200 N ultimate (4.17 mm permanent, nil damage — pass), peak 2720 N at weld shear. Concrete adequacy (thickness, strength, edge distance, reinforcement, condition) and minimum embedment per the screw-bolt manufacturer's data remain a site matter for the project engineer / certifier.

9. Timber fixing — screw selection (Case 1, balustrade)

Specified timber fastener. The recommended timber fastener is the Bremick XTP 18g washer-head construction screw (T40 drive, TechnoGuard coated) — a structural screw that drives without coach-screw effort and whose large washer head bears across the 10 mm base-plate hole without an added washer. For coastal or pool environments the equivalent is the SPAX 8 mm washer-head screw in 316 stainless steel (drive without an impact driver). Capacity is taken from the XTP published pull-out data (mean ultimate 12.6 kN in F17/JD3 hardwood and 7.3 kN in F5/JD4 pine at 35 mm embedment), reduced by a 0.34 design knock-down and scaled linearly with penetration. The loaded-row pattern is two screws in hardwood (JD3 and denser) and three screws in pine/LVL (JD4). Screw length is sized so the thread penetrates the structural bearer (not decking alone) by the depth in the table below; where the post sits over a decking or packer gap, that gap is added to the screw length. The substrate document covers this same post system — the 65 × 65 mm aluminium post on its 112 × 112 mm aluminium base plate, independently load-tested on concrete in AZT0257.23 — and is available on request. This is an engineering assessment by Sentrel, not an independent test result.

Per-mm design withdrawal (mean ultimate × 0.34, over the 35 mm test depth): JD3 = 122 N/mm, JD4 = 71 N/mm. Denser hardwoods (JD1, JD2) exceed JD3, so the JD3 row is conservative for them. T* required = 10.23 × span (kN).

Timber / pattern	XTP 18g screw	Penetration	Max span	kN req.	kN ach.	Wind rating
JD3 hardwood & denser — 2 screws	100 mm	83 mm	1.9 m	19.4	20.3	**N4**
JD3 hardwood & denser — 2 screws	125 mm	108 mm	2.5 m	25.6	26.4	**N4**
JD3 hardwood & denser — 2 screws	150 mm	133 mm	3.0 m	30.7	32.6	**N3**
JD3 hardwood — 3 screws	100 mm	83 mm	2.9 m	29.7	30.4	**N3**
JD3 hardwood — 3 screws	125 mm	108 mm	3.0 m	30.7	39.5	**N3**
JD4 pine / LVL — 3 screws	100 mm	83 mm	1.7 m	17.4	17.7	**N6**
JD4 pine / LVL — 3 screws	125 mm	108 mm	2.2 m	22.5	23.0	**N4**
JD4 pine / LVL — 3 screws	150 mm	133 mm	2.7 m	27.6	28.3	**N3**

Balustrade case (w* = 1.125 kN/m, panel height 1,020 mm). Direct to the structural bearer (gap = 0); for a decking/packer gap g add g to the screw length. Screw length = 12 mm plate + gap + penetration + 5 mm tip, rounded to the next stocked length. kN required = 10.23 × span; kN achieved = screws × design withdrawal × penetration. Wind rating = highest AS 4055 class the panel width (= span) stays within the tested post capacity for (N1–N3 ≤ 3,030 mm; N4 ≤ 2,590 mm; N5–N6 ≤ 1,830 mm — see wind section); all spans are capped at the 3.0 m maximum panel length.

10. Steel and other substrates — required fixing capacity

The demand does not change with substrate — the loaded-row fixings must develop T* = 10.23 × S (kN). For steel Sentrel specifies the required per-fixing capacity rather than a single product, because the valid method depends on steel thickness, grade and access; the project engineer selects a fixing whose design tensile capacity φNf meets or exceeds the demand and verifies the steel on site.

Post spacing (span)	T* total on loaded row	2 fixings	3 fixings	4 fixings
1.8 m	18.4 kN	9.2 kN	6.1 kN	4.6 kN
2.4 m	24.6 kN	12.3 kN	8.2 kN	6.1 kN
2.7 m	27.6 kN	13.8 kN	9.2 kN	6.9 kN
3.0 m	30.7 kN	15.3 kN	10.2 kN	7.7 kN

Per-fixing tension = T* / number of loaded-row fixings. Valid methods: thick steel (≥6 mm) — tapped Grade 8.8 M10 set screw or through-bolt; thinner steel (3–6 mm) — rated self-drilling structural screws or weld studs; hollow sections — blind/cavity fixings or weld-on. Galvanic isolation of the aluminium plate from steel is mandatory (isolation washers/coating or stainless fixings), especially in coastal/pool environments. Other substrates (masonry/FRP/composite) follow the same per-fixing demand, verified by the engineer.

11. Wind loading & maximum panel width

For a balustrade the governing action is the AS 1170.1 people-load (w* = 1.125 kN/m), not wind — it is about three times the wind demand, so the span table above already satisfies the wind case at every row. The **Wind rating** column in that table shows the AS 4055 wind class each fixing/span combination stays within the tested post capacity (1,200 N·m, AZT0257.23) for. No separate wind fixing calculation is required; the certifier confirms the site wind classification per AS 4055 / AS/NZS 1170.2 and reads the achievable class from the column. (For a pool fence, where wind does govern, the full wind width table applies — see the pool fence pack.)

12. Installation & site setout requirements

Penetrate the structural bearer. Stated penetration must be into the structural bearer/joist, not decking alone. Where the bearer is not directly beneath the base plate, install solid blocking ≥ 150 × 90 mm at every post.

Minimum substrate width 150 mm in the load direction (38 mm edge distance + 110 mm lever arm). Edge distance ≥ 38 mm (5 × the ~7.5 mm 18g screw diameter) to the loaded free edge and any other free edge; end distance ≥ 70 mm from any bearer end.

Pattern. Two screws on the loaded row in hardwood (JD3+); three in pine/LVL (JD4). Lever arm 110 mm — do not reduce; reducing it raises the load.

Pre-drilling. Pine/LVL: generally none. Mixed hardwood (JD3): pre-drill recommended. Dense hardwood (JD1/JD2, Merbau/ironbark): pilot drill required, wax thread.

Corrosion. Treated pine (H2/H3, CCA/ACQ) and coastal/pool environments: use the SPAX 8 mm 316 stainless option; zinc-plated fixings are not suitable in treated or marine conditions.

Timber condition. Sound timber, no splits in the fixing zone; JD4 seasoned (MC ≤ 19%). Confirm species / joint group on site; where unknown assume JD4 (most conservative). Merbau/Kwila = JD2 per AS 2082 regardless of F-grade.

Standards: AS 1170.0/1 (barrier design actions), AS 1720.1 (timber withdrawal, φ = 0.85), AS 2082 (species/joint groups), AS 4055 / AS/NZS 1170.2 (wind), Bremick XTP published pull-out data. This fixing content is a Sentrel engineering assessment for domestic barrier loading only and is not a substitute for site-specific structural engineering; the installer / certifier verifies species, substrate dimensions and condition, edge distances, and that the thread engages the structural bearer. Sentrel supplies a kit for onsite assembly and is not the installer.

13. Supporting documents (available in full on request)

Test reports are issued under NATA accreditation conditions and shall not be reproduced except in full; complete copies of the documents below are provided on request rather than excerpted here.

Report 4207-2100	Balustrade and Pool Fence Testing on Cable Balustrade, PearlStreet ETRS Pty Ltd, tested 14/12/2007 at Rocklea QLD, issued 07/01/2008 (11 pages, includes AS/NZS 1170.1 Table 3.3)
PearlStreet letter	Building Code Compliance letter, Lester Solley, Consultant Mechanical Engineering, PearlStreet ETRS, 26 May 2008
AZT0257.23	Test Report — Physical Edge Protection, Aluminium Balustrade Post fixed to concrete, Azuma Design Pty Ltd, NATA Lab 15147, tested 07/07/2023, signed A. Horne
Compliance Statement	Sentrel Australia Compliance Statement — occupancy types and over-4 m suitability

	(manufacturer's statement)
AS/NZS 3000 letter	Sentrel certification letter regarding electrical continuity / earthing of the cable system, October 2025
Warranty	Sentrel Aluminium Products Warranty Certificate, 15 years (V.22.1)

Prepared by Sentrel Australia Pty Ltd for the information of certifiers and building surveyors. This pack summarises independent test evidence; it is not itself a design certificate and does not replace the certifier's own assessment of the project against the National Construction Code and the standards applicable in the relevant jurisdiction. Contact Sentrel on 1300 658 330 or via www.sentrelaustralia.com.au for full reports, drawings or further information.