



**International  
Standard**

**ISO 6319**

**Ships and marine technology —  
Marine environment protection  
— Conducting and documenting  
in-water cleaning of biofouling on  
ships**

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## Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO document should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see [www.iso.org/directives](http://www.iso.org/directives)).

ISO draws attention to the possibility that the implementation of this document may involve the use of (a) patent(s). ISO takes no position concerning the evidence, validity or applicability of any claimed patent rights in respect thereof. As of the date of publication of this document, ISO had not received notice of (a) patent(s) which may be required to implement this document. However, implementers are cautioned that this may not represent the latest information, which may be obtained from the patent database available at [www.iso.org/patents](http://www.iso.org/patents). ISO shall not be held responsible for identifying any or all such patent rights.

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For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see [www.iso.org/iso/foreword.html](http://www.iso.org/iso/foreword.html).

This document was prepared by Technical Committee ISO/TC 8, *Ships and marine technology*, Subcommittee SC 2, *Marine environment protection*.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at [www.iso.org/members.html](http://www.iso.org/members.html).

## Introduction

Preventing and removing biofouling on hulls of ships limits the introduction and spread of invasive aquatic species (IAS). Indeed, biofouling on ships is recognized as an important potential sub-vector to translocate IAS.<sup>[1]-[4]</sup> Such translocation threatens coastal environments by disrupting ecological systems, which can also negatively affect fisheries, aquaculture and tourism. Additionally, biofouling increases frictional drag on hulls and decreases the propeller efficiency, in turn increasing fuel consumption, greenhouse gas (GHG) emissions and air pollution from ships. Not only is biofouling estimated to increase a ship's fuel consumption by on average 9 %, <sup>[5]</sup> this added fuel consumption costs the shipping industry billions of USD.<sup>[6]</sup> Therefore, improving biofouling management across the global shipping fleet will have considerable benefits, both from an environmental and economic standpoint.

The most common way of controlling hull biofouling is applying coatings containing biocides, however, if the anti-fouling system (AFS) fails or if the ship's operational profile or environmental conditions deviate from the coating specification, removing biofouling by cleaning the hull can become necessary. Traditionally, service providers have offered in-water cleaning (IWC) services using brush-based IWC systems operated by human divers, with considerable variation among systems. More recently, IWC remotely operated vehicles (ROVs) using brush or water-jetting technology and autonomous systems as well as crew-operated systems have become available for in-port and in-transit cleaning. IWC may be conducted with or without capturing the materials liberated from the ship surface.

IWC can help to protect the environment from both IAS and harmful emissions by reducing the number of heavily fouled ships in international trade that may spread IAS during operations and idle periods. However, an inherent risk of IWC is that the cleaning operation itself may result in the release of IAS and contaminants into the local environment. The aim of this document is to provide best practices and requirements to ensure that IWC operations not only effectively achieve a clean hull, but simultaneously ensure that these measures are conducted safely, meaning that they protect human life and the environment. Environmentally sound IWC operations strive for little to no impact to marine ecosystems and avoid damage to ships' AFCs to facilitate their optimal performance.

This document aligns with and supplements the International Maritime Organization's (IMO) 2023 Guidelines for the control and management of ships' biofouling to minimize the transfer of invasive aquatic species, henceforth referred to as the IMO 2023 Biofouling Guidelines.<sup>[7]</sup> This document specifies that cleaning of microfouling (biofouling rating 1 or less) does not require the use of a capture system, while the cleaning of macrofouling (biofouling rating 2 or higher) requires the use of a capture system. At the time of publication of this document, comprehensive biofouling management policies are not widespread, and the few jurisdictions that have such policies use varying procedures.<sup>[8]</sup> This document aims to provide a level playing field by contributing to globally harmonized practices. By specifying a methodology for safe and sustainable IWC processes, procedures are provided to ports and other relevant authorities facing requests for IWC when a ship is in port or at anchorage. Furthermore, this information aims to assure shipowners that cleaning services are performed according to a set of standard practices regardless of the location. This document also informs a range of other stakeholders including ship biofouling IWC service providers, inspection service providers, IWC equipment manufacturers and coating manufacturers.

Through a stepwise approach, this document describes the IWC process chronologically. First, all relevant, preparatory aspects — such as general preparations, the assessment of the hull prior to the IWC operation, and preparations associated with any single cleaning event — are considered, then the cleaning operation itself is discussed, which is followed by considerations of post-cleaning processes and reporting. Questions of why and when cleaning is necessary, including the establishment of proactive or reactive cleaning regimes, are beyond the scope of this document. Rather, this document focuses on the questions of how the IWC preparations and operations should take place, and how they should be documented.

# Ships and marine technology — Marine environment protection — Conducting and documenting in-water cleaning of biofouling on ships

## 1 Scope

This document provides requirements and best practices for planning, conducting and documenting in-water cleaning (IWC) operations safely, efficiently and in an environmentally sound manner. Additionally, this document provides requirements and best practices for reporting on the effectiveness of IWC operations.

This document addresses all forms of IWC of external submerged surfaces, which are hull and niche areas, all types and levels of biofouling, which means biofilms, microfouling and macrofouling, conducted both with or without capture. It does not address internal piping.

The document has been established to inform ports, regulatory agencies, ship biofouling IWC service providers, inspection service providers, IWC equipment manufacturers, coating manufacturers, shipowners, ship managers, ship operators and other relevant stakeholders.

## 2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 20679, *Ships and marine technology — Marine environment protection — Testing of ship biofouling in-water cleaning systems*

## 3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <https://www.electropedia.org/>

### 3.1 antifouling coating

#### AFC

surface coating designed to prevent, repel or facilitate the detachment of *biofouling* (3.3) from *hull* (3.7) and *niche areas* (3.13) that are typically or occasionally submerged

Note 1 to entry: AFC includes both biocidal and non-biocidal coatings.

### 3.2 antifouling system

#### AFS

coating, paint, surface treatment, surface or device that is used on a *ship* (3.18) to control or prevent attachment of unwanted organisms