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Guideline for Stacking Shipping Containers

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Introduction

This document is a guide to support Royal Wolf (RW) CSC's and RW customers to reduce the risk of freight containers causing harm to others by becoming unstable. These recommended criteria shall be considered in conjunction with AS/NZS 1170.2:2021 and AS/NZS 3711.10:2000. This Guideline does not replace any OH&S Management Plans, Risk Management Plans or Australian Standards but complements and supports these plans.

Objective

The objective of this document is to recommend protocols and practices for handling and securing of standard freight containers, particularly during severe weather and strong wind conditions which may have an impact on the stability of the container stacks.

Stacking standard freight containers

There are two relevant Australian and New Zealand Standards that provide guidance on wind effects on block stacking of containers and also aspects which can be introduced to reduce wind effects. The standards are:

- AS/NZS 1170.2:2021 Structural design actions, part 2: wind actions
- AS3711.10:2000 freight containers, Handling and securing, section 8, stacking on ground

Depending upon wind direction and height of stacking, in addition to above standards, the following stacking criteria shall be considered:

- All containers shall be stacked "corner cast" to "corner cast" and for long term installations shall be secured using rated twist locks.
- It is recommended that single containers which are double stacked or greater (without container block stacking), are risk assessed and reviewed by an engineer.
- Immediately adjacent to site boundaries, containers should be single level only. Where block stacking is possible, the second row of containers away from the boundary can be stacked 2 high, the third row of containers away from the boundary can be stacked 3 high with a corresponding step of container heights per row up to the maximum allowable height for the site. RW recommends that containers are block stacked no higher than 5 high.
- Boundary block stacking can serve as a shield for empty containers or smaller stacks in the yard. All boundary stacks shall be secured during strong winds.
- Where containers are stacked, the bottom container should be made level and horizontal so that the stack is vertical and the requirement for corner cast to corner cast stacking can be met.

- Visual ground assessment shall be conducted prior positioning of the containers. Level sites help ensure the container is stable and doors are easy to open and close. It is recommended that containers are positioned on compacted soil to prevent the container and delivery vehicle from sinking into soil.
- Containers shall be stacked in rows parallel to prevailing winds. To find prevailing wind direction for stacking refer to Wind rose through Bureau of Meteorology website.
- All stacks shall be positioned so as to allow sufficient wind tunnelling.
- Any isolated stacks shall be placed appropriately behind boundary block stack which can serve as a shield.
- Where possible, barriers above boundaries shall be installed in areas which are affected by strong winds.
- In sites subject to strong wind, container stack heights should be reduced to reduce the risk of the containers becoming unstable.
- Creating clear areas between stacks (or blocks) should be considered in the site layout to provide an impact zone should a container become unstable during extreme weather periods.
- In sites subject to strong wind, use of early warning devices such as wind anemometers programmed for the wind loading condition is recommended. Such devices provide a warning when wind gusts reach unsafe working conditions.
- In locations subject to strong winds, an emergency management plan should address actions to ensure continued stability of the container and that surrounding infrastructure is not compromised. (Possible securing methods can include counterweights, eg concrete, tie-downs, block stacking, ...)

Disclaimer

This guideline is provided by RW as recommendations to reduce risk of containers becoming unstable. Where there is risk to people, property, plant or equipment, RW recommends all stacking plans are assessed by a qualified engineer considering specific site conditions.