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BIOFOULING: QUESTIONS AND ANSWERS ON THE NEW RULES FOR SHIPS IN BRAZIL

WITH NORMAM-401/DPC, THE BRAZILIAN NAVY HAS STRENGTHENED CONTROL OVER MARINE BIOFOULING ON VESSELS. BELOW, THE MARITIME AUTHORITY CLARIFIES CENTRONAVE'S QUESTIONS ON THE TOPIC.

Growing international concern over the introduction of invasive alien species into the marine environment has led the Brazilian Navy to strengthen its regulatory framework for controlling biofouling on vessels. This resulted in the issuance of NORMAM-401/DPC, which established a comprehensive set of rules aimed at managing biological fouling on ship hulls and submerged structures. Below, the Maritime Authority, through the Directorate of Ports and Coasts (DPC), responds to questions from the National Center for Transatlantic Navigation (Centronave) on the subject.

With NORMAM-401/DPC, the country has made the guidelines of the International Maritime Organization (IMO) mandatory for vessels longer than 24 meters, applying them to both domestic and foreign ships operating in Brazilian jurisdictional waters, including those under Authorization for Traffic in Brazilian Jurisdictional Waters (AIT). Although formal procedures for requesting authorizations began in June 2025, the full enforcement of administrative penalties related to biofouling is scheduled to come fully into effect on June 10, 2026.

The regulation incorporates into the Brazilian legal framework international commitments undertaken within the IMO, particularly those set out in the International Convention for the Control and Management of Ships' Ballast Water and Sediments (BWM Convention), the International Convention on the Control of Harmful Anti-fouling Systems on Ships (AFS Convention), and the IMO Guidelines for the Control and Management of Biofouling, updated in 2023.

Biofouling, characterized by the accumulation of aquatic organisms such as algae, mollusks and other invertebrates on submerged surfaces of vessels, including hulls, propellers, rudders and structural niches, represents both an operational challenge and a significant environmental risk. Among the associated impacts are the introduction of invasive alien species, the disruption of coastal ecosystems, damage to biodiversity, economic impacts on activities such as fishing and aquaculture, as well as increased fuel consumption and greenhouse gas emissions. International studies indicate that biofouling is currently one of the main vectors for the spread of invasive organisms in the marine environment, alongside ballast water.

To address this risk, Brazilian regulations adopted a fouling classification system inspired by IMO guidelines, ranging from the absence of visible fouling (Level 0) to heavy macrofouling (Level 4). Vessels transiting between different biogeographic regions of the Brazilian coast, currently divided into three major areas: North, Northeast and South-east-South, must maintain fouling levels equal to or lower than Level 1, corresponding to microfouling or biofilm.

If Level 2 or higher is identified, hull cleaning may be required, following specific procedures and, when necessary, using systems for capturing and containing residues to prevent the dispersion of organisms into the environment. In this context, underwater cleaning is no longer merely an operational practice but becomes a regulated activity that requires prior authorization, a detailed operational plan, the use of containment technologies, and environmentally appropriate disposal of the removed residues. In addition, ports and local authorities may impose additional restrictions or designate specific areas for carrying out such activities.

The regulation also maintains ballast water management as one of its pillars, aligned with IMO international standards.

Standard D-1 requires ballast water exchange in open seas at least 200 nautical miles from the coast and in waters at least 200 meters deep, while Standard D-2 requires the use of certified ballast water treatment systems capable of meeting maximum limits for viable organisms and specific pathogens.

Since September 2024, the D-2 standard has progressively become mandatory for the international fleet. To demonstrate compliance, vessels must maintain specific documentation, including the Ballast Water Management Plan, the Ballast Water Record Book and the corresponding international certificate.

In addition, the regulation establishes requirements related to anti-fouling systems used on hulls, in accordance with the AFS Convention, prohibiting the use of certain harmful substances and requiring appropriate certification for larger vessels. It also defines requirements for underwater inspections, which must be carried out by companies certified by the Maritime Authority, and establishes specific documentation obligations, such as the Biofouling Management Plan and the Biofouling Record Book, which allow tracking of maintenance and control actions over time.

Failure to comply with these obligations may lead to different forms of liability based on environmental, sanitary and maritime regulations. The sanctioning regime provides for fines ranging from modest amounts, such as R\$ 500 (US\$ 94.67), to figures reaching tens of millions of reais, up to R\$ 50 million (US\$ 9.4 million), in addition to other administrative measures such as suspension of activities, vessel interdiction, daily fines for continued violations, and civil and criminal liability for potential environmental damage.

In light of this new regulatory framework, several operational questions have arisen among shipowners, operators, maritime agents and port terminals, particularly in situations where irregularities are identified during inspections carried out under Port State Control (PSC), such as the absence of certification or high levels of biofouling.

Below, we present the Brazilian Navy's responses to some of Centronave's main questions regarding the practical application of these rules in Brazilian ports.



IN THE EVENT OF MISSING CERTIFICATION OR A HIGH LEVEL OF MARINE FOULING IDENTIFIED BY THE PORT STATE CONTROL (PSC) INSPECTION:

1. Will the vessel be unable to proceed with mooring maneuvers?

Reply: In principle, the vessel will not be prevented from mooring.

2. Will the vessel be authorized to dock, but will have to perform technical underwater cleaning of marine fouling during the operation?

Reply: If the vessel can prove that the fouling was generated locally (e.g., in the anchorage area at Brazil), the decision to clean will be up to the ship, if it is to remain in the same biogeographical port region; if the next mooring location is in another biogeographical port region, the ship must perform the cleaning before departing for the next port. If the fouling is from another biogeographic region or from outside the AJB (Jurisdiction of Brazilian waters), cleaning may be authorized on an exceptional basis, as the standard requires inspection/cleaning before arrival at the AJB or before departure to the next region. The vessel will need to take the necessary corrective actions as provided for in Annex J. of the NORMAM 401.

3. Will the vessel be diverted to any specific authorized area in the port to perform cleaning before docking?

Reply: Depending on each location port, and the rules of the Port Authority and/or terminal.

4. Will the vessel be allowed to dock and operate, and perform cleaning upon departure in any specific authorized zone?

Reply: Yes, upon request to the local port Harbor Master and in accordance with the port/terminal's established port zones regarding authorized areas.

5. If any penalty is applied, and after payment of the same, will the vessel be allowed to dock?

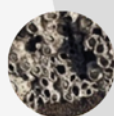
Reply: The payment of fines resulting from environmental infraction notices is not billed immediately. Cases not covered by the rule and/or specific cases should be forwarded to dpc.secom@marinha.mil.br.

6. Has the Maritime Authority designated specific areas in each port for hull cleaning services, if necessary?

Reply: Port authorities/terminal managers should be consulted in this regard, as the establishment of these areas in ports/terminals is not within the jurisdiction of the Brazilian Harbour Master. Once established by the relevant authorities, they should be included in the Port Authority Standards and Procedures of each port jurisdiction.

DETAILS OF NORMAM-401/DPC

BIOFOULING



The accumulation of consolidated micro and macroorganisms (such as barnacles, algae, and mussels) that increase the hull's thickness.

1



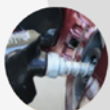
Greater resistance on the ship's hull.

2



High costs associated with removing these underwater structures.

3



Increased fuel consumption due to added resistance in the water.

4



Higher carbon dioxide emissions into the atmosphere, contributing to the main global impact: the greenhouse effect.

5



ANNEX J / SCALE ASSESSMENT OF FOULING AND RECOMMENDED CLEANING PRACTICES

Illustration	Fouling Level	Description	Coverage	Action
	0. No biofouling	Totally clean surfaces. No visible biorusting.		
	1. Microfouling	Areas partially or totally submerged by microfouling. Metal and painted surfaces may be visible under the inlay.		Proactive cleaning of the hull, niche and other submerged areas.
	2. Lightweight macrofouling	Presence of microfouling and multiple occurrences of macrofouling. The species Incrustants are not easily removed by hand.	1-15% of the surface	Reactive cleaning with capture. It is recommended to shorten the interval until the next inspection.
	3. Moderate macrofouling	Presence of microfouling and multiple occurrences of macrofouling.	16-40% of surface	If the AFS is deteriorated, dry docking with maintenance/ reapplication of the AFS is recommended.
	4. Heavy macrofouling	Large areas covered by macrofouling or areas completely covered by macrofouling.	41-100% of surface	

- J-1 - Brazil P&I Notes : AFS - Antifouling System.

CAPTURE - Process of containing, collecting and removing biofouling, material and waste released from underwater hull cleaning in water or in dry dock.

1. BIOFOULING: ENVIRONMENTAL, ECONOMIC, AND OPERATIONAL RISK

Biofouling is the accumulation of aquatic organisms, such as algae, mollusks, and other invertebrates, on submerged surfaces of a vessel, including the hull, propellers, rudders, and structural niches. The problem is not merely aesthetic or hydrodynamic.

The main risks include:

- Introduction of exotic invasive species;
- Imbalance of coastal ecosystems;
- Damage to local biodiversity;
- Economic impacts on fisheries and aquaculture;
- Increased fuel consumption and greenhouse gas emissions.

International studies indicate that biofouling is currently one of the main vectors for the introduction of invasive species into the marine environment, alongside ballast water.

2. CLASSIFICATION

NORMAM-401/DPC adopts a classification system based on fouling levels, inspired by IMO guidelines:

- Level 0 – no visible fouling;
- Level 1 – microfouling (biofilm);
- Level 2 – light macrofouling (1% to 15%);
- Level 3 – moderate macrofouling (16% to 40%);
- Level 4 – heavy macrofouling (41% to 100%).

Vessels transiting between different Brazilian biogeographic regions must maintain a fouling level equal to or lower than Level 1. If Level 2 or higher is identified, cleaning using a waste capture system may be required.

This point is particularly sensitive: underwater cleaning cannot be carried out indiscriminately. The following are required:

- Prior request to the maritime authority (with minimum advance notice);
- Detailed operational plan;
- Waste containment and capture system;
- Environmentally appropriate disposal of debris.

Ports and local administrations may impose additional restrictions, including prohibiting routine cleanings.

3. BALLAST WATER STANDARDS

Ballast water management remains one of the pillars of the regulation.

- **D-1 Standard** – open sea exchange: Requires exchange at least 200 nautical miles from the coast and in waters with a minimum depth of 200 meters, with at least 95% volumetric efficiency. Methods include sequential exchange, flow-through exchange, or Brazilian dilution exchange.

- **D-2 Standard** – treatment by approved system: Requires the installation of a certified Ballast Water Management System (BWMS) capable of meeting maximum limits for viable organisms and specific pathogens. Since September 2024, the D-2 standard has become mandatorily applicable to the international fleet, progressively eliminating exclusive reliance on the D-1 standard.

In addition to technical compliance, the regulation requires:

- Ballast Water Management Plan (BWMP);
- Ballast Water Record Book (BWRB);
- Valid International Certificate.

The absence, inconsistency, or improper completion of these documents may result in penalties.

4. EXEMPTIONS

NORMAM-401/DPC establishes that, under exceptional circumstances, certain vessels may be temporarily exempted from fully complying with ballast water exchange or treatment procedures. These situations do not represent unrestricted flexibility in the regulation but rather safeguard mechanisms applicable to emergency or unpredictable situations. Among the scenarios covered are:

- **Operational emergencies:** Circumstances requiring urgent action to preserve the safety of the vessel or to assist persons at sea may justify an exception.
- **Force majeure or fortuitous events:** Extraordinary and unavoidable situations that threaten human life or the integrity of the vessel may justify the immediate non-performance of ballast water exchange or treatment.
- **Pollution prevention:** If exchanging or retaining ballast water represents a greater risk of environmental damage, discharge may be allowed as a measure to prevent or mitigate a more serious pollution event.
- **Accidental discharge:** When the release of ballast water occurs due to damage to the hull or equipment, provided that reasonable preventive measures were taken to avoid the incident.

- **Uptake and discharge at the same location:** When water is taken on and discharged at the exact point of origin, without contact with waters from other regions, the operation may be considered to pose reduced environmental risk.

- **Contingency circumstances:** When unforeseen factors make ballast water treatment technically unfeasible, such as unexpected system failures or unforeseen operational limitations, the regulation allows differentiated treatment, provided that it is properly justified.

It is important to emphasize that any of these situations must be immediately reported to the local maritime authority. Claims of exemption must be supported by consistent documentation, including technical records, onboard reports, and evidence demonstrating the necessity of the measure adopted.

5. ANTI-FOULING SYSTEMS (AFS)

In line with the AFS Convention, the regulation prohibits the use of organotin substances and other harmful compounds in anti-fouling paints. Vessels with a gross tonnage of 400 or more must carry an International Anti-Fouling System Certificate (IAFS). Smaller vessels must maintain a declaration of compliance.

The disposal of residues from scraping and painting is considered a potentially polluting activity and must be carried out through a licensed company.

6. UNDERWATER INSPECTIONS AND CERTIFICATION

Underwater inspection and cleaning operations may only be performed by companies duly certified by the Directorate of Ports and Coasts, in accordance with NORMAM-222/DPC. These companies must hold a CSSM (Diving System Safety Certificate) and an FCEM (Diving Company Registration Form).

These requirements ensure that the activities are conducted within technical and safety standards compatible with the complexity of the operation and with environmental protection.

7. UNDERWATER CLEANING: CRITERIA AND PROCEDURE

The regulation distinguishes two types of intervention:

- **Proactive cleaning:** Consists of the periodic removal of microfouling (initial layer of organisms). It is a preventive measure aimed at maintaining hull efficiency. However, when fouling exceeds Level 1, cleaning without a waste capture system is prohibited.

- **Reactive cleaning:** Applies to situations where biofouling has already reached Level 2 or higher. In such cases, the operation must mandatorily use a waste capture and containment system. Debris must be disposed of in an environmentally appropriate manner, and the request for authorization must be submitted to the local maritime authority at least 10 days in advance.

Cleaning carried out without authorization or without containment may be classified as an environmental violation.

8. MANDATORY DOCUMENTARY REQUIREMENT

The regulation establishes two central instruments for control and monitoring:

Biofouling Management Plan (BFMP): This is a preventive document aimed at the continuous management of biological risk. It should function as a structured technical document describing in detail:

- Maintenance strategies for the hull and submerged areas;
- Periodic inspection schedules;
- Procedures for scheduled and corrective cleaning;
- Methods for containment and disposal of removed residues.

Biofouling Record Book (BFRB): This is the operational traceability instrument. All actions related to inspection, maintenance, and cleaning must be recorded, along with relevant technical observations that allow the environmental risk level of the vessel to be assessed. The absence or improper completion of these documents may result in penalties imposed by the maritime authority.

9. BIOGEOGRAPHIC REGION

The regulation divides the Brazilian coastline into three distinct biogeographic regions: Northern Region, Northeastern Region, and Southeast-South Region. This division takes into account the ecological and oceanographic characteristics specific to each coastal zone.

Vessels entering Brazilian waters or navigating between these regions must present a biofouling level equal to or lower than Level 1, characterized by microfouling (biofilm or "slime").

If Level 2 (light macrofouling) or higher is identified, the vessel may be required to undergo cleaning before continuing operations.

This requirement aims to prevent the transport of organisms between distinct ecosystems, thereby reducing the risk of introducing exotic invasive species.



10. PENALTIES

The sanctioning regime is broad and may involve multiple legal spheres. Penalties may be based on:

- Environmental Crimes Law (Law No. 9,605/1998);
- Decree No. 6,514/2008;
- Law No. 9,966/2000 (Oil Law);
- Law No. 6,437/1977 (health violations).

Fines may range from: R\$ 500 (US\$ 94.67) to R\$ 50 million (US\$ 9.4 million), depending on the violation, extent of the damage, and the economic capacity of the offender. Health violations may reach values exceeding R\$ 1.5 million (US\$ 284,000).

In addition to fines, the following measures may be applied:

- Partial or total suspension of activities;
- Vessel detention;
- Daily fines for continued violations;
- Prohibition from contracting with the public administration;
- Civil liability for environmental damages;
- Criminal liability.

11. ADMINISTRATIVE PROCEDURE

The process begins with a notice of violation issued by the maritime authority. The accused party has a deadline to submit an administrative defense. In certain situations, particularly involving foreign vessels, a financial guarantee may be required to ensure payment of the fine.

After the decision, an administrative appeal may be filed. If the penalty is upheld, the fine must be paid within the established deadline, under penalty of registration as public debt and judicial collection.

Liability may be excluded upon proof of absence of causal link, force majeure or fortuitous event, or exclusive fault of a third party.

12. STRATEGY AND CONSEQUENCE

Non-compliance with NORMAM-401/DPC is not limited to financial consequences. It may result in operational delays, loss of contracts, restrictions in strategic ports, and negative exposure before environmental authorities and international clients.

With growing global pressure for ESG practices and emission reductions, proper biofouling management is also directly connected to energy efficiency and the decarbonization of maritime transport. Given the regulatory complexity and the severity of penalties, compliance cannot be treated as a merely documentary issue.

It requires continuous monitoring of the hull and structural niches, scheduled preventive maintenance, crew training, periodic internal audits, and constant updates in light of regulatory revisions.

NORMAM-401/DPC establishes a high standard of environmental responsibility in Brazil. Understanding its requirements, recognizing the risks associated with biofouling and ballast water, and structuring internal compliance governance are essential measures for any operator intending to operate safely, sustainably, and with legal protection in Brazilian waters. In this context, compliance is not merely a legal obligation but also a risk management instrument and a competitive advantage.



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