Guidance Notes for the Management of Indoor Air Quality in Elderly Homes

December 2022

1. INTRODUCTION

In Hong Kong, there are different types of residential care homes for the elderly (elderly homes)¹. They provide different degrees of residential care, personal and nursing care as well as other necessary services for elders who, for personal, social, health and/or other reasons, cannot adequately be taken care of at their own home. Elders who receive such service often live or spend a considerable portion (up to 95%) of their time in elderly homes every day. Poor indoor air quality (IAQ) in elderly homes would affect elderlies' health. Some overseas studies have shown that poor IAQ in elderly homes could be associated with respiratory morbidity (e.g. Chronic Obstructive Pulmonary Disease (COPD), breathlessness, cough, wheeze, etc.) [1, 2, 3, 4, 5].

Common indoor air pollutants in elderly homes include carbon dioxide (CO₂), moulds, bacteria, particulates, volatile organic compounds (VOCs), etc. On the other hand, temperature and relative humidity, which are considered as thermal comfort factors rather than pollutants in usual room conditions, would also affect elders' perception of IAQ. In addition, elders are more sensitive to poor thermal environments, which might aggravate the adverse impact of air pollutants on their health [1, 3, 4].

This Guidance Notes provides background information as well as simple and practical guidelines to facilitate elderly homes premises management to identify and rectify IAQ problems in elderly homes. An elderly home walkthrough inspection checklist (checklist) is appended to identify pollutant sources and diagnose IAQ problems so that appropriate corrective actions can be taken to prevent recurrences. However, whenever an outbreak of infectious disease occurs in an elderly home, the advice on ventilation by the Centre for Health Protection of the Department of Health for infection control purposes should be followed.

Elderly homes with mechanical ventilation and air conditioning (MVAC)² system may also refer to the Guidance Notes published by the Indoor Air Quality Management Group [10] for measures to prevent IAQ problems and enhance IAQ.

¹ Elderly homes refer to residential care homes for the elderly (RCHEs) licensed under the Residential Care Homes (Elderly Persons) Ordinance and scheduled nursing homes under the Private Healthcare Facilities Ordinance providing residential care for the elderly.

² Mechanical ventilation and air conditioning (MVAC) system means the equipment that provides temperature and humidity control, ventilation or air-purification, or any other associated processes to a conditioned space except window-type or split-type air conditioners.

In gist, the strategy to achieve good IAQ in elderly homes includes:

- i) Developing an IAQ management programme to identify and assess indoor air problems;
- ii) Implementing measures to achieve good ventilation, prevent pollutant sources, and ensure thermal comfort in indoor environments;
- iii) Monitoring IAQ parameters where necessary; and
- iv) Educating and communicating with elderly home occupants (e.g. staff and residents as well as visitors) to enhance awareness and practices to achieve good IAQ.

2. <u>COMMON INDOOR AIR PROBLEMS IN ELDERLY HOMES AND THEIR</u> <u>CONTRIBUTING FACTORS</u>

Elders, compared with young people, are more susceptible to adverse health effects of indoor air pollution because of a decline in immune and respiratory function. The air quality of an elderly home depends on several factors, such as the location of the elderly home, the outdoor air quality, roadside and outdoor activities nearby, as well as building-related factors, such as the condition of the building envelope, maintenance and cleaning of air conditioners, adequacy of ventilation, the occupants' behaviour, etc.

2.1 Outdoor Sources of Indoor Air Pollution

Polluted outdoor air may enter the indoor environment by natural and mechanical ventilation or infiltration through leakages (e.g. cracks in ceilings and walls, around doors and windows, etc.). If an elderly home is located next to busy roads or within a zone with many urban and industrial activities, the level of pollutants (e.g. particulates, nitrogen dioxide, etc.) indoors would be affected accordingly.

Tuble 1. Typical outdoor bources in Enderly nomes			
I. Outdoor Sources			
Pollen, dust, mould spores			
Industrial emissions			
Vehicle emissions			
Machinery emissions			
II. Nearby Sources			
Odours from rubbish bins			
Unsanitary debris or building exhausts near air intakes			

 Table 1. Typical Outdoor Sources in Elderly Homes

2.2 Indoor Sources of Indoor Air Pollution

A majority of air pollutants, however, originate from the indoor environment, such as the release from building materials and furniture, and processes that occur within elderly homes. On the other hand, the IAQ also depends on the level of occupancy, activities of occupants as well as the type, effectiveness, efficiency, sanitation and maintenance of mechanical ventilation systems.

2.2.1 Building Materials and Furniture

Wall and flooring, furniture, paints and glues, insulation materials, etc., can release harmful pollutants. For example, emissions from flooring made of polyvinyl chloride (PVC)/vinyl or linoleum products can irritate the respiratory system. If renovation is necessary, physical barriers should be set up with adequate ventilation to prevent spreading of air pollutants to adjacent areas. New furniture should also be aired out before moving indoors to minimize the exposure to gaseous pollutants.

2.2.2 Activities at Elderly Homes

Many elderly home activities would generate indoor air pollutants. For example,

- i) In offices, gaseous and particle emissions from photocopying machines and printers will accumulate if ventilation inside the room is inadequate.
- ii) During repair and renovation, the use of high-VOC products, such as paints and adhesives, will significantly deteriorate the IAQ.
- iii) The use of VOC-containing cleaning agents, disinfectants and pesticides will increase the risk of the elderlies' exposure to the strong off-gas residues.
- iv) Extensive use of air fresheners, hand sanitisers and personal care products (including medicated ointments/oil) may cause irritation to some elders.
- v) Carpets and filters of air conditioners without proper cleaning can be a source of trapped pollutants and dust.

Table 2. Typical Indoor Sources in Elderly Homes

I. Building Equipment, Components & Furniture			
a) Air conditioners and mechanical ventilation equipment			
• Mould growth in condensate pans, ductworks, coils and humidifiers			
Dust or debris in ductworks			
b) Other equipment			
Emissions from office equipment			
 Emissions from kitchen, storerooms and cleaning equipment 			
c) Components			
 Mould growth on or in soiled or water-damaged materials 			
• Materials containing VOCs, inorganic compounds or damaged asbestos			
 Materials that produce or trap dust and pollutants 			
d) Building materials and furniture			
Emissions from new furniture and floorings			
 Mould growth on or in soiled or water-damaged furnishings 			
II. Other Potential Indoor Sources			
Cleaning materials/air fresheners			
Emissions from rubbish			
Pesticides			
Paint, caulk, adhesives and varnishes			
Personal care products			

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2.3 Status of Elderly Home Building Envelope

An aged elderly home would unavoidably have damages on walls and ceilings. If proper maintenance of the building structure is not carried out, infiltration of outdoor air pollutants, water moisture, heat, etc., into elderly homes can occur. Water infiltration via the leakages can lead to mould growth inside the building that may cause allergies and irritation to the occupants.

2.4 Type and Condition of Ventilation Systems

The age, type, cleanliness and maintenance of ventilation systems can significantly affect the accumulation and removal of indoor air pollutants. An old ventilation system that lacks proper maintenance may not function adequately to provide favourable air exchanges. When the ventilation is insufficient or not effective, air pollutants may not be removed effectively from indoor areas, and the supply of fresh outdoor air is insufficient to dilute the emissions from indoor sources and meet the respiratory needs of the elderly home occupants, resulting in unsatisfactory IAQ. Both properly maintained natural ventilation (through doors, windows, or any openings) and mechanical ventilation (through exhaust fans, fresh air supply fans, air conditioners, etc.) can help to maintain good IAQ, in particular for venues with window/split type air conditioners, which are designed to condition indoor thermal comfort but are unable to handle air pollutants effectively. They should be complemented by exhaust fans to remove indoor air pollutants, and openable windows or doors to provide adequate fresh air.

2.5 Thermal Comfort

Thermal comfort is the condition of mind that expresses satisfaction with the thermal environment, and it can vary from one individual to another. As thermal comfort is a subjective perception, it is not possible to have a single comfort level that can satisfy all occupants in a space.

Temperature has the most direct effect on thermal comfort, while relative humidity relates to thermal comfort by affecting the human body's ability to lose body heat through sweating. In addition, air movement is also an important factor.

The design and operation of an air-conditioning system can significantly affect the level of thermal comfort³. Based on different uses of premises, air temperature from 20°C to 26°C (20°C to 23°C in winter-time and 24°C to 26°C in summer-time), relative humidity from 40% to 70%, and air movement not exceeding 0.2m/s are

³ Reference can be made to the "Guidelines on Optimum Indoor Air Temperature, Relative Humidity and Air Movement" published by the Environmental Protection Department [7], and other international guidelines such as the ASHRAE Standard 55-2017 [8] and British Standard, BSEN 15251:2007 [9].

optimum ranges for most occupants in air-conditioned spaces. However, elders generally tend to perceive thermal comfort differently from young people due to a combination of physical ageing and behavioural differences. Studies show that older adults prefer a warmer environment (+2°C) than younger people [3].

Elderly homes in Hong Kong mostly prefer natural ventilation rather than airconditioning. The indoor air temperature and relative humidity are therefore susceptible to the outdoor conditions and optimum values are often difficult to maintain, especially during summer. The use of oscillating fans and dehumidifiers may help enhance thermal comfort. Apart from thermal comfort, proper control of indoor air temperature and relative humidity (less than 70%) are important for preventing mould growth. They should also be taken into consideration while achieving other objectives of satisfactory IAQ.

2.6 Health Effects of Poor IAQ

The relationship between poor IAQ, and respiratory symptoms and diseases among the elderly permanently living in elderly homes has not been wellcharacterized [1, 2]. Nevertheless, elders, compared with young people, are more susceptible to adverse health effects of indoor air pollution because of a decline in immune and respiratory function. Some overseas studies have shown that exposure to indoor air pollutants, even at moderate concentrations, is strongly correlated with respiratory symptoms of elderly people, such as COPD and COPDlike symptoms, and might lead to cardiac problems [1, 2, 3]. Poor IAQ and inadequate ventilation, as well as uncomfortable temperature and relative humidity, may increase the risk of adverse health effects [1] hence increasing nursing care and medical needs.

3. STRATEGY TO ACHIEVE GOOD IAQ IN ELDERLY HOMES

3.1 IAQ Management Programme

Executing an IAQ Management Programme would be a systematic approach to help monitor and maintain good IAQ at elderly homes. The programme includes a plan of preventive and corrective measures to reduce indoor air pollution.

3.1.1 Establish an IAQ Team

Elderly homes should assign appropriate personnel to form an IAQ team to design and implement the IAQ Management Programme. Key responsibilities of the team are to:

- i) Develop, review and modify the IAQ Management Plan, including IAQ policies and procedures that support and enhance good IAQ;
- ii) Communicate with staff and other stakeholders (e.g. visitors) about IAQ matters;
- iii) Assign members (the inspectors⁴) to conduct walkthrough inspection with the help of a checklist;
- iv) Investigate IAQ concerns and complaints, and take corrective and preventive actions;
- v) Meet regularly to review IAQ related matters;
- vi) Coordinate IAQ related activities; and
- vii)Consult an external IAQ expert (Note: a list of relevant service providers is available from the IAQ Information Centre website: www.iaq.gov.hk), if needed.

3.1.2 Perform Walkthrough Inspections

The inspectors should conduct walkthrough inspections of elderly homes at least annually or more, if determined necessary by the IAQ team, to identify potential areas for improvement. A checklist would facilitate a systematic and effective inspection. A sample checklist is provided in Appendix I for reference. However, the IAQ team should develop a checklist to suit the need or specific situations of the elderly home and modify them when needed. After each inspection, the inspector should sign the checklist which should be documented.

⁴ The term "inspectors" is only used in its general sense but not specifically referring to the "inspector" as laid down in the Residential Care Homes (Elderly Persons) Ordinance, Cap. 459.

3.1.3 Evaluate and Resolve Identified IAQ Problems

When IAQ issues are identified during a walkthrough inspection, or there are IAQ concerns or complaints, the IAQ team should investigate and take appropriate actions to address the issues as soon as possible, and ensure that problems are rectified. All actions taken should be documented.

Section 3.2 suggested commonly used measures to reduce and manage IAQ problems in elderly homes.

3.2 Measures for Good IAQ

3.2.1 Building Design and Renovation

Elderly homes are subject to license by the Social Welfare Department under the Residential Care Homes (Elderly Persons) Ordinance (Cap. 459). The design of all elderly home premises must allow for adequate ventilation to the satisfaction of the Director of Social Welfare according to the requirements stipulated in the Residential Care Homes (Elderly Persons) Regulation (Cap. 459A) [11] and the Building (Planning) Regulations (Cap. 123F) [12], and making reference to the relevant code of practices and guidelines published by the Social Welfare Department [15].

<u>a) Materials Selection</u>

During elderly home renovation, selection and use of environmentally friendly materials and products are essential for good IAQ:

- i) Select renovation materials and furniture with low-emission or green labels.
- ii) Select floor coverings that can be damp wiped or cleaned easily.
- iii) Select low-VOC or water-based paint over solvent-based paint, and choose paints which give a less glossy finish.
- iv) Use water-based coatings, low-VOC adhesives and surface-treating agents for flooring installation and treatment.

b) Renovation Control

Elderly home occupants' exposure to the pollutants generated during renovation should be minimised:

i) Keeping distance—Keep elderly home occupants or activities as far from renovation work as possible.

- ii) Isolating—Set up physical barriers around the renovation areas to reduce the spread of pollutants to adjacent areas. Also, cover all air inlets or vents nearby to prevent the dispersion of contaminants by the ventilation system.
- iii) Cleaning up—Clean the renovation areas frequently so that there is less chance that these pollutants (e.g. dust) will enter other areas.

3.2.2 Improving Air Ventilation

IAQ would be improved by introducing cleaner or adequate properly treated outdoor air into the building to dilute indoor air pollutants and remove the pollutants from the building by means of mechanical exhaust systems.

a) Proper Operation of Ventilation Systems

Proper operation of ventilation system can help to remove air pollutants timely and effectively:

- i) Ventilate dining rooms, common rooms, bedrooms, laundry and isolation room (by natural or mechanical means).
- ii) Enhance the ventilation rate (e.g. switching on exhaust fans) to boost ventilation effectiveness when there are pollutant-releasing activities and/or high occupancy rates.

<u>b) Natural Ventilation</u>

Natural ventilation can complement the ventilation of window- or split-type air conditioners and enhance the dilution of indoor pollutants:

- i) Open windows and doors wider when the outdoor air cleanliness and conditions permit.
- ii) Allow cross-ventilation by opening windows at opposite walls.

<u>c) Mechanical Ventilation</u>

Fan-assisted air movement is a simple and cost-effective way to enhance ventilation:

- i) Switch on circulating and oscillating fans to enhance indoor air circulation.
- ii) Switch on mechanical ventilation when the isolation room is in use, direct the air flow from the isolation room to outdoor exhaust.
- iii) Switch on exhaust fan(s) to extract and remove indoor pollutants, and fresh air supply fan(s) with proper air treatment to bring in fresh outdoor air to dilute indoor pollutants.

<u>d) Regular Inspection and Maintenance of Mechanical Ventilation Equipment and</u> <u>Air Conditioners</u>

Maintaining the working efficiency of air conditioners, exhaust fans and oscillating fans is needed to ensure sufficient ventilation and indoor air pollutants are removed effectively:

- i) Inspect ventilation systems regularly⁵.
- ii) Establish a cleaning and maintenance plan and schedule.
- iii) Change air filters regularly.
- iv) Drain condensate pans.
- v) Keep air-conditioning outlets clear without obstruction.

Further reference can be made to guidelines for ventilation control published by the Labour Department [17]⁶. The Department of Health [13, 14] has also provided supplementary information related to ventilation control in reducing the spread of communicable diseases in elderly homes. Specific criteria for ventilation systems with regard to hygiene and other important factors are also given in the World Health Organization Guidelines for Indoor Air Quality: dampness and mould [19] and the ASHRAE Standard 62.1 - Ventilation for Acceptable Indoor Air Quality [6].

3.2.3 Pollutant Source Management

<u>a) Source Removal & Control (Outdoor)</u>

Outdoor pollutants should be minimized from entering the elderly homes:

- Close the vent valves of window-type air conditioners, close the windows and switch on portable air purifiers when the outdoor air condition is very poor. Improve indoor air circulation by opening windows and the vent valves of the window-type air conditioners when the outdoor air quality improves, even temporarily.
- ii) Use of air filters of suitable particulate removal efficiencies in the MVAC system to efficiently filter outdoor air pollutants.

⁵ The Building (Ventilating Systems) Regulations (Cap.123J) [16] stipulates that the owner of a building must arrange a registered specialist contractor to check every damper, filter and precipitator in a ventilation system (with ducting or trunking passing through two buildings) at intervals not exceeding 12 months.

⁶ "Guidance Notes on Ventilation and Maintenance of Ventilation Systems", published by the Labour Department.

b) Source Removal & Control (Indoor)

Since the majority of indoor pollutants come from products and activities within the elderly homes, identification and removal of pollutant sources are essential:

- i) Avoid excessive use of fragranced and pollutant emitting products, such as cleaning agents, air fresheners, hand sanitisers, disinfectants and medicated ointments/oil.
- ii) Install dedicated exhaust fans for areas with pollution sources, such as restrooms, storerooms for cleaning agents and chemicals, printing and photocopy rooms, dining room and kitchen.
- iii) Open windows and doors wider when the outdoor air cleanliness and conditions permit.
- iv) Conduct regular inspection and proper maintenance of the exhaust system.

<u>c) Source Substitution</u>

Materials that affect IAQ should be avoided and substituted with less harmful ones:

- i) Maintain a list of pollutant emitting products used in elderly homes.
- ii) Develop guidelines on the use of pollutant-releasing materials and products. Use alternative products with low-VOC or green labels.

d) Source Encapsulation

If pollutant emissions cannot be avoided, the pollutant source should be isolated to prevent affecting other areas:

- i) Place a barrier around the source to reduce the spread of pollutants to nearby areas.
- ii) Place the pollutant emitting equipment or products, such as photocopiers, printers, hand sanitisers, disinfectants and cleaning agents, in a separate well-ventilated room.

3.2.4 Housekeeping and Cleaning

a) Effective Cleaning and Preventive Maintenance

Good maintenance and cleaning practices are essential to maintain a good IAQ in elderly homes:

- i) Conduct proper cleaning regularly to remove dust, dirt and contaminants. For example, wet clean dining rooms, common rooms and bedrooms, and disinfect washrooms daily.
- ii) Develop a maintenance plan and arrange regular inspections for the building,

air conditioners and ventilation equipment to ensure they are operating effectively.

<u>a) Moisture/Mould Control</u>

Mould growth can be inhibited if moisture and dust are controlled. Control measures include:

- i) Repair cracks on walls and ceilings as well as leaks to avoid water or moisture infiltration.
- ii) Maintain indoor relative humidity to below 70%.
- iii) Clean or remove mouldy items. Let them dry through after cleaning.
- iv) Vacuum at least weekly, using cleaners with high-efficiency particulate air (HEPA) filters.

More information about mould remediation can be found in the guidelines published by the Environmental Protection Department [18]⁷.

3.2.5 Use of Other Equipment

Use of appropriate equipment where necessary to further improve indoor air conditions. For example, using portable air purifiers that are equipped with HEPA filters to remove airborne particulates and dehumidifiers to remove moisture.

3.3 Monitoring

Apart from the routine walkthrough inspections of ventilation systems, humidity and temperature control, concentration of other IAQ parameters (e.g. CO₂, particulates and total VOC) may be monitored to identify where necessary if extra measures are needed to enhance the IAQ. The CO₂ level is also a good indicator of the effectiveness of the ventilation system and the adequacy of ventilation in a room⁸. Reference can be made to the Guidelines published by the Indoor Air Quality Management Group [10]⁹. An external IAQ expert may be consulted to measure these IAQ parameters and evaluate the findings, if needed.

⁷ A Guide on Prevention and Control of Indoor Mould: Indoor Air Quality Information Centre, Environmental Protection Department [18].

⁸ CO2 has been commonly adopted by IAQ researchers as an indicator with levels above 1,000 parts per million by volume (ppmv) in office environments indicating that the ventilation rate is low and that other airborne contaminants are accumulating.

⁹ "Guidance Notes for the Management of Indoor Air Quality in Offices and Public Places": Indoor Air Quality Management Group, The Government of the Hong Kong Special Administrative Region [10].

3.4 Communication

Staff, elders, visitors and other stakeholders should contact the IAQ team if there is any IAQ concern or issue. The IAQ team should always communicate with them in a prompt and transparent manner until the IAQ issue is resolved.

3.5 Education

All staff and elderly home occupants play an important role in elderly home IAQ. Their behaviour can indeed affect the IAQ in elderly homes, hence providing IAQ information would help to promote their awareness of the importance of IAQ and help to maintain good IAQ:

- i) Basic information of IAQ, e.g. health effects of poor IAQ and types and sources of indoor air pollutants.
- ii) Tips on how to maintain good IAQ (e.g. avoid using VOC-containing products, ventilation control, moisture control, effective cleaning and maintenance) during their daily activities at elderly homes.

4. GENERAL TIPS FOR A HEALTHY ELDERLY HOME ENVIRONMENT

The followings are general tips to achieve good IAQ regarding different types of rooms and facilities in elderly homes.

I. Dining Room/Common Room/Bedroom

Furniture

- Low-VOC furniture is preferred.
- New furniture should be stored in a clean, dry, well-ventilated area until VOC off-gassing has diminished.
- The installation of furniture and furnishings should be scheduled during periods of non- or low occupancy.

Floor

- The least hazardous flooring products with low emissions should be selected.
- Rooms should be dusted, vacuumed or wet-cleaned every day.
- Use of carpet should be avoided. However, if carpets are used, they should be cleaned with vacuum cleaners equipped with a HEPA filter.
- When it is time to replace carpeting, linoleum, hardwood or tiles are recommended as alternatives.

Cleaning

- Room equipment and public facilities should be cleaned regularly every day.
- Low-VOC cleaning products are preferred.
- Cleaning products should be chosen according to the specific surfaces to be cleaned to avoid inappropriate mixing. They should be used according to the instructions on the label.
- If necessary, stronger cleaning agents can be used but only during periods of non- or low-occupancy and with increased ventilation.
- Cleaning work should be done during non- or low-occupancy periods and with proper ventilation during and after cleaning.

Ventilation

- If no mechanical ventilation system is installed, natural ventilation should be used (i.e. open windows) for introducing fresh air.
- If it is not possible, or permitted, to open the windows because of the poor weather, high levels of outdoor air pollution, noise or safety reasons,

mechanical ventilation should be switched on for providing a suitable amount of fresh air supply to the room.

- The operating speed of ventilation fans should be regularly adjusted to maintain stable and comfortable indoor air temperature and humidity levels.
- Ventilation systems should be inspected regularly and a maintenance plan should be established.
- Air filters of air conditioners must be cleaned or renewed regularly and condensate pans must be checked regularly to ensure that they are draining adequately.
- Ventilation fans should be kept switched on with the airflow passage free from blockage by any items.

Fragranced and Pollutant Emitting Products

- Excessive use of fragranced and pollutant emitting products, such as cleaning agents, air fresheners, hand sanitisers, disinfectants and medical ointments/oil, should be avoided.
- If necessary, pollutant emitting products should be used in open spaces with increased ventilation.

<u>II. Bathroom</u>

Ventilation

- A ventilation system should be installed according to the size and location of the bathroom, and regularly inspected and maintained.
- Broken fans should be repaired as quickly as possible.
- Exhaust fan should be switched on when the bathroom is in use.

Moisture & mould control

- Water leaks should be repaired as quickly as possible.
- If mould appears, it should be removed immediately.
- Use of disinfectants or biocides to clean up mould should be avoided. Mould can be cleaned with cleaning detergent and water. However, if the use of disinfectants or biocides is necessary, the cleaning should be done during periods of non- or low-occupancy and with increased ventilation.

Cleaning

- Shower cubicles and water closets should be thoroughly cleaned at the end of every day.
- Low-VOC or plant-derived cleaning products are preferred.

- Cleaning products should be chosen according to the specific surfaces that need to be cleaned to avoid inappropriate mixing. They should be used according to the instructions on the label.
- If necessary, stronger cleaning agents can be used but only during periods of non- or low-occupancy and with increased ventilation.
- Water pipe systems should be regularly inspected, maintained and cleaned.

III. Kitchen/Pantry

Ventilation

- Exhaust fans (equipped with filters) should be installed.
- The ductwork should be adapted to prevent exhaust fumes and odours from the food-preparation area from entering the common rooms or dining rooms.

Cleaning & pest Control

- Low-emission cleaning agents should be used, following the instructions on the labels and in appropriate quantities.
- Rooms should be well ventilated during cleaning. When needed, stronger cleaning agents can be used during periods of non- or low-occupancy and with adequate ventilation.
- If pesticides are necessary, spot treatments are preferred, and only during periods of non- or low-occupancy.

Moisture & mould control

- Water leaks and moisture damages should be rectified as soon as it is noticed.
- Material contaminated with moulds should be removed effectively and safely.

5. REFERENCES

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Appendix I

Sample Elderly Homes Walkthrough Inspection Checklist

Inspector name	•	
Room or area	:	
Date completed	•	
Signature	:	

Inspection Items		Yes	No	Remarks	
1. B	1. Building Design and Renovation (Refer to GN Section 3.2.1 for details)				
a.	 Materials Selection Selecting renovation materials and furnishing products with low-emission or green label Selecting floor coverings that can be damp wiped or cleaned easily Selecting low-VOC or water-based paint over solvent-based paint, and choose paints which give a less glossy finish Using water-based coating, low-VOC adhesives and surface-treating agents for flooring installation and treatment 				
b.	 Renovation Control Keeping distance of renovation work from elderlies/activities Isolating renovation area Cleaning renovation areas frequently 				
2. In	nproving Air Ventilation (Refer to GN Section 3.2.2)	for detail	(s)		
a.	 Proper Operation of Ventilation Systems Ventilating dining rooms, common rooms, bedrooms, laundry and isolation room Enhancing the ventilation rate when there are pollutant releasing activities and/or high occupancy rate 				
b.	 Natural Ventilation Keeping windows and doors open wider when the outdoor air cleanliness and conditions permit Providing cross ventilation 				
с.	 Mechanical Ventilation Using circulating fans and oscillating fans Using mechanical ventilation when isolation room is used Using exhaust fan and fresh air supply fan with proper air treatment 				

	Inspection Items	Yes	No	Remarks		
d.	 Regular Inspection and Maintenance of Mechanical Ventilation Equipment and Air Conditioners Inspecting ventilation systems regularly Establishing a cleaning and maintenance plan and schedule Changing air filters regularly Draining condensate pans Not obstructing air-conditioning outlet 					
3. P	3. Pollutant Source Management (Refer to GN Section 3.2.3 for details)					
a.	 Source Removal & Control (Outdoor) Closing the vent valves of window-type air conditioners and switching on portable air purifiers when the outdoor air conditions is very poor. Improve indoor air circulation by opening windows and the vent valves of the window-type air conditioners when the outdoor air quality improves, even temporarily. Using air filters of suitable particulate removal efficiencies in the mechanical ventilation & air conditioning (MVAC) system to efficiently filter outdoor air pollutants 					
b.	 Source Removal & Control (Indoor) Avoiding excessive use of fragranced and pollutant emitting products (e.g. cleaning agents, air fresheners, hand sanitisers, disinfectants and medicated ointments/oil) Using exhaust fan for areas with pollution sources Open windows and doors wider when the outdoor air cleanliness and conditions permit. Conducting regular inspection and proper maintenance of exhaust system 					

Inspection Items		Yes	No	Remarks
с.	 Source Substitution Maintaining a list of pollutant emitting products used Using alternative products with low-VOC or green labels 			
d.	 Source Encapsulation Placing barriers around pollutants source Placing the pollutant emitting equipment (e.g. photocopiers and printers) and products (e.g. hand sanitisers, disinfectants and cleaning agents) in a separate well-ventilated room 			
4. H	ousekeeping and Cleaning (Refer to GN Section 3.2.	4 for deta	uils)	
a.	 Effective Cleaning and Preventive Maintenance Conducting cleaning regularly, e.g. daily Developing a maintenance plan and arranging regular inspection for building and air- conditioners and ventilation equipment 			
b.	 Moisture/Mould Control Repairing cracks and leaks Maintaining relative humidity to below 70%, as far as possible Cleaning and removing mouldy items. Let the items dry through after cleaning. Vacuuming at least weekly 			
5. Use of Other Equipment (Refer to GN Section 3.2.5 for details)				
a.	• Use of appropriate equipment to improve indoor environmental conditions, e.g. portable air purifiers that are equipped with HEPA filters and dehumidifiers			