

TITLE : HONEYCOMB STRUCTURED FIRE DOOR

TECHNICAL FIELD :

The present invention brings a new dimension and improvement in the production technology of fire proof
5 doors. Its internal honeycomb structure and appropriate filling material and construction design introduces a light-weight, durable and safe fire doors.

PRIOR ART

Fire proof doors are no newcomers in the market and is
10 on essential safety requirement in most commercial development. For example, a building would not get approval for occupancy nor its certificate of fitness(CF) if adequate fire safety aspects are not encountered for.

Current commercially available fire proof doors are
15 used to isolate fire escape routes from the rest of the building. This makes the emergency passageway safe against potential fire hazards. There is a certain time frame that the door can sustain onslaught of direct flames after which it is rendered ineffective.

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The present design of fire doors are extremely heavy and bulky which is understandable due to the conditions these doors are subjected to in the event of a fire emergency. The applicant has proven that technological
5 advances have paved a way for this innovative fire door which is less heavy, less bulky, safer and more durable.

In general, this invention has numerous short and long term advantages as compared to current conventional designs. The weight of the conventional fire door is one
10 disadvantage. For fire resistant properties a metal sheet or cement fibreboard is incorporated in the construction with external plywood as a frame. The sheer weight proves to be disadvantageous due to the difficulties in the manufacturing process, transportation and storage. At the other end,
15 installation works could also prove to be tedious as proper alignment and adjustment need to be made for the fire door to serve its purpose effectively and the weight again would hinder smooth work.

Having noted this serious disadvantage in current fire
20 doors, the applicant has been able to propose an entirely new concept in design. Advances in technology have brought various new synthetic resins to be used in the

development of glue laminated construction material with various core designs. The design of the core in this invention has an internal structure somewhat similar to that of a honeycomb. A light kraft paper sheet can easily be
5 fashioned to form the honeycomb structure in the core of the door. Along with proper impregnated or unimpregnated core, filling material and chemicals the honeycomb 'backbone' proves to be an effective barrier to fire hazards and is the root to this innovative invention.

10 An added advantage is the duration of fire resistance of the honeycomb fire door. Conventional fire doors are effective against fire for a period of one hour or less but this invention boasts of a resistance of about two hours to direct flames and intense heat. The safety aspect
15 is a major plus point as in the event of an emergency, every second is crucial and consequently lives can be saved.

SUMMARY OF THE INVENTION

The present invention relates to a revolutionary fire door that utilises a new structural concept that improves its overall safety capability and manageability due to its much reduced weight. Though the general appearance would have similarity to normal fire doors, the main innovation lies in the internal structure, design and chemical constituents.

The base building material is a solid timber frame to give a high level of stability to the structure. In general, the honeycomb core encloses the entire internal structure and is sandwiched between two specially treated pieces of plywood that forms the faces of the present fire door.

The honeycomb structure is fashioned out of a light kraft paper and is intricately zig-zagged with curved edges. This basic building design is combined and arranged in such a manner that the end product resembles a honeycomb that is commonly found in beehives. This honeycomb design is able to withstand a tremendous vertical pressure that comes close to the tolerance of a solid object with the advantage of being lighter and more manageable. This innovative structure

forms the internal skeleton of the fire door with the advantage of low weight factors and equal strength as compared to its conventional counterparts.

5 This intricate honeycomb design is then placed in the timber frame and arranged in a dense manner leaving only the vacant sites in the honeycomb structure visible. On one end of the frame a specially treated plywood is mounted and glued using the synthetic resin of phenol ressesonol. The exposed surface of the internal honeycomb core is then
10 densely filled with Calsium Silicate and smoothed over. A similar piece of treated plywood as used earlier is then glued over the exposed surface again with Phenol Ressesonol. Thus we obtain a self contained honeycomb core filled with Calsium silicate fire door.

15 The reason behind the usage of Calsium Silicate and Phenol Ressesonol is its fire resistive properties and non combustibility. The finished touches are then added on which is a timber beading along the edges of the door which completes the basic door construction.

This completed product has a core thickness of about 2.81 cm which is the honeycomb depth, a timber frame also about 2.81 cm and 7.50 cm wide. The dimensions of the door are x cm X y cm X z cm and the plywood thickness is about 0.75 cm. Custom made thicknesses of the entire fire door can be tailor made and core design may be changed to accomodate various design and structural requirement. This entire construction makes the door less bulky and more light-weight. The resistance towards fire for about 2 hours also makes it an extremely safety conscious invention. The added mobility in transport, manufacture and storage as well as simpler installation processes makes it extremely cost worthy and the savings would be passed on to end users in terms of price reductions of fire doors.

15 A BRIEF DESCRIPTION OF THE DRAWINGS

To describe the present invention in an effective manner, several drawings have been made to illustrate the details. The detail description makes reference to the annexed drawings wherein ;

20 Figure 1 shows the perspective view of the fire door and its components.

Figure 2 shows the front view of the internal structure without the top treated plywood of the fire door.

Figure 3 shows the cross sectional view to illustrate how the sandwich construction is made.

5 DETAIL DESCRIPTION OF THE DRAWINGS

In figure 1, the perspective view of the door is shown whereby a certain area has been exposed to reveal the inner structure where layers of treated plywood(3), Phenol Resesonol and the Calsium Silicate filled honeycomb core(1) are revealed.

Figure 2 illustrates the dimensions of the door which are x cm X y cm X z cm. The timber frame(2) is about 7.50 cm wide and 2.81 cm deep which nicely accomodates the honeycomb core(1) which is also 2.81 cm deep. The Calsium Silicate filled honeycomb core is sandwiched between two treated pieces of plywood(3) and glued on using Phenol Resesonol resin. The treated plywood(3) is about 0.75 cm thick.

Figure 3 is the cross sectional view of the door to reveal the individual components in the sandwich. The plywood(3) casing is compressed against the timber frame(2) enclosing the honeycomb core and its filling material. The
5 resin also has its location clearly displayed as well as the timber frame(2) which reinforces the structure. A timber beading(4) that surrounds the door also lends to a refined external finish around the edges.



CLAIMS

1. Internal honeycomb structured fire door comprises of a honeycomb core(1), suitable filling material for the core and encased in treated plywood(3) or similar material on
5 either side using resin.
2. Internal honeycomb structured fire door as recited in claim 1 uses kraft paper fashioned in a zig-zag curve and joint appropriately as the honeycomb core(1) along with appropriate filling material.
- 10 3. The claim according to claim 2, wherein the above mentioned suitable filling material is Calsium Silicate which is known to be a non heat conducting, non combustible and no non flammable material.
4. The claim according to claim 1, wherein the plywood(3)
15 used is specially treated and the resin used to bond it to the frame and honeycomb core(1) is Phenol Ressesonol.
5. The internal honeycomb structured fire door as recited in claim 1 wherein various dimensions can be used in priciple such as the door size, or honeycomb size or



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configuration, impregnated or unimpregnated honeycomb
core(1), timber frame or similar material thicknesses,
treated plywood(3) or similar material with various
thicknesses as well as the thicknesses of the Phenol
5 Resesonol resin coating or adhesives used.