Estates.Firesafety

From: Tyler, Nick
Sent: 13 May 2019 09:22
To: Aleksandrs Trofimovs
Cc: Torero Cullen, Jose; McBrien, Matthew; Doubleday, Tom; Michael Fostiropoulos; Boampong, Derrick; Papadosifos, Nikolaos; Suzuki, Tatsuto; Cooke, Simon; 043536 Ucl Pearl
Subject: Re: Materials in PEARL research

Categories: Copied (CC) to Me

Dear Aleksandr,

Many thanks.

I think strict management rules such as you suggest are simple and eminently workable - and easy to check for compliance on a regular/frequent basis - so I am not troubled about the practicality of that.

Michael, does this help?

Yours,

Nick

Sent whilst on the move...

From: Aleksandrs Trofimovs <Aleksandrs.Trofimovs@BuroHappold.com>
Sent: Monday, May 13, 2019 9:09:10 AM
To: Tyler, Nick
Cc: Torero Cullen, Jose; McBrien, Matthew; Doubleday, Tom; Michael Fostiropoulos; Boampong, Derrick; Papadosifos, Nikolaos; Suzuki, Tatsuto; Cooke, Simon; 043536 Ucl Pearl
Subject: RE: Materials in PEARL research

Nick

Please find our responses to the series of emails that you have sent through below.

3.6m Storage Height

As you note, the 3.6m storage height is proposed as a reasonable assumption for the top height of the rack storage to not be considered high rack and is based on the recommendations of IBC. This should be measured to the top of the stored materials.

While this recommendation does not directly relate to the materials stored outside of the storage racks, for example stacked floor surfaces, we would still recommend that this is not exceeded. This would ensure consistency of the approach to the storage of materials and simplify discussions with Building Control and London Fire Brigade.

IBC Recommendations for Storage

While the 3.6m figure was taken from the IBC guidance, this was due to the lack of suitable figure in the local guidance. The design would still be based on recommendations provided in BS9999:2017, as guidance document relevant for buildings in England.

As such, any guidance provided in the IBC regarding the fire protection and treatment of storage areas would be considered as supplementary international guidance to the main basis of design which will be BS 9999.

Storage of Non-Combustible Materials

The materials of limited combustibility (i.e. materials classified as A2-s3,d2 in accordance with BS EN 13501-1:2007+A1, when tested to BS EN ISO 1182 or BS EN ISO 1716 and BS EN 13823) or non-combustible materials (i.e. materials not capable of undergoing combustion under specified conditions, BS EN ISO 13943:2010, 4.239) could be stored above the 3.6m limit in principle, as they would not represent additional fire load or fire risk.

However, this would place further emphasis on the development of strict management procedures and control to ensure that the storage principles of materials (i.e. combustibles at the lower shelves and non-combustibles on the shelves above) is maintained throughout the life of the building.
Please note that all of the above is subject to the discussion and agreement with Building Control and London Fire Brigade.
Kind Regards,
Aleks

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BUROHAPPOLD RECLAIMING ENGINEERING

From: Tyler, Nick <n.tyler@ucl.ac.uk>
Sent: 09 May 2019 09:02
To: Aleksandrs Trofimovs <Aleksandrs.Trofimovs@BuroHappold.com>
Cc: Torero Cullen, Jose <j.torero@ucl.ac.uk>; McBrien, Matthew <Matthew.McBrien@aecom.com>; Doubleday, Tom <t.doubleday@ucl.ac.uk>; Michael Fostiropoulos <m.fostiropoulos@penoyreprasad.com>; Boampong, Derrick <derrick.boampong@ucl.ac.uk>; Papadosifos, Nikolaos <n.papadosifos@ucl.ac.uk>; Suzuki, Tatsuto <t.suzuki@ucl.ac.uk>; Cooke, Simon <simon.cooke@ucl.ac.uk>; 043536 Ucl Pearl <043536UclPearl@BuroHappold.com>
Subject: Re: Materials in PEARL research
**** External Email ****
Dear Aleksandr,
Sorry for bothering you with this, but I think it is important to make sure that we are correct in the way of handling fire risk in a practical and sustainable way.
I have been looking at the IBC Section 32 High Piled combustible storage. I would just like to clarify a couple of things.
High piled is designated as in excess of 12 feet (3.6m) measured to the top of the stored items and this is what Chapter 32 of the IBC refers to.
As we agreed yesterday, our most hazardous combustible material to be stored in the storage area is wood products. In Table 3203.8 unbundled wood products are classified as Category III and bundled wood products are Category II. I would assume that we are talking about unbundled wood products and therefore we are dealing with Category III. If for example, we stipulated that the scenery sets were constructed using plasterboard, that would presumably be Catagory I?
In Table 3602.1, Categories I-IV are listed and the fire prevention requirements listed according to the area of high piled storage. One of the categories in this table is 2501-12000 square feet and these area is designated into two: depending on whether the space is accessible to the public or not. In our case it is not accessible to the public. Therefore, for this area, sprinklers are not required (under something called "Option 2" but I cannot find what "Option 2" refers to). This would require a fire detection system and fire access doors.
So would I be correct in thinking that if the scenery sets were stored in one area up to 3.6m, it would not be considered to be high-piled storage, and other non-combustible materials (e.g. concrete, materials stored in fire proof cabinets etc.) could be stored in another area with suitable separation from the scenery sets to a higher requirement?
If the scenery sets were stored on their long edge, thus 2.4-3m 'high' when stored in this way), if they were in an enclosed space with a suitable fire door and side and top closures (e.g. steel sheet), would that mitigate the fire risk sufficiently to enable non-combustible materials to be stored higher at that location?
Yours,

Nick
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TEDx talk: Cities are people: https://www.youtube.com/watch?v=8vV4UpUScTo

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From: Aleksandrs Trofimovs <Aleksandrs.Trofimovs@BuroHappold.com>
Sent: 08 May 2019 16:18
To: Tyler, Nick
Cc: Torero Cullen, Jose; McBrien, Matthew; Doubleday, Tom; Michael Fostiropoulos; Boampong, Derrick; Papadosifos, Nikolaos; Suzuki, Tatsuto; Cooke, Simon; 043536 Ucl Pearl
Subject: RE: Materials in PEARL research

Hi Nick

Thank you for the information.

The BS9999 specifies the ultra-fast fire growth rate as being associated with flammable liquids and gases or materials that could lead to rapid uncontrolled fire growth (i.e. expanded plastics etc.), as well as high racked storage.

Based on the information that you have provided regarding the materials used for the construction of the experimental set ups, we believe that the Laboratory area could be classified as having an A3 risk profile without the need to provide sprinklers in this area. Please note however that this would be dependent on the tight control of the materials present in the Laboratory area to ensure that the materials present in the building remain limited to the plywood, steel and concrete throughout the life of the building and suitably demonstrated management procedures. We also note the comment regarding the use of items such as acetones, paints, thinners, fuel etc. The management procedures would need to be in place to ensure that at no point are these materials stored in bulk in the premises (small volumes for maintenance uses can be retained).

The storage area, however, would represent a slightly different issue. While materials present in the storage area would be similar to these in the Laboratory area, the fact that they would be stacked on top of each other in high rack storage could lead to rapid, uncontrolled spread of fire. As such, this would still need to be classified as A4 area requiring sprinklers if designed as currently proposed.

Therefore, to potentially avoid provision of sprinklers, the height of the rack storage would need to be limited. The BS9999 guidance does not define the height at which the storage would be considered to be high rack storage. However, there is a definition for "high piled storage" given in the International Building Code (IBC, model building code developed by the International Code Council) as generally approximately up to 3.6m high storage in racks. It is therefore proposed to use 3.6m as a reasonable assumption for the top height of the rack storage to not be considered high rack.

It is also recommended that polymer-based floor surfaces are either stored in fire rated containers or outside of the building when not used, as these could potentially result in rapid fire spread.

If all of the above is implemented, it is reasonable in our view to classify the entirety of the building as an A3 risk profile building and therefore avoid the requirement to provide sprinklers. Please note however that this would still need to be discussed and agreed with Bureau Veritas and London Fire Brigade.

Please note that omission of sprinklers would have impact on the amount of unprotected area that could be provided on the building elevations, reducing the unprotected areas that could be provided to the following (based on the same assumptions and dimensions as used in the Stage 2 fire strategy):

- North elevation – 9% from 17% previously
- South elevation – 10% from 20% previously
- West elevation – 31% from 81% previously

Kind Regards,

Aleks

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From: Tyler, Nick <n.tyler@ucl.ac.uk>
Sent: 08 May 2019 07:54
To: Aleksandrs Trofimovs <Aleksandrs.Trofimovs@BuroHappold.com>
Cc: Torero Cullen, Jose <j.torero@ucl.ac.uk>; McBrien, Matthew <Matthew.McBrien@aecom.com>; Doubleday, Tom <t.doubleday@ucl.ac.uk>; Michael Fostiropoulos <m.fostiropoulos@penoyreprasad.com>; Boampong, Derrick <derrick.boampong@ucl.ac.uk>; Papadosifos, Nikolaos <n.papadosifos@ucl.ac.uk>; Suzuki, Tatsuto <t.suzuki@ucl.ac.uk>; Cooke, Simon <simon.cooke@ucl.ac.uk>
Subject: Materials in PEARL research
**** External Email ****

Dear Aleksandrs,

Good to meet you yesterday.

I was asked to send you a list of materials that we expect to use in PEARL research.

Basically these are as follows. I have also estimated the extent to which we would expect to need to store these:

1. Plywood (3-ply): used for model-making. The models would be kept in fire-proof steel cabinets inserted into the pallet racking. We would only purchase this material when it is about to be used and would not store it on site in its raw form.
2. Plywood (5mm-10mm): this would be the thickness of scenery sets. These would be made offsite and brought in, then stored when not in use for an experiment. The raw material would therefore not be stored on site. The sets would be framed and supported by softwood frames in order to maintain internal stiffness and would be made in the order of 7m x 2.5m panels, assembled as required in an experiment. When installed for an experiment these would be supported by a steel structure (e.g. scaffolding), which would be assembled as required. These could be stored horizontally at floor level, thus not exceeding 3m from the floor (including protective mounting at floor level). On occasion, these will be surfaced with items such as ceramic tiles, (sliced) bricks, (sliced) breeze block etc. (in order to provide the correct haptic feel in, for example an Underground station).
3. Plywood (50mm): this would be used for floor surfaces in place of the 'standard' concrete surfaces. The final design of these is not quite finalised, but the likelihood is that they would be contained within a steel 'tray' to be secured to the configurable floor modules in place of the (same design) trays which hold the concrete pavers. These can be stored in stacks on the floor, with the steel tray forming a barrier between each surface.
4. Concrete, Stone floor surfaces: In the main these would be assembled into steel trays (as per (3) and when not deployed on the modules would be stored in stacks on the floor (also as per (3).
5. Polymer-based floor surfaces (e.g. Olympic running track surface). These are 1.2m wide strips and kept rolled up and secured, then unrolled and placed on top of the concrete surfaces on the modules. The length of material in a roll is determined by the weight. *If these represent a fire hazard when stored, they can be stored in the containers outside: they are more amenable to this handling than e.g. the sets because they are less prone to damage.*
6. All items smaller than $1m^3$ will be kept in doored steel containers, on shelves set in the pallet racking. These consist of instruments, meters, short cables, electrical (disconnected) items, tools, small scenery items.
7. We do not use material such as expanded polystyrene, paper, and we do not store items such as acetones, paints, thinners, fuel etc. If any of these are required for any reason they will be purchased for the particular use and disposed of afterwards.
8. Acoustic systems will be contained within separate baffles and fireproofed as a standard requirement.

Given that high racking is problematic in terms of fire protection, we can reduce the height of the racking to the maximum acceptable level - the storage volume would need to be maintained by use of the outside containers for those items that would be least badly served (by reason of e.g. infrequent use, handling, imperviousness to rain or damage-in-transit) from this solution.
In terms of fire sources

1. The configurable floor is powered from a 3-phase ring main, cabled to power protection panels, which step down to 240V and pass to Power Distribution Panels, which step down to 18/24V, which drive the modules. All power is disconnected unless the floor is being reconfigured. All PPPs and PDPs are protected against overheating, power surges etc.
2. The lighting system will have its own power system, suitably protected and thermal cutouts as required.
3. The sound system will have its own protection systems (and generally runs on low voltage).
4. Ancillary electrical items (e.g. lighting contained in scenery setups) will be low voltage on their own supply and protection system.
5. Power tools used for work in the laboratory space will be battery-powered. Chargers for these will be in the Workshop space or alongside the MWEP charging units outside the laboratory space.
6. No other electrical devices will be kept in the laboratory space.
7. No electrical connection in the laboratory space will be made to the power supply when the building is unoccupied.

In terms of operations, experiments generally will take place at floor level or on the configurable floor (which is about 1m high). The portable seating is up to 2.5m high from floor level, thus the zone within which we would expect to have people involved is below 3m. One exception to this would be the boarding gate experiments, where we would contract the construction of a boarding gate, which would be higher than this (actual height to be determined), and access. We expect that this construction would come with its own fire and other safety measures, but essentially would be a steel construction with no combustible material involved. Furniture, e.g. check-in desks, would be constructed out of 10mm plywood and we would expect, following a specific risk assessment that suitable procedures and equipment would be included as part of the construction and operation.
All experiments involving participants are highly controlled, with strict staff:participant ratios at all times (minimum 1:10). Similar conditions will apply when members of the public attend events.
Does this help?
I would like to have the list that was promised of what materials could be considered as risky, just to check that these would not be likely to be used (or, if so, what the risk mitigation procedures should be) and on the guidance to what "high rise racking" actually is.
I am happy to discuss this. The aim is to minimise the fire risk to an acceptable level while enabling us to do the research for which we are funded.
Thanks.
Yours,
Nick
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TEDx talk: Cities are people: https://www.youtube.com/watch?v=8vV4UpUScTo