MOM / OSHD / 2024-05

03 Jun 2024

Trained Air-conditioning Unit Installers;
Air Conditioning Servicing Contractors; and
Interested Parties

Circular on Safety Considerations in Installation and Maintenance of Air-conditioning Condensing Units and their Structural-Supporting System

1. The Ministry of Manpower (MOM) and the Building and Construction Authority (BCA) are jointly issuing this circular to remind all stakeholders responsible for the installation and maintenance of air-conditioning condensing units ("air-con units") and their structural supporting systems.

2. Working on externally mounted air-con units are high-risk work at height ("WAH") activities. In August 2023, an air-con technician tragically fell to his death while maintaining an air-con unit mounted on the exterior of a building. In February 2024, another air-con technician also lost his balance when the structural supporting system of the air-con unit he was working on gave way, narrowly escaping a fatal fall. Further details of these incidents can be found in **Appendix 1** for reference.

3. However, incidents of Fall from Height ("FFH") can be easily prevented with the establishment and implementation of safety measures. This circular emphasises the duty of stakeholders to take all reasonably practicable measures to ensure the safety of workers at work and the safety of members of the public who may be affected by the work.

Pre-requisites

4. Only Trained Air-con Unit Installers ("TAIs") who have successfully completed the training course on the installation of a structural supporting system to support an air-con unit required by BCA can install air-con unit on the exterior of any building. TAIs must comply with requirements in Part IVA of the Building Control Regulations 2003 ("BC Regs") and ensure that the installed structural support systems (existing or replacement) comply with specifications listed under Part I, II, III or IV of the Seventh Schedule of the BC Regs. For Housing and Development Board ("HDB") properties, the specifications and general conditions found in HDB's InfoWEB must also be complied with.

Site Preparation and Risk Assessment

5. Before air-con servicing workers or TAIs commence any work, perform a site-specific risk assessment to identify hazards, evaluate risks, and determine appropriate risk control measures. Implement these measures and ensure that all workers are briefed and familiar with them. Measures must be adopted to ensure that the structural supporting systems would not be overloaded during work.

6. Air-con servicing workers must look out for obvious signs of deterioration (such as loosened bolts and nuts, badly corroded brackets and misalignment or dislodgement) on the structural supporting systems. If any of such signs is observed, TAIs must be engaged to inspect and rectify or replace the structural supporting systems before air-con servicing work can be carried out. Please refer to **Appendix 2** for examples of deterioration.

7. Establish cordons around all work zones and affected areas at ground level to restrict access to individuals not involved in the works. This includes areas where objects have the potential to fall and cause injury. For examples of area cordoning, please refer to **Appendix 3**.

Fall Prevention Management

8. Whenever possible, do not carry out WAH activities on top of the air-con units and/or its structural supporting systems.

9. When WAH is unavoidable, it is essential to consider fall arrest measures for workers. Ensure that secure anchor devices are installed. For examples of fall arrest measures, please refer to the information provided in **Appendix 4.**

10. In addition to having the necessary physical controls, it is crucial to ensure that workers carrying out WAH activities receive adequate training and supervision:

a) Deploy only trained workers who have received trade-specific training and have successfully completed the relevant WAH courses acceptable to MOM. You may refer to **Appendix 5** for information on accredited WSH courses and training providers.

b) Appoint a competent person to provide thorough supervision for the workers, ensuring they are not exposed to hazards and that all necessary precautions are taken in situations where there is a risk of falling; and

c) Ensure adequate supervision especially when workers are new, inexperienced, and unfamiliar with the working environment.

Post-installation

11. TAIs must submit a report of the installation works no later than 14 days after completion to the Commissioner of Building Control:

a) For private properties, submit Form AC-01 to BCA; or

b) For HDB properties, submit Form AC-02 to HDB via e-feedback form at www.hdb.gov.sg/efeedback .

The forementioned forms with submission instructions can be retrieved from BCA's webpage on air-con units safety indicated in **Appendix 5**.

12. Please refer to informative references in **Appendix 5**. Should you need further information, please contact:

a) MOM at 6438 5122 for information on workplace safety and health; or

b) BCA at 1800 3425 222 for issues relating to structural supporting systems of air-con units.

 SEBASTIAN TAN DIRECTOR, OCCUPATIONAL SAFETY AND HEALTH INSPECTORATE MINISTRY OF MANPOWER	 LEE CHEE WEYE DIRECTOR, FAÇADE ENGINEERING AND TECHNOLOGY DEPARTMENT BUILDING & CONSTRUCTION AUTHORITY

Encl: *Appendix 1,* Case Studies
Appendix 2, Examples of Deterioration on Structural Supporting Systems
Appendix 3, Area Cordoning Examples
Appendix 4, Fall Arrest Measures
Appendix 5, Informative References

APPENDIX 1- CASE STUDIES

27 August 2023

An air-con technician climbed out the window of a residential apartment and was checking an air-con unit mounted on the exterior of the building when he fell about 11 meters to the ground. The technician was sent to the hospital where he died the same day.

2. Preliminary findings indicated that the brackets supporting the air-con unit had given way. The technician was not equipped with any personal fall-protection device at the time of the accident.

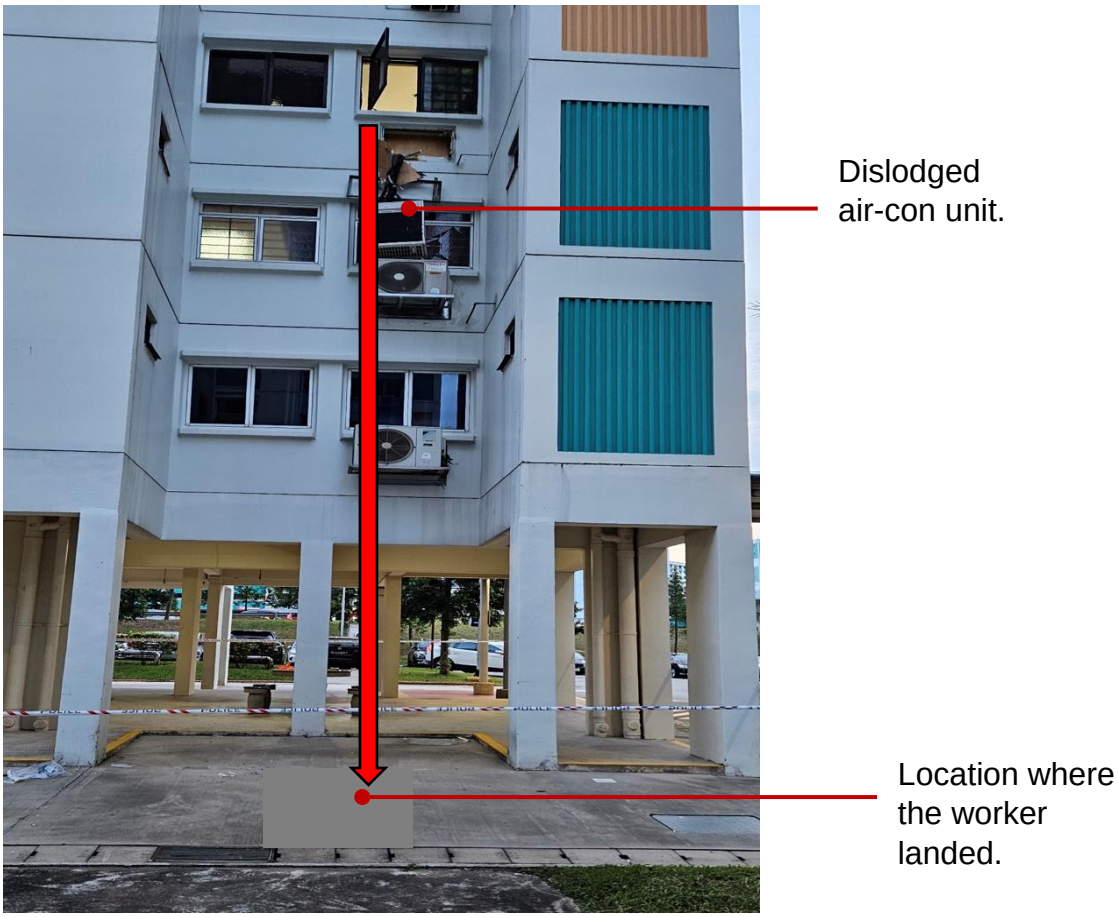


Figure 1: Scene of the accident

24 February 2024

An air-con technician was servicing an air-con unit at the external ledge of a residential apartment when he fell. The technician suffered chest injuries and was sent to the hospital. He subsequently recovered from his injuries.

2. Preliminary investigations revealed that while he was working on top of the air-con unit, one end of the bracket supporting the air-con unit gave way. The technician had donned a safety belt and was suspended mid-air before being rescued.

Figure 2: Scene of the accident

APPENDIX 2 – EXAMPLES OF DETERIORATION ON STRUCTURAL SUPPORTING SYSTEMS

Figure 3: Loosened bolt and nut

Figure 4: Rusty bolt

Figure 5: Badly corroded bracket

APPENDIX 3 – AREA CORDONING EXAMPLES

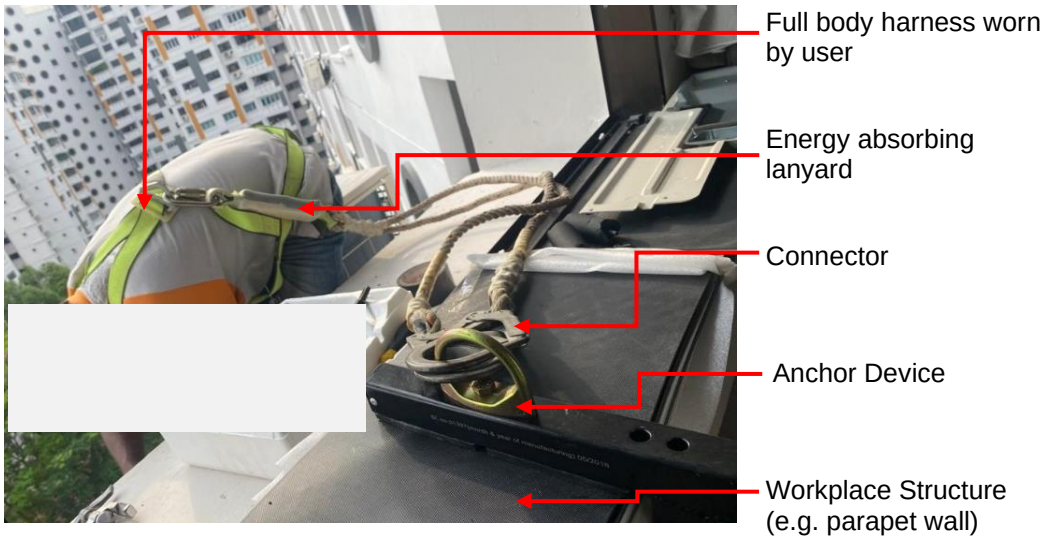
Figure 6: Caution Tape

Figure 7: Mesh netting with cones

APPENDIX 4 – FALL ARREST MEASURES

Personal Fall Arrest System ("PFAS")

PFAS consists of a full body harness, suitable connector (e.g. a lanyard), and secure anchor device. Components of a personal fall arrest system are shown below:



Anchor Devices

2. Do not use non-secure points (such window frames, window grills, air-con brackets, table legs, bed frames) as they are not designed to bear the dynamic force of a person's fall.

3. Always follow the manufacturer's instructions when using anchor devices. Examples of anchor devices are shown in **Table 1** below.

Height Clearance

4. Ensure that the fall clearance height is sufficient before using a lanyard with an energy absorber. If the fall clearance height is insufficient, use an immediate arrest Self-Retracting Lifeline ("SRL").

Inspection and Maintenance

5. PFAS should be regularly inspected and maintained by competent persons in accordance with the manufacturer's instructions and recommendations. Any PFAS found to be defective should be immediately removed from service and replaced.

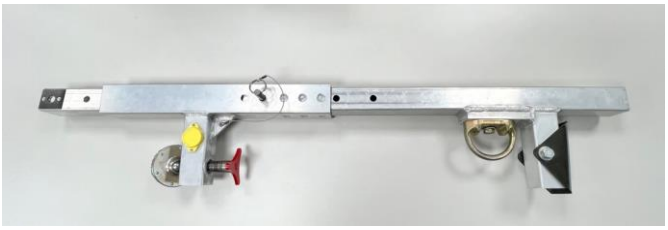
Solution Number	Anchor devices	Image for reference
1	**Permanent device such as welded eyebolts** Suitable when the device could be specifically cast-in or anchored into a building or structure. *Note:* • Consider installing a new permanent anchor bolt especially in situations where future access is expected.	
2	**Anchor sling** Suitable when there is an existing structural element (e.g. a building column).	
3	**A window or door jamb anchor** Transportable temporary anchor device is suitable for places without permanent secure points. *Note:* • *Both the temporary anchor and the structure to which the temporary anchor is mounted must be able to sustain the force in the anticipated direction(s) of loading.*	
4	**Parapet wall anchor** Transportable temporary anchor device is suitable for places without permanent secure points. *Note:* • *Both the temporary anchor and the structure to which the temporary anchor is mounted must be able to sustain the force in the anticipated direction(s) of loading.*	

Table 1: Examples of anchor devices

APPENDIX 5– INFORMATIVE REFERENCES

	Resources
Code of Practice for Risk Management	https://go.gov.sg/riskmgmt
Code of Practice for Working-At-Height	https://go.gov.sg/wahcop
MOM's Webpage on Accredited WSH courses and training providers	https://go.gov.sg/wshtraining
BCA's Webpage on Air-con Units Safety	https://go.gov.sg/bca-aircon
HDB's Webpage on Approved Locations and Installation Methods for Air-Con Units	https://go.gov.sg/hdb-aircon

Further information can be found at:

1. Ministry of Manpower (MOM) – Occupational Safety & Health Division (OSHD)
   http://www.mom.gov.sg/workplace-safety-health/Pages/default.aspx

2. Workplace Safety & Health Council (WSHC)
   https://www.tal.sg/wshc

3. Building and Construction Authority (BCA)
   https://www1.bca.gov.sg/

4. Housing and Development Board (HDB)
   https://www.hdb.gov.sg/cs/infoweb/homepage