

Started: 28 April 2013
Revised: 26 December 2013
In-depth version: 3 May 2014
Final: 16 June 2014

Comment on Hawker Stall Fires

W.K. Chow, JP FHKEng

Fellow Elected, Hong Kong Academy of Engineering Sciences

Research Centre for Fire Engineering, Department of Building Services Engineering

The Hong Kong Polytechnic University, Hong Kong, China

1. Introduction

A big fire [1] occurred on Fa Yuen Street, Mongkok, Hong Kong on 30 November, 2011. The fire started when combustibles in the hawker stalls outside a building were ignited, though whether it was caused by accident or arson is still not known.

The big stall fires with tall flame height acted on the adjacent buildings. Post-flashover fires were sparked on the mezzanine and the first floor of the buildings next to the stalls, spreading flame and smoke to other parts of the buildings. There were illegal constructions in the tenement buildings, with some blocking the evacuation paths.

Nine occupants were killed consequently. After this big fire, fire safety concerns, such as fire spread from outside to inside of a building, are raised by different parties [2-7]. A preliminary investigation report [8] on the possible fire spread had been submitted to the responsible department in July 2012. The possible fire scenarios were deduced with empirical equations on fire dynamics [8] as shown in Fig. 1.

2. Current Situation

In 2013, the government published three documents which are labelled D1 to D3 [4-6] below, all contain some parts related to fire safety design of hawker stalls:

- Document 1 (D1):
Assistant Scheme for Hawkers in Fixed-Pitch Hawker Areas (LC Paper No. CB(2)572/12-13(03)) [4] - released by the Food and Environmental Hygiene Department in January 2013;

- Document 2 (D2):
Public Consultation on Management of Fixed Pitch Hawker Areas [5] - released by the Food and Environmental Hygiene Department in February 2013; and
- Document 3 (D3):
Study Report – Fire Safety and Design of Fixed Pitch Hawker Stalls in Hong Kong (LC Paper No. CB(2)796/12-13(01)) [6] - a document released in March 2013.

Further, a gazette [7] was issued by the government on 25 April 2013. Appendix 1 is a summary of the passive and active systems required in these three documents [4-6], while terms related to fire safety in the gazette [7] are listed in Appendix 2.

3. Preliminary Observations from the Documents

All three documents mentioned above [4-6] do not specify the fire hazard scenarios. The documents [4-6] only address the passive construction elements, and nothing was mentioned regarding effective fire suppression systems. Preliminary observations are:

For document D1 [4]:

- The fire cannot be extinguished if active fire suppression systems do not operate due to whatever reasons.
- It might take a long time to suppress a hawker stall fire like the one on Fa Yuen Street.
- Systematic experimental studies are needed to demonstrate that the active fire suppression system would function as expected.

For document D2 [5]:

- Sprinkler requirement is a good idea, but the design should be worked out systematically with real-scale burning experiments.
- The system should be able to suppress a big fire when a hawker stall catches fire.
- The design flow parameters of the system should be worked out carefully.

For document D3 [6]:

- Dry powder might not be good enough to put out big fires, depending on the scenario. Systematic experimental studies are needed to demonstrate that dry powder would suppress hawker stall fires.

- As hawker stalls are closed at night, it has not been demonstrated that the stalls can act as closed cabins in case of fire. It comes into question if the stalls only satisfy the ‘integrity’ criteria of BS476 [9] through experiments with a furnace.

Note that most of the goods in hawker stalls are combustibles. Fire officers are worried that burning such large amounts of combustibles will give rise to big fires easily as experienced in the Fa Yuen Street fire. Therefore, a big design fire is required in hazard assessments.

4. The Fire Scenarios

A fire scenario in a hawker stall should be identified in hazard assessment. Large amounts of combustibles are stored in the stalls. The situation is even more hazardous as many electrical adaptors, appliances, air-conditioners and refrigerators with clean hydrocarbon refrigerant are in use, where explosions are imminent possibilities [10]. Further, crowded markets with hawker stalls might give problems on emergency evacuation as encountered in the subway stations in the Far East [11]. Basically, the fire scenarios at daytime and nighttime are very different.

The fire hazard in daytime might not be high because humans are very sensitive fire detectors. Any small fire at the early stage can be detected and suppressed effectively if stall keepers have some firefighting training. The physical consequence should not be so severe. As the places where hawker stalls are located are always crowded with people, evacuation is a key issue. More evacuation paths should be designated in order to avoid repeating the Lan Kwai Fong tragedy [12].

However, small fires started at night while nobody is in attendance are huge concerns. The intensity might aggravate as experienced in the Fa Yuen Street fire [1-3] as indicated in Fig. 1. Hazard assessment on accidental nighttime fire scenarios should be carried out carefully, and the following should be considered at the very least:

- Provide appropriate design data such as a bigger design fire.
- Conduct full-scale burning tests to understand the fire physics.
- Enhance fire protection by providing more hardware, both passive and active systems; and by improving fire safety management.

5. Conclusion

It is obvious that adequate fire safety in terms of equipment and management must be provided in hawker stalls because the current condition is not satisfactory. The huge fire on Fa Yuen

Street was a painful lesson because of its grave consequences. The big fire resulted from burning stalls would act at the adjacent buildings. As a building fire could be induced by a source from outside, the assumption of the fire safety strategy in such buildings that the fire spread always starts from inside has to be changed.

References

1. South China Morning Post, “An accident just waiting to happen”, Hong Kong, 1 December 2011.
2. W.K. Chow, “Large fire in Fa Yuen Street”, In: G. Rein (editor), International Association for Fire Safety Science Newsletter No. 32, p. 13, April 2012.
3. W.K. Chow, “Hidden fire problems: Consideration after the Fa Yuen Street big fire”, Department of Building Services Engineering, The Hong Kong Polytechnic University, Hong Kong, December 2011. Available at:
http://www.bse.polyu.edu.hk/researchCentre/Fire_Engineering/Hot_Issues.html
4. Assistant Scheme for Hawkers in Fixed-Pitch Hawker Areas (LC Paper No. CB(2)572/12-13(03)), Released by Food and Environmental Hygiene Department in January 2013 for discussion by the Legislative Council Panel on Food Safety and Environmental Hygiene on 5 February 2013.
5. Public Consultation on Management of Fixed Pitch Hawker Areas, Released by Food and Environmental Hygiene Department for public consultation in February 2013.
6. Y.L. Wong, Study Report – Fire Safety and Design of Fixed Pitch Hawker Stalls in Hong Kong (LC Paper No. CB(2)796/12-13(01)), Released on 12 March 2013 and submitted to Legislative Council Panel on Food Safety and Environmental Hygiene on 13 March 2013.
7. Chapter 132AI Hawker Regulation, Laws of Hong Kong, Version date 25 April 2013.
8. W.K. Chow, “Fire Investigation Report on Fa Yuen Street Fire”, A report to the Fire Services Department, 25 July 2012.
9. British Standards Institution (BSI), Fire tests on building materials and structure, Part 7: Method of test to determine the classification of the surface spread of flame of products. BS476: Part 7: 1997, London, UK, 1997.
10. W.K. Chow, “Lesson learnt from a recent incident in Ma On Shan : Any explosion risk for environmentally friendly refrigerants?”, Department of Building Services Engineering, The Hong Kong Polytechnic University, Hong Kong, February 2013. Available at:
http://www.bse.polyu.edu.hk/researchCentre/Fire_Engineering/Hot_Issues.html.

11. W.K. Chow, “Fire safety for subway systems in Hong Kong”, Invited talk at Beijing University of Technology, Beijing, China, 24-25 April 2014.
12. South China Morning Post, “Lan Kwai Fong tragedy”, Hong Kong, 2 January 1993.

CompHS20141d

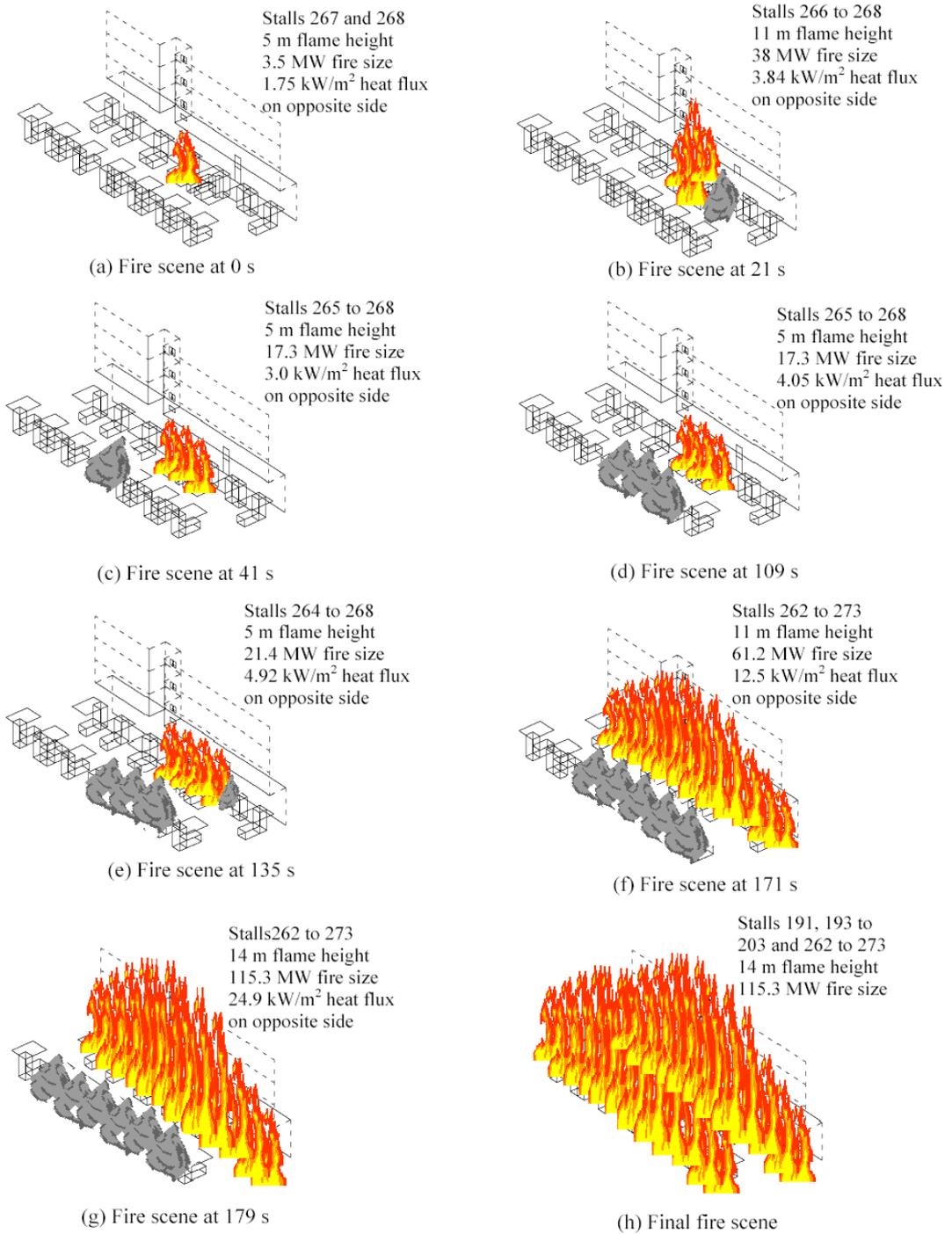


Figure 1: Possible fire scenarios deduced by Chow and associates

Appendix 1: Comparison of Hawker Stall Specification

Document	Passive construction element	Active protection system (Fire Service Installations)
D1: LC Paper Jan, 2013 [4]	<ol style="list-style-type: none"> 1. No separation requirement between stalls. 2. Fire retardant materials for canopy e.g. PVC tarpaulin not more than 0.45 m with maximum 2.5 m in height. 3. 2 mm galvanized mild steel or comparable fire resistance capability. <ul style="list-style-type: none"> - For dry goods, fully enclosed. - For wet goods, metal wire gauze for ventilation. 	<ol style="list-style-type: none"> 1. No fire suppression provision required. 2. Electricity meter box located at the back comply with CLP requirement (no specified document referred).
D2: Pubic Consultation Feb, 2013 [5]	<ol style="list-style-type: none"> 1. Relocate all stalls within 6 m from building exits. 2. 1 hour FRP for top, back and two sides. 	<ol style="list-style-type: none"> 1. Sprinkler installed inside stall cabinet. 2. No specification on electricity installation requirement.
D3: Wong Mar, 2013 [6]	<ol style="list-style-type: none"> 1. Maximum stall width 1.8 m with 1 m for separation. 2. Fire proof fabric for canopy. 3. No specification given on stall design but comply with 1 hour FRP test with certificate. 4. Supposed to cover the entire stall at night. 5. Proposed to have partition structure. 	<ol style="list-style-type: none"> 1. 12 kg dry powder automatic extinguisher. 2. 20A power supply located at the back with two 13A socket installed inside and outside the stall.

Appendix 2: Terms Related to Fire Safety: Gazette April 2013

Terms Related to Fire Safety appeared in Gazette April 2013 [7]:

active fire protection; chimney/stack effect; combustibility; combustible goods/product; combustible structure; emergency vehicular access (EVA); fire hazard; fire load; fire proof; fire rated enclosure; fire resistance; fire resistance period (FRP); fire resistance rating (FRR); fire resisting construction; fire resisting material; fire resisting structure; fire retardant materials; fire risk; fire safety; fire separation; fire service installation; fire size; flame; hot fume; means of escape (MoE); passive fire protection; and smoke.