



The Association represents diving contractors who are involved with inland or inshore diving operations in the UK and Ireland

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Guidance Procedure

Diving From, On or In Close Proximity to Merchant Vessels

Protocol for Isolating Machinery Systems



Important Notice

The Protocol summarised in this document is intended to be supplementary to the process and documents necessary for the planning and conduct of commercial diving operations .

This document does not eliminate the need to adopt or work under one or more approved permit systems that may form part of the Safety Management System used by the owners / operators of the Merchant Vessel on which the diving operation is to take place.



The Association of Diving Contractors (ADC) is the trade association representing diving contractors working Inland /Inshore in the UK and Ireland an constantly seeks to;

Cultivate and promote the art and science of commercial diving within the context of the activities of its members;

Establish uniform safe standards;

Encourage industry wide observation of such standards;

Encourage the enactment and enforcement of appropriate laws for the protection and regulation of the business of commercial diving;

To do any such other things as considered by the membership or management committee of ADC to be in their interest or that of this industry sector.

*The information included in this document is provided for guidance purposes only and seeks to promote industry best practice.
No legal liability shall attach to any guidance or recommendation circulated by the Association*

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1. Introductory Information:

1.1 Experience has shown that any diving operations conducted from, on or in close proximity to an operational Merchant Vessel have the potential to put diving personnel at additional risk, especially if there is inadequate planning and coordination between diving contractors and vessel operators or crews. Across the world commercial divers regularly suffer severe or fatal injuries when they come into contact with live underwater fittings on merchant vessels (for example, sea chests, rotating shafts, propellers, impellers or other types of thrusters).

1.2 In an effort to safeguard commercial divers engaged in diving operations of this type, effective measure must be taken to prevent access to dangerous parts of ships' machinery. If access to dangerous parts cannot be prevented, then effective measures must be taken to stop the movement of any dangerous parts of machinery before any person enters a danger zone. In addition the dangerous parts must remain motionless until all persons are confirmed clear of the danger zone.

(Important Note: For the purposes of this protocol "danger zone" means any zone in or around ships' machinery in which a diver is exposed to a risk to their health or safety.)

1.3 In the diving industry there are a number of situations where divers need to operate in or around danger zones associated with shipping; During maintenance or inspection operations or when using a vessel as a dive platform. During diving operations from, on, in, or close to live merchant vessels the operating controls for fittings located underwater, will normally be remote from the dangerous underwater parts. This means that the operators of such machinery may not be able to see divers in danger zones and may be unaware of their presence. Under such circumstances machinery may be inappropriately energised with devastating consequences for any diver working or moving in the danger zone.

1.4 In order to prevent the risk of injury or death to divers working from, on or in close proximity to a Merchant Vessel two things are needed:

(1) **All relevant personnel;** must be made aware that diving operations are being conducted, whether it be from the vessel's deck, on the vessel's hull, or simply in close proximity to the vessel.

(Important Note: "All relevant personnel" must include the Vessel Master, Officer of the Watch (OOW); bridge crew; Chief Engineer; engine room staff or any other persons whose acts or omissions could conceivably endanger the diver(s) during the course of the planned operation.)

(2) **Before diving operations commences;** a Permit-to-Work / Dive should be raised as a means of ensuring the necessary level of awareness amongst those involved. Appropriate warning signage must be placed at relevant locations and controls.

1.5 Secure isolation of any machinery that could have an adverse impact on the safety of the diver(s) must be achieved prior to the commencement of the diving operation. Secure isolation of dangerous ships' machinery must be maintained until diving operations have ceased and all divers are confirmed to be clear of the water by an authorised person and by cancellation of the Permit-to-Work / Dive.

(Important Note: "Isolation" means establishing a break in the energy supply in a secure manner i.e. by ensuring that unsafe (inadvertent or inappropriate) reconnection is not possible.)

1.6 Before any divers enter the water the possibilities and risks of reconnection should be identified as part of a joint risk assessment, prepared in consultation with the vessel operators, that should then establish how secure isolation can be achieved. For some equipment this can be done by simply removing fuses. For other equipment, an isolating switch or valve may have to be locked in the appropriate position to avoid unsafe reconnection.

(Important Note: Lock-off isolation methods are considered to be the most secure/robust means of preventing unsafe reconnection and should be implemented whenever it is possible to do so. Fuses and keys should only be held by authorised persons – usually the Master, Chief Engineer or Diving Supervisor. If multi-padlockable hasps are used to help maintain secure isolation then unique keys to individual padlocks may be held by more than one authorised person.)

1.7 **Power v Control Isolation:** It is good working practice to isolate machinery from its actual main power source rather than just to isolate a switch on a control panel that remains energised. Where it is possible to do so safely, always arrange to disconnect the power supply, not just the item that controls the power supply.

(Ask yourself: "Is the reliability of disconnecting through a control system the same as doing it through an open contactor on the main power?" The answer will virtually always be, "No".)

1.8 When isolating work equipment all relevant sources of energy must be considered and shut off where required e.g. relevant electrical, mechanical, pneumatic, and hydraulic sources. In addition any residual energy stored may need to be dealt with by discharge of capacitors or accumulators, relaxation of pressure in hydraulic or pneumatic pipework, venting etc. Scotching (blocking with a wedge or chock) may also be necessary.

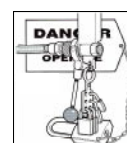
2. To the Vessel Master, Chief Engineer and First Officer:

- 2.1 In Great Britain the Diving at Work Regulations 1997 (DWR) *place an explicit requirement on any person whose acts or omissions* could adversely affect the health and safety of persons engaged in a diving project to do what is reasonable to ensure that diving is conducted in accordance with the Diving Regulations i.e. in a manner which protects the health and safety of all persons taking part in the diving project.
(Refer to DWR, Approved Code of Practice, Commercial Diving Projects Inland / Inshore, L104, Regulation 4, Clients and Others.)
- 2.2 The purpose of this guidance document is to ensure that all parties are made fully aware of their responsibilities and that every effort is made to reduce the risks associated with conducting diving operations from, on or in close proximity to your ship so far as reasonably practicable.
- 2.3 The scale of the underwater task assigned to the dive team is to some extent irrelevant. Whether the diving task involves a cursory check of a specific location below the waterline, or a full scale major repair or replacement programme, it is likely that the same level of effort will be required to isolate all dangerous parts of ships' machinery securely.
- 2.4 Secure isolation of the correct power supplies and controls is the key. Wherever possible, physical barriers should be used to eliminate the potential for reactivation to occur without the express knowledge or approval of the Diving Supervisor (see 1.4(2). above).

3. To the Diving Supervisor:

- 3.1 Only you have the authority to confirm that diving operations can commence.
- 3.2 Before commencing diving you **must be satisfied** that all machinery or other operating equipment that has the potential to affect the safety of the diver or the support team has been properly and securely isolated so that start-up or unsafe movement cannot occur without your authority.
- 3.3 The purpose of this document and the attached reference checklist, is to assist you in ensuring that every possible effort is made to isolate all dangerous parts of vessel machinery securely before you commit divers to the water.

(Important Note: Never Assume that the necessary isolations have been completed, based only on verbal confirmations.)
- 3.4 If any doubt or uncertainty exists, double check by physically viewing the locations at which the controls have been applied. Request the vessel operators to try starting the "isolated" machinery with the controls in place and watch their efforts.
- 3.5 Only commence diving if the machinery cannot be started without intentionally defeating robust preventive measures and when you are satisfied that unsafe reconnection should not occur.



4. Diving From, On or Close to Merchant Vessels – General Advice Summary:

The following is a summary of general recommendations made to vessel operators/crew and to diving contractors:

- (1) Where there is a risk of serious or fatal injury from remote start-up of machinery, then secure isolation must be achieved (lock-off isolation methods are the most robust / reliable and should be used wherever possible).
- (2) A formal Permit-to-Dive system specifying relevant isolations must be put in place and strictly observed.
- (3) The Vessel Master, Chief Engineer and Diving Supervisor must be signatories to the Permit.
Important Note: If the Master and Chief Engineer are off-shift and sleeping, then the officers officially deputising for the Master and Chief Engineer should sign the Permit-to-Dive.
- (4) All bridge and engine room staff should be briefed on the proposed diving work, and the vessel PA system should announce the commencement and the conclusion of diving operations.
- (5) Relevant signage warning that divers are working must be placed at all control points where machinery hazardous to a diver could be energised. (See attached sample Warning Sign)
- (6) Where it is possible to do so, machinery should be locked-off. If multi-padlockable hasps are used the Diving Supervisor should fix his own padlocks and keep the keys for these padlocks in his possession.
- (7) Where it has not been possible to institute lock-off isolation procedures members of the Dive Team may be posted as sentries on the bridge and in the engine room (or at any other control points where machinery hazardous to a diver could be energised) for the specific purpose of preventing inadvertent or inappropriate start-up of dangerous machinery by other persons.

The following checklist and sample warning sign are generally to be provided as separate sheets to this Protocol for use when conducting live diving operations

Diving Operations - Vessels Checklist
(To be completed by the Diving Supervisor)

Vessel Name:			
Vessel Type:			
Master Name:			
Duty Engineer Name:			
Date:		Location:	
Time:			

Reference Checklist

		<i>(Initial as appropriate)</i>	Confirmed	Not Confirmed
1	Has the Vessel Master (or his official deputy if the Master is off-shift and asleep) approved the diving operations?			
2	Has the Chief Engineer (or his official deputy if the Chief Engineer is off-shift and asleep) approved the diving operations?			
3	Are all bridge staff aware of the diving operations?			
4	Are all engine room staff aware of the diving operations?			
5	Has a suitably competent Duty Officer been allocated to co-ordinate the isolation of operating machinery onboard?			
6	Will the Duty Officer remain available throughout the period of the diving operations?			
7	If a shift change is expected while diving operations are ongoing, are arrangements in place so that when replacement staff arrive on-shift they will know that diving operations are underway and that all necessary risk control measures must remain in force?			
8	Have all necessary steps been taken to isolate securely all machinery hazardous to the divers by applying appropriate preventive measures on the bridge, in the engine room or at any other relevant locations?			
9	Can you confirm that no additional safety precautions are required to achieve the required isolation over and above that proposed by the Duty Officer/vessel crew?			
10	Are you satisfied that the proposed isolation control actions do fully shutdown / lock-off any possible movement or harmful action that could occur in the vicinity of the diving operation?			

Diving Operations - Vessels Checklist (To be completed by the Diving Supervisor)

<i>(Initial as appropriate)</i>		Confirmed	Not Confirmed
11	Have warning signs been placed at strategic locations alerting crew members, other than those on the bridge or control room, that the indicated equipment has been isolated for safety reasons?		
12	Have lock-off isolation procedures been used so as to minimise the chances of inadvertent or inappropriate reactivation of plant during diving operations conducted within danger zones?		
OR			
	If it has proven impossible to institute lock-off isolation procedures, have dive team members been posted as sentries for the specific purpose of preventing inadvertent or inappropriate start-up of dangerous machinery by other persons while diving operations are underway?		
13	Is the vessel displaying the appropriate diving signal(s)? Flag Alpha Ball – Diamond – Ball Red – White – Red (Lights)		
14	Has a VHF radio broadcast been made to alert: Harbour Authority / Port Control / VTS; and all other nearby vessels, informing all those in the vicinity that diving operations are approved and about to commence?		
15	No other controls or warnings are required. If they are, summarise here and then confirm:		

Confirmation Signature Box:

	<i>Name</i>	<i>Signature</i>
1	Vessel Master (or official deputy):	
2	Chief Engineer (or official deputy):	
3	Diving Supervisor:	

If any of the above checklist items are NOT CONFIRMED, additional control, actions will be required before diving operations can commence.

This checklist is intended to be used in conjunction with the requirements of a Permit to Work / Dive system that would normally be in use for diving on marine craft.

This Warning Sign is provided as a sample of the High Visibility format that should be adopted in support of this Protocol

WARNING

The Equipment / Machinery to which the sign is attached has been isolated as part of a Safety Procedure to allow Diving Operations to be conducted.

DO NOT

**Tamper with / Alter,
Unlock or Release,
Start Up or change the condition of
the Equipment / Machinery
without first contacting the Officer
named below.**

Duty Officer Details

Name:

Contact Number:

(Name and contact number must be clearly displayed)



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Working to Promote Safer Commercial Diving

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