Polski Rejestr Statków

Equipment and installations exposed to explosion hazard - PRS perspective for marine classification and certification

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ORIGIN OF REQUIREMENTS

STANDARDS

- SOLAS (International Convention for the Safety of Life at Sea) Reg. II-1 / 45.10;
- SOLAS Reg. II-1 / 45.11;
- SOLAS Reg. II-2/19.3.2;
- SC 79 (IACS Int.) Certified Safe Type Electrical equipment for Ships Carrying Dangerous Goods
- MODU Code: Code for the Construction and Equipment of Mobile offshore Drilling Units
- IACS Requirements concerning Mobile Offshore Drilling Units

ORIGIN OF REQUIREMENTS

SOLAS – International Convention for the Safety of Life at Sea

Reg. II-1 / 45.10

10. No electrical equipment shall be installed in any space where flammable mixtures are liable to collect including those on board tankers or in compartments assigned principally to accumulator batteries, in paint lockers, acetylene stores or similar spaces, unless the Administration is satisfied that such equipment is:

.1. essential for operational purposes;

.2. of a type which will not ignite the mixture concerned;

.3. appropriate to the space concerned; and

.4. appropriately certified for safe usage in the dusts, vapours or gases likely to be encountered.

ORIGIN OF REQUIREMENTS

SOLAS – International Convention for the Safety of Life at Sea

Reg. II-1 / 45.11

11. In tankers, electrical equipment, cables and wiring shall not be installed in hazardous locations unless it conforms with standards not inferior to those acceptable to the Organization*. However, for locations not covered by such standards, electrical equipment, cables and wiring which do not conform to the standards may be installed in hazardous locations based on a risk assessment to the satisfaction of the Administration, to ensure that an equivalent level of safety is assured.

ORIGIN OF REQUIREMENTS

IACS Int. – International Association of Classification Societies

SC79 SOLAS Reg. II-2/19.3.2;

3.2 Sources of ignition

Electrical equipment and wiring shall not be fitted in enclosed cargo spaces or vehicle spaces unless it is essential for operational purposes in the opinion of the Administration. However, if electrical equipment is fitted in such spaces, it shall be of a certified safe type** for use in the dangerous environments to which it may be exposed unless it is possible to completely isolate the electrical system (e.g. by removal of links in the system, other than fuses). Cable penetrations of the decks and bulkheads shall be sealed against the passage of gas or vapour. Through runs of cables and cables within the cargo spaces shall be protected against damage from impact. Any other equipment which may constitute a source of ignition of flammable vapour shall not be permitted.

**refer to Publication IEC 60092 – Electrical installation in ships

ORIGIN OF REQUIREMENTS

IACS Int. – International Association of Classification Societies

SC79 SOLAS Reg. II-2/19.3.2;

Interpretation:

1. Reference is to be made to IEC 60092-506 standard, Special features - Ships carrying specific dangerous goods and materials hazardous only in bulk.

2. For pipes having open ends (e.g., ventilation and bilge pipes, etc.) in a hazardous area, the pipe itself is to be classified as hazardous area. See IEC 60092-506 table B1, item B.

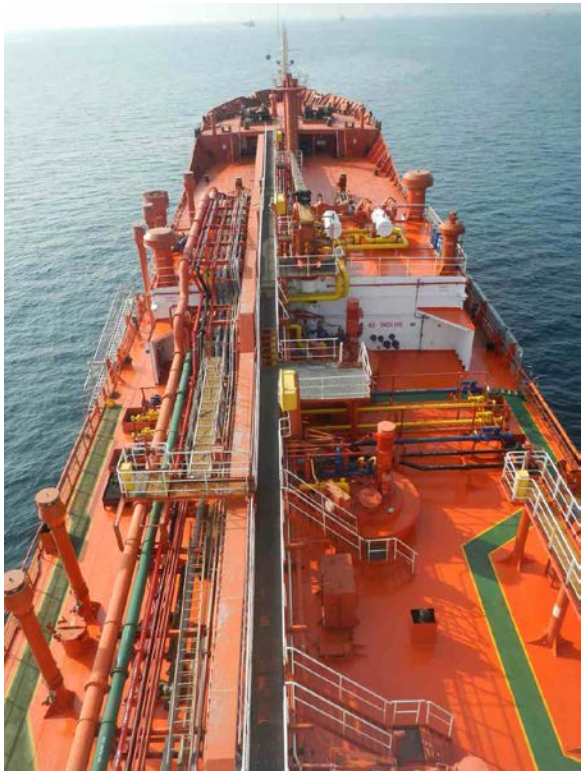
3. Enclosed spaces (e.g., pipe tunnels, bilge pump rooms, etc.) containing such pipes with equipment such as flanges, valves, pumps, etc. are to be regarded as an extended hazardous area, unless provided with overpressure in accordance with IEC 60092-506 clause 7.

ORIGIN OF REQUIREMENTS

STANDARDS

IEC 60092-502 Electrical installations in ships - Tankers - Special features

IEC 60092-506 Electrical installations in ships – Special features – Ships carrying specific dangerous goods materials hazardous only in bulk



ORIGIN OF REQUIREMENTS

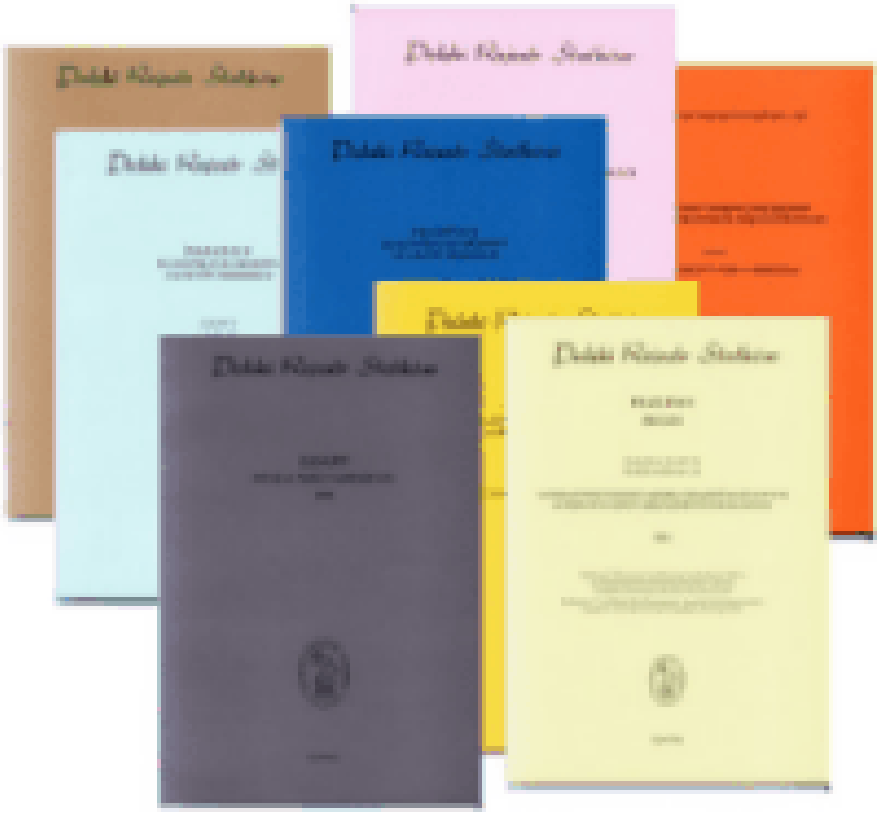
STANDARDS

IEC 61892-7:2007 Mobile and fixed offshore units. Electrical installations. Hazardous areas

PN EN 60079-14:2014 Explosive atmospheres - Part 14: Electrical installations design, selection and erection (IDT IEC)

GROUNDS FOR ENFORCEMENT OF REQUIREMENTS by POLISH REGISTER OF SHIPPING

- Rules for the Classification and Construction of Mobile Offshore Drilling Units (RJW)
- Rules for the Classification and Construction of Sea-going Ships
- Instructions for Surveyors
- Publication NR 5/I
- Publication NR 105/P



GROUNDS FOR ENFORCEMENT OF REQUIREMENTS by POLISH REGISTER OF SHIPPING

- Rules for the Classification and Construction of Sea-going Ships Part VIII Electrical installations and control systems: 2012

  - 2.8 Electrical Equipment in Hazardous Spaces,

  - 22.3 Installation of Electrical Equipment in Ro-Ro Cargo Spaces,

  - 22.5 Crude Oil Tankers, Product Carriers, Gas Tankers, Chemical Tankers, Ships Intended for Operation in Oil Spillage Area

- Publication NR 5/I - Guidelines for periodic review of the classification of explosion-proof electrical equipment on vessels in operation: 2005

- Publication PRS Nr 105/P – Principles of supervision over fixed production platforms: 2014

ELECTRICAL SYSTEMS AND EQUIPMENT IN SPACES EXPOSED TO EXPLOSION – REQUIREMENTS

1. Certification and classification survey of new buildings
2. Inspection in service

- Electric Systems and equipment in spaces exposed to explosion hazard of vapours or gasses
- Electrical systems and equipment in places endangered by explosion of dust

ELECTRICAL SYSTEMS AND EQUIPMENT IN SPACES EXPOSED TO EXPLOSION – Survey of new buildings

Installation of electrical equipment in places exposed to explosion should be limited to **absolute minimum**, and:

.1 **Cables** – in good condition, without additional connections and properly secured against mechanical damages.

.2 **Installed equipment** – fully efficient without any visible damages, and elements of devices crucial to explosion-proof properties are not painted.

.3 All **installed equipment** – in proper, PRS type approved explosion-proof enclosures.

.4 **Explosion-proof enclosures** of strengthened construction – installed only in places agreed with PRS.

.5 **Interlocking of electrical equipment** in connection with ventilation system, especially interlocking of cargo pumps and lighting in pump room.

.6 **Remote switch off** of pumps, ventilators and other electrical equipment - operational.

ELECTRICAL SYSTEMS AND EQUIPMENT IN SPACES EXPOSED TO EXPLOSION – SURVEY REPORT

Descriptive Report on Electrical Equipment

1. Specification of electrical equipment installed in spaces exposed to explosion.
2. Equipment of explosion-proof with information:

– compartment in which equipment has been installed;

– name and number of equipment installed;

– equipment type of construction and its symbol;

– name of certifying institution.

Polski

Electrical equipment for hazardous areas (zone 0, 1 and 2)

Equipment	Place of installation	Degree of protection	Certificate No.*	Authority
1.El.motor Hold No1 exhaust fan 7ABT 132MA-4KA ALWO LOHER	Compt:042B fr. 222-226 CL	EExd IIC T6 IP 65	03 ATEX 280X	CESI
2.El.motor Hold No2 exhaust fan AC 33 160 L4 ALWO CEMP INTERNATIONAL	Compt: 041B Fr. 204-206 PS	EExd IIC T6 IP 65	02 ATEX 123	CESI
2a.El.motor Hold No2 supply fan – 5 pcs AC 33 132 MB4 ALWO CEMP INTERNATIONAL	Compt: 041,041A fr. 204-206 PS, SB	EExd IIC T4 IP 65	02 ATEX 125X	CESI
3.El.motor Hold No3 exhaust fan AC 33 160 MB4 ALWO CEMP INTERNATIONAL	Compt:039B fr. 168-170 PS	EExd IIC T4 IP 65	02 ATEX 125X	CESI
4.El.motor Hold No3 supply fan – 5 pcs AC 33 160 L4 ALWO CEMP INTERNATIONAL	Compt:039, 039A fr. 168-170 PS, SB	EExd IIC T4 IP 65	02 ATEX 125X	CESI
5.El.motor Hold No4 exhaust fan AC 33 160 MB4 ALWO CEMP INTERNATIONAL	Compt:037B fr. 130-132 PS	EExd IIC T4 IP 65	02 ATEX 125X	CESI
6.El.motor Hold No4 supply fan – 5 pcs AC 33 160 L4 ALWO CEMP INTERNATIONAL	Compt:037, 037A fr. 130-132 PS, SB	EExd IIC T4 IP 65	02 ATEX 125X	CESI
7.El.motor Hold No5 exhaust fan AC 33 160 MB4 ALWO CEMP INTERNATIONAL	Compt:035C fr. 94-96 PS	EExd IIC T4 IP 65	02 ATEX 125X	CESI
8.El.motor Hold No5 supply fan – 5 pcs AC 33 160 L4 ALWO CEMP INTERNATIONAL	Compt:035, 035A fr. 94-96 PS, SB	EExd IIC T4 IP 65	02 ATEX 125X	CESI
9.El.motor for Paint Store exhaust fan 5ABT 80B-2K/T4 ALWO LOHER	Compt:29 Paint Store Tweendeck fr.245-246 SB	EExd IIC T4 IP 55	05 ATEX 110X	CESI
10.El.motor for p-p room exhaust fan 5.5 ABTA 71B-2K/T4 ALWO LOHER	Compt:00004 Pump Room Bottom Fr.245-246 PS	EExd IIC T4 IP 55	05 ATEX 110X	CESI
11.El.motor for fire p-p – BEVI 200 – IRON (Nanyang Explosion	Compt.:00004 Pump Room Bottom fr.248 PS	EExd IIB T4 IP 55	03 ATEX 1618	Nemko

Equipment	Place of installation	Degree of protection	Certificate No.*	Authority
Protection Group CO.,Ltd.)				
12.Bilge p-p for holds el.motor BEVI 200 - IRON (Nanyang Explosion Protection Group CO.,Ltd.)	Compt.:00004 Pump Room Bottom fr.245-246 SB	EExd IIB T4 IP 55	03 ATEX 1618	Nemko
13.Spraying p-p for holds el.motor BEVI 280 - IRON (Nanyang Explosion Protection Group CO.,Ltd.)	Compt.:00004 Pump Room Bottom fr.248 SB	EExd IIB T4 IP 55	03 ATEX 1618	Nemko
14.Start-Stop push button for fire p-p and spraying p-p – 2 pcs 8040/1350.054+GN/I/0/-STAHL	Compt.:00004 Pump Room fr. 248 PS, SB	EEx ed IIC T6 IP 66	01 ATEX 1105	PTB
15.Light.fittings -198 pcs FAMOR OF4191-07 (2x18) OF4191-08 (2x18) OF4191-09 (2x18)	Companionway Hold 2,3,4,5,6 fr.94-96,112-114, 130-132 148-152, 168-170 186-188, 204-206 222-226, 242-246 PS,SB Compt: 00004, 041,041A, 041B, 041C,039, 039A, 039B,039C, 038, 038A,037, 037A, 037B,037C,035, 035A,035B, 035C, 29, 703	EEx ed IIC T6 IP 67	05 ATEX 092X	KDB
16.Floodlight – 88 pcs PL4139-06-FAMOR PL4139-08-FAMOR PL4139-09-FAMOR	Hold No 1,2,3, 4,5 fr.94-96, 130-132,168-170,204-206, 242-244 PS&SB	IP 56	To be switched off and locked during the carriage of dangerous goods.	
18.Switch Socket – 5 pcs GW+W2.1L-16-MS-ELDIS GW2.2L-16-MS	Open deck fr.78 PS,SB fr.151 PS,SB fr.225 PS,SB	IP 56	To be switched off and locked during the carriage of dangerous goods.	
19.Installation switch – 2 pcs EXWP2.2L-MS	Comp.29(Paint Store), 703(Battery Room)	EEx ed IIC T6 IP 67	No 00.E.421	KDB
20.Signal Alarm Clock – 8 pcs EExII-ZOLLNER GA 200	Compt.: 00004 Hold: 2,3,4,5 Fr.95,131,169,205 PS,SB	EEx de IIC T6 IP66	01 ATEX 1064	PTB
21.IS Smoke detector Consilium EVC-PY-IS IS isolator Consilium NS-ISOL	Comp.:00004 Pump Room Fr.246-247 PS,SB Comp.:00005 Bow Thr. Room	EEx ia IIC T4 IP55 [EEx ia] IIC IP55	ITS 03 ATEX 21253 BAS 98 ATEX 7343	ITS EECS

ELECTRIC SYSTEMS AND EQUIPMENT IN SPACES EXPOSED TO EXPLOSION HAZARD – Inspection in service

Electric Systems and Equipment in Places Endangered by Explosion of Vapours or Gases

- Defective cables should be entirely replaced without application of additional joints.
- The inspected equipment should be fully reliable in assembled state without any visible defects, the parts decisive for the explosion proof features must not be painted.
- The equipment installed in the places endangered by explosion of vapours or gas should be of explosion proof type with valid certificates of appropriate laboratory (for instance “Barbara” Coal Mine Laboratory)

ELECTRIC SYSTEMS AND EQUIPMENT IN SPACES EXPOSED TO EXPLOSION HAZARD – INSPECTION IN SERVICE cont.

When replacing an explosion proof electric device check:

- what is the country of **manufacture**,
- is it properly **labelled** in the way enabling the comparison with given explosion proof design, are there **certificates** issued by proper research institutes (European ATEX notified body for *94/9/EC Equipment and protective systems intended for use in potentially explosive atmospheres*)
- on tankers, the required **interlocks** of electric equipment combined with **ventilation system** and particularly the interlock of **cargo pumps** and pump room **illumination**
- and **measurement** of **insulation resistance** value of circuits and electric equipment

ELECTRIC SYSTEMS AND EQUIPMENT IN SPACES EXPOSED TO EXPLOSION HAZARD – INSPECTION IN SERVICE cont.

Electric Systems and Equipment in Places Endangered by Explosion of Dust

1. **Defective cables** should be entirely replaced **without** application of **additional joints**.
2. The **inspected equipment** should be fully reliable in assembled state **without** any **visible defects**, the parts decisive for the explosion proof features must **not** be **painted**.
3. Attention should be paid to the **protection degree** of installed equipment, which should **not** be **less** than **IP65**.

The measurement of insulation resistance value of circuits and electric equipment should be carried out.

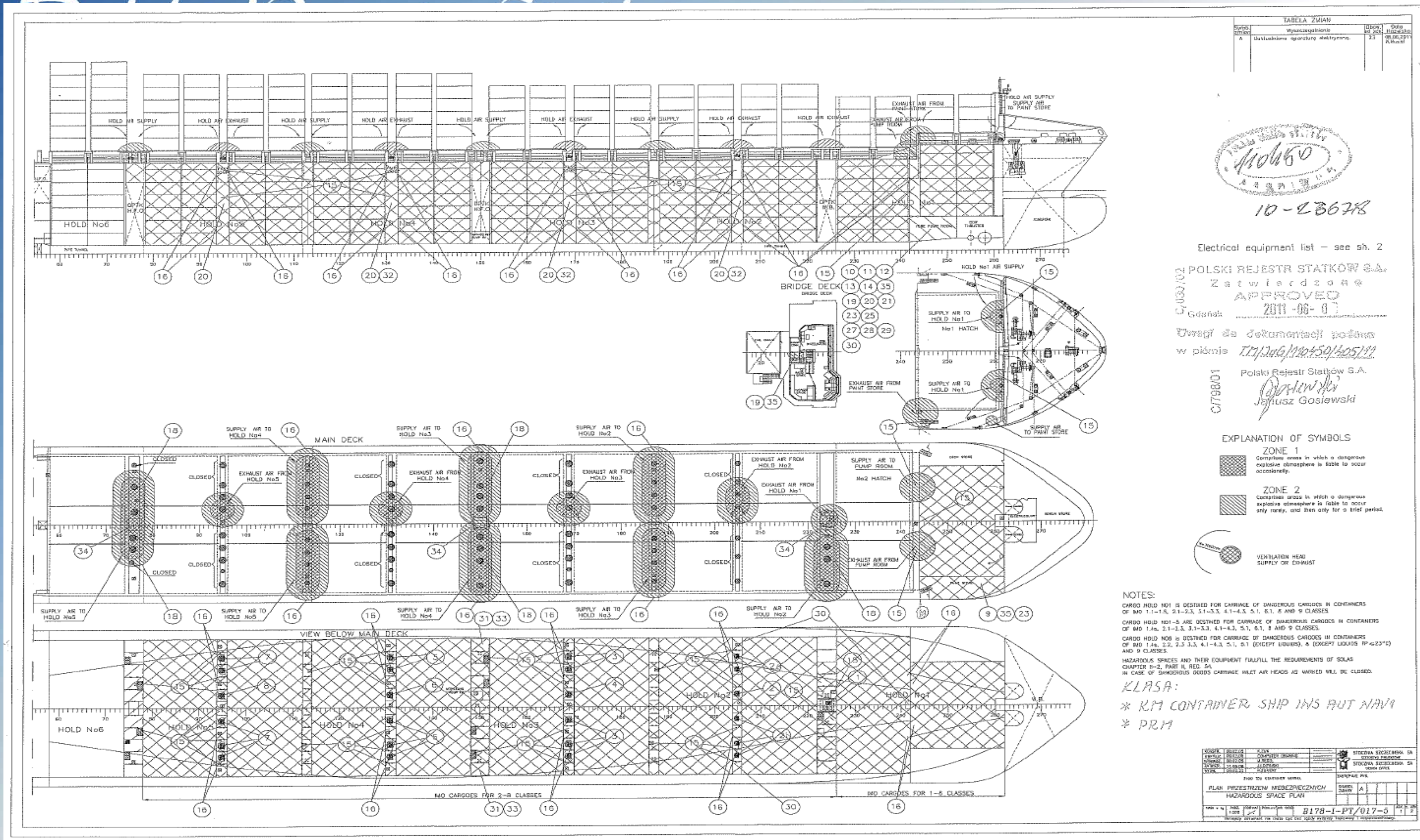
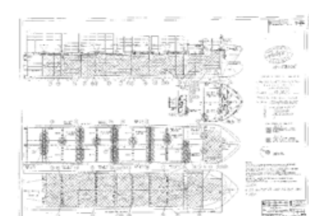


TABELA ZMIAN
HOLD No6
HOLD No5
HOLD No4
HOLD No3
HOLD No2
HOLD No1
BRIDGE DECK
MAIN DECK
VIEW BELOW MAIN DECK
Electrical equipment list — see sh. 2
POLSKI REJESTR STATKÓW S.A.
Zatwierdzone
APPROVED
Polski Rejestr Statków S.A.
Janusz Gosiewski
EXPLANATION OF SYMBOLS
ZONE 1
ZONE 2
VENTILATION HEAD SUPPLY OR EXHAUST
NOTES:
KLASA:
* KM CONTAINER SHIP INS AUT NAVI
* PRM
PLAN PRZESTRZENI NIEBEZPIECZNYCH
HAZARDOUS SPACE PLAN
B178-I-PT/017-5



THANK YOU FOR THE ATTENTION

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