

## **U.S. Coast Guard Interpretation**

### **IEC 60092-502:1999 Supplement**

#### **Purpose:**

This supplement defines a “standard not inferior to that acceptable to the Organization” under SOLAS regulation II-1/45.11 for U.S. vessels enrolled in the alternate compliance program (ACP). A “standard not inferior to that acceptable to the Organization” means IEC 60092-502:1999 as modified by the supplemental requirements contained in this document.

#### **How to Use This Document:**

Where the word “cite” appears, the referenced section of IEC 60092-502:1999 is modified by the text provided in this document. Where the words “supplement cites” appear, reference is made to the respective cite in this document. Where the word “Clause” appears, the referenced section of IEC 60092-502:1999 is considered acceptable without modification.

Note: The words “*Category*” and “*Type*”, as used in this Supplement are the same as Ex “x” protection techniques, i.e., “x” is the type of protection techniques.

#### **Application:**

For tankers (Group IIA only), supplement cites: 4.2.1, 4.2.2 and 4.2.3 apply.

For tankers carrying 46 CFR Subchapter O (except Group IIA) cargoes, liquid sulfur carriers, and inorganic acid carriers, supplement cite: 4.5 applies.

For tankers carrying flammable liquefied gases or ammonia as a cargo, cargo residue, or vapor, the following apply:

- a. Clause 2 (Definitions) and Sections Three and Four of IEC 92-502 Third Edition 1980;
  - b. Supplement cites 6.5.A and 6.5.3, and Clauses 6.5.1 and 6.5.2 of IEC 60092-502:1999;
  - c. The requirements of 46 CFR 58.01-10 and 46 CFR 154.705 for cargo boil-off used as fuel for boilers, inert gas generators, and combustion engines in the main propelling machinery space. Cargo boil-off used as fuel for other services that are located in the main propelling machinery space or other spaces must be approved by the Marine Safety Center; and
  - d. The weather deck of a cargo ship carrying ammonia is not a hazardous area;
- :1999

For cargo ships fitted with ro/ro spaces and vessels carrying vehicles with fuel in their tanks, supplement cite: 6.5.3, and Clauses 6.5.1 and 6.5.2 of IEC 60092-502:1999 apply.

**List of Supplemental Requirements to IEC 60092-502:1999:**

**4. Area classification**

**Cite: 4.1.4.1.** Table 1 is replaced with the following table. A space separated by gastight boundaries from a hazardous area may be classified as Zones 0, 1, 2, or considered as non-hazardous, taking into account the sources of release inside that space and its conditions of ventilation as indicated in Clause 8.3 of IEC 60092-502:1999, in accordance with Table 1.

**Table 1 – Spaces separated by one gastight boundary from the zones mentioned in the column (gas group IIA only)**

	With source of release <sup>1)</sup>		Without source of release	
	With ventilation <sup>2)</sup>	Without ventilation	With ventilation <sup>2)</sup>	Without ventilation
<b>Zone 0</b>	Zone 1 for example cofferdams with cargo pipe flanges  (see annex A, clause A.1)	Zone 0 for example cofferdams with cargo pipe flanges  (see annex A, clause A.4)	Zone 1 for example ballast pump rooms adjacent to cargo tanks  (see annex A, clause A.7)	Zone 0 for example cofferdam, void space  (see annex A, clause A.10)
<b>Zone 1</b>	zone 2 for example rooms with cargo pipe flanges  (see annex A, clause A.2)	zone 1 for example rooms with cargo pipe flanges  (see annex A, clause A.5)	Non-hazardous areas  (see annex A clause A.8)	Non-hazardous areas  (see annex A, clause A.11)
<b>Zone 2</b>	Zone 2 for example rooms with cargo pipe flanges  (see annex A, clause A.3)	Zone 1 for example rooms with cargo pipe flanges  (see annex A, clause A.6)	Non-hazardous areas  (see annex A, clause A.9)	Non-hazardous areas  (see annex A, clause A.12)
<sup>1)</sup> The following are examples of some sources of release: – venting and other openings to cargo tanks, slop tanks and cargo piping; – seals of cargo pumps, cargo compressors and process equipment; – seals of valves and flanges and other connections and pipe fittings.  <sup>2)</sup> Mechanical ventilation must change a minimum of 30x the volume of the space in air each hour. If ventilation is lost all electrical power to the hazardous zone must be shut off. The fan motor must be outside the duct and either rated Ex d IIA or be 10ft from the duct exhaust end.				

Table 1 above also applies to the corresponding text of Clauses 4.1.4 and 8 of IEC 60092-502:1999.

**Cite: 4.1.5.** Openings, access and ventilation conditions affecting the extent of a hazardous area.

Table 2 is replaced by the following table:

**Table 2 – Spaces without source of release and separated by door(s) from the zones mentioned in the column (Group IIA only)**

	Protected by over-pressure relative to the surrounding hazardous area		Not protected by over-pressure relative to the surrounding hazardous area but artificially ventilated <sup>6)</sup>		Not protected by over-pressure relative to the surrounding hazardous area and not artificially ventilated	
	Separated by one door <sup>1)</sup>	Separated by two doors <sup>2)</sup>	Separated by one gastight door <sup>3)</sup>	Separated by two gastight doors <sup>4)</sup>	Separated by one door <sup>5)</sup>	Separated by two doors <sup>5)</sup>
<b>Zone 1</b>	Zone 2  (see annex A, clause A.13)	Non-hazardous area  (see annex A, clause A.15)	Zone 1  (see annex A, clause A.16)	Zone 2  (see annex A, clause A.18)	Zone 1  (see annex A, clause A.20)	Zone 1  (see annex A, clause A.20)
<b>Zone 2</b>	Non-hazardous area  (see annex A, clause A.15)	Non-hazardous area  (one door is sufficient)	Zone 2  (see annex A, clause A.17)	Non-hazardous area  (see annex A, clause A.19)	Zone 2  (see annex A, clause A.21)	Zone 2  (see annex A, clause A.21)

<sup>1)</sup> Door capable of maintaining the over-pressure.  
<sup>2)</sup> Two doors forming an air-lock capable of maintaining the over-pressure.  
<sup>3)</sup> Watertight doors or fire doors class A are considered as gastight.  
<sup>4)</sup> Two gastight doors forming a ventilated air-lock.  
<sup>5)</sup> Any type of doors; see 4.1.5.5.  
<sup>6)</sup> Mechanical ventilation must change a minimum of 30x the volume of the space in air each hour. If ventilation is lost all electrical power to the hazardous space must be shut off. The fan motor must be outside the duct and either rated Ex d IIA or be 10ft from the duct exhaust end

Table 2 above also applies to the corresponding text of Clauses 4.1.5 and 8 of IEC 60092-502:1999.

**Tankers carrying flammable liquids having a flashpoint not exceeding 60 degrees C:**

**Cite: 4.2.1.**

A. In addition to the areas listed in Clause 4.2.1, the following spaces or areas are Zone 0 hazardous areas:

NOTES: The areas or spaces followed by an IEC Clause in parenthesis i.e., (Clause 4.2.2.x) are listed as Zone 1 spaces in IEC 60092-502:1999 Clauses 4.2.2 (with modifications).

1. A cargo handling room or a cargo pump room. (Clause 4.2.2.4)
2. An area on an open deck, or a semi-enclosed space on an open deck, within 0.5 m of any: cargo tank outlet, gas or vapor outlet (see note), cargo manifold valve, cargo valve, cargo pipe flange, cargo pump-room ventilation outlet, or cargo tank opening for pressure release provided to

permit the flow of small volumes of gas or vapor mixtures caused by thermal variation. (Clause 4.2.2.7)

NOTE – Such areas are, for example, all areas within 0.5 m of cargo tank hatches, sight ports, tank cleaning openings, ullage openings, sounding pipes, and cargo vapor outlets.

3. An area on an open deck, or a semi-enclosed space on an open deck, within 0.5 m of a cargo pump room entrance, a cargo pump room ventilation inlet, or an opening into a cofferdam. (Clause 4.2.2.9)

4. A void space adjacent to, above or below an integral cargo tank. (Clause 4.2.2.1)

5. A hold space containing an independent cargo tank. (Clause 4.2.2.2)

6. A cofferdam or a permanent (for example, segregated) ballast tanks adjacent to a cargo tank. (Clause 4.2.2.3)

7. An area within 2 m of a cargo pressure/vacuum valve with unlimited height. (Clause 4.2.2.8)

8. An area within 3 m of a vent outlet for free flow of vapor mixtures or of a high velocity vent outlet for the passage of large amounts of vapor, air or inert gas mixtures during cargo loading and ballasting or during discharging. (Clause 4.2.2.8)

B. A submerged cargo pump motor and associated cables are allowed in a cargo tank; and must meet the cargo pump motor requirement in supplement cite: 6.5.A.

C. **Cite: 4.2.2.** Unless identified as a Zone 0 Hazardous Area above, the following spaces or areas are Zone 1 Hazardous Areas:

1. An area on an open deck, or a semi-enclosed space on an open deck that is more than 1.0 m beyond the Zone 0 area of any cargo tank outlet, gas or vapor outlet, cargo manifold valve, cargo valve, cargo pipe flange, cargo pump-room ventilation outlet or cargo tank opening for pressure release provided to permit the flow of small volumes of gas or vapor mixtures caused by thermal variation.

2. An area on an open deck, or a semi-enclosed space on an open deck that is more than 1.0 m beyond the Zone 0 area of a cargo pump room entrance, a cargo pump room ventilation inlet or exhaust, an opening into a cofferdam or another Zone 0 space.

NOTE – Such areas are, for example, all areas within 1.0 m beyond the Zone 0 areas of cargo tank hatches, sight ports, tank cleaning openings, ullage openings, sounding pipes, and cargo vapor outlets.

3. Regardless of the level of natural ventilation, an area on an open deck over all cargo tanks (including all ballast tanks within the cargo tank area) to the full breadth of the ship plus 3 m fore and aft of the forward-most and aft-most cargo tank bulkhead, up to a height of 2.4 m above the deck.

4. A hazardous area in Clauses 4.2.2.5, 4.2.2.6, 4.2.2.10, 4.2.2.12 and 4.2.2.13 of IEC 60092-502:1999.

5. An area that is more than 1.5 m beyond the Zone 0 Hazardous Area of each cargo pressure/vacuum valve with unlimited height.

6. An area within 3 m around the Zone 0 Hazardous Area of a vent outlet for free flow of vapor mixtures or a high velocity vent outlet for the passage of large amounts of vapor, air or inert gas mixtures during cargo loading and ballasting or during discharging.

D. **Cites: 4.2.3.** Unless identified as Zone 0 or 1 above, the following spaces or areas are Zone 2 hazardous areas:

1. An area that is more than 1.5 m beyond the Zone 1 Hazardous Area of each cargo pressure/vacuum valve with unlimited height.
2. An area within 4 m around a Zone 1 Hazardous Area of a vent outlet for free flow of vapor mixtures or a high velocity vent outlets for the passage of large amounts of vapor, air or inert gas mixtures during cargo loading and ballasting or during discharging.
3. A hazardous area in Clauses 4.2.3.1, 4.2.3.3, 4.2.3.4, and 4.2.3.6 of IEC 60092-502:1999. Clause 4.2.3.1 of IEC 60092-502:1999 does not include a Zone 1 Hazardous Area in supplement cite 4.2.2.3.

### **Tankers carrying flammable liquids having a flashpoint exceeding 60 °C**

*Cite: 4.3.1.1.* Storage batteries may not be installed in cargo handling rooms.

*Cite: 4.3.2.* Cargoes heated to temperature (TH) above their flashpoint (FP) and cargoes heated to temperature within 15 °C of their flashpoint:  $TH \geq FP - 15 \text{ °C}$ , the requirements of Clause 4.2 of IEC 60092-502:1999 and supplement cites: 4.2.1, 4.2.2 and 4.2.3 apply.

### **Tankers carrying cargoes (for example acids) reacting with other products/materials to evolve flammable gases**

*Cite: 4.5.*

1. Supplement cite 4.2.1 defines Zone 0 Hazardous Areas.
2. Supplement cite: 4.2.2 defines Zone 1 Hazardous Areas.
3. Supplement cite: 4.2.3 defines Zone 2 Hazardous Areas.
4. Table 1 contained in supplement cite 4.1.4.1 and Table 2 contained in supplement cite 4.1.5 do not apply.
5. Electrical equipment installations in a Zones 0 or Zone 1 Hazardous Area must meet Clauses 6.5.1 and 6.5.2 of IEC 60092-502:1999, and supplement cite: 6.5.3.
6. For a submerged cargo pump, supplement cite: 6.5.A applies.

## **5 Electrical Systems**

*Cites: 5.2.1.* Classification Society rules may be followed instead of IEC 60092-201. SOLAS II-1/45.4.1 applies.

## **6 Electrical Equipment**

### **6.5 Electrical equipment in hazardous areas**

- A. Submerged cargo pump motor** is a cargo pump motor in a cargo tank in which:
- a. Low liquid level, motor current, or pump discharge pressure automatically shuts power to the motor if the pump loses suction;
  - b. An audible and visual alarm is actuated by the shutdown of the motor; and
  - c. A lockable circuit breaker or lockable switch is provided to disconnect power to the motor.

*Cites 6.5.3:* Intrinsically-safe “ib”, increased safety (type “e”); encapsulated (type “m”), sand filled (type “q”), and oil-immersed (type “o”) may not be used in a Zone 0 or Zone 1 Hazardous Area. Special (type “s”) protection technique may not be used.

## **7 Installation**

**Cite: 7.6.** Cable joints are not permitted in a Zone 1 Hazardous Area unless the enclosure is flameproof (Ex “d”) or explosion proof, or the circuit is intrinsically safe Ex "ia".

## **8 Ventilation and pressurization**

**Cite: 8.1.3** Note: - To downgrade a hazardous area by one zone, the ventilation supplied must be a minimum of 30 air changes per hour regardless of whether or not the space has a “source of release”.

**Annex A – F** are "Informative Examples" only and shall not be used to alter or modify the hazardous area classifications specified in this document.