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**TESTING OF SAMPLE STAIR AND
LANDING RAIL ASSEMBLIES IN
ACCORDANCE WITH THE PRINCIPLES OF
BS 585: PART 2: 1985 AND BS 6180: 1995**

Commercial in Confidence

Report Number : TMT/F95024
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3. TEST SPECIMENS

A full specification for each unit tested is given in the relevant Appendices attached to the rear of this report. The following table shows the range of units which were tested.

Table 1 Domestic Use

Specimen No	System ID	Material	Unit Type	Handrail Type	Spindle Section (mm)	Nom. Span (m)	Comments
1	STR	Pine	Landing	LHR	32	2.4	-
2	STR	Pine	Stair	LHR	32	4.2	-
3	B/FIX	Pine	Landing	LHR	32	2.4	-
4	B/FIX	Pine	Stair	LHR	32	4.2	-
5	B/FIX	Pine	Landing	LHR	32	2.4	Baluster point load re test
6	B/FIX	Pine	Stair	LHR	32	4.2	Balustrade static load re test
7	CONT	Hemlock	Landing	LHR	32	2.4	-
8	CONT	Hemlock	Stair	LHR	32	4.2	-
9	CONT	Hemlock	Stair	LHR	32	3.5	Balustrade static load re test
10	CONT	Hemlock	Stair	HDR	32	4.2	Balustrade static load re test
11	CONT	Hemlock	Stair	HDR	32	4.2	Balustrade static load re test
12	CONT	Hemlock	Stair	HDR	32	4.2	Balustrade static load re test

Table 2 Public Use

Specimen No	System ID	Material	Unit Type	Handrail Type	Spindle Section (mm)	Nom. Span (m)	Comments
13	STR	Oak	Landing	OHR	41	2.4	-
14	STR	Oak	Stair	OHR	41	4.2	-
15	STR	Oak	Stair	OHR	41	4.2	Horizontal deflection re test

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4.1.4 Balustrade impact load test

The stair rail remained mounted in the test rig as for item 4.1.3. A calibrated 30kg load bag, suspended from a point 2100mm above the midspan of the handrail, was raised 300mm above and aimed "uphill" at an angle of 45° to the rail. The bag was released and allowed to swing freely against the stair rail. This was repeated three times and the assembly was checked for damage after each impact.

4.2 **Specimens for public use**

4.2.1 Baluster point load test

The complete assemblies were supported and tested as described in item 4.1.1.

The applied load which each baluster was required to sustain without damage was 50kg and the derivation of this load is given in Appendix I.

4.2.2 Horizontal deflection test - landing rails

The landing rail was supported and tested as described in item 4.1.2.

The specified design load of 0.74kN/m was taken from Tables A1 and A2 of BS 6180. The deflection of the handrail under this load should not exceed 25mm.

4.2.3 Horizontal deflection test - stair rails

The stair rail was laid horizontally and mounted in a universal test rig with both newels fully supported on steel channel sections. The upper newel was clamped to the supporting steelwork at the top and bottom while the lower newel was clamped at the bottom only. The newels were clamped in this manner in order to simulate as closely as possible the fixing to be used in practice. A pair of 100mm x 100mm softwood members was fixed to the stringer along its length in order to simulate the stiffening effect of the stairs.

A simulated uniformly distributed load was applied to the handrail using hydraulic cylinders and a series of hardwood load spreaders. The applied load was measured using a slave cylinder and calibrated dynamometer. The deflection of the assembly was measured at the handrail and stringer midpoints using displacement transducers and a digital display unit.

The design load and deflection limit was as given for item 4.2.2.

Where the handrail deflection exceeded the 25mm limit, the strength test given in the performance requirements of the Product Conformity Scheme was followed, as outlined in item 4.1.3.

5. RESULTS

Full test results for each specimen, together with any comments, observations and photographs, are presented in Appendices II to XVI at the rear of this report. The following tables provide a summary of the performance of each specimen against the requirements of the individual tests conducted, together with an overall pass/fail in respect of BS 585, BS 6180 and the performance requirements of the Product Conformity Scheme, where appropriate.

Table 3 Results summary - specimens for domestic use

Specimen No	BS 6180 cl. 6.3.4	BS 6180 cl. 6.4.1	BS 585 cl. B4	BS 585 cl. B5	Overall
1	pass	pass	NA	NA	pass
2	pass	NA	pass	pass	pass
3	fail	pass	NA	NA	fail
4	NC	NA	fail	NC	fail
5	pass	pass	NA	NA	pass
6	pass	NA	pass	pass	pass
7	pass	pass	NA	NA	pass
8	NC	NA	fail	NC	fail
9	NC	NA	fail	NC	fail
10	NC	NA	fail	NC	fail
11	NC	NA	fail	NC	fail
12	NC	NA	fail	NC	fail

NC - test not conducted.

Table 4 Results summary - specimens for public use

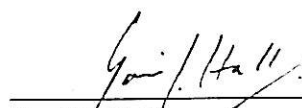
Specimen No	BS 6180 cl. 6.3.4	BS 6180 cl. 6.4.1	Overall
13	pass	pass	pass
14	NC	fail	fail
15	pass	pass	pass

Report written by:

Issued under the authority of:



S Edwards
Product Testing Engineer



Dr G S Hall
Technical Director

8 November 1995

Date

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APPENDIX XIV

SPECIMEN NUMBER 13

SPECIFICATION

Species	Oak
System	Straight
Handrail section (mm)	70 (w) x 55 (d)
Handrail length between newels (mm)	2300
Baluster section (mm)	41 x 41
Bluster length between handrail and stringer (mm)	1023
Baluster turning length (mm)	464
Newel cross section (mm)	90 x 90
Stringer cross section (mm)	NA
Handrail to newel joint	Glued and single doweled stopped mortice and tenon. Tenon dimensions 18mm x 30mm softwood loose tenon.

RESULTS

Baluster point load test

All balusters withstood the applied load without damage.

Landing rail horizontal deflection test

The midspan deflection of the handrail after 15 minutes at full design load was 20.0mm.

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SPECIMEN NUMBER 15

SPECIFICATION

Species	Oak
System	Straight
Handrail section (mm)	70 (w) x 50 (d)
Handrail length between newels (mm)	4130
Baluster section (mm)	41 x 41
Bluster length between handrail and stringer (mm)	768
Baluster turning length (mm)	464
Newel cross section (mm)	90 x 90
Stringer cross section (mm)	28 x 218
Handrail to newel joint	Glued and single doweled stopped mortice and tenon. Tenon dimensions 35mm x 50mm.

RESULTSBaluster point load test

All balusters withstood the applied load without damage.

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