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Technical specifications and guidance

for the implementation of devices for the continuous monitoring of catching vessels' engine power

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Technical specifications and guidance for the implementation of devices for the continuous monitoring of catching vessels' engine power

Developed by the Technical Working Group on Engine Power, subgroup of the Expert Group on Fisheries Control

This guidance document is legally non-binding, intended to provide guidance to Member States and stakeholders about how EU law in the field of engine power certification and verification should be applied, on the basis of the views of the Commission's Directorate-General for Maritime Affairs and Fisheries and the majority of Member States in the Expert Group on Fisheries Control, who endorsed this guidance on 7 March 2025. The binding interpretation of EU legislation is the exclusive competence of the Court of Justice of the European Union. The views expressed in this guidance are without prejudice to the position that the Commission might take before the Court of Justice.

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1. Introduction and regulatory context

1.1. Engine power in the Common Fisheries Policy – introduction continuous monitoring

Engine power is one of the capacity indicators of catching vessels regulated through the Entry/Exit scheme for which the Common Fisheries Policy[1] (CFP) sets ceilings. Member States are required to put in place measures to adjust the fishing capacity of their fleet to their fishing opportunities over time. Engine power is also used as a determinant and restrictive parameter to manage fishing effort, aimed to protect specific areas and fish stocks and to manage fisheries sustainably. The declared and certified maximum continuous engine power of catching vessels must reflect the actual maximum power of propulsion engines installed on board, which is essential for sustainable fisheries management and to realise a level playing field among competing fishermen in the European Union.

Member States must certify and verify the engine power of certain catching vessels to ensure the correct declaration and registration of engine power, as laid down in Council Regulation (EUC)1224/2009[2] (hereafter: the Control Regulation), which at the end of 2023 has been amended by Regulation (EU) 2023/2842[3] (hereafter: the new Control Regulation).

Among others, the new Control Regulation introduced provisions on the continuous monitoring of the engine power for certain categories of catching vessels, which will become applicable in 2028.

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1 REGULATION (EU) No 1380/2013 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 11 December 2013 on the Common Fisheries Policy, amending Council Regulations (EC) No 1954/2003 and (EC) No 224/2009 and repealing Council Regulations (EC) No 2371/2002 and (EC) No 639/2004 and Council Decision 2004/585/EC.

2 Council Regulation (EC) No 1224/2009 of 20 November 2009 establishing a Community control system for ensuring compliance with the rules of the common fisheries policy, amending Regulations (EC) No 847/96, (EC) No 2371/2002, (EC) No 811/2004, (EC) No 768/2005, (EC) No 2115/2005, (EC) No 2166/2005, (EC) No 388/2006, (EC) No 509/2007, (EC) No 676/2007, (EC) No 1098/2007, (EC) No 1300/2008, (EC) No 1342/2008 and repealing Regulations (EEC) No 2847/93, (EC) No 1627/94 and (EC) No 1966/2006. (OJ L 343, 22.12.2009, p. 1.).

3 Regulation (EU) 2023/2842 of the European Parliament and of the Council of 22 November 2023 amending Council Regulation (EC) No 1224/2009, and amending Council Regulations (EC) No 1967/2006 and (EC) No 1005/2008 and Regulations (EU) 2016/1139, (EU) 2017/2403 and (EU) 2019/473 of the European Parliament and of the Council as regards fisheries control PE/38/2023/REV/1 (OJ L, 2023/2842, 20.12.2023).

Any use of "new Control Regulation" hereafter refers to the amended Control Regulation. Any use of "(new) Control Regulation" refers to both the Control Regulation and the new Control Regulation.

1.2. Technical scope

In accordance with Article 39a of the new Control Regulation, these technical specifications and guidance concern **systems permanently installed on board catching vessels that measure and record propulsive engine power continuously and store the recorded engine power data on board.**

The objective of this guidance is to support Member State authorities with the full and harmonised implementation of the newly introduced provisions on the continuous monitoring of the engine power.

1.3. Regulatory context

These technical specifications and guidance describe systems that are permanently installed on board catching vessels, that measure and record engine power continuously under application of Article 39a of the new Control Regulation.

The main purpose of these systems is to ensure compliance with the prohibition to fish with a catching vessel that is equipped with an engine the power of which exceeds the one established in the fishing licence (Article 39 (1) of the (new) Control Regulation).

Member States are responsible for certifying engine power and issuing engine certificates (Article 40 (1) of the (new) Control Regulation), and Member States are required to ensure that the certified engine power is not exceeded (Article 39 (2) of the (new) Control Regulation).

Permanently installed systems that measure and record engine power continuously contribute to reaching the objective that the certified engine power is not exceeded.

1.4. Ongoing development of the regulatory context

These technical specifications and guidance are developed considering Article 39a (5) of the new Control Regulation, which states that the Commission shall, by means of implementing acts, lay down detailed rules concerning the installation, technical requirements and characteristics of these systems, and that

those implementing acts shall be adopted in accordance with the examination procedure referred to in Article 119(2) of the (new) Control Regulation.

The guidance has been developed within the framework of the Technical Working Group on Engine Power, to support the development of detailed rules for the installation, technical requirements and characteristics of these systems and the implementation by Member States of the regulatory requirements. The working group is managed by the European Commission (DG MARE) with support of the external contractor Roos Diesel Analysis BV, and is composed of experts from the Member States' competent authorities in the field of engine power certification and verification, the European Fisheries Control Agency (EFCA) and other external experts that were invited or consulted on an ad-hoc basis.

1.5. Applicability

1.5.1. Catching vessels at risk of non-compliance based on a joint risk assessment

In accordance with Article 39a (1) of the new Control Regulation, vessels that meet both of the following two criteria, should undergo a risk assessment:

(a) The vessel is equipped with inboard propulsion engines with a certified engine power[4] that exceeds 221 kW;

(b) The vessel uses towed gear, as defined in Article 6, point (12), of Regulation (EU) 2019/1241[5].

In accordance with Article 39a (7) of the new Control Regulation, this risk assessment must be jointly carried out by the Member States, in cooperation with EFCA. In accordance with Article 39a (6) of the new Control Regulation, the risk assessment must:

[4] In case a vessel is equipped with multiple main engines, irrespective of whether these engines are driving one or multiple propeller shafts, the engine power is the sum of the engine powers of all propulsive engines combined.

[5] Regulation (EU) 2019/1241 of the European Parliament and of the Council of 20 June 2019 on the conservation of fisheries resources and the protection of marine ecosystems through technical measures, amending Council Regulations (EC) No 1967/2006, (EC) No 1224/2009 and Regulations (EU) No 1380/2013, (EU) 2016/1139, (EU) 2018/973, (EU) 2019/472 and (EU) 2019/1022 of the European Parliament and of the Council, and repealing Council Regulations (EC) No 894/97, (EC) No 850/98, (EC) No 2549/2000, (EC) No 254/2002, (EC) No 812/2004 and (EC) No 2187/2005 PE/59/2019/REV/1 (OJ L 198, 25.7.2019, p. 105–201).

(a) Establish the level of risk of non-compliance by fleet segment, based on gear, area covered, effort regime, species targeted, power reduction and speed;

(b) Take into consideration confirmed infringements related to the use of an engine with an engine power exceeding that indicated on the engine certificate;

(c) Include an analysis determining the likelihood and impact of non-compliance with the rules of the common fisheries policy concerning engine power, in particular as regards overfishing;

(d) Take into consideration exceedance of the capacity ceiling.

If the risk assessment referred to above indicates that the catching vessel poses a high risk of non-compliance with the rules of the common fisheries policy concerning engine power, the Member State must ensure that the catching vessel is equipped with a permanently installed system that measures and records engine power continuously, in accordance with Art. 39a (1) of the new Control Regulation.

1.5.2. Catching vessels at risk of non-compliance based on a data verification

In accordance with Article 41 (1) of the new Control Regulation, Member States must perform a risk analysis, in accordance with a sampling plan, to select catching vessels which are not equipped with a continuous monitoring system as provided in Article 39a of the new Control Regulation, and perform a data verification of these vessels. Article 41 (1) of the (new) Control Regulation provides the minimum requirements of the data verification referred to above. In accordance with Article 41 (5) of the new Control Regulation, the Commission may, by means of implementing acts, lay down detailed rules concerning the verification of engine power, including the methodology for establishing the sampling plan.

If during the data verification the analyses of the information concerning the characteristics of the vessel concerned provides indications that the engine power of a catching vessel exceeds the power indicated in the fishing license or in the Union or national fishing fleet register, in accordance with Article 41 (2) of the new Control Regulation, the Member State must proceed with a *physical verification* of the engine power, or needs to ensure that the vessel is equipped with a permanently installed system that measures and records engine power continuously, in accordance with Article 39a (1) of the new Control Regulation.

The Commission published *'Technical guidance for the monitoring, certification and verification of engine power in EU fisheries control'*[6], which were developed by the Technical Working Group on Engine Power. That guidance provides detailed suggested procedures for the sampling and data verification procedure and the physical engine power verification referred to above.

1.5.3. Catching vessels operating in the Plaice Box

In case a catching vessel meets all of the following three conditions:

(a) The vessel uses bottom trawls or Danish seines;

(b) The vessel is equipped with inboard propulsive engines with a certified engine power between 120 and 221 kilowatts;

(c) The vessel is operating in the area referred to in part C, point 2.1, of Annex V to Regulation (EU) 2019/1241.

The Member State must ensure, in accordance with Article 39a (2) of the new Control Regulation, that the vessel is equipped with a permanently installed system that measures and records engine power continuously, in accordance with Article 39a (1) of the new Control Regulation.

1.5.4. Catching vessels at risk of non-compliance based on other risk indicators

Under application of Article 39a (8) of the new Control Regulation, Member States may provide that catching vessels equipped with inboard propulsive engines with a certified engine power of no more than 221 kilowatts and using towed gear, as defined in Article 6 (12) of Regulation (EU) 2019/1241, must be equipped with permanently installed systems that measure and record engine power continuously, based on the risk of non-compliance with the rules of the common fisheries policy concerning engine power.

A decision tree representing the applicability and decision criteria above, is included in Annex 1.

[6] Directorate-General for Maritime Affairs and Fisheries (European Commission), Roos Diesel Analysis B.V., Technical guidance for the monitoring, certification and verification of engine power in EU fisheries control, Luxembourg, Publications Office of the European Union, 2025.

1.6. Content of these specifications and guidance

Some of the terms and definitions used in this guidance are of a technical nature. Section 2 aims at clarifying terms and definitions used in this guidance and removing possible ambiguity. Section 3 defines the essential functional requirements of systems permanently installed on board catching vessels that measure and record propulsive engine power continuously and store the recorded engine power data on board. Section 4 defines the functional and technical specifications of these systems, that follow from the essential functional requirements defined in section 3. Section 5 outlines the procedure for approval of these systems by Member State competent authorities and how ongoing compliance of the systems should be demonstrated to the Member State competent authorities. Section 6 aims to provide guidance and considerations on the implementation of the requirement to permanently install systems on board catching vessels that measure and record propulsive engine power continuously and store the recorded engine power data on board, pursuant to the entry into force of the relevant legislation.

2. Terms and definitions

2.1. Brake power

Power or the sum of the powers delivered at the end of the crankshaft or its equivalent, with the equipment and auxiliaries fitted as required by the relevant satellite ISO standard.

[Source ISO 15550:2016[7], clause 3.3.3]

2.2. Bias error

The difference between the true value of a quantitative parameter and the average of measured values of that parameter.

2.3. Catching vessel

A vessel equipped or used for the capture of marine biological resources for commercial purposes.

[Source: new Control Regulation Art. 4(33)]

2.4. Classification Society

Technical organisation to which certification of compliance with IMO conventions to a certain extent has been delegated, which develop and apply technical standards for the design, construction and survey of ships and which carry out surveys and inspections on board ships. At present, 11 classification societies are recognised by the European Commission[8].

[Source: Directive 94/57/EC[9] (recast), Directive 2009/15/EC and Regulation (EC) 391/2009[10] and www.emsa.europa.eu]

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7 ISO 15550:2016, Internal combustion engines — Determination and method for the measurement of engine power — General requirements.

8 Commission Decision 2022/C 466/07, List of organisations recognised on the basis of Regulation (EC) No 391/2009.

9 COUNCIL DIRECTIVE 94/57/EC of 22 November 1994 on common rules and standards for ship inspection and survey organizations and for the relevant activities of maritime administrations.

10 REGULATION (EC) No 391/2009 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 23 April 2009 on common rules and standards for ship inspection and survey organisations (Recast).

2.5. Continuous (engine power) monitoring device

A permanently installed system that continuously measures and records engine power, in accordance with the requirements laid down in Article 39a of the new Control Regulation.

2.6. Controllable pitch propeller (CPP)

Propeller with blades whose position (angle relative to the centreline of the propeller shaft) can be adjusted by hydraulic or mechanical means.

2.7. Control Regulation

Council Regulation (EC) No 1224/2009 of 20 November 2009 establishing a Community control system for ensuring compliance with the rules of the common fisheries policy.

2.8. Co-rotating gearbox

Gearbox where the direction of rotation (clockwise or counter-clockwise) of the input shaft (engine side) is equal to that of the output shaft (propeller side) while operating ahead.

2.9. Counter-rotating gearbox

Gearbox where the direction of rotation (clockwise or counter-clockwise) of the input shaft (engine side) is opposite to that of the output shaft (propeller side) while operating ahead.

2.10. Engine power

Engine power (main propulsion) is defined as the total of the maximum continuous engine power of each engine, determined in accordance with ISO 3046-1:2002[11] at the flywheel of each engine and which can by mechanical, electrical, hydraulic or other means, be applied to vessel propulsion, after the

[11] Section 11.1.2 Power and torque of ISO 3046-1:2002 provides that "For engines delivering power through a shaft or shafts, any power in accordance with the requirements of this part of ISO 3046 is proportional to the mean torque, calculated or measured, and to the mean rotational speed of the shaft or shafts transmitting this torque".

The relation between shaft power, shaft speed and shaft torque, determined at one position can be described as:

$$P_x = T_x \times \frac{Vx \times 2\pi}{60}$$

Where $P_x = shaft\ power\ (kW)\ at\ position\ x$

$T_x = shaft\ torque\ (kNm)\ at\ position\ x$

$V_x = shaft\ speed\ (rpm) at\ position\ x$

engine has been derated, if applicable, provided that there is no possibility to increase the engine performance above the stated maximum continuous engine power of each engine. However, when a gearbox is incorporated into the engine, the power shall be measured at the gearbox output flange.

[Source: Control Regulation, Article 40, Commission Implementing Regulation[12], Article 61, Regulation (EU) 2017/1130[13], Article 5, and Working Group meeting no. 2]

2.11. Engine power certificate

Any document issued by, or on behalf of, the (Member State) certifying authority, which has formally been designated as the engine power certificate in the meaning of Article 40 of the (new) Control Regulation.

2.12. Engine speed

The revolutionary speed of the crankshaft of the engine, expressed in revolutions per minute (rpm or $n\ min^{-1}$).

2.13. Fishing vessel

A catching vessel or any other vessel used for commercial exploitation of marine biological resources, including support vessels, fish processing vessels, vessels engaged in transhipment, towing vessels, auxiliary vessels and carrier vessels used for the transportation of fishery products, but excluding container vessels and vessels used exclusively for aquaculture.

[Source: new Control Regulation Article 4(31)]

2.14. Fixed pitch propeller (FPP)

Propeller with blades whose position (angle relative to the centreline of the propeller shaft) cannot be adjusted by any means (except structural deformation, for which the propeller needs to be removed from the shaft and heated).

[12] Commission Implementing Regulation (EU) No 404/2011 of 8 April 2011 laying down detailed rules for the implementation of Council Regulation (EC) No 1224/2009 establishing a Community control system for ensuring compliance with the rules of the Common Fisheries Policy. (OJ L 112, 30.4.2011, p. 1).

[13] REGULATION (EU) 2017/1130 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 14 June 2017 defining characteristics for fishing vessels (recast of Council Regulation (EEC) No 2930/86).

2.15. Flag state

The state in which a vessel is registered, identifying which state, and thus which authority, is responsible for the implementation of flag state responsibilities, arising from national, Union, and international legislation, including IMO conventions.

2.16. Gearbox (marine)

Equipment between the engine and the propeller shaft, which reduces the revolutionary speed of the propeller relative to the speed of the engine crankshaft (reduction gearbox) through gear transmission. Clutches may be incorporated into the gearbox to allow for running in neutral mode or to engage a different number of gears, with the objective to reverse the direction of rotation of the output shaft (reversal gearbox). Additional gear driven (or driving) shafts may be incorporated to consume engine power for auxiliary applications (or to add power to the driven shaft).

2.17. International Maritime Organization (IMO)

A specialised agency of the United Nations which is responsible for measures to improve the safety and security of international shipping and to prevent pollution from ships. It is also involved in legal matters, including liability and compensation issues and the facilitation of international maritime traffic. It was established by means of a Convention adopted under the auspices of the United Nations in Geneva on 6 March 1948 and met for the first time in January 1959.

[Source: www.imo.org]

2.18. Main engine

Engine on board a vessel whose power is primarily used to propel the vessel.

2.19. MARPOL

International Convention for the Prevention of Pollution from Ships (MARPOL), adopted by the IMO (2.17) in 1973 (Convention), 1978 (1978 Protocol), 1997 (1997 Protocol - Annex VI) and its subsequent amendments.

2.20. Member State

A country that is a member of the European Union.

2.21. Member State competent authority

The authority in the Member State responsible for the implementation, control and enforcement of national and European fisheries regulations. In the context of this guidance, this may refer to either the flag (Member) State's fisheries control authority or other authority that issues the engine power certificate referred to in Article 40 (1) of the (new) Control Regulation, including a recognised organisation

acting on behalf of that authority, classification societies or other authorised operator(s).

2.22. MEPC

Marine Environmental Protection Committee, IMO's senior technical body on marine pollution related matters.

[Source: www.imo.org]

2.23. New Control Regulation

Council Regulation (EC) No 1224/2009 of 20 November 2009 establishing a Community control system for ensuring compliance with the rules of the common fisheries policy, amended by Regulation (EU) 2023/2842 of 22 November 2023 and in particular the provisions concerning the engine power in Articles 38 to 41.

2.24. Propeller (shaft) speed

The revolutionary speed of the propeller shaft, expressed in revolutions per minute (rpm or $n\ min^{-1}$).

2.25. Recognised Organisation (RO)

Classification society (2.4) which has been assigned by a Flag state (2.15) to act on their behalf to carry out statutory survey and certification work of their ships. EU Member States can only authorise a classification society recognised by the European Commission.

[Source: www.emsa.europa.eu]

2.26. Seal

A mechanical device or substance that can be installed to prevent the unauthorised and / or unnoticed: removal of equipment, access to certain engine components and connectors, opening of (a) cover(s), or changes to (a) engine setting(s) and/or of its components.

2.27. ShaPoLi

Overridable Shaft Power Limitation system for the limitation of the maximum shaft power by technical means, with the objective to obtain a specific Energy Efficiency Design Index (EEDI) or Energy Efficiency Existing Ship Index (EEXI) value.

2.28. Strain gauge

Gauge used to measure the strain on an object. As the object is deformed it causes a change in electrical resistance. This change in resistance, usually measured using a Wheatstone bridge, is related to the strain by the quantity known as the gauge factor.

[Source: ISO 23048:2018[14], clause 3.1]

[14] ISO 23048:2018, Ships and marine technology — Verification method for portable power measurement using a strain gauge.

3. Essential functional requirements

Article 39a of the new Control Regulation sets out four regulatory essential functional requirements for systems to continuously monitor engine power:

1. measurement of propulsive engine power,
2. recording and storage of measured data on board,
3. accessibility of data recorded and stored on board, and
4. functioning of the system at all times.

3.1. Measurement of propulsive engine power

3.1.1. Units of power

The system must continuously measure propulsive engine power expressed in kilowatts (kW)[15].

3.1.2. Source data

If engine power is calculated from other measured quantities, e.g. torque and revolutionary speed, these quantities are considered source data. The system should provide and store the relevant source data with the measured power.

3.1.3. Secondary data

Data that are not used to measure or calculate engine power, but that may be relevant in view of the regulatory purpose(s) of the system (section 1.3), are considered secondary data. Examples of secondary data are the date and time of measurement, corresponding to an engine power data point. The system should provide secondary data with the measured power and source data, as a minimum to the extent necessary to enable the effective usage of measured engine power to meet the regulatory purpose(s) of the system.

[15] In accordance with Article 5 of REGULATION (EU) 2017/1130 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 14 June 2017 defining characteristics for fishing vessels (recast of Council Regulation (EEC) No 2930/86).

3.2. Recording and storage of data

Article 39a (4) of the new Control Regulation requires that the data from the continuous measurement of propulsive engine power is recorded and stored on board. In the context of these specifications and guidance, 'data' are considered measured propulsive engine power, source data, and applicable secondary data.

3.3. Accessibility of data

Article 39a (4) of the new Control Regulation requires that the data from the continuous measurement of propulsive engine power, recorded and stored on board, is accessible on board the vessel at all times to officials.

3.4. Functioning of the system

Article 39a (4) of the new Control Regulation requires the master of the catching vessel and holders of fishing licences to ensure that the system functions at all times and that the data is recorded, stored and accessible as described above.

4. Functional and technical specifications of the system

4.1. Measurement of propulsive engine power

The system and methodology to continuously measure engine power kilowatts must meet the following characteristics and requirements:

4.1.1. Shaft power measurement (shaft torque and revolutionary speed)

Propulsive engine power must be calculated by the system from measured shaft torque and measured shaft revolutionary speed. If the propulsive engine power is not determined at the crankshaft of the engine, or at the output flange of the engine, or at the output flange of the gearbox in case the gearbox is incorporated into the engine (but instead, for example, at the propeller shaft between the gearbox and the propeller), the measured power should be corrected for the energy efficiency of the gearbox between the engine and the measuring position, if applicable, as described in section 4.1.2.

4.1.1.1. Main components of the system

(a) Torque sensor;

Torque must be measured by means of permanently installed strain gauges or another type of permanently installed shaft torque sensor, which has been certified to measure power, in conjunction with a revolutionary speed measurement, in line with the accuracy requirements stated in section 4.1.3.

The torque meter zero setting should be carried out in accordance with the manufacturer's instructions, to avoid bias from residual torque in the shaft when the torque meter is installed.

The shaft diameter used in the power calculation should be measured directly or be derived from the shaft circumference at the shaft circumference measured at the location of the torsion meter. In the case of controllable pitch propeller(s), there might be a drilling diameter to be taken into account. The shaft diameter(s) used in the power calculation and its source(s) should be submitted to the authorities for approval, as part of the 'detailed technical description of the system and all its subsystems' (section 5.1).

The shaft material properties, in particular the properties used in the power calculation such as the G-modulus should be fully described, documented and should be submitted to the authorities for approval, as part of the 'detailed technical description of the system and all its subsystems' (section 5.1). If no certificate based on an actual shaft torsional test is available, the G-Modulus of 82.400 N/mm^2 shall be used.

(b) Shaft revolutionary speed sensor;

Shaft revolutionary speed should be measured by means of a permanently installed shaft speed sensor (e.g. inductive, laser-optic or gyro), which has been certified to measure shaft power, in conjunction with a shaft torque measurement, in line with the accuracy requirements (section 4.1.3).

(c) Transmission and conversion appliances;

The output signal of each sensor (shaft torque, shaft speed) must be transmitted to a data processing (and storage) device. This transmission consists of wireless (from the shaft) and wired paths, and may comprise signal converters (analogue to digital) and amplifiers.

The system manufacturer must submit a detailed technical description of the system and all its subsystems (section 5.1). This description should include detailed information on transmitters, receivers, converters, amplifiers and data protocols. The system manufacturer must also submit a tampering risk assessment (sections 4.7 and 5.1), addressing in detail the susceptibility of the transmission system to tampering attempts, including signal modification, amplification or disturbance, and all mitigating measures incorporated in the system.

(d) Data processing appliances;

The device for processing source data into propulsive engine power may be integrated with the data recording and storage device (section 4.3). The system manufacturer must submit a detailed technical description of the system and all its subsystems (section 5.1), including detailed information on the hardware and software characteristics of data processing appliances, as well as a tampering risk assessment (sections 4.7 and 5.1). This risk assessment should evaluate in detail the susceptibility of the data processing device to tampering attempts and include relevant mitigating measures incorporated in the system.

4.1.2. Correction of measured power for gearbox energy efficiency

In case the propulsive engine power is determined at the crankshaft of the engine, the output flange of the engine, or at the output flange of the gearbox in case the

gearbox is incorporated into the engine, the engine power does not need to be corrected for energy efficiency of the gearbox.

In case the power is determined by means of a shaft torque and shaft speed measurement between the gearbox and the propeller, a correction should be applied to the measured shaft power in order to obtain the corresponding brake engine power. This correction is similar to the correction that is required for a *physical verification* of engine power (section 1.5.2) provided by Article 41 (2) of the (new) Control Regulation, in accordance with the provisions of article 63(2) of the Commission Implementing Regulation.

In case an official energy efficiency value of the gearbox at nominal speed and nominal power has been specified by the gearbox manufacturer for the gearbox under consideration, this figure may be used to convert the measured propeller shaft power into brake engine power. The Member State's competent authorities need to verify the accuracy and authenticity of any document stating the gearbox energy efficiency, in particular when the officially stated energy loss is lower than the energy loss to be assumed in accordance with the generally acceptable gearbox efficiency data from table 1[16].

The relation between energy loss and efficiency of the gearbox can be expressed as:

$$\eta_{gbx\ eff} = (1 - \eta_{gbx\ loss})$$

where:

$\eta_{gbx\ eff}$ = gearbox efficiency ratio

$\eta_{gbx\ loss}$ = gearbox loss ratio

In case no official information regarding the energy efficiency of the gearbox is available, the efficiency values presented in table 1 are applied as follows:

$$P_{propeller\ shaft} = P_{engine} \times \eta_{gbx\ eff}$$

where:

P_{engine} = brake engine power (kW)

$P_{propeller\ shaft}$ = propeller shaft power (kW)

[16] Section 4.6 of the *'Technical guidance for the monitoring, certification and verification of engine power in EU fisheries control'*.

Table 1. Generally acceptable energy efficiency of gearboxes per configuration

		Reversal gearbox		Reduction gearbox
		co-rotating	counter-rotating	
Clutch	yes	0,970	0,976	0,985
	no			0,986
Additional pre-stage		-0,008	-0,008	-0,008
Additional auxiliary drive		-0,006	-0,006	-0,006

4.1.3. Accuracy of measured propulsive engine power

The measurement system must be certified for power measurements with a bias error equal to or lower than 1,25 %, so that an overall bias error not exceeding 2,50 % of the actual engine power on board the ship can be achieved, or a positive bias error not exceeding 2,50 % of the actual engine power corrected for the gearbox efficiency, if the engine power is calculated from the measured shaft power at the shaft propeller shaft, and a gearbox is incorporated in the propulsion system between the measurement system and the engine.

The systems that measure torque and shaft speed to derive shaft power which has a valid Type Approval Certificate issued by the Member State's competent authority, or at least one of the Recognised Organisations by the Member State, for application of the system as ShaPoLi power measurement system in the context of MARPOL Annex VI chapter 4 regulations and relevant MEPC resolutions, may be accepted as certified to measure shaft power with a bias error not exceeding the values stated above.

4.2. Secondary data

Together with measured engine power and the relevant source data, the system needs to provide at each data point as a minimum the following secondary data:

- Date of the measurement (DD-MM-YYYY);
- Time (UTC) of the measurement (HH-MM).

In addition to the minimum secondary data, the following secondary data could improve the effectiveness of the system in achieving its regulatory objective if provided together with measured engine power:

- Vessel position;
- Vessel speed;
- Vessel course;

- Propeller pitch position;
- Engine revolutionary speed (in case this is not source data);
- Propeller revolutionary speed (in case this is not source data);
- Deployment of fishing gear.

4.3. Recording and storage of data

The source data and applicable secondary data must be recorded and stored on board. The manufacturer should specify the format of the recorded data (section 4.3.1), document the procedure to access and download recorded data (section 4.4), specify the time interval between subsequent data points (section 4.5) and provide an overview of the events that could trigger a malfunctioning or other alarm (section 4.9) in the detailed technical description of the system and all its subsystems, to be submitted for approval to the Member State authorities (section 5.1).

4.3.1. Format of recorded data

From an extracted data set, it must be possible, without any further processing, to conclude with certainty:

- Whether the vessel's propulsive engine power has exceeded the vessel's certified engine power;
- When the vessel's propulsive engine power has exceeded the vessel's certified engine power (if applicable);
- How long the vessel's propulsive engine power has exceeded the vessel's certified engine power (if applicable);
- By how much the vessel's propulsive engine power has exceeded the vessel's certified engine power (if applicable).

The data format should be described and documented in the detailed technical description of the system and all its subsystems, to be submitted to the authorities for approval (e.g. Comma Separated Values (CSV), with one set of all recorded quantities per line).

4.4. Accessibility of data

It should be possible for authorised officials to extract and analyse recorded data without specialist knowledge or special paid-for analysis tools and / or software. The manufacturer must document clearly in the system's OMM the procedure for

inspection and extraction of measurement data from the storage device of the system, in accordance with section 4.8 (i).

The data obtained from continuous engine power monitoring systems that have been installed onboard catching vessels following the application of Art. 39a of the new Control Regulation, shall be subject to relevant data protection regulations and shall be used by the Member States competent authorities solely for fisheries control purposes.

In case the system is capable of transmitting the data to shore, this does not substitute the requirement to make the data available on board at all times to officials[17].

4.5. Sampling interval

Manufacturers shall specify the frequency at which data are measured, recorded and stored, in the detailed technical description of the system and all its subsystems, to be submitted to the authorities for approval. The sampling frequency should be as high as possible, to obtain the most detailed operational footprint of the catching vessel, considering practical boundaries (e.g. electronic storage capacity).

The sampling interval between two subsequent data points must be as short as possible, to obtain the most detailed operational footprint of the engine power operation, while considering practical boundaries (e.g. electronic storage capacity) and cannot exceed one minute.

4.6. Operation, maintenance and calibration of the system

The system should be designed in such a way that under normal circumstances, no operative and maintenance actions from the ship's crew are required for the system to function as required.

Maintenance and calibration requirements, including calibration intervals, must be specified in detail in in the system's OMM (section 4.8 (g)).

All conducted maintenance and calibrations are to be recorded in the appropriate record book by the individual that conducted the maintenance and / or calibration(s), in accordance with section 4.8 (h).

[17] The transmission of the data collected by the continuous engine power monitoring system from ship to shore is currently not a regulatory requirement.

The master and licence holder are responsible for complying with the manufacturer's maintenance and calibration interval requirements to ensure the functioning of the system.

4.7. Tampering

The permanently installed system on board a catching vessel that measures and records propulsive engine power continuously, and stores the recorded engine power data on board, and any subsystem, must be tamper-proof.

Manufacturers must submit a detailed tampering risk assessment, and an overview of all risk mitigation appliances incorporated in the system, prior to approval by the Member State competent authority (section 5.1).

The tampering risk assessment should, among others, consider the risk of manipulation, modification, amplification or disturbance of data for every (sub) system listed in the OMM (section 4.8 (a), (b) and (c)) and for the overall system.

4.8. Onboard Management Manual

The Onboard Management Manual (OMM) for the systems permanently installed on board catching vessels that measure and record propulsive engine power continuously and store the recorded engine power data on board must be verified and approved by the Member State competent authority prior to commissioning of the system, for every vessel and every individual system (e.g. in case the vessel is equipped with more than one propulsion drive line). The system should be accompanied by the OMM, which should be permanently on board the ship and available to officials for inspection upon request.

The OMM should include as a minimum:

(a) A detailed technical description of the system and all its subsystems;

(b) Identification of key components of the system by manufacturer, model / type, serial number and other details as necessary;

(c) A list of all verifiable electronic and physical tamper-proofing appliances (e.g. physical sealing), as applicable;

(d) A description of a verification procedure demonstrating that the system is in compliance with the description provided under (a), (b) and (c) of this section;

(e) The maximum shaft power for which the unit is designed;

(f) An overview of the alarm events that trigger a system malfunctioning or other fault event;

(g) Service, maintenance and calibration requirements of sensors according to the respective sensor manufacturer(s) and a description how to monitor the appropriateness of the calibration intervals, if applicable;

(h) A record book for the recording of service, maintenance and calibration of the system;

(i) Procedure for data extraction from the system by the Member State's competent authority;

(j) Procedure for survey of the system by the Member State's competent authority.

4.9. Fall-back procedures in case of technical malfunction

When the continuous engine power measuring system on board a catching vessel malfunctions, the master will not commence a fishing trip until the system is repaired and functioning if the malfunction occurs before the beginning of a fishing trip.

When the malfunction occurs during a fishing trip, the master is required to notify immediately the flag (Member) State competent authority and, if different, the coastal Member State competent authority, and ensure that the system is repaired and functioning as confirmed by the flag (Member) State competent authority, before commencing a new fishing trip, unless the sole purpose of the new trip is to go to a port to repair the system.

When a malfunction occurs during consecutive fishing trips, the master is required to notify immediately the flag (Member) State competent authority and, if different the coastal Member State competent authorities, and ensure that the system is repaired and functioning, obtaining confirmation by the flag (Member) State competent authority before commencing a new fishing trip, unless the sole purpose of the new trip is to go another port to repair the system.

The system must verify its functioning and must produce a visual and / or audible alarm when it detects its own malfunctioning. The system must log (malfunctioning or other) alarm events, with a date and time stamp, in a separate log file which must be accessible for inspection.

5. Approval of the system

To ensure the effective implementation of the regulatory requirements to permanently install systems on board catching vessels that measure and record propulsive engine power continuously and store the recorded engine power data on board, Member States competent authorities will need to develop and instate a framework for the approval of such systems.

5.1. Documents to be submitted by the manufacturer

It is recommended that, as part of the system approval process, either as type approval or case approval, Member States competent authorities should require the following documents to be submitted by manufacturers, to enable adequate evaluation of the proposed system:

(a) A detailed technical description of the system and all its subsystems;

(b) Identification of key components of the system by manufacturer, model / type, serial number, other details and associated certificates as necessary;

(c) Up-to-date software quality plan;

(d) Onboard Management Manual (OMM) (section 4.8);

(e) Tampering risk assessment (section 4.7).

5.2. Demonstration of compliance prior to commissioning the system

Member States competent authorities should verify, prior to commissioning of the system, that the system installed on board is exactly as described and specified in the approved documentation provided by the manufacturer. Furthermore, Member States competent authorities are required to verify, in accordance with the procedures documented in the approved OMM (section 4.8) that the system functions as required.

5.3. Demonstration of compliance during the service life of the system

Member States competent authorities should, by means of appropriate surveys, verify whether the system is operating and has been serviced, maintained and calibrated as required in accordance with the approved OMM. These surveys may also be used to inspect the system for possible indications of tampering, considering the tampering risk assessment submitted by the manufacturer of the system and the list of all verifiable electronic and physical tamper-proofing appliances incorporated in the OMM.

6. Guidance on implementation and considerations

6.1. Implementation roadmap

The provisions concerning engine power in the new Control Regulation, including Article 39a concerning systems permanently installed on board catching vessels that measure and record propulsive engine power continuously and store the recorded engine power data on board, will apply as from 10 January 2028.

6.2. Market consultation and feasibility

In anticipation of the mandatory requirements that will apply as from 10 January 2028, it is recommended to compose a list of potential (future) manufacturers of the systems described in this guidance, and request feedback from these manufacturers, to identify possible shortcomings and / or limitations of the proposed functional and technical specifications of the system and proposed methodology covered by this guidance.

6.3. Field experience and pilot projects

It may be expected that at least some of the systems described in this guidance document will be produced by manufacturers that also produce ShaPoLi systems for vessels of the commercial marine fleet. It is anticipated that the distinct characteristics of catching vessels, although these vessels cannot be considered a homogeneous group either, will confront manufacturers with challenges they may not commonly face on board merchant vessels equipped with ShaPoLi solutions. Notable characteristics of catching vessels that are expected to cause challenges include limited installation space and the incentive and related enhanced risk of potential tampering in the fisheries sector.

It is recommended to conduct (a) field test(s) to gather experience with systems designed to meet all criteria presented in this guidance. It is known that engine power measurement on board catching vessels is also an element of other (current) data-driven fisheries projects. On board at least some of the vessels taking part in these projects, propulsive engine power is determined by systems which are very similar to the systems described in this guidance. It is therefore recommended to closely monitor these pilot projects, in order to gain much desired field experience via these projects, before the entry into force of the requirement to install continuous power measurement systems on board specific vessel as from 10 January 2028.

6.4. Considerations harmonisation of data storage and transmission requirements

The new Control Regulation, and this guidance, address the recording and storage of data measured by continuous engine power monitoring systems on board catching vessels. While this guidance has been developed to support the development of detailed implementing rules for the installation, technical requirements and characteristics of these particular systems and the future implementation thereof by Member States, other areas of the (new) Control Regulation also regulate measurement, storage, transmission of, and access to (other) data that are collected by other onboard systems (e.g. vessel monitoring systems (VMS), automatic identification systems (AIS), remote electronic monitoring systems (REM)).

The Working Group noted that system requirements and data storage/transmission requirements concerning data collected by multiple onboard systems, as well as requirements with regard to access of that data for control purposes under the (new) Control Regulation, could partly overlap (insofar multiple onboard systems would be simultaneously installed on a catching vessel on a compulsory basis). This situation offers the opportunity to capitalise on synergising effects if the requirements of these systems are being harmonised as much as possible, by benefitting from technological synergy solutions and (cost)efficiency benefits aiming to avoid unnecessarily large operational and financial impact due to the compulsory installation of multiple onboard systems.

6.5. Considerations in case of technical unfeasibility

Although it is expected that a continuous engine power measuring system as described in section 4.1 can be installed on board a substantial fraction of the catching vessels to which the requirement to continuously measure engine power will apply, specific circumstances may exist on board vessels under which installation of such a system is objectively not possible nor technically feasible [18].

At the time this guidance was developed, it is unclear whether future rules may permit Member State authorities to consider other, reasonably accurate, methods

[18] E.g. situations where no (realistic) structural modifications to the vessel (e.g. rearrangement of piping, creating a hatch in a floor overhead of the propeller shaft, or shifting the engine and / or gearbox in the longitudinal direction) are feasible that would enable the installation of a permanent (propellor) shaft torque based continuous engine power measurement system and / or which would require unreasonable technical interventions on board leading to unreasonable costs. Reference is made to section 8.3 of the *'Technical guidance for the monitoring, certification and verification of engine power in EU fisheries control'* containing similar considerations and conditions for situations where a *physical engine power verification* under Article 41 (2) of the (new) Control Regulation cannot be conducted.

to continuously monitor engine power, in those cases where a system based on the methodology described in section 4.1 can objectively not, or not at reasonable costs, be installed onboard a catching vessel meeting the applicability criteria to have such system installed (section 1.5).

Member States are therefore recommended to put efforts into obtaining alternative (to shaft torque and revolutionary based speed measurement) continuous monitoring systems only for those catching vessels that meet the following conditions:

1. A strain gauge shaft torque based continuous measurement system can objectively not be permanently installed (even if structural modifications are made to the vessel);
2. The engine of the catching vessel concerned has been installed prior to the new Control Regulation entered into force with regard to the provisions of Article 39a concerning the systems permanently installed to measure and record engine power that will apply as from 10 January 2028[19].

In case a Member State determines that a system based on the methodology described in section 4.1 cannot be installed, and therefore considers the catching vessel eligible for an alternative measurement system, it should be documented which vessel-specific factors support this decision.

6.5.1. Minimum requirements alternative measurement systems

If future (implementing) regulations would permit the use of alternative measurement systems other than described in this guidance, and the aforementioned conditions in section 6.5 are met, such alternative measurement system should as a minimum meet the following criteria:

(a) The accuracy requirements shall be certified not to exceed the values stated in section 4.1.3;

(b) All specifications in this guidance on measurement of secondary data, recording and storage of data, accessibility of data, interval

[19] In anticipation of the entry into force in January 2028, and considering the currently available power measurement systems, both temporary and continuous power measurement should, in accordance with the (new) Control Regulation be based on (propellor) shaft power measurement. Member State Certifying Authorities are therefore strongly recommended to update the approval process for technical modifications to already installed engines and for engine installations and engine room layout arrangements on newly constructed catching vessels, by ensuring that a continuous shaft power measurement system can reasonably be installed. Reference is made to section 8.1 of the *'Technical guidance for the monitoring, certification and verification of engine power in EU fisheries control'*.

of data sampling, operation of the system, maintenance and calibration of the system, tamper-proofing requirements and contents of the OMM must be met (sections 4.2 to 4.8);

(c) All conditions for approval presented in this guidance must be met (section 5);

(d) All source data used to derive engine power must be measured instantaneously[20];

(e) The determination of engine power must not depend on (a) reference vessel(s) or engine performance data that are obtained at, or derived from (a) sister vessel(s) or a (group of) peer vessel(s);

(f) If, (a) factor(s) and / or constant(s) is / are required to calculate engine power, the factor(s) and / or constant(s)[21] that are required to calculate engine power, or the function(s) applied to dynamically determine such factor(s), must be substantiated and submitted to the Member State authority for approval prior to acceptance of the alternative measurement methodology and systems;

(g) This approval, must only be granted if these factor(s), or the function(s) used to dynamically determine there factor(s) and / or the constant(s) on which the power determination depends, if applicable, cannot be altered unnoticed[22].

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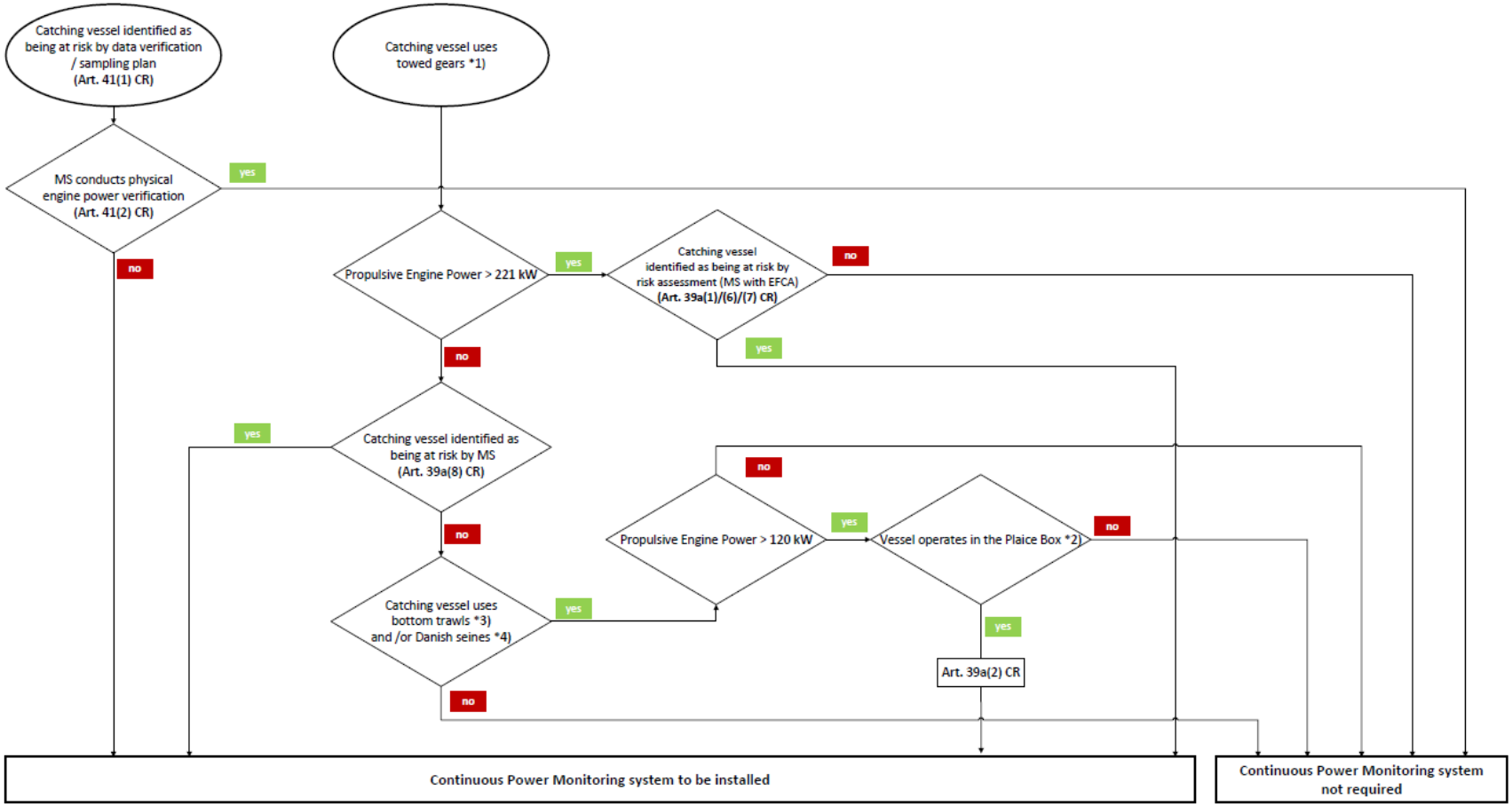
20 Shaft torque measured by means of strain gauges and fuel consumption measured by means of electronic (mass) flow meters in all fuel supply (to the engine) and return lines are examples of instantaneous measurements. The total amount of fuel bunkered at one occasion is an example of a non-instantaneous measurement, as the fuel is consumed over an extended period of time, and is therefore not acceptable as 'source data'.

21 Depending on the alternative measurement method selected to determine engine power, factors that may need to be substantiated include the engine's Brake Specific Fuel Consumption and / or the shaft's G-modulus.

22 A methodology that is unsuitable as alternative measurement method for vessels equipped with towed gear for this reason, is for example one that is primarily based on the measurement of only vessel speed and / or (propeller) shaft revolutionary speed, and their mathematical relation to (propeller shaft) power. Simultaneous manipulation of multiple vessel properties (e.g. FPP propeller pitch and fishing gear resistance) may cause shaft power to change without a change of the shaft revolutionary speed and the vessel speed. However, application of the aforementioned methodology to vessels that are not equipped with towed gear is also not recommended.

Annex 1 Decision tree summarising the applicability criteria of the continuous power monitoring requirement (section 1.5)



*1) Article 6, point (12), Technical Measures Regulation (EU) 2019/1241: *'towed gear' means any trawls, Danish seines, dredges and similar gear which are actively moved in the water by one or more fishing vessels or by any other mechanised system.*

*2) part C, point (2.1), of Annex V Technical Measures Regulation (EU) 2019/1241.

*3) Article 6, point (13) Technical Measures Regulation (EU) 2019/1241: *'bottom trawl' means a trawl designed and rigged to operate on or near the seabed.*

*4) Article 6, point (18) Technical Measures Regulation (EU) 2019/1241: *'Danish seine' or 'Scottish seine' means an encircling and towed gear, operated from a boat by means of two long ropes (seine ropes) designed to herd the fish towards the opening of the seine. The gear is made up of a net which is similar in design to a bottom trawl.*

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