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Delivery Address:
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Postal Address:
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Email: info@melbtest.com.au
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IN CONFIDENCE TO THE CLIENT

REPORT NO: 21-0621

AS 1926.1 COMPLIANCE TESTING OF WATTLE & WIRE SWIMMING POOL SAFETY BARRIER ASSEMBLY & COMPONENTS

CLIENT: **WATTLE & WIRE PTY LTD**
ATT: GEOFF KENNEDY
150–152 YAUGHER RD
FORREST VIC 3236

DATE OF TEST: JULY 28TH 2021

DATE OF REPORT: AUGUST 11TH 2021

TEST SYNOPSIS:

A WATTLE & WIRE Split Pale Fence (Swimming Pool Safety Barrier) was erected at the MTS Laboratory by the client for testing (see Fig. 1). At the request of the client, pool fencing tests were to be carried out in accordance with select criteria of AS 1926.1 – 2012 SWIMMING POOL SAFETY, PART 1: SAFETY BARRIERS FOR SWIMMING POOLS.

Testing was performed in five (5) distinct stages identified as Parts A, B, C, D and E (refer to 'Test Schedule').

FIG. 1
WATTLE AND WIRE SPLIT PALE POOL FENCE

TEST SCHEDULE:

The following tests were to be undertaken:

Part A: Dimensional / Geometrical Assessment of Barrier Components – AS 1926.1 – SECTION 2

Part B: Tests for Strength and Rigidity of Barrier Openings – AS 1926.1 – CLAUSE 3.1

Part C: Strength Tests for Rigid Barrier Components – AS 1926.1 – CLAUSE 3.3.1

Part D: Strength Tests for Flexible Materials and Components – AS 1926.1 – CLAUSE 3.3.2

Part E: Tension Tests for Swaged Wire Joins – Experimental Type Tests

TEST ITEM DETAILS:

Prior to testing, the swimming pool safety barrier was inspected. Details from the inspection and the client's documented specifications are provided as follows:

Overall Fence Height: *1360 mm (Distance from underside of plinth to top of baluster)*
1210 mm (Distance from top of plinth to top of baluster)

End / Strainer Posts:	*150 × 150 mm Square Timber*
Intermediate Posts:	*100 × 100 mm Square Timber*
Max. Post Spacing:	*2500 mm Centre – to – Centre*
Bottom Plinth:	*150 × 50 mm Timber*
Vertical Balusters:	*Timber Black Wattle / Acacia Mearnsii*
	Split into Pie Sections (Quadrants) of 40 – to – 50 mm Section Width
Baluster Fixing:	*Balusters fixed to plinth using nails at two (2) points between posts*
	Horizontal Ligatures, Two (2) × 2.5 mm Waratah Flexabel Blue Wire
Opening Between Balusters:	*65 – to – 90 mm*

TEST SETUP:

A single bay of pool barrier was erected in conjunction with the client at the MTS Laboratory. The barrier was installed following the client's documented procedure (see Appendix A). A schematic depicting the typical post and plinth layout is presented in Appendix B.

In preparation for testing, a series of rigid steel stanchions were erected in a parallel manner and fastened to the laboratory strong floor. The end and intermediate barrier posts were in-turn bolted to the stanchions to provide 2.5 m post spacings.

A pair of 50 mm ratchet tie down straps were used to incrementally pre-tension the fence fabric (preassembled balusters with wire ligatures). Pre-tensioning was carried out by coupling the balustrade to a rigid reaction post (see Fig. 2). A pair of calibrated force measuring devices were used to measure the applied wire tension. The final tension in the top and bottom straps was measured to be 1.05 kN and 1.40 kN respectively.

An alternate procedure was developed to verify that the balustrade was adequately pre-tensioned using a dynamometer (digital "fish-scale"). The scale was coupled to the top ligature at the mid-span position. A string-line was attached between the posts and installed parallel to the fence-line directly above the balustrade (see Fig. 3). Under an applied lateral load of 10 kg indicated by the dynamometer, the deflection of the barrier at mid-span was measured to be nominally 35 – to – 40 mm.

FIG. 2
RATCHET STRAP PRE-TENSIONING CONFIGURATION

FIG. 3
ALTERNATE PROCEDURE TO VERIFY WIRE TENSION

PART A – DIMENSIONAL / GEOMETRICAL ASSESSMENT OF BARRIER COMPONENTS – AS 1926.1 – SECTION 2:

The barrier was inspected for dimensional and geometrical requirements in accordance with AS 1926.1 – SECTION 2. The following dimensions and details were recorded:

a) As per CLAUSE 2.1, the height of a barrier shall not be less than 1200 mm.
   The height of the barrier, from the underside of the bottom plinth (finished ground level) to top of infill, was measured to be 1360 mm. **PASS**

b) As per CLAUSE 2.1, a barrier shall not lean away or slope by more than 15˚.
   The barrier was erected in a vertical manner. **PASS**

c) As per CLAUSE 2.1, balustrades shall be free of sharp edges and projections.
   The surface of the timber balustrades was observed to be smooth. **PASS**

d) As per CLAUSE 2.2.2 (A), horizontal components shall be located more than 900 mm apart.
   The distance between the top and bottom horizontal wires was measured to be greater than 900 mm along the length of the barrier (NCZ 1). **PASS**

   The top horizontal wire was located 1080 mm above the top surface of the bottom plinth (NCZ 1). **PASS**

   The bottom horizontal wire was located 1020 – to – 1040 mm below the top of the barrier (NCZ 1). **PASS**

e) As per CLAUSE 2.3.6, clear openings shall not exceed 100 mm at any point in a barrier.
   The clear openings between vertical balustrades were measured to be within 65 – to – 90 mm. **PASS**

f) As per CLAUSE 2.3.7, the height of any opening between the bottom barrier and finished ground level shall not exceed 100 mm.
   The clearance between the balustrade and bottom plinth was measured to be 0 mm. **PASS**

PART B – TESTS FOR STRENGTH AND RIGIDITY OF BARRIER OPENINGS – AS 1926.1 – CLAUSE 3.1

Test Procedure:

Testing was conducted in accordance with AS 1926.1 APPENDIX A using a mandrel freely suspended from an overhead support rail. The mandrel was a 400 mm long × 105 mm dia. cylindrical bar with a conical end.

Tests were performed by forcing the cylindrical mandrel between the vertical balusters (openings) of the barrier (see Fig. 4). The applied load was measured using a calibrated force-measuring device. In accordance with the Australian Standard, the barrier openings shall be capable of resisting a test force of 150 N. Testing was conducted across the width of the barrier at the middle of each third. The locations included three (3) tests at mid-height and three (3) tests directly above the top horizontal wire (see Fig. 5). At each location, tests were performed in both the inward and outward direction.

Test Results:

At each location, the barrier resisted pull-through of the mandrel under an applied force of 150 N. The panel has therefore **PASSED** the requirements for testing as per AS 1926.1 CLAUSE 3.1.

FIG. 4
PART B – TEST SETUP

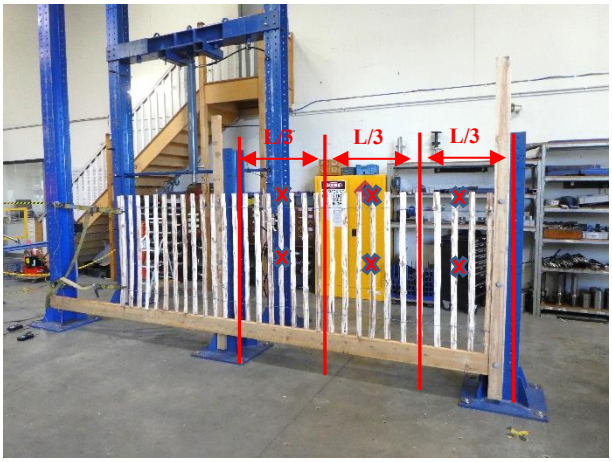


FIG. 5
PART B – TEST LOCATIONS

PART C – STRENGTH TESTS FOR RIGID BARRIER COMPONENTS – AS 1926.1 – CLAUSE 3.3.1

Test Procedure:

Testing was conducted in accordance with AS 1926.1 APPENDIX C using a 105 mm dia. cylindrical mandrel. In accordance with the Australian Standard, the barrier components shall be capable of resisting an applied force of 330 N for a period of 30 seconds. Upon unloading, the permanent deformation of any component shall be less than L / 200 (≈ 12.5 mm); where L is taken to be the post spacing.

Test locations included the top, middle and bottom of the balustrade at the mid-span position. Additional tests were performed on the vertical balustrades adjacent the posts (see Fig. 7). At each location, tests were performed in both the inward and outward direction. The test setup is shown in Figure 6.

Test Results:

In all cases, the rails and balusters of the pool barrier resisted a test force of 330 N without breakage, fracture or loosening of components. Upon release of the test load, the maximum permanent deformation of the barrier was measured to be 4 mm. Therefore, the barrier has **PASSED** the requirements for testing as per AS 1926.1 CLAUSE 3.3.1.

FIG. 6
PART C – TEST SETUP

FIG. 7
PART C – TEST LOCATIONS

PART D – STRENGTH TESTS FOR FLEXIBLE MATERIALS – AS 1926.1 – CLAUSE 3.3.2:

Test Procedure:

Testing was conducted in accordance with AS 1926.1 APPENDIX D using a 9.1 kg mandrel with a half spherical solid-faced 50 mm dia. at one end (see Fig. 9). In accordance with the Australian Standard, the flexible materials and components of a barrier shall resist a dynamic force without signs of penetration, breakage or signs of fracture.

Tests were performed by suspending the mandrel 1400 mm below a pivot point (see Fig. 8). The object was then raised through an arc of 40˚ from vertical to allow a free-swinging pendulum. Tests were performed at select locations considered to be the most flexible. Locations included the top, middle and bottom of the infill at mid-span. Dynamic testing was carried out on both sides of the barrier.

Test Results:

At each location, the barrier withstood impact without evidence of breakage, fracture or loosening of components. Minor bruising of the timber balustrades was observed at the impact sites. The barrier has **PASSED** the requirements for testing as per AS 1926.1 CLAUSE 3.3.2.

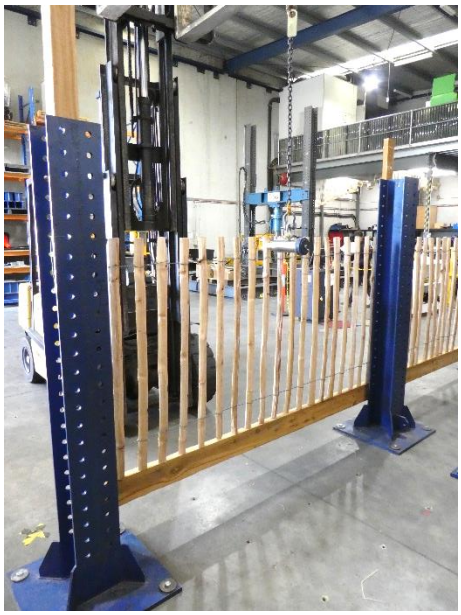


FIG. 8
PART D – TEST SETUP

FIG. 9
PART D – IMPACT MANDREL

PART E –TENSION TESTS FOR SWAGED WIRE JOINS – EXPERIMENTAL TYPE TESTS:

Test Procedure:

Upon the conclusion of all Australian Standard compliance test described in Part A – to – Part D of this report, an experimental type test was conducted to determine the ultimate tension capacity of a swaged wire join between ligatures. A pair of 50 mm ratchet tie down straps were used to apply tension in an incremental manner. The ratchet straps were installed parallel to the top and bottom horizontal wires.

Test Results:

The peak force supported by a single swaged wire join was recorded to be 3.1 kN. A reduction in peak load coincided in withdrawal of the ligature from the swaged terminal.

TEST SUMMARY:

The results, as reported herein, confirm that the WATTLE & WIRE SPLIT PALE FENCE has **PASSED** the requirements of AS 1926.1 – 2012 SWIMMING POOL SAFETY, PART 1: SAFETY BARRIERS FOR SWIMMING POOLS, for the specific performance and testing requirements reported herein.

1. Melbourne Testing Services (MTS) Pty Ltd shall not be liable for loss, cost, damages or expenses incurred by the client or any other person or company, resulting from the use of any information or interpretation given in this report. In no case shall Melbourne Testing Services Pty Ltd be liable for consequential damages including, but not limited to, lost profit, damages for failure to meet deadlines and lost production arising from this report. This document shall not be reproduced except in full and relates only to the items tested.
2. It remains the responsibility of the client to ensure that the samples tested are representative of the entire product batch.
3. MTS shall take no responsibility for the procurement and authenticity of the test product as described herein.
4. This report is specific to the test items in their state at the time of testing. It should not be taken as a statement that all products in all states of repair, would also perform in the same manner.
5. MTS advises the reader that compliance of the barrier as reported herein is strictly limited to barriers constructed in accordance with the dimensional tolerances as reported herein. As such, barriers manufactured prior to or after the date of this report which may differ in respect of dimensional and material properties shall not be considered, or deemed to be compliant with Australian Standards as a result of these tests.
6. Compliance of the swimming pool safety barrier as tested and reported herein is strictly limited to the performance attributes of the barrier in accordance with the requirements of AS 1926.1 - 2012 clauses as explicitly described herein. With this in mind MTS shall take no responsibility for the overall conformance of the barrier with other aspects of compliance with respect to Australian or International Standards that may apply.
7. MTS shall take no responsibility for the interpretation or misinterpretation of the procedures or calculation methods as provided herein or for the appropriateness or validity of the test procedures for the test items described and reported herein.

CAREY ARTHURSON
AUTHORISED SIGNATORY

DANIEL HUMFREY
TEST ENGINEER

APPENDIX A:

ERECTING WATTLE&WIRE FENCES

We recommend that our fences be installed with a plinth board. In the case of pool fencing it is mandatory that the base of the fence be fixed at 2 to 3 points between posts.

Concrete, timber, sleepers and sleeper walls and timber decks can constitute a plinth. Plinths can be used to extend the height of the fence.

Swaged Joins

Joining sections of fence

Trim the ends of the ligatures (wires) to slightly less than the prescribed spacing to make a tail.

Make sure the tails are straight and parallel, the twists tight and there are no sharp ends or burs to catch on the ferrule.

Place a ferrule onto each tail and bring the ends together so that the tails overlap and are both inside the ferrule.

Check the pale spacing is correct before making the swage.

Use a 5mm swaging tool.

Erecting Wattle&Wire fence fabric, (Example for 40m of fence)

Roll out four 10.0m rolls of fence.

Join roll one and two together and join roll three and four together with the ferrules supplied and following the above procedure.

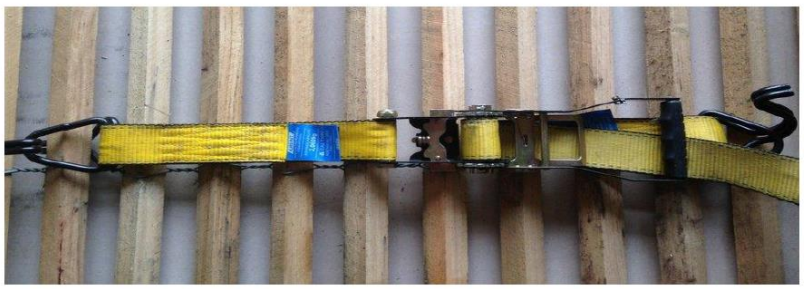
At the strainer post ends of the fabric, twist the tails behind the pale in order that they will be hidden between the pale and the strainer post when fixed. Trim off the excess wire.

Lift the fence into position and fix to the post at each ligature using 100mm baton screws. Pre drill the holes through the pale with a 4.5mm bit.

APPENDIX A (CONT.):

Carry out same at both strainer post ends and stand the remaining fence upright against the posts. Use the packaging strap from around the rolls of fence to loosely tie the fence to the posts.

The most efficient tool to strain the fence fabric is a pair of 50mm ratchet tie down straps with retainers on the hooks. These are usually around 2000kg breaking strain.



Place the strap hooks around a selected pale at the top and bottom ligature and lock with the retainer rings.

Pull through excess strap and begin winching, starting with the bottom strap first.

Repeat with the top strap and winch up until the pales are vertical and parallel. By this time the fence will stand up by itself.

Release the winch and repeat if the winch drum is full of strap and make sure none of the post ties are tight.

With a lever (a post hole spade is useful) lever the fence toward the strainers using the fence post as a fulcrum. Start levering at the strainer posts and work toward the centre, (strainers) from each end.

Winch up the slack and repeat the process until the fabric is taught, the pales at the join are vertical and parallel and at the correct distance apart.

To make the join, trim off the excess fence and repeat as per the process of making swaged joins.

Remove the straps when swaging is complete and fix the fence to the posts.

Fixing to posts and cable

100mm Bugle screws can be used to fix the fence to the posts, one at each ligature. Where a pale does not correspond with a post, a 50mm barbed staple can be used over the ligature. Do not drive staples all the way in.

Fixing pales to the plinth

In the case of pool fence it is mandatory that between posts at least two pales be fixed to the plinth.

APPENDIX A (CONT.):

In standard fences, fixing pales to the plinth is optional but recommended.

How to fix the pales to the plinth

This process is carried out once the fence has been strained and fixed to the posts.

Select 2 or three pales at roughly even spacing's and which are of good section.

Mark the point where the centre of each pale meets the plinth.

Push the pale away and using a 2.5mm bit, drill a 10-15mm deep hole into the plinth

Drive a 50mm galvanised bullet head nail, head first into the drilled hole. It should be tight and you should be unable to pull it out.

Take the pale and lift it back into position over the nail.

Using a hammer, tap the pale down onto the nail until it rests on the plinth.

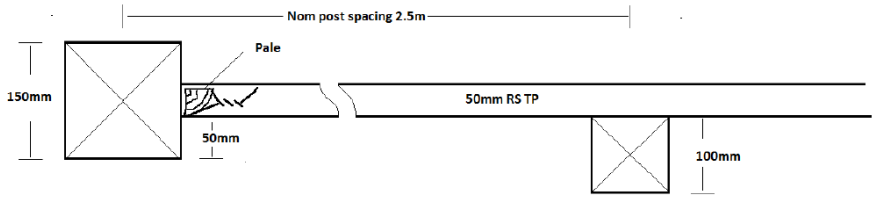
Make sure the nail drives all the way into the pale and does not just bend over. If it does straighten it and try again

This process will avoid the possibility of the fence being pushed off the plinth and out of position.

Wattle&Wirepl

APPENDIX B:

Typical Post and Plinth Lay Out for Wattle&Wire Split Pale Fence



Recommended strainer post sizes which includes all posts carrying a lateral load; (end posts, gate post and corner posts)

900mm high 125mm x 125mm

1200mm high 125mm x 125mm to 150mm x 150mm

1500mm high 150mmx 150mm or larger

All Intermediate posts 100mm x 100mm

Post footings for strainer posts

800mm deep x 300 to 350mm wide concreted

wattle&wire™ p/l