Wire Balustrade Construction (Nat)

This information sheet has been prepared specifically to provide details on wire balustrades. More information on general requirements for balustrades is available in the information sheet titled "*Balustrade Construction for Class 1 buildings*".

Wire Balustrade Construction

A wire balustrade consists of a series of tensioned wire rope connected either vertically or horizontally to supports in order to prevent a person from falling from a roof, stairway, or raised floor level. It does not include wire mesh fences.

For clarity, the following terms are defined in relation to wire balustrades:

- Continuous – the wire spans over three or more supports
- Non-continuous – the wire is supported over two supports.
- Pulley Block – a device consisting of a wheel in which a wire runs around to change its direction.
- Permissible Deflection – is the allowable bending of the wire.
- Support Rails – are the horizontal components of the balustrade system that span across the top and bottom to provide structural support.

Openings in balustrades (including decorative balustrades) must be constructed so that any opening does not permit a 125mm sphere to pass through it. For stairs, the space is measured above the nosing line.

To comply with this requirement, spacing of support posts (post or rail spacing), wire tension, deflection and lay of wire (number of strands by the number of individual wires in each strand) are specified within the Building Code of Australia (BCA).

Wire Tension

The installer needs to ensure that the required wire tension is achieved and maximum permissible deflections are not exceeded. The tension can be measured using a strain indicator, if available, or the deflection can be measured using a 2kg mass suspended at mid-span on the wire between support posts.

The tension and deflection measurements will depend on the type of wire used, support post or rail spacing, wire diameter and lay, and wire spacing. **Table 3.9.2.1** (see below) of BCA Volume 2 gives the required wire tension (T) and maximum permissible deflection (D) for Stainless Steel and Galvanised Steel horizontal wire systems and non-continuous vertical systems. **Table 3.9.2.2** (see below) of BCA Volume 2 gives the widest spacing between wires (in mm) and the wire tension (N) required for continuous vertical wire systems or near vertical sloped wire systems.

Spacing

In horizontal systems and non-continuous vertical wire balustrades, the maximum spacing is 100mm and for continuous vertical wire systems 120mm. A restriction is placed on the type of wire used in continuous vertical systems as the wire will need sufficient flexibility to make the necessary turns at rails or supports and only Stainless Steel wire is suitable. Galvanised Steel wire is only used for straight run applications.

Other Provisions

Other provisions include the use of 'pulley blocks' where there is a change in direction at a support on a vertical or zig-zag wire system. The maximum spacing for support rails is 800 mm for vertical systems to ensure that the rails do not deflect and decrease the tension in the wires. Care and maintenance are necessary to ensure that the wire tension will be maintained during the life of the balustrade. In some situations, it is necessary to install 'locking off' devices to prevent loosening of wires.

Table 3.9.2.1 WIRE BALUSTRADE CONSTRUCTION - REQUIRED WIRE TENSION (T) AND MAXIMUM PERMISSIBLE DEFLECTION (D)		Stainless Steel Wire													Galvanised Steel Wire		
		Wire Diameter (mm) and Lay															
		2.5	2.5			3.0			3.0	4.0	4.0			4.0	3.25		
		7 x 7	1 x 19			1 x 19			7 x 7	7 x 7	7 x 19			1 x 19	1 x 6		
		Wire Spacing (mm)															
Support (post or rail) Spacing (mm)		60	60	80	100	60	80	100	60	60	60	80	100	60	60	80	100
600	T	6	35	420	1140	25	325	1090	81	29	155	394	1038	6	45	240	1060
	D	20	20	9	2	19	8	2	19	18	18	8	3	18	30	10	3
800	T	198	218	630	1565	183	555	1500	242	213	290	654	1412	127	140	537	1540
	D	13	13	7	2	16	6	2	16	14	14	7	3	14	23	7	3
900	T	294	310	735	N/A	261	670	1705	323	242	358	785	1598	242	188	685	1780
	D	11	11	5	N/A	13	6	2	13	12	12	6	3	12	20	6	3
1000	T	390	402	840	N/A	340	785	1910	404	329	425	915	1785	358	235	853	N/A
	D	10	10	5	N/A	11	6	2	11	10	10	5	3	10	17	6	N/A
1200	T	583	585	1050	N/A	520	1015	N/A	525	519	599	1143	2165	525	435	1190	N/A
	D	9	9	5	N/A	8	6	N/A	8	8	8	4	2	8	13	6	N/A
1500	T	860	810	1400	N/A	790	1330	N/A	681	785	860	1485	2735	785	735	N/A	N/A
	D	8	8	5	N/A	7	5	N/A	7	8	8	4	2	8	10	N/A	N/A
1800	T	1100	1125	1750	N/A	1025	1725	N/A	980	1050	1080	1860	N/A	1000	1150	N/A	N/A
	D	8	8	N/A	N/A	7	5	N/A	7	7	8	4	N/A	8	10	N/A	N/A
2000	T	1229	1325	N/A	N/A	1180	1980	N/A	1171	1188	1285	2105	N/A	1090	N/A	N/A	N/A
	D	8	8	N/A	N/A	7	5	N/A	7	7	7	4	N/A	7	N/A	N/A	N/A
2500	T	1581	N/A	N/A	N/A	N/A	N/A	N/A	1483	1719	1540	2615	N/A	1488	N/A	N/A	N/A
	D	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	7	7	4	N/A	7	N/A	N/A	N/A

Notes:

1.	Tension (T) = when measured with a strain indicator the minimum required tension of the wire balustrades in Newtons (N)
2.	Deflection (D) = maximum permissible deflection in (mm) of the wire balustrades when a 2 kg mass is suspended mid-span between the posts
3.	Lay = number of strands by the number of individual wires in each strand. For example 7 x 19 = 7 strands, each with 19 individual wires in each strand
4.	Galvanised Steel Wire is only to be used in straight run applications
5.	Where a change of direction is made in the run of a wire , the tensioning device is to be placed at the end of the longest span.
6.	N/A = wire balustrades not allowed in this situation

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Table 3.9.2.2 CONTINUOUS VERTICAL WIRE BALUSTRADE CONSTRUCTION – REQUIRED WIRE TENSION Minimum Lay	Widest Spacing Between Wires (mm)	Tension (N)
7×7	80	20
Or	105	285
7×19	120	850
Note:		
Lay = number of strands by the number of individual wires in each strand. For example:		
Lay 7 x 19 = 7 strands, each with 19 individual wires in each strand		

For further information

HIA members can contact HIA's Building Services staff on 1300 650 620 or email HIA_technical@hia.com.au

Ref No. NAT BCA 07-17

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