

FLEXFENCE 4 WIRE ROPE SAFETY BARRIER

REVISION REGISTER

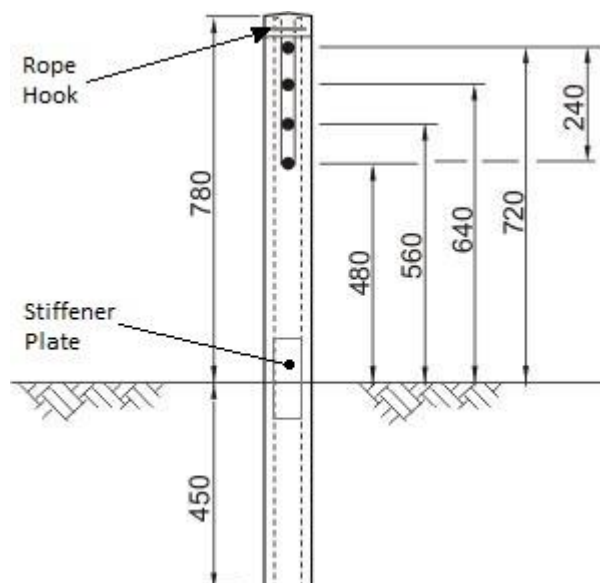
Revision	Description	Date
1	Issued for use.	23/2/2004
1 A	General editorial changes.	03/03/2006
1 B	File numbers corrected under the heading 'References'.	23/09/2006
1 C	Supplier details amended.	26/06/2008
1 D	Editorial changes and addition of cross reference for single carriageways to Guide to the Design of Road Safety Barriers.	11/05/2009
1 E	Standard End Terminal deleted and replaced with TL3 End Terminal. Delineator spacing increased to 25m. Cross reference for single carriageway guidance updated. Supplier details and Ingal drawing references updated.	3/07/2013
1 F	TL4 configuration of Flexfence wire rope safety barrier approved for use.	13/06/2014
1 G	Update Supplier details	17/08/15
1 H	Limitation on the verge cross slope amended.	13/05/16

The Flexfence (also known as Safence) four wire rope system is a flexible barrier system accepted for use by Main Roads. The system consists of a barrier that is accepted to test level TL4 and a terminal that is accepted to test level TL3.

Note that a Flexfence three wire rope system is also manufactured, but is not accepted for use by Main Roads.

Note that a Flexfence four wire rope system consisting of a barrier rated to test level TL3 was previously accepted by Main Roads. This system is no longer accepted for new installations.

Images:

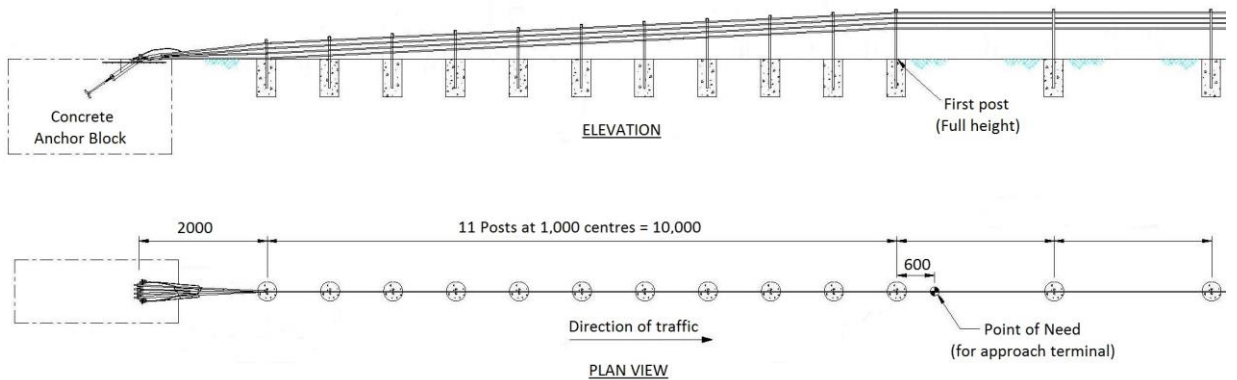


FLEXFENCE 4 WIRE ROPE SAFETY BARRIER

Flexfence TL4 4 Wire Rope Barrier - Typical Cross Section (refer to Supplier for post footing details)



Photograph of installed Flexfence TL4 Wire Rope Safety Barrier



Flexfence TL3 Terminal (refer to Supplier for Concrete Anchor Block details)

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**Photograph of installed Flexfence TL3 Terminal
(foreground)**

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Test Level: NCHRP 350 TL4.

Accepted Configuration

- Post spacing of 2.5 m, wire ropes located at 480, 560, 640 and 720 mm above ground. The barrier configuration accepted to test level TL4 includes stiffening plates and rope hooks (refer Images).
- Installed with cast in-situ concrete footings.
- Nominal rope tension of 25kN for an ambient temperature of 20°C.

Design Considerations:

Design should be undertaken in accordance with relevant design manuals (Flexfence Wire Rope Safety Barrier Product Manual - version "Release 02/14") provided by the Supplier.

Deflection:

1.90 m under TL3 conditions (2000 kg vehicle at 100 km/h impacting at 25°, post spacing 2.5 m) and TL4 conditions (8000 kg vehicle at 80 km/h impacting at 15°, post spacing 2.5 m).

It is not accepted that Flexfence Wire Rope Safety Barrier installed with reduced post spacing can be used to reduce deflection.

Working Width:

2.00 m under TL4 conditions (8000 kg vehicle at 80 km/h impacting at 15 degrees post spacing 3.0 m).

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Deflection Correction Factors:

In the Flexfence Wire Rope Safety Barrier Product Manual, correction factors for the deflection and working width are provided where the barrier is installed on a convex curve and/or lengths greater than 100m. The correction factors for radius 1500m+ should be applied when the Flexfence Wire Rope Safety Barrier is installed on a straight.

Footings

In the Flexfence Wire Rope Safety Barrier Product Manual different footing depths are given for different soil conditions. For installations in WA the maximum footing depth (750mm) shall be used unless confirmed otherwise by the Supplier and supported by specific soil investigations.

Minimum Length:

85m (excluding terminal ends) under TL3 or TL4 conditions.

Length of Need:

The beginning of the length of need of the barrier commences at the point shown in the Flexfence TL3 Terminal images (refer page 2).

Offset from Kerbing:

- Only mountable type kerbing should be used and the centreline of the post placed 475 mm from the face of the kerb to minimise nuisance impacts. Locations offset further from the kerb are not preferred because of the possibility of vehicle either vaulting the barrier or not being redirected by the barrier.
- If semi-mountable kerbing is used then offset to the centreline of post is 405 mm.

Height Correction:

If placed within 1.5 m of the edge of carriageway the mounting height is measured from the pavement surface. At greater offsets the mounting height is measured from the adjacent finished surface levels.

End Treatments:

The barrier comes with its own gating end treatment which complies with NCHRP-350 TL3. This is a non-releasing end terminal. When the Flexfence TL3 terminal is impacted (as either an approach or departure terminal) the wire ropes remain attached to the anchor block and the wire rope safety barrier retains capacity for secondary impacts.

Note that a Flexfence Standard End Terminal (refer drawing WR-STD-55 in the Flexfence Wire Rope Safety Barrier Product Manual) is also manufactured, but is not accepted for use by Main Roads.

Delineators:

At all locations where a Flexfence 4 wire rope safety barrier is installed post caps are to be marked with a 100 mm (wide) x 50 mm (high) Class 1A reflective tape. Post caps to be marked at suitable intervals based on post spacing to approximate 25 m intervals between markings.

Limitations:

- The cross slope shall be not greater than 10% for the area between the edge of travelled way and the barrier, and the area immediately behind the barrier for a width of 1.4m multiplied by the relevant deflection correction factor.
- Refer to the MRWA Supplement to Austroads Guide to Road Design – Part 6, Section 6.3.14.1 for further guidance on the verge and permissible slopes requirements on single carriageways.

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- Preferably should not be installed behind kerbs. If kerbing is required then the only acceptable kerbing is mountable Type A 100 mm in high-speed situations.
- Semi-mountable kerbs may be acceptable in lower speed environments (< 70 km/hr) but is not desirable.
- Refer to Main Roads Standard Drawing 9331-0376 for kerb types.
- Shall not be used on curves less than 200 m without seeking guidance from the Supplier. On convex curves at radii less than 600 m excessive dynamic deflection may occur.
- Shall not be used on either crest or sags curves with a K value less than 30.
- Note that for this system there are no “intermediate anchors” and that anchorage is provided by installation of separate barrier lengths with overlaps. Main Roads WA limits the length of barrier between terminals to 1000 m.
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Parts to be Replaced after Impact:

Damaged posts, damaged stiffening plates.

Parts Typically Re-Useable after Impact:

Wire Rope.

References

Item	Description
1	Barrier system tested to NCHRP 350 Test 4-10 on 17 November 2010 by Holmes Solutions. A copy of the test report can be found on Main Roads file 12/1687.
2	Barrier system tested to NCHRP 350 Test 4-11 (3 wire rope configuration) on 16 November 2010 by Holmes Solutions. A copy of the test report can be found on Main Roads file 12/1687.
3	Barrier system tested to NCHRP 350 Test 4-12 on 12 December 2012 by Holmes Solutions. A copy of the test report can be found on Main Roads file 12/1687.
4	Terminal tested to NCHRP 350 Test 3-30 on 14 June 2005 by VTI Crash Safety. A copy of the test report can be found on Main Roads file 12/1685.
5	Terminal tested to NCHRP 350 Test 3-34 on 8 June 2005, 15 June 2012 and 6 November 2012 by VTI Crash Safety. A copy of the test reports can be found on Main Roads file 12/1685.
6	Terminal tested to NCHRP 350 Test 3-35 on 16 June 2005 by VTI Crash Safety. A copy of the test report can be found on Main Roads file 12/1685.
7	Terminal tested to NCHRP 350 Test 3-39 on 3 June 2005 by VTI Crash Safety. A copy of the test report can be found on Main Roads file 12/1685.

Drawings:

Refer to Ingal Civil Product drawings WR-STD-50, WR-STD-60 and WR-STD-59 for general arrangement drawings. Note rope heights and post spacings are to be in accordance with the Main Roads specified configuration.

Drawings and Product Manual are available from the following location:

http://www.ingalcivil.com.au/pdfs-manuals/flexfence_product_manual_web.pdf