Standard Fire Resistant Ceiling Systems BS EN 13501-2 – the European Standard and BS 476 – the British Standard

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The British Standards

The British National Standard BS 476 is still valid in the UK. OWA tested unique loadbearing structures which are usually applied in the UK according to this standard. Building regulations and guidance regarding fire performance are contained in Approved Document B and in other guidance documents for specific applications. In addition BS EN 13501-2 is still valid in UK.

Reaction to fire

If a fire is able to find sufficient flammable materials it will quickly spread through an area. It is therefore crucial to use materials of limited combustibility on key surfaces within a room, such as ceilings and walls. The use of such materials can dramatically reduce the speed flames spread through an area as well as minimise their contribution to the fire.

The European Standard BS EN 13501-1: reaction to fire provides a number of performance criteria to measure the fire characteristics of building products. These cover spread of flame and contribution to fire as well the generation of smoke and the production of burning droplets. The table below provides an overview of the available classifications.

Additional requirements		European class according to BS EN 13501-1
No smoke	No burning droplets falling/dripping	
✓	✓	A1
✓	✓	A2-s1,d0
✓	✓	B-s1,d0 | C-s1,d0
	✓	A2-s2,d0 | A2-s3,d0 B, C-s2,d0 | B, C-s3,d0
✓		A2-s1,d1 | A2-s1,d2 B, C-s1,d1 | B, C-s1,d2
		A2-s3,d2 | B-s3,d2
✓	✓	D-s1,d0
	✓	D-s2,d0 |D-s3,d0
		E | E-d2 | F
✓		D-s1,d2 | D-s2,d2 | D-s3,d2

The additional designations are:

smoke \| s1, s2, s3
s1 = little or no smoke generation
s2 = medium smoke generation
s3 = heavy smoke generation

burning droplets \| d0, d1, d2
d0 = no droplets within 600 seconds
d1 = droplet form within 600 seconds but do not burn for more than 10 seconds
d2 = not as d0 or d1

Country	Test standard	Classification
EC member states	BS EN 13501-1	A2-s1,d0 | B-s1,d0
Switzerland	Guide to fire regulations, 1976	VI q.3 virtually non-combustible, smoke level low
USA	ASTM E 84 a / ASTM E 1264	Class I / class A
UK	BS 476	Class 0

Fire Resistance

Fire Resistance class BS EN 13501-2	Fire Resistance duration in minutes
REI 30	up to 30
REI 60	up to 60
REI 90	up to 90
REI 120	up to 120
REI 180	up to 180

Structural elements based on BS EN 13501-2 encompass the whole structural element and not just the suspended ceiling. This may consist of the roof and the suspended ceiling or the structural floor and suspended ceiling. The entire element should resist the impact of fire on its structural ability for as long as possible. The length of time this can be maintained is the fire resistance duration and will classify it in one of the classes shown.

Test criteria

During the fire resistance test the laboratory will look out for adverse reaction as well as reporting on the following key criteria.

R. The structural element should not collapse or deflect beyond the permitted levels when subjected to the applied load.
E. The integrity of the room must be maintained. No breakthrough of flames is permitted.
I. The temperature on the non-exposed side of the structural element must not rise more than 140 °K above ambient as an average measurement and no more than 180 °K at any one location.

If one of the above criteria is exceeded the test is terminated and the duration achieved prior to failure will dictate the appropriate fire resistance classification.

Due to the diversity of the various structural elements currently available it is impossible to test each individually. We therefore endeavor to test the worst case scenario in each generic construction type.

The following example shows construction within a test furnace:

The illustration below (fig. 1) shows an example of a typical steel beam construction with the OWA ceiling below.

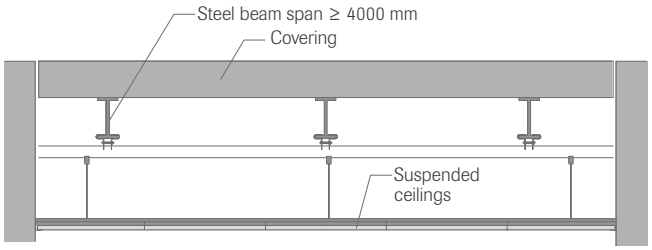
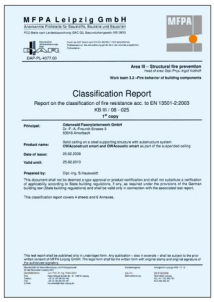


Fig. 1: steel beam floor

Where an OWAcoustic ceiling is used to provide structural fire resistance it is important that the ceiling is constructed in the same manner as that used in the test. Failure to use the same components and layout may invalidate any certification and prevent us issuing a KIT declaration.

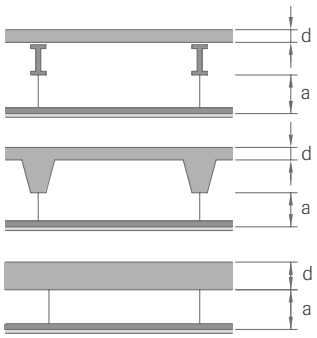
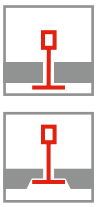
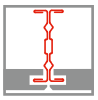


The BS EN 13964 (suspended ceilings requirements and test methods), covers a number of essential requirements including:

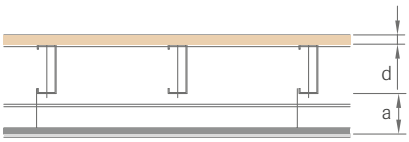
- reaction to fire
- fire resistance
- mechanical safety
- hygiene, health and environmental
- acoustics
- corrosion
- others

Important: in case of fire resistance a UKCA label and DoP for the whole kit (ceiling tiles + subconstruction) is mandatory according to BS EN 13964 ZA 1.1

European Fire Resistance test (BS EN 13501-2)

Loadbearing construction		Min. thickness of concrete slab (d)	Min. cavity height (a)	Type of suspended ceiling OWAconstruct premium systems
	**Steel beam floor/ concrete floor KIT-11.1-01/2008**	≥ 90 mm	≥ 200 mm	 S 3 S 3a
	Steel beam floor/ concrete floor KIT-28.1-01/2015 – S 3 **Steel beam floor/ concrete floor KIT-29.1-01/2018 – S 3**	≥ 90 mm	≥ 250 mm	 S 3
	Steel beam floor/ concrete floor KIT-19.1-01/2011 – S 6a	≥ 100 mm	≥ 200 mm	 S 6a
	Steel beam floor KIT-17.1-01/2013 – S 15 cliq KIT-18.1-01/2011 – S 15a cliq	≥ 100 mm	≥ 200 mm	 S 15 cliq  S 15a cliq
	Steel beam floor KIT-27.1-01/2011 – S 3 KIT-27.1-01/2011 – S 3	≥ 100 mm	≥ 200 mm	 S 3  S 3a

Fire Resistance (BS 476)

Loadbearing construction		Min. thickness floor boards (d)	Min. cavity height (a)	Type of suspended ceiling OWAconstruct premium systems
	**Mezzanine floor**	38 mm	≥ 150 mm	 S 3, S 3 cliq

OWAcoustic tiles *			Fire Resistance		Tested hanger (max. distance)			
Module	Thickness	Products	Classification min.	Test report no.	Centre of main tee	Centre of hangers	Hanger OWA-no.	Suspension details
600 x 600 mm	15 mm	Product surfaces from Table 1 (page 8)	**REI 60**	PB 3686/137/10-CR	1200 mm	1200 mm	Pre-stressed 2 mm wire	OWAconstruct 45G/46G/47G perimeter 51/32G
600 x 600 mm	15 mm	Product surfaces from Table 2 (page 9)	**REI 60**	PB 3.2/14-338-1, PB 3.2/15-411-1 … and further reports	1200 mm	1200 mm	Pre-stressed 2 mm wire	OWAconstruct 45G/46G/47G perimeter 51/32G
		OWAcolor	**REI 45**					
≤ 2000 (tile length) x 300 mm	15 mm	Cosmos/N Constellation Sinfonia Privacy	**REI 90**	No. 285879/6380/CPD … and further reports	–	–	–	C profile no. 36/70 perimeter 51/25 only surface-mounted lights
625 x 625 mm 600 x 600 mm	15 mm nom.	Product surfaces from Table 1 (page 8)	**REI 60**	No. 285878/6379/CPD … and further certificates	625 mm 600 mm	1250 mm 1200 mm	Pre-stressed 2 mm wire	OWAconstruct cliq-15-MR cliq-15-CT short perimeter 51/32G
1200 x 600 mm	15 mm	Product surfaces from Table 1 (page 8)	**REI 60**	No 282291/6095/CPD … and further certificates	600 mm	1200 mm	Pre-stressed 2 mm wire	OWAconstruct 45G/46G perimeter 51/32G

OWAcoustic tiles			Fire Resistance		Tested hanger (max. distance)			
Module	Thickness	Products	Classification min.	Test report no.	Centre of main tee	Centre of hangers	Hanger OWA-no.	Suspension details
600 x 600 mm	15 mm	Mezz pro	**60**	WF test report no. 106961 … and further reports/ assessments	1200 mm	1200 mm	Pre-stressed 2 mm wire	OWAconstruct 45G/46G/47G perimeter 51/32G

Fire resistance duration of individual OWAlifetime products

Table 1

Product surfaces	**Reinforced concrete/steel beam floors:** fire resistance classification REI in accordance with BS EN 13501-2 to *
Bamboo	90
Cosmos	90
Creaprint Constellation	90
Janus (Cosmos, Constellation)	90
NEW Sandila	90
Sinfonia Privacy	90
Constellation	90
Mezz pro	90

* Depending on system, tile dimensions and design

Table 2

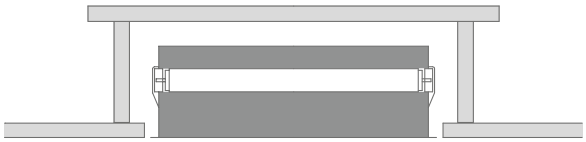
Product surfaces	**Reinforced concrete/steel beam floors:** fire resistance classification REI in accordance with BS EN 13501-2 to *
Creaprint Sinfonia	60
Ocean	60
OWAlux	60
Sinfonia (white, black, grey)	60
Sinfonia Humancare	60
Humancare Plus	60
Humancare Lab	60
OWAcolor	45

* Depending on system, tile dimensions and design

Light fittings

When installing recessed luminaires in an OWAcoustic Fire Resistant Ceiling an OWAcoustic fire box should be installed to ensure continuity of fire resistance. It is important to ensure that the performance of the fire box matches that of the installed OWAcoustic ceiling.

Recessed light fittings



OWAcoustic standard ceilings (steelbeam floor, mezzanine floor)

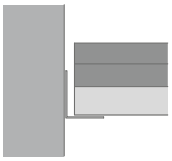
OWAcoustic ceilings with recessed light fittings offer the same fire resistance as closed OWAcoustic ceilings, if the recessed light fittings are encased in a 15 mm thick Minowa® Firebox. For details, see OWA Installation Guide 9801 e.

When using 20 mm thick OWAcoustic premium tiles, 21 mm thick Minowa® tiles should be used. Also see information sheet on Fire Protection Enclosure no. 9905 e.

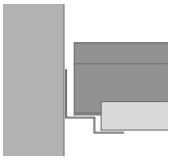
Thickness OWAcoustic tiles	Thickness firebox
15 mm	15 mm
20 mm	21 mm

Perimeter trims

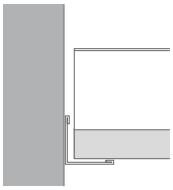
For Fire Resistant Ceilings the perimeter trims should be installed in accordance with corresponding test report. Only approved fire resistant wall fixings should be used. Fixing centre ≤ 250 mm.



Standard wall perimeter
for all standard ceilings



Wall perimeter
for Contura ceilings S 3a



Wall perimeter
for S 6a

Hangers and suspensions

Pre-stressed wire
Ø ≥ 2.0 mm;
fixing ends are bound at least 3 times

Top fixings

Only approved fire resistant top fixings suitable for the substrate should be used.

Verification

For fire resistance requirements relating to OWAcoustic ceilings, it is recommended that you clarify the design for the relevant requirement prior to ordering and installing the ceiling.

When placing an order, please request the documents from your dealer by providing a completed checklist (download right). This is required in order to provide the correct documents (DoP, UKCA-label).

OWA fire protection documents are only valid if OWAcoustic-tiles and original OWAconstruct system components (as tested) are used.

Technical assistance

This brochure provides a very brief outline of BS EN 13501 and how OWAcoustic Ceilings can help meet your fire resistance requirements.

If you require further information or assistance on any aspect of your proposed ceiling installation please contact us or visit our website.

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