Stair Seminar

Balancing High Standards of Specification with Innovative Design

28th March 2012

Welcome

Iain McIlwee

BWF Chief Executive

British Woodworking Federation

UK joinery & woodworking manufacturers

- A not-for-profit trade association
- Founded 1904
- 500 strong membership

To architects and specifiers we offer:

- A technical helpline, supporting you in choosing and using wood
- A range of specifiers guides and advice via
  - www.bwf.org.uk
  - www.woodwindowalliance.com
  - www.bwfcertifire.org.uk
- Technical consultancy from recognised experts

Agenda

- Presentation from Ian Purkis, JELD-WEN UK Ltd
- Presentations from Tom Lennon and Damien Ward, BRE
- Opportunity for Questions

Ian Purkis
Technical Director, JELD-WEN UK Ltd

Immediate Past President,
BRITISH WOODWORKING FEDERATION
(BWF)

TIMBER STAIRS: The Agenda

- Illustrate importance of stairs as part of a building's ***STRUCTURE***
- Highlight implications and extent of bad practice
- Explain the ***NEW*** BWF Timber Stair Scheme
- Show how good design and innovative specification can raise standards, lower costs, improve safety and client satisfaction

TIMBER STAIRS: The Outcome

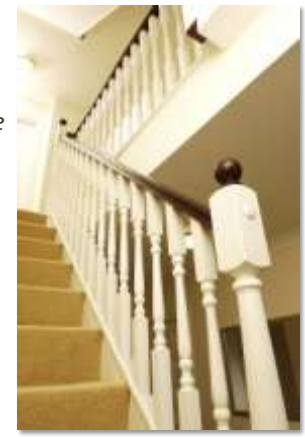
- Recognise good practice in design, construction & installation
- Develop broad understanding of:
  - *Technical performance (all aspects)*
  - *Compliance with Standards & Regulations*

TIMBER STAIRS: The Outcome continued

- Well specified, designed and installed stairs
- Reduced cost and improved design
- Easy checking and confidence in acceptance
- Improved outcomes for Clients, Builders, Contractors and Occupiers

STAIRS; The facts

- One of most hazardous locations in the home
- 800 Fatalities & major injuries every year*
  - *Many caused by trips & falls, gravity & age*
- Poor construction also to blame –
  - *Substandard baluster in care home results in fatality*
  - *Stair collapses under weight of its twin during installation*



*BS 5395 pt 1 2009

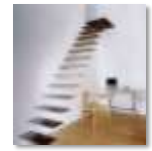
Stairs: The hazards

- Serious issues around substandard stairs
- Poorly understood Standards and Building Regulations
  - Forthcoming changes add to confusion
- Increasing evidence of bad practice in both manufacture & installation
- Growing media interest and public concern

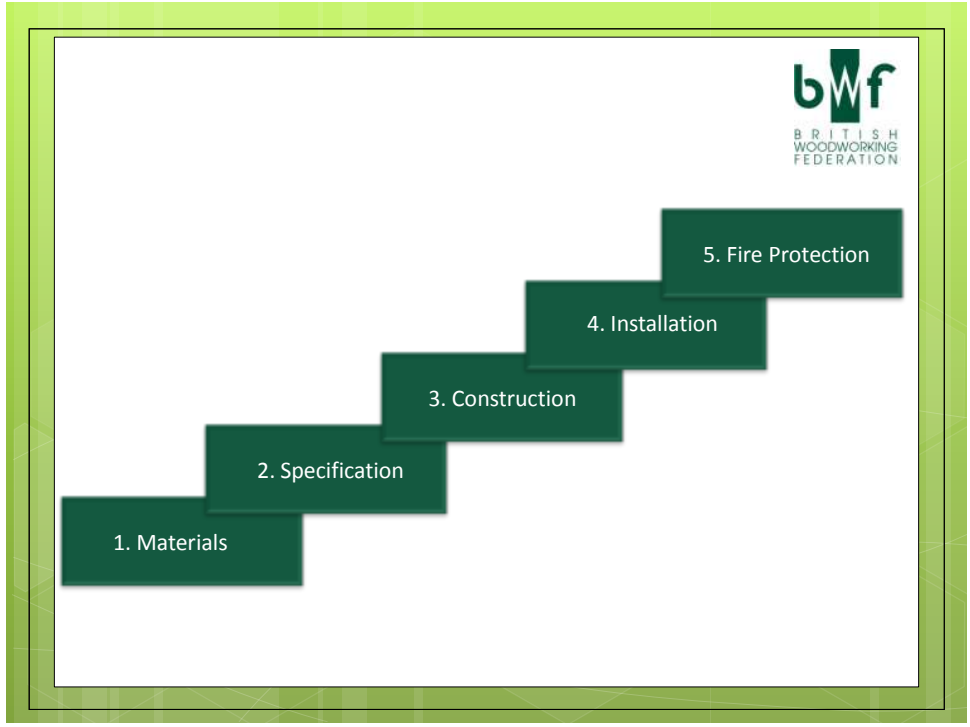

BRITISH WOODWORKING FEDERATION
"SLAP IT ON" FIRE PROTECTION
A multiple occupancy housing project required fire protected Escape Stairs but were actually supplied with standard stairs and a pot of intumescent paint, with the instruction, "Paint this on and they'll be fire protected!"
"DOCTORED" STAIRS REPORT MISLEADS NATIONAL HOUSEBUILDER
A report presented to support a stairs tender had a critical page, the deflection performance, missing, presumed removed.
STAIRS THAT FELT LIKE A TRAMPOLINE
Complaint to NHBC that professional examination supsequently identified to be falling apart; BBC Watchdog viewer Jane Horrocks says "the stairs aren't just creaking anymore they're actually coming arpart. They're more like standing on a trampoline as you're going up the stairs"
STAIRS SO BAD, I FELL DOWN WITH MY BABY
BBC Watchdog blogger "We had the same trouble with our stairs. NHBC did fix the faults but not until after I fell down the stair with my baby. The baby was fine but I broke my big toe and needed an operation to pin it together. The fall was caused by the stair tread dropping an inch when i stood on it.
POOR STAIR CONSTRUCTION BLAMED FOR CARE HOME FATALITY


BRITISH WOODWORKING FEDERATION
WATCHDOG

- Timber stairs combining tradition with technology
- Traditional skills & design producing attractive features and design
- Modern “contemporary” styles, fashion driven compliant installations
- Beware of non compliant “designer” stairs


- ***What to* look *for***
- ***The 5* key *steps***



Materials:

Good Practice:

- *Strings made from solid timber components*
- *Plywood risers*
- *Strings made from accredited / certificated "engineered" timber laminated, finger jointed materials*

Bad Practice:

- *Components made from unproven materials*
- *Strings made from untested jointed materials*
- *Hardboard risers*

See BWF Technical Guide for Timber Stairs the 'Brown Book'

Specification:

Good Practice:

- *Dimensions of components in compliance with BS 585 as detailed in BWF 'Brown Book'*
  - *Beware the difference between nominal ("ex") sizes and finished dimensions*
- *Stair specification that is tested and/or accredited by recognised body*
- *Testing to relevant "Use Type" i.e. single occupancy domestic or multi-occupancy "Common Flight"*

Specification

Bad Practice:

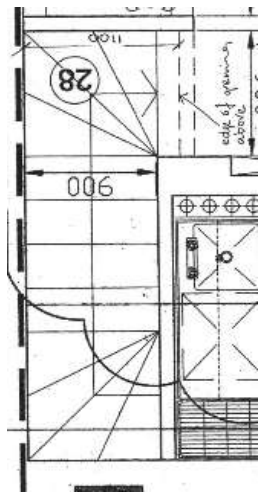
- *Stairs outside BS with unknown performance*
- *Split or weak nosing*

Specification

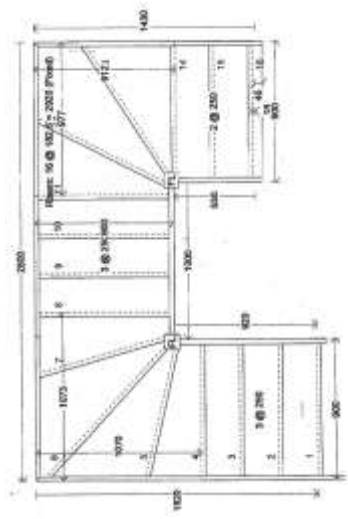
- ***Ensure the Building Design is fully communicated to the Stair Manufacturer!***
  - *Inaccurate or incomplete details, particularly floor finishes, (leading to changes to finished floor levels) can ruin an otherwise compliant stair installation.*
  - *Always engage with the stair supplier at an early opportunity*

- ***Beware the Effect of Building Regulations on Architects Details!***
  - *Seen rather too often: A schematic layout approximates the stair but when fully detailed, the stair has to meet Building Regulations, likely to change its landing position and can also compromise headroom etc.*

Specification….cont.



Architect's arrangement



Stair manufacturer's design

Construction

Good Practice:

- *Tapered trenched, glued and wedged construction*
- *Risers securely fixed to treads*
- *Factory assembly of trunks where practicable*
- *Component transitions tested (handrail/newel, String /newel)*
  - *Newel to string joint, to be load bearing*
- *Finger joint between string to easement*

Bad Practice:

- *Parallel trenches*
- *Glue block, pinned not glued*
- *Poorly fixed risers*
- *Handrails butt jointed and screwed*
- *Butt joint between string and easement*

Installation 1.

Good Practice:

- *Stair fixed to supporting structure in accordance with manufacturers instructions*
- *Strings cut over the trimmer*
- *String tenons draw bored into newel*
- *Site assembled components screwed and glued*
- *Non-standard assembly methods must be supported by evidence of acceptable performance.*

Bad Practice:

- *String abutted to trimmer*
- *Tenons removed to overcome installation mistakes*
- *Tenons not tight into newels*
- *Nails in bore holes - should be dowelled*
- *Leaning newel post due to incorrect storey height*
- *Top of risers not securely fixed to tread*

Installation 2.

Good Practice:

- *String cut over trimmer and securely fixed.*

- *Steel straps supporting under strings where required*

- *Trunk fully supported in accordance with manufacturer's instructions*

What the Industry Needs

A consistent standard to identify compliant and non-compliant stairs

Introducing the BWF Stair Scheme

What the BWF Scheme Covers

One scheme – Many Standards

- **Approved Document M**
  - *Stairs; Access to and use of buildings (Mobility)*
- **Approved Document K**
  - *Stairs: Protection from falling, collision & impact*
- **Approved Document B**
  - *Stairs in Fire*

- **BS 585 parts 1 and 2**
  - ***Obsolescent***
- **BS 5395 parts 1, 2 and 4**
  - ***Design of Stairs***
- **BS 6399 part 1, BS 5268 part 2 and Eurocode 5**
  - ***Loading and structure***
- **EN 15644**
  - ***European product standard***

The BWF Stair Scheme

Objectives of the Scheme include

- ***Improved building safety (occupants & emergency services)***
- ***Ease of recognition by Building Control and NHBC***
  - *Differentiate accredited and non-accredited stairs*
- ***Meeting appropriate Standards***
  - *Loading – Deflection – Fire resistance*
- ***Differentiate quality stair manufacturers from non-accredited producers***
- ***Setting the Standard***
  - *Robust industry standard for stair manufacturing*

The BWF Stair Scheme

- Every stair "Badged" with unique identity serial number
  - *Evidence of accreditation or certification*
- Colour coded to provide simple identification of rating

Domestic Stair

Common Stair

Fire protected Stair

Where to find the badge

1. Back of Newel post, just under handrail

2. On front of bottom riser top left hand side
   - *And in "no newel post" situation*

3. On underside of bottom tread
   - *If open tread design*

What's behind the badge?

- **Accreditation**
  Design and manufacture independently verified as complying with relevant Building Regulations and product standards

G001279 Stair Company Ltd

Domestic Stair

G001279 Stair Company Ltd

Common Stair

LPCB CERTIFICATED STAIR TO LPS 1234 G001301 Stair Company Ltd

Fire protected Stair

What's behind the badge?

Mechanical Testing of Stairs

- Key requirements
- Loading
- Domestic
- Common flights
- Deflection
- Evidence of structural integrity
- Includes trunk and balustrading
- May include demountable balustrade

What's behind the badge?

Fire Testing and Certification

- *Demonstrate compliance with BD2569 Fire Performance of Escape Stairs.*
- *Independent third party certification*

- **Test method developed by BRE for whole stairs**
- **Reproduces worst case real life fire situation**

What's behind the badge?

Fire Testing and Certification … cont.

Pass Criteria

- *Must not support combustion*
- *Fire burns out without igniting stairs*
- *Must retain load bearing capability after fire*
- *"3 Firemen" test*

Ensures safe access after fire, both for escape and emergency services access

What's behind the badge?

- **Factory Production Control System (FPC)**
  FPC system must be in place to ensure CONSISTENT standards
  FPC will become necessity for any CE marked product
- **Auditing**
  Annual Audit by BWF or approved partner
  Confirms continued compliance in manufacture and control systems
- ***Fire Certification***
  Third party certification and auditing provided by BRE

Training and Support to Inspectors

Training opportunities to promote the use of timber stairs have been discussed with building control bodies and the NHBC

Timber alternative to concrete

- Timber stairs suitable for medium rise buildings (up to 6 storeys*)
  - *Includes Escape Stairs*
- Substantially lower cost than concrete
- Wide variety of materials, designs, styles and innovation opportunities available
- Improved occupier environment, more "homely" less "institutional" feel to common areas
- *No need to over-clad concrete with timber!*

The Environmental case:

- *FSC or PEFC Chain of Custody can ensure sustainable timber is used with the chain of custody providing traceability, "Right back to the tree stump"*
- *BRE referenced in The Code for Sustainable Homes and BREEAM under "Responsible Sourcing"*
- *European Timber Regulations will create a requirement to demonstrate legally felled timber*

Case Study

- **Bovis Homes, Grantham**
  - Social Housing development alongside East Coast Mainline railway
  - 4 storey development
  - Fire protected stairs throughout
- **Timber specified over concrete stairs**
- **Key consideration: cost & installation**
  - Significant savings achieved
  - More savings available as methods refined
  - Site trials concluded optimum is for stairs to be installed just before roof trusses go on

Bovis Homes and the NHBC

- Bovis Homes adopted fire protected timber stairs as alternative to concrete
- BRE test reports provided by JELD-WEN to Bovis Homes and used to support designs
  - *Approved by NHBC for national house types*
  - *LPCB Certification awarded to BWF Stair Scheme member, JELD-WEN by BRE, March 2011*
- Substantial cost savings over concrete
- Bovis Homes now specifying BWF Stair Accreditation & Fire Certification Scheme

Summary

- *Timber stairs meeting the future agenda*
- *Accredited and Fire Certificated Stairs provide total confidence in loading and deflection*
- *New era in verification of stair compliance*
- *Real alternative to concrete for low & medium rise developments*
- *Certificated products available **now***

Remember…

Look for the badge

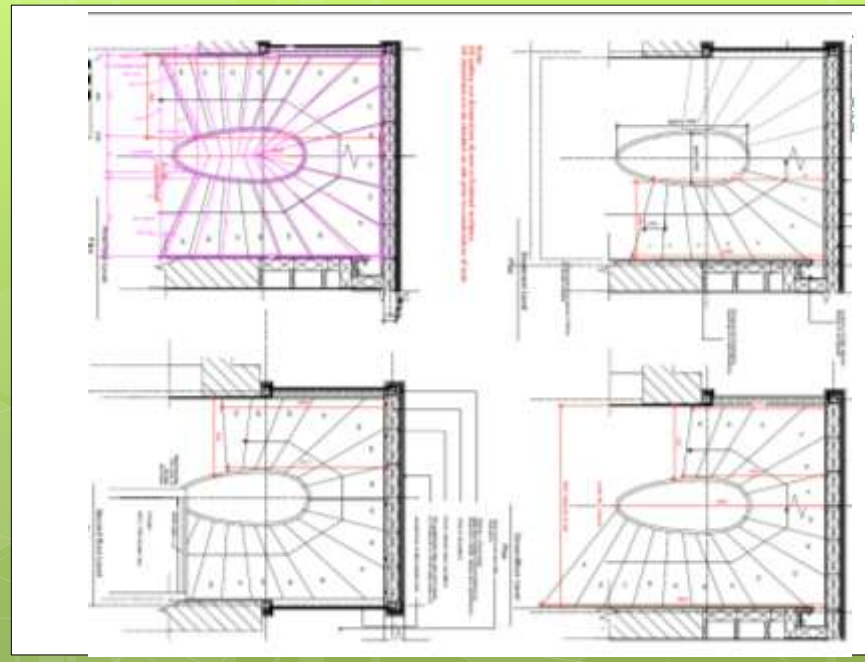
G001279
Stair Company
Ltd

G001279
Stair Company
Ltd

CERTIFICATED
STAIR
TO LPS 1234

G001301
Stair Company
Ltd

heat



The Performance in Fire of Escape Stairs Background to LPCB/BWF Fire Protected Timber Stair Scheme

Tom Lennon
Fire Safety
March 2012

Part of the BRE Trust

Scope of presentation

- Background to project
- TF2000 Trial tests
- TF2000 Stair test
- Design Fire Scenario
- Design Solutions
- CLG Experimental Programme

Background to project

- Research Project ,“Fire Performance of Escape Stairs” commissioned by Communities and Local Government and undertaken by BRE in collaboration with key stakeholders including the BWF
- The overall aim of the project was to extend the methodology adopted in the TF2000 research project to develop guidance based on a test method that provides a realistic assessment of the fire performance of escape stairs in practice.
- The intention was that the approach would retain existing levels of safety with regard to means of escape and access for the Fire and Rescue Service whilst enabling alternatives to prescriptive design solutions

Background

- ADB requirements restrict the use of timber stairs as single means of escape
- TF2000 project demonstrated the ability of a *suitably treated* timber stair to meet the requirements of the regulations with respect to fire safety
- Solution was specific to the combination of timber, adhesive and retardant treatment used
- Project aims to develop an appropriate means of test and assessment to facilitate other solutions

CLG Experimental Programme

- 13 Fire tests completed. Principal conclusions were:
- Unprotected timber stairs are incapable of surviving the design fire scenario
- A return flight with intermediate landing (dog leg) provides a worst case in terms of fire spread
- A straight flight stair provides a worst case in terms of structural stability (post-fire)
- A range of different design solutions (brush applied intumescent coatings, pressure impregnated treatments, fire retardant MDF) have demonstrated their ability to survive the fire scenario and continue to perform their design function
- The inclusion of stair coverings did not adversely affect the performance of the stair

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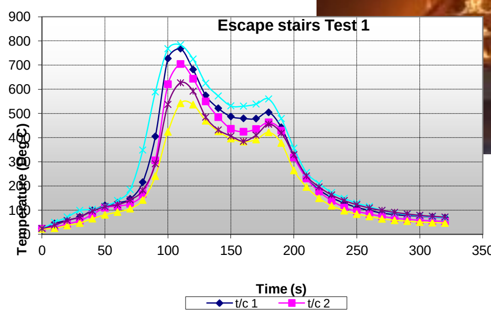

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Test no.	Stair geometry	Timber type/species Treads and Risers	Treatment process	stair covering	Results Reaction to fire test	Results post-fire load test	Comments
1	dog-leg	Whitewood	Unprotected	none	failed	n/a	test terminated after 3 minutes
2	straight flight	Whitewood	Unprotected	none	failed	n/a	test terminated after 18 minutes
3	dog-leg	MDF	Unprotected	none	failed	n/a	test terminated after 5 minutes
4	dog-leg	Whitewood	surface treatment (intumescent)	none	passed	passed	no significant damage observed
5	dog-leg	MDF	surface treatment (intumescent)	none	passed	passed	no significant damage observed
6	dog-leg	Whitewood	pressure impregnation (Class 1)	none	passed	passed	risers burnt through
7	dog-leg	Whitewood	pressure impregnation (Class 1)	carpet (wool) with rubber underlay	passed	passed	no significant damage observed
8	straight flight	Whitewood	pressure impregnation (Class 1)	none	passed	passed	risers burnt through, stair unsafe for use after completion of load test
9	dog-leg	MDF	pressure impregnation (Class 1)	carpet (wool) with rubber underlay	passed	passed	no significant damage
10	straight flight	MDF	pressure impregnation (Class 1)	none	passed	passed	no significant damage
11	dog-leg	MDF	pressure impregnation (Class 0)	none	passed	passed	no significant damage
12	dog-leg	MDF	pressure impregnation (Class 0)	carpet (polypropylene) with rubber underlay	passed	passed	no significant damage
13	dog-leg	Whitewood	pressure impregnation (Class 0)	none	passed	passed	no significant damage

Table 1 Summary of experimental programme

bre

Project outputs

- Research report and Guidance Document (BD2569) published by (D) CLG
- Available from website http://www.communities.gov.uk/publications/planningandbuilding/1350619
- Guidance Document contains detailed test method
- The test method is now being adopted by the LPCB/BWF and is the basis for the assessment for companies wishing to gain accreditation for their fire protected timber stairs

LPCB

Protecting People, Property and the Planet

LPCB Certification requirements

Stairs: Balancing High Standards of Specification with Innovative Design, The Building Centre, London. 28th March 2012

Damien K. Ward
Certification Consultant
Passive Fire Protection, LPCB

Part of the BRE Trust

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LPCB

Scope of presentation

- Testing self declaration
- What is 3rd party approval?
- Where does Fire Protected Timber Stairs fit into this?

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Protecting People, Property and the Planet

Testing
Self declaration

1

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Self Declaration

- The simplest form of approval is 'Self Declaration'
- Manufacturer makes their own claim of conformity
  - May not have been tested
  - Not impartial
  - May not meet all requirements
  - To what standards?
  - What about ongoing product?
  - Can you trust it?

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Risk to the end user or specifier

- Common claims:
  - "Complies with …"
  - "Designed to …"
  - "Tested to …"
- These claims are no guarantee that products will meet the right standards or that they will continue to do so.

LPCB

Testing Only

- Producers or manufacturers may ‘test’ their product to provide ‘evidence’
- However caution needs to be taken with this additional information
  - Was the sample representative?
  - What standards?
  - Independent?
  - Will future products be the same?
- What if
  - materials change?
  - processes change?
  - designs change?
- Even if the above conditions are met a test is only a snapshot in time

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What is Third Party Approval?

What makes LPCB approved products desirable

2

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What is Third Party Approval?

- How do you know……
- The company operate under **ISO9001?** If so are the QMS surveillance audits appropriate to the risks? Is the QMS provider accredited?
- Uncontrolled changes may be made to the tested product due to:
  - commercial/supplier pressures , production methods/personnel changes, delivery pressures, relocations/takeover/sub-contract manufacture , no installer training and poor or incorrect installation instructions

Is QMS via an Accredited Body?

Delivery Pressures

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What is Third Part Approval?

- For LPCB product schemes, approval comprises:
  - Initial type testing and evaluation of product (sampled by LPCB) to Loss Prevention Standards
  - Approval of the manufacturer's quality management system to ISO 9001
  - Assessment of the manufacturer's factory production control system (FPC)
  - Approval awarded if tested systems are satisfactory and equivalent to product placed on the market.
  - Periodic audit testing of the product from either the factory or marketplace
  - Surveillance of ISO 9001 and FPC systems
  - Labelling or marking as appropriate.
  - Listing of the approved product in the Red Book.

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Where does Fire Protected Timber Stairs fit into this?

The story so far…

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Where does Fire Protected Timber Stairs fit into this?

- LPCB in association with BWF and BRE Global have developed a Fire Protected Timber Stair scheme (SD198/BD2569)
- It uses the BRE Global developed test methodology as published in BD2569 and discussed by Tom Lennon.
- And the LPCB product approval scheme requirements as discussed earlier
- All LPCB/BWF approved Fire Protected Timber Stairs are listed on our web-based database
- And in the “LPCB Red Book”

LPCB

Scheme success

- To date we have one approved company with a range of approved designs – Jeld-Wen UK LTD
- All Fire Protected Timber Stairs approved by LPCB will carry a tamper proof approval mark for easy identification
- The LPCB/BWF have together developed a special scheme mark
- The Mark you can Trust.

LPCB

Thank you for listening
Any Questions???

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Final Questions Session

Thank You

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