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## WORK PROGRAMME

### Proposal for a new output on guidelines for fire prevention by detecting hazardous levels of airborne fuels and oil-based vapours on ships in the field of maritime safety

Submitted by Denmark, Germany and CESA

#### SUMMARY

*Executive summary:* This document proposes a new output on the agenda of MSC to update the "Code of Practice for Atmospheric Oil Mist Detectors" (MSC/Circ.1086, approved in 2003).

*Strategic direction,  
if applicable:* 5

*Output:* Not applicable

*Action to be taken:* Paragraph 24

*Related documents:* MSC/Circ.1086 and MSC-MEPC.1/Circ.5/Rev.4

#### Introduction

1 To reflect the development in technology for contemporary means of fire prevention this document proposes to update the "Code of Practice for Atmospheric Oil Mist Detectors" (MSC/Circ.1086 approved in 2003) and is submitted in accordance with the provisions of paragraph 4.6 of the *Organization and Method of Work of the Maritime Safety Committee and the Maritime Environment Protection Committee and their Subsidiary Bodies* (MSC-MEPC.1/Circ.5/Rev.4).

#### Background

2 Fires on board ships are often caused by leaks of oil in engine rooms. The emitted oil evaporates into the air, in many cases undetectable to the seafarers. At a certain point, the level of oil content reaches a saturation level and the oil may be ignited. Due to the presence of oil, heat and oxygen such fires tend to develop very fast, and conventional fire alarms only react when the fire has broken out. Earlier reaction to, or better prevention of, fires could significantly reduce the consequences of such incidents.

3 The industry has developed various solutions for continuous monitoring and tracing potentially hazardous levels of airborne fuels and oil-based vapours. The purpose of such systems is to provide an alarm above specific levels of oil contents which enables the crew to react, identify and remove oil leaks and thereby preventing a potential fire from occurring.

4 There are several regulated sensor solutions aiming at detecting smoke, high temperatures and flames. These typically provide an alarm when the fire has already occurred. At best, such detectors therefore allow the crew to minimize the fire at an early stage.

5 A typical engine-room has a measurable content of airborne oil particles or vapours (background level), depending on the specific technological design, the age and the level of maintenance of the ship. Changes in the level of airborne oil particles may therefore indicate a leakage in a system containing oil.

### **IMO objectives**

6 The prevention of fires to ensure maritime safety lies at the heart of the mission statement of IMO to promote safe, secure and environmentally sound, efficient and sustainable shipping.

### **Need**

7 Study of fires in engine-rooms has found that the majority of fires in engine-rooms are generally caused by a leak or fracture from a flammable liquid system. Most engine-room fires begin as a result of the ignition of airborne hydrocarbons.

8 In general, liquid oil can be airborne as a mist or vapour. Oil spray and mist (airborne drops) may result from leakages in high pressure systems, such as pipes. In addition, airborne oil particles may also appear as leaking oil is vaporized due to heat. At high temperatures and high concentrations such vapours may be detected by mist detectors.

9 ISO 16437:2012 states: "Oil mist detection systems are available to continuously monitor the machinery space atmosphere. They can give early warning of a dangerous onset of oil mist accumulation and can be incorporated in arrangements to automatically shut down valves, machinery, etc. to prevent the outbreak of fire".

10 MSC/Circ.1086 and ISO 16437:2012 were developed based on the available technologies at the time. These are still relevant however, they do not fully reflect the current principles and technologies which provide the possibility to detect airborne oil over the whole spectrum from a few particles of vapour to higher levels in form of mist and airborne drops.

### **Analysis of the issue**

11 The industry has developed various types of technical solutions to identify mist and vapours. Such solutions have been installed on a variety of ships. The accumulated experience is positive and provides a basis to include in international guidelines concerning "Atmospheric Oil Leakage Detectors".

### **Analysis of implications**

12 It is considered that this proposal will not incur any additional administrative requirements or burdens. The update of the guidelines will provide updated guidance within the existing IMO framework.

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13 A completed administrative checklist, as set out in annex 5 to MSC-MEPC.1/Circ.5/Rev.4, is set out in annex 1.

### **Benefits**

14 An updated code of practice for atmospheric oil leakage detectors offers a range of significant benefits for the maritime sector:

15 An updated code of practice for the performance and operation of atmospheric based oil leakage detectors would provide a consistent, reliable foundation as to what can be expected from these systems, as well as the installation, training and operation of such systems.

16 A framework for atmospheric oil leakage detection systems will provide the basis for a consistent evaluation of and identification of such systems, which will:

- .1 enable shipowners to select the best possible system for a specific ship; and
- .2 be in line with IMO's safety objectives.

17 Increased physical welfare for the crew would be possible sensing oil vapours on a human health level. This is in line with ongoing efforts to improve the work environment and provide cleaner air in engine rooms.

18 ISO 16437:2012 describes that detectors can be incorporated in arrangements to automatically shut down valves, machinery, etc. to prevent the outbreak of a fire.

19 Further, the increased digitalization and the possibility of data collection from (some) leakage detectors enables preventive maintenance, benchmarking, developing best practices, analysis of incidents, etc. This is in line with the general technological development of autonomous shipping, bidirectional vessel to shore communication, etc.

### **Industry standards**

20 Within the area of current regulation and standards the following is found to be relevant for detecting the potential presence of atmospheric oil on ships

- .1 MSC/Circ.1086 from 2003 details a "Code of Practice for Atmospheric Oil Mist Detectors". This code of practice specifies the problem and identifies important aspects in relation to how to locate oil mist detectors and how to conduct test and maintenance of such detectors.
- .2 ISO 16437:2012 sets out requirements, test methods and performance criteria for resettable oil mist detectors for use in fire hazard alarm systems installed on marine vessels. It identifies three different principles for detecting oil mist which are useful (see later).

### **Output**

21 The co-sponsors propose to include an output on "Review and update of the Code of Practice for Atmospheric Oil Mist Detectors (MSC/Circ.1086)" on the post-biennial agenda of the Sub-Committee on Ship Systems and Equipment.

### **Human element**

22 The completed checklist for considering human element issues contained in the *Checklist for considering human element issues by IMO bodies* (MSC-MEPC.7/Circ.1) is set out in annex 2.

### **Urgency**

23 It is proposed that the suggested output is included in the post-biennial agenda with the SSE Sub-Committee as the associated organ, with two sessions necessary to complete the output.

### **Action requested of the Committee**

24 The Committee is invited to consider the information provided in this document and in particular the proposals contained in paragraph 21, and take action, as appropriate.

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**ANNEX 1**

**CHECKLIST FOR IDENTIFYING ADMINISTRATIVE REQUIREMENTS**

This checklist should be used when preparing the analysis of implications required in submissions of proposals for inclusion of outputs. For the purpose of this analysis, the term "administrative requirement" is defined in accordance with resolution A.1043(27), as an obligation arising from a mandatory IMO instrument to provide or retain information or data.

**Instructions:**

- (A) If the answer to any of the questions below is **YES**, the Member State proposing an output should provide supporting details on whether the requirements are likely to involve start-up and/or ongoing costs. The Member State should also give a brief description of the requirement and, if possible, provide recommendations for further work, e.g. would it be possible to combine the activity with an existing requirement?
- (B) If the proposal for the output does not contain such an activity, answer **NR** (not required).
- (C) For any administrative requirement, full consideration should be given to electronic means of fulfilling the requirement in order to alleviate administrative burdens.

1. Notification and reporting? Reporting certain events before or after the event has taken place, e.g. notification of voyage, statistical reporting for IMO Members	NR x	Yes <input type="checkbox"/> Start-up <input type="checkbox"/> Ongoing
Description of administrative requirement(s) and method of fulfilling it: (if the answer is yes)		
2. Record-keeping? Keeping statutory documents up-to-date, e.g. records of accidents, records of cargo, records of inspections, records of education	NR x	Yes <input type="checkbox"/> Start-up <input type="checkbox"/> Ongoing
Description of administrative requirement(s) and method of fulfilling it: (if the answer is yes)		
3. Publication and documentation? Producing documents for third parties, e.g. warning signs, registration displays, publication of results of testing	NR x	Yes <input type="checkbox"/> Start-up <input type="checkbox"/> Ongoing
Description of administrative requirement(s) and method of fulfilling it: (if the answer is yes)		
4. Permits or applications? Applying for and maintaining permission to operate, e.g. certificates, classification society costs	NR x	Yes <input type="checkbox"/> Start-up <input type="checkbox"/> Ongoing
Description of administrative requirement(s) and method of fulfilling it: (if the answer is yes)		
5. Other identified requirements?	NR x	Yes <input type="checkbox"/> Start-up <input type="checkbox"/> Ongoing
Description of administrative requirement(s) and method of fulfilling it: (if the answer is yes)		

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ANNEX 2

CHECKLIST FOR CONSIDERING HUMAN ELEMENT ISSUES BY IMO BODIES

	1 Question	2 Yes/ No	3 IMO References	4 Considerations	5 Instructions
<b>Workload</b>			<i>Other relevant references may be added</i>  <i>Strikeout references that are not relevant</i>	<i>If answer to question is "yes" identify considerations. If answer is "no" make proper justification</i>	<i>Identify how human element considerations should be addressed in the output</i>
1	Does the "output" affect workload?				
1.1	On board, especially in the already intensive phases of the voyage and port operations to:	yes	<i>Revised guidelines for the operational implementation of the International Safety Management (ISM) Code by Companies (MSC-MEPC.7/Circ.8)</i>	The "input" is an update of existing MSC/Circ.1086. The development of sensor technology has made it possible to identify very early stages of a fire, already when the risk is present. The guidelines in MSC/Circ.1086 are from 2003 need to be improved, in regard of scope and awareness.	
1.1.1	Operations including navigation, cargo and engineering	no			
1.1.2	Maintenance of the ships structure and its equipment	no			
1.1.3	Onboard administration in support of the ships' management systems	no			

	1 Question	2 Yes/ No	3 IMO References	4 Considerations	5 Instructions
1.1.4	Onboard administration related to regulation involving flag States, classification societies, port State and other bodies such as charterers and port authorities	yes		See 1.1	
1.1.5	Increased workload or time pressure on personnel if involved in implementation of changes prior to the implementation date	no			
1.2	<b>Ashore, in a manner that would affect the ships operation to:</b>				
1.2.1	Companies' administration	no			
1.2.2	Flag State, port State and classification societies administration such that certification and other processes are compromised or delayed	no			

	1 Question	2 Yes/ No	3 IMO References	4 Considerations	5 Instructions
	<b>Decision-making</b>			<i>If answer to question is "yes" identify considerations. If answer is "no" make proper justification</i>	<i>Identify how human element considerations should be addressed in the output</i>
<b>2</b>	<b>Does the "output" impact decision-making on board the ship?</b>				
2.1	By confusion with existing requirements and regulations	no			
2.2	By changing responsibilities as laid out in the ISM Code	no			
2.3	By creating complexity in its implementation and/or in the safety management systems	yes		See 1.1	
2.4	By requiring increased mental effort, such as the need to find, transform and analyse data or result in the need to make judgements based on incomplete information	no			
2.5	By limiting the time available to establish situational awareness, decide, communicate (possibly across time zones) or check	no			
2.6	By increasing reliance on judgement and administrative controls to manage major risks such as oil spills and collisions	no			

	1 Question	2 Yes/ No	3 IMO References	4 Considerations	5 Instructions
<b>Living and Working Environment</b>			<i>Other relevant references may be added</i>  <i>Strikeout references that are not relevant</i>	<i>If answer to question is "yes" identify considerations. If answer is "no" make proper justification</i>	<i>Identify how human element considerations should be addressed in the output</i>
<b>3</b>	<b>Does the "output" affect the living and working environment?</b>				
<b>3.1</b>	By interfering with existing arrangements for abandonment, fire-fighting and other emergency plans or procedures	yes		If atmospheric oil mist detectors are being used in the engine-room the crew can get an early warning before a fire occurs. Also, it will improve the air quality as it will be discovered that oil mist/vapours are in the engine-room hence the crew will have the possibility to look for the problem and stop it.	
<b>3.2</b>	By introducing new materials that could create an explosion, fire, environmental or occupational health risk	no			
<b>3.3</b>	By introducing new high energy sources such as high-voltage, high pressure fluids	no			
<b>3.4</b>	By affecting access or egress and causing lack of ventilation in working spaces	no			
<b>3.5</b>	By affecting the habitability of accommodation spaces due to noise, vibration, temperatures, dust and other contaminants	no			

	1 Question	Yes/ No	3 IMO References	4 Considerations	5 Instructions
<b>Operation and Maintenance</b>			<i>Other relevant references may be added</i>  <i>Strikeout references that are not relevant</i>	<i>If answer to question is "yes" identify considerations. If answer is "no" make proper justification</i>	<i>Identify how human element considerations should be addressed in the output</i>
<b>4</b>	<b>Does the "output" affect the operation and maintenance of the ship, its structure or systems and equipment?</b>		<i>Revised guidelines for the operational implementation of the International Safety Management (ISM) Code by Companies (MSC-MEPC.7/Circ.8)</i>		
<b>4.1</b>	By introducing equipment that the user may find difficult to operate or maintain or may be unreliable	no			
<b>4.2</b>	By introducing new and/or novel technology, or technology that changes the role of the person	yes		Introduction and training of the fire/safety teams on board.	
<b>4.3</b>	By introducing requirements for new competencies and roles	no			
<b>4.4</b>	By overloading existing infrastructure such as power generation and ventilation systems	no			
<b>4.5</b>	By poor integration with existing systems and controls	no			
<b>4.6</b>	By introducing new and unfamiliar operations/procedures	no			
<b>4.7</b>	By introducing new and unfamiliar operating interfaces?	yes		Systems may be stand-alone or integrated – which can implement new HMIs	
<b>4.8</b>	By introducing risks to the ship during any modifications required prior to the implementation date of the output	no			

	1 Question	Yes/ No	3 IMO References	4 Considerations	5 Instructions
			<i>Other relevant references may be added</i>  <i>Strikeout references that are not relevant</i>	<i>If answer to question is "yes" identify considerations. If answer is "no" make proper justification</i>	<i>Identify how human element considerations should be addressed in the output</i>
	<b>5</b>		<i>Revised guidelines for the operational implementation of the International Safety Management (ISM) Code by Companies (MSC-MEPC.7/Circ.8)</i>		
	<b>5.1</b>	yes		See 4.7	
	<b>5.2</b>	no			
	<b>5.3</b>	no			
	<b>5.4</b>	no			
	<b>5.5</b>	no			
	<b>5.6</b>	no			
	<b>5.7</b>	no			