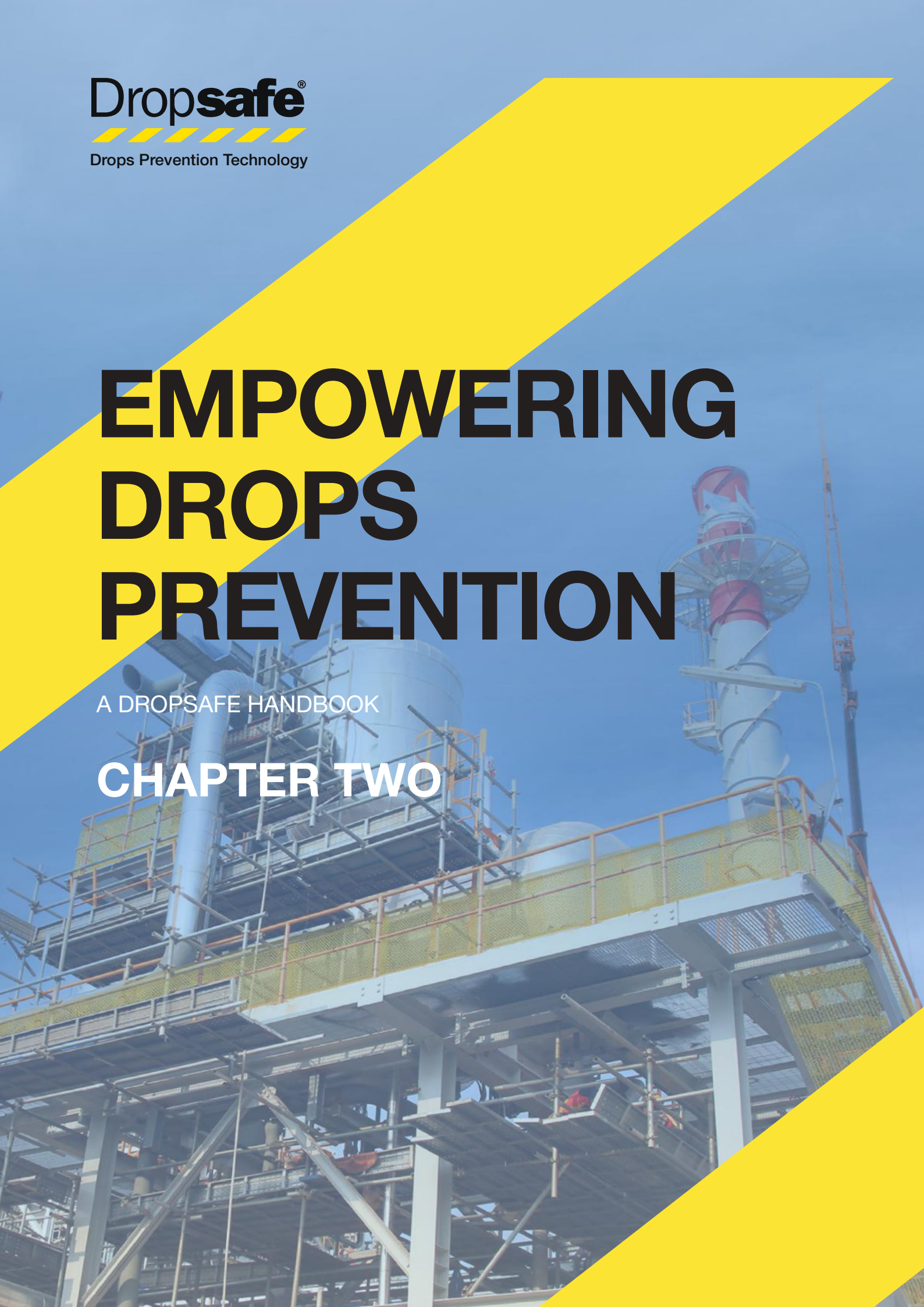
Dropsafe®

Drops Prevention Technology

EMPOWERING DROPS PREVENTION

A DROPSAFE HANDBOOK

CHAPTER TWO



THE FUNDAMENTALS OF DROPS PREVENTION BEST PRACTICE

Plant and facility managers in the Power Generation industry have a rare opportunity to reinforce Drops prevention throughout the sector in the long-term. The latest guidance can help operators establish proactive approaches to safety throughout the industry to protect personnel at their facilities from Drops incidents.

The first chapter of 'Empowering Drops prevention: A Dropsafe Handbook' set out the scale of the Drops challenge in Power Generation and outlined the impact of Drops on operators.

This second instalment will take a detailed look at the risks posed by Drops in Power Generation, and provide a resource on current best practice in Drops prevention.

WHAT ARE THE KEY DROPS RISKS IN POWER GENERATION?

Managers of Power Generation facilities face a specific set of Drops risks due to the large size of their facilities and the irregular nature of maintenance operations. These risks may be influenced by the following factors:

- Large numbers of third-party and regular personnel enter facilities during shutdowns and turnarounds.
- Tasks undertaken during these periods may include non-familiar work that does not occur regularly, increasing the risk of Drops incidents.
- External third-party personnel may have no record of DROPS Awareness or competency, and can present an unknown factor in terms of safety.

Ultimately, these factors can increase the likelihood of Drops incidents occurring, particularly since the three main causes of Drops in Power Generation relate to human error:

- Inadequate securing of portable devices such as radios, phones, tools and safety equipment used at height - leading to "dynamic" Drops.
- Poor housekeeping on stairways and raised working platforms, leading to tools such as wrenches and hammers being knocked through gaps in railings.
- Lack of inspection of equipment, maintenance and equipment corrosion leading to fixtures and fittings falling from height, or "static" Drops.

WHAT IS THE DIFFERENCE BETWEEN DROPS PREVENTION AND DROPS MITIGATION?

Before examining measures to tackle these issues, it is important to consider the difference between **mitigation** and **prevention**.

Mitigation:
Mitigation involves measures taken to minimise the impact of Drops incidents when they happen – without stopping them from occurring completely. Personal Protective Equipment (PPE), barrier systems and secondary securing solutions such as nets are examples of mitigation measures that Power Generation operators might use to protect personnel and equipment at their facilities. These physical controls may require initial expenditure.

Prevention:
Prevention means stopping Drops from occurring at all. This requires a holistic approach, considering the design of facilities, operational practices and protocols, and ensuring regular maintenance schedules are followed. Prevention measures can sometimes require no capital expense from an operator's perspective, although investment in training and policy is a key element of effective Drops prevention programmes.

Both mitigation and prevention are vital – knowing when to apply each one effectively separates the best Drops prevention programmes from the rest.

WHAT ARE THE CORE INGREDIENTS OF A ROBUST DROPS PREVENTION PROGRAMME?

There are four crucial parts of a comprehensive Drops prevention strategy that plant and HSE managers in Power Generation need to bear in mind when seeking to make their facilities safe. These are:

1. Proactive prevention
2. Personnel training
3. Drops engineering
4. Holistic awareness

The next section will unpack these four components of Drops prevention and give practical advice on how to apply these principles to Power Generation facilities.

1. PROACTIVE PREVENTION – TACKLING DROPS FROM THE BEGINNING

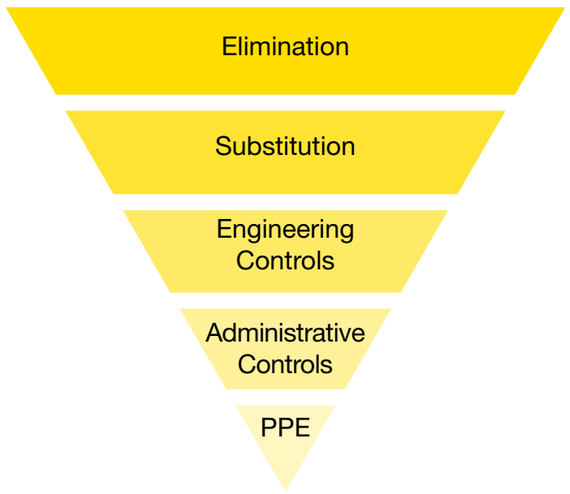
Drops prevention starts with planning. Plant and HSE managers will be familiar with running complex operations. Drops prevention is no different – but it requires taking a step back to assess the bigger picture. Setting out a holistic strategy guided by current best practice will provide a solid base for the individual measures taken.

The hierarchy of controls

The basic building block of health and safety across industries such as oil and gas, Power Generation and manufacturing is the hierarchy of controls. It should be the starting point for any HSE strategy – and this is particularly true for Drops prevention.

The hierarchy of controls, presented graphically below, shows the order of priority when tackling hazards such as Drops.

Elimination:
This means removing the risk. For example, when designing a facility, are there overhanging hazards such as lights and speakers? Are all of these fixtures required?



The same goes for operations. Lifting manoeuvres are a key source of Drops incidents. Plant managers should consider minimising lifting where possible.

Substitution:
Where it isn't possible to remove a risk altogether, it should be minimized. Operators should ask: can fixtures presenting overhanging hazards be positioned elsewhere? Could a different kind of lighting be used?

Engineering controls:
This includes tool tethering, barrier systems, pouches and 'red zone mats', designed to place a physical barrier between Drops and personnel.

Administrative controls:
No-go zones, collision checklists and toolbox talks are examples of administrative controls to mitigate Drops, aiming to enforce procedures and reduce human error.

See apendix at the end of this chapter for several examples of drops collision checklists.

PPE:
Personal Protective Equipment is the last line of defence against Drops, helping to minimise serious injuries and fatalities if personnel are struck by a falling object.

Policy and procedures

Well thought out procedures can play a significant role in minimising Drops incidents, as every other part of a Drops prevention programme stems from the overall policies laying out the direction and scope of Drops prevention at a facility.

Power Generation operators should follow the best practice laid out in the DROPS reliable securing handbook and DROPS online when designing their Drops prevention strategies to ensure that the scope for Drops incidents to occur is minimised. Dropsafe has been involved in supporting the development of DROPS policy and can advise on practical steps managers can take to meet established best practice.

2. PERSONNEL TRAINING – ENSURE FAMILIARITY WITH SAFETY MANAGEMENT SYSTEMS

To maximise the effectiveness of Drops prevention measures, a key preventative tactic is ensuring all personnel working at the site have adequate DROPS awareness and competency training. Outlined below is an explanation of concrete actions to implement the control measures above, with links to further information.

Safety meetings

If they are not already doing so, plant managers should establish pre-tower/pre-job meetings before each shift. It is also common practice to have toolbox talks five minutes before each task proceeds. Building the latest guidance on Drops prevention into these meetings helps to prevent any potential incidents. You can view more information on this control measure here.

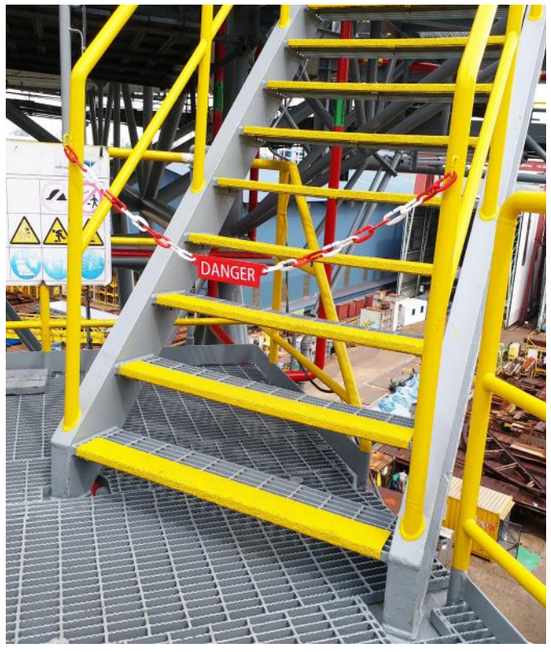
Time out for safety

Originally a campaign by oil and gas drilling contractors 15 years ago, 'time out for safety', or 'stop the job' is a way of empowering personnel to take responsibility for safety.

Operators should ensure that if a worker identifies a hazard, they can call for a temporary halt in operations until the issue is fixed. Sharing accountability for safety saves operators money, as it prevents Drops incidents from occurring. Read more about time out for safety here.

Red zones/no-go zones

Plant and HSE managers should aim to put physical barriers into place around high-risk areas to minimise the impact of Drops incidents on personnel. A red zone is a designated high-risk area, where personnel must secure permission to enter. For the most hazardous areas, operators should establish a no-go zone requiring a permit, granted following an inspection. Read more at this link.



Housekeeping

Loose, unattended tools can easily become Drops when working at height, particular in a fast-moving work environment. Facility managers should therefore ensure that tools are tidied away safety after breaks, using posters to heighten awareness and building this guidance into toolbox talks. You can learn more on the importance of tight housekeeping practices on site at this link.

Collision checklists

Plant managers should place collision checklists in the cabs of cranes and forklifts to highlight any obstructions that may become dynamic Drops in the event of a collision during lifting operations.

DROPS training

Operators in Power Generation should ensure personnel have Drops awareness certification, covering the factors outlined above, to foster a more comprehensive Drops culture at a facility. Dropsafe is able to advise on and recommend certified training providers, as well as deliver aspects of Drops training.

3. DROPS ENGINEERING – CHOOSING THE RIGHT HIGH-QUALITY SOLUTIONS FOR EACH RISK

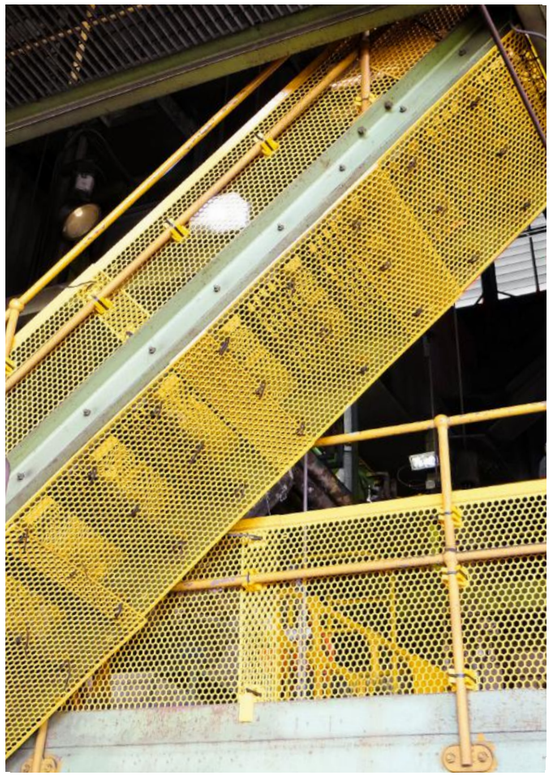
It is not always possible to eliminate Drops risks completely. To ensure a robust defence against Drops, Power Generation operators can install secondary securing solutions and other engineered controls at critical points in their facilities, containing any Drops incidents that occur. Drops mitigation technology can take the form of nets, barriers, and pouches, depending on the situation.

Tool Tethering

Tolls are regularly required on facilities, especially during maintenance periods or turnarounds. It is important that all tools used at height are not only risk assessed and rated ‘suitable’, but are also able to be adequately secured while in use.

Tools need to be secured whilst being transported as well as when being used using tethers, lanyards or other appropriate means. Tool tethers allow tools to be attached to personnel safely and securely whilst working at height. Heavier items should still be secured, but to a sturdy attachment point.

Tool tethers are on of the most simple ways to prevent dropped object risks, and dramatically increase the level of safety on a worksite.



Barriers

Barrier solutions are a key feature of Drops engineering and risk mitigation, and there are a large number of solutions available. Flexible mesh is commonly employed on power generation facilities, however does not offer the high-quality level of safety that other systems do. Expanded metal is a stronger alternative, but is also heavier, harder to install, and requiring ongoing maintenance.

Advanced polymer barriers however can be fixed to guardrailing on stairs and raised working platforms easily, while mitigating tools from being knocked through gaps or from ricochets. For Power Generation operators, there are main two things to consider when procuring a barrier system.

1. Is the barrier designed for the operational conditions at your facility?

   The best barrier ranges will offer the flexibility for harsh, outdoor environments, while including a purpose designed barrier for temperate conditions such as a climate-controlled Power Generation facility.

2. Can the barrier be installed and re-installed with minimum hassle?

   Welding work will add significant labour costs and time to an installation and makes rapid redeployment difficult. A universal attachment system enables easy installation.

To find out more about best practice in Barrier system procurement, you can read this article.

Mats For Grating

It is not only tools that can be dropped from height; a significant number of dropped objects are a result of loose or discarded items, such as nuts and bolts, replaced parts or components. This is mostly during maintenance periods or fixture repair.

All items at height should be logged in an inventory, no matter their size or apparent importance. Grating mats are one of the best and most effective ways to stop small items or components from falling through grating or other gaps. The also enable item lists or inventories to be kept track of easily, thus significantly minimising dropped risks.

Pouches

Personnel can be equipped with steel wire mesh pouches to tether 2-way radios and tools to their belts, mitigating any dynamic Drops that occur when working at height. All lanyards, pouches, bags and safety harnesses for carrying equipment and personnel at height should be visually inspected prior to use.

Find out more about the proper use of Pouches at this link.

Personal Protection Equipment

The goal of a comprehensive Drops prevention programme is to make PPE redundant. For example, hard hats are not infallible and may not prevent serious injury if a severe Drops incident occurs. PPE is still vital, however, and operators should ensure that high quality equipment is supplied to personnel.

For a guide on proper PPE use in Power Gen, click here.

Catch Nets

When grating or flooring is altered or modified to accommodate piping, cables or fixtures requiring a ‘feedthrough’ point, it is important to become aware of potential dropped object risks these can cause.

All piping and feedthroughs should have toe boards or adequate alternatives installed, however this is not always possible, depending upon location, size and shape of the feedthrough.

A more safety-aware and effective solution (even if toe boards are able to be installed), would be ensuring any areas, especially those posing potential high-risk dropped object sites, be covered. Additional grating or tarpaulin covers can be effective prevention solutions. Similarly, steel mesh catch nets can be installed as an easy way to prevent objects from dropping from modified areas or gaps in grating.

4. HOLISTIC AWARENESS – INSPECTIONS, REPORTING, AND UNDERSTANDING

As outlined previously, the size of Power Generation facilities and the cyclical nature of maintenance in the sector has posed challenges for plant and HSE managers in the past. For personnel performing planned maintenance tasks, raising their awareness of potential Drops through visual inspection and reporting is particularly crucial.

Third-party inspections

Contracting a third-party Drops prevention specialist to perform an inspection of a facility can help to fine tune a Drops prevention programme. To maximise the cost-effectiveness of these inspections, plant managers should aim to establish a comprehensive strategy and identify key risks throughout a facility.

Prior to the inspection, plant managers can contract an inspection firm to perform a Drops Management Review and Drops Audit, assessing the overall approach to Drops prevention taken by the business as a whole.

The third-party experts can then provide validation and offer final guidance. Dropsafe can advise on experienced and reputable inspection companies in Power Generation.

Planned Maintenance schedules

The 'shutdown' or 'turnaround' period is major event for a Power Generation facility. Within specific timeframes, certain sections of the plant will be maintained or replaced.

This presents an ideal opportunity to perform Drops inspections, so this should be factored into schedules. Keeping safety – including Drops prevention – front of mind at all times will save operators significant sums in the long-term due to reduced incident rates.

Sharing information

The drilling sector in oil and gas has led in reporting and wider information sharing. The experience of drillers has shown the value of an open approach to reporting, both within organisations and the sector.

As discussed in chapter one of 'Empowering Drops prevention: A Dropsafe Handbook', the Power Generation sector should take the opportunity to ensure that information on Drops incidents is shared widely, to learn from mistakes and prevent them from occurring twice.

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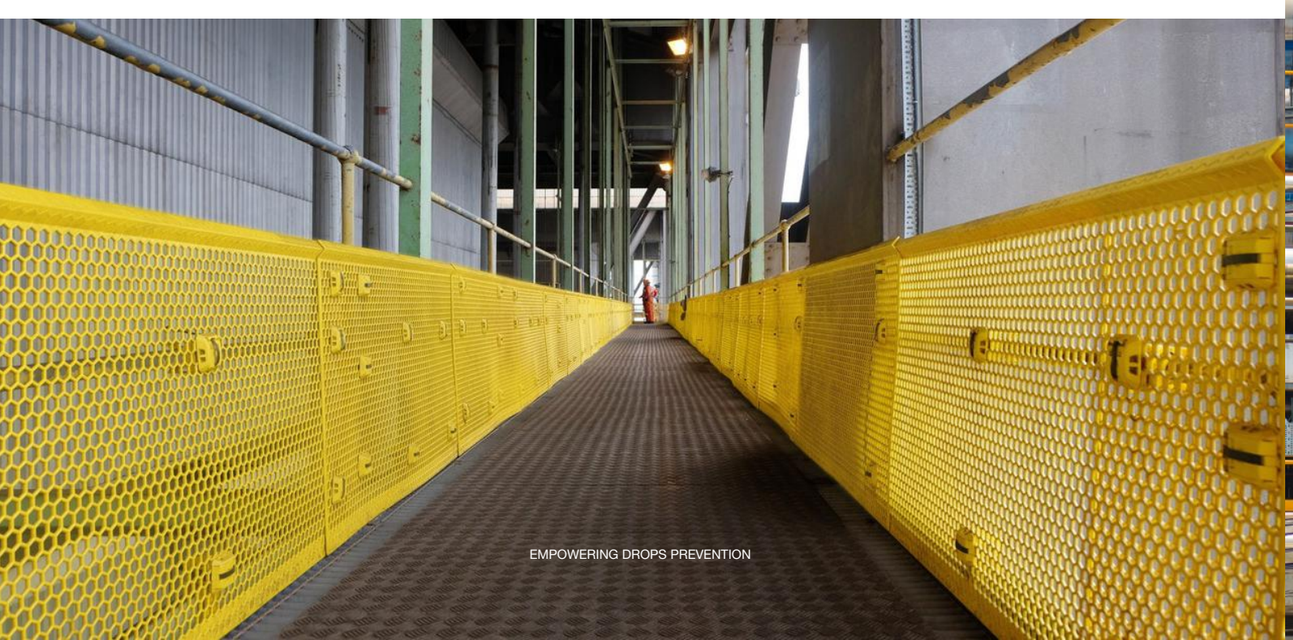
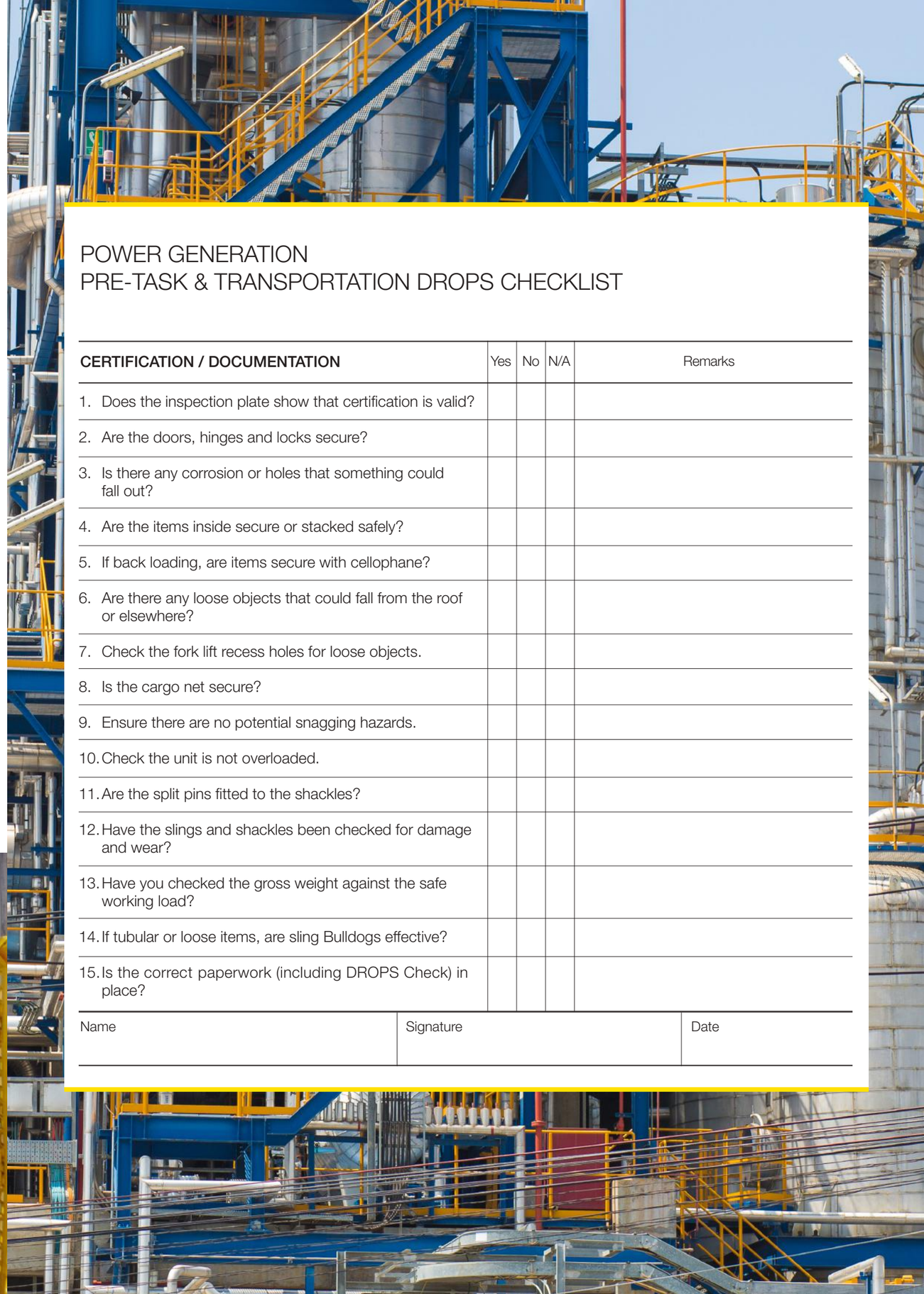
Facilities managers globally are poised to take Drops prevention within Power Generation to the next stage. Chapter three of 'Empowering Drops prevention: A Dropsafe Handbook' will offer a case study of what effective Drops prevention looks like within the sector.





POWER GENERATION
PRE-TASK & TRANSPORTATION DROPS CHECKLIST

CERTIFICATION / DOCUMENTATION	Yes	No	N/A	Remarks
1. Does the inspection plate show that certification is valid?				
2. Are the doors, hinges and locks secure?				
3. Is there any corrosion or holes that something could fall out?				
4. Are the items inside secure or stacked safely?				
5. If back loading, are items secure with cellophane?				
6. Are there any loose objects that could fall from the roof or elsewhere?				
7. Check the fork lift recess holes for loose objects.				
8. Is the cargo net secure?				
9. Ensure there are no potential snagging hazards.				
10. Check the unit is not overloaded.				
11. Are the split pins fitted to the shackles?				
12. Have the slings and shackles been checked for damage and wear?				
13. Have you checked the gross weight against the safe working load?				
14. If tubular or loose items, are sling Bulldogs effective?				
15. Is the correct paperwork (including DROPS Check) in place?				

Name	Signature	Date

POWER GENERATION
GUARDS, HANDRAIL & STAIRWELL DROPS CHECKLIST

CERTIFICATION / DOCUMENTATION	Yes	No	N/A	Remarks
1. Are the handrails / guards damaged?				
2. Have the handrails / barricades / guards been inspected lately?				
3. Are all fastenings and pins are in place and secured?				
4. Is there a likelihood that the handrails may be snagged during lifting operations?				
5. Are the handrails/guards appropriate for the area?				
6. Are all handrails inserted into pockets and secured with through pin and safety pin/keeper?				
7. Are permanent guards, barricades and mesh systems in place made of suitable materials / fastenings and OEM certified?				
8. Have all homemade barricades or guards been removed?				
9. Have all temporary barricading / netting or hoarding been secured against inclement weather?				
10. Have all temporary barricades / nets and handrails been regularly inspected and removed when complete?				
11. Have all stairs and stairwells been Drops Risk assessed?				
12. Are there potential fall gaps or gaps for tools to fall?				
13. Have all kick plates been checked for effectiveness?				

Name	Signature	Date