ANNEX 8

RESOLUTION MEPC.373(80)
(adopted on 7 July 2023)

2023 GUIDELINES FOR THERMAL WASTE TREATMENT DEVICES (TWTD)

THE MARINE ENVIRONMENT PROTECTION COMMITTEE,

RECALLING Article 38(a) of the Convention on the International Maritime Organization concerning the functions of the Marine Environment Protection Committee (the Committee) conferred upon it by international conventions for the prevention and control of marine pollution from ships,

RECALLING ALSO that, at its fifty-eighth session, the Committee adopted, by resolution MEPC.176(58), a revised MARPOL Annex VI, which mentions in paragraph 5.2 of regulation 16 that this regulation should not preclude the development, installation and operation of alternative design shipboard thermal waste treatment devices that meet or exceed the requirements of this regulation,

NOTING that regulation 4 of MARPOL Annex VI allows the use of alternative compliance methods at least as effective in terms of emissions reductions as those required by the Annex,

RECOGNIZING the need to develop guidelines for the use of thermal waste treatment devices as alternative methods to comply with the standards set forth in regulation 16 on shipboard incineration,

HAVING CONSIDERED, at its eightieth session, *2023 Guidelines for Thermal Waste Treatment Devices (TWTD)* (hereinafter referred to as the "2023 TWTD Guidelines"), prepared by the Sub-Committee on Pollution Prevention and Response at its tenth session,

1 ADOPTS the 2023 TWTD Guidelines, as set out in the annex to the present resolution;

2 INVITES Administrations to take the annexed Guidelines into account in developing provisions for regulating the use of thermal waste treatment devices as equivalent means of compliance in accordance with regulation 4 of MARPOL Annex VI;

3 REQUESTS Parties to MARPOL Annex VI and other Member Governments to bring the 2023 TWTD Guidelines to the attention of shipowners, ship operators, shipbuilders, marine equipment manufacturers and any other interested groups;

4 AGREES to keep these Guidelines under review in light of experience gained with their application.

ANNEX

2023 GUIDELINES FOR THERMAL WASTE TREATMENT DEVICES (TWTD)

Contents:

1 Introduction

2 General – Basis of these Guidelines

3 Definitions

4 Emission Limits

5 Functional Objectives and TWTD Technical Report

6 Certification process

Annex Form of TWTD Certificate

1 Introduction

1.1 These Guidelines cover the approval, certification and in-service controls applicable to thermal waste treatment devices (TWTD) as equivalent means, under regulation 4 of MARPOL Annex VI, to incinerators as covered by regulation 16 of that Annex and as specifically provided for by paragraphs 1 and 5.2 of that regulation.

1.2 These Guidelines, as directed by PPR 6, are written on the basis of a technology-neutral, goal-based approach that can be applied to any thermal waste treatment device using, for example, gasification, hydrothermal carbonization, pyrolysis, plasma or other thermal means for the disposal of permitted garbage and other shipboard wastes generated during a ship's normal service.

1.3 As an alternative to conventional incinerators, as a means of disposal of garbage and other shipboard wastes, these thermal waste treatment devices remain subject to the same prohibitions as to those materials which are not to be so disposed of as given in regulation 16.2 of MARPOL Annex VI.

1.4 A TWTD certified in accordance with these Guidelines should meet Performance Level 1 in terms of emissions to air which is comparable to the emission limit requirements given in the *2014 Standard specification for shipboard incinerators* (resolution MEPC.244(66), as amended) – this Performance Level should be demonstrated by in-service emission measurements. Where there is a related water discharge to sea, that also should be controlled as given in these Guidelines.

1.5 Additionally, an applicant may request certification to Performance Level 2. In that case not only should the Performance Level 1 requirements be met but there are detailed additional testing requirements which should be met prior to approval as an equivalent means together with tighter in-service emission limits.

2 General – Basis of these Guidelines

2.1 In order to be "technology-neutral" these Guidelines follow a goal-based approach, the basis of which is:

.1 the in-service monitoring and recording of specified emissions;

.2 the identification of relevant Functional Objectives; and

.3 the applicant-proposed/demonstrated resolution of each Functional Objective by means of an applicant-compiled Thermal Waste Treatment Device Technical Report. The aspects which should be covered as part of that TWTD Technical Report may include, but are not limited to, the items listed in table 2 as given in these Guidelines.

2.2 The TWTD Technical Report should be assessed for completeness in respect of the Functional Objectives by the reviewing Administration and further developed by the applicant as considered necessary by the Administration together with such physical surveys as required of the device in production and, as a unit, as installed and in operation. This TWTD Technical Report should thereafter form the basis of the overall approval package of that thermal waste treatment device as an equivalent means to incineration for permitted onboard garbage and waste disposal. Thereafter individual unit certification should be in accordance with the procedures as agreed in respect of the related Functional Objective – Unit certification resulting in the issue to each unit of a TWTD Certificate, the form of which is given in the annex, and the approval of that unit's TWTD File.

2.3 These Guidelines cover only the MARPOL Annex VI, prevention of air pollution, aspects related to the use of TWTD. The manufacturer, installer, shipowner and others, as applicable, are responsible for ensuring that all other relevant statutory requirements, together with relevant classification requirements, are complied with as and where appropriate.

2.4 These Guidelines may involve hazardous materials, operations and equipment. These Guidelines do not purport to address the safety aspects associated with the use of thermal waste treatment devices. It is the responsibility of the user of these Guidelines to establish appropriate safety and health practices and determine the applicability of regulatory and classification limitations prior to use, including possible port State limitations.

3 Definitions

Table 1: Definitions

Applicant	This may be the device manufacturer or another party – in all cases the applicant is responsible for providing the required information, performance testing (where required) and subsequent required ongoing support of the certification
Carbon monoxide (CO)	Controlled as an indicator of incomplete oxidation of waste material – otherwise as per the NO_x Technical Code 2008
Event Record Points	Events to be recorded for the purpose of reflecting compliant operation of the device as installed
Functional Objectives	These are the objectives which should be met in order that the thermal waste treatment device is designed, manufactured, installed, operated, maintained and serviced such that the required emission performance is achieved and that as an equivalent means other uncontrolled pollution streams are not generated
PAH	Polycyclic Aromatic Hydrocarbons – expressed in terms of phenanthrene equivalent as defined in the *2021 Guidelines for Exhaust Gas Cleaning Systems* (resolution MEPC.340(77))
Performance Level 1	See section 4.1.1 for the requirements for Performance Level 1. This performance level, where limited, is comparable to the existing requirements for incinerators (resolution MEPC.244(66), as amended) but as appropriate to in-service monitoring applied on a continuous basis to a thermal waste treatment device
Performance Level 2	Requirements set out in section 4.1.2. This level has tighter emission to air limits than Performance Level 1. The report from that testing should be included in the TWTD Technical Report
Sewage sludge	Material from the ship's sewage system which would include, but not be limited to, de-watered sewage prior to treatment or the residues from a sewage treatment plant
Supporting information annex	Commercially sensitive material submitted to the approving Administration covering detailed aspects of the TWTD Technical Report, which should not be circulated outside that Administration
Thermal waste treatment device (TWTD)	A device for disposing, by thermal action, of onboard generated garbage other than by use of an incinerator as defined by paragraph 2.2 of the *2014 Standard specification for shipboard incinerators* (resolution MEPC.244(66), as amended). The thermal waste treatment device includes the waste reduction unit itself together with all other necessary support systems and equipment

TWTD File	The document prepared by the applicant for each certified thermal waste treatment device and approved by the Administration. The TWTD File should be retained on board with the device during its service life. The TWTD File details the device and how it is to be surveyed or inspected
TWTD Operating Manual	The document supplied with the thermal waste treatment device describing to the user how the device is to be installed, operated, maintained and serviced
TWTD Technical Report	The document prepared by the applicant detailing how the Functional Objectives are met. The TWTD Technical Report would form part of the information supplied to the Organization by the Administration of a Party approving a thermal waste treatment device as an equivalent means in accordance with the requirements of regulation 4 of MARPOL Annex VI
UTC	Universal Time Coordinated

4 Emission limits

4.1 Discharges to air

This section does not apply to systems which do not generate any emissions to air, such as hydrothermal carbonization (HTC).

4.1.1 Performance Level 1

4.1.1.1 A TWTD certified under these Guidelines should not exceed the following in-service maximum emission limits:

CO 185 ppm (dry basis) at 11.00% O_2 – averaged over each UTC three-hour period

Soot number maximum average: Bacharach 3 or Ringelman 1 (20% opacity) (A higher soot number is acceptable only during very short periods such as starting up)

4.1.1.2 CO should be measured in accordance with section 6.4 of the NO_x Technical Code 2008 (direct measurement and monitoring) and should be monitored at a frequency of not less than 0.05 Hz.

4.1.1.3 Oxygen content, temperature and pressure profiles, as applicable, through the TWTD should be monitored and controlled in accordance with the relevant Functional Objective.

4.1.2 Performance Level 2

4.1.2.1 Where requested by the applicant, the TWTD may additionally be certified as meeting Performance Level 2. This involves a detailed pre-certification test together with in-service emission limits which are tighter than those of Performance Level 1.

4.1.3 Pre-approval Test

4.1.3.1 As part of the initial approval process for Performance Level 2 as an equivalent means, the TWTD model should be subject to a Pre-approval Test.

4.1.3.2 The Pre-approval Test should be of 6 to 8 hours duration with the TWTD in its operating condition.

4.1.3.3 Pre-approval Test emission limit values are given on a dry basis, other than for HC which is measured on a wet basis, at 11.00 % O_2 concentration and at 273 K, 101.3 kPa:

Pre-approval Test

Species	**Limit**	**Test Method**
CO	50 ppm	NTC **
NO_x	100 ppm – as NO_2	NTC **
HC	15 ppmC_1	NTC **
Particulate matter	10 mg/m^3	US EPA Method 5
Hydrogen Chloride (HCl)	10 mg/m^3	US EPA Method 26/26A
Dioxins and Furans*	0.1 ng/m^3	US EPA Method 1613B

In addition oxygen, temperature and pressure profiles, as applicable, through the device should be monitored over the duration of the test period and given in the test report.***

* as listed and with equivalency calculated in accordance with EU Directive 2010/75/EU Annex-VI Part 2
** in accordance with the NO_x Technical Code 2008 chapter 5
*** oxygen content, temperature and pressure, as applicable, should be measured in accordance with NO_x Technical Code 2008 chapter 5

4.1.3.4 Pre-approval Test procedures:

.1 testing should be undertaken while operating with a) sludge oil (if applicable to the TWTD system) and b) solid waste compositions both as given in paragraph 1 of appendix IV to MARPOL Annex VI;

.2 sampling position should be after any exhaust gas treatment components, such as water washing, but prior to any dilution of that exhaust gas;

.3 CO, NO_x and HC should be monitored at a frequency of not less than 0.05 Hz over the duration of each test and those readings averaged to give the result to be compared to the respective limit value;

.4 CO and NO_x limits are given on a dry basis. Consequently, if these are measured on a wet basis, those findings should be converted to dry basis reading using a concurrently measured water vapour content in order to determine the relevant dry/wet correction factor (concentration, dry = concentration, wet/exhaust gas non-water fraction);

.5 correction to reference 11.00% O_2 should be on the basis of:

$$C_{reference} = C_{measured} \times (20.95 - O_2 \text{ measured}) / (20.95 - 11.00);$$

.6 oxygen content, temperature and pressure profiles, as applicable, through the TWTD should be monitored over the duration of each test for conformity with the required values as given by the relevant Functional Objective;

.7 not less than three separate HCl and particulate matter readings should be taken over the duration of each test period at approximately equally spaced intervals and those results averaged to give the result to be compared to the limit value. For thermal waste treatment devices with intermittent loading those test procedures should commence no later than 10 minutes after a loading; and

.8 alternative emission species test methods which provide equivalent results to those given above may be used with the agreement of the Administration.

4.1.3.5 A test report detailing the TWTD tested, the test sequence followed, the measurement devices/procedures used, the traces of the CO, NO_x, HC and O_2, the temperature and pressure profile readings and the test results of the other emissions measured together with details of the actual sludge oil (if applicable), and solid waste compositions and waste loading quantities and times should form part of the TWTD Technical Report. If the TWTD is not built for handling sludge oil and testing is therefore not undertaken with sludge oil, this should be specified in the test report.

4.1.3.6 In service, the emissions from thermal waste treatment devices certified to Performance Level 2 should not exceed the following in-service maximum emission limits:

CO 50 ppm (dry basis) at 11.00% O_2 – averaged over each UTC three-hour period

Opacity 10%

4.1.3.7 CO should be measured in accordance with section 6.4 of the NO_x Technical Code 2008 (direct measurement and monitoring) and should be monitored at a frequency of not less than 0.05 Hz.

4.1.3.8 Oxygen content, temperature and pressure profiles, as applicable, through the TWTD should be monitored and controlled in accordance with the relevant Functional Objective.

4.2 Discharge Water to Sea

4.2.1 This section applies if there is:

.1 a direct water discharge as a by-product of the thermal waste treatment process used; and/or

.2 water used to wash the exhaust gas from the TWTD before discharge to the atmosphere, where that water is then subsequently discharged to sea.

Alternatively, these discharge water streams may be collected in a holding tank for discharge ashore.

4.2.2 If discharged to sea, the discharge water should not be diluted or mixed with water from other sources before monitoring for the turbidity and PAH limit parameters. After monitoring for PAH and turbidity, the discharge water may be diluted as required or chemically treated prior to pH monitoring.

4.2.3 The discharge water to sea should not exceed the following limits at any time when the TWTD is in operation:

.1 pH: minimum 6.5 or a maximum difference of 2 pH units between the inlet water and the discharged water after dilution values – if chemically treated the requirements of 10.1.6.1 of the *2021 Guidelines for Exhaust Gas Cleaning Systems* (resolution MEPC.340(77)) should also be applied;

.2 Turbidity: maximum continuous turbidity in the discharge water should not be greater than 25 FNU (formazine nephelometric units) or 25 NTU (nephelometric turbidity units) or equivalent units, above the inlet water turbidity assessed on the basis of 15-minute average values; and

.3 PAH: phenanthrene equivalent concentration should not exceed that equivalent to 2.2 g/h per nameplate capacity in MW at the discharge water flow rate(s) above the inlet water PAH concentration.

4.2.4 The monitoring methods used for pH, turbidity and PAH should be in accordance with the *2021 Guidelines for exhaust gas cleaning systems* (resolution MEPC.340(77)) and should be monitored at a frequency of not less than 0.05 Hz.

4.2.5 Performance, calibration and permissible deviations of the discharge water monitoring devices should be in accordance with the relevant sections of the *2021 Guidelines for exhaust gas cleaning systems* (resolution MEPC.340(77)).

4.3 Residues from thermal waste treatment devices

4.3.1 Any solid residues or other materials from TWTD, including any washings or other material collected as part of maintenance or servicing activities, should be discharged ashore to appropriate reception facilities.

4.3.2 Any residues from a TWTD discharge water treatment system, either in-service or as collected during maintenance or servicing activities, should be discharged ashore to appropriate reception facilities.

5 Functional Objectives and TWTD Technical Report

5.1 These are the Functional Objectives which should be met in order to achieve the in-service Performance Level 1 emission limit requirements and, if applicable, those of Performance Level 2. The following listing of core Functional Objectives represents a technology-neutral approach to the review of the design, manufacture, installation, use and ongoing management of a TWTD. The applicant is therefore additionally responsible for identifying any other Functional Objectives which may potentially affect the device's performance in terms of emissions to air and, if applicable, water and to duly address those as part of the TWTD Technical Report such that the requirements of regulation 4.4 of MARPOL Annex VI are met. Consequently, the TWTD Technical Report is to cover, but is not limited to, an assessment of the following functional requirements and is to be compiled against the Functional Objective references as listed in table 2. In the case of operational, servicing or maintenance requirements, the TWTD Technical Report may cite the relevant section of the TWTD Operating Manual which is to be supplied with the device rather than reproducing in full the applicable text. Where a particular Functional Objective is not applicable owing to the operating principle applied, the waste streams to be processed or other factors would be given as “not applicable”, together with supporting justification, in the TWTD Technical Report.

5.2 It is recognized that the applicant may need to provide commercially sensitive information to the Administration in order to demonstrate that a particular Functional Objective has been met by the design of the TWTD and/or would be met in service. In view of this, such information may instead be included in a supporting information annex to the TWTD Technical Report which would not be circulated outside the approving Administration. Where information is provided in that category, it may be cited rather than being given in full in the TWTD Technical Report itself.

Table 2: Thermal Waste Treatment Device – Functional Objectives

These Guidelines have been developed on a technology-neutral basis. Therefore, particular Functional Objectives as listed below may not be applicable to certain types of TWTD since the point being covered does not exist. The applicant should indicate in the TWTD Technical Report submitted why certain Functional Objectives are not applicable to the TWTD under consideration and provide justification for that assertion.

	Functional objective	Content of TWTD Technical Report
1. Device design and manufacture		
1.1	The device should be designed to meet the Performance Level 1 criteria under all operating conditions with the waste materials it is designed to process To include those in-service controls and measurements used to regulate the device	Description and basis of how the device has been designed and tested to demonstrate the required performance
1.2	Device capacity should be defined	How capacity (i.e. MW, m^3/day, or as applicable) is assessed and defined for the device
1.3	The device should be designed so that when installed it will operate as required when the ship is upright and when inclined at any angle of list up to and including 15° either way under static conditions and 22.5° under dynamic conditions (rolling) either way and simultaneously inclined dynamically (pitching) 7.5° by bow or stern	Description of how the device has been designed and tested to ensure that it will operate as required under those conditions
1.4	The device should be designed so that there will not be leakage out of the device to the surrounding environment	Description and basis of how the device has been so designed and how is that demonstrated and maintained in service
1.5	The device should be designed to handle the various temperatures to which it will be exposed	Description and basis of how the device has been so designed and how that is demonstrated and maintained in service
1.6	The device should be designed to resist corrosion and erosion that may be result from the process method applied, the waste materials to be handled or the resulting products	Description and basis of how the device has been so designed and how that is demonstrated and maintained in service
1.7	The device should be designed to minimize the amount of by-product, unburnt and partially combusted material in the exhaust gas stream	Description and basis of how the device has been so designed and how that is demonstrated and maintained in service
1.8	The device should be designed to control intake air flow such that the required oxygen content and operating conditions are achieved through the device for it to function as intended	Description and basis of how the device has been so designed and how that is demonstrated and maintained in service together with the required oxygen content profile across the device in operation
1.9	The device should be designed to maintain the required pressure levels through the device for it to function as intended	Description and basis of how the device has been so designed and how that is demonstrated and maintained in service together with the required pressure profile across the device in operation

	Functional objective	Content of TWTD Technical Report
1.10	The device should be designed to minimize visible smoke and particulate emissions	Description and basis of how the device has been so designed and how that is demonstrated and maintained in service
1.11	The device should be designed to minimize the formation of dioxins in the exhaust gas stream when disposing of garbage containing PVC	Description and basis of how the device has been so designed and how that is demonstrated and maintained in service
1.12	The device should be designed so that if there is an emergency shutdown, either triggered by the device itself or the user, there will not be abnormal levels of emissions	Description and basis of how the device has been so designed and how that is demonstrated and maintained in service
1.13	The device should be designed so that on restart following an emergency shutdown the emission limits will normally not be exceeded	Description and basis of how the device has been so designed and how that is demonstrated and maintained in service
1.14	Unless discharged ashore, the discharge water arrangements of the device should be designed to meet the discharge limits under all operating conditions with the waste materials it is designed to process to include those in-service controls and measurements used to regulate the device together with emergency shutdown and re-starting procedures	Description and basis of how the discharge water arrangements of the device have been designed and tested to demonstrate in service that the required performance will be achieved under all operating conditions
1.15	Where the nature of the device operating principles results in a discharge water stream with pollution aspects additional to those controlled in section 4 of these Guidelines then those should be duly controlled	Identification of additional discharge water criteria applicable to the operating principle applied and how those are controlled in order to meet the requirements of regulation 4.4 of MARPOL Annex VI
1.16	The capacity of the device (minimum and maximum) should be stated and should be such that when operating at any point in that range the emission limits would not be exceeded	How that capacity range has been established and demonstrated
1.17	All different capacity options/models of the device should meet the emission limits	How those capacity ranges have been established and demonstrated
1.18	The design of the device should be defined and there should be an agreed conformity of production arrangement to ensure each unit as delivered will not exceed the emission limits in service Each unit should be identified in a manner which provides for its inclusion under the approval given together with its waste handling capacity (MW or as applicable)	Device definition and proposed conformity of production arrangement and how that is to be audited/inspected to ensure ongoing consistency with that definition
1.19	There should be a means of unit certification	Proposed means by which each unit will be certified and how that is to

	Functional objective	Content of TWTD Technical Report
		function between the applicant and the Administration leading to the issue of individual TWT Device Certificates
1.20	Where there are design/manufacturing changes after approval as an equivalent means that affect the emissions performance of the device, those changes should be approved before being applied to devices to be considered for certification under that approval	Proposed change management process and how that will function to ensure that changes are not introduced to certified devices prior to their acceptance by the Administration
1.21	Additional device design and/or manufacture related Functional Objectives as applicable to this type of device which are relevant in terms of meeting the emission limits and the objectives of regulation 4.4 of MARPOL Annex VI should be identified	Resolution of those additional Functional Objectives
2. Installation on board		
2.1	The installation on board should be such that the device performance is as required	The onboard installation requirements, including if applicable discharge water arrangements, to ensure that the performance of the device is not adversely affected by, but not limited to, heat, vibration, ship movement or the functioning of other equipment. How it is demonstrated, by post installation tests or other means, that these requirements have been met
2.2	The exhaust duct arrangements and fittings should be such that the device performance is as required	The design, arrangement and installation requirements of the exhaust duct design from the device to atmosphere to ensure that the performance of the device is not adversely affected. All necessary connections for operating features, monitoring devices and control arrangements to be positioned as necessary. The means by which it is demonstrated these have been met
2.3	The necessary supply services (fuel, air, compressed air, electrical, etc.) for the device to operate as required should be provided	Listing of all the requirements in respect of those support services necessary for the correct operation and performance of the device including any associated discharge water arrangements. The means by which it is demonstrated that these have been met

	Functional objective	**Content of TWTD Technical Report**
2.4	Installation test demonstrating that the device performance is as required including that of any discharge water arrangements	Installation test procedures which are to be applied and associated acceptance criteria
2.5	Additional device installation related Functional Objectives as applicable to this type of device which are relevant in terms of meeting the emission limits and the objectives of regulation 4.4 of MARPOL Annex VI should be identified	Resolution of those additional Functional Objectives
3. In-service operation		
3.1	When in an idle condition there should not be any significant emissions from the device (these systems can be difficult to quickly shut completely on and off and thus may require an idle status when they do not receive any feedstock)	Means by which this requirement is achieved or basis on which this is not applicable
3.2	The warm-up phase should ensure that on completion the device will operate as required	Means by which this requirement is achieved
3.3	The preparation of solid waste (sorting, size screening etc.) should be such that the device will operate as required	Operating procedures in respect of the preparation of solid waste
3.4	The preparation of liquid wastes/sludge oil should be such that the device will operate as required	Operating procedures in respect of the preparation of liquid wastes
3.5	The preparation of sewage sludge should be such that the device will operate as required	Operating procedures in respect of the preparation of sewage waste
3.6	The procedure for loading solid waste should be such that the device performs as required	Operating procedures in respect of the loading of solid waste into the device
3.7	The procedure for loading liquid waste should be such that the device performs as required	Operating procedures in respect of the loading of liquid waste into the device
3.8	The procedure for loading sewage sludge should be such that the device performs as required	Operating procedures in respect of the loading of sewage waste into the device
3.9	If applicable – the procedure for concurrently loading solid waste, liquid waste or sewage sludge should be such that the device performs as required	Operating procedures in respect of the concurrent loading of solid waste, liquid waste or sewage waste into the device
3.10	When processing solid waste, the emission to air should be controlled to not exceed the emission limits	Operating procedures for the disposal of solid waste
3.11	When processing liquid waste, the emission to air is to be controlled to not exceed the emission limits	Operating procedures for the disposal of liquid waste
3.12	When processing sewage sludge, the emission to air should be controlled to not exceed the emission limits	Operating procedures for the disposal of sewage sludge

	Functional objective	Content of TWTD Technical Report
3.13	If applicable - when concurrently disposing of solid waste, liquid waste or sewage sludge the emission to air should be controlled to not exceed the emission limits	Operating procedures when operating concurrently on solid waste, liquid waste or sewage sludge
3.14	The loading of further waste material should not result in one or more of the emission limits being exceeded	Operating procedures in respect of loading additional solid waste, liquid waste or sewage sludge while the device is in operation
3.15	The device should demonstrate ongoing compliance with the emission limits to air at all times when in operation, including warm-up and shutdown phases	Means by which ongoing compliance with the emission limits is to be demonstrated
3.16	The means by which ongoing compliance with the emissions to air are monitored should produce reliable measurement data	Means by which monitoring equipment, and any associated equipment, are operated, zero and span checked, maintained and serviced to achieve the required measurement performance
3.17	The device should be shut down in a manner which ensures that all thermal processes are terminated and that the device and associated exhaust system to atmosphere is purged of all residual gases	Operating procedures and procedures relating to the shutdown of the device
3.18	The means and procedures for the removal of solid residues from the device should ensure that these are fully and securely contained for landing ashore	Operating means and procedures in respect of the removal of solid residue material from the device and subsequent onboard storage prior to discharge ashore
3.19	The discharge water arrangements should be prepared, operated and shutdown such that the emission to sea limits are met under all operating conditions including during the device warm-up and shutdown phases	Operating procedures of the discharge water arrangements, including control and monitoring functions, relating to the preparation for use, in-service application and shutdown
3.20	Discharge water PAH limit should be expressed as a concentration (µg/litre) as appropriate to the device across its operating range	PAH limit(s) should be given against discharge water flow rate(s)
3.21	The means by which ongoing compliance with the discharges to sea is monitored should produce reliable measurement data	Means by which monitoring equipment, and any associated equipment, are operated, zero and span checked maintained and serviced to achieve the required measurement performance
3.22	Additional Functional Objectives related to device operations, as applicable to this type of device and relevant in terms of meeting the emission limits and the objectives of regulation 4.4 of MARPOL Annex VI, should be identified	Resolution of those additional Functional Objectives
4. Record-keeping		

	Functional objective	Content of TWTD Technical Report
4.1	There should be an Events Record for each TWTD device installed. That Events Record is to cover all phases of operation of the device when in service	What the Events Record is to include and the manner of its recording
4.2	There should be retained records in respect of emissions to air	Form of records which are required to be kept demonstrating the performance and self-checking functions against respective limits showing that the device performed as required set against the recorded Event Record points
4.3	There should be records of the oxygen content, temperature and pressure values, as applicable to the principle of operation, through the device showing that it operated within the required profiles	Form and extent of records which should be kept demonstrating that the required oxygen content, temperature and pressure values were achieved set against the recorded Event Record points
4.4	There should be records in respect of emissions to sea	Form of records which are required to be kept demonstrating the performance and self-checking functions against respective limits showing that the device performed as required set against the recorded Event Record points
4.5	There should be records of solid, and any other, residue materials or related liquids discharged ashore	Related record-keeping requirements
4.6	Records should be against date and UTC. These records should be retained on board at least 18 months from date of recording. If the recording device is changed over that period, it should be ensured that the required data is retained on board and available as required. The recording device should be capable of producing reports as required demonstrating past performance	Means by which the required records are to be recorded and retained on board in a tamper-proof manner. The extent and form of the reports that the recording device is capable of producing
4.7	Additional Functional Objectives related to device record-keeping, as applicable to this type of device and relevant in terms of meeting the emission limits and the objectives of regulation 4.4 of MARPOL Annex VI, should be identified	Resolution of those additional Functional Objectives
5. Maintenance and servicing		
5.1	The extent, frequency and details of device maintenance necessary by user is to be specified – including like for like replacements – should be specified	Basis and details of the required onboard maintenance in terms of activities and timings in order to maintain the effectiveness of the device

	Functional objective	**Content of TWTD Technical Report**
5.2	Extent, frequency and details of device servicing requirements should be specified	Basis and details of the required servicing in terms of activities and timings in order to maintain the effectiveness of the device to operate with the emission limits
5.3	Extent, frequency and details of maintenance and servicing requirements of emission monitoring devices should be specified	Basis and details of the required maintenance and servicing in terms of activities and timings in order to maintain the effectiveness of the devices to operate as required
5.4	Maintenance and servicing records should be retained on board for a duration at least 18 months from the date of performance	Means by which the recordkeeping requirements related to maintenance and servicing are recorded and retained on board in a tamper-proof manner and will be available as required
5.5	Additional Functional Objectives related to device maintenance and servicing related as applicable to this type of device and relevant in terms of meeting the emission limits and the objectives of regulation 4.4 of MARPOL Annex VI, should be identified	Resolution of those additional Functional Objectives
6. Instructions and training		
6.1	A TWTD Operating Manual should be supplied with the device covering as necessary those Functional Objective sections 2 to 5	The TWTD Operating Manual, which may be divided into a number of separate documents as appropriate, should provide all necessary direction and guidance for the installation, in-service operation and onboard maintenance of the device together with appropriate fault finding and resolution guidance. Also included should be the servicing extent and timing requirements
6.2	A person who is to operate or maintain the device is to be trained to implement the guidance provided by the TWTD Operating Manual – training records are to be retained on board at least 18 months from date of training or while that person is performing those tasks – whichever is the longer	Description and content of the provided training programme, which may include test material, to be provided which would allow the user to train persons to apply the guidance as given in the TWTD Operating Manual and means to record, in a tamper-proof manner, which persons had been successfully trained as appropriate to their assigned tasks
7. TWTD File		
7.1	To enable the device to be surveyed, or inspected, a TWTD File should be provided The TWTD File should include, but is not limited to, the following:	An example of a TWTD File covering the required topics should be included

	Functional objective	**Content of TWTD Technical Report**
	1. Identification of the device to which the File refers, including model, rating and serial number 2. Description of the device and its manner of operation – including any exhaust gas treatment arrangements 3. The means by which the device should be surveyed both initially and in-service to verify that it is conforms to its as certified condition and is operating and performing as required 4. The means by which it would be verified that the guidance given in the TWTD Operating Manual has been applied as required 5. Means of verification that the required maintenance and servicing has been performed as required 6. Description of the emission monitoring arrangements and components and necessary ancillary equipment or requirements. Including details of the respective sampling points relative to the layout of the device including, if fitted, the discharge water handling arrangements 7. Details of monitoring device zero and span check, calibration, maintenance and servicing requirements and timings and the means of verification that those actions have been undertaken as required 8. Description of the monitoring and record-keeping arrangements and the capability of the recording device to produce operating/emission reports for selected parameters as required 9. The means by which recorded emissions values, set against the Events Record, compared to the respective limit values would be reviewed In addition, the TWTD File should include other checkpoints, as appropriate to the particular type of thermal waste treatment device and its manner of operation, that would confirm its correct operation and performance	
7.2	The TWTD File for each TWTD model should be approved by the Administration	Means by which TWTD File for each device will be submitted for approval
7.3	Amendments to the TWTD File which reflect changes that affect aspects covered by these Functional Objectives and the associated TWTD Technical	Means by which amendments to previously approved TWTD File will be submitted for approval prior to application to in-service devices

	Functional objective	Content of TWTD Technical Report
	Report or emissions performance, should be approved by the Administration. Where these are to be applied to previously certified devices and reflect necessary changes to the TWTD File as approved, those changes should not be applied prior to their approval by the Administration. Where additions, deletions or amendments to the TWTD File are separate to the TWTD File as initially approved, they should be retained with the TWTD File and should be considered as part of it	
8. Performance Level 2		
8.1	Where a device is to be approved and individual units certified to Performance Level 2, and as a result the device requires additional or alternative fittings, settings, operating procedures, documentation or other aspects in order to achieve that performance level, then that should be reflected as relevant in each of the respective Functional Objectives as listed above	Information, procedures, records, restrictions or other as appropriate to achieving and maintaining Performance Level 2

6 Certification process

6.1 The certification process divides into two parts. The first is the approval of the proposed TWTD model as an equivalent means under regulation 4 of MARPOL Annex VI. The second part is the approval of individual units of that TWTD operating on the basis of the equivalent means as approved.

6.2 The approval by the Administration of the TWTD model as an equivalent means should be on the basis of the applicant-submitted TWTD Technical Report together with, if appropriate, any additional information in the supporting information annex. The TWTD Technical Report should specify whether the units are to be certified to Performance Level 1 or Performance Level 2 and, in the latter case, contain the necessary supporting data including the Pre-approval Test report.

6.3 Any subsequent amendments to the information as given in the TWTD Technical Report or which affect emissions performance as controlled by these Guidelines should be approved by the Administration before being applied to individual thermal waste treatment devices in service.

6.4 Following approval of the TWTD model as an equivalent means then individual units should be certified by the Administration in accordance with the agreed procedures as set out in the TWTD Technical Report as approved.

6.5 An approved TWTD should be issued with a TWTD Certificate, as set out in the annex, by the Administration and have TWTD File as approved by that Administration.

6.6 Following satisfactory completion of installation test procedure as given in the TWTD File, section 2.6 of the Supplement to the International Air Pollution Prevention Certificate should be duly updated.

6.7 Individual thermal waste treatment devices should thereafter be subject to the survey procedures as given in the approved TWTD File at those times the ship on which the device is installed is surveyed in accordance with the applicable MARPOL Annex VI survey regime.

6.8 Amendments to the TWTD as installed, operated or monitored should be duly covered by amendments to the TWTD File as approved by the Administration before they are applied in service.

ANNEX

FORM OF TWTD CERTIFICATE

Name of Administration

Thermal Waste Treatment Device Approval Certificate

Issued under the provisions of the Protocol of 1997, as amended, to amend the International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978 related thereto under the authority of the Government of:

……
(*full designation of the country*)

by ……...
(*full designation of the competent person or organization authorized under the provisions of the Convention*)

This is to certify that the thermal waste treatment device (TWTD), as an equivalent means under regulation 4 to incineration under regulation 16, as detailed below has been surveyed and related documentation approved in accordance the *2023 Guidelines for thermal waste treatment devices* adopted by resolution MEPC…(..).

Manufacturer	**Model/ Type**	**Serial Number**	**Maximum capacity**	**Equivalent means – approval reference**
[…]	[…]	[…]	[…]	[…]

This TWTD is certified to:
Performance Level 1 ..…...…… ☐
Performance Level 2 ..…...…… ☐

The TWTD does not generate any emissions to air …… ☐

Title	**Approval reference**
TWTD File	

A copy of this Certificate together with the approved TWTD File should be carried on board the ship fitted with this TWTD at all times and should be available as required.

This Certificate is valid for the life of the TWTD, subject to surveys in accordance with regulation 5 of MARPOL Annex VI, installed in ships under the authority of this Government.

Issued at ……..
(*place of issue of Certificate*)

Date (dd/mm/yyyy) ……..
(*date of issue*)

……
(*signature of duly authorized official issuing the Certificate*)

(*seal or stamp of the authority, as appropriate*)

***