FORTRESS™
FENCING SYSTEMS

INSTALLATION INSTRUCTIONS FOR BRACING/SUPPORTING

FORTRESS PANEL SYSTEMS – Page 1 of 2

1. Before installing brace, otherwise known as supports or back stays, it may be necessary to do an individual wind impact assessment for the site. Our guidelines for bracing are set out below. Fortress Fencing will not be held responsible for any fencing blowing over, as each site has different exposure levels.
2. If STD 3000 Panel System is installed in straight runs with no material such as shadecloth on the fencing, then a brace should be installed every 6th panel. If the area is prone to high winds & very exposed it may be necessary to brace as often as every 3rd panel. The bracing is designed to be fitted on alternate sides of the fence, however if that is not practical because of walkways, then all braces can be fitted on one side. In this instance, 20% more bracing may be necessary.
   If Std 3000 Panel System has Shadecloth (50% - 70% block out) installed on the full length of the fence, then a brace will need to be installed at least every 2nd panel. If a STD brace is insufficient, it may require the Heavy Duty Brace which can fit up to 4 feet on each brace. If more bracing is required, consideration should be given to put more weight on the brace rather than installing more braces.
3. If 6000 Panel System is installed then it may require about 10-20% more bracing supports per metre than the STD 3000 Panel System. This is due to panels being 10 metres longer with less weight support per metre to begin with.

Installing STD Brace

The STD brace has a bend on one end. The older models have a coupler welded to them, and a 10mm round rod welded to the other end as pictured.
The brace helps support a fence line which has force against it from either side. It works as a support for one side & a counter weight for the opposite force direction.

Step 1

Position Rubber/Poly Feet end to the end of Fence Panel Foot.

Step 2

Place rod end of brace into rectangular slot in the brace foot closest to panel. Then turn 90° so that the rod fits up under the foot with the foot sitting on the rod so that the brace is firmly secured in place.

Step 3

Then push the top of the brace over to the join in the fence panels & couple to the fence using coupler already welded to the brace.

INSTALLATION INSTRUCTIONS FOR BRACING/SUPPORTING

FORTRESS PANEL SYSTEMS – Page 2 of 2

Installing H/D Brace

The H/D Brace is designed so the feet are stacked on the pipes that protrude from the base. Four feet are able to be placed on each H/D Brace. Then the top can be pushed over to the fence panel join & coupled on to upright of panel using our H/D coupler.

INSTALLATION INSTRUCTIONS FOR STD 3000 Panel System

1. Ensure delivery vehicle is parked securely on level ground at the site. Establish exclusion zone around plant and unloading area. Unload with care using a Manitou, Forklift, Hiab or Franna.
2. Make sure all site required PPE is worn, including eye protection and gloves.
3. Before cutting straps ensure fencing pack is supported on both sides to prevent collapse.

4. Although one person can lift & install panels by themselves, it is preferable to have an assistant for greater efficiency and ease of installation. Follow established principles for manual handling, including bending knees while lifting.
5. Lay out fence panels along perimeter.
6. Lay down one foot at each join at 90° to the fence line as shown below.
7. Stand up panels one by one & install in middle holes of the feet as shown below.

8. As shown below, put one coupler on each panel join, preferably using assistant to adjust by lifting one end of the panel. Tighten up coupler bolt using a ratchet socket spanner.
9. Make sure feet are not protruding onto a roadway or walkway. High visibility feet may be necessary in high pedestrian areas.
10. Put a standard brace with one foot on alternate sides of the fence every 6 - 7 panels. If alternate bracing is not practical, then brace all on one side & slightly more often (5-7 panels) – see **"Installation Instructions for Bracing"**

Installing Shadecloth

If you are installing shadecloth on our STD 3000 Panel System you will need to brace the system more often. Allow for a minimum of one STD brace on every 2nd panel either on alternate sides or on the same side.
An independent wind impact assessment may be necessary for individual requirements for each site. More feet may be required per brace or an H/D brace, which take up to four feet each, may be necessary.
(See **"Installation Instructions for Bracing")**

Melbourne Testing Services

Unit 1/15 Pickering Road
MULGRAVE Victoria 3170
Telephone 03 9560 2759
Mobile 0419 116 733

TEST CERTIFICATE

FOR REPORT MT-10/253

CLIENT: **FORTRESS FENCING & SAFETY SYSTEMS**
23 CHARLES STREET
ST MARYS NSW 2760

APPLICABLE STANDARDS: ***AS 4687-2007 TEMPORARY FENCING AND HOARDINGS***
AS/NZS 1170.2-2002 STRUCTURAL DESIGN ACTIONS – WIND LOADS

Unbraced Fortress temporary fence panels, as described in test report MT-10/253, have been tested in accordance with AS 4687:2007 Section 4, and have passed the specified requirements for Clause 4.2 Simulated Climbing & Clause 4.4 Foothold Aperture Tests.

Braced Fortress temporary fence panels, as described in test report MT-10/253, have passed the specified requirements for Clause 4.3 Impact Test and Clause 4.5 Wind Force Overturning Tests.

The computed wind load capacities, as provided below, have been calculated using the tabled AS/NZS 1170.2-2002 values in conjunction with the averaged test results from the report.

Fence Type	Infill Type (mm)	Bracing Condition (per panel)	Number of Blocks (per brace)	Test Load (kN)	Calculated Wind Speed Capacity (m/s)	Conformance with AS 4687	Australian Wind Region
Fortress Single Panel Scenario	Rectangular 3.0mm Diameter Mesh	Single	1	0.34	**18**	Complies	A to B
			2	0.55	**24**	Complies	A to D
			3	0.66	**26**	Complies	A to D
			4	0.75	**28**	Complies	A to D
		Double	1	0.55	**24**	Complies	A to D
			2	0.87	**30**	Complies	A to D
			3	1.26	**36**	Complies	A to D
			4	1.50	**40**	Complies	A to D

Fence Type	Infill Type (mm)	Bracing Condition	Number of Blocks (per brace)	Test Load (kN)	Calculated Wind Speed Capacity (m/s)	Conformance with AS 4687	Australian Wind Region
Fortress Double Panel Scenario	Rectangular 3.0mm Diameter Mesh	Single	1	0.50	**16**	Complies	A
Fortress Double Panel Scenario	Rectangular 3.0mm Diameter Mesh	Single	4	0.92	**22**	Complies	A to C

Fence Type	Infill Type (mm)	Bracing Condition (per panel)	Number of Blocks (per brace)	Test Load (kN)	Calculated Wind Speed Capacity (m/s)	Conformance with AS 4687	Australian Wind Region
Fortress Single Panel Scenario	Rectangular 3.0mm Diameter Mesh with shadecloth	Double	3	1.26	**16**	Complies	A

CONDITIONS:

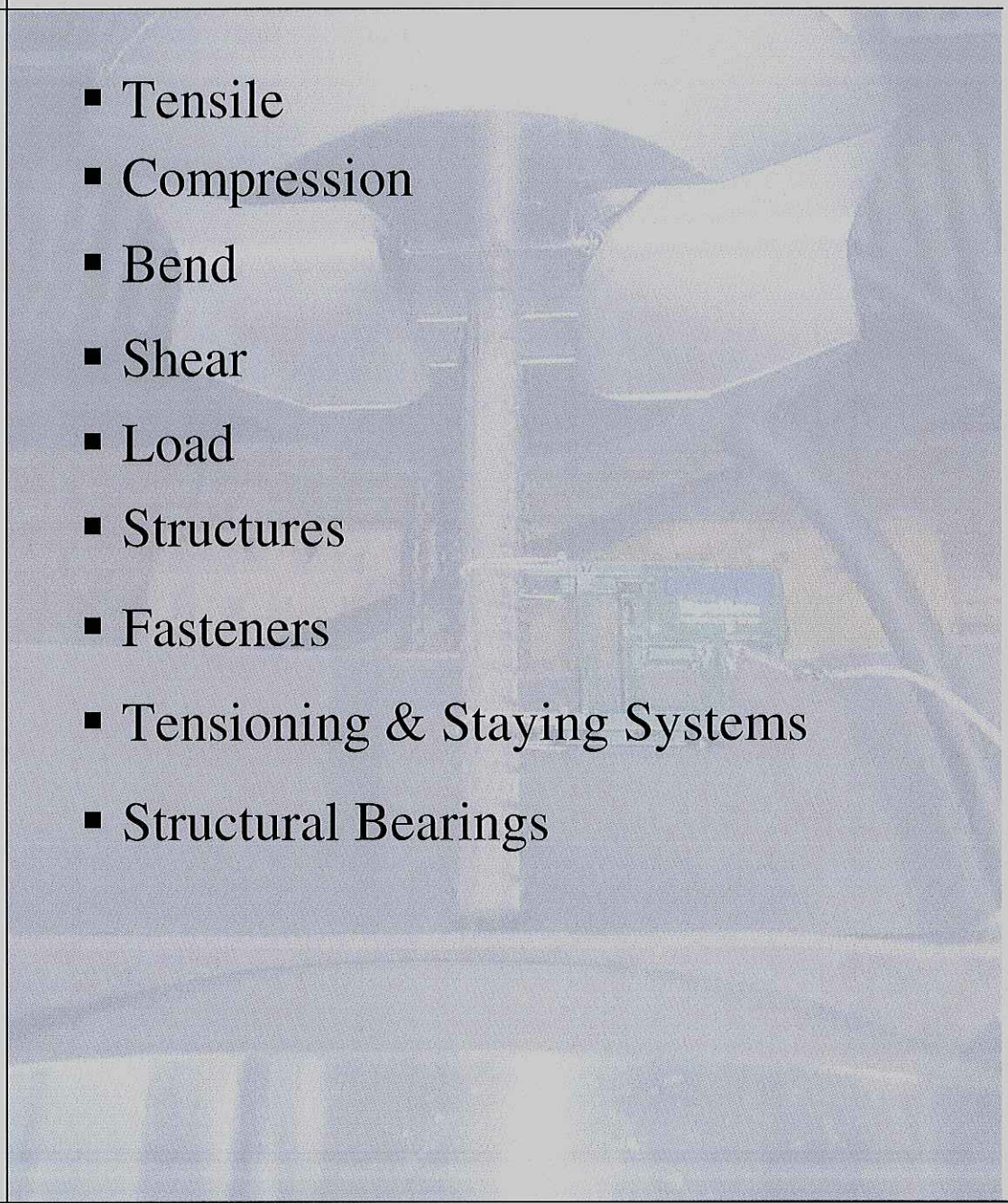
1. It remains the responsibility of the client to ensure that the "Temporary Fencing Panels" and associated components, as reported in MT-10/253 are representative of entire production batches.
2. Melbourne Testing Services shall take no responsibility for the procurement and authenticity of the "Temporary Fencing Panels" as described herein.
3. Melbourne Testing Services shall take no responsibility for any subsequent alterations or design changes that may affect the safety and performance of the "Temporary Fencing Panels" as described in MT-10/253.
4. Melbourne Testing Services shall take no responsibility for the installation procedures and use of the "Temporary Fencing Panels" as described in MT-10/253.

R. Wilkie

RODNEY WILKIE
TEST ENGINEER,
LABORATORY MANAGER
DATE: 31/05/2010

Melbourne Testing Services

Mechanical Testing



- Tensile
- Compression
- Bend
- Shear
- Load
- Structures
- Fasteners
- Tensioning & Staying Systems
- Structural Bearings

NATA
ACCREDITED FOR TECHNICAL COMPETENCE

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IN CONFIDENCE TO THE CLIENT

REPORT NO: MT-10/253

TESTING OF A TEMPORARY FENCE SYSTEM

CLIENT: FORTRESS FENCING & SAFETY SYSTEMS
23 CHARLES STREET
ST MARYS NSW 2760

DATE OF TESTING: MAY 10TH – MAY 29TH 2010

DATE OF REPORT: MAY 31ST 2010

TEST SYNOPSIS:

Temporary fence panels, a number of plastic footing blocks, clamping fixtures and bracing members were delivered to the Melbourne Testing Services (MTS) laboratory for testing. Upon arrival at the laboratory the test items were inspected and the following fence identification details were supplied by the client and recorded as:

FIG. 1.
FORTRESS FENCE TEST PANEL

Fence Panels:	*3.44m wide x 1.87m high*
Fence Frame:	*Nominal 40mm OD diameter zinc coated pipe.*
Back Braces:	*Nominal 40mm OD diameter zinc coated pipe with welded footing interlock plates.*
Internal Wire:	*200x50x3.0mm diameter wire, rectangular pattern, galvanising hot-dipped.*
Foot Blocks:	*Weighing nominally 15kg each. L=800mm x W=290mm x D=135mm.*

At the request of the client, tests were to be conducted to determine the performance attributes of individual and assembled fences in accordance with AS 4687-2007 TEMPORARY FENCING AND HOARDINGS.

The following tests were conducted in accordance with Section 4:

- Simulated Climbing Test
- Impact Test
- Infill Aperture Test
- Wind Force Overturning Test

Melbourne Testing Services Pty Ltd
ABN: 71353261540

TEST PREPARATION:

Temporary fence panels were prepared for testing in both single panel and continuous panel configurations. Continuous panel testing was conducted on a three panel assembly with the middle panel being the focus of the testing. The temporary fencing was assembled using the supplied clamping fixtures and in accordance with the manufactures assembly guidelines.

SIMULATED CLIMBING TEST:

Simulated climbing tests were conducted by pulling the top rail of the fence panel vertically downward. A stiffened 400mm lever-arm attached to the centre of the fence panel was used to apply the load (See Fig.2). The downward force was continuously applied until an applied load of 65kg had been achieved. This test load was maintained for a period of 3 minutes.

FIG. 2.
CLIMBING TEST

IMPACT TEST:

Impact testing was conducted by swinging a pendulum mass into the mesh infill of a braced, single fence panel. Four test locations, as described in Fig.2 of AS 4687-2007 were selected and tests were conducted at an impact energy level of 150 joules. A visual inspection for damage to the fence panels, mesh infill, and infill/post connection points was conducted after each impact.

FOOTHOLD TEST:

(a) Aperture Width

Aperture width testing was conducted by attempting to pass a 76mm x 76mm test block through a mesh aperture. Measurement of a single mesh aperture was also conducted to determine that the opening was less than the specified dimensional limit of 75mm.

FIG. 3.
INFILL DOWNWARD TEST

(b) Infill Downward Load Test

To test that the infill mesh had sufficient stiffness to resist an attempt to climb the fence, a downward load of 100kg was applied at one of the rectangular shaped openings (see Fig.3). This load was maintained for 60 seconds at which point the downward deflection of the infill material was recorded.

SIMULATED WIND LOAD TEST:

Wind load testing was conducted by applying a lateral overturning load to the centre of the panel (See Fig.4). The test load was steadily increased until the footing blocks were observed to have completely lifted from the ground, rendering the fence unstable. At this point the applied test load was maintained and the peak test load recorded. Wind load testing was conducted on unbraced panels as well as panels incorporating a back brace with a combination of single and double block support scenarios.

FIG. 4.
WIND LOAD TEST

TEST OBSERVATIONS:

SIMULATED CLIMBING

The fence panels were visually inspected for signs of deformation and failure after completion of the test. No visible sign of permanent deformation or structural failure was observed in the panel or mesh upon completion of testing. The fence panel successfully supported a 65kg test load without overturning.

IMPACT TESTING

A single fence panel using plastic footings and with no bracing, overturned after an impact collision of 150 joules was applied.

A single fence panel assembled as above with the addition of a single, interlocking back brace revealed the following observations after an impact collision of 150 joules was applied:

- No penetration of the mesh.
- No failure between the mesh and post/rail connections.
- No visible sign of cracking.
- No overturning due to impact.
- Maximum dynamic deflection recorded was **78mm** which is less than the specified 300mm.

FOOTHOLD APERTURE TESTS

(a) Aperture Width

The infill aperture horizontal width was measured to be **50mm**, less than the specified maximum of 75mm. A test block measuring 76mm x 76mm could not be passed through the rectangular shaped mesh infill.

(b) Infill Downward Load Test

Infill downward load test resulted in a deflection of **26mm**, less than the specified permissible maximum of 35mm.

SIMULATED WIND LOAD TESTING

Simulated wind load testing was conducted on various temporary fence panel erection scenarios including:

1. Panels with single back braces fitted with single and multiple stacked footings.
2. Panels with two (2) back braces fitted with single and multiple stacked footings.

In each case the tested panels resisted the simulated wind loads without failure of the fence's structural frame work or infill material.

Testing was conducted to the point where the fence panels were on the verge of tipping. The tipping force was recorded as the peak force and is presented along with the calculated equivalent wind speed for each test in Appendix A.

Melbourne Testing Services Pty Ltd
ABN: 71353261540

SUMMARY

Unbraced Panels

The test results confirm that an unbraced, Fortress Temporary Fence panel, as described and reported herein, meets the minimum requirements as specified in Section 4 of AS 4687-2007 TEMPORARY FENCING AND HOARDINGS for:

- Simulated Climbing Test
- Infill Aperture Width Test
- Infill Downward Load Test

A single, unbraced panel with plastic footings overturned upon an impact collision of 150 joules.

Braced Panels

The impact test results confirm that a Fortress Temporary Fence panel with plastic footings, one interlocking back brace with a plastic footing meets the impact test requirements as specified in Section 4 of AS 4687-2007 TEMPORARY FENCING AND HOARDINGS.

The wind test results confirm that a Fortress Temporary Fence panel fitted with plastic footings, one interlocking back brace and a single plastic footing meets the minimum wind speed requirement for Region A & B as specified in Section 4 of AS 4687-2007 TEMPORARY FENCING AND HOARDINGS.

The wind test results confirm that two (2) Fortress Temporary Fence panels fitted with plastic footings, one interlocking back brace and a single plastic footing meets the minimum wind speed requirement for Region A as specified in Section 4 of AS 4687-2007 TEMPORARY FENCING AND HOARDINGS.

The wind test results confirm that one (1) shade-cloth covered Fortress Temporary Fence panel fitted with plastic footings, two (2) interlocking back braces and three plastic footings per brace, meets the minimum wind speed requirement for Region A as specified in Section 4 of AS 4687-2007 TEMPORARY FENCING AND HOARDINGS.

Notes:

1) Melbourne Testing Services 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) This report is specific to the temporary fence panels described herein, in their state at the time of testing. It should not be taken as a statement that all similar temporary fence panel assemblies or components of temporary fence panel assemblies in all states of repair, would also perform in a similar manner to items described herein.
3) Melbourne Testing Services shall take no responsibility for the procurement and authenticity of the temporary fencing as described herein.
4) Melbourne Testing Services shall take no responsibility for the onsite installation procedures used for the temporary fencing described herein.
5) It remains the responsibility of the client to ensure that the temporary fence panels tested are representative of the entire product batch.
6) Wind speed calculations based on AS/NZS 1170.2 2002 with an importance level of 1, terrain category of 2 and topographic multiplier of 1.
7) MTS shall take no responsibility for the performance of temporary fencing as described herein where back braces used with footings are not an interlocking type or capable of securing the footing to the back brace.

R. Wilkie

RODNEY WILKIE
AUTHORISED SIGNATORY

APPENDIX A

Fence Type	Infill Type (mm)	Bracing Condition (per panel)	Number of Blocks (per brace)	Test Load (kN)	Calculated Wind Speed Capacity (m/s)	Conformance with AS 4687	Australian Wind Region
Fortress Single Panel Scenario	Rectangular 3.0mm Diameter Mesh	Single	1	0.34	**18**	Complies	A to B
			2	0.55	**24**	Complies	A to D
			3	0.66	**26**	Complies	A to D
			4	0.75	**28**	Complies	A to D
		Double	1	0.55	**24**	Complies	A to D
			2	0.87	**30**	Complies	A to D
			3	1.26	**36**	Complies	A to D
			4	1.50	**40**	Complies	A to D

TABLE A1.
WIND LOAD TEST DATA FOR
UNCOVERED SINGLE PANELS

Fence Type	Infill Type (mm)	Bracing Condition	Number of Blocks (per brace)	Test Load (kN)	Calculated Wind Speed Capacity (m/s)	Conformance with AS 4687	Australian Wind Region
Fortress Double Panel Scenario	Rectangular 3.0mm Diameter Mesh	Single	1	0.50	**16**	Complies	A
Fortress Double Panel Scenario	Rectangular 3.0mm Diameter Mesh	Single	4	0.92	**22**	Complies	A to C

TABLE A2.
WIND LOAD ANALYSIS FOR
TWO (2) UNCOVERED FENCE PANELS

Fence Type	Infill Type (mm)	Bracing Condition (per panel)	Number of Blocks (per brace)	Test Load (kN)	Calculated Wind Speed Capacity (m/s)	Conformance with AS 4687	Australian Wind Region
Fortress Single Panel Scenario	Rectangular 3.0mm Diameter Mesh with shadecloth	Double	3	1.26	**16**	Complies	A

TABLE A3.
WIND LOAD ANALYSIS FOR
SHADECLOTH COVERED SINGLE FENCE PANELS