Date : 1 Mar 2021 **Our Ref**: CD/FSSD/12/02/03/01

Registrar, Board of Architects
Registrar, Professional Engineers Board
President, Singapore Institute of Architects
President, Institution of Engineers, Singapore
President, Association of Consulting Engineers, Singapore

Dear Sir/Mdm,

AMENDMENTS TO FIRE CODE 2018 - 8th BATCH OF AMENDMENTS

SCDF would like to issue the 8th batch of amendments to the Code of Practice for Fire Precautions in Buildings 2018 (Fire Code 2018). The amendments which were deliberated and accepted by the Fire Code Review Committee are attached as Annex A of this circular.

2. Amendments stipulated in this Annex shall take effect from the dates specified therein. For those amendments that are to take effect at future dates as specified in Annex A, Qualified Persons are encouraged to comply with the requirements before the effective dates. Any proposed plans of fire safety works for new buildings or existing buildings that are submitted to SCDF for approval on or after the effective dates shall be subjected to the amendments made to the Fire Code.

3. Please convey the contents of this circular to members of your Board/ Institution/ Association. This circular is also available in CORENET's e-Info: http://www.corenet.gov.sg/einfo.

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4. For general queries, you may contact Mr Randy Tan at DID: 68481461 or Mr Tan Yi Yang at DID: 68481734. However, for specific issue relating to the reinstatement of ductless jet fan clauses and edits made to regulated fire safety products/materials, please contact performance-based team at 6848 1744 and CPT Daven Tan at 68481408 respectively.

Yours faithfully

(transmitted via email)

LTC Tan Chung Yee
for Commissioner
Singapore Civil Defence Force

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Annex A

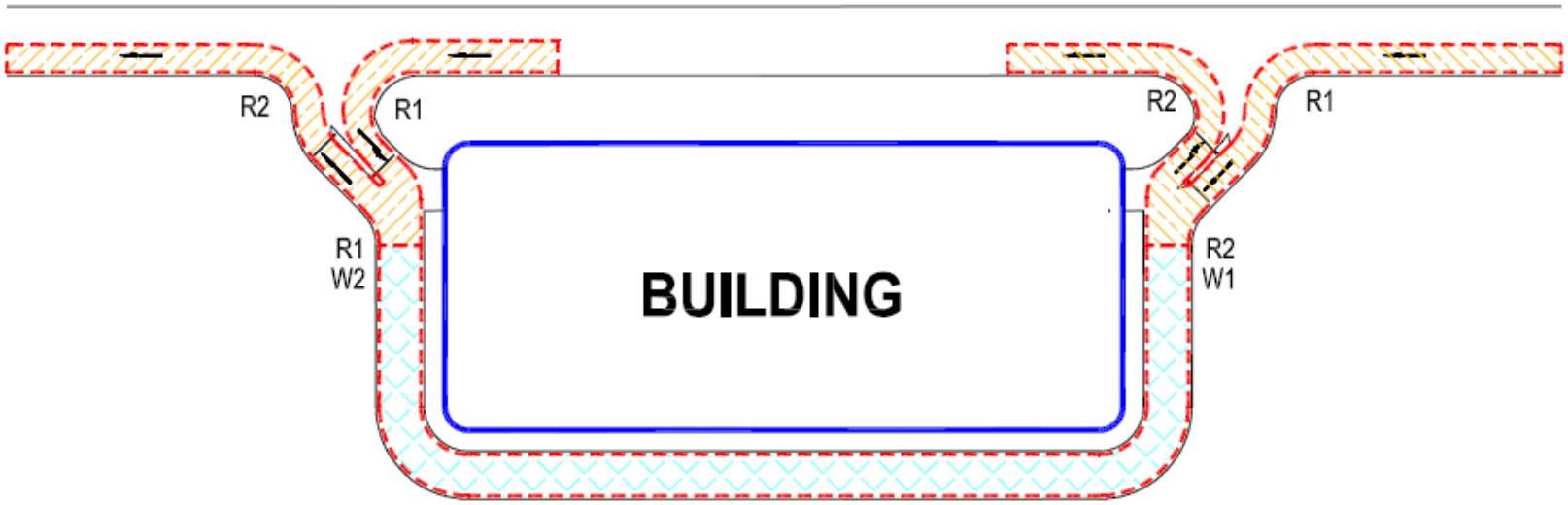
S/N	Clause No	Amendment Date	Effective Date	Clause Status	Clause Before Amendment	Clause After Amendment
1	1.1.2	01/03/2021	01/03/2021	Clarification	Fire safety requirements for laboratories handling hazardous chemicals For laboratory storing and using chemicals/HazMat shall be in compliance with NFPA 45, except for the Maximum Allowable Quantity (MAQ) which shall comply with the figures released by SCDF.	Fire safety requirements for laboratories handling hazardous chemicals ~~For laboratory~~ Laboratories storing and using chemicals/HazMat shall ~~be in compliance~~ comply with SS 641~~NFPA 45, except for the Maximum Allowable Quantity (MAQ) which shall comply with the figures released by SCDF~~. *Note: Table 9.8K & Table 9.8L will be omitted from the Fire Code.*
2	1.1.6	01/03/2021	01/03/2021	Clarification	Nil	Fire safety requirements for open plant processing structure The design of open plant processing facilities in the oil, chemical and process industries shall comply with SS 634.
3	1.1.7	01/03/2021	01/03/2021	Clarification	Nil	Fire safety requirements for pipeline service corridors The design, construction and operation of pipeline service corridors shall comply with SS 512.
4	1.1.8	01/03/2021	01/03/2021	Clarification	Nil	Fire safety requirement for storage of flammable liquids

						The safe storage of flammable liquids shall comply with SS 532.
5	2.3.1	01/03/2021	01/09/2021	Revised/ Clarification	General a. Means of escape shall be provided for all buildings by one or more of the facilities listed herein. Access and exit facilities not specifically covered in this Code shall not be used without the approval of the SCDF. Required exits shall be kept readily accessible, and doors shall be openable and unobstructed at all times during the occupancy of the building. b. Exit staircase signage ……..	General a. Means of escape shall be provided for all buildings by one or more of the facilities listed herein. Access and exit facilities not specifically covered in this Code shall not be used without the approval of the SCDF. Required exits shall be kept readily accessible, and doors shall be openable and unobstructed at all times during the occupancy of the building. Any future grille gate/door swing from units/service shaft into the common areas shall be indicated with dotted lines on building plans to show the egress requirements are met, despite the door swing. b. Exit staircase signage ……..
6	2.3.3c.(5)	01/03/2021	01/03/2021	Clarification	(4) There shall be no unprotected openings of occupancy area or combustible material/construction within 3m from discharge point of the exit staircase (both internal and	(4) There shall be no unprotected openings of occupancy area or combustible material/construction within 3m from discharge point of the exit staircase (both internal and

					external). This distance can be reduced to 1.5m if the unprotected openings are along the same plane of the staircase exit.	external). This distance can be reduced to 1.5m if the unprotected openings are along the same plane of the staircase exit. (5) There shall be no obstruction or any object encroaching, including any door swinging, onto the egress path at the discharge point of the exit staircase. The width of the egress path at the discharge point shall not be less than the width of the exit staircase.
7	3.8.6c.	01/03/2021	01/09/2021	Revised/ Clarification	Nil	Any door fitted to an opening in protecting structure of a shaft containing services, such as electrical and telecommunication cables, pipes (including gas pipe in separate shaft), ducts etc., is not required to comply with the requirements in *Cl.2.3.9d.(2)* if it is fitted with a self-closing device. Rising mains and hose reel doors shall not be fitted with self-closing device and shall comply with the stipulated corridor width when the door is in its fully opened position. Areas within the swing paths of the rising mains and hose reel doors shall be clear of any obstruction/storage at all times.
8	4.2.2h.	01/03/2021	01/09/2021	Revised/ Clarification	h. Obstruction	h. Obstruction

					Fire engine accessways/fire engine access roads shall be kept clear of obstructions at all times. Plants, trees or other fixtures shall not obstruct the path between the fire engine accessway and fire access openings.	Fire engine accessways/fire engine access roads shall be kept clear of obstructions at all times. Plants, trees, or other fixtures shall not obstruct the path between the fire engine accessway and fire access openings. Exception (a) Where an access control system for unmanned building (exclude PG I building) such as a barrier, sliding/swing gate, etc. is provided at the entrance into the development, such systems (i) shall automatically open upon detection of firefighting appliances (such as In-vehicle Unit (IU) for emergency vehicles) or activation of the building fire alarm, and shall remain open until the access control system has been manually reset; and (ii) shall be arranged to open automatically from a fail-safe manual override device located 1.2m

						above the floor and within 1.5m facing the external side of the development, with the manual override device readily accessible and clearly identified by a sign that reads "Emergency Release". (2) For manned building, the barrier at the entrance into the development shall be immediately opened/removed upon building's fire alarm activation.
9	4.2.2l.	01/03/2021	01/09/2021	Revised/ Clarification	Nil	Bi-directional fire engine accessway/fire engine access road For buildings with vehicular entries/exits that provides bi-directional access, both directions shall be designed with sufficient turning radius and width to allow firefighting appliances to manoeuvre along the fire engine accessway/fire engine access road in the intended traffic direction as shown in *Diagram 4.2.2l.*.



Legend:

W1	Signage at start of fire engine accessway
W2	Signage at end of fire engine accessway
R1	Signage at start of fire engine access road
R2	Signage at end of fire engine access road
	Fire engine access road
	Fire engine accessway

Diagram 4.2.2l. Bi-directional fire engine accessway/fire engine access road

10	6.2.8	01/03/2021	01/09/2021	Revised/ Clarification	Hose reels a. Provision (1) Hydraulic hose reel(s) conforming to the requirements in SS 575 shall be provided to every storey of every building regardless of building height. (2) Where a roof level is a non-habitable floor, fire hose reels shall be provided to cover the M&E plants/equipment. (3) Exemption (a) PG I buildings. (b) Non-residential occupancy at the 1st storey of a mixed commercial-cum-residential building or single storey standalone building and fulfilling all of the following conditions: (i) AFA of the non-residential unit does not exceed 150m².	Hose reels a. Provision (1) Hydraulic hose reel(s) conforming to the requirements in SS 575 shall be provided ~~to~~ for every storey of every building regardless of building height. (2) Where a roof level is a non-habitable floor, fire hose reels shall be provided to cover the M&E plants/equipment. (3) Exemption (a) PG I buildings. (b) Non-residential occupancy at the 1st storey of a mixed commercial-cum-residential building or single storey standalone building, which fulfils ~~and fulfilling~~ all of the following conditions: (i) AFA of the non-residential unit does not exceed 150m².

					(ii) Individually compartmented, except for the parts of the unit fronting and within 3m from the external. (iii) Not being used as an eating establishment, or for storage of flammable materials. (iv) Not being used as a public entertainment outlet. (v) Not belonging to PG VI or VIII buildings. (vi) Not being used as a dormitory, hostel, etc. where sleeping risk is involved. (c) Other standalone buildings as follows: (i) Single-storey guard houses. (ii) Bin centres.	(ii) Individually compartmented, except for the parts of the unit fronting and within 3m from the external space. (iii) Not ~~being~~ used as an eating establishment, or for storage of flammable materials. (iv) Not ~~being~~ used as a public entertainment outlet. (v) Not belonging to PG VI or VIII buildings. (vi) Not ~~being~~ used as a dormitory, hostel, etc. where sleeping risk is involved. (c) Other standalone buildings as follows: (i) Single-storey guard houses. (ii) Bin centres.

					(iii) 22kV (and lower) electrical substations. (iv) Open-sided sheds (excluding those for PG VI and VIII usages) with floor areas not exceeding 200m^2 and openings that constitute not less than 80% of the perimeter wall area (measured along the roof eaves).	(iii) 22kV (and lower) electrical substations. (iv) Open-sided sheds (excluding those for PG VI and VIII usages) with ~~floor areas~~ AFA not exceeding 200m^2 and openings that constitute not less than 80% of the perimeter wall area (measured along the roof eaves). (v) Domestic water supply, rainwater, wastewater, sewage pumping stations with AFA not exceeding 300m^2.
11	7.4.4d.(15)	01/03/2021	01/03/2021	Reinstatement of past requirement	Nil	(15) There shall be at least one viable approach route (i.e. where acceptance criteria for firefighters are in accordance with *Cl.7.4.4g.* and *Diagram 7.4.4e.(4)-2)* for the firefighters to any possible fire location up to a distance of 5m from that fire. As such, information as to the viable approach route shall be displayed at the main fire alarm panel. This can be achieved by arranging the sprinkler control zone

						to correspond with that of the smoke control zone. Upon detection of the fire within a particular smoke control zone / sprinkler zone, reference can be made to the display showing the viable approach route for that particular smoke control zone.
12	7.4.4.g.(1)	01/03/2021	01/03/2021	Reinstatement of past requirement	Exhaust fan design (1) The car park shall be provided with at least 12 air changes per hour during a fire. (2) ……..	Exhaust fan design (1) The car park shall be provided with at least 12 air changes per hour during a fire. A lower air change not less than 9 air changes can be permitted provided the acceptance criteria stipulated in the *Cl.7.4.4g.(1)(b)* can be achieved through fire modelling: (a) Hot smoke test / CFD fire modelling The effectiveness of the jet fans system design shall be demonstrated using hot smoke test in accordance with *Cl.7.4.4j*.. The heat release rate of the fuel load for the hot smoke test shall be at least 1MW. The relevant PE or Fire Safety Engineer should decide on the fire location(s) that is (are) deemed most onerous

						with justification. In addition to the hot smoke test, Computational Fluid Dynamics (CFD) fire modelling will also be required in the following instances: (i) If air change per hour is smaller than 12. (ii) If there are general goods vehicle or coaches where design fire size exceeds 4 MW (i.e. car fire). (iii) If replacement air is a combination of natural and mechanical means. (iv) If spacing of jet fans is more than $^{2}/_{3}$ of the tested effective range. The CFD study is to be endorsed by a Fire Safety Engineer (FSE) to verify the conformance of the jet fans system with the acceptance criteria as stipulated in *Cl.7.4.4g.(1)(b)*. The FSE is also required to put up a fire engineering report. Some of

						the accepted fire modelling software includes FDS, Swift-AVL, Fluent and Pheonics. (b) Acceptance criteria (i) Not more than 1000m^2 of the car park space can be smoke-logged for at least 20 mins, regardless of whether the fire is located within the smoke control zone or across the zone boundaries (Note: After the 20 mins duration, smoke is expected to remain confined within the 1000m^2 area). Within this smoke-logged area, there shall be at least 1 viable route for the firefighters where the following conditions are satisfied: * Smoke temperature shall not exceed 250°C at a height of 1.7m from floor level.

						* Visibility shall not be less than 5m at a height of 1.7m from floor level. These conditions shall commence at a distance of 5m from the fire location in the direction opposite to the induced bulk air flow induced by the jet fans. All other areas outside the smoke-logged area shall be kept substantially free from smoke i.e. smoke temperature not more than 60°C and visibility of at least 25m (*Diagrams 7.4.4e (4) - 1 & 2*). (Note: If hot smoke test is performed, assessment is to be made on the operation of the jet fans system, movement of smoke towards the extraction points and smoke spread. The latter 2 aspects can be generally verified using

						the above visibility criterion. The temperature criterion need not be verified in view of the nature of the hot smoke test.) (c) CFD fire modelling input parameters (i) Fire Size The design fire size shall be based on at least 4MW steady-state fire (i.e. car fire). For general goods vehicle, the design fire size shall be based on at least 10MW steady state fire (FSE is expected to provide justification for the bigger fire size other than the car fire). (ii) Type of fire The type of fire shall be flaming polyurethane. (iii) Location of fire

						Generally, the fire should be located furthest away from the exhaust points and in between zones. The relevant PE or Fire Safety Engineer should decide on the fire location(s) that is (are) deemed most onerous with justification. (iv) Down-stand beams and other obstruction The CFD model shall take into consideration the presence of any down-stand beams and other obstruction that are of depths of more than 1/10 of the car park floor to ceiling height so as to account for any resistance to airflow and turbulence. (v) Jet fan velocity profile Validation model of the velocity profile is to be carried out for a single jet fan. The data from the model shall be compared against physical test data.

						As such, the jet fan shall be tested for velocity profile by an accredited testing laboratory for comparison with the simulated velocity profile. The test report is to be attached to the Fire Engineering Report. The equation to be used for the deviation between the CFD profile and actual test profile is as follows: Equation : Deviation = [(A-B) / B] X 100% Where : A = distance/width/height from CFD profile B = distance/width/height from actual test profile The deviation of the distance, width and height of the actual profile from the simulated profile at the various air velocities should be within 10%. (vi) Duration of fire simulation

						The duration of the fire simulation shall be at least 20 mins. (vii) Sprinkler activation The model shall assume there is no sprinkler activation for the design fire size specified in *Cl.7.4.4g.(1)(c)(i).* (viii) Grid resolution The grid size to be used in the fire model shall not be larger than 200mm X 200mm X 200mm in the smoke control zone where fire is located and its adjacent zones. Other than these zones, the grid size shall not be larger than 400mm X 400mm X 400mm. Alternatively, the relevant PE or FSE undertakes a grid resolution study to ascertain the appropriate grid size needed for the fire size and smoke

						flows modelled (e.g. outcome of study showing that additional resolution does not make much of a difference to the results). (ix) Sensitivity study A sensitivity study is to be carried out to show the impact of 1 group of jet fan failure nearest the fire on the overall effectiveness of the jet fans system. This study is applicable to both fire modelling and hot smoke test. Notwithstanding the failure of 1 group of jet fans, the acceptance criteria must still be maintained.
13	7.4.4i.	01/03/2021	01/03/2021	Reinstatement of past requirement	Nil	Operations and maintenance manual An operations and maintenance manual shall be attached. The manual shall contain the roles and responsibilities of the building owner/operator, the restrictions placed on the building, identification of the sub-systems, servicing and maintenance plan, fault

						identification, etc. The manual can also be used as a guide for future renovations and changes to the building.
14	7.4.4j.	01/03/2021	01/03/2021	Reinstatement of past requirement	Nil	Commissioning test The Registered Inspector who carries out commissioning test of the jet fans system may make reference to Table 2 of BS 7346 - Part 7 as a guide. When hot smoke test is performed, the PE/FSE shall use a test fire size of 1MW. Reference may be made to AS 4391 on hot smoke test and PE is advised to make reference on how the test can be prepared and carried out in a proper manner.
15	8.1.7f.	01/03/2021	01/03/2021	Clarification	Self-illuminating signs The use of self-illuminating exit and directional signs powered by radioactive material are permitted in buildings, provided the signs comply with UL 924, SS 563 and SS 508 (Part 1, 2, 3 & 5). Either graphic or text format can be used for the design of the signage. In addition, SS 563 Part 1 shall be complied with for determination of the viewing distance with distance factor (Z) fixed at 50.	~~Self-illuminating signs~~ Self-luminous sign The use of ~~self-illuminating~~ self-luminous exit and directional signs powered by radioactive material are permitted in buildings, provided the signs comply with UL 924, SS 563 and SS 508 (Part 1, 2, 3 & 5). Either graphic or text format can be used for the design of the signage. In addition, SS 563 Part 1 shall be complied with for determination of the viewing distance with distance factor (Z) fixed at 50.
16	11.8.2	01/03/2021	01/03/2021	Clarification	Fire-rated doors a. Requirements for CoC	Fire-rated doors a. Requirements for CoC

					(1) The brand, model and test report number of hardware shall be displayed on the CoC, including, but not limited to: (a) Door closer (Concealed); (b) Locks and latches (electromechanically operated); (c) Door coordinator devices; (d) Door bolts; (e) Lever handles and knots; (f) Mechanical locks and latches; (g) Emergency exit devices; (h) Panic exit devices; (i) Single axis hinges; (j) Electrically powered door hold-open devices; (k) Cylinders for locks; and (l) Mechatronic cylinders. b. Requirements for door closers (1) All door closers (regardless if concealed or surface-mounted) shall have their own CoCs.	(1) The brand, model and test report number of hardware shall be displayed on the CoC, including, but not limited to: (a) Door closer ~~(Concealed)~~; (b) Locks and latches (electromechanically operated); (c) Door coordinator devices; (d) Door bolts; (e) Lever handles and knots; (f) Mechanical locks and latches; (g) Emergency exit devices; (h) Panic exit devices; (i) Single axis hinges; (j) Electrically powered door hold-open devices; (k) Cylinders for locks; and (l) Mechatronic cylinders. b. Requirements for door closers (1) All door closers (regardless if concealed, ~~or~~ surface-mounted or floor-mounted) shall have their own CoCs.

					(2) For concealed door closers, these shall be tested together with the specific type of fire-rated door (i.e. brand, model, fire performance), and their CoC numbers and specifications shall be included in the appendix for that related fire door. (3) Uninsulated surface-mounted door closers shall only be used on uninsulated doors. Insulated surface-mounted door closers may be used on either insulated or uninsulated doors. (4) The 6-digit coding system indicating the performance of the door closer, as stipulated in SS 332 Cl 6 Annex C or EN 1154, shall be stored within the QR code on the serial label for the door closer. (5) The following statement shall be included in the appendix of the CoC:	(2) ~~For concealed door closers, these shall be tested together with the specific type of fire-rated door (i.e. brand, model, fire performance), and their CoC numbers and specifications~~ The door closer specifications and CoC number/CoC holder company name shall be included in the appendix for that related fire door. ~~(3) Uninsulated surface-mounted door closers shall only be used on uninsulated doors. Insulated surface-mounted door closers may be used on either insulated or uninsulated doors.~~ (3) The 6-digit coding system indicating the performance of the door closer, as stipulated in ~~SS 332 Cl 6 Annex C or~~ EN 1154, shall be ~~stored within the QR code on the serial label for~~ imprinted on the door closer.

					"For surface-mounted door closers, the selected door closer shall meet the performance requirements needed for the respective fire-rated door, in accordance with SS 332 Cl 6 Annex C. *Surface-mounted door closers tested with uninsulated fire-rated doors can be installed on insulated or uninsulated fire-rated doors (subject to the maximum fire-rating attained by the door closer in a fire test). Surface-mounted door closers tested with insulated fire-rated doors can only be installed on insulated fire-rated doors."*	(4) The following statement shall be included in the appendix of the CoC: *"For surface-mounted door closers, the selected door closer shall meet the performance requirements needed for the respective fire-rated door, in accordance with SS 332 Cl 6 Annex C.* *Surface-mounted door closers tested with uninsulated fire-rated doors can be installed on insulated or uninsulated fire-rated doors (subject to the maximum fire-rating attained by the door closer in a fire test). Surface-mounted door closers tested with insulated fire-rated doors can only be installed on insulated fire-rated doors."* *Floor-mounted door closers (floor spring) shall only be installed on fire-rated doors, subject to the maximum fire-rating attained by the floor spring in a fire test."*