



REPRESENTING



Easy. Safe. Simple.
Access for Maintenance

The Future of Cooling Towers, Today

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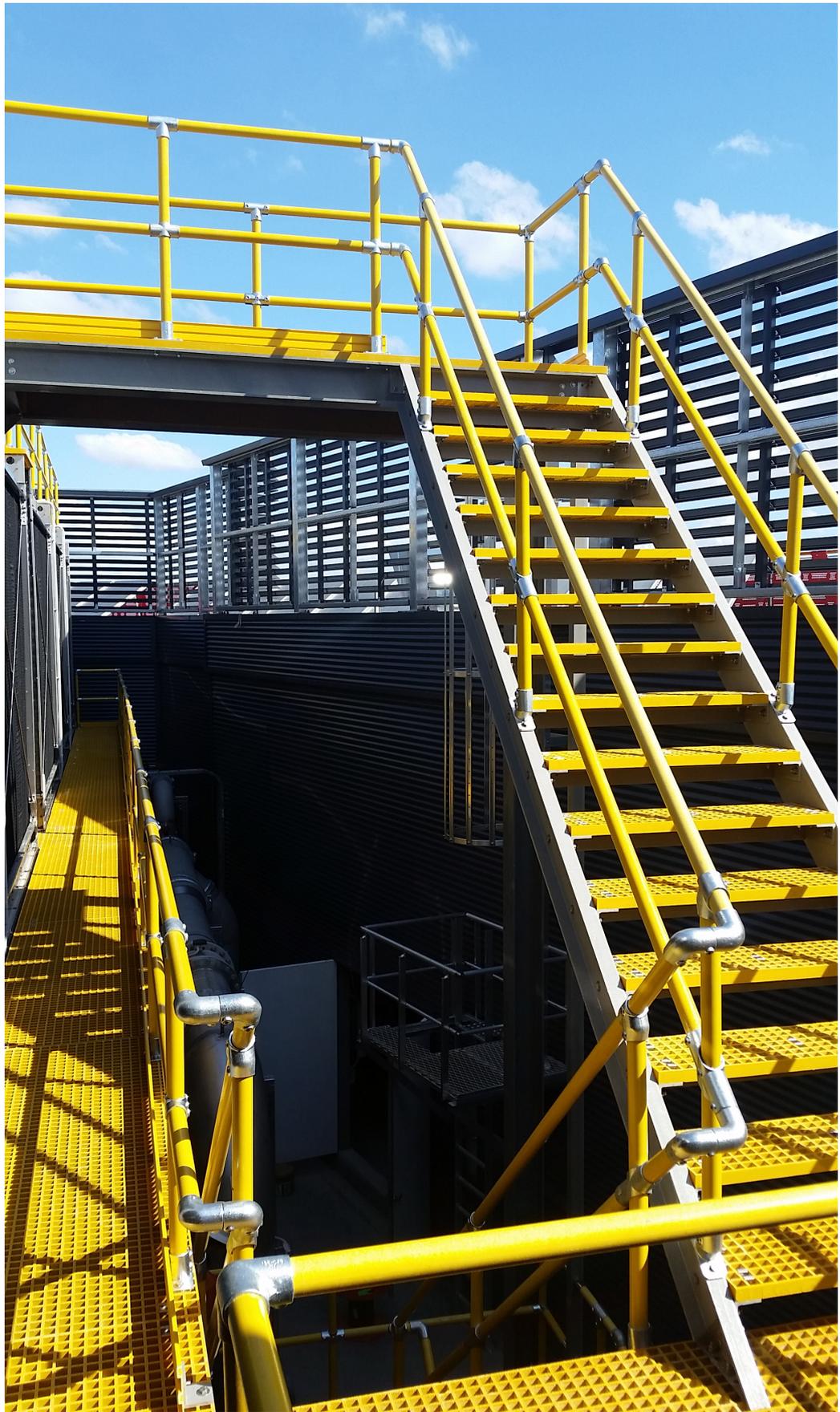
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SIMPLICITY

IS THE ULTIMATE FORM OF
SOPHISTICATION

Leonardo da Vinci



Introduction

Management of safe, successful business operations has never been so demanding for Australian Managers.

Look around any site or read through any scope of works and you will be reminded of our obligation as users, designers and installers is to comply with duties and responsibilities under the Occupational Health and Safety Act 2000 (OHS Act) and associated Occupational Health and Safety Regulation 2001.

Our duty of care to employees and the public are enforced by legislation. Astute businesses now recognise that risk mitigation by smarter buying is equally as important to the profitability as growing the top line.



understand that great functioning product is only half of the story. Our challenge has been to design and provide simple, safe, effective, compliant access solutions suitable for all forms of work performed in and around our installations.

A recent collaboration of various state Work Place and Safety Authorities entitled "*Machinery and Equipment Safety: An Introduction*" cites cooling towers on building roofs as a classic access example. "... they may have poor access, yet must be attended by a service person."

The most basic of requirements for access to equipment are a stable work platform suited to the nature of the work. The environment must be safe and promote good posture and adequate space for the work to be performed.

Australia's leading Consultants and Principle Contractors now have a lower appetite for risk and demand comprehensive access solutions. Ladders and

use of harnesses are no longer considered components of safe practice.

Baltimore Aircoil / Pritchard Pacific solutions are simple, safe, easy, yet strong, modular and meet all aspects of Australian Standard AS1657 defining the design, construction and installation of fixed platforms, walkways, stairways and ladders.

Access platforms are fabricated from strong, corrosion resistant pultruded composite components which complement equipment materials of construction. Platforms and walkways are generous (1200mm minimum width) to enable service teams (with tools and equipment) access. Equally important for emergency services to gain unimpeded access in the case of emergency.

Design Obligations in Relation to Easy, Safe and Simple Access

The following is a summary of reference clauses and documents utilised in assessing design options. Our experience has demonstrated individuals and organisations choose to interpret reference material in different ways to satisfy their order of priority of the design criteria.

Pritchard chooses to:

- Identify the problem/task.
- Determine how serious the problem/task is and assess the risks by reviewing the relevant Work Method Statement.
- Carry out a Job Safety Analysis.
- Decide what needs to be done to solve the problem by eliminating or controlling the risk if the problem cannot be eliminated.
- Consider the obligations of all stakeholders and review the risk assessment process and control measures to ensure risks are adequately addressed by all parties.
- Apply the final test of what would be the likely responses to challenging and probing questioning in a possible legal forum as to what considerations were given to other possibilities that would, should or could have resulted in the workplace being more safe than the “as built” design and installation upon or in which an incident occurred and would, should or could have prevented the incident from occurring.

During the design and installation phase, consideration should be given to the following references.

Australian Standard 3666

Clause 4.1.1 - Access for maintenance:

“Easy and safe access for cleaning, inspection and maintenance shall be available to and about all plant, equipment and components covered in this Section”.

Clause 4.1.5 - Cooling towers:

“Cooling towers shall be fabricated from corrosion-resistant materials, and shall be designed for ease of maintenance, particularly for cleaning of fill, water distribution system, basin and sumps.”

SAA HB 32 as referred to by the Queensland Workplace Health and Safety Plant Advisory Standard

Clause 6.2 - Access for maintenance:

“The Cooling Tower installation.....should allow for all wetted surfaces of such plant (including any hot water distribution channels, nozzles and any pipework headers) to be accessible for cleaning.”

“Cleanability and maintainability are very important factors in reducing the potential for microbial growths in condenser water systems”.

“There should be adequate access available to the heat exchange fill for the purposes of removal for routine cleaning.....”





“Where appropriate, non-slip access walkways should be provided inside the cooling tower and where necessary, outside (around) the basin or base of the tower to help facilitate access to other areas requiring inspection, maintenance and cleaning.”

“Cooling tower installations should be provided with appropriate fixed access ladders, internal and external walkways, handrails, toe guards and platforms in accordance with AS 1657 to facilitate safe access for necessary inspection, maintenance and cleaning. Such activities carried out on top of cooling towers in windy locations can be hazardous unless such safety protection is provided.”

Queensland Government Workplace Health and Safety Supplement No.2 to the PLANT ADVISORY STANDARD

Clause 3 - Design and installation of cooling water systems:

“Easy and safe access should be available to cooling water systems. The design of the system should facilitate regular maintenance and cleaning.”

Clause 5.3 - Who else has workplace health and safety obligations in relation to microbial control in cooling systems of buildings?

Under Section 32 of the Workplace Health and Safety Act, a designer of plant or specified high risk plant for use at a relevant place has an obligation to:

- Ensure the plant is designed to be safe and without risk to health when used properly.

Under Section 33 of the Workplace Health and Safety Act, an installer of plant or specified high risk plant at a relevant workplace has an obligation to:

- Install the plant in a way that is safe and without risk to health; and
- Ensure that nothing about the way the plant was installed makes it unsafe and a risk to health when used properly.

Under Sections 28 and 29 of the Workplace Health and Safety Act, an employer and a self-employed person have an obligation to ensure his or her own safety and to ensure that the workplace health and safety of others is not affected by the way the person conducts the person's undertaking.

Regulation 61A of the Workplace Health and Safety Regulations places the responsibility on the employer to control risks resulting from entry to a **confined space**. It is essential that a risk assessment is undertaken by a competent person (refer Australian Standard AS 2856).

Pier Height

When Cooling Towers are installed on piers, a low-level and/or mid-level platform/s may be required to access the basin, air intake louvers, fill, water distribution system and drift eliminators located inside the Cooling Tower notwithstanding the standard obligations for high-level walkways to mechanical components and water distribution system located on top of the Cooling Towers.

It is generally considered that a pier height of approximately 900mm plus an allowance of 500mm for the basin depth will safely facilitate the cleaning of the cold water basin although easy and safe access into all areas requiring inspection, maintenance and cleaning may not be afforded. As a minimum, stairs and platforms should be provided to access doors and panels where required. Further, consideration should be given to the removal of air inlet louvers and easy and safe access for the inspection/cleaning or removal of the fill, water distribution system and eliminators as noted above. This may necessitate the installation of low/mid/high-level walkways with large Cooling Towers.

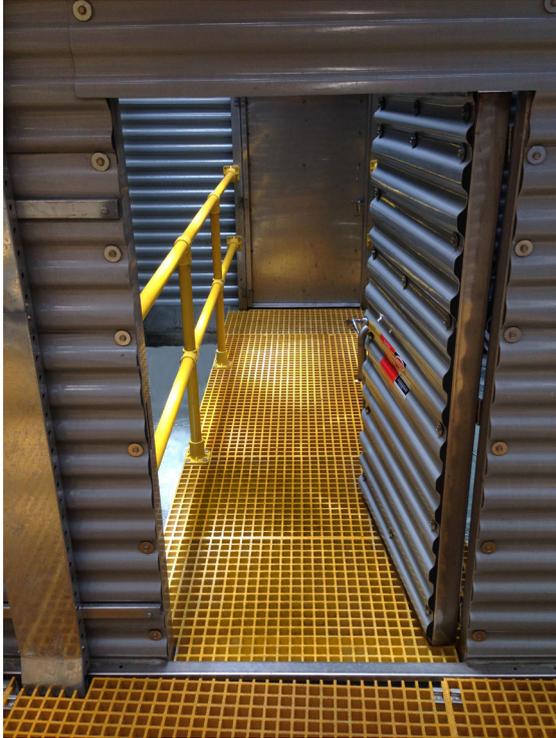
The height of the piers is generally dominated by the height required to accommodate the pipework under the tower which provides for easy and safe “freedom” to move about all of the plant without restriction.

The installation of the Cooling Towers and pipe-



work, when completed in a manner that permits easy and safe access for cleaning, inspection and maintenance to and about all plant, equipment and components referred to above, and not be restrictive with trip and work hazards when removing/cleaning/servicing the air inlet louvers, fill, hot water distribution basins, eliminators and mechanical equipment increases the likelihood of these works being completed to the appropriate standards in a manner “that is safe and without risk to health” thereby satisfying the obligations of the designer and installer.

Extent of Walkways Required



An internal low-level walkway is provided for access to the cold water basin, strainer, low level fill with access doors to adjoining cells.



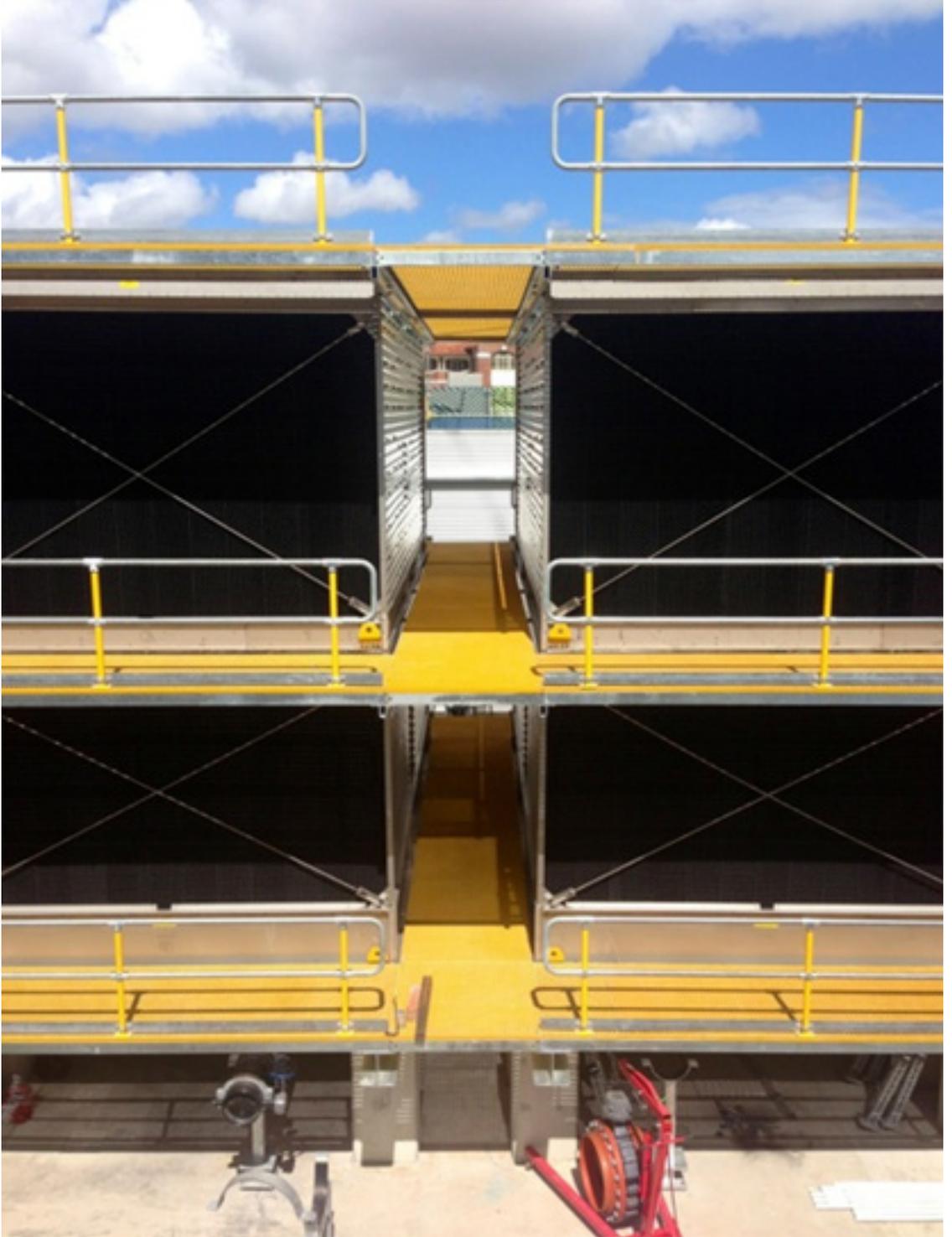
An internal mid-level walkway is provided for access to the upper level fill, eliminators areas and mechanical equipment.



High-level walkways are recommended above all air intakes to provide unimpeded easy and safe access to the water distribution system noting that considerable trip hazards exist on the roof decks.

Assuming a nominal pier height of 1500mm, we suggest walkways should be provided as follows:

1. Low-level walkways to all air intakes for access to the lower level air intake louvers and fill up to an additional height of approximately 3m. Low-level walkways to four end walls to gain access to the inside of each tower via an access door.
2. Mid-level walkways to all air intakes for access to the upper level air intake louvers and fill up to an additional height of approximately 3m with cross over walkways along the four end walls to gain access to the inside of each tower via an access door.
3. Noting the roof deck consists of limited free space with access only available from walking on the hot water distribution basin covers which incorporate various trip hazards (i.e. uneven surfaces, handles, retainer hardware, fan cylinder bracing and hold down brackets), fitting handrails alone to the perimeter of this roof deck could determine this area to be considered as a confined space. Suitable precautions should be taken including the provision of a standby person to remain within sight of the person carrying out the works. Amongst other considerations a risk assessment is to take into account emergency and rescue procedures i.e. a rescue recovery plan noting the rescuer has an obligation to minimise additional trauma to the injured person.



Location and Installation of Variable Speed Drives



Each VSD can be installed in a 316 stainless steel weather proof enclosure in an area adjacent to each of the four access doors with appropri-

ate local isolation to provide line of sight and implementation of localised tag off procedures to reduce risk.

Hot Water Bottom Inlet EASY CONNECT® Piping Arrangement Option



The EASY CONNECT® Piping Arrangement simplifies hot water inlet piping on the BAC Series 3000 by automatically balancing the flow within each cell, eliminating the need for flow balancing valves. A single hot water pipe inlet, located at the bottom of each unit, eliminates the need for external long vertical risers and overhead piping and piping supports normally provided by the installing mechanical contractor thereby providing a more simple, safe and easy installation for access for maintenance.

The EASY CONNECT® Piping Arrangement

reduces construction risks and installation costs by:

- Keeping all external pipework at a low level,
- Simple by having all headers located under the Cooling Towers with bottom connections,
- Eliminating working at heights issues during installation.

The final installation provides for Easy, Safe and Simple “freedom” to move about all of the plant without restriction thereby further satisfying the obligations of the designer and installer.

Delivery and Craneage



Reducing risk during installation is paramount. Easy, safe and simple installation techniques are now possible for larger scale projects.

Each Cooling Tower is delivered directly to site from BAC's Australian Production Facility located in Gosford, NSW.

One truck will be loaded with one Cooling Tower in two sections suitable for lifting one at a time.

The builder's tower crane should be suitable for lifting and positioning each section directly into position.

We suggest the crane be allocated for one hour to unload and position one Cooling Tower with a minimum of two trucks per delivery being two hours in total.

Walkways and stairways are delivered in prefabricated modules for lifting directly into position and be supported from each Cooling Tower structure keeping all external structural supports to a minimum.

Site labour hours are therefore minimised during each phase of installation by providing a simple, safe and easy process reducing risk.



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