# Workplace Safety and Health Guidelines

Personal Flotation Devices - Life Jackets





## Table of Contents

1. Intr	oduction	3
1.1	Objectives and Scope	3
1.2	Managing Life Jackets	4
1.3	Roles and Responsibilities	4
1.4	Relevant Legislation	5
1.5	Risk Assessment	5
2. Life	Jackets	8
2.1	Types of Life jacket	8
2.2	Types of Activation Mechanism for Gas Inflation	9
3. Life	Jacket Selection	10
3.1	Differences between Inflatable and Foam Life Jackets	10
3.2	Life Jacket Performance Level	10
3.3	Life Jacket Accessories	12
3.4	Selection During Procurement	15
4. Pre-	-use Inspection	16
5. Life	Jacket Use	18
6. Life	Jacket Storage and Maintenance	20
6.1	Cleaning before Storage	20
6.2	Storage	20
6.3	Servicing	20
7. Cas	e Studies	22
C a	Case Study 1: Technician fell into the sea while crossing from tanker to service boat using an accommodation ladder	22
C	Case Study 2: Shore technician fell into the sea when disembarking a vessel to board a launch pilot ladder	boat using 23
C	Case Study 3: Worker drowned after falling into river	24
8. Refe	erences	25
9. Ack	nowledgements	26
Annex	æs	27
Anr	nex A – Roles and Responsibilities	27
Anr	nex B – Life Jacket Selection Guide for Users	29
Anr	nex C – Sample pre-use inspection checklist	30

## 1. Introduction

A Personal Flotation Device (PFD), a form of Personal Protective Equipment (PPE), is a garment or device which, when correctly worn and used in water, provides the user with a specific amount of buoyancy which increases the likelihood of survival should a person fall into water. Ensuring the proper selection, inspection, use, and maintenance of the PFDs are important to ensure their reliability and effectiveness during emergencies.

PFDs can be classified into the following classes:

- Life jackets
- Buoyancy aids
- Special application PFDs

A life jacket maintains the user in a face-up flotation position without additional action, with various levels of performance suitable for sheltered<sup>1</sup> and non-sheltered waters. A life jacket has a buoyancy distribution sufficient to turn most users to a position where the user's mouth is clear of the water even when exhausted or unconscious.

A buoyancy aid<sup>2</sup> <u>does not</u> provide significant face-up flotation ability and requires active manoeuvring by the user to position one's face clear of the water. On the other hand, a special application PFD offers performance equivalent to that of a life jacket or buoyancy aid, but with additional features and specific application requirements.

In general, all persons at work who are exposed to the risk of falling into water and of drowning should use life jackets. Buoyancy aids, which are not suitable for work, should only be used with supervision for recreational purposes or by rescuers performing water rescue.

## 1.1 Objectives and Scope

These Guidelines are intended for any person working in and near water in Singapore, including but not limited to workers involved in mooring operations, vessel transfers, launch boat operations and workers working next to water bodies such as reservoirs, lakes, rivers, and ponds. They apply to all works in Singapore where there is a possible risk of a worker falling into water and drowning while carrying out such works.

<sup>&</sup>lt;sup>1</sup> Reference to ISO 12402:2020, sheltered water means water with protection from significant breaking waves, current, or strong winds, where the possibility of being blown or carried away from shore or a place of safety is minimal. <sup>2</sup> Buoyancy aid (level 50) should not be used by persons at work at workplaces.

The objectives of these guidelines are (i) to provide guidance on the selection of life jackets for different work environments in line with international standards; and (ii) to recommend good practices on the use and maintenance of life jackets.

In line with ISO 12402 - Personal Flotation Devices, these Guidelines do not cover the requirements for life jackets on seagoing ships, which are regulated by the International Maritime Organization (IMO) under the International Convention for Safety of Life at Sea (SOLAS)<sup>3</sup>. Throwable devices, flotation cushions, buoyancy aids and special application PFDs are also excluded from this guidelines.

Additionally, equipment used in non-work related, recreation or leisure activities (e.g., water sports)<sup>4</sup> will not be covered in these Guidelines.

## 1.2 Managing Life Jackets

The process of managing life jackets involves several stages, from selecting the right life jacket for the job to inspecting it before use and to maintaining it properly.



Figure 1: Systematic approach to managing life jackets.

Readers may refer to the relevant Chapter of these Guidelines for details of each stage of Figure 1.

### 1.3 Roles and Responsibilities

It is important for all workers and their employers working in or near the water to understand their roles and responsibilities in ensuring safety and preventing accidents or incidents.

The stakeholders defined in this Guidelines are:

- Employer
- Principal
- Self-employed
- Employee

<sup>&</sup>lt;sup>3</sup> Life jackets that comply with SOLAS standards are designed and tested to meet specific criteria to enhance safety at sea. Amongst the various accessories and features found in SOLAS life jackets, of special mention is the inclusion of two independent chambers that can inflate separately, providing redundancy in the event of failure.

<sup>&</sup>lt;sup>4</sup> For water sports and recreational activities, refer to SS 701:2023 Code of Practice for inland and open water sporting activities, which specifies requirements that are aimed at preventing injuries and fatalities from recreational, competitive, and educational activities planned by the public and organised groups in inland and open waters.

• Manufacturer / Supplier of PFDs

Annex A outlines the roles and responsibilities of the above stakeholders.

### 1.4 Relevant Legislation

The following WSH legislations and MPA Guidelines are relevant to the use of life jackets while at work. The list provided below is non-exhaustive, and organisations should proactively identify other relevant regulatory requirements that apply to their work activities.

#### Workplace Safety and Health (WSH) Act

The WSH Act and its subsidiary legislations cover the safety, health, and welfare of persons at work in a workplace. The Act states that employers, self-employed persons, and principals are responsible to take reasonably practicable measures necessary to ensure the safety and health of the persons at work and of others who may be affected by the work being carried out.

#### WSH (Risk Management) Regulations

The Workplace Safety and Health (Risk Management) Regulations state that employers, selfemployed persons, and principals are responsible for identifying safety and health hazards at workplaces and taking measures to eliminate or reduce the risks.

#### WSH (General Provisions) Regulation 23 – Measures to be Taken to Prevent Falls

Employers shall provide their workers who are at risk of falling and drowning in the water with equipment and means of rescuing and resuscitating drowning persons. They shall also provide suitable life jackets or other equipment for keeping such persons afloat in the event they fall into the water.

Port Marine Circular on Guidelines for Safe Transfer of Persons between Vessels at Anchorages

The MPA Guidelines for Safe Transfer of Persons between Vessels at Anchorages recommend the use of a working SOLAS type-approved life jacket or a life jacket meeting ISO 12402 performance level.

### 1.5 Risk Assessment

Risk assessment (RA) is the process of identifying, evaluating, and controlling risks at the workplace. RA is a proactive approach that can help prevent accidents and injuries. For example, where the risk of drowning cannot be eliminated in a work process, conducting an RA before starting work can help in identifying the control measures to mitigate the risk of drowning. The control of hazards and the reduction of risk can be achieved through the WSH Hierarchy of Control (see Figure 2). These controls are not usually mutually exclusive. For example, engineering controls can be implemented concurrently with administrative controls.



Figure 2: Hierarchy of Control

**Elimination** refers to the total removal of the worker's exposure to the hazards, effectively making all the identified possible accidents, incidents, and ill-health impossible. It is a permanent solution and should be attempted first, as recommended in the Hierarchy of Control. Once the exposure to hazard is eliminated, all other controls, such as the use of life jackets would no longer be required. For example, adopting technologies such as using robotic equipment for inspections or tele-consulting with shore technicians for shipboard technical support.

**Substitution** involves replacing a process or product with a less hazardous process or product to mitigate the risk. For example, doing work in dry docking facilities instead of traditional wet docking methods.

**Engineering controls** are physical means that reduce the likelihood of occurrence or severity of consequence of the mishap. For example, installing guardrails or barriers along the edges of docks, piers or other water bodies to prevent workers from accidentally falling in.

Administrative controls eliminate or reduce exposure to a hazard by adherence to procedures and instructions. Documentation should emphasise all the steps to be taken and controls to be used to carry out the activity safely. An example would be the safe work practices for work near water bodies.

**Personal protective equipment** should be used only as a last resort; after all other control measures have been considered. The success of this control depends critically on the protective equipment being chosen, and whether it is fitted correctly, always worn and maintained properly. Appropriate PPE such as suitable life jackets of the appropriate performance level should be used as an additional safeguard as long as there is a potential risk of drowning.

In general, detailed risk assessments should be performed and approved for all works in and near water bodies before the tasks commence. For more information on RA, refer to WSH Council's <u>Code</u> of Practice on Workplace Safety and Health (WSH) Risk Management.

7

## 2. Life Jackets

Life jackets are essential personal protective equipment for workers who are exposed to the risk of falling into water and drowning. Workers who work in and near water should wear a life jacket that is appropriate for the task, as it can significantly increase the chances of survival should they fall into the water.

## 2.1 Types of Life jacket

There are two main types of life jacket:

• **Foam-type:** A life jacket filled with foam material that provides natural buoyancy without the need for inflation.



Figure 3: Example of a Foam Type Life Jacket

- Inflatable-type: A life jacket containing a compressed gas (usually carbon dioxide, or CO<sub>2</sub>) cartridge that will inflate the bladder of the life jacket when activated. Both automatic and manual life jackets are equipped with an oral inflation tube as a backup to inflate the life jacket by blowing air into it, should the rest of the inflation mechanisms fail.
  - <u>Automatic inflation</u>: An automatically-inflated life jacket typically has two inflation mechanisms – (i) an automatic mechanism that inflates the life jacket by puncturing a gas cartridge once submerged in water, and (ii) a backup pull cord that can be used to manually puncture the same gas cartridge to inflate the life jacket in the event of automatic mechanism failure.



Figure 4: Example of an Automatic Gas Inflation Type Life Jacket

• <u>Manual inflation</u>: These are life jackets that are designed with only the manual inflation pull cord to puncture the gas cartridge for inflation, so it is important to familiarize with the operation of a life jacket before using it.



Figure 5: Example of a Manual Gas Inflation Type Life Jacket

Automatically inflated life jackets are recommended for activities where users might unexpectedly enter the water and become unconscious. Manually inflated life jackets must be inflated by a user who is conscious.

### 2.2 Types of Activation Mechanism for Gas Inflation

The following are examples of the activation mechanisms in automatic inflation life jackets:

### Water-soluble capsule

A bobbin pill is a small water-soluble capsule found in the activation mechanism. Once it is submerged in water, the bobbin pill dissolves and releases a spring-loaded firing pin which punctures the cartridge that releases gas to inflate the life jacket. Note that the bobbin pill is designed to be dissolved by water that flows into the activation mechanism, such as when a person falls into water. Rainwater or sea spray will typically not dissolve the bobbin pill unless excessive water fills the activation mechanism.

### Hydrostatic valve

A pressure-sensitive hydrostatic valve is designed to activate when submerged in 10cm of water. Once submerged, the valve releases a spring-loaded firing pin which punctures the cartridge that releases gas to inflate the life jacket. Rainwater or sea spray will not activate the mechanism as submergence is necessary for activation.

### Pull Cord

When pulled, the pull cord activates or triggers the gas inflation which fills the life jacket rapidly with air to provide buoyancy for the user. In manual life jackets, pulling the cord is the sole method for inflation, whereas in automatic life jackets, it serves as a backup method in case the automatic mechanism fails.

## 3. Life Jacket Selection

Employers must select the appropriate type of life jackets for their employees based on their specific work activity. Life jackets are also available under different performance levels, so it is important to select the one best suited for the work environment and activity.

## 3.1 Differences between Inflatable and Foam Life Jackets

Inflatable life jackets are more comfortable to wear over longer periods of time as compared to foam life jackets as they are less bulky and allows better movement while at work. Inflatable life jackets will also contour closer to the user's body shape when inflated.

The advantage of foam life jackets is that they do not need to be inflated to provide flotation. They are made of naturally buoyant materials, such as closed-cell foam, that will keep the user afloat without the need for activation mechanisms or gas cartridges. Foam life jackets provide consistent buoyancy as the foam material does not absorb water. However, foam life jackets may impede the work activity as they are generally bulkier and less comfortable to wear when compared to inflatable life jackets.

## 3.2 Life Jacket Performance Level

The performance level of a life jacket specifies its degree of buoyancy and the conditions under which it can be used. The three common life jacket performance levels are 100N (or "Newtons"), 150N and 275N. Note that life jackets with higher performance levels are more buoyant and are designed for more demanding conditions.

Performance	Application and Suitability		
Level			
100N	• For use in sheltered or calm waters (e.g., swimming pools, rivers, reservoirs, or ponds) and not suitable for rough water condition or when there is wave splash.		
	<ul> <li>For lightly clothed users (e.g., sports attire, single layer clothing without equipment or attachment)</li> </ul>		
	<ul> <li>Intended for those who may have to wait for rescue in sheltered or calm waters.</li> </ul>		
	<ul> <li>Give reasonable assurance of safety from drowning in relatively calm waters, where users remain capable of helping themselves.</li> </ul>		
	<ul> <li>Not guaranteed to self-right an unconscious user and should not be expected to protect the airway of an unconscious person in rough water.</li> </ul>		
150N	• For use in general, offshore, rough waters, or foul weather.		
	<ul> <li>For fully clothed user or heavy weather clothing.</li> </ul>		
	Give reasonable assurance of safety to people not fully capable of helping		
	themselves due to injury or exhaustion.		
	<ul> <li>Able to turn an unconscious user into a position where one's mouth and nose is clear of the water without active participation, but with limitations for wearers of special protective clothing or heavy equipment.</li> </ul>		
275N	For use in offshore waters or under severe weather or sea conditions.		
	<ul> <li>For users who don special protective clothing.</li> </ul>		
	• For users who are wearing items of significant weight (e.g., tool belt) and thus requires additional buoyancy.		
	• For person with clothing which may trap air and adversely affect the self- righting capacity of the lifejacket.		
	<ul> <li>Able to turn an unconscious user into a position where one's mouth and nose is clear of the water without active participation, even when they are wearing heavy clothing or weather gear.</li> </ul>		
1			

The table below summarises the different performance levels of life jackets:

Table 1: Performance level of life jackets and its application

For work at non-sheltered waters ISO 12402 recommends the use of life jackets with a performance level of at least 150N and above. Employers and life jacket users are advised to conduct a thorough risk assessment that is specific to their nature of their work before selecting a life jacket of appropriate performance level for the work activity.

## 3.3 Life Jacket Accessories

Below are examples of accessories that life jackets can be provided with:

Reflective material	Designed to raise the visibility of users in low light condition.
Whistle	Attached to life jackets to enable users to signal for help in an emergency
Lifting loop	Provides a secure attachment point for rescuers to hook onto for retrieving a person from the water.
Indicator light	Attached to life jackets to make users more visible and easier to locate.

Personal Locator Device (also commonly referred to as a Personal Locator Beacon)	Used as part of a system to assist in finding users who have fallen overboard. Particularly useful in areas with strong current and tides or while working at night.
Ride-up prevention system	A device attached to a lifejacket. When worn and adjusted correctly, the lifejacket is prevented from riding-up a user's torso in the event of the user entering water and due to effect of wave action. Commonly a crotch-strap or thigh-straps. It is recommended that a user only purchases a lifejacket with a hold-down device.
Spray Hood	A hood that can be pulled over the user's head to protect the worker's airway from sea spray. Useful in rough weather or water conditions when immediate rescue is not an option.
Deck Safety Harness integrated with a Life Jacket	Designed to allow users to be securely attached to an anchor point or lifeline on a vessel or boat, to protect users from falling overboard.

Deck safety harness with either textile or	
metal D-ring	

Table 2: Examples of life jacket accessories

## The mandatory accessories for conformance to ISO 12402 are:

Performance Level	Reflective material	Whistle	Lifting Loop
100N	~	~	×
150N	~	~	~
275N	$\mathbf{\mathbf{v}}$		~

Table 3: Mandatory ISO12402 life jacket accessories

### 3.4 Selection During Procurement

Employers are advised to acquire life jackets that are either SOLAS type-approved or meet ISO 12402 standards.

Employers/ purchasers should also consider the following in the procurement plan:

- **Trusted source:** Purchase directly from manufacturers and/ or authorised distributors and request the certificate/ declaration of conformity for the life jackets.
- **Comfort and sizing:** Acquire a variety of sizes so that workers can find a life jacket that fits them well. The selected life jackets should be comfortable to wear throughout the duration of work and should not restrict the worker's movement.
- **High visibility:** Select brightly coloured life jackets with reflective strips for improved visibility, especially in low light condition.
- Worker training: The life jackets should come with an instruction manual, and training should be conducted for workers to learn how to use the life jackets correctly. This is especially important for inflatable life jackets and those with special accessories.
- **Service date:** The life jackets should come labelled with a service date so that employers can keep track of when the life jackets need to be sent for maintenance.
- **Expiry date:** The life jackets should also come labelled with an expiry date. The expiry date specifies the life expectancy of the life jacket. Life jackets that have expired must be put out of service as they may no longer be reliable in times of emergency.
- **Overall value:** The procurement of life jackets should be viewed as a long-term investment to protect workers from harm. While initial cost is a concern, prioritising product quality and features that enhance protection can lead to fewer replacements over the long term and better overall value.

Please refer to <u>Annex B</u> for a basic guide on selecting a life jacket.

## 4. Pre-use Inspection

Before putting on a lifejacket, it is important to conduct a pre-use visual inspection to ensure the life jacket is in good condition and can be relied upon in the event of an emergency. This inspection involves examining all components of the life jacket, including straps, buckles, zippers, and inflation mechanisms, if applicable.

Do not use any life jacket found to be damaged or in poor condition. Below are examples of wornout life jackets that should be taken out of service and replaced immediately.



Figure 6: Damaged stitches on an inflatable life jacket



Figure 7: Discoloured and torn foam life jacket

A sample checklist outlines the key elements for inspection before putting on a lifejacket can be found in <u>Annex C</u>.

Users are advised to refer to the respective life jacket user manual for model-specific instructions on pre-use checks and to customise or expand the above inspection checklist accordingly.

# Information on the life jacket

Users can find out more about the life jacket to be used by referring to the labels and/ or markings on the life jacket, which typically indicate its performance level, size, basic instructions for use, and whether it is certified to ISO 12402 standard or is SOLAS type approved.



Figure 8: Example of a life jacket label

## 5. Life Jacket Use

When worn properly, a life jacket can keep the user afloat, reduce the risk of drowning and allow time for rescue. A well-fitted life jacket will enable the user to move comfortably on land and will not limit the user's visibility when in the water.

In general, to ensure a good fit,

- choose a life jacket of the correct size;
- follow the manufacturer's instructions for putting on the life jacket;
- adjust the straps to customise the fit to your body; and
- ensure the life jacket is comfortable and secure, with no more than a fist's width of space between your body and the buckle.

Typically, the step-by-step instructions for putting on an inflatable life jacket is illustrated below:



Figure 9: Typical steps for donning an inflatable life jacket \*to add that step 5 is only applicable for life jackets with crotch straps

Step 1: Choose the right size life jacket.

Refer to the sizing chart provided by the manufacturer and ensure that the user falls within the specified ranges.

Step 2: Put on the life jacket on over your clothes. Wear the life jacket like a vest. Do not wear an inflatable life jacket under any clothing.

Step 3: Fasten all buckles.

Fasten the buckles. Check that the manual inflation pull cord is hanging out from the bottom of the life jacket.

Step 4: Adjust the straps. Pull the straps to customise the fit to your body.

Step 5: Check for comfort.

Adjust the life jacket so that it is comfortable yet secure and it does not impede your movement as you move around.

Below are the steps-by-steps instructions on how to use the foam life jackets



1. Put lifejacket yoke on your neck.



2. Extend your hands into the lifejacket and adjust the position of the chest and pillows.



3. Connect upper and lower buckles, pull securing tape as tight as possible.



4. Finish the lifejacket and avoid contact or friction with sharp objects during use to prevent puncture and abrasion of the lifejacket.

Figure 10: Typical steps for donning a foam life jacket

## 6. Life Jacket Storage and Maintenance

To prolong the lifespan of a life jacket, it is important to clean it before storage and to store it in an environment that does not cause the life jacket material(s) to degrade.

To ensure that the life jacket is reliable and functions properly during emergencies, regular life jacket maintenance is crucial. Refer to the life jacket user manual and adhere to the maintenance schedule specified by the manufacturer.

## 6.1 Cleaning before Storage

In general, life jackets may be hand-washed with clean water to remove seawater, sand, and other contaminants from its surface. Refrain from using abrasive chemicals or cleaning agents which may damage the life jacket. Air-dry the life jacket in a well-ventilated area and once the life jacket is dry, check for any shrinkage or puckering before storage. Refer to the life jacket user manual for specific cleaning instructions which may differ based on the material(s) used in the life jacket.

### 6.2 Storage

Store life jackets in a well-ventilated area away from direct sunlight. Do not store life jackets in locations with extreme temperatures as this can cause material degradation. Also, do not store life jackets under high humidity conditions as this can result in mould or mildew growth, and in the case of inflatable life jackets, gas cartridge corrosion, as well as to prevent unwanted early release of the automatic inflation device caused by condensation. Avoid folding the life jacket or placing heavy objects on top of the life jackets as this can cause physical damage.

### 6.3 Servicing

Send your life jackets to an authorised service station based on the maintenance schedule specified by the manufacturer. Typically, inflatable life jackets are required to undergo yearly servicing. Maintenance checks carried out during servicing include subjecting the inflation mechanism and bladder to a functionality test, checking valve and seal integrity, replacing worn or expired components, and proper repacking.

A typical life jacket that has been serviced can be identified easily by the presence of a service tag or badge:



Figure 11: Service tag

The last date of servicing was November 2023 and the next serving to be carried out in 2024.



The **next** servicing should be carried out within December 2024.

<u>Note</u>: The number "24" on the badge indicates the year, while the notch's position on the rim at the number "12" indicates the month for the next servicing. Typically, the month is marked out or punctured to enhance clarity.

Figure 12: Service badge

## 7. Case Studies

Case Study 1: Technician fell into the sea while crossing from tanker to service boat using an accommodation ladder

### **Accident Description**

On May 17, 2022, a technician was disembarking from a tanker to a service boat using an accommodation ladder. The sudden sway of the service boat caused the technician to lose balance, causing the technician to fall overboard. Lifebuoys were deployed immediately, but the technician did not manage to grab any until about 10 minutes later, when he managed to hold on to one lifebuoy. However, the technician soon let it go and went out of sight. The technician's body was recovered four days later.



Profile view of the vessels involved (not to scale) (Photo source: Transport Safety Investigation Bureau)

### Investigation Findings (relevant to life jacket use)

- The technician was wearing a manually inflated life jacket at the time of the accident, but it was not inflated.
- It is unclear if the technician was disoriented or in a state of panic, unfamiliar with how to manually inflate the lifejacket, or influenced by the misleading label, which included instructions for both manual and automatic activation lifejacket.

### Recommendations

- Ensure all personnel involved in transfer operation wear suitable life jackets to stay afloat if they fall into the water.
- Ensure that users know the type of lifejackets being used and to be familiar with how the life jackets work.

For more information and recommendations on Case Study 1, see the <u>final report</u> from Transport Safety Investigation Bureau (TSIB).

Case Study 2: Shore technician fell into the sea when disembarking a vessel to board a launch boat using a pilot ladder

### **Accident Description**

On 16 February 2021, a Shore Technician (ST) was disembarking a vessel to board a launch boat via a pilot ladder. While descending the pilot ladder, he fell into the sea. Efforts to bring the ST out of the water were not successful. The ST was eventually brought out of the water by the port authority's patrol boat which responded to the man overboard call. The ST was sent to the hospital where he was pronounced dead.



View of port side pilot ladder rigged for disembarkation (Photo source: Transport Safety Investigation Bureau)

### Investigation Findings (relevant to life jacket use)

- The lifejacket worn by the ST may have been equivalent to performance level 100, suitable for use in sheltered or calm waters.
- The life jacket model was not suitable for non-swimmers as stated in the user manual, which was in Japanese.
- The backpack which the ST carried weighed about 8kg, which may have affected the ST's ability to stay afloat.

### Recommendations

- Bags can prevent a worker from staying afloat or obstruct the proper inflation of the lifejacket. Lift or lower bags separately. Workers embarking or disembarking a vessel must keep their hands free for the climb and not be carrying any bags.
- Use a life jacket of the correct performance level for the work environment and know the limitations of the life jacket in use.

For more information and recommendations on Case Study 2, see the <u>final report</u> from Transport Safety Investigation Bureau (TSIB).

### Case Study 3: Worker drowned after falling into river

#### **Accident Description**

On 12 March 2019, two river cruise workers reported for their night shift duty to berth and charge the electric boats at the jetty. While one of the workers was doing his rounds, he noticed his coworker resting on board a boat. About two hours later, the worker could not locate his co-worker. The police were notified, and the co-worker's body found about 16 hours later, floating near the location where he was last seen. The co-worker could have slipped and fell into the water when he was making his way from the boat back to land. He could have been moving from the boat to the pathway or from one boat to another to access the landing point.



#### **Investigation Findings**

- The worker did not know how to swim and was not wearing a life jacket.
- The worker likely exited the work area through an unsafe path.

#### Recommendations

- Conduct an RA before starting work, for all activities on a boat or near a body of water to control any foreseeable risk that may arise during the work. The RA should include slip, trip, and fall hazards along access routes, falling hazards while getting on or off a boat, health condition of workers as well as an assessment of each workers' ability to swim.
- Put on a suitable life jacket when working near water.

For more information and recommendations on Case Study 2, refer to WSH Council's <u>Case</u> <u>Studies on Working In and Around Water</u>.

## 8. References

- Workplace Safety and Health Act
- WSH (General Provisions) Regulations
- WSH (Risk Management) Regulations
- Code of Practice on Workplace Safety and Health Risk Management
- Code of Practice for Working Safely at Heights
- ISO 12402: 2020 Personal Flotation Devices (Life jackets and Buoyancy Aids)
- International Convention for the Safety of Life at Sea (SOLAS), 1974
- LSA Code International Life-Saving Appliance Code Resolution MSC.48(66)
- Maritime And Port Authority's Guidelines for Safe Transfer of Persons Between Vessels at Anchorages
- WSH Council's Guide to WSH for Service Providers on Safe Working on Ships at Anchorages
- WSH Council's Guide to WSH Obligations for Shipmasters and Contractors for Anchorage Works
- WSH Council's Case Studies on Working in and Around Water
- SS 701:2023 Code of Practice for inland and open water sporting activities

## 9. Acknowledgements

The WSH Council would like to thank the following for their valuable contribution towards this Guidelines:

	Organisations	Contributors
Co-Chairs	Singapore Maritime Academy, Singapore Polytechnic	Capt. Mohd Salleh A Sarwan
	Maritime Port of Authority of Singapore	Capt. Chong Jia Chyuan
Members	Singapore Association of Shipsuppliers & Services	Ms. Bay Yanming
	Singapore Shipping Association	Mr. Michael Phoon
	Noah Agencies 'N' Marine Services Pte Ltd	Mr. Eugene Wee Mr. Mohd Noor Bin Hamzah
	Survitec Group Limited	Mr. Harry Mok
	Tian San Shipping (Pte) Ltd	Mr. Mark Ko
	Ministry of Manpower	Mr. Sivashankar S/O Nagarejan
	Workplace Safety and Health Council	Mr. Muhd Zulnazri Bin Jaafar ( <i>until December 2023)</i> Ms. Joanne Teo Mr. Edison J Loh

The WSH Council would also like to thank Singapore Maritime Academy, Noah Agencies 'N' Marine Services Pte Ltd and Survitec Group Limited for the photos featured in this Guidelines.

## Annexes

### Annex A – Roles and Responsibilities

This table outlines the roles and responsibilities of different stakeholders in ensuring the safe and proper use of life jackets in a workplace, with a focus on adherence to safety standards, regular inspections, and training to promote water safety in addition to the roles and responsibilities of the stakeholders as mentioned in the Workplace Safety and Health Act 2006.

Roles	Responsibilities
Employer	<ul> <li>Conduct RA of the relevant works which has the potential risk of workers falling into water and drowning.</li> <li>Select the appropriate performance level of the life jacket according to job requirement.</li> <li>Use and maintain life jacket in accordance with the manufacturer's instructions.</li> <li>Develop the Safe Work Procedures and mandate the use of life jackets for working in and near water.</li> <li>Train workers on life jackets selection, inspection, maintenance, and usage.</li> <li>Ensure regular inspections, maintenance, and replacement of life jackets as needed.</li> <li>Encourage a safety culture that emphasizes the importance of life jackets usage and compliance.</li> <li>Keep records of life jacket inspection and maintenance.</li> <li>Ensure that an RA is conducted on all the WSH risks, associated with selection, inspection, use and maintenance of life jackets.</li> </ul>
Principal	<ul> <li>Ensure that any contractor engaged by the principal and any direct or indirect subcontractor has conducted RA of the relevant works which has the potential risk of workers falling into water and drowning.</li> <li>Ensure that the employee of any contractor engaged by the principal and any direct or indirect subcontractor has been issued a life jacket which is suitable for the works engaged for.</li> <li>Ensure that the persons at work have been trained to use the life jackets.</li> <li>If the Principal instruct the contractor or the workers on how work is to be carried out, the Principal duties will include that of an Employer.</li> </ul>
Self employed	<ul> <li>Conduct a thorough RA of the work activities which have the potential risk of falling into water and drowning, before undertaking the work.</li> <li>Select the appropriate performance level of the life jacket according to job requirement.</li> <li>Use and maintain the life jacket in accordance with the manufacturer's instructions.</li> <li>Regularly inspect the lifejacket to ensure that it is in good condition and functioning before each use.</li> <li>Familiarise with the proper use and inflation mechanism of the life jacket.</li> </ul>

	<ul> <li>Keep records of life jacket inspections and maintenance.</li> </ul>
Employee	<ul> <li>To wear a life jacket of the correct size, type, and performance level depending on the works to be carried out.</li> <li>Assess the risk and exercise caution when working near water.</li> <li>Visually ensure that the life jacket is in serviceable condition before use.</li> <li>Follow the manufacturer's instructions for cleaning, maintenance, and storage.</li> <li>Report any issues or concerns regarding the life jacket to the employer or safety personnel.</li> </ul>
Manufacturer / Supplier	<ul> <li>Ensure that appropriate labelling and adequate instructions are provided with each life jacket.</li> <li>Offer customers with different sizes and types of life jackets suitable for specific working conditions.</li> <li>Educate customers about the importance of proper use and maintenance of life jackets.</li> </ul>

## Annex B – Life Jacket Selection Guide for Users

Factor to Consider	Recommendation		
Certified life jacket	Select a life jacket that is SOLAS type-approved and/or certified to ISO 12402 or any other equivalent standard.		
Foam or inflatable	Choose between a foam or inflatable life jackets based on the task to be performed and its potential for interfering with the work activity.		
Manual or automatic inflation	Decide on automatic or manual inflation based on the work activity:		
	Automatically-inflated life jackets are suitable for work situations where a worker may lose consciousness as these will inflate automatically in water.		
	Manually-inflated life jackets can only be activated by a worker who is conscious. These are a good choice for work or emergency situations where there is ample time for users to react.		
Performance level (to be determined via	100N • For use in sheltered or calm waters. Not suitable for rough waters or non-sheltered waters.		
risk assessment)	150N • For use in general, offshore, and rough waters.		
	275N • For use in offshore and/ or under severe weather or sea conditions.		
Comfort and sizing	Select a life jacket of the right size with adjustable straps so that you can customise it for better comfort and fit.		
Visibility	Choose a brightly-coloured lifejacket with reflective strips for improved visibility.		
Accessories	Decide on the life jacket accessories necessary for the work environment and the possible emergency situation(s).		

### Annex C – Sample pre-use inspection checklist

The checklist serves as a reference and may vary depending on the type, model, and brand of life jackets. Users must adhere to the supplier or manufacturer's guidelines and the user manual when conducting preuse inspection checks.

	Y	Ν
All life jackets		
1. Cover is not damaged		
2. The stitching of the cover is not worn or frayed		
2. Straps, fasteners and buckles are in good condition		
3. Reflective strips are firmly attached and not faded		
4. Whistle is securely attached and working		
Inflatable life jacket		
1. Manual inflation pull cord is hanging freely from the cover and easily		
accessible.		
2. Quick bursting elements (e.g. zippers, Velcro straps, press studs) of the cover		
are working as they should		
3. Bladder shows no signs of damage		
4. Oral inflation tube is present and in good condition		
5. Gas cartridge is not punctured or corroded		
(Check the user manual or with the supplier on the correct way to open the cover.)		
Punctured		
Eas calificação		
Gas cartridge		
that is not		
punctared		
Foam life jacket		
1. Foam is not damaged (e.g., no signs of crumbling, water damage or mould).		
2. Foam is evenly distributed and not lumpy or compressed in any area.		

Published in XX XXXX by the Workplace Safety and Health Council in collaboration with the Ministry of Manpower.

All rights reserved. This publication may not be reproduced or transmitted in any form or by any means, in whole or in part, without prior written permission. The information provided in this publication is accurate as at time of printing. The Workplace Safety and Health Council does not accept any liability or responsibility to any party for losses or damage arising from following this publication.

This publication is available on www.wshc.sg.