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CEN WORSHOP 10
European Handbook for Defence Procurement

Expert Group 18
Life Cycle Waste Management

EG 18 FINAL REPORT

Bagneux, September 17th, 2011

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LIST OF EG 18 MEMBERS

INTRODUCTION

During a one-year period (March 2010 to March 2011), the expert group EG 18 discussed *Waste Management issues* related to several categories of armament systems, such as Army military vehicles, Air Force military aircraft and Navy vessels, munitions, electric and electronic equipment (EEE), in relation to the life cycle phases relevant to acquisition issues (design, operational use, dismantling).

France took the *EG-18 chairmanship* and *EG 18 secretariat* was supported by AFNOR. The experts come from different origins (ministries of defence, industrial suppliers, a standardization office) and from different nations (France, Germany, Italy, and United Kingdom).

This EG is expected to produce a report in exclusive connection with the perimeter defined within the key area *Waste Management*. This report consists in the list of the relevant *Best Practice Standards* (BPS) and the associated recommendation, which exclusively applies to these relevant, selected set of BPS.

Since life cycle waste management issues differ widely for different types of equipments, the expert group was regularly divided into subgroups studying in depth the issues relating to their domain.

HORIZONTAL SUB-GROUP: GENERAL ISSUES, MUNITIONS, ELECTRONICS

CEN MEMBER	EG 18 – HORIZONTAL SUBGROUP	MOD / COMPANY EMAIL ADDRESS
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NAVAL SUB-GROUP: NAVAL TEAM OF EXPERT (NTE)

The present table gives the list of naval experts involved in the *Naval Team of Experts* (NTE) under EG 18 (representatives coming from France and Germany, from MoDs and industries).

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AERIAL SYSTEMS EXPERT SUB-GROUP

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1) REFERENCES AND VOCABULARY

1.1) Generic References

The following general references give information about the work to be conducted by EG 18.

a) CEN/WS 10 N 0018 General framework paper – Final version (September 10th 2007).

b) CEN/WS 10 N 0020 Template/structure to draft the final report (November 30th 2010).

c) CEN/WS 10 N 0022 Template for drafting recommendations (October 3rd 2007) and its amendment (January 2011).

d) CEN/WS 10 N 0027 Template for presenting best practices standards (Revision 3).

e) prEN CSF07006:2010 Application of standards and other technical rules for defence product and services – order of preference, priorities (June 2010).

1.2) Specific References

The following specific references give some complementary information about meetings that were organised by EG 18 (agenda, expert group reporting, actions…).

a) CEN/WS 10/EG 18 N 007 Minute of meeting #1 on March 26th 2010 (Paris, MoD DGA Armament General Directorate).

b) CEN/WS 10/EG 18 N 009 Minute of meeting #2 on May 19th 2010 (London, MBDA).

c) CEN/WS 10/EG 18 N 012 Minute of meeting #3 on July 1st 2010 (Paris, MoD DGA Armament General Directorate).

d) CEN/WS 10/EG 18 N 017 Minute of meeting #4 on October 20th 2010 (Hamburg, Chamber of Commerce).

e) CEN/WS 10/EG 18 N 021 Minute of meeting #5 on January 12th 2011 (Paris Saint-Denis, AFNOR).

f) CEN/WS 10/EG 18 N 0024 Minute of meeting #6 on March 15th and 16th 2011 (Roma, MoD Air Armament General Directorate).

g) CEN/WS 10/EG 18 N 0027 List of Best Practice Standards identified by the EG 18, Naval Team of Expert (NTE).

1.3) Vocabulary

The present report contains a glossary of essential acronyms, terms and definitions in order to enhance the understanding of the relevant terminology for the selected *Best Practice Standards* (BPS) and recommendations dealing with the key area *Waste Management* for naval systems (annexes I and II).

The main objective for using any recognised terms is also to provide a basis for the introduction of equipment and/or procedures to enhance standardisation and interoperability with *Waste Management*. The NATO terminology management system gives some relevant data (web site: www.nsa.nato.int).

2) INTRODUCTION

2.1) Generic introduction related to EHDP

In 2010, *European Commission* (EC) requested *European Committee for Standardisation* (CEN) to establish Workshop 10 (WS 10) to improve the efficiency and enhance the competitiveness of the *European Defence Industry* (EDI) by producing a recognised European reference system identifying *Best Practices Standards* (BPS) for use in national and multinational armament projects.

The existing plethora of (national) standards are recognised by EC as a major constraint and cost driver. WS 10 was tasked to design and deliver the *European Handbook for Defence Procurement* (EHDP) and provide guidance for *European Defence Project Managers* (EDPM) in the selection and the utilisation of standards in armament contracts.

The EHDP is a guide designed as a tool for anyone involved in the *European Defence Procurement* (EDP) contractual negotiation. The primary target audiences for the EHDP are:

- The *staff in the Ministries of Defence* (MoD's) who are producing procurement specifications and *invitations to tender* (ITT).
- The *staff in Defence Suppliers* who are responding to those requirements.

The EHDP is designed to provide *Defence Procurement Agencies* (DPA) and *Defence Industries* (DI) with a *preferential list of selected recommended standards qualified as best practice* ones to be included in armament contracts together with concise recommendations for an optimum use of those standards in such a Defence Procurement context.

These types of resulting informative data should be used in the *acquisition process* by MoD and in the *development process* by Industry, such that system will be built and operated better and cheaper.

The aim of a recommendation is to develop good practices in the domain addressed by EG and to assist the final user in using recommended best practices standards in the best cost-effective way:

- Increasing the controlled use of existing standardisation, a necessity to harmonise European practices used by Defence Procurement stakeholders.
- The objective is to deploy a common approach through *Nations Procurement Agencies* (NPA), about an optimised utilisation of standards: civilian ones and military ones, the possible limitations of civilian standards with respects to military applications… to provide a useful guide to all stakeholders involved in Defence Procurement process.
- Description of how to implement standards successfully in armament contracts.
- The overall result will be a better use of standards in armament contracts.

Recommendations are, during the drafting process, designed to allow EHDP final users to be provided with the right information for timely and quickly acquiring the best control in writing standards clauses related to the selected material, in armament contracts.

That's why the volume of recommendation will be accordingly fully compatible with respect to EHDP vocation and purpose.

2.2) Generic introduction related to Phase III

After that EC awarded a contract to CEN for an upgrade and/or an initiation of several tasks under *Phase III*, WS 10 was tasked to identify several themes to be more investigated. 11 *Experts Groups* (EG) have been set up in 2010 with the objective to extend the applicability of *European Handbook for Defence Procurement* (EHDP).

EXPERT GROUP	PHASE III – WS 10 - PERIMETER – KEY AREA DESIGNATION
EG 01	Nuclear Biological Chemical Detectors
EG 02	Energetic Materials
EG 03	Fuel and Lubricants
EG 04	Batteries
EG 05	Packaging
EG 06	Electrical Interfaces
EG 07	Electromagnetic Environment

EG 08	Environmental Engineering
EG 17	Reliability and Availability
EG 18	Waste Management
EG 19	Disposal of Munitions

Among these items, *Waste Management* is considered by the EC as a new major topic to be tackled by representatives from MoD's and industries. The need came to provide some recommendations on the use of the Best Practice Standards in *European Defence Procurement* (EDP), the scope and limitations for defence application by MoD's (*acquisition process*) and industries (*development process*).

Those standards will be identified and analysed (*scope*), commented as far as the reasons for their selection (*reduction process*) and the way of implementing them in contracts according a tailored approach (*recommendation for best practices*) are concerned. The need for new standards and/or for updating existing standards has also to be identified (*recommendation for future standardisation*).

Furthermore, an additional feature will focus on possible findings resulting in recommendations impacting the related standardisation process to meet up identified needs. General conclusions will sum up the main axis revealed by the investigation work carried out by experts along the recommendation drafting process.

2.3) Specific introduction related to EG 18, historical background

The EG 18 has been created in 2010 for analysing the key area "*Waste Management*" standards used within the member states of the European Union and selecting a preferential list of best practice standards. The present report aims at providing recommendations on the best use of those best practice standards in armament contracts.

The EG 18 held six meetings, namely on March 26th 2010, May 19th 2010, July 1st 2010, October 20th 2010, January 12th 2011 and March 15th and 16th 2011. For a better efficiency, it was decided that each meeting had to be organised around 2 main parts.

- *A common session* with all the EG 18 experts, for discussing about questions of common interest (scope, methodological aspects for the work to be undertaken, planning, reporting…).
- *Several parallel sessions*, for discussing about specific questions linked to each technical domain (Air, Land, Naval, EEE…) inside dedicated sub-groups where were split the EG 18 experts.

By comparison with the other teams of experts within EG 18 (air domain, land domain, EEE…), the naval domain is characterised by a large diversity of documents issued from current legislation or standardisation. Most of these documents related to *Waste Management* are already used by stakeholders (Ministries of Defence, industrial market) for a better design and operational use of vessels. They deal with terminology, product design, maintenance and supply, interoperability (best practices during operational use and during product end-of-life).

More, concerning the work to be conducted by the NTE about *Waste Management* for naval systems, the following specificity was taken into consideration: any Navy vessel (small craft, patrol-ship, corvette, frigate, landing platform dock, aircraft carrier, logistic support ship…) has to be considered:

- First, as a small community of people living together in an autonomous mode on board each vessel and/or within a naval task force, generating *domestic waste*,
- Also, as an industrial site with a large diversity of activities (maintenance, aviation…), generating *industrial waste*. Specific waste that is directly linked to the ship use is also considered.

That is the reason why the *Naval Team of Expert* (NTE) namely focused their effort on dedicated shipboard systems capable of managing any relevant category of waste.

3) SCOPE

3.1) Definition and characterisation of the key area "Life Cycle Waste Management"

3.1.1) Global scope

For a better understanding of what type of material or product may be considered as waste, the following table gives a standardized definition for the terms "*Waste*" and "*Management*".

WASTE	Substances or objects, which the holder intends or is required to dispose of (see Basel Convention). *[ISO 14.040:2006]*
MANAGEMENT SYSTEM	Set of interrelated elements used to establish policy and objectives, and to achieve those objectives. A management system includes organisational structure, planning activities, responsibilities, practices, procedures, processes and resources. [ISO 14.001:2004]

Other, similar, definitions can also be found in current international (UN) or regional legislation (Europe). From a NATO point of view, the following definition is given for the term "*Waste Management*":

WASTE MANAGEMENT	Collection, transport, recovery and disposal of waste, including the supervision of such operations and after-care of disposal sites. *[STANAG-2545:2009]*

When looking at these definitions, the connection between defence procurement and waste management is not obvious and the opportunities to mention waste issues seem limited, except for the potential standards issues relating to the procurement of dedicated waste management systems for military use in bases or inside equipment. At first glance, this might relate mostly to specific issues such as waste management inside ships (which have a significant life on board to deal with), and waste management systems for specific kind of waste (medical, biological…) provided there are some European standards or the need for some.

That is why EG-18 decided to define the scope of waste management procurement as "*life cycle waste management*", which means dealing with waste issues for military equipment and waste and emissions issues for military waste management systems through the life cycle of products:

- At the design stage, for the procurement of new equipment.
- During use and maintenance, for the procurement of specific waste management solutions to deal with waste (ideally, this is done while procuring new equipment).
- At the disposal stage, when MODs procure disposal services (whether the elimination of the product considered as ultimate waste or its clean-up allowing selling it or giving it away).

Let's note that when procuring new equipment, it is important to think about standards for making the use and end of life phase easier:

- This includes standards proposing an approach to design for facilitating use, maintenance, and/or end of life.

"End of life" is defined as the final stage of the life of equipment. In a military point of view, it can be considered as "out-of-service phase"; thus, various ways can be used to "eliminate" the equipment like disposal (dismantling, shredding, burning…), recycling / recovering (recycling and energetic recovery) or sale…

"Design for end of life" may be defined as all the decisions which can be taken so that the equipment has a lower environmental impact at the end of its life (for instance, the calculation of recyclability ratios, avoiding hazardous substances to facilitate elimination and/or recycling, the marking of hazardous materials when they can't be avoided…).

- It also includes standards on information gathering with the same facilitation goal, such as information on hazardous materials.

"Information gathering" means all the actions, which aim to collect information on substances, materials or components contained in the equipment and compile data (such as location, quantity, hazardousness…) to facilitate both the equipment operational use and maintenance phase (health and safety issues, obsolescence issues…) and the equipment end of life phase (recycling issues, best disposal methods issues…).

Therefore the recommendations are organized as follows:

1	New equipment acquisition - design a. Design standards for end of life b. Design standards for waste management during use and maintenance
2	New equipment acquisition – information gathering standards
3	Disposal services acquisition – disposal standards

Figure 1: organisation of recommendations

Furthermore, it is obvious that the stakes and sets of available standards are not the same for different categories of equipment, therefore the expert group decided to classify its recommendations in the following categories, dealing with the most common issues in defence acquisition:

- General standards (standards relevant for all categories),
- Naval standards,
- Aeronautical systems standards,
- Land systems standards,
- Missiles and munitions standards,
- Electronic equipment standards.

For lack of time or of specific experts, EG-18 didn't address the following types of systems which are within the defined scope:

- CBRN systems,
- Medical systems,
- Facilities such as buildings and mobile facilities (tents, shelters…),
- Other potentials areas of interest such as satellites, lasers, cryogenic systems …

Most of these systems seem to be dealt today with either mostly national standards (or none) but this has to be checked in future work as well as the potential need for European level standards.

Finally, EG-18 scope as defined above deals with some environmental issues and standards when they interface with the "life cycle waste management" scope (e.g., eco-design as a general recommendation for good design including for end of life, waste management systems emissions…). However, the scope is far from encompassing environmental issues in general. For instance, EG18 doesn't deal with the ozone depleting or climate impacting emissions; water, land and air pollution; noise etc.

This general definition of the key area "life cycle waste management" scope is refined hereunder for the most important categories (naval, aerial and land systems), then the approach followed for each of these categories is detailed in chapter 3.2.

3.1.2) General standards: environmental management, eco-design, waste catalog

Let's reiterate that the recommendations are organized as follows:

1	New equipment acquisition - design ➢ Design standards for end of life ➢ Design standards for waste management during use and maintenance
2	New equipment acquisition – information gathering standards
3	Disposal services acquisition – disposal standards

In addition, for general standards, EG-18 identified 3 types of standards which may be useful as guidance depending on the type of acquisition (new equipment or disposal) being made:

- **Environmental management** during the manufacturing or disposal process (with a design or project oriented scope, not just a site environmental management scope),
- Good **eco-design** practices by the contractor during acquisition,
- Following official guidelines for the **classification of waste** (and labelling of dangerous waste) when proposing waste management systems or disposal solutions.

3.1.3) Naval issues scope

a) Fundamental principles

International and regional legislation, national policies, military doctrines or agreements dealing with the protection of human health, *Environmental Protection* (EP) and particularly the key area *Waste Management*, are based on a number of well-recognised principles that have to be known by stakeholders (Defence project managers, Defence suppliers) during a product design process and any technical choices impacting the *ship operational use* and *ship dismantling* phases.

PRECAUTIONARY PRINCIPLE	Environmental damage is to be avoided and inevitable environmental damage must be minimised. Environmental damage that has occurred is to be remedied as far as possible.
WASTE HIERARCHY PRINCIPLE	Waste must primarily be avoided and secondary be reused or recycled by dedicated systems or procedures. Final disposal is the last option.
POLLUTER-PAYS PRINCIPLE	All producers of waste are responsibly for the safe and environmentally sound disposal of the waste they produce.
PROXIMITY PRINCIPLE	Compliant waste disposal must take place as closed as possible to the location where the waste originated. This particularly intends to minimise the risks associated with waste transport.

Two main principles are particularly relevant during a ship design process by naval architects: the *waste hierarchy principle* concerning the choice of waste management systems and the *proximity principle* concerning the shipboard location of hazardous waste management systems: for that, one of the objective is to avoid any risk of cross contamination and/or shipboard pollution.

b) Scope

Only specific waste that was directly linked to the naval sector has been analysed by the NTE. Except in some cases, the analysis does not include transverse waste that is essentially linked to

European legislation (waste of EEE, waste containing heavy metals…) and that have been discussed at a higher level inside EG-18.

c) Characterisation

With the knowledge of the different origins of shipboard potential pollution (during its life cycle), the NTE defined a first level for the perimeter of the study (list of waste and type of management to be tackled, taking into account the military specificity). Some complementary definitions related to these categories of waste are also given in annex II.

CATEGORIES OF WASTE	Operational liquid waste: Contaminated oil, oily bilge water, oil spill, sewage, grey water, ballast water and sediment, any residues issued from a shipboard liquid waste treatment process (oily sludge, sewage sludge, grease…) Operational solid waste: food waste, garbage issued from packaging (plastics, non-plastics such as: glass, metal, cardboard, paper…), any solid residues issued from a shipboard solid waste treatment process (ashes…). Operational waste of specific category: health care waste (HCW), hazardous materials (anti-fouling coating, WEEE, materials containing heavy metals…). End-of-Life waste: Navy vessel and its equipment (platform and armament systems) containing potentially hazardous materials (HAZMAT).
MANAGEMENT	Waste: Characterisation, minimisation at source, selective collect at source, storage, processing, treatment, disposal, discharge measurement, periodical survey, occupational health, safety of personnel, release to air, discharge at sea, *waste removal at se*a (WRAS) to a ship, ship-to-shore interface, recycling. Organisation: Policy, doctrine, strategy, responsibility, interoperability, training, survey, inspection, advice, support, recording, reporting.

The guide "*Safe management of wastes from healthcare activities*" issued from the WHO gives a definition of *Waste Management*, as all the activities, administrative and operational, involved in the handling, treatment, conditioning, storage, and disposal of waste (including transportation).

d) Integrated Waste Management

The *Integrated Waste Management* (IWM) is a concept, more ambitious than the key area *Waste Management*, which only applies to waste that are produced during the normal ship operational use. It results from some additional efforts for a better optimisation of the shipboard waste management systems and acts in the following different phases: minimisation at source, collecting, storage, treatment and discharge at sea and/or on shore, recycling (if need be).

Practically, during any ship design process, the naval architects have to imagine a new optimised combination of the *Waste Management* systems, for each category of ship, taking into account the scenario of ship operational use (near the coasts, in high sea, alone or inside a naval task force). The IWM must take into account the following items: a systematic continuous treatment of any secondary waste (sludge…), the reuse of the heat issued from a waste treatment system (if any), and a minimisation of the number of discharge points overboard (at sea and in the air).

Shipyards and suppliers in charge of integrated solutions (shipboard waste destruction system, heat recovery system…) may offer this concept by selecting advanced systems (vacuum collect, biological treatment, incineration, and plasma arc…) for ship owners (cruise line…). On the basis of these civilian efforts, NATO military navies also act in this field (specification, demonstrator, and expertise…) due to the specific military advantages of this concept (better autonomy, better signature, small amount of residues to be discharged in ports reception facilities…).

3.1.4) Aerial issues scope

On the basis of the definitions given in the naval chapter, the different categories of aircraft emissions (gaseous emission, energetic emission, acoustic emission, thermal emission, electromagnetic emission…) have been considered by aerial group of experts.

Nevertheless, the Aerial Experts focused the work on specific emissions (refrigerants, fire-fighting agents) directly linked to waste management or maintenance and decided not to consider the emission related to the use of aircraft (such as gaseous emissions (green house gases) from a propulsion system, noise emissions…).

3.1.5) Land issues scope

The initial scope was "waste management of land systems". Land systems group different materials such as vehicles, tents, containers and consumables… together. Land systems were a too vague subject. So, the experts group decided to focus only on military vehicles which represent the most important part of materials. Moreover, waste management in operational bases was not taken into account in this report because it is another subject which is very interesting but is a far cry from vehicles waste management.

3.1.6) Missiles and munitions issues scope

The scope was the end of life disposal of unused missiles and munitions. It should be noted that Design for end of life STANAG-4518 covers missile structure, end of life of propellants and explosives handled by EG 19. **This expert group considered the other aspects of missiles and munitions**.

3.1.7) Electronic systems scope

The scope was design for end of life electronics with electronics. There are however a number of regulations and standards which require or define a life cycle approach to electronics consequently we looked at life cycle rather than just end of life.

The use of the following standard should ensure that a life cycle approach is taken by using EN IEC 62430:2009 Environmentally conscious design for electrical and electronic products.

The use of the standard IEC/PAS 62545:2008 Environmental information on electrical and electronic equipment (EIEEE) will enable the necessary information is collected to ensure correct disposal this standard is stand alone and can be used independently of IEC 62545

IEC/TR 62476:2010 Guidance for evaluation of products with respect to substance use restrictions in electrical and electronic products. Can be used as its title suggest but with the following significant caution when considering end of life electronics from a defence product, commercial standards may not be applicable to all defence electronics because of the required functionality in the defence environment. That information should however be declarable under this standard.

IEC 62635 End of life recyclability calculation for electrical and electronic equipment. Publication due November 2011. Provides methods for the calculation of end of life recyclability for electrical and electronic equipment. The use of this standard may be useful in determining the recyclability of defence electronic equipment.

IEC 62474 Material Declaration For Products of and for the Electronics Industry. The publication date for this standard has yet to be decided but once published application of this standard will enable collection of valuable information for the management of end of life electronics

3.2) Implementation of a global and interactive approach

3.2.1) General issues

Due to the diversity of life cycle waste issues in relation to the different systems types (naval, land, aerial, missiles and munitions), only 3 general standards types (environmental management, eco-design, waste classification) were proposed. They could be used in two of the areas of recommendations (design standards, disposal standards) defined in this report, except for eco-design which is obviously limited to design.

However, the expert group didn't propose any general standard for information gathering because there is none, even though there is no lack of regulations (such as REACh and RoHS) requiring that (hard to obtain and complex) information is gathered and potentially provided to clients purchasing products. See chapters 6.1) and 7.1) for EG-18 conclusions on the matter.

3.2.2) Complementary analysis of the key area "*Waste Management*" – naval issues

a) Link between "*Waste Management*" and "*Pollution Prevention*"

The NTE recalls that the maritime and naval sectors usually use the term *Pollution Prevention* that covers the key area *Waste Management* and other environmental key areas, such as *Emission Management*.

The OSPAR convention (Convention for the Protection of the marine Environment of the North-East Atlantic) that was adopted on 22 September 1992 and entered into force on 25 March 1998 gives a definition of the term *Pollution*.

POLLUTION	Introduction by man, directly or indirectly, of substances or energy into the maritime area which results, or is likely to result, in hazards to human health, harm to living resources and marine ecosystems, damage to amenities or interference with other legitimate uses of the sea. *[OSPAR Convention, 1992]*

The term *Pollution Prevention* may be defined as the identification and reduction or elimination of activities, areas, or processes which create excessive waste products or pollutants. The US *Environmental Protection Agency* (EPA) gives another definition of this term.

POLLUTION PREVENTION	Pollution prevention is reducing or eliminating waste at the source by modifying production processes, promoting the use of non-toxic or less-toxic substances, implementing conservation techniques, and re-using materials rather than putting them into the waste stream. *[EPA, 2011]*

The term *Pollution Prevention* includes: equipment or technology modifications, process or procedure modifications, reformulation or redesign or products, substitution of raw materials, and improvements in housekeeping, maintenance, training, or inventory control.

b) Link between "*Waste Management*" and "*Emission Management*"

Directly linked to the key area *Pollution Prevention*, the following definition may be given for the term *Emission* to be understood as a consequence of a *Waste Management* process.

EMISSION	Releases to air and discharge to water and soil. *[ISO 14.040:2006]*

For managing shipboard waste, the objective is the minimization of any environmental impact in order to obtain a high quality of any emission and finally a reduced polluting signature.

For that objective, the NTE considered that only *emissions* directly linked to a *waste management* process have to be taken into consideration for the selection of BPS and related recommendations.

Among the currently well recognized categories of shipboard emissions from vessels (gaseous emission, energetic emission, acoustic emission, thermal emission, electromagnetic emission…), a second level may be defined for the perimeter of the study.

EMISSIONS: INCLUSION	Leakage to the atmosphere of chemical products stored inside fixed pressurised equipment (refrigerants, fire-fighting agents) particularly during a maintenance process (high-pressure tank periodic control, replacement of a polluted fluid…). Discharge or release directly linked to a shipboard waste management process (toxic gases issued from a sewage storage tank, permeate issued from an oily bilge water separator or from a sewage treatment system, treated ballast water, gaseous emissions from an incineration process, ash discharge…). Discharge to the sea of biocides coming from anti-fouling systems (paints…).
EMISSIONS: EXCLUSION	Discharge generated by shipboard equipment not directly concerned by *waste management* (gaseous emissions such as NOx, SOx, COx and PM generated by a propulsion system), acoustic and energetic emissions (noise, CO_2 …), thermal emission (cooling systems, smokes…), electromagnetic emission.

c) Link between "*Waste Management*" and "*Resource Management*"

The NTE also identified that *Waste Management* on board a vessel may also be linked to some *Resource Management*. These resources may be fresh water for human consumption (when a water use minimisation is foreseen), marine and/or aviation fuel oil and lubricants, packaging for food and/or spare parts transport, hazardous materials and/or substances that are normally present aboard and inside equipment. A third level may also be defined for the perimeter of the study.

For that reason, the NTE considered that, in some cases, a link might also be made with other EG working during Phase III (EG-03, EG-04, EG-05) and also with EG-12 (*Fluid Handling*) for its work in 2008. For that purpose, only preliminary proposals have been made by the NTE.

d) Transverse approach between AIR, LAND and NAVAL domains

Considering, first that the EG-18 technical perimeter namely deal with air systems, land systems and naval systems, and then that *Waste Management* is a transverse key area, a specific working method has been implemented during the reduction process.

For that objective, the NTE tried to segregate between best practices and/or recommendations that are only specific to naval systems, and those that are transverse to air, land and naval systems.

e) Global approach based on the ship Life Cycle Analysis (LCA)

By comparison with air and land systems, *Waste Management* for naval systems is currently well regulated and/or standardised, at international, European and/or national levels, on the basis of the whole ship life cycle, even if some waste may be more brought to light than others.

For that reason, the NTE considered that the BSP analysis has to be conducted for the two first following finalities directly linked to the acquisition of any new ship: "*Design for Waste Management during ship operations*" and "*Design for Waste Management during ship recycling*". A third finality directly linked to the acquisition of ship dismantling operations may also be taken into consideration, event if not directly linked to a product design process.

3.2.3) Approach for aerial systems

In considering 'best practice' standards for waste management of aircrafts, the Aerial Experts were faced with a lack of documents. Thus, they decided to have a life cycle approach and to extend the scope to all documents which could have an impact on waste reduction.

The Aerial Experts agreed on 3 main categories to classify the analysed documents:

- Standards on design for end of life
- Standards on information gathering for maintenance and end of life
- Standards on waste management during use phase

3.2.4) Approach for land systems

There are currently a number of regulations and standards regulating waste management issues for vehicles. However, in most circumstances these regulations relate to EU or National Type Approved Vehicles.

Military vehicles except for unmodified versions of civilian vehicles requiring type approval e.g. White Fleet and motorcycles will NOT be type approved. Consequently, in most cases these regulations and standards can only be considered as "good practices" for military vehicles.

These regulations and standards can be divided into 3 categories:

- Design for product end-of-life phase
- Information gathering for maintenance and end-of-life of vehicles
- Vehicles end-of-life operations

3.2.5) Missiles and munitions issues

In considering 'best practice' standards for waste management of Missiles and Munitions, the Experts were faced with a lack of documents. Thus, they decided to consider documents used in other products which could be read across to missile and munitions.

3.2.6) Electronic systems

In considering electronic systems the Experts found a number of standards that could be used.

4) REDUCTION PROCESS

4.1) Introduction about the working method

a) Identification process of relevant standards and standard-like documents

The reduction process for selecting the *Best Practice Standards* (BPS) and the related working method adopted by the NTE was first based, not only on the global and interactive approaches as described before (§.3), but also on the draft European standard on the "*application of standards and other technical rules for defence products and services, order of preference and priorities*" (prEN CSF07006:2010, June 2010).

- Identification of the relevant international, European and/or national regulations and laws related to the perimeter *Waste Management*, and the related standards and/or standard-like documents (*particularly when there is a formal link of a relevant standard with a current regulation*).
- Identification of the international military alliance standards (*mainly allied standards covered by NATO standardisation agreements: STANAG*), if ratified by nations (without reservations) with the intention of implementation for achieving the required interoperability between naval Forces.
- Identification of national civilian standards transposing European standards from CEN and international standards from ISO, and other international standards that are not transposed by nations, such as other European technical documents.

Within this relevant standard identification process, other documents may have an interest:

- Common European Technical Specifications (CTS),
- European Technical Approvals (ETA) mainly in the construction sector,
- Other national civilian standards and/or standard-like documents (DIN, NF, BS…),
- National Technical Approvals (NTA),
- National Technical Specifications (NTS),
- European Technical Standards (ETS) issued from recognised organisms (ECHA…).

b) Analysis process of relevant standards and standard-like documents

The following analysis was conducted about this preliminary list of standards:

- Preliminary characterisation, comparative review and analysis among relevant standards, by using a large choice of generic and additional analysis and selection criteria. Each expert gave its own opinion and experience for the selection process.
- Production of a preliminary naval list of relevant Standards (Excel file), organised around the 3 main items (*current international and European legislation about environmental issues and waste management plus military doctrines, current international and European standard about waste management, best-practice standard analysis, reduction and selection process*).
- Output of the selection work after having implemented the *Best-Practice Standards* (BPS) analysis and selection criteria (*see the final joined dedicated Excel file N0027 Rev 3.xls*).

4.2) Best-Practice Standard (BPS) Analysis and Selection Criteria

4.2.1) General standards analysis

Due to the small number of issues selected and due to the limited amount of standards in each domain, there was no need for a complex selection process for these few horizontal standards.

The selected standards are presented hereunder for each standard category (slightly modified to take into account the general nature of this chapter standards) together with the rationale for selection:

1. New equipment acquisition – management and design

a. <u>Management</u>

Environmental management of contractor's activities: <u>1 guidance standard</u>

- **ISO 14001** (including design in the certification perimeter): requires an organisation, objectives, a policy, continuous improvement…

Managing environmental issues, with the obvious aim of limiting environmental impact, and having in house environmental experts who understand environmental regulations (including ones under work) facilitates among other things the management of waste issues in design, maintenance, end of life operations...

ISO 14001 was preferred to EMAS, which requires a lot of information being provided-published by the certified organization, with the consequence of very few organizations being EMAS certified (EMAS is a European management tool for companies and other organizations to evaluate, report and improve their environmental performance. The scheme has been available for participation by companies since 1995 and was originally restricted to companies in industrial sectors. Since 2001 EMAS has been open to all economic sectors including public and private services).

b. <u>Design</u>

Eco-design of equipment: <u>2 guidance standards</u>

- **ISO 14062**: general eco-design recommendations

- **IEC 62430**: practical eco-design approach proposed to the electronic and electro-technical community, which can be applied by any organisation in any technical domain, including small and medium size enterprises.

In conjunction with environmental management, eco-design is an important tool for analyzing all the environmental aspects (including waste issues) relating to the equipment being developed, so that the overall environmental impact is minimized and pollution transfer is avoided.

There is no other eco-design standard at this stage relating to the eco-design approach and organisation.

The other eco-design standards of the ISO 140XX family deal with labelling and information on products (relevant for consumer products only) or environmental impact assessment and life-cycle analysis (they relate to general environmental impact issues and are not relevant to EG18 specific scope centred on waste management during the use and end of life phases).

c. Design for end of life standards and design standards for waste management during use and maintenance

No general recommendation beyond the global ones listed above: each equipment domain has specific issues.

2. New equipment acquisition – **information gathering** standards

There is **no standard** at the moment for information gathering on hazardous materials for military/security procurement (the naval domain can get some inspiration from IMO conventions): there is a need for either a single one or one for each domain, or both.

3. Disposal services acquisition – **Waste classification** standards

EG-18 selected the **European Waste Catalogue (EWC)** as a standard for guidance when mentioning waste categories in a contract, although it is officially a regulation, because it offers a detailed classification of waste widely recognized as the reference.

In addition, it selected the Classification Labelling and Packaging (CLP) regulation as a standard to apply when providing information about dangerous substances on or on the packaging of products containing the regulated substances.

4.2.2) Naval systems analysis

a) Generic criteria requested by CEN

The following general criteria (those listed in the document N0018 are indicated in the final joined dedicated Excel file N0027 Revision 3) were considered by the NTE for the *Best-Practice Standard* (BPS) analysis and selection process:

- Standard ICS code when available (*namely those existing in ISO or EN standards*).
- Key area (EG 18 on *Waste Management*) and sub-domain perimeter directly identified by the NTE (*naval systems, category of waste such as oily bilge water, sewage, garbage, ballast water and sediments…, ship recycling, interoperability…*).
- Standard reference, date and current edition (*"adoption" date, not "enter into force" date*).
- Standard title (*English language and original language*), considering that any standard that are not written in English will not be referenced in EHDP, unless an English translation is available within 12 months.
- Standard scope and presentation (*general description, technical perimeter, existence of national and/or European transposition*).

- Standardisation organisation (*IMO, NATO, CEN, ISO*), source where to obtain the standard (*Web-address from where the standard can be downloaded or ordered*). Annex III gives the addresses and web sites of the organisations and bodies that were identified as relevant.
- Strength of the standard (*A "To be applied", G "Guide", F "Expected future evolution"*). A standard A means a standard that shall be the first choice for application for the given scope. A standard G means a standard that will provide overall guidance on requirements, procedures, standards in the given technical domain. A standard F means a national standard that could be included or updated into a European or International standard.
- Standard category: MS (*management, quality and organisation standard, conformity assessment*), HS (*horizontal and transversal standard: fundamental and generic system, methodology, terminology*), IS (*interoperability and interface standard*), TS (*technical and performance standard*).
- Keywords.

b) Additional criteria proposed by EG 18 Naval Team of Expert (NTE)

Some additional criteria (those deemed by the NTE due to the specificity of the considered domain and characterised inside a preliminary Excel file) were also considered at a preliminary stage during the *Best-Practice Standard* (BPS) analysis and selection process:

- Complementary information about the current legislation or current military doctrine directly linked to a relevant standard on the key area *Waste Management* (*official organisation, category of legislative document, official name or reference, title, key area and sub-domain perimeter, NATO doctrine linked to waste management and environmental protection*).
- Complementary information on the relevant standard: category (*civil, military*), identification of the technical committees (TC) that produced standards (CEN, ISO), detailed technical perimeter (*definition and terminology, classification, labelling, packaging, product design requirements for use-recycling, compliance test procedures and measurements, organisation in operation*), product life cycle (*design production, use, maintenance, recycling*).
- Complementary information on the reduction process: level of knowledge and use status by the naval sector, level of potential interest and communality inside the military sector (*air system, land system, naval system, EEE ...*), potential users of relevant standards (*Ministry of Defence, Armament Industry*), work to be conducted, existence of some potential interfaces with other expert group (EG).

4.2.3) Aerial systems analysis

The first part of the work was to identify relevant documents related to waste management of air crafts. The problem is that "end of life" is not considered as a main issue for air systems and stakeholders (industries, federation…) are generally focused on emission (air pollution) and noise.

Consequently, a few documents are available on this topic. By basing the scope on a life cycle approach, the aerial experts managed to identify about 10 documents. The documents (standards, guidance…) were taken from the published outputs of standards organisations (ICAO; National military standards; National civilian standards; US MIL-STDs…). Additionally we looked at documents that are internationally recognised and considered as best practice, found on web sites of organisations (ASD, FAA, AFRA…).

4.2.4) Land systems analysis

The first part of the work was to identify relevant documents related to waste management of vehicles. This part was easy because regulations and standards on this subject are very restrictive and so, very well-known by the different parties (car manufacturers, recycling companies…) in the civilian vehicles world.

The working group has identified about 10 documents which are regulations, classified standards linked to regulations and civilian industries' technical requirements.

It should be noted that we have not recommended any standard because such a document does not exist. Nevertheless, we have recommended a selection of documents that give key elements and which can be used singularly in armament contracts.

4.2.5) Missiles and munitions analysis

The first part of the work was to identify relevant documents related to waste management of missile and munitions. This part was not easy because there no regulations and standards on these subjects

We therefore considered standards that are applicable to other products with a view to identifying those standards that contained design principles that could be read across to other products

4.2.6) Electronic systems analysis

The first part of the work was to identify relevant documents related to waste electronic systems This part was easy because regulations and standards on this subject are very well established and so, very well-known in both the civilian and military electronics world particularly by those manufacturers' of dual use equipment.

The challenge was to down select to those standards that could applied to the full range of defence electronic equipment accepting that secure disposal may make reuse impossible.

4.3) Presentation of selected Best-Practice Standards (BPS)

4.3.1) General BPS: environmental management, eco-design, European waste catalogue

SELECTED BPS	TITLE	APPROACH	CERTIFICATION
EN ISO 14001:2004	Environmental management systems - Requirements with guidance for use	Sites oriented with possibility to integrate the design phase in the scope	Yes
ISO/TR* 14062:2002	Environmental Management – Integrating environmental aspects into product design and development	Products and services oriented (Eco-design general best practices)	No
IEC 62430:2009	Environmentally conscious design for electrical and electronic products	EE Products oriented but very general in fact (similar to ISO 14062, with a few practical recommendations)	No
EWC**	European Waste Catalogue and Hazardous Waste List	Detailed lists of waste and hazardous waste categories	
CLP: regulation 2008/1272/EC	Classification, Labelling, Packaging	Classification, Labelling, and	

SELECTED BPS	TITLE	APPROACH	CERTIFICATION
		Packaging of dangerous substances and mixtures	

TR* = technical report

EWC** :

- Commission Decision 2000/532/EC of 3 May 2000 replacing Decision 94/3/EC establishing a list of wastes pursuant to Article 1(a) of Council Directive 75/442/EEC on waste and Council Decision 94/904/EC establishing a list of hazardous waste pursuant to Article 1(4) of Council Directive 91/689/EEC on hazardous waste.
- Council Decision 2001/573/EC amending Commission Decision 2000/532/EC as regards the list of wastes.

4.3.2) BPS for naval systems

a) Introduction

The term "*Standard*" has to be understood as any international and/or regional standards being globally well recognised on a worldwide or European scale, regardless of their sources.

For the naval systems, the term "*Best Practice Standard*" has to be understood, as any standard recommending a method, training, and/or procedure that has to be known and used by:

- The shipbuilders and industrial suppliers during industrial "*ship design*", "*ship production*" and "*ship maintenance*" phases,
- The ship-owners (crew, maintenance staff) during "*ship operational use*" (ship at sea, ship-to-shore interfaces) and "*ship recycling*" phases, on the basis of the ship design choices,
- The ship recycling industries during the industrial "*ship dismantling and recycling*" phase.

For naval systems and related different categories of waste, the NTE has identified and selected around **55 references**, listed in the BPS list according to the general framework paper CEN_WS10_EG18_N_0027 Revision 3. Priorities have been given to IMO standards, EC standards, NATO standards, CEN standards, ISO standards and others (regional…).

WASTE	IMO	EC	NATO	CEN	ISO	Others	TOTAL
Waste (in general)	2	2	3	1	2	0	**10**
Oil - Fuel	1	0	2	0	0	0	**3**
Oily bilge water	3	0	1	2	0	0	**5 (+ 1)**
Black & Grey water	2	0		2	2	0	**6 (+ 1)**
Sludge	0	0	0	3	0	0	**3**
Packaging - Garbage	4	0	0	3	3	0	**10**
ODS and GHG	0	0	0	1	2	0	**3**
Anti-fouling paints	2	0	0	0	0	0	**2**
Ballast water	5	0	0	0	0	0	**5**
Health Care Waste	0	0	0	0	0	1	**1**
Hazardous Materials	5	0	0	0	0	1	**6**

TOTAL of Standards	**24**	**2**	**6**	**12**	**9**	**2**	**55**

Some details about the reduction process for *Best Practices Standards* (BPS) are given below.

The use of specific web sites and the subscription to specific newsletters may also contribute to a better identification and knowledge of *Best Practice Standards* (BSP) for the Ministries of Defence and Defence suppliers (LR web-site, IMO news, IMO Publishing e-newsletter …).

b) UN Standards (IMO…)

The *International Maritime Organization* (IMO) is well known for adopting the most important set of international rules dealing with the environment and the mitigation of ship pollution (the IMO is more than 60 year old and its previous name was IMCO between 1948 and 1982).

Any new convention is discussed between *United Nations* (UN) during diplomatic conferences. Two specific conditions are usually requested for the entry into force of a convention (number of states, percentage of fleet gross tonnage):

Entry into force: "*The convention shall enter into force 12 months after the date on which not less than … states, the combined merchant fleets of which constitute not less than … % of fleet gross tonnage of the world's merchant shipping, have either signed it without reservation as to ratification, acceptance or approval, or have deposited the requisite instrument of ratification, acceptance, approval or accession*".

The NTE noted that several IMO conventions have a link with the key area *Waste Management* and the "*ship design*" process for both "*ship operational use*" and "*ship recycling*" phases.

1ST SET OF SELECTED BPS	RELEVANT IMO CONVENTION TITLE
MARPOL (1973/1978) with its amendments (1997)	International convention on the MARitime POLlution
AFS Convention (2001)	International convention on the control of harmful anti-fouling systems on ships
BWM Convention (2004)	International convention for the control and management of ships' ballast water and sediments
SR Convention (2009)	International convention for the safe and environmentally sound recycling of ships

It is the own responsibility of military Navies to define the level of compliance to these IMO conventions, according to the generic article 3 "*Application*" that contains each IMO convention.

Extract: "*The present Convention shall not apply to any warship, naval auxiliary or other ship owned or operated by a State and used, for the time being, only on government non-commercial service. However, each Party shall ensure by the adoption of appropriate measures not impairing the operations or operational capabilities of such ships owned or operated by it, that such ships act in a manner consistent, so far as is reasonable and practicable, with the present Convention*".

It is well established that an increasing number of European Navies make more and more efforts to comply with IMO conventions, when in force. First for national public reasons (relationship with media), environmental reasons (relationship with NGO, non-governmental organisations), occupational safety and health, but also in response to NATO doctrines from the *Military Committee* (MC) and management plans from *NATO Naval Armament Group* (NNAG). The NTE proposes to take into account these recognised conventions as *Best Practice Standards* (BSP).

The *Assembly* (A) and the *Maritime Environmental Protection Committee* (MEPC) essentially manages these texts. But the *Maritime Safety Committee* (MSC) and/or the sub-committee *Bulk Liquids and Gases* (BLG) may also act in this field. These organisations regularly produce a large

number of other international instruments (resolutions, circulars) for an easier implementation of these IMO conventions, particularly for green ship design and testing standards.

Only documents that directly deal with the ship design for *Waste Management* have been selected by the NTE. It is important to notice that the operational procedures (garbage management plan, ballast water management plan, ship recycling plan, ship recycling facility plan…) have also to be considered as *Best Practice Standards* (BPS) due to their link with the ship design process.

2ND SET OF SELECTED BPS	RELEVANT IMO STANDARD TITLE
Resolution MEPC.141(54)	Regulation 12A - Oil fuel tank protection
Resolution MEPC.107(49)	Revised guidelines and specifications for pollution prevention equipment for machinery spaces bilges of ship
MEPC.1/Circular.642	Revised guidelines for systems for handling oily wastes in machinery spaces of ships incorporating guidance notes for an integrated bilge water treatment system (IBTS)
MEPC.1/Circular.643	Harmonised implementation of the revised guidelines and specification for pollution prevention equipment for machinery space bilges of ships during the type approval process
Resolution MEPC.159(55)	Revised guidelines on implementation of effluent standards and performance tests for sewage treatment plants
Circular MSC.648	Guidelines for the operation, inspection and maintenance of ship sewage systems
MEPC/Circular.317	Guidelines for the development of garbage management plans
Resolution MEPC.76(40)	Standard specification for shipboard incinerators
Resolution MEPC.92(45)	Amendments to the revised guidelines for the implementation of Annex V
Resolution MEPC.93(45)	Amendments to the standard specification for shipboard incinerators
Circular.3	Guidance on best management practices for removal of anti-fouling coating from ships, including TBT hull paints
Resolution MEPC.127(53)	Guidelines for ballast water management and development of ballast water management plans (G4)
Resolution MEPC.124(53)	Guidelines for ballast water exchange (G6)
Resolution MEPC.174(58)	Guidelines for approval of ballast water management systems (G8)
Resolution MEPC.169(57)	Procedures for approval of ballast water management systems that make use active substances (G9)
MEPC.1/Circular.671	Guide to good practice for port reception facility providers and users
Resolution MEPC.179(59)	Guidelines for the development of the inventory of hazardous materials
Resolution A.864(20)	Recommendations for entering enclosed spaces aboard ships
Circular MSC.1084	Principles for hot work on board all types of ships
Circular MEPC.419	Guidelines for the development of the ship recycling plan

For the ship end-of-life management, the *Naval Team of Experts* (NTE) also pointed out the complementary role of the two following organisations that act in collaboration with the *International Maritime Organisation* (IMO):

- The *Basel Convention* (BC) on the control of transboundary movements of hazardous wastes and their disposal in protecting human health and the environment against the adverse effects which results from such wastes.
- The *International Labour Organisation* (ILO) in protecting the occupational safety and health of workers involved in ship recycling.

For the final selected BSP, complementary information is given in annexes V and VI (name, reference, adoption date, link to standardisation, scope, rationale for selection, how to apply, key point). These standards have been presented according to the following categorisation:

- Waste issued from ship operational use (oil, oily bilge water, sewage, garbage, anti-fouling waste, ballast water and sediments).
- Waste issued from ship recycling operations (hazardous materials and substances).

c) EC Standards

Among the quantity of EC regulations and/or directives related to environmental protection and to the key area *Waste Management*, the NTE first identified and selected the *Marine Equipment Directive* (MED) from EC, which is based on IMO Conventions. A set of 8 amendments has been adopted on the original text, between 1998 and 2010.

1ST SELECTED BPS	EC STANDARD TITLE
Directive 96/98/EC and its amendments	Marine Equipment Directive (MED)

For the MED implementation, the existence of the Mar-ED Database and the Mar-ED web site has to be known by the European stakeholders (web site: www.mared.org). It gives some relevant information about the products that are MED approved and the manufacturers producing these equipments. The technical perimeter is not limited to environmental issues (it also deals with safety at sea issues, to comply with SOLAS convention).

On the basis of the definition of the key area *Waste Management*, the NTE identified and selected the European directive dealing with ship-to-shore interfaces, and particularly the port reception facilities for ship-generated waste and cargo residues. A set of 6 amendments has been adopted on the original text, between 2002 and 2008.

2ND SELECTED BPS	EC STANDARD TITLE
Directive 2000/59/EC and its amendments	Port reception facilities for ship-generated waste and cargo residues

During the reduction process, the NTE also identified a few regulations dealing with topics that are linked to the key area *Waste Management* (ozone depleting substances, green house gases, waste of packaging, waste of EEE, REACH, CLP …), but they have not been considered by the NTE because there are mandatory regulations.

EC REGULATIONS	EC STANDARD TITLE
Regulation 1005/2009	Substances that deplete the ozone layer
Regulation 744/2010	Modification of regulation 1005/2009
Regulation 842/2006	Certain fluorinated greenhouse gases
Regulation 782/2003	Prohibition of organotin compounds on ships

Regulation 1907/2006	REACH (Registration Evaluation Authorisation of Chemicals)
Regulation 1272/2008	CLP (Classification Labelling Packaging)

For the final selected BSP, complementary information is given in annex VII (name, reference, adoption date, link to standardisation, scope, rationale for selection, how to apply, key point).

d) NATO Standards

During the reduction process, the NTE identified the 2 following working groups dealing with EP issues and particularly the key area *Waste Management*:

WORKING GROUP (WG)	SCOPE – MAIN ACTIVITIES
Environmental Protection Working Group (EPWG)	Tri-service standardisation (air, land, naval), environmental aspects of military activities, training and lessons
Maritime Capability Group n° 7 (MCG/7)	Ship design for *Waste Management*, and other considerations (resource management, emission management…)

The NTE identified that these groups might merge under the new *Joint Environmental Protection Management Group* (JEPMG) and become panels involved in tri-service activities on EP issues:

- The *Operational Environmental Protection Panel* (OEPP) that should replace the EPWG.
- The *Environmental Protection Technical Panel* (EPTP) that should replace the MCG/7.

Nota: this merger process remains under experimentation. On the basis of national positions to be expressed within end 2011, a final decision shall be taken on the way ahead for such a merger.

Considering that the key area *Waste Management* is also a logistic task during naval operations, the activities of the *Maritime Logistics and Replenishment At Sea Working Group* (MLRASWG) about the concept of *Waste Removal At Sea* (WRAS) have also to be known for the ship design.

More, the *NATO Maintenance and Supply Agency* (NAMSA) acting for land forces may also have an urgent need for specific guidelines (experiences, good practices) for any contract related to *Waste Management*, particularly about the checks, controls or inspections to be carried out on the performances of the equipments delivered to NATO forces.

NATO standards that were identified and selected by the NTE have been established to comply with main NATO doctrines, namely MC 469 "*Military principles and policies for environmental protection (EP)*" and/or MC 334 "*Principles and policies for host nation support (HNS)*".

SELECTED BPS	MILITARY STANDARD TITLE
STANAG 2510	Joint NATO waste management requirements during NATO LED military activities (edition 2)
STANAG 2545	NATO Glossary on environmental protection (edition 1)
STANAG 4167	NATO pollutant discharge connection for sewage and oily water (edition 1)
STANAG 7063	Method of detection and treatment of fuels contaminated by micro-organisms (edition 2)
STANAG 7102	Environmental protection handling requirements for petroleum handling facilities and equipment (edition 1)
STANAG 7141	Joint NATO doctrine for environmental protection during NATO LED military activities (edition 5)

If some of these military standards may be considered only for information (2510, 2545, 7141), others may have to be applied in contracts (4167, 7063), but the status of STANAG-7102 ought to be more discussed in relation with the expert group EG-12. The expert group EG-18 pointed out

that EG-12 had also identified and selected in 2008 the STANAG-4167 and STANAG-7102 as BPS (under the sub-domain perimeter "*Environment*"), but not the STANAG-7063.

The NTE identified the existence of 3 recent STANAG under ratification process that deal with environmental issues. They were produced in 2009 from preliminary *Allied Joint Environmental Protection Publications* (AJEPP). At this stage, the NTE has not selected these military standards, considering that they essentially deal with land systems and because they are not yet in force.

STANDARD	MILITARY STANDARD TITLE
STANAG 2581	Environmental protection standards and norms for military compounds on NATO operations
STANAG 2582	Best environmental protection practices for military compounds in NATO operations
STANAG 2583	Environmental management systems in NATO operations

The existence of STANAG-4698 "*Performance requirements for protective paint systems and their application*" has also to be mentioned. It consists of a set of *Allied Engineering Publications* (AEP) produced by a NATO *Specialist Team* (ST) on "*Coating and Paints*" from ISO standards and have a high level of interest for the global ship performances (corrosion, speed, signature …).

STANDARD	MILITARY STANDARD TITLE
STANAG 4698	Performance requirements for protective paint systems and their application: AEP-59: Application process for optimum paint and coatings systems' performance. AEP-60: Performance requirements for exterior topside coatings. AEP-61: Performance requirements for underwater hull paint systems. AEP-63: Performance requirements for non-skid coating systems.

About the antifouling coatings, AEP-61 deal with the minimum performance requirements for biofouling (attachment of marine organisms) and corrosion protection by *Underwater Hull Paint Systems* (UHPS) applied to ships hulls subject to seawater immersion. But essentially due to a lack of experience about the current use of this recent NATO standard, it has not been selected by the NTE, considering that some more investigations ought to be conducted to appreciate its direct relevance for the key area *Waste Management*.

National policies and practices that may have been produced by national joint military staff have not been considered in this list, because there are usually issued from NATO doctrines.

For the final selected BSP, complementary information is given in annex VIII (name, reference, adoption date, link to standardisation, scope, rationale for selection, how to apply, key point).

e) CEN Standards

For the reduction process and the selection of relevant *European Committee for Standardisation* (CEN) standards related to the key area *Waste Management*, the NTE proposed to adopt a similar method than for ISO standards.

The activity of several *Technical Committees* (TC), usually producing CEN standards directly or not directly linked to the key area *Waste Management*, has been analysed (see annex IV).

Among the 9 TC that have been identified, the following categorisation has been adopted between TC acting only for the civilian maritime sector (with a high level of interest for the naval sector) and TC having a potential common interest between air, land and naval systems.

MILITARY SYSTEM	LIST OF RELEVANT CEN TECHNICAL COMMITTEES (TC)

Naval System	TC 300
Common interest	TC 164, TC 165, TC 182, TC 183, TC 233, TC 261, TC 292, TC 308

It clearly appears that the TC-300 "*High sea ships and marine technologies*" remains the main technical committee for which a specific attention has to be kept on its normative activities within CEN, particularly for the key area *Waste Management*.

The priority was given for CEN standards directly linked to a current international and/or regional legislation, and/or acting in the civilian maritime sector. The NTE has selected them as a priority.

1ST SET OF SELECTED BPS	CEN STANDARD TITLE
EN ISO 9377	Water quality - Determination of hydrocarbon oil index
EN ISO 15083	Small craft - Bilge pumping systems
EN ISO 8099	Small craft - Toilet waste retention systems
EN ISO 15749	Ship and marine technology - Drainage systems on ships and marine structures (5 parts)

The NTE has also selected other relevant standards, on a case by case approach, due to their potential interest for a better understanding of waste management process.

2ND SET OF SELECTED BPS	CEN STANDARD TITLE
EN/TR 15126	Characterisation of sludge - Good practice for land filling of sludge and sludge treatment residues
EN/TR 15473	Characterization of sludge - Good practice for sludge drying
EN/TR 15584	Characterisation of sludge - Guide to risk assessment especially in relation to use and disposal of sludge
EN 12461	Biotechnology – Large scale process and production – Guidance for the handling, inactivating and testing of waste
EN 12574	Stationary waste containers
EN 13193	Packaging - Packaging and the environment – Terminology
EN 13965	Characterisation of waste – Terminology
EN 14624	Performance of mobile leak detectors and of room monitors for halogenated refrigerants

For the final selected BSP, complementary information is given in annex IX (name, reference, adoption date, link to standardisation, scope, rationale for selection, how to apply, key point). These standards have been presented according to the following categorisation:

- Liquid waste (oil and oily water, sewage and grey water, ballast water and sediments).
- Solid waste (garbage such as plastic and non-plastic waste).
- Hazardous waste (chemical materials, such as refrigerants or gaseous fire extinguishers).

f) ISO Standards

For the reduction process and selection of relevant *International Standardisation Organisation* (ISO) standards related to the key area *Waste Management*, the NTE proposed to adopt a similar method than for CEN standards.

The activity of several *Technical Committees* (TC), usually producing ISO standards directly or not directly linked to the key area *Waste Management*, has been analysed (see annex IV).

Among the 7 TC that have been identified, the following categorisation has been adopted between TC acting only for the civilian maritime sector (with a high level of interest for the naval sector) and TC having a potential common interest between air, land and naval systems.

MILITARY SYSTEM	LIST OF ISO RELEVANT TECHNICAL COMMITTEES (TC)
Naval System	TC 8, TC 28, TC 188
Common interest	TC 21, TC 86, TC 104, TC 207

It clearly appears that the TC-8 "*Ships and marine technologies*" (particularly the sub-committees SC-2 "*Marine environmental protection*" and SC-3 "*Piping and machinery*") and TC-188 "*Small craft*" remain the main technical committees for which a specific attention has to be kept on their normative activities within ISO, particularly for the key area *Waste Management*.

The priority was given for ISO standards directly linked to a current international and/or regional legislation, and/or acting in the civilian maritime sector. The NTE has selected them as a priority.

1ST SET OF SELECTED BPS	ISO STANDARD TITLE
ISO 5815	Test method standard for BOD_5
ISO 15705	Water quality - Test method standard for COD
ISO 14726	Ship and marine technology – Identification colours for the content of piping systems
ISO 13617	Shipboard incinerators requirements
ISO 14520	Gaseous fire extinguishing systems - Physical properties and system design
ISO/CD 16304	Ship and marine technology - Marine environmental protection – Arrangement and management of port waste reception facilities
ISO/DIS 21070	Ship and marine technology – Marine environmental protection - Management and handling of shipboard garbage

The NTE has also selected other relevant standards, on a case by case approach, due to their potential interest for a better understanding of waste management process.

2ND SET OF SELECTED BPS	ISO STANDARD TITLE
ISO 817	Refrigerants - Designation system
ISO 1496	Series 1 Freight containers – Specification and testing

All these relevant standards address the "*Ship operational use*" phase. The NTE pointed out that the ISO also acts for the "*ship recycling*" phase by producing several specific standards under the leadership of the TC 8: "*Ship and marine technology - Ship recycling management systems*".

STANDARD	ISO STANDARD TITLE AND DATE OF EDITION (IF EFFECTIVE)
ISO 30.000	Specifications for management systems for safe and environmentally sound ship recycling facilities (March 2009)
ISO 30.001	Best practice for ship recycling facilities – Assessment and plan (*not adopted*)
ISO 30.002	Guidelines for selection of ship recyclers, and pro-format contract (April 2010)
ISO 30.003	Requirements for bodies providing audit and certification of ship recycling management (October 2009)
ISO 30.004	Guidelines for the implementation of ISO 30.000 – General guidelines on

	principles, systems and support techniques (February 2011)
ISO 30.005	Information control for hazardous materials in the manufacturing chain of shipbuilding and ship operations (September 2010)
ISO 30.006	Diagrams to show the location of hazardous materials onboard ships (December 2010)
ISO 30.007	Measures to prevent asbestos emission and exposure during ship recycling (June 2010)

Due to a lack of experience about these recent ISO standards, a specific analysis appears to be necessary for a better understanding about their complementary interest, by comparison with IMO texts, currently under production within the *Ship Recycling* (SR) Convention.

Nevertheless, considering that these standards may have a relevant interest for the stakeholders, the NTE selected some of them as relevant standards (except ISO 30.001). Due to a lack of time, detailed information about these only ISO standards (30.000) has not been produced in annex X.

For the final selected BSP, complementary information is given in annex X (name, reference, adoption date, link to standardisation, scope, rationale for selection, how to apply, key point). These standards have been presented according to the following categorisation:

- Liquid waste (oil and oily water, sewage and grey water, ballast water and sediments).
- Solid waste (garbage such as plastic and non-plastic waste).
- Hazardous waste (chemical materials, such as refrigerants or gaseous fire extinguishers).

g) IACS and National Classification Societies Standards

For the key area *Waste Management*, no IACS standard has been clearly identified by the NTE. Only a set of national *Naval Rules* (NR) dealing with the prevention of pollution (to sea, to air) have been written by *National Classification Societies* (NCS) such as GL, BV, DNV or LR.

These texts have been built in response to current UN/IMO and USCG/CFR regulations. They define good practices and guidelines for the ship design, periodical tests, measurements and surveys. This set of NR introduces a class notation, which demonstrates a compliance level.

	EXAMPLES OF CLASS NOTATION FROM CLASSIFICATION SOCIETIES
GL	Environmental passport (emissions to the sea and to the air)
BV	Clean-sea (emissions to the sea), clean-air (emissions to the air), with some options
DNV	Clean, clean design
LR	Environmental Protection (EP), with some options

Due to the fact that this set of NR is similar in terms of objectives and/or procedures, even if some differences may exist, on case by case, depending on the national ambitious level, they have not been selected by the NTE as relevant BSP.

h) Other standards of potential interest (UNEP, ECHA, EDA, DIN, AFNOR …)

The NTE pointed out the existence of several international, regional, national or local documents, already available and/or under production, that may have a high relevant interest for the key area *Waste Management* and that might be considered as potential future BPS.

First, the *United Nation Environmental Programme* (UNEP) and the *European CHemical Agency* (ECHA) have produced a few standard-like documents that may give a relevant knowledge on some specific environmental issues dealing with hazardous waste, materials and/or substances.

WASTE	ORGANISATION	LIST OF STANDARD-LIKE DOCUMENTS

Health Care Waste	UNEP	Guidelines on *Best Available Techniques* (BAT) and *Best Environmental Practices* (BEP) for medical waste incineration (2003)
Hazardous substances	ECHA	Guidance on waste and recovered substances (2010)

Moreover, the European project "*Antifouling Coating for War Ships*" (ACWS) has also to be known by the stakeholders. It was launched mid 2008 by the *European Defence Agency* (EDA) between France and the United Kingdom, with a collaboration from the Netherlands, and is about to be completed mid 2011. Its main objectives were first the evaluation of emerging technologies to obtain environmentally friendly antifouling coatings with projected long-term performances, and then the development of advanced accelerated test methods for assessing new products, including biocide free coatings, in a short period but representative of long-term "in service" conditions. Among the set of work packages, some best practice guidelines are under final production.

Essentially due to a lack of time and/or maturity, all these complementary documents issued from UNEP, ECHA and EDA have not been analysed by the NTE. There have only been identified under this paragraph, as "others", but not inside the descriptive database available in annex.

Essentially due to a very small number of nations within the NTE and due to a lack of time (the priority was given to international, European and military standards), very few national standards have been clearly identified as potential future relevant BPS. Nevertheless, some standards about environmental issues have been listed for further potential investigations.

Nevertheless, concerning the ballast water and sediment management, it has to be mentioned that the German national standard association (NSMT: "*Normenstelle Schiffs- und Meerestechnik*") is very active about the establishment of normative requirements for the implementation of BWM Convention (web site: www.nsmt.de) and is intensively involved in innovative standardization projects through the DIN's "*Innovation with Norms and Standards*" initiative.

WASTE	ORGANISATION	LIST OF NATIONAL STANDARDS
Sewage	AFNOR	Biotechnology (NF X 42-005 of August 1988, 42-102 of December 1988, 42-203 of May 1989) Scope: Vocabulary, data sheet for drafting a contract bill, data sheet for selecting filtration equipment
Waste	AFNOR	Waste - Recycling terminology (GA X 30-012 of August 2004).
Health Care Waste	AFNOR	Packaging for medicinal care waste (set of standards with the reference NF X 30-500 to NF X 30-505 between December 1999 and December 2006) Terminology (NF X 30-510 of October 2003)
ODS and GHG	AFNOR	Refrigerating systems and heat pumps (35-421)
Ballast water and sediments	DIN	DIN 86270 (parts 1 & 2) of November 2010: Ballast water management - Requirements and tests (Part 1 "*Monitoring system for ballast water treatment installations*" and Part 2 "*Resources of controlling*")

These national standards address questions that would not be currently covered by international and/or regional standards. For this reason, the NTE recommends to analyse the current status of these national standards and to propose them at a higher level if they become relevant for CEN.

During the final production of the present report, the NTE also identified the existence of a study on "*Access to standards*" that has been recently launched by EDA. The potential interest for the

European stakeholders from government and industry is very large and not limited to the key area *Waste Management*. It may be extended to other needs (resource management). For that purpose, a specific portal has been created: *European Defence Standards Information System* (EDSIS).

4.3.3) BPS for aerial systems

According to the definition of the term *"Standard",* the aerial experts **have not recommended any national or international standards**. Nevertheless, we have recommended a selection of interesting documents that give key elements and which can be used singularly in armament contracts.

Each selected documents has been sorted in categories (as explain above) and the aerial experts have provided a description in accordance with the "Template for Recommendations". These are made up as follows:

- The document´s description
- Why a particular document has been considered by experts?
- How to use the document in the best way in armament contracts?

4.3.4) BPS for land systems

Each selected documents has been sorted in defined categories (as explain above) and we have provided a description in accordance with the "Template for Recommendations". These are made up as follows:

- The document's description
- Why a particular document has been considered by experts
- How to use the document in the best way in armament contracts

4.3.5) BPS for Missiles and munitions

There are no standards that specifically written for missile and munitions and therefore we cannot recommend a standard. However it is possible to apply the principles found in both ISO 14062 Environmental Management – Integrating environmental aspects into product design and development, IEC62430 Environmentally conscious design for electrical and electronic products for missile and Munitions for those aspects not covered by the STANAG.

4.3.6) BPS for Electronic systems

There is currently one standard in the electronics field that can be applied to any electronic system and that is EN IEC 62430:2009 Environmentally conscious design for electrical and electronic products.

5) RECOMMENDATIONS FOR BEST PRACTICES

5.1) General standards

SELECTED BPS	TITLE	WHEN TO APPLY	HOW TO APPLY
EN ISO 14001:2004	Environmental management systems - Requirements	▪ New equipment acquisition ▪ Disposal services	**Guidance standard: require certification or sufficient[1] organisation and processes** **Require** the prime contractor to be

[1] In relation to project complexity

SELECTED BPS	TITLE	WHEN TO APPLY	HOW TO APPLY
	with guidance for use	acquisition	certified **or** to demonstrate his organisation offers dedicated and competent points of contacts, his environmental management policy proposes a continuous improvement process, and his environmental management plan deals with all the equipment design and development aspects, including addressing subcontractors contributions
ISO/TR* 14062:2002	Environmental Management – Integrating environmental aspects into product design and development	New equipment or part/component acquisition	**Guidance standard:** **Quote** the standard as providing general recommendations on eco-design and as a good general practice to follow (life cycle approach, study all environmental aspects…) to minimize waste (among other environmental aspects) at end of life and – for some equipments – during use phase, in order to avoid pollution transfer.
EN IEC 62430:2009		New equipment (not just electronic and electro-technical systems) or part/component acquisition	**Guidance standard:** **Quote** the standard's eco-design process as a model to follow in order to achieve good eco-design practices **and** use the adoption of the process, or of a equivalent one, integrated in the processes of an environmental management approach or system, such as a project oriented environmental management system, as an evaluation **criteria** of the contractor's proposal.
EWC	European Waste Catalogue and Hazardous Waste List	▪ New equipment or part/component acquisition ▪ Maintenance contracts ▪ Disposal services acquisition	**Guidance standard:** Ask the EWC to be used as a reference whenever specific categories of waste have to be quoted in the contract.
CLP	Classification, Labelling, Packaging	▪ New equipment or part/component acquisition ▪ Maintenance contracts	**Apply standard:** The regulation asks the defined pictograms (following the Globally Harmonised System of Classification and Labelling of Chemicals, GHS) to be used to identify dangerous substances & mixtures and the Security Data Sheets to be updated.

5.2) Naval systems

5.2.1) Introduction

The scope of EG-18 recommendations for BPS essentially includes standards issued from IMO, EC, NATO, CEN and ISO, dealing with terminology on waste, ship design for waste management during ship life (including operational use and recycling) and process of ship recycling management.

On the basis of the previous table presenting the selected BPS, approximately 90 % of these relevant BPS deal with the "*ship use*" phase and only 10 % of these BPS are relevant for the "*ship recycling*" phase. More, as explained in the following table, a large majority of these relevant standards is only relevant for naval systems (45 % for IMO standards and 20 % for both NATO-CEN-ISO standards). It also appears that 33 % of these BPS may have a common interest between air, land and naval systems.

Armament Systems	IMO	EC	NATO	CEN	ISO	Others	TOTAL
Naval Systems	24	2	1	4	6	0	**37**
Common interest	0	0	5	8	3	2	**18**
TOTAL of Standards	**24**	**2**	**6**	**12**	**9**	**2**	**55**

A general recommendation is to use the last edition of these standards in armament contracts.

5.2.2) Acquisition of new Products – Design for *Waste Management*

DESIGN STANDARDS FOR "PRODUCT OPERATIONAL USE" PHASE

A set of several standards from IMO and EC has to be applied in armament contracts (A):

- The *MARPOL convention* that is one of the most important international conventions covering prevention of pollution of the marine environment by ships.
- The *AFS convention* that prohibits the use of harmful organo-tins in anti-fouling paints used on ships and establishes a mechanism to prevent the potential future use of other harmful substances in anti-fouling systems.
- The *BWM convention* that aims to prevent the potentially devastating environmental effects of the spread into the sea of harmful aquatic organisms carried by ships' ballast water from one region to another.
- The *Marine Equipment Directive* (MED) that is to enhance safety at sea and the prevention of marine pollution through the uniform application of the relevant international instruments related to equipment to be placed on board ships.

On the basis of the IMO conventions, complementary resolutions and/or circulars have to be applied in armament contract (A) if these standards define objective performances or design requirements or test methods. Some other complementary documents may also be recommended as Guidance (G) if these standards only give some examples of recommendations (other equivalent solutions may exist).

Among military standards, to cover the interoperability, essentially STANAG-4167 dealing with the pollutant discharge connection for sewage and oily water has to be applied in armament contracts (A).

Complementary recommended standards from CEN and/or ISO have also to be known. They have to be applied in armament contracts (A) if there are requested by mandatory standards from IMO and/or EC. Some other normative standards from these organisations may also be recommended as Guidance (G), on a voluntary basis, for a better understanding of the key area *Waste Management*.

DESIGN STANDARD FOR "*PRODUCT RECYCLING*" PHASE

Two main standards have to be applied in armament contracts (A):

- The IMO SR convention that prohibits and/or restricts the installation or use of HAZMAT listed in Appendix I on ships under construction, operation and maintenance.
- The IMO resolution MEPC.179(59) that provides some recommendations for establishing the *Inventory of Hazardous Materials* (IHM) for HAZMAT listed in appendix 1 and II on ships. This IHM has to be properly maintained and updated throughout the operational life of the ship, reflecting new installation and/or any changes in ship structure and/or equipment.

Complementary standards from ISO may also be recommended as Guidance (G), on a voluntary basis, particularly ISO 30.004, ISO 30.005 and ISO 30.006 standards about the control for hazardous materials in the manufacturing chain of shipbuilding and ship operations, and the diagram of the location of hazardous materials onboard ships.

5.2.3) Acquisition of new Products – Information gathering

For the key area *Waste Management* in marine domain, the required design documentation is already well defined by IMO conventions (arrangement plan, drawing, diagram of systems and equipment, computation, descriptive document, attestation, certificate, operational procedure) and/or ISO and EN standard (maintenance instruction produced by the shipbuilder and/or the system manufacturer).

To these design documents, some other information is given about operational documents. Both "*ship design*" and "*ship operational use*" documents are relevant for a safe *Waste Management*. Practically, the contribution of national classification societies is more and more requested for checking the ship design and its compliance with IMO conventions (periodical tests, measurements and surveys …).

- MARPOL Convention, annex I: a *Shipboard Oil Pollution Emergency Plan* (SOPEP) intends to address any ship and tanker and essentially indicates the list of national Authorities to be contacted in the event of an oil pollution incident and the actions to be taken immediately on board to reduce or control the discharge of oil following the incident, and minimize an oil spill.
- MARPOL Convention, annex V: a *Garbage Management Plan* (GMP) and a *Garbage Record Book* (GRB) have to be established and kept on board of all ships. The *first plan* provides written procedures for the collecting, storing, processing and disposing of garbage, including the use of the equipment on board. The *second plan* comprises all relevant information of the discharge operations or completed incineration (this includes the following situations: when garbage is discharged into the sea, when garbage is discharged to reception facilities ashore or to other ships, when garbage is incinerated, accidental or other exceptional discharges of garbage).
- BWM Convention: a *Ballast Water Management Plan* (BWMP) and a *Ballast Water Record Book Plan* (BWRP) are specific to all ships, directly linked to ship design choices and have to be kept readily available for any inspection. The *first plan* namely details safety procedures for the ship and the crew associated to BWM, provides detailed description of the actions to be taken to implement the BWM requirements and practices, and details the procedures for the disposal of sediments at sea and to shore. The *second plan* addresses the ballast water operation and has to be written under the following conditions (when BW is taken on board, whenever BW is treated, when BW is discharged into the sea or to reception facility).
- SR Convention: a *Ship Recycling Plan* (SRP) and a *Ship Recycling Facility Plan* (SRFP). The *first plan* addresses the requirements for ships and has to be developed taking into account information provided by the ship-owner (IHM …). The *second plan* addresses the requirements for ship recycling facilities and has to be developed by the recycling company (a

policy ensuring workers' safety and protection, human health and environment, identification of responsibilities). These plans are currently known as *Safety and Health Plan* (SHP) about procedures for protecting workers, *Environmental Compliance Plan* (ECP) about the abilities of the ship recycling facility, *Operational Plan* (OP) about the waste management procedures during scrapping.

Particularly, the *Inventory of Hazardous Materials* (IHM) is essential for knowing substances and/or materials contained on board of ship (end-of-life management): this document has to be considered as a database (location, quantity, hazardousness …). It contributes to define the disposal methods and the *Personal Protective Equipment* (PPE) to be used by the crew, maintenance workers and recyclers.

5.2.4) Ship dismantling operation

As stated previously, a very small amount of standards deal with the "*preparation for ship recycling*" and "*ship dismantling operation*" phases, by comparison with the "*ship operational use*" phase.

The first main standards that have to be applied in armament contracts (A) are the IMO SR convention with the dedicated *Ship Recycling Plan* (SRP) and *Ship Recycling Facility Plan* (SRFP), and the IMO resolution MEPC.179(59) for the delivery of the IHM to ship-owners.

Other relevant IMO standards may also be selected as guidance (G): resolution A.864(20), circular MSC.1084 and circular MEPC.419. The *Naval Team of Expert* (NTE) also pointed out that these existing resolutions and circulars would be updated by new resolutions under production by IMO.

As for the acquisition of new ships and the design for *Waste Management* for the "*ship dismantling*" phase, complementary standards from ISO may also be recommended as Guidance (G), on a voluntary basis, particularly ISO 30.002 (under production), ISO 30.003, ISO 30.004, ISO 30.006 and ISO 30.007 standards, about the selection of ship recyclers and pro-format contract, the requirements for bodies providing audit and certification of ship recycling management, the diagram of the location of hazardous materials onboard ships, and the measures to prevent asbestos emission and exposure during ship recycling (if the existing vessel to be dismantled and recycled contents asbestos).

5.3) Aerial systems

5.3.1) Acquisition of new aircrafts Standards : Design for waste management

DESIGN FOR "PRODUCT USE" PHASE

Not relevant

DESIGN FOR "PRODUCT END OF LIFE" PHASE

Context

There is no specific regulation or standards about design to facilitate the end of life of aircrafts. Nevertheless, regulations such as REACh, RoHS… or national instructions (MoDs standards) help to reduce hazardous substances in equipments and thus, the amount of hazardous wastes once these equipments are disposed.

French MoD - DGA

The French procurement agency (DGA) asks the contractor to limit the use of hazardous substances when he designs a new aircraft. Particularly, CMR substances and radioactive substances must be avoided. The DGA requests also the contractor to think about the end of life when the equipment is designed (particularly for disassembly).

Italian MoD – General Directorate of Air Armaments

The Technical Specification from the DGAA contains requirements related to the use hazardous materials like eco-compatible paints instead of chrome-based paints.

More over, in agreement to European regulations, the DGAA asks the contractor to respect the "Manual for Managing Hazardous Materials " which is enclosed to Technical Manuals and give information related to the use of hazardous materials to the maintenance staff or aircrew.

This document has to be applied before starting any procedure (maintenance, disposal…) and is intended to be a summary of the safety aspects link to the use of hazardous materials.

Civilian practices

At that time, there is no standard, document or good practice shared on that subject. When a process is led, it is because of company policy.

Relevant documentation

Nevertheless, we have identified a number of documents (national instructions or MIL Standards) which should be taken into account.

Name Primer coating epoxy anticorrosive (Italian name : Pittura di fondo epossidica anticorrosiva)
Reference AER.MP-023a
Date June 1999
Link to Standardisation Organisation Italian Ministry of Defence - Air Armament General Directorate (Direzione Generale Armamenti Aeronautici)
Scope of the document This document is the standard uses by the DGAA at the time of acquisition. It defines the specification for primer coating epoxy anticorrosive like zinc phosphate based primer and other chrome free primer.
Rationale for selection This document is used by Italian MoD as national standard in acquisition process.
How to apply/key points Currently, this Italian standard could be recommended as guidance in EHDP. Parts of this Italian specification could be interesting for European MoDs, that is why it is mentioned in EHDP. The English translation will be issued in 2011.

Name Requirements and performances of paint systems for military aircrafts protection
Reference NORMDEF 0004-1
Date Expected in 2011
Link to Standardisation Organisation French Defence normalisation centre (CND) (CIN Paint & Varnish workgroup)

Scope of the document This standard defines requirements and performances for external paint systems for aircrafts with low solvent rate, low volatile organic compound (VOC), high-solids primer coating and Chromium VI free corrosion inhibiting.
Rationale for selection This document is used by French MoD as recommendations in acquisition process.
How to apply/key points This French standard could be recommended as guidance in EHDP. Some parts of this French specification could be interesting for European MoDs.

Name Performance specification on primer coating : epoxy, high solids
Reference MIL-PRF 23377
Date June 2006
Link to Standardisation Organisation Defense Standardization Program Office (USA)
Scope of the document This standard covers corrosion inhibiting, chemical and solvent resistant, solvent-borne, high-solids epoxy primer coating that have a maximum volatile organic compound (VOC) content of 340 grams per liter and gives requirements on toxicity of compounds, physical properties or test methods. This standard includes the primer N (chrome free) which do not have the same performances than chrome based primer (e.g. no salt fog performance).
Rationale for selection This document is used by Italian MoD as standard in some acquisition process.
How to apply/key points This US standard could be recommended as guidance in EHDP. This American specification is mentioned because some parts of this document could be interesting for European MoDs.

5.3.2) Acquisition of new aircrafts Standards : Information Gathering

Context

Contrary to naval or automotive domains, there is no specific regulation or international standard about data gathering for aircrafts. However, military or civilian stakeholders have undertaken to collect information in order to make the end-of-life easier and some documents (national or industrial standards) can be mentioned.

<u>French MoD - DGA</u>

The DGA requires in their procurement contracts of any equipment that contractors realize an end-of-life document and locate hazardous substances. The objective of this document is to help the service in charge of equipment end-of-life, to find out the best way to eliminate the equipment.

<u>Italian MoD – Air Armaments general Directorate</u>

As explained in the previous part, the set of technical manual requested by the DGAA include the "Manual for Managing Hazardous Material -60" AER.P-107. This manual is intended to be a

summary of the contents, concerning safety aspects, on the use of hazardous materials foreseen by the various maintenance manuals.

The contractor is responsible for the consequences resulting either from a lack of information, either from the omitted notification to DGAA of any subsequent modification or update of hazardous materials manual.

Civilian practices

The AeroSpace and Defence Industries Association of Europe (ASD) works on hazardous substances issues. They have had many discussions on hazardous substances issues and have published the PDSL (Priority Declarable Substance List) which is a reference list of hazardous substances used in aeronautical products throughout the supply chain.

Furthermore, SAE International, in partnership with Aerospace Industries Association (AIA) and the Aerospace and Defence Industries Association of Europe (ASD) published two documents related to data collection.

- ARP 9536: Declarable Substances Recommended Practice
- AS9535: Substance Declaration Standard

These documents are not shared at an european level but can give guidelines for companies. So far, companies have worked on the respect of mandatory different regulations (REACh, RoHS, EURATOM….).

Relevant documentation

Even if there is a lack of European regulation or standards, we have identified a number of national documents which should be taken into account.

Name Preparation of the manual "-60" concerning the management of hazardous materials
Reference AER.P-107 (for Italian version) AER.P-107TR (for English version)
Date July 11 2006
Link to Standardisation Organisation Italian Ministry of Defence - Air Armament General Directorate (Direzione Generale Armamenti Aeronautici)
Scope of the document This manual is intended to be a summary of use of hazardous materials, concerning safety aspect, foreseen by the various maintenance manuals. It is a reference document in which users can find information related to risks area, solutions, emergency cases, precautions to take during normal use or in case of extraordinary events. By this document, the contractors are required to clearly identify the hazardous materials and provide indications on how to deal with them. This document is principally used for the maintenance phase and also for end-of-life and disposal.
Rationale for selection This document is used by Italian MoD as standard in acquisition contracts.

How to apply/key points
This Italian standard could be "recommended" as guidance in EHDP. Some parts of this Italian standard could be interesting for other European MoDs.

Name
"Substance Declaration Standard" (in conjunction with "Declarable Substances Recommended Practice")
Reference
- AS9535: Substance Declaration Standard - ARP 9536: Declarable Substances Recommended Practice
Date
April 2008
Link to Standardisation Organisation
SAE International, in partnership with Aerospace Industries Association (AIA) and the Aerospace and Defence Industries Association of Europe (ASD)
Scope of the document
This standard was developed for members of the aerospace and defense industries to support compliance with regulatory and customer requirements, as well as business risks management (as supply chain disruption). This document is a data collection form and an instruction for completing the form. It is intended to be used with SAE ARP9536 "Declarable Substances Recommended Practice": list of substances having an interest to the sector to know whether any of these substances are used within aerospace products or manufacturing processes.
Rationale for selection
This standard has been selected because it gives a consistent method for collecting information from the supply chain that every supplier can use.
How to apply/key points
This standard could be "recommended" as guidance in EHDP, even if, for the meantime, it is not really used by stakeholders. However, it can be mentioned in EHDP as example because some elements can be interesting for European MoDs.

In addition, it should be noted that French DGA has also established an "end of life manual" draft. This document set up the chapter titles and explains to the contractor which information is required in each part. For now, this document is not an "official" standard for the French MoD but is recommended as a guidance document in contracts.

5.3.3) Aircraft dismantling operation

Context

There is no regulation or standards related to aircrafts disposal. Nonetheless, some general directives like Waste batteries and accumulators or WEEE should be noticed because they could have an impact on aeronautical domain.

<u>French MoD - DGA</u>

The main problem for the disposal of French old aircrafts is linked to asbestos contained in them. A French decree on asbestos does not allow to give (or sale) to third party equipment which contains asbestos. Therefore, it is impossible for the SIMMAD (service in charge of maintenance and end of life of aircrafts in the French MoD) to contract to dispose the aircrafts without having the complete asbestos inventory for each aircraft. So, for the meantime, lots of French aircrafts in end of service are stored in air force bases waiting for the asbestos inventory.

Italian MoD

There is an Italian general instruction (AER.00-1-73) which defines the administrative management of the aircraft declared "out of order" or "out of service".

Civilian practices

Two interesting projects about dismantling and disposal centres of aircrafts have to be noticed:

- Tarmac Aerosave center (Tarbes Advances Reacycling & Maintenance Aircraft Company) settle in Tarbes (south of France) which is supported by Airbus, SITA Snecma, Equip'Aero and TASC Aviation…
- Chateauroux-Deols dismantling centre (in the centre of France) opened by Bartin Aero Recycling and supported by AFRA (Aircraft Fleet Recycling Association)

Relevant documentation

Name ***Best Management Practice for management of used aircraft parts and assemblies***
Reference AFRA BMP version 2.0
Date May 2009
Link to Standardisation Organisation **AFRA** (Aircraft Fleet Recycling Association)
Scope of the document This document represents a collection of recommendation concerning best practices for the management of parts that are removed from an aircraft, engine or during the disassembly at the end of the aircraft service life. It provides guidance on how to disassemble an aircraft, engine or other asset and gives safety dispositions to articles removal. It does this by providing Best Practices, which are auditable standards.
Rationale for selection This document has been selected because it is intended to guide aspects of the management of parts removed from an end-of-service aircraft asset. Thus, it could be useful for the MoD services in charge of disposal of aircrafts.
How to apply/key points This standard could be recommended as guidance in EHDP. It is mainly dedicated to companies whose core business is the management of used aircraft parts and not to aircraft manufacturers. Despite that, some elements can be interesting for European MoDs.

5.3.4) Other relevant standardisation work

We also had a look on standardisation work carried out by the ASD (AeroSpace and Defence Industries Association of Europe). This organisation is developing a set of ILS standards; the chapter 17 of S3000L standard is considered as potential "best practice" because it provides

guidance on end of life. However, it covers the 3 issues (design, information and end of life) so we have to introduce this document separately.

Name ***S3000L Chapter 17 - Disposal***
Reference S300L-A-17-00-0000-00A-040A-A
Date April 2010
Link to Standardisation Organisation **ASD** (AeroSpace and Defence Industries Association of Europe)
Scope of the document This chapter provides guidance to develop a disposal procedure applicable for a product (existing or under development), that can be demonstrated to be safe, efficient, environmentally acceptable and cost effective. This document includes all provisions taken in the Product design in a sustainable development approach such as limiting the use of scarce resources, reducing the environmental impact of Product disposal (no toxic substances, identification of materials for easy recycling …). It also recommends to compile a "Product Disposal File" (PDF) in which CMR substances used in the equipment are recorded as part of Product Data This chapter advises : - to perform a Product Dismantling Task Analysis (PDTA), where tasks required to dispose of the Product are identified and characterised (tasks duration, required resources …) - to assess the impact of disposal on Product Logistic Support Elements such as extra support equipment required to perform the Product disposal, describe the disposal tasks in the Technical Publications, training courses to teach operators how to dispose of the Product (including Health & Safety cautions), etc.
Rationale for selection This document has been selected because it is a standard and explains how to deal with end-of-life of aircraft in a life cycle approach.
How to apply/key points This standard could be “recommended” as guidance in EHDP. For the meantime, this document is maybe too complicated and not really used by stakeholders. However, it can be mentioned because some elements can be interesting for European MoDs.

5.4) Land systems

5.4.1) Acquisition of new equipments: design for product end-of-life phase

For land systems, design for end of life focuses on: prevention, the calculation of recyclability ratio and the marking of hazardous materials.

PREVENTION

a. Context

- **Regulation**

There is one regulation about design for vehicles end-of-life phase which is interesting as good practice; it is the ELV directive (end of life directive).

Article 4 addresses end of life issues that should be addressed at the project concept phase:

1. "In order to promote the prevention of waste…:

(a) vehicle manufacturers, in liaison with material and equipment manufacturers, to *limit the use of hazardous substances in vehicles* and to reduce them as far as possible from vehicle concept onwards, to in particular prevent their release into the environment, make recycling easier, and avoid the need to dispose of hazardous waste;

(b) the *design and production of new vehicles which take into full account and facilitate the dismantling, reuse and recovery*, in particular the *recycling*, of end-of life vehicles, their components and materials;

(c) Vehicle manufacturers, in liaison with material and equipment manufacturers, *to integrate an increasing quantity of recycled material in vehicles* and other products, in order to develop the markets for recycled materials.

1. "…that materials and components of vehicles…*do not contain lead, mercury, cadmium or hexavalent chromium* other than in cases listed in Annex II…"

- **MoD practices**

French MoD - DGA

The French procurement agency (DGA) asks the contractor to limit heavy metals such as lead, mercury, cadmium or hexavalent chromium in the vehicle design.

In particular for paints, there is one standard NORMDEF 0003-1 which is used by French MoD as recommendations in acquisition process. There is one interesting requirement in this standard about limiting the use of hazardous substances in paints.

UK MoD - DE&S

In the UK, DE&S (Defence Equipment & Support) – responsible for equipping and supporting UK armed forces - already has an environmental management procedure called POEMS (Project Orientated Environmental Management System) based on ISO 14001. The procedure follows the project life cycle including identifying disposal environmental aspects and impacts that can be mitigated during the vehicle design.

UK military vehicle Def Stans (Defence Standards e.g. Def Stan 23-7) do not address ELV directive requirements but the use of heavy metals is addressed through other Def Stans and UK MoD policy documents.

German MoD - BAWW

In Germany the Army, Navy and the Air force use the Federal Office for Defence Technology and Procurement (BWB) for equipping. The BWB is responsible for the support e. g. with vehicles. After the armed forces define their needs the BWB starts with the procurement. The first step is to analyse, how ecologically harmless the components of the ordnance are. Components with high negative impact on the environment are identified and if possible are replaced by environment friendly components. This environmental analysis is based on European directives and national law.

- **Conclusion**

In conclusion, we can observe that each MoD asks contractors to not use, as far as possible, hazardous substances in military vehicles and replace them by environment friendly substances. This approach is in compliance with the first point of the article 4 of ELV directive. The other points such as "integration of recycled materials in vehicles" have not been studied yet.

b. Relevant documentation

Name ELV directive – Article 4 about prevention
Reference Directive 2000/53/EC
Date 18th of September 2000
Link to Standardisation Organisation -
Scope of the document The aim of the article 4 is to promote the prevention of waste in : - limitating the use of hazardous substances in vehicles (in particular lead, mercury, cadmium, hexavalent chromium), - designing new vehicles in taking into account dismantling, recycling and reuse, - increasing the quantity if recycled material in vehicles.
Rationale for selection Even if this directive is not applicable to military vehicles, some articles such as article 4 are pertinent as good practices to reduce the environmental impact and cost of disposal of end of life military vehicles.
How to apply/key points The different MoDs should require in their acquisition contracts that the contractors comply with article 4 of the ELV directive.

RECYCLABILITY AND RECOVERABILITY

a. Context

- **Regulation**

There is one regulation about design for vehicles recycling which is interesting as good practice; it is the ELV directive (end of life directive).

For the reuse and recovery, it is the article 7 which is interesting:

1. "…the *reuse and recovery* shall be increased to *a minimum of 95%* by an average weight per vehicle and year in 2015. Within the same time limit, *the re-use and recycling* shall be increased to *a minimum of 85%* by an average weight per vehicle and year."

- **MoD practices**

French MoD

The DGA asks the contractor to calculate the recyclability and recoverability ratios as in the ELV directive.

UK MoD

DE&S requires that contractors identify environmental aspects and impacts at all stages of the project life cycle including identifying disposal aspects during the concept phase of an equipment project and identifying means of mitigating environmental aspects in accordance with POEMS or an equivalent procedure. DE&S does not mandate that contractors calculate the recyclability and recoverability of a vehicle.

German MoD

The recyclability and recoverability element is implemented in the environmental analysis process. The German army regulations for environmental analysis are in accordance with present German legislation and do not address targets for 2015. If the Industry follows the Ideas also the Procurement will follow.

- **Conclusion**

In conclusion, we can observe that this point is not really taken into account by MoDs but it is an interesting point.

b. Relevant documentation

Name ELV directive – Article 7 about reuse and recovery
Reference Directive 2000/53/EC
Date 18th of September 2000
Link to Standardisation Organisation -
Scope of the document The aim of the regulation is to improve the ratio of recycling and recoverability of civilian vehicles (below 3.5 tons).
Rationale for selection Even if this directive is not applicable to military vehicles, some articles such as article 7 are applicable as good practices to improve the end-of-life phase for military vehicles.
How to apply/key points The different MoDs should require in their acquisition contracts that the contractors comply with article 7 of the ELV directive.

Name Road vehicles - Recyclability and recoverability - Calculation method
Reference ISO standard 22628
Date December 2002
Link to Standardisation Organisation International Standardization Organization
Scope of the document To define the calculation method for vehicle recyclability and recoverability ratios.
Rationale for selection This document is linked to article 7 of the ELV directive.

How to apply/key points
The different MoDs should require in their acquisition contracts that the contractors comply with the ISO standard to calculate recyclability ratios for military vehicles. Other idea: It could be possible to create a special ISO standard for military vehicles.

THE MARKING OF PIECES/COMPONENTS

a. Context

- **Regulation**

There is one regulation about design for vehicles recycling which is interesting as good practice; it is the ELV directive (end of life directive).

For the coding standards, it is the article 8 which is interesting:

> **1. "…the necessary measures to ensure that producers, in concert with material and equipment manufacturers, *use component and material coding standards*, in particular to *facilitate the identification of those components and materials* which are suitable for reuse and recovery."**

- **MoD practices**

French MoD

The DGA asks the contractor to mark plastic pieces > 100g.

UK MoD

DE&S does not specify any marking above the requirements in relevant legislation.

German MoD

The German Armed Forces follow the European directives, e.g. EN 13432 and national law in force. No special regulations are known for the procurement.

- **Conclusion**

In conclusion, we can observe that this point is not really taken into account by MoDs but it is an interesting point.

b. Relevant documentation

Name
ELV directive – Article 8 about coding standards
Reference
Directive 2000/53/EC
Date
18th of September 2000
Link to Standardisation Organisation
-
Scope of the document
The aim of the article 8 is to use component and material coding standards to facilitate their identification during reuse and recovery.

Rationale for selection Even if this directive is not applicable to military vehicles, some articles such as article 8 are pertinent as good practices to improve the end of life of military vehicles.
How to apply/key points The different MoDs should require in their acquisition contracts that the contractors comply with article 8 of the ELV directive.

Name Plastics – Generic identification and marking of plastics products
Reference ISO standard 11469
Date August 2000
Link to Standardisation Organisation International Standardization Organization
Scope of the document The aim of this standard is to standardize the marking of plastics to identify more easily and facilitate the end of life of products made of plastics.
Rationale for selection This document is linked to the article 8 of the ELV directive.
How to apply/key points The different MoDs should require in their acquisition contracts that the contractors comply with the ISO standard to mark the different pieces (over 100g) made of plastic.

5.4.2) Acquisition of new equipments: information gathering for maintenance and end-of-life of vehicles

a. Context

- **Regulation**

There is one regulation about information about end of life of vehicles which is interesting as good practice; it is the ELV directive (end of life directive).

For the dismantling information, it is the article 8 which is interesting:

1. "…take the necessary measures to ensure that *producers provide dismantling information* for each type of new vehicle… This *information* shall identify…the *different vehicle components and materials*, and the *location of all hazardous substances in the vehicles*, in particular with a view to the achievement of the objectives laid down in Article 7.

- **MoD practices**

<u>French MoD</u>

The DGA requires in their procurement contracts of any vehicles that contractors provide an end-of-life document and locate hazardous substances. The objective of these documents is to help the service (SIMMT) which is in charge of managing the end-of-life of vehicles.

<u>UK MoD</u>

In the UK the DSA (Disposal Services Authority) which sits within DE&S is responsible for all aspects of disposal policy and activity undertaken by UK MoD. DE&S requires that projects consider end-of-life during all stages of the procurement cycle. To support this, project teams are required to produce a disposal plan which outlines disposal routes, disposal process and materials treatment.

UK MoD contracts require that contractors supply a safety data sheet in accordance with CHIP (control of hazardous substances inventory program) of all hazardous materials provided. This information can be used in the equipment disposal plan.

German MoD

The Federal Office for Defence Technology and Procurement (BWB) asks the contractors to give them information about hazardous materials and components which are used in military vehicles. After that the BWB can start its environmental analysis and put this information in its special database. This information is handed over to the military users and if it is necessary up dated during the lifetime of the vehicle. At the end of life of the vehicle, this information comes back to the BWB who is in charge of the end of life of the vehicle.

- **Civilian practices**

GADSL = Global automotive declarable substance list

The GADSL is the result of a year-long global effort of representatives from the automotive, automotive parts supplier (tier supplier) and chemical/plastics industries who have organized the Global Automotive Stakeholders Group (GASG). The GASG's purpose is to facilitate communication and exchange of information regarding the use of certain substances in automotive products throughout the supply chain. The GADSL only covers substances that are expected to be present in a material or part that remains in a vehicle at point of sale (website: www.gadsl.org).

IMDS = International Material Data System

IMDS is a collective, computer-based material data system used by automotive OEMs (Original Equipment Manufacturer) to manage environmentally relevant aspects of the different parts used in vehicles. Through this system, the automotive industry is able to reconstruct the complete material flow.

The adoption of the IMDS relies above all on a legislative background, namely:

- Laws & Regulations on hazardous substances: OEMs must eliminate these substances from the supply chain.
- End-Of-Life vehicles directive (ELV): it forces car manufacturers to improve their recycling ratios. Therefore all suppliers must deliver accurate material information.

- **Conclusion**

In conclusion, we can observe that each MoD needs information about location of hazardous materials/substances in its military vehicles and asks contractors to locate these hazardous materials. Nevertheless, each MoD uses its own list and its own hazardous substances database whereas there are different available and well-known database (such as IMDS or SAP…) and substances list (GADSL list) in the civilian automotive world. So, it could be interesting, for the different MoDs, to further investigate and find out a good standard to get, at least, a common substances list.

b. Relevant documentation

Name
ELV directive – Article 8 about dismantling information
Reference

Directive 2000/53/EC
Date 18th of September 2000
Link to Standardisation Organisation -
Scope of the document The aim of the article 8 is to provide dismantling information as: - the different vehicle components and materials, - the location of all hazardous substances in the vehicle.
Rationale for selection Even if this directive is not applicable to military vehicles, some articles such as article 8 are pertinent as good practices to improve the end of life of military vehicles.
How to apply/key points The different MoDs should require in their acquisition contracts that the contractors comply with article 8 of the ELV directive.

5.4.3) Acquisition of vehicle end-of-life operations

a. Context

- **Regulation**

There is one regulation about end-of-life of vehicles which is interesting as good practice; it is the ELV directive (end of life directive).

For the end-of-life, it is the article 7 which is interesting:

1. "…the *reuse and recovery* shall be increased to *a minimum of 95%* by an average weight per vehicle and year in 2015. Within the same time limit, *the re-use and recycling* shall be increased to *a minimum of 85%* by an average weight per vehicle and year."

- **MoD PRACTICES**

French MoD

The SIMMT (service in charge of maintenance and end-of-life of vehicles in the French MoD) demilitarizes the vehicle and then, enters into a contract with recycling companies which depollutes, recovers and recycles the demilitarized vehicle. The SIMMT gives sometimes information to the recycling company about the location of hazardous substances/materials.

UK MoD

The DSA (Disposal Services Authority) is responsible for disposal of all UK MoD equipment including military vehicles. All military vehicles are demilitarised before disposal and the majority of military vehicles are then resold. The DSA use a number of selling methods including e-selling.

German MoD

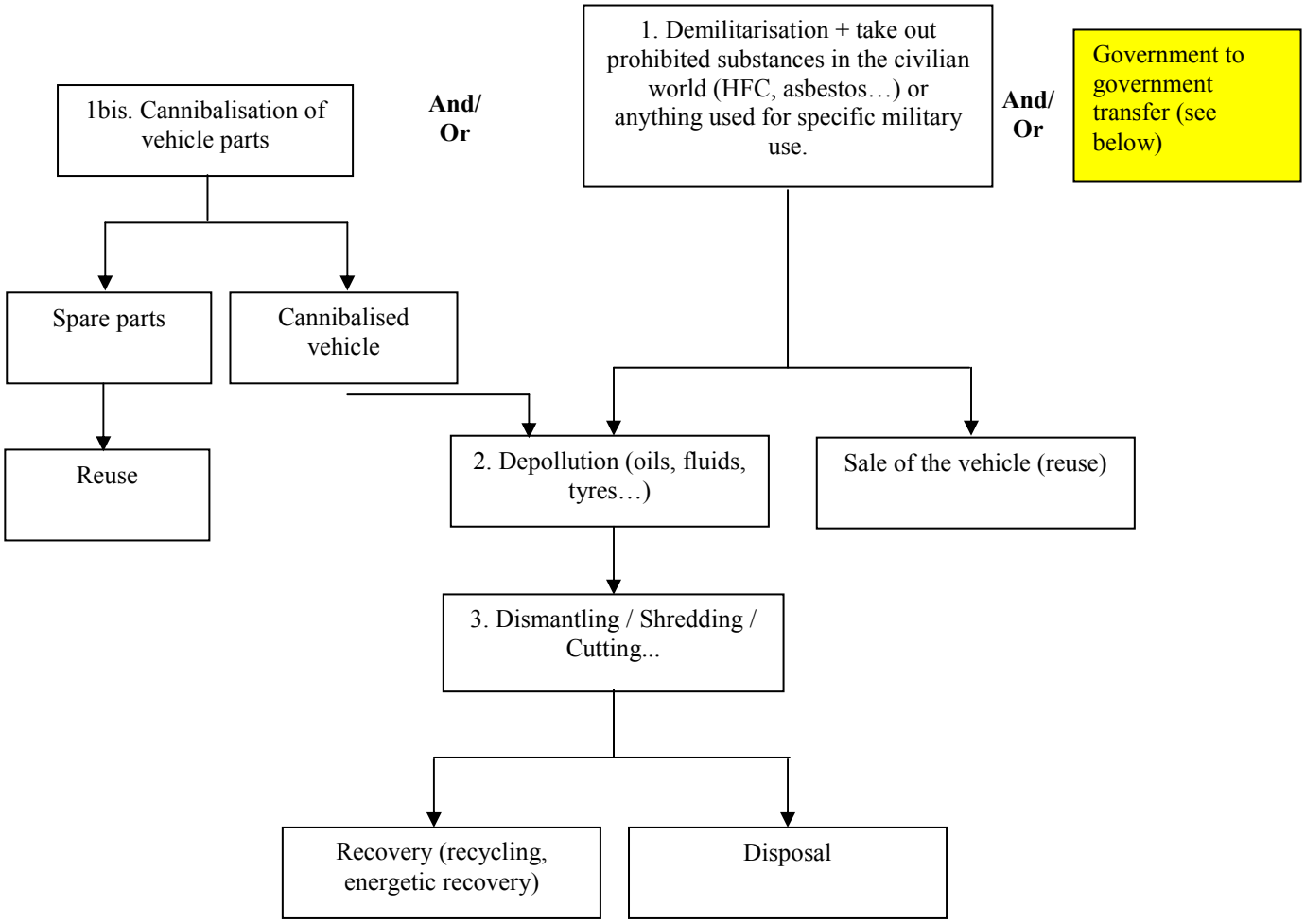
For armoured vehicles: In some procurement contracts, there is a requirement which requires that the contractor take the armoured vehicle back when the vehicle reaches the end of its useful life. For others the military user is responsible for demilitarizing and for the treatment of anything hazardous for specific military use . The other steps dismantling, recovering (recycling and energetic recovery), disposal… will be done by contractors.

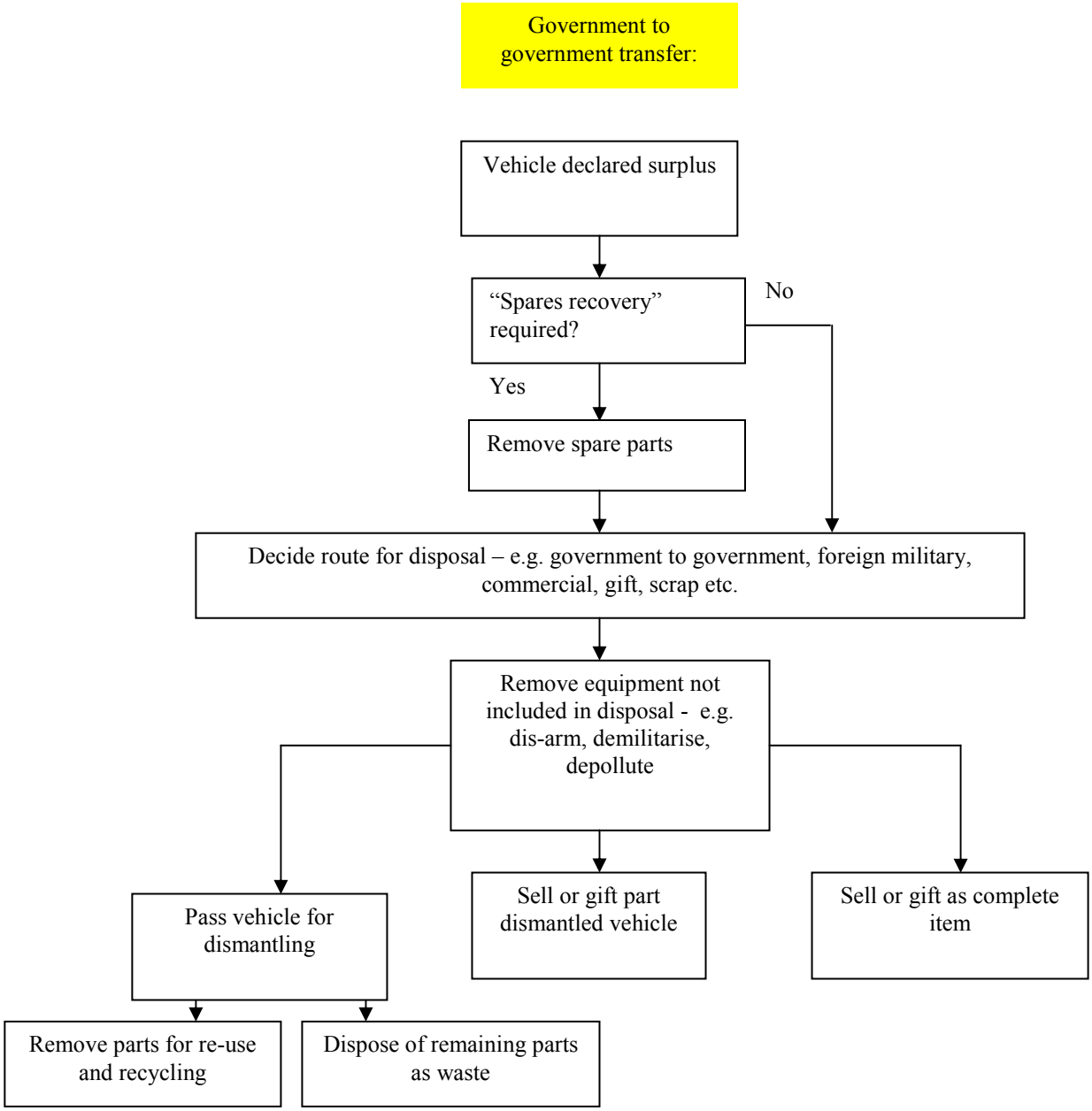
For logistical vehicles: The German MoD has a kind of Ebay where logistical military vehicles (cars, trucks) can be sold to private individuals and if the vehicles are not sold, they are recycled by local recycling companies.

- **Conclusion**

Nowadays, it is possible to measure the potential of vehicles reuse and recycling but it is difficult to reach the reuse and recycling targets of the ELV directive because there are different ways to manage the end-of-life of vehicles such as sale (reuse of vehicle), reuse of spare parts (cannibalisation) and recovery/disposal.

Each MoD follows the following end-of-life operations scheme for its vehicles. The first step of treatment process is the demilitarisation of the vehicle. At the same time, the vehicle can be cannibalised, it means that some spare parts can be extracted and reused in an other vehicle. Then, the vehicle is depolluted. And finally, it is dismantled and each component is either recovered (recycled or energetic recovered) or disposed.





b. Relevant documentation

Name ELV directive – Article 7 about reuse and recovery
Reference Directive 2000/53/EC
Date 18th of September 2000
Link to Standardisation Organisation -
Scope of the document

The aim of the regulation is to improve the ratio of recycling and recovering of civilian vehicles (below 3.5 tons).
Rationale for selection Even if this directive is not applicable to military vehicles, some articles such as article 7 are pertinent as good practices to improve the end of life of military vehicles.
How to apply/key points The different MoDs should require in their end of life contracts that the recycling companies comply with article 7 of the ELV directive.

5.5) Missiles and munitions

5.5.1) Acquisition of new equipments: design for product end-of-life phase

With missile and munitions STANAG-4518 Design for end of life covers missile structure, end of life of propellants and explosives, (See EG 19) the remaining components of missiles are largely electronics, electronics are covered else where and some mechanical components which can be treated in the same way as the missile structure. Seekers generally require secure disposal

The support equipment and platforms are covered in other parts of this document.

Conclusion

With missiles and munitions the design for end of life is largely covered by the Stanag.

However if it is considered that more needs to be done beyond the requirements of the Stanag then the application of the principles in ISO 14062 and IEC 62430 should result in designs that are designed for end of life.

5.6) Electronic systems

5.6.1) Acquisition of new equipments: design for product end-of-life phase

Electronic systems fall into two categories: commercial off the shelf and purpose built defence electronics.

Commercial of the shelf these should always comply with the requirements of WEEE and RoHS directive as implemented nationally. And generally the regulatory and commercial pressures on the manufacturers of such systems results in product that is designed for end of life.

Purpose built defence electronics, here the specification of IEC 62430 should be considered to ensure that end of life disposal. The following standards can be used to support IEC 62430 in managing end of life disposal IEC/PAS 62545:2008 Environmental information on electrical and electronic equipment (EIEEE).

IEC/TR 62476:2010 Guidance for evaluation of products with respect to substance use restrictions in electrical and electronic products. Can be used as its title suggest but with the following significant caution when considering end of life electronics from a defence product, commercial standards may not be applicable to all defence electronics because of the required functionality in the defence environment. That information should however be declarable under this standard.

IEC 62635 End of life recyclability calculation for electrical and electronic equipment. Publication due November 2011; provides methods for the calculation of end of life recyclability for electrical and electronic equipment. This standard may be useful in determining the recyclability of defence electronic equipment.

IEC 62474 Material Declaration For Products of and for the Electronics Industry. The publication date for this standard has yet to be decided but once published application of this standard will enable collection of valuable information for the management of end of life electronics.

Conclusion

The commercial electronics market place is already well regulated and under significant pressure to produce a product that easy to manage at end of life and one that maximises re-use and recycling.

Purpose built defence electronics producers do not have the same pressures on them as commercial electronics producers to produce a product that is as easy to manage at end of life so the use of a standard should be considered.

The use of the standards that are yet to be published will potentially provide better information for the recycling of defence electronics, although commercial recycling rates may not be obtainable due to other constraints placed on the disposal of used defence equipment

6) RECOMMENDATIONS FOR FUTURE STANDARDISATION

6.1) General issues

6.1.1) Acquisition of new equipments: design for waste management

EG-18 suggested 1 standard (ISO 14001) as guidance for environmental management and 2 standards (ISO 14062, IEC 62430) as guidance for eco-design, in order, among other aspects, to minimize the environmental impacts associated with the waste (use phase or ultimate) aspect.

It might be useful to develop a standard, applicable for any kind of product development, encompassing environmental management and eco-design at the same time. In addition, or instead if there is no motivation for such a standard, one or more specific standard(s) for defence equipment acquisition might be developed, based on the practical return of experience of experiments on project oriented environmental management systems in order to propose concrete solutions suitable for procurement agencies and contractors work, small and large projects… EG18 suggests for future work to study existing experiments and analyze the usefulness of such standards.

6.1.2) Acquisition of new equipments: information gathering for maintenance and end of life

There is no standard at the moment for military/security procurement on the subject of information gathering about hazardous materials (the naval domain can get some inspiration from IMO conventions): there is a need for either a single one or one for each domain, because European regulation on hazardous materials is getting stricter by the day (REACh, RoHS, possibly Mercury …) so it is absolutely necessary to track them through the equipment life cycle.

6.2) Naval systems

6.2.1) Introduction

The need for future standardisation may be justified for the main following reasons:

- Lack of standard for a specific category of waste or perimeter.
- Incoherence between existing civilian and/or military standards.
- Better synergy between Defence and civilian standardisation.
- National standard to be considered at a highest level.
- National experience about waste management (technical, operational, environmental and human interoperability).

After the present work under phase III, this need may also be requested in case of any change in international and regional legislation: the adoption of a new text or an update of existing texts (IMO convention, IMO resolution and/or circular, EC legislation, EN or ISO standards…).

Obviously, before carrying out any work for producing a new standard, the NTE recommends to check if such questions are not already under investigation by dedicated *Technical Committees* (TC) from CEN and/or ISO, as those identified and listed by the NTE in annex IV.

6.2.2) Acquisition of new Products – Design for *Waste Management*

DESIGN STANDARDS FOR "*PRODUCT OPERATIONAL USE*" PHASE

a) Current questions about ship design for *Waste Management*

During the standard analysis and reduction process for the key area *Waste Management*, the NTE noticed that several civilian standards deal with common questions, such as about the terminology of some terms. A risk of contradiction and/or incoherence between legislation and standards was identified. This situation may require an update for several standards (example: some definitions between the ISO 15.749 and MARPOL Convention, annex IV).

With the increasing use of synthetic oils and other chemical additives, a need for the development of a new standardized oily bilge water mixture (usually called "oily bilge water cocktail" by NATO nations), reflecting military uses, might be necessary for the testing of *Oily bilge Water Separators* (OWS) and *Oil Content Monitor* (OCM). The aim is to reflect modern warship oily bilge water. The level of this long collaborative work has to be defined (EG, EDA, NATO...).

The IMO circular MSC.648 of June 1994 is intended to give safety recommendations for the design and the use of sewage storage and treatment system. On the basis of some national facts and experiences, some complementary recommendations should also be produced about gaseous emissions (H_2S) issued from grey water, oily bilge water and sludge (sewage sludge, sludge oil), for a better anticipation of any potential sanitary and environmental risks onboard ships.

The problem of medicine residues that may be present in wastewater (generated by any medical complex and/or hospital) is a well known problem. For the drainage systems on ships and marine structures, the ISO 15.749 standard indicates that "*drain lines from the hospital areas shall be routed via disinfectors, which are to be activated in case of contamination*". A potential need for a standardised mixture of chemical and biological contaminants might be relevant for the design of such disinfectors, and more generally *Marine Sanitary Device* (MSD).

Due to the progressive implementation of new IMO regulations about NOx and SOx emissions from propulsion systems (Tiers I-II-III), some specific techniques are under design and evaluation to reach for these new emissions levels. Some of these techniques may produce a liquid and/or solid waste, for which a need for further standardisation is foreseen (probably at an IMO level).

b) Better common standardisation about ship design *Waste Management*

At the present time, the abilities of national classification societies are widely used for checking the compliance of civil ships with the current international legislation (IMO, USCG…). Recently, more and more nations also use their national classification society for the production of specific naval rules related to the different categories of military vessels (frigates…).

Concerning environmental issues and particularly the key area *Waste Management*, the possibility for using common standardised naval rules might be relevant. But it needs to be more discussed within naval military organisations (EDA, NATO). For information, it has already been the case for the key area *Safety of life at sea*, with the Naval Ship Code (NSC) which was produced on a request from NATO with the help of some national classification societies from IACS.

DESIGN STANDARDS FOR "*PRODUCT RECYCLING*" PHASE

The *Inventory of Hazardous Materials* (IHM) as defined by IMO is an essential prevention tool that should be also used during normal operation and maintenance phases (for a better protection of crews and workers), considering that military Navies keep their vessel during a long period (up to 40 years).

This tool should integrate complementary information reflecting the new expectations of relevant international and regional legislation, particularly REACH and CLP European regulations (hazard symbols, links to MSCD…) and current European legislation related to radioactive elements and sources management. To comply with this policy and strategy, several NATO and European nations already act in this field and may use some specific questionnaires and/or database.

The *Naval Team of Expert* (NTE) pointed out a high potential interest for having common standardized requirements and best-practices for establishing any IHM for new vessels. This question has to be discussed at a military level (EDA, NATO) by using the national experiences concerning the implementation of IMO SR convention and European regulations about hazardous materials and/or substances.

6.2.3) Acquisition of new Products – Information gathering

This item is directly linked to the previous question about the *Inventory of Hazardous Waste* (IHM). A standardised software tool might be produced within a collaborative work between European nations.

6.2.4) Ship dismantling operation

No need at the present stage.

6.3) Aerial systems

6.3.1) Introduction

After a close study, the working group finds some national standards related to waste management of aircrafts (during design or disposal phases). Nevertheless, there is no European or international standard or regulation for the end-of-life of civilian or military aircrafts.

Nowadays, the stakeholders (ICAO, ASD…) are more focused on pollution or noise related to the use of aircrafts than on “end of life”.

However, this is an important issue for MoDs who are in charge of aircrafts end of life. So, the working group recommends working with the stakeholders on several topics related to end of life of aircrafts.

6.3.2) New Acquisition Standards: Design for end of life

The first one could be focused on the design phase : write standard fixing eco-design methods for aircrafts (such as recycling ratio, elimination ratio…) like end of life vehicle regulation does.

6.3.3) New Acquisition Standards : Information Gathering

The second one could be the data collection for disposal. Both MoDs and industry are working on standards to gather information on hazardous substances (quantity, location…). It could maybe be useful to exchange on this topic to share our experience and write a common standard for all the aeronautical industry.

6.3.4) Acquisition of dismantling operation

The second topics could be done with people in charge of aircraft elimination: define standard on disposal / dismantling or recycling of aircrafts.

The interesting elements in national standards currently used by MoDs or industries could be used as a work base.

6.4) Land systems

After a close study, the working group has not found any standard related to waste management of military vehicles. However, there is one very restrictive regulation about waste management of

civilian vehicles (below 3,5 tons), it is the ELV directive or directive 2000/53/EC of 18 September 2000 on end-of life vehicles. So, even if this directive is not applicable to military vehicles, some articles are very pertinent and could be used as good practices as it was explained before.

The working group suggests working with the stakeholders on several topics related to vehicles end-of-life.

- On the whole, the working group suggests making a standard with all good practices found in regulations or MoD and civilian practices.
- In particular, the first topic could be focused on the **design for product end-of-life phase**. A chapter could be dedicated to eco-design methods to improve the end-of-life of military vehicles (such as limiting the use of heavy metals, the marking of plastics, calculating special recycling ratios for military vehicles) whilst considering the through-life environmental impact of the vehicle.
- The second topic could be focused on **information gathering for maintenance and end-of-life vehicle**. MoDs and industries should all work together on a standard which would define the methodology/tools (list, database) to gather information on materials and components contained in the vehicle and information about hazardous substances (quantity, location…) contained in the vehicle. This work is already done in the civilian world.
- The third and last topic is about vehicle end-of-life operations. The approach of the German MoD which consists in asking contractors to take their vehicles back when they are out-of-service is interesting and has to be worth considering.

Suggestions for another working group: As it was explained at the beginning of the report, waste management in operational bases was not taken into account because the subject is too vague. It could be a good idea to have a working group on this specific subject.

6.5) Missiles and munitions

See general issues above.

6.6) Electronic systems

Adequate standards already exist for these products.

However, it would be useful to study the issue of secure disposal while minimizing the environmental impact. So far, the only rules for secure disposal are government instructions with the objective of maximizing security, without optimizing the environmental impact.

The issue is of interest to other types of products/equipments but it makes sense to start with electronics due to their ubiquity.

7) CONCLUSIONS

7.1) General conclusions

a) Scope

EG-18 original title ("waste management") and its apparent disconnection from equipment acquisition issues (except for naval systems, where it is necessary to include use phase waste management within the whole system acquisition) and from MODs and industry concerns (environmental issues at large, including hazardous materials as the closest subject relating somehow to waste) didn't make it easy to decide on a scope and to find participants for the expert group. That is why the subject was renamed "life cycle waste management" and the scope was extended to include issues such as end of life and equipment design (to reduce waste from design and track hazardous materials from the beginning).

EG 18 suggestion is to further extend the scope to all environmental issues relating to defence acquisition, with an organisation such as the one adopted by the group (sub-groups of experts dedicated to general issues, horizontal subjects such as electronics, and specific domain subjects such as naval, land, aerial or missile systems). It would allow for a coherent approach and would make the expert group much more appealing to a wide range of experts.

Chapter 3.1.1) provides a list of additional domains EG18 didn't have time to explore but seem of interest.

b) BPS and recommendations for future standardisation

Due to the expert group scope, most of the recommendations relate to naval systems issues (see 7.2).

However, the scope includes issues such as design for end of life and information gathering on hazardous substances. The experts' research underlined the lack of official standards in such young domains.

There is clearly a need and an opportunity to work on general and dedicated standards for:

Environmental management and eco-design (see 6.1).

Hazardous materials information gathering requirements:

- require simple lists, fancy cartographies (possibly integrated in design tools) ?
- use what kind of reference : official EU substance lists (such as REACh annexes, candidate list, registry of intentions…), other lists, risk phrases… ?

Design for end of life:

- Requirements to make dismantling easier and facilitate recycling
- Potentially, recycling percentage requirements, …

The young experience of the naval and automobile sectors would be sources for inspiration.

7.2) Specific conclusions on naval systems

The *Naval Team of Experts* (NTE) presents its conclusions following their collaborative work, with some proposals for further actions. These results may be presented as followed:

a) Best Practice Standards (BPS)

- Some international and/or regional standards directly linked to a convention or a regulation have been included in the proposal for EHDP due to the fact that these texts are worldwide recognised and are systematically incorporated inside Defence Procurement requirements.
- Priority was given to standards that are essentially relevant for the civilian and naval sector. It has been established that other standards (not directly linked to ships or marine structures) may also have a high interest for a better understanding of the key area *Waste Management*.
- It also appears that a perfect equilibrium has to be found concerning the list of selected BPS. Their number must be defined as the "*just necessary*" for "A" standards directly incorporated inside armament contracts, in order to avoid any too high cost or any risk of a poor industrial offer (particularly for any new environmental challenge related to *Waste Management*). By opposition, "G" standards may not be limited, because used on a voluntary basis.
- The NTE also identified documents that might be considered as BPS, but there have not been incorporated in the database due to the fact that there are easily downloaded from dedicated websites. These document offer complementary guidelines: for example from IMO for the implementation of Conventions (MARPOL …) or from other organisations (WHO …).

b) Future standardisation

- A need for a complementary standardisation on *Waste Management* appears to be necessary about several remaining technical questions, on a case by case approach. For this further work, the right action level remains to be defined (IMO, NATO, EDA, CEN, EG, IACS …).
- It might be useful to identify other complementary documents that were partially identified during this phase III: Common European Technical Specifications (CTS), European Technical Approvals (ETA) mainly in the construction sector, other national civilian standards and/or standard-like documents (DIN, NF, BS…), national classification society Naval Rules (NR), National Technical Approvals (NTA), National Technical Specifications (NTS) or European Technical Standards (ETS) issued from recognised organisms.
- The absolute necessity to update regularly this work which was conducted in 2010-2011, due to the fact that regulations, policies, doctrines or standards related to the perimeter *Waste Management*, and also the offer from Defence Industries and Suppliers (shipboard integrated equipment…), may change and may need to be actualised in the near future.

c) Level of investigations by the NTE

- The work conducted by the NTE has to be understood as *a preliminary stage*, due to the fact that the key area *Waste Management* was only tackled within a small number of nations and organisation. More, only international and regional standards have been considered.
- The absolute necessity to enhance this preliminary work to other European Ministries of Defence (ship owners) and Armament Industries (shipbuilders, ship recycling industries), because complementary points of view issued from other experiences may be available.
- During this one-year work, the NTE essentially focused its efforts on medium and large size ships. Even if a couple of BPS have been identified on small crafts for a potential interest for small vessels (vedette-boat, patrol-ship…), the domain of small size ships remains specific and might require further investigations (recycling phase…).
- Essentially due to a lack of time, the activities from the *Technical Committees* (TC), the *Sub-Committees* (SC) and some *Working Group* (WG), related to the management of CEN and/or ISO standards, has not been totally analysed in details. It appears as essential to obtain a better knowledge or anticipation on future standards under production by these committees. In the future, these texts might be considered as new BSP.
- The NTE recommends that all the *environmental issues* (waste management, polluting emissions to the atmosphere, energetic questions about CO_2 emissions) ought to be tackled and inserted in the EHPD under the *Eco-Design Method* (defined as design for environment).

d) Complementary collaborative work with other EG and/or organisations

- A collaborative work with other EG dealing with *Resource Management* might be initiated for consolidating the data given by the present report and for avoiding any duplication of work: EG-03 (*Fuels and Lubricants*), EG-04 (*Batteries*), EG-05 (*Packaging*) and EG-12 (*Fluid Handling*). By reference to existing final reports issued from these EG, some BPS were simultaneously selected and might have to be transferred to the right EG.
- Some complementary actions might be necessary to reach for a more exhaustive work. These actions might be conducted at 2 different levels: a *civilian level* (IMO, CEN, ISO, IACS…) and particularly within the related committees (A, MEPC, MSC, BLG, TC-SC), a *military level* (NATO, EDA…) and particularly within the related working groups (EPWG, MCG-7…), or a combined level, for example under EG-18 in response to a new road map.

e) Access to information

- A proposal is made by the NTE for a free access to a European database where the Best Practice Standards (BPS) would be easily downloadable. Their updating conditions have not been investigated, but should be at a level to be defined (EDA…).

- The NTE pointed out the need to have an objective knowledge and advise, as far as possible, on the quality of industrial offers and compliant shipboard *Waste Management* solutions with good feedback (particularly for the right choice of any efficient equipment, even if there are IMO and/or MED approved, for the best value and cost effectiveness).
- The high interest for using relevant web sites (MarED database for the implementation of the MED) or any subscription to some relevant newsletters produced by different organisations (IMO Publishing, EC Euro-Lex…) or any purchase of some relevant books and guides, or any course on EP for operational forces (under NATO training schools).

8) ANNEXES

8.1) Annex I - Glossary of Terms related to WASTE MANAGEMENT

	TERMS AND ACRONYMS
A	Assembly (reference to IMO activities)
ACWS	Antifouling Coating for War Ships
AEP	Allied Engineering Publication
AFNOR	Agence Française de Normalisation
AFRA	Aircraft Fleet Recycling Association
AFS	Anti Fouling System (reference to IMO AFS Convention, 2001)
AIA	Aerospace Industries Association
AJEPP	Allied Joint Environmental Protection Publication
ASD	AeroSpace and Defence Industries Association of Europe
BC	Basel Convention
DBO_5	Biochemical Oxygen Demand after 5 days
BLG	Bulk Liquids and Gases (reference to IMO activities)
BMP	Best Management Practice
BPS	Best-Practice Standard
BS	British Standard
BSI	British Standard institute
BV	Bureau Veritas
BWM	Ballast Water Management (reference to IMO BWM Convention, 2004)
BWRB	Ballast Water Record Book (reference to IMO BWM Convention, 2004)
BWRP	Ballast Water Management Plan (reference to IMO BWM Convention, 2004)
CEN	Comité Européen de Normalisation – European Committee for Standardisation
CENELEC	Comité Européen de Normalisation Electrotechnique - European Committee for Electrotechnical Standardisation
CFR	Code of Federal Regulation (reference to USCG)
CIN	Commission inter-armées de normalisation (“Joint services normalisation commission”)
CLP	Classification Labelling Packaging
CND	Centre de Normalisation de Défense (“Defence normalisation centre”)
CTS	Common European Technical Specification
COD	Chemical Oxygen Demand
DEFNET	DEFence NETwork
DIN	Deutsches Institut für Normung
DNV	Det Norske Veritas

DPA	Defence Procurement Agencies
EC	European Commission
ECP	Environmental Compliance plan
ECHA	European CHemical Agency
ECP	Environmental Compliance Plan (reference to IMO SR Convention, 2009)
EDA	European Defence Agency
EDI	European Defence Industry
EDP	European Defence Procurement
EDPM	European Defence Project Managers
EDSIS	European Defence Standards Information System
EG	Expert Group (example: "*EG-18 about Waste Management*")
EHDP	European Handbook for Defence Procurement
ELV	End of Life Vehicle
EMAS	Eco-Management and Audit Scheme
EMEC	European Maritime European Council
EP	Environmental Protection
EPA	Environmental Protection Agency
EPTP	Environmental Protection Technical Panel (reference to NATO activities)
EPWG	Environmental Protection Working Group (reference to NATO activities)
ETA	European Technical Approval
ETS	European Technical Standard
FAA	Federation Aviation Administration
FPSO	Floating Production Storage and Off-loading
FSU	Floating Storage Units
GESAMP	Group of Experts on the Scientific Aspects of Marine Environmental Protection (reference to IMO activities)
GHG	Green House Gas
GL	Germanischer Lloyd's
GMP	Garbage Management Plan (reference to IMO MARPOL Convention)
GRB	Garbage Record Book (reference to IMO MARPOL Convention)
HACCP	Hazard Analysis and Critical Control Point
HAZMAT	HAZardous MATerials
HS	Horizontal / Transversal Standards (fundamental / generic / systems / method)
HNS	Host Nation Support
IACS	International Association of Classification Societies
IBWTS	Integrated Bilge Water Treatment System

ICAO	International Civil Aviation Organization
ICS	International Classification of Standards
IEC	International Electrotechnical Commission
EIEEE	Environmental information on electrical and electronic equipment
EWC	European Waste catalogue
GADSL	Global Automotive Declarable Substance List
IHM	Inventory of Hazardous Materials (reference to IMO SR Convention)
IIR	International Institute of Refrigeration
ILO	International Labour Organisation
IMCO	Inter-Governmental Maritime Consultative Organisation
IMDS	International Material Data System
IMO	International Maritime Organisation
IS	Interoperability / Interface Standards
ISO	International Organisation for Standardisation
ISO (F)DIS	(Final) Draft International Standard (reference to ISO standards)
ISO PAS	Publicity Available Specification (reference to ISO standards)
ISO TR	Technical Report (reference to ISO standards)
ISO TS	Technical Specification (reference to ISO standards)
ITT	Invitation To Tender
IWM	Integrated Waste Management
JEPMG	Joint Environmental Protection Management Group (reference to NATO activities)
LR	Lloyd's Register
Mar-ED	Marine Equipment Directive Database
MARPOL	MARitime POLlution (reference to IMO Convention, 1973/78 and its amendments)
MCG/7	Maritime Capability Group n° 7 (reference to NATO activities)
MED	Marine Equipment Directive
MEPC	Maritime Environmental Protection Committee (reference to IMO activities)
MLRASWG	Maritime Logistic & Replenishment At Sea Working Group
MoD	Ministry of Defence
MS	Management / Organisation Standard / Conformity Assessment
MSC	Maritime Safety Committee (reference to IMO activities)
MSD	Marine Sanitary Device
MSDS	Material Safety Data Sheet
NAMSA	NATO Maintenance and Supply Agency
NATO	North Atlantic Treaty Organisation

NCS	National Classification Society
NF	Norme Française (“French standard”)
NFLWG	NATO Fuel and Lubricant Working Group
NNAG	NATO Naval Armament Group (reference to NATO activities)
NR	Naval Rules
NSC	Naval Ship Code
NSA	NATO Standardisation Agency
NSMT	Normenstelle Schiffs- und Meerestechnik
NTA	National Technical Approval
NTE	Naval Team of Experts (reference to EG-18 activities)
NTS	National Technical Specification
OCM	Oil Content Monitor
ODS	Ozone Depleting Substances
OEM	Original Equipment Manufacturer
OEPP	Operational Environmental Protection Panel
OWS	Oily bilge Water Separator
PHEWG	Petroleum Handling Equipment Working Group (reference to NATO activities)
PM	Particulate Matter
PPE	Personal Protective Equipment
ppm	Parts of oil per million parts of water by volume
PRF	Port Reception Facilities
RAS	Replenishment At Sea
REACH	Registration Evaluation Authorisation of CHemicals
ROHS	Restriction of Hazardous materials
SC	Sub-Committee (reference to CEN or ISO Technical Committee)
SHP	Safety and Health Plan (reference to IMO SR Convention, 2009)
SMS	Safety Management System (reference to IMO SR Convention, 2009)
SOLAS	Safety Of Life At Sea (reference to IMO Convention)
SOPEP	Shipboard Oil Pollution Emergency Plan (reference to IMO MARPOL Convention)
SR	Ship Recycling (reference to IMO SR Convention, 2009)
SRP	Ship Recycling Plan (reference to IMO SR Convention, 2009)
SRFP	Ship Recycling Facility Plan (reference to IMO SR Convention, 2009)
STANAG	STANdardisation Agreement (reference to NATO activities)
TC	Technical Committee (reference to CEN or ISO activities)
TS	Technical / Performance Standards

UHPS	Underwater Hull Paint Systems
UN	United Nations
UNEP	United Nations Environmental Programme
USCG	United States Coast Guard
WEEE	Waste of Electrical and Electronic Equipment
WHO	World Health Organisation
WRAS	Waste Removal At Sea

8.2) Annex II - Glossary of Definitions related to WASTE MANAGEMENT

	TECHNICAL DEFINITIONS LINKED TO SHIPBOARD WASTE
Ship	A vessel or any type whatsoever operating in the marine environment and includes hydrofoil boats, air-cushion vehicles, submersibles, floating craft, and fixed or floating platforms, floating storage units (FSUs) and floating production, storage and off-loading units (FPSOs). Warships are not covered by the term ship. *[IMO AFS Convention:2001]*
New Ship	A ship the keel of which is laid or which is at a similar stage of construction on or which undergoes a major conversion or after the date of the entry into force of any directive or convention. For the purpose of this definition, a similar stage of construction shall mean the stage at which: ➢ Construction identifiable with a specific ship begins, and ➢ Assembly of that ship has commenced, comprising at least 50 tonnes or 1 % of the estimated mass of all structural material, whichever is less. By opposition, "Existing ship" means a ship which is not a new ship. *[EC MED:1996]* derived from *[IMO Conventions]*
Ship major conversion	A conversion of an existing ship which: ➢ changes its ballast water carrying capacity by 15 % or greater, or ➢ changes the ship type, or which is projected to prolong its life by 10 years or more, or ➢ results in modifications to its ballast water system other than component replacement-in kind. *[IMO BWM Convention: 1973/78]*
Small craft	Small craft of hull length up to 24 m. *[EN ISO 8099:2000]*
Gross Tonnage (GT)	The gross tonnage is calculated in accordance with the tonnage measurement regulation contained in Annex 1 of the international convention on Tonnage Measurement of Ships, 1969 or any successor convention.
Marine Equipment	Equipment which must be placed on board a ship (new ship and/or existing ship) for use in order to comply with international instruments or are voluntarily placed on board for use, and for which the approval of the flag State administration is required according to international instruments (lifesaving appliances, marine pollution prevention, fire protection equipment, navigation equipment, radio-communication equipment). *[EC MED:1996]*
Special areas	A sea area where for recognized technical reasons in relation to its oceanographical and ecological condition and to the particular character of its traffic the adoption of special mandatory methods for the prevention of sea and air pollution. *[IMO MARPOL Convention:1973/78]*
Port Reception Facilities	Any fixed, floating or mobile facility capable of receiving ship-generated waste or cargo residues and fit for that purpose. On the basis of the IMO Guidelines for Ensuring the Adequacy of Port Waste

	Reception Facilities, "adequate" facilities are those which "do not provide mariners with a disincentive to use them," and further suggest that unreasonably high costs can deter use of PRFs. *[IMO MARPOL Convention:1973:78]*
Harmful substances	Any substance which, if introduced into the sea, is liable to create hazards to human health, to harm living resources and marine life, to damage amenities or to interfere with other legitimate uses of the sea. *[IMO MARPOL Convention:1973/78]*
Discharge	Any release howsoever caused from a ship and includes any escape, disposal, spilling, leaking, pumping, emitting or emptying (in relation to harmful substances or effluents containing such substances). Discharge does not include dumping, release of harmful substances directly arising from the exploration, exploitation and associated offshore processing of sea-bed mineral resources, and release of harmful substances for purposes of legitimate scientific research into pollution abatement or control. *[IMO MARPOL Convention:1973/78]*
Effluent	Waste liquid that is discharged. *[IMO MARPOL Convention:1973/78]*
Emission	Any release of substances subject to control from ships into the atmosphere or sea *[IMO MARPOL Convention:1973/78]*
Oil	Petroleum in any form including crude oil, fuel oil, sludge, oil refuses and refined products (other than petrochemicals). *Oily mixture* means a mixture with any oil content. *Oil fuel* means any oil used as fuel in connection with the propulsion and auxiliary machinery of the ship in which such oil is carried. *[IMO MARPOL Convention:1973:78]*
Oil fuel	Any oil used as fuel oil in connection with the propulsion and auxiliary machinery of the ship in which such oil is carried. *[IMO MARPOL Convention:1973/78]*
Oil spill	This form of pollution is any release of a liquid petroleum hydrocarbon into the environment (on soil or sea water) due to human activity. The term often refers to marine oil spills, where large amounts or layers of oil floating on water are significantly released into the ocean or coastal waters. Oil spills include releases of oil from tankers, offshore platforms, drilling rigs and wells, as well as spills of refined petroleum products (such as gasoline, diesel) and their by-products, and heavier fuels used by large ships such as bunker fuel, or the spill of any oily white substance refuse or waste oil. Spills may take months or even years to clean up. *[NOAA, 2010]*
Oily bilge water	Water collected in the bilge wells or the tank top resulting from the unexpected leakage from piping or the maintenance work in machinery spaces, which may be contaminated by oil. *[IMO MARPOL Convention:1973/78]*
Sludge Oil	Sludge from the fuel or lubricating oil separators, waste lubricating oil from main or auxiliary machinery, oily drains resulting from the leakage of equipment used

	for oil, or waste oil from bilge water separators, oil filtering equipment or drip trays. *[IMO MARPOL Convention:1973/78]*
ppm	Parts of oil per million parts of water by volume *[IMO MARPOL Convention:1973/78]*
IBWTS	The Integrated Bilge Water Treatment System (IBWTS) is a system to minimize the amount of oily bilge water generated in machinery spaces by treating the leaked water and oil separately. It also provides an integrated means to process the oily bilge water and oil residue (sludge). *[IMO MARPOL Convention:1973/78]*
Waste water	Off-running water which has undergone change due to use, as for instance sewage (contaminated water), water from precipitation, seawater and condensation water that has reached the drain lines. With this type of wastewater, a distinction is made between grey water and sewage. *[EN ISO 15.749:2004]*
Sewage	Drainage and other wastes from any form of toilets and urinals, drainage from medical premises (dispensary, sick bay, etc.) via wash basins, wash tubs and scuppers located in such premises, drainage from spaces containing living animals, or other waste waters when mixed with the drainage defined above. *[IMO MARPOL Convention:1973/78]* Human body wastes and the wastes, including flushing water, from toilets and other receptacles intended to receive or retain these wastes *[EN ISO 8099:2000]*
Black water	The preferred term is Sewage. *[STANAG-2545:1973/78]*
Grey water	Waste water to be disposed of, excluding sewage. *[ISO 15.749 Standard]* Drainage from dishwater, shower, laundry, bath and washbasin drains, excluding sewage and drainage from cargo spaces. *[STANAG-2545:2009]* derived from *[IMO MARPOL Convention:1973/78]*
Sewage sludge	Digested or undigested residues from sewage treatment plants containing a high proportion of solids. *[STANAG-2545:2009]* Accumulated solids that separate from liquids such as water or wastewater during processing, or deposits on the bottom of streams or other bodies of water. *[WHO, 2011]*
Garbage	All kinds of victual, domestic and operational waste excluding fresh fish and parts thereof, generated during the normal operation of the ship and liable to be disposed of continuously or periodically (except oil, sewage or noxious liquid substances). The garbage is to be grouped into categories: - Plastics, - Floating dunnage, lining, or packing material, - Ground-down paper products, rags, glass, metal, bottles, crockery ...

	- Cargo residues, paper products, rags, glass, metal, bottles, crockery ... - Food waste, - Incinerator ash, except from plastic products which may contain toxic or heavy metal residues. *[IMO MARPOL Convention:1973/78]* Remark from the NTE: garbage might also be defined on the basis of the following category: recyclable waste (plastics, cans, paper), food waste (kitchen waste, leftovers), hazardous waste (waste oil, paint), other waste (all none recyclable).
Plastics	Plastic means a solid material which contains as an essential ingredient one or more synthetic organic high polymers and which is formed (shaped) during either manufacture of the polymer or a fabrication into a finished product by heat and/or pressure. Plastics have material properties ranging from hard and brittle to soft and elastic. *[IMO MARPOL Convention:1973/78]*
Food waste	Any spoiled or unspoiled victual substances, such as fruits, vegetables, dairy products, poultry, meat products, food scraps, food particles and all other materials contaminated by such waste, generated aboard ship, principally if the galley and dining areas. *[STANAG-2545:2009]* derived from *[IMO MARPOL Convention:1973/78]*
Ozone Depleting Substances (ODS)	Controlled substances defined in the Montreal Protocol on Substances that Deplete the Ozone Layer, 1987, listed in Annexes A, B, C or E to the said Protocol. *[IMO MARPOL Convention:1973/78]*
Anti-Fouling System	A coating, paint, surface treatment, surface, or device that is used on a ship to control or prevent attachment or unwanted organisms. *[IMO AFS Convention:2001]*
Ballast Water and Sediments	Water with its suspended matter taken on board a ship to control trim, list, draught, stability or stresses of the ship. Sediments mean matter settled out of ballast water. *[IMO BWSM Convention:2004]*
Ballast Water Management	Mechanical, physical, chemical and biological processes, either singularly or in combination, to remove, render harmless, or to avoid the uptake or discharge of Harmful Aquatic Organisms and Pathogens within Water Ballast and Sediments. *[IMO BWSM Convention:2004]*
Active substances	A substance or organism, including a virus or a fungus, that has a general or specific action on or against Harmful Aquatic Organisms and Pathogens *[IMO BWSM Convention:2004]*
Harmful Aquatic Organisms and Pathogens	Aquatic organisms and pathogens which, if introduced into the sea including estuaries, or into fresh water courses, may create hazards to the environment, human health, property or resources, impair biological diversity or interfere with other legitimate uses of such areas. *[IMO BWSM Convention:2004]*
Health Care Waste (or medical waste)	Health-care waste includes all the waste generated by health-care establishments, research facilities, and laboratories. In addition, it includes the waste originating from “minor” or “scattered” sources, such as that produced in the course of health care undertaken in the home (dialysis, insulin injections, etc.).

	Between 75 and 90 % of the waste produced by health-care providers is non-risk or "general" health-care waste, comparable to domestic waste. The remaining 10 to 25 % of healthcare waste is regarded as hazardous and may create a variety of health risks (hazardous health-care waste is also known as "health-care risk waste"). *[WHO, 2011]*
Radioactive waste	Material that contains, or is contaminated with, radionuclide at concentrations or activities greater than clearance levels and for which no use is foreseen. A radionuclide is a nuclide (*i.e. an atom of specified atomic number and mass number*) that exhibits properties of spontaneous disintegration, liberating energy, generally resulting in the formation of new nuclides, and accompanied by the emission of one or more types of radiation, such as α and β particles and γ rays. *[WHO, 2011]*
WEEE	Electrical or electronic equipment (EEE) means equipment which is dependent on electric currents or electromagnetic fields in order to work properly and equipment for the generation, transfer and measurements of such currents and fields falling under the categories set out below and designed for use with a voltage rating not exceeding 1.000 Volt for alternating current and 1.500 Volt for direct current. <u>Categories</u> : large and small household appliances, IT and telecommunication equipment, consumer equipment, lighting equipment, electrical and electronic tools, toys, leisure, sport equipment, medical devices, monitoring and control instruments, automatic dispensers) WEEE (waste of EEE) means electrical or electronic equipment which is waste, including all components, subassemblies and consumables which are part of the product at the time of discarding. *[Directives 2002/95/EC and 2002/96/EC]*
Refrigerant	Fluid used for heat transfer in a mechanical refrigerating system, which absorbs heat at a low temperature and a low pressure of the fluid, and rejects it a higher temperature and a higher pressure of the fluid, usually involving changes of the phase of the fluid. Blends may be used as azeotrope or zeotrope fluids. *[ISO 817:2005]*
End of life	Final stage of the life of equipment. From a military point of view, it can be considered as “end of service life”. Thus, various ways can be used to eliminate equipment like sale, dismantling, and disposal recycling.
Ship Recycling	The activity of complete or partial dismantling of a ship at a Ship Recycling Facility in order to recover components and materials for reprocessing and re-use, whilst taking care of hazardous and other materials, and includes associated operations such as storage and treatment of components and materials on site, but not their further processing or disposal in separate facilities. *[IMO SR Convention:2009]*
Hazardous Material	Any material or substance which is liable to create hazards to human health and/or the environment. *[IMO SR Convention:2009]]*
Inventory of Hazardous Materials (IHM)	This inventory has to be specific to each ship and contains information concerning the establishment, maintenance and monitoring of Safe-for-entry and Safe-for-hot work conditions. The IHM identifies Hazardous Materials listed in Appendices 1 and 2 to the convention and contained in ship’s structure or equipment, their

	location and approximate quantities (part I). The IHM also identifies operationally generated wastes (part II) and stores (part III). *[IMO SR Convention:2009]*
Enclosed spaces	A space, which has any of the following characteristics: limited openings for entry and exit unfavourable natural ventilation and is not designed for continuous worker occupancy. It includes, but is not limited to, cargo spaces, double bottoms, fuel tanks, ballast tanks, pump-rooms, compressor rooms, cofferdams, void spaces, duct keels, inter-barrier spaces, engine crankcases and sewage tanks. *[IMO SR Convention:2009]*
Safe for entry	A space that meets the following criteria: - the oxygen content of the atmosphere and the concentration of flammable vapours are within safe limits; - any toxic materials in the atmosphere are within permissible concentrations; - any residues or materials associated with the work authorized by the Competent person will not produce uncontrolled release of toxic materials or an unsafe concentration of flammable vapours under existing atmospheric conditions while maintained as directed. *[IMO SR Convention:2009]*
Safe for hot work	A space that meets the following criteria: - a safe, non-explosive condition, including gas-free status, exists for the use of electric arc or gas welding equipment, cutting or burning equipment or other forms of naked flame, as well as heating, grinding, or spark generating operations; - safe-for-entry requirements are met; - existing atmospheric conditions will not change as a result of the hot work; - all adjacent spaces have been cleaned, or inerted, or treated sufficiently to prevent the start or spread of fire. *[IMO SR Convention:2009]*
HACCP	The Hazard Analysis and Critical Control Point was introduced in the late 1960s to assure that the food for the manned space flight programme would be safe. It has subsequently been adopted internationally (Codex, 1997) as the basis for food and drink safety and in some cases for engineering and waste treatment (Composting Association, 2003). HACCP requires the producer to consider the intended use of a product and then to assess the hazards that could be associated with that use (or reasonably expected misuse). *[CEN TR 15584:2007]*

8.3) Annex III - Addresses of Standardisation Organisation and Bodies

	LIST OF ADDRESSES OF SOME REGULATION AND STANDARDISATION BODIES – WEB-SITE	
UN	United Nation UN Headquarters First Avenue at 46th Street New York, NY 10017 - USA Web site: www.un.org	
IMO	International Maritime Organization 4, Albert Embankment, London, SE1 7SR - UNITED KINGDOM Web site: www.imo.org Digital edition of IMO News: http://www.imo.org/Newsroom/mainframe.asp?topic_id=1884	
ILO	International Labour Organization 4 route des Morillons, CH-1211 Genève 22 - SWITZERLAND Web site: www.ilo.org	
WHO	World Health Organization Avenue Appia 20 1211 Geneva 27 - SWITZERLAND Web site: www.who.int	
ISO	International Standardisation Organisation Secrétariat central de l'ISO 1, ch. de la Voie-Creuse, Case postale 56 CH-1211 Genève 20 - SWIZERLAND Web site: www.iso.org	
EC	European Commission (representation) rue Archimède, 73 1000 – Brussels - BELGIUM Web site: http://ec.europa.eu	
EMEC	European Maritime Equipment Council Rue Belliard, 159 B-1040 Brussels - BELGIUM Web site: www.emec-marine-equipment.org	
ECHA	European Chemical Agency Annankatu 18 00120 Helsinki - FINLAND Web site: http://echa.europa.eu	

CEN CENELEC	CEN-CENELEC Management Centre Avenue Marnix 17 B-1000 Brussels - BELGIUM Web site: www.cen.eu Web site: www.cenelec.eu	
NATO	NATO Standardization Agency North Atlantic Treaty Organization 1110 Brussels – BELGIUM Web site: http://nsa.nato.int	
EDA EDSIS	European Defence Standards Information System Rue des Drapiers 17-23, B-1050 Brussels, BELGIUM Web site: https://extranet.eda.europa.eu/edsis	
IACS	International Association of Classification Societies Ltd Permanent Secretariat 6th Floor, 36 Broadway London SW1H 0BH - UNITED KINGDOM Web site: www.iacs.org.uk	
DIN	Deutsches Institut für Normung Burggrafenstrasse 6 DE-10787 Berlin - GERMANY Web site: www.din.de Webstore: www.beuth.de	
AFNOR	Association française de normalisation 11 rue Francis de Pressensé FR-93571 La Plaine Saint-Denis Cedex - FRANCE Web site: www.afnor.org Webstore: www.boutique.afnor.org	
AFRA	Aircraft Fleet Recycling Association 2233 Wisconsin Avenue - Suite 503 Washington, DC 20007 - USA Web site: www.afraassociation.org	
AIA	Aerospace Industries Association 1000 Wilson Boulevard - Suite 1700 Arlington, VA, 22209 - USA Web site: www.aia-aerospace.org	
ASD	Aerospace & Defence Association of Europe 270 Avenue de Tervuren	

	B-1150 Brussels BELGIUM Web site : www.asd-europe.org	
FAA	Federal Aviation Administration 800 Independence Avenue, SW Washington, DC 20591 - USA Web site : www.faa.gov	
ICAO	International Civil Aviation Organization 999 University Street, Montréal Quebec H3C 5H7 - CANADA Web site : www.icao.int	

8.4) Annex IV - List of civilian Technical Committees related to WASTE MANAGEMENT

CEN	PERIMETER OF ACTIVITY	COMMENTS
TC 164	Water supply	Potential interest for EG-12
TC 165	Waste water engineering	Informative interest for EG-18
TC 182	Refrigerating systems, safety and environmental requirements	Potential interest for EG-12
TC 183	Waste management	Informative interest for EG-18
TC 233	Biotechnology	Informative interest for EG-18
TC 261	Packaging	Informative interest for EG-18
TC 292	Characterisation of waste	Informative interest for EG-18
TC 300	High sea ships and marine technologies	Priority interest for EG-18
TC 308	Characterisation of sludge	Informative interest for EG-18

ISO	PERIMETER OF ACTIVITY	SUB-COMMITTEES
TC 8	Ships and marine technologies	SC 2 : Marine environmental protection
		SC 3 : Piping and machinery
TC 21	Equipment for fire protection and fire fighting	SC 8 : Gaseous media and fire fighting systems using gas
TC 28	Petroleum products and lubricants	SC 4 : Classifications and specifications
TC 86	Refrigeration and air conditioning	SC 8 : Refrigerants and refrigeration lubricants
TC 104	Freight containers	SC 2 : Specific purpose container
TC 188	Small craft	
TC 207	Environmental management	SC 1 : Environmental management systems (EMS)
		SC 2 : Environmental auditing and related environmental investigations
		SC 3 : Environmental labelling
		SC 5 : Life Cycle Assessment (MCA)
		SC 7 : Greenhouse Gas Management and related activities

NOTA: Other international organisations and/or commissions have also to be considered, because dealing with technical topics directly or not directly linked to the key area *Waste Management*.

	OTHER RELEVANT INTERNATIONAL ORGANISATIONS - SCOPE
IMO	Maritime safety; prevention of pollution from ships; facilitation of international maritime traffic.
ILO	Working conditions and environment; occupational safety and health; equality of treatment between men and women; non-discrimination; rights of tribal and indigenous peoples; employment.
IIR	Tests of thermal performance of insulated vehicles; tests of insulating materials; refrigerated storage and transport of perishable foodstuffs; food freezing; refrigerating equipment; terminology.

WHO	All matters directly or indirectly related to health, including biological and pharmaceutical and similar products and substances, food additives, pesticides, pesticide residues in food, food safety, air and water quality, diagnostic procedures, terminology, nomenclature and classification.

8.5) Annex V - List of relevant IMO Regulations related to WASTE MANAGEMENT

a) Waste issued from ship operational use (oil, oily bilge water, sewage, garbage, anti-fouling paints, ballast water and sediments)

Name: International convention on the MARitime POLlution
Reference: MARPOL Convention
Date: Adoption in 1973-1978 and amendments in 1997
Link to standardisation: IMO Convention
Scope of the document: Marpol 73/78 is one of the most important international conventions covering prevention of pollution of the marine environment by ships. It is a combination of two treaties adopted in 1973 and 1978 respectively (Annex I to V) and also includes the Protocol of 1997 (Annex VI). It was designed to minimize pollution of the sea from operational or accidental causes, including dumping, oil and exhaust pollution. Its stated object is to preserve the marine environment, namely through the complete elimination of pollution by oil and other harmful substances, and the minimization of accidental discharge of such substances. Special Areas with strict controls on operational discharges are included in most annexes (6). It has been updated by several amendments through the last 30 years.
Rationale for selection: This convention is designed for civilian ships and is interesting for military vessels to be closed of this regulation to reduce their pollution and their environmental impact, by having a better management of oily bilge water (annex I), sewage (annex IV), garbage (annex V), air emissions (annex VI). This convention is usually referenced by national classification societies in their own naval rules and guidelines.
How to apply / key points: When requested by Navy Staff Targets and national environmental doctrines avoiding the use of article 3, this document has to be applied in armament contracts (A), with a selection of relevant MEPC resolutions and/or circulars that can be applied for military vessels. These complementary documents notably deal with oily bilge water separators, sewage treatment units, garbage treatment units, and incinerators (see the annex “relevant IMO standards”).

Name: International convention on the control of harmful anti-fouling systems on ships
Reference: AFS Convention
Date: Adoption on 5th of October 2001
Link to standardisation: IMO Convention
Scope of the document: This convention prohibits the use of harmful organo-tins in anti-fouling paints used on ships and establishes a mechanism to prevent the potential future use of other harmful substances in anti-fouling systems (Entry into force: 17 September 2008).
Rationale for selection: This convention is designed for civilian ships and is interesting for military vessels to be closed of this regulation to reduce their pollution and their environmental impact, by having a better management of anti-fouling paints. This convention is usually referenced by national classification societies in their own naval rules and guidelines.
How to apply / key points: When requested by Navy Staff Targets and/or national environmental doctrines avoiding the use of article 3, this document has to be applied in armament contracts (A), with a selection of relevant MEPC resolutions and/or circulars that can be applied for military vessels. . These complementary documents deal with anti-fouling paints (see the annex “relevant IMO standards”).

Name: International convention for the control and management of ships' ballast water and sediments
Reference: BWM Convention
Date: Adoption on 16th of February 2004
Link to standardisation: IMO Convention
Scope of the document: This convention aims to prevent the potentially devastating environmental effects of the spread into the sea of harmful aquatic organisms carried by ships' ballast water (BW) from one region to another (Entry into force: not yet effective). It is organised around 3 main design rules: (D1) about ballast water exchange standard, (D2) about ballast water performance standard, which practically requires the installation of treatment systems, (D3) about the approbation of ballast water management system. The Convention will require all ships to implement a Ballast Water and Sediments Management Plan. All ships will have to carry a Ballast Water Record Book and will be required to carry out ballast water management procedures to a given standard. Existing ships will be required to do the same, but after a phase-in period.
Rationale for selection: This convention is designed for civilian ships and is interesting for military vessels to be closed of this regulation to reduce their pollution and their environmental impact, by having a better management of ballast water and sediments. The convention also intends to address reception facilities. This convention is usually referenced by national classification societies in their own naval rules and guidelines.
How to apply / key points: When requested by Navy Staff Targets and/or national environmental doctrines avoiding the use of article 3, this document has to be applied in armament contracts (A), with a selection of relevant MEPC resolutions and/or circulars that can be applied for military vessels. These complementary documents deal with specific guidelines, namely (G6), (G8) and (G9) standards for ship design, plus (G2) and (G4) standards for BW sampling and BW management plan (see the annex "relevant IMO standards").

b) Waste issued from ship recycling operations (hazardous materials and substances)

Name: International convention for the safe and environmentally sound recycling of ships
Reference: SR Convention
Date: Adoption on 11th of May 2009
Link to standardisation: IMO Convention
Scope of the document: This convention is aimed at ensuring that ships, when being recycled after reaching the end of their operational lives, do not pose any unnecessary risk to human health and safety or to the environment (Entry into force: not yet effective). The Convention intends to address all the issues around ship recycling, including the fact that ships sold for scrapping may contain environmentally hazardous substances (inventory of potentially hazardous materials, such as asbestos, heavy metals, hydrocarbons, ozone-depleting substances and others). It also deals with the recycling facilities and will address concerns raised about the working and environmental conditions at many of the world's ship recycling locations.
Rationale for selection: This convention covers the design, construction, operation and preparation of ships so as to facilitate safe and environmentally sound recycling. It is designed for civilian ships and is interesting for military vessels to be closed of this regulation to reduce their pollution and their environmental impact, by having a better management of their end-of-life and by introducing the concept of ship recycling. This convention shall be referenced by national classification societies in their own naval rules and guidelines.
How to apply / key points: When requested by Navy Staff Targets and/or national environmental doctrines avoiding the use of article 3, this document has to be applied in armament contracts (A), with a selection of relevant MEPC resolutions and/or circulars that can be applied for military vessels. These complementary documents deal with the ship design process for the ship end-of life phase, and also the ship dismantling operation (see the annex "relevant IMO standards").

8.6) Annex VI - List of relevant IMO Standards related to WASTE MANAGEMENT

a) Oil and oily waste

Name: Regulation 12A - Oil fuel tank protection
Reference: Resolution MEPC.141(54)
Date: Adoption on 24th of March 2006
Link to standardisation: IMO MARPOL Convention, Annex I
Scope of the document: This resolution is directly linked to the IMO MARPOL Convention (annex I on Regulations for the Prevention of Pollution by Oil, entered into force 2 October 1983). It establishes some new rules for the design of oil fuel tank boundary lines in order to minimise the impact of accidental oil fuel pollution, in the event of collision or grounding (this edition of a new regulation 12A on oil fuel tank protection might be already integrated inside a new edition of MARPOL Convention, annex I).
Rationale for selection: This resolution is relevant for military vessels to be closed of the MARPOL convention to reduce their pollution and their environmental impact. It has to be used for a better protection of oil fuel tanks, in order to reduce any risk of accidental pollution and environmental impact, in the event of collision or grounding.
How to apply / key points: This resolution is specific to naval systems and is usually referenced by classification societies in their own naval rules and guidelines. It has to be applied in armament contracts (A) for any new ship design. A choice has to be made about the compliance demonstration (the analytic method or the probabilistic method).

Name: Revised guidelines and specifications for pollution prevention equipment for machinery spaces bilges of ship
Reference: Resolution MEPC.107(49)
Date: Adoption on 18th of July 2003
Link to standardisation: IMO MARPOL Convention, Annex I
Scope of the document: This resolution is directly linked to the IMO MARPOL Convention (annex I on Regulations for the Prevention of Pollution by Oil, entered into force 2 October 1983). It gives some clear requirements for the pollution prevention equipment to be approved with emulsified oily bilge water.
Rationale for selection: This resolution is relevant for military vessels to be closed of the MARPOL convention to reduce their pollution and their environmental impact, by having a better management of oily bilge water. It gives some clear requirements about the performances for the oily water separator (discharge < 15 ppm of oil) and the oil content monitor (data storage during 18 months) that have to be installed on board ships and that have to be approved.
How to apply / key points: This resolution is specific to naval systems and is usually referenced by classification societies in their own naval rules and guidelines. It has to be applied in armament contracts (A) for any new ship design, or during retrofit in case of any new installation of an oily bilge water separator fitted on or after 1 January 2005 to ships, the keel of which were laid or which were at a similar stage construction before 1 January 2005 in so far as is reasonable and practicable. The performances that are requested for the oily bilge water management (testing standards on discharges at sea) and the use of the IMO standardised mixture of oily water that is recommended are minimum requirements.

Name: Revised guidelines for systems for handling oily wastes in machinery spaces of ships incorporating

guidance notes for an integrated bilge water treatment system (IBTS)
Reference: MEPC.1/Circular.642
Date: Adoption on 12th of November 2008
Link to standardisation: IMO MARPOL Convention, Annex I
Scope of the document: This circular has to be regarded as guidance in achieving an efficient and effective system for the handling of oily bilge water and oily residues. It supersedes the circular MEPC.1/Cir.511 of 18th April 2006 (improvement of definitions about oil residues, change in the calculation formula for the size of tanks, minor changes in the flow diagram of IBTS). The following practices are described: collection and storage of oily wastes, size and arrangements for oily residues (sludge) and oily bilge water tanks, pumping, piping and discharge systems in machinery spaces, systems for separated sludge, and example of an on-board system for oil sludge incineration. A typical flow diagram of IBWTS is given as example.
Rationale for selection: This circular is relevant for military vessels to be closed of the MARPOL convention to reduce their pollution and their environmental impact, by having a better management of oily bilge water. Particularly, the concept of integrated bilge water treatment system (IBWTS) is necessary for minimising the amount of oily bilge water and for a better management of oil residue (sludge).
How to apply / key points: This circular is specific to naval systems. It may be considered as guidance (G) and has be known for any new ship design, particularly the IBTS flow diagram to be used by ship-builders.

Name: Harmonised implementation of the revised guidelines and specification for pollution prevention equipment for machinery space bilges of ships during the type approval process
Reference: MEPC.1/Circular.643
Date: Adoption on 12th of November 2008
Link to standardisation: IMO MARPOL Convention, Annex I
Scope of the document: This circular has to be considered as a clarification about particular issues and interpretations issued from the resolution MEPC.107 (49), in order to be sure that approval of the equipment will be based on a uniform high level application and that appropriate guidance is provided.
Rationale for selection: This circular is relevant for military vessels to be closed of the MARPOL convention to reduce their pollution and their environmental impact, by having a better management of oily bilge water, particularly for the choice of the oily water separator and the oil content monitor.
How to apply / key points: This circular is specific to naval systems. It may be considered as guidance (G) and used for any new ship design. It has to be used for the approval process of oily bilge water separators and oil content monitors installed on board ships.

b) Waste water (sewage…)

Name: Revised guidelines on implementation of effluent standards and performance tests for sewage treatment plants
Reference: Resolution MEPC.159(55)
Date: Adoption on 13th of October 2006
Link to standardisation: IMO MARPOL Convention, Annex IV
Scope of the document: This resolution is directly linked to the IMO MARPOL Convention (annex IV on Prevention of Pollution by Sewage from Ships, entered into force 27 September 2003). This resolution is intended to establish programs for testing the performance of the sewage treatment plant for approval.

Rationale for selection: This resolution is relevant for military vessels to be closed of the MARPOL convention to reduce their pollution and their environmental impact, by having a better management of sewage. It gives some clear requirements about the performances for the sewage treatment plants (CF, TSS, DBO_5, DCO, pH) installed on board ships and that have to be approved.
How to apply / key points: This resolution is specific to naval systems and is usually referenced by classification societies in their own naval rules and guidelines. It has to be applied in armament contracts (A) for any new ship design or during a retrofit, in case of any new sewage treatment plant installed on board on or after 1 January 2010. The performances that are requested for any sewage management system (testing standards on discharges at sea) are minimum requirements.

Name: Guidelines for the operation, inspection and maintenance of ship sewage systems
Reference: Circular MSC.648
Date: Adoption on 6th of June 1994
Link to standardisation: IMO MARPOL Convention, Annex IV
Scope of the document: This circular is directly linked to the IMO MARPOL Convention (Annex IV on Prevention of Pollution by Sewage from Ships, entered into force 27 September 2003). This circular is intended to give safety recommendations for the design and the use of sewage storage and treatment system (safety parameters, ventilation arrangements, operational aspects …).
Rationale for selection: This circular highlight the potential danger associated with the sewage systems (if they are not installed, operated and maintained properly) and gives some essential safety recommendations for the design and a better use of sewage storage and treatment system on board ships. The main risk to be managed is the production of highly toxic gases to human, including hydrogen sulphide (H_2S).
How to apply / key points: This circular is specific to naval systems and is more and more referenced by standardization organisations, shipbuilders and ship owners. On a voluntary basis, the general principles given by this circular have to be applied in armament contracts (A) for any new ship design or during a retrofit, in case of any modification on the existing sewage collect, storage and/or treatment systems.

c) Garbage (plastic and non-plastic waste)

Name: Guidelines for the development of garbage management plans
Reference: MEPC Circular.317
Date: Adoption on 10th of July 1996
Link to standardisation: IMO MARPOL Convention, Annex V
Scope of the document: This circular is directly linked to the IMO MARPOL Convention (annex V on Prevention of Pollution by Garbage from Ships, entered into force 31 December 1988) and particularly to the regulation 9 requiring the existence of a garbage management plan (GMP) and a garbage record book (GRB). It lists some essential matters to be addressed (responsibilities and procedures for collecting, processing, storing and disposing of garbage, such as domestic, operational, food and maintenance waste).
Rationale for selection: This circular is relevant for military vessels to be closed of the MARPOL convention to reduce their pollution and their environmental impact, by having a better management of garbage to assist ship-owners and/or operators in the implementation of MARPOL convention. This circular has to be used for every ship of 400 tons of gross tonnage and above certified to carry 15 persons and more.
How to apply / key points: This circular is specific to naval systems. It may be considered as guidance (G) and used for any new ship design. The descriptive technical information that is given by any shipbuilder about a shipboard garbage management system has to be used by ship owners for establishing the final

garbage management plan and the garbage record book.

Name: Standard specification for shipboard incinerators
Reference: Resolution MEPC.76(40)
Date: Adoption on 25th of September 1997
Link to standardisation: IMO MARPOL Convention, Annex V
Scope of the document: This resolution is directly linked to the IMO MARPOL Convention (annex V on Prevention of Pollution by Garbage from Ships, entered into force 31 December 1988) and updates appendix 2 of resolution MEPC.59(33) on revised guidelines for the implementation of Annex V (1992). It lists some essential requirements for the design of incinerators and their good running (materials and manufacture, operating requirements and controls, emission standard, incinerators integrated with heat recovery units, flue gas temperature, documentation, tests, certification, marking …) and the conditions of their approval.
Rationale for selection: This resolution is relevant for military vessels to be closed of the MARPOL convention to reduce their pollution and their environmental impact, by having a better management of garbage. This resolution has to be used when there are incinerators on board ships.
How to apply / key points: This resolution is specific to naval systems and is usually referenced by classification societies in their own naval rules and guidelines. It has to be applied in armament contracts (A) for any new ship design or during a retrofit in case of any new installation of incinerator. The performances that are requested for any garbage incineration system are minimum requirements.

Name: Amendments to the revised guidelines for the implementation of Annex V
Reference: Resolution MEPC.92(45)
Date: Adoption on 5th of October 2000
Link to standardisation: IMO MARPOL Convention, Annex V
Scope of the document: This resolution is directly linked to the IMO MARPOL Convention (annex V on Prevention of Pollution by Garbage from Ships, entered into force 31 December 1988) and proposes a new table 2 "*options for shipboard handling and disposal of garbage*".
Rationale for selection: This resolution is relevant for military vessels to be closed of the MARPOL convention to reduce their pollution and their environmental impact, by having a better management of garbage. This update of the MARPOL Convention might be already integrated inside a recent edition of MARPOL Convention, annex V.
How to apply / key points: This resolution is specific to naval systems. It has to be applied in armament contracts (A) for any new ship design or during a retrofit in case of any new installation.

Name: Amendments to the standard specification for shipboard incinerators
Reference: Resolution MEPC.93(45)
Date: Adoption on 5th of October 2000
Link to standardisation: IMO MARPOL Convention, Annex V
Scope of the document: This resolution is directly linked to the IMO MARPOL Convention (annex V on Prevention of Pollution by Garbage from Ships, entered into force 31 December 1988). It updates resolution MEPC.76(40). The capacity of incinerators on board ships is increased up to 1500 kW.
Rationale for selection: This resolution is relevant for military vessels to be closed of the MARPOL

convention to reduce their pollution and their environmental impact, by having a better management of garbage. This resolution has to be used when there are high capacity incinerators on board ships, for which the design and operation guidelines described in resolution MEPC.76(40) are applicable.
How to apply / key points: This resolution is specific to naval systems. It has to be applied in armament contracts (A) for any new ship design or during a retrofit in case of any new installation.

d) Anti-fouling paints

Name: International convention on the control of harmful anti-fouling systems on ships - Guidance on best management practices for removal of anti-fouling coating from ships, including TBT hull paints.
Reference: Circular.3
Date: Adoption on 22nd of July 2009
Link to standardisation: IMO AFS Convention
Scope of the document: This circular is guidance on Best Management Practices (BMP) for removal of anti-fouling coatings from ships. These BMP include 2 mains techniques: source-control methods and collection, filtration and treatment methods (removal techniques: scrapping, blasting, water washing). A bibliography of recommended sources for BMPs is included.
Rationale for selection: This resolution is relevant for military vessels to be closed of the AFS convention to reduce their pollution and their environmental impact, by having a better management of anti-fouling paints, particularly during ship maintenance and ship end-of-life phases.
How to apply / key points: This resolution is specific to naval systems. It may be considered as guidance (G) and used during any ship maintenance and/or ship end-of-life operation.

e) Ballast water and sediments

Name: Guidelines for ballast water management and development of ballast water management plans (G4)
Reference: Resolution MEPC.127(53)
Date: Adoption on 22nd of July 2005
Link to standardisation: IMO BWM Convention
Scope of the document: This resolution is directly linked to the IMO BWM Convention on the Control and Management of Ships' Ballast Water and Sediments, 2004, not yet entered into force. It aims to prevent, minimise and eventually eliminate the risk of introducing harmful aquatic organisms and pathogens from ship's ballast water and sediment that contain. This resolution describes the guidelines for ballast water management (ship operational procedures, recording procedures, training …) and guidelines for establishing ballast water management plans (a standard format is given in annex).
Rationale for selection: This resolution is relevant for military vessels to be closed of the BWM convention to reduce their pollution and their environmental impact, by having a better management of ballast water and sediments. It provides guidance on general principles for the management of ballast water and the indications on the structure and content on management plans for ballast water prescribed by the convention.
How to apply / key points: This resolution is specific to naval systems. It may be considered as guidance (G) and used for any new ship design or during a retrofit in case of any major conversion. The descriptive technical information that is given by any shipbuilder about a shipboard ballast water management system has to be used by ship owners for establishing the final ballast water management plan and the record book.

Name: Guidelines for ballast water exchange (G6)

Reference: Resolution MEPC.124(53)
Date: Adoption on 22nd of July 2005
Link to standardisation: IMO BWM Convention
Scope of the document: This resolution is directly linked to the IMO BWM Convention on the Control and Management of Ships' Ballast Water and Sediments, 2004, not yet entered into force. It gives some general guidelines for the development of procedures for the ballast water exchange, with the dedicated safety precautions on the basis of three methods (sequential method, flow-through method, dilution method).
Rationale for selection: This resolution is relevant for military vessels to be closed of the BWM convention to reduce their pollution and their environmental impact, by having a better management of ballast water and sediments. It has to be used by all of those concerned by the ballast water exchange, including the owners and ship operators, designers, classification societies and shipbuilders.
How to apply / key points: This resolution is specific to naval systems. It may be considered as guidance (G) and used only for new ships constructed after 2009, but before 2012, with a ballast water capacity of 5.000 m^3 or more. This resolution has not to be used for any new ships constructed after 2012, with a ballast water capacity of 5.000 m^3 or more, for which a ballast water treatment will be required: rules (G8) or (G9).

Name: Guidelines for approval of ballast water management systems (G8)
Reference: Resolution MEPC.174(58)
Date: Adoption on 10th of October 2008
Link to standardisation: IMO BWM Convention
Scope of the document: This resolution is directly linked to the IMO BWM Convention on the Control and Management of Ships' Ballast Water and Sediments, 2004, and updates resolution MEPC.125(53). These guidelines contain recommendations on design, installation, performance, testing the acceptability, and the approval of environmental management systems for ballast water.
Rationale for selection: This resolution is relevant for military vessels to be closed of the BWM convention to reduce their pollution and their environmental impact, by having a better management of ballast water and sediments. It ensures the appropriate application of standards mentioned in the BWM Convention.
How to apply / key points: This resolution is specific to naval systems. It has to be applied in armament contracts (A) for any new ship design or during a retrofit in case of any major conversion. It gives exhaustive guidelines that have to be used by the manufacturers and known by the shipbuilders and the ship owners.

Name: Procedures for approval of ballast water management systems that make use active substances (G9)
Reference: Resolution MEPC.169(57)
Date: Adoption on 4th of April 2008
Link to standardisation: IMO BWM Convention
Scope of the document: This resolution is directly linked to the IMO BWM Convention on the Control and Management of Ships' Ballast Water and Sediments, 2004. It describes the conditions for the approval of ballast water management systems that use active substances. Moreover, these procedures aim at determining the acceptability of active substances and preparations containing one or more active substances (risk characterization, evaluation criteria, regulation of the use of active substances and preparations …).
Rationale for selection: This resolution is relevant for military vessels to be closed of this BWM convention to reduce their pollution and their environmental impact, by having a better management of ballast water and sediments. It allows knowing the requirements for approval of active substances in the system for managing

ballast water.
How to apply / key points: This resolution is specific to naval systems. It has to be applied in armament contracts (A) for any new ship design or during a retrofit in case of any major conversion. It gives exhaustive guidelines that have to be used by the manufacturers and known by the shipbuilders and the ship owners.

f) Waste issued from ship operational use (oily bilge water, sewage, garbage …)

Name: Guide to good practice for port reception facility providers and users
Reference: MEPC.1/Circular.671
Date: Adoption on 20th of July 2009
Link to standardisation: IMO Convention
Scope of the document: This circular is directly linked to the IMO MARPOL Convention on the Prevention of Pollution from Ships. It provides a basis for establishing best practice procedures, with the objective of improving the integration of Port Reception Facilities (PRF) into a more comprehensive waste management scheme that avoids any inadequacy (undue delay, lack of safety, pollution, …) and in which final disposal of MARPOL residues/wastes occurs in a manner that protects the environment, with due regard for the health and safety of workers and the general population. It gives additional information (list of relevant web sites).
Rationale for selection: This circular is relevant for military vessels and ship-to-shore facilities in naval bases to be closed of the MARPOL convention to reduce their pollution and their environmental impact. For its implementation and particularly for a better efficient delivery of residues and waste ashore, the need for a brief guide of good practices has been considered as necessary for crews and port reception facility (PRF) providers.
How to apply / key points: This circular is specific to naval systems. It may be considered as guidance (G) and has to be used by ship masters, ship owners and operators. This document refers to ISO 21070 for the management and handling of shipboard garbage (that has been identified as BPS inside this report) and deals with BPS directly linked to the minimization of waste, their segregation, their treatment, their storage.

g) Waste issued from ship recycling operations (hazardous materials and substances)

Name: Guidelines for the development of the inventory of hazardous materials
Reference: Resolution MEPC.179(59)
Date: Adoption on 17th of July 2009
Link to standardisation: IMO SR Convention
Scope of the document: This resolution is directly linked to the IMO SR Convention on the safe and environmentally sound recycling of ships, 2009. It provides recommendations for establishing the Inventory of Hazardous Materials (IHM) that aims to provide specific information regarding ship hazardous materials that are actually on board (requirements for the inventory and the development of Parts I-II-III of the inventory, material declaration, supplier's declaration of conformity).
Rationale for selection: This resolution is relevant for military vessels to be closed of the SR convention to reduce their pollution and their environmental impact during the ship end-of-life. The objective is to protect the health and safety of the workers and to prevent pollution of the environment in recycling facilities.
How to apply / key points: This resolution is specific to naval systems. It has to be applied in armament contracts (A) for any new ship design or during a retrofit for any new installation or modification. The knowledge and use of this document may present a potential interest for air and land systems that wish to establish inventories of hazardous materials for aircraft and land vehicles.

Name: Recommendations for entering enclosed spaces aboard ships
Reference: Resolution A.864(20)
Date: Adoption on 5th of December 1997
Link to standardisation: IMO SR Convention
Scope of the document: This resolution intends to complement national laws and regulations, standards or procedures, which may exist for specific ships. It gives an exhaustive information about essential general precautions before and during any entry, some recommendations for testing the quality of the atmosphere, and additional precautions when the atmosphere is known or suspected to be unsafe.
Rationale for selection: This resolution is relevant for ship-owners, ship-repairers and ship recyclers, during the ship maintenance and ship end-of-life (these operations generate waste). The objective is to avoid accidents on board ships that are in most cases caused by an insufficient knowledge of the need to take precautions rather than a lack of guidance, and finally to protect the health and safety of maintenance and dismantling personnel. These recommendations are complementary to those given by circular MSC.1084.
How to apply / key points: This resolution is specific to naval systems. It may be considered as guidance (G) and used during any ship maintenance and/or ship end-of-life operation. In practice, this resolution contents an example of an enclosed space entry permit to be used by any person entering such a space.

Name: Principles for hot work on board all types of ships
Reference: Circular MSC.1084
Date: Adoption on 13th of June 2003
Link to standardisation: IMO SR Convention
Scope of the document: This circular provides sufficient guidance in the development of hot work on-board instructions and guidance, only limited to the identification and listing of basic principles, based on best industry practices (responsibility, permit-to-work, safety and health rules, fire safety precautions …).
Rationale for selection: This circular is relevant for ship-owners, ship-repairers and ship recyclers, during the ship maintenance and end-of-life. The objective is to protect the health and safety of maintenance and dismantling personnel. These recommendations are complementary to those given by resolution A.864(20).
How to apply / key points: This circular is specific to naval systems. It may be considered as guidance (G) and used during any ship maintenance and/or ship end-of-life operations that usually generate waste. This circular has to be incorporated in a safety management system (SMS). It gives a user-friendly and not detailed list of common principles, as set out in annex, applicable to hot work situations on board all types of ships, which ship-owners, ship-operators, shipmasters, ship-repairers, ship-recyclers, and auditors could keep in mind when developing specific on-board instructions to suit their operational needs.

Name: Guidelines for the development of the ship recycling plan
Reference: Circular MEPC.419
Date: Adoption on 12th of November 2004
Link to standardisation: IMO SR Convention
Scope of the document: This circular is directly linked to the first IMO guidelines on ship recycling and particularly resolution A.962(23) introducing the "*green passport*" and recommending the development and the implementation of a ship recycling plan (SRP). This SRP may be defined as a set of guidelines by which the ship recycling facility and the ship-owner can ensure an understanding of the process that will be used for

the recycling of a ship. It also takes into account the potential hazards which may arise during the recycling operation, the relevant national and international requirements and the facilities available at the recycling facility in terms of materials, handling and the disposal of any wastes generated during the recycling process.
Rationale for selection: The objective is to protect the worker health and safety, and to prevent pollution of the environment in recycling facilities on ship. An update of this circular ought to be produced soon.
How to apply / key points: This circular is specific to naval systems. It may be considered as guidance (G) and used during any ship end-of-life operation. The SRP has to include the 3 following plans: - a worker *Safety and Health Plan* (SHP), about diving operations, confined enclosed spaces, fire prevention and protection, health and sanitation, communication of hazards, personal protective equipment, employee emergency plan, … - an *Environmental Compliance Plan* (ECP), about the recycler's abilities to recycle ships and dispose of resulting materials (including potentially hazardous materials management procedures: fuel, lubricants coolants, waste water, sludge, harmful aquatic organisms, paints, environmental monitoring …), - an *Operational Plan* (OP), about the procedures to accomplish hazardous/regulated materials handling during the cutting process and the step-by-step method for recycling the vessel, including hazardous regulated material identification and remediation.

8.7) Annex VII - List of relevant EC Regulations related to WASTE MANAGEMENT

Waste issued from ship operational use (oil, oily bilge water, sewage, garbage, ballast water and sediments …)

Name: Marine Equipment Directive (MED)
Reference: Directive 96/98/EC and its amendments
Date: Adoption on 20th of December 1996
Link to standardisation: EC Legislation
Scope of the document: The purpose of this directive (and its 8 amendments) is to enhance safety at sea and the prevention of marine pollution through the uniform application of the relevant international instruments related to equipment to be placed on board ships to ensure the free movements of such equipment within Europe and to eliminate differences in the implementation of international standards and unnecessary costs. A specific mark has been created to indicate its compliance with the requirement of this directive.
Rationale for selection: This directive is relevant for military vessels to be closed of the MARPOL convention to reduce their pollution and their environmental impact. It contents an item dealing with "*Marine pollution prevention*" listing equipment for which detailed testing standards exist in international instruments and have to be used during a ship design process for shipboard waste management (oily bilge water, sewage, garbage).
How to apply / key points: This directive is specific to naval systems. Only if a national MoD decides not using the exemption (article 3), this standard has to be applied in armament contracts (A) for any new ship design or during a retrofit in case of any new installation (in compliance with the MARPOL convention).

Name: Port reception facilities for ship-generated waste and cargo residues
Reference: Directive 2000/59/EC and its amendments
Date: Adoption on 27th of November 2000
Link to standardisation: EC Legislation
Scope of the document: The purpose of this directive (and its 3 amendments) is to reduce the discharges of ship-generated waste and cargo residues into the sea, especially illegal discharges by improving the availability and use of port reception facilities for ship-generated waste and cargo residues (waste reception and handling plans, delivery of ship-generated waste).
Rationale for selection: This directive is relevant for military vessels to be closed of the MARPOL convention to reduce their pollution and their environmental impact. It gives a good knowledge of what is required for port reception facilities for the shore management of ship-generated waste and cargo residues.
How to apply / key points: This directive is specific to naval systems. Only if a national MoD decides not using the exemption (article 9), this standard has to be applied in armament contracts (A) for any new ship design. Before any ship design process, the shipbuilders have to know the requirements given in annex 1 for waste reception and handling plans in European ports. The ship-owners have to use the formula given in annex 2 before entry into a European port.

8.8) Annex VIII - List of relevant NATO Standards related to WASTE MANAGEMENT

Waste issued from ship operational use (oily bilge water, sewage, garbage, food waste, ballast water and sediments)

Name: Joint NATO waste management requirements during NATO LED military activities (edition 2).
Reference: STANAG-2510
Date: Adoption in December 2008
Link to standardisation: NATO Military Committee (MC)
Scope of the document: The aim of this military standard is to state the joint requirements for NATO Waste Management (WM) during NATO-led military activities. This agreement deal with the general principles of waste management, the responsibilities, the planning factor for waste management, the waste management plan, hazardous waste, and waste disposal options. An edition 3 is under approval and ratification.
Rationale for selection: This military standard covers a large range of environmental affairs. It refers to Basel convention, European directives 91/689/EC (hazardous waste) and 2006/12/EC (waste), and European regulation 1013/2006 (shipments of waste). It got chapters for residual and recyclable waste, for hazardous waste and especially for HCW, all type of waste, which exists on most Navy ships. A link is also made to an old STANAG-2982 (essential field sanitary requirements) that might be updated and to the use of ISO containers. Due to these references to legislative and operational links, this standard may be selected as BPS.
How to apply / key points: This military standard may have an informative interest for air, land and naval systems. It may be considered as guidance (G) because it is more relevant for military forces in operation.

Name: NATO Glossary on environmental protection (edition 1)
Reference: STANAG-2545
Date: Adoption in November 2009
Link to standardisation: NATO Military Committee (MC)
Scope of the document: This military standard lists special terms and definitions of environmental protection (general terms, environmental management, waste, wastewater...) and introduces the European Waste Catalogue (EWC).
Rationale for selection: This military standard refers to NATO MC doctrines, STANAG-7141, STANAG-2510, and also ISO 14001 standards. The knowledge of this standard is essential to any armament manager for a better understanding of terms and definitions linked to the key area *Waste Management*.
How to apply / key points: This military standard may have an interest for air, land and naval systems. The use of this military standard is currently relevant, but as guidance (G). A web site with similar data shall replace this military standard.

Name: NATO pollutant discharge connection for sewage and oily water (edition 1)
Reference: STANAG-4167
Date: Adoption in October 1983
Link to standardisation: NATO Military Committee (MC)
Scope of the document: This military standard gives some technical requirements about bore adapters for

discharging oily bilge water and sewage to shore facilities or auxiliary craft in NATO Navy port (deck connection to be compatible with IMCO polluted fluid flange fitting and NATO quick-disconnect fluid coupling.
Rationale for selection: This military standard has already been identified by EG-12 "*Fluid Handling*", but EG-18 also proposed it as a *Best Practice Standard* (BPS) for the key area *Waste Management*.
How to apply / key points: This military standard is specific to naval systems and ship-to-shore facilities in naval bases. It has to be applied in armament contracts (A) for any new ship design, due to some technical interoperability reasons (any deck connection has to be compatible with the IMCO flanged fitting or the NATO quick-disconnect coupling which must be adaptable to the IMCO flanged fitting).

Name: Method of detection and treatment of fuels contaminated by micro-organisms (edition 2)
Reference: STANAG-7063
Date: Adoption in December 2008
Link to standardisation: NATO Military Committee (MC)
Scope of the document: This military standard describes the rules to apply in order to protect the equipment against the consequences of a bio-contamination of fuels and to standardise detection tests and the use of biocidal additives (preventive and curative actions).
Rationale for selection: This military standard contains interoperability requirements and good practices to be adopted for aircraft, vehicles or Navy vessels. It has been selected by EG-18 (a contaminated fuel may become waste), but might be identified by EG-12 "*Fluid Handling*" as a BPS for managing marine oil fuel.
How to apply / key points: This military standard may have an interest for air, land and naval systems. It may be considered as guidance (G) for any new armament systems fitted with fuel capacities, such as ships.

Name: Environmental protection handling requirements for petroleum handling facilities and equipment (edition 1)
Reference: STANAG-7102
Date: Adoption in August 2005
Link to standardisation: NATO Military Committee (MC)
Scope of the document: The aim of this military standard is to protect national environmental resources and comply with national environmental legislation by establishing technical standards and procedures to alloy deploying national units to construct, operate and maintain fixed and mobile jet fuel storage and fuel handling equipment while deployed to another nation.
Rationale for selection: This military standard has already been identified by EG-12 "*Fluid Handling*", but may also be identified by EG-18 (within a global eco-design approach).
How to apply / key points: This military standard may have an interest for air, land and naval systems. It may be considered as guidance (G).

Name: Joint NATO doctrine for environmental protection during NATO LED military activities (edition 5)
Reference: STANAG-7141
Date: Adoption in February 2008
Link to standardisation: NATO Military Committee (MC)

Scope of the document: This military standard describes the NATO environmental doctrine (planning, risk management), commander's environmental responsibilities, environmental training and education, and a list of national military points of contact for environmental matters.
Rationale for selection: This military standard refers to MARPOL convention, AMEPP publications, NATO MC doctrines and ISO 14000 series.
How to apply / key points: This military standard may have an informative interest for air, land and naval system. It may be considered as guidance (G) because it is more relevant for military forces in operation.

8.9) Annex IX - List of relevant CEN Standards related to WASTE MANAGEMENT

a) Liquid waste (oil and oily water, sewage and grey water, ballast and sediments)

Name: Water quality - Determination of hydrocarbon oil index
Reference: EN ISO 9377
Date: Adoption in October 2000
Link to standardisation: CEN
Scope of the document: This standard deals with 2 methods for the sampling and the determination of hydrocarbon oil index: a method using solvent extraction and gravimetry (Part 1) and a method using solvent extraction and gas chromatography (Part 2). The method is suitable for drinking water, surface water, waste water and water from sewage treatment plants and allows the determination of hydrocarbon oil index in concentrations above 0,1 mg/1 (it does not apply to the quantitative determination of the content of volatile mineral oil). This standard has been prepared by a technical committee from ISO that produced ISO 9377 (October 2000). National transpositions exist, such as standard DIN EN ISO 9377 Part 2 (July 2001).
Rationale for selection: Part 2 of the ISO standard is directly linked to MARPOL Convention Annex I and is directly requested by resolution MEPC.107(49) for the measurement of the hydrocarbon oil content in samples of effluent taken during the test period. Part 1 is not used.
How to apply / key points: This standard is specific to naval systems due to its reference to an IMO MEPC resolution. It has to be applied in armament contracts (A) and has to be used during trials, for any new ship design, or during retrofit for any new installation. This standard has to be used at each time an oily bilge water separator is tested on shore and/or on board, for which a chemical analysis is required for knowing the quality of the oily bilge water to be treated and/or the quality of the permeate after the treatment (hydrocarbon oil index). On the basis of the peak pattern of the gas chromatogram (part 2), some qualitative information on the composition of the mineral oil contamination can be derived.

Name: Small craft - Bilge pumping systems
Reference: EN ISO 15083
Date: Adoption in February 2003
Link to standardisation: CEN
Scope of the document: This standard applies to small craft of hull length up to 24 m. It gives a set of requirements for the design, construction and installation of bilge pumping systems or other means to be used to control the normal accumulation of water in holds on small boats. It does not establish the requirements for bilge pumps or bilge-pumping systems used to control water resulting from damage to the boat. This standard has been prepared by the technical committee TC 188 "*Small craft*" from ISO. National transpositions exist, such as standard NF EN ISO 15083 from AFNOR (July 2003).
Rationale for selection: This standard is relevant for the design requirements dealing with the bilge pumping on board small crafts, considering that some military Navies may have a need for such small crafts.
How to apply / key points: This standard is specific to naval systems. It may be considered as guidance (G) and has to be known for any new small craft design. This standard contains accurate recommendations for the ship builders (number, location and capacity of bilge pumps) and for ship owners (information to be provided in the owner's manual). Some terms and definitions related to bilge pumping are also available.

Name: Small craft - Toilet waste retention systems

Reference: EN ISO 8099
Date: Adoption in December 2000
Link to standardisation: CEN
Scope of the document: This standard applies to small craft of hull length up to 24 m. It gives a set of requirements for the design, construction and installation of systems for temporary retention of sewage for subsequent disposal. Particularly, it gives some drawings about the nominal design of pump-out fitting (with the associated symbol) and 2 examples on typical installations for toilet retention system (deck pump-out and overboard discharge capability). This standard has been prepared by the technical committee TC 188 "*Small craft*" from ISO that produced ISO 8099 (December 2000) and supersedes EN 24567 (December 1989). National transpositions exist, such as standards BS EN ISO 8099 (March 2001), NF EN ISO 8099 from AFNOR (April 2001) and DIN EN ISO 8099 (July 2001).
Rationale for selection: This standard is relevant for the design requirements dealing with the retention of sewage on board small crafts, considering that some military Navies may have a need for such small crafts.
How to apply / key points: This standard is specific to naval systems. It may be considered as guidance (G) and has to be known for any new small craft design. This standard contains accurate recommendations for the ship builders (design of fixed and portable holding tanks: materials, venting systems) and for ship owners (use of the owner's manual). Some terms and definitions related to bilge pumping are also available.

Name: Characterisation of sludge - Good practice for landfilling of sludge and sludge treatment residues
Reference: TR 15126
Date: Adoption in July 2005
Link to standardisation: CEN
Scope of the document: Among the sludge management options, this standard gives some recommendations for good practices concerning the sludge disposal by landfilling (sludge issued from urban wastewater and water supply treatment plants) and the sludge treatment residues. The technical committee TC 308 "*Characterisation of sludge*" from CEN has drawn up this standard which is voluntarily presented in the form of a technical report (TR).
Rationale for selection: Even if most of these recommendations are not completely in line with practices and regulations in each Member State, this standard may have a relevant interest for a better understanding of sludge management processes (particularly the aerobic degradation, the anoxic conditions …). Armed forces (Navy vessels or Army bases) operating wastewater biological treatment systems (biological reactor) that produce sludge as residues, have to know that, in its untreated state, sludge is initially in liquid form with a low consistency (dry solids content around 2 %), odorous and contains pathogens and contaminants. Sludge has to be managed by using safe and clean processes (particularly regarding H_2S gaseous emissions).
How to apply / key points: This standard is informative for naval and/or land systems. It may be considered as guidance (G) and has to be known by the stakeholders if such residues are produced (some general data are given about the microbiological activity and the sanitary and environmental aspects). It is notably the case of the vessels for which an Integrated Waste Management System (IWMS) is requested (temporally storage of sludge, before its discharge or its incineration, if an incinerator is available on board) or the case of armed forces land bases (sludge delivery, sludge containment …). A bibliography is given in annex.

Name: Characterisation of sludge - Good practice for sludges drying
Reference: TR 15473
Date: Adoption in September 2007

Link to standardisation: CEN
Scope of the document: Among the sludge management options, this standard describes good practices for drying sludge coming from waste water treatment plants. The technical committee TC 308 "*Characterisation of sludge*" from CEN has drawn up this standard which is voluntarily presented in the form of a technical report (TR).
Rationale for selection: Even if most of these recommendations are not completely in line with practices and regulations in each Member State, this standard has a relevant interest for a better understanding of sludge management solutions, particularly safety considerations for their drying before their incineration, energy recovery or their disposal by landfilling (sludge characterisation with respect to fire and explosion risk, characteristics of dried sludge products). Ship builders of Navy vessels fitted with an integrated waste management system (IWMS), that includes a biological reactor producing sewage sludge and an incinerator for destroying garbage and other residues such as this sludge, have to consider these recommendations.
How to apply / key points: This standard may have a relevant interest for naval and/or land systems. It may be considered as guidance (G) and has to be known by the ship builders for the design and/or the purchase of sludge dryers. Some examples of sludge thermal treatment processes (dryers) are given. A bibliography is given in annex.

Name: Characterisation of sludge - Guide to risk assessment especially in relation to use and disposal of sludge
Reference: TR 15584
Date: Adoption in July 2007
Link to standardisation: CEN
Scope of the document: Within the sludge management options, such as those described in the technical reports TR 15126 and 15473, this standard describes the methodologies of risk assessment, risk management and risk communication especially in relation to use and disposal of sludge. It includes sludge from treating municipal, industrial and food processing wastewaters, sludge from treating raw water to make it potable, and other residues having similar potential environmental impacts. The technical committee TC 308 "*Characterisation of sludge*" from CEN has prepared this standard which is voluntarily presented in the form of a technical report (TR).
Rationale for selection: The knowledge of this standard is relevant for a better knowledge of sludge, risk assessment and safety aspects. Sludge is the inevitable residue of treating raw potable water and municipal and industrial wastewaters, and sludge may also contain surplus biomass cultured during biological treatment processes. The objective of treatment is to avoid adverse impacts on the environment and human health when the effluent is discharged into the environment or water is supplied for human consumption.
How to apply / key points: This standard may have an informative interest for naval and/or land systems. It may be considered as guidance (G) and has to be known by the stakeholders (its purpose is addressed to an audience of specialists as well as non-specialists). Particularly, the use of the "*Hazard Analysis and Critical Control Point* (HACCP)" may be recommended (HACCP may be understood as a pragmatic approach for managing the risks of sludge use and disposal). This standard also contents several informative annexes (glossary of acronyms commonly used in risk assessment, extended text on risk assessment, communication and management, fault tree analysis), even if it deals with terrestrial applications (these recommendations need to be adapted to each military context : use at sea, use on shore). A bibliography is given in annex.

Name: Ship and marine technology - Drainage systems on ships and marine structures (5 parts)
Reference: EN ISO 15749
Date: Adoption in May 2004

Link to standardisation: CEN
Scope of the document: This standard applies to ships and marine structures. It deal with design good practices about sanitary drainage system design (part 1), sanitary drainage and drain piping for gravity system (part 2), sanitary drainage and drain piping for vacuum system (part 3), sanitary drainage and sewage disposal pipes (part 4), drainage of decks, cargos spaces and swimming pools (part 5). This set of recommendations is issued from ISO 15.749 (May 2004) and has been prepared by the technical committee TC 8 "*Ships and marine technologies*" from ISO. National transpositions exist, such as the standard NF EN ISO 15749 from AFNOR (December 2004).
Rationale for selection: This standard is relevant for Navy vessels. It gives some explicit recommendations for the design of shipboard sewage drainage systems (collect piping, storage tanks, treatment units, discharge on-shore or at sea) in response to hygienic and environmental requirements.
How to apply / key points: This standard is specific to naval systems. It ought to be applied in armament contracts (A) and ought to be used for any new ship design or during retrofit in case of any new installation. The use by ship-builders of these good practices given by parts 1 to 5 of this standard (design choices, test methods, common graphic symbols to be used on technical drawings…) is strongly recommended, but must remain compatible with IMO requirements. Obviously, vessels are not concerned by the swimming pools.

b) Solid waste (garbage such as plastic and non-plastic waste)

Name: Biotechnology – Large scale process and production – Guidance for the handling, inactivating and testing of waste
Reference: EN 12461
Date: Adoption in February 1998
Link to standardisation: CEN
Scope of the document: This standard gives guidance on the assessment and the selection of procedures for the treatment of waste, to ensure the safety of people and environment. It applies to waste and effluents (solid, liquid and gaseous) emitted from biotechnological processes, but not to the waste from hospital and to the chemical and physical hazardous waste. This standard has been prepared by the technical committee TC 233 "*Biotechnology*" from EN. National transpositions exist, such as standards DIN EN 12461 (April 1998).
Rationale for selection: This standard is relevant for naval and/or land systems wishing to improve their waste management and considering that some efficient and safe methods have to be implemented by the stakeholders for a better identification of waste streams and a better knowledge of waste treatment methods.
How to apply / key points: This standard may have an interest for air, land and naval systems. It may be considered as guidance (G) and has to be known by the stakeholders. Particularly, for armament managers and/or military forces, this standard proposes good practices about the waste management policy and the characterisation of waste streams. For defence industry (ship-builders…) it gives general recommendations about the risk assessment and the procedure to be considered to guide the choice of waste treatment methods (thermal treatment, chemical treatment, biological treatment, sterilisation and incineration…).

Name: Stationary waste containers
Reference: EN 12574
Date: Adoption in February 2006
Link to standardisation: CEN
Scope of the document: This standard deal with stationary waste container, not including special containers for hazardous materials. It describes the dimension and design requirements for stationary containers up to

10.000 liters (part 1), the performance requirements and test methods (part 2) and the safety and health requirements (part 3). This set of recommendations has been prepared by the technical committee TC 183 "*Waste management*" from CEN and supersedes the previous edition (May 2002). National transpositions exist, such as standards BS EN 12574 (March 2006) and DIN EN 12574 (April 2006).
Rationale for selection: This standard may be first applicable to land forces, but may also have a relevant interest for naval bases (ship-to-shore interfaces: use at berth…). Particularly, the use of such containers may be relevant within the waste management organisation that is adopted by forces.
How to apply / key points: This standard may have an interest for land and/or naval systems. It may be considered as guidance (G) and may be used if such containers are requested for waste management. Particularly, the recommendations dealing with safety and health are general enough to be known and used.

Name: Packaging - Packaging and the environment - Terminology
Reference: EN 13193
Date: Adoption in May 2000
Link to standardisation: CEN
Scope of the document: This standard gives some complementary information related to EC directives 94/62/EC (packaging and packaging waste) and 75/442/EC (waste), amended by directives 91/156/EC and 96/350/EC (waste). It defines terms specific to packaging and their link with the environment, degradability and energy recovery. It also gives a classification for categories of waste, disposal operations and recovery operations. This standard has been prepared by the technical committee TC 261 "*Packaging*" from CEN. National transpositions exist, such as standards DIN EN 13193 (August 2000) and BS EN 13193 (September 2000).
Rationale for selection: The knowledge of this standard may be necessary for a better understanding of EC directives dealing with waste management, particularly for packaging and their terminology.
How to apply / key points: This standard may have an interest for air, land and naval systems wishing to improve their waste management. It may be considered as guidance (G). The stakeholders (project managers, suppliers, operational forces…) have to know that the EC legislation on waste has changed (directive n° 2006/12/EC of 2006). This EN standard which has been selected ought to be updated to take into account this new legislative context. It is the user's responsibility to consult the latest versions of EU legislation.

Name: Characterisation of waste - Terminology
Reference: EN 13965
Date: Adoption in December 2004
Link to standardisation: CEN
Scope of the document: This standard is a part of a series of European Standards each covering a sector of waste concepts. It gives a compilation of selected terms and definitions about materials (part 1) and waste management (part 2) in 3 languages (German, English and French). Radioactive waste is excluded. This standard has been prepared by the technical committee TC 292 "*Characterisation of waste*" from CEN. National transpositions exist, such as standard DIN EN 13965 (March 2005). Part 2 of this standard has been updated (October 2010) with national transpositions by AFNOR (December 2010) and DIN (January 2011).
Rationale for selection: The knowledge of this standard is relevant for stakeholders (legislator, project managers, industry). It ensures a better understanding of terms dealing with the characterisation of waste. It gives a compilation of recognised, selected and updated terms and definitions in the waste management field.
How to apply / key points: This standard may have an interest for air, land and naval system. It may be

considered as guidance (G) and has to be known by, for example, producers, waste industry and legislators in the waste management field. It is the user's responsibility to consult the latest versions of EU legislation.

c) Hazardous waste (chemical materials, such as refrigerants or gaseous fire extinguishers…)

Name: Performances of mobile leak detectors and of room controllers of halogenated refrigerants
Reference: EN 14624
Date: Adoption in April 2005
Link to standardisation: CEN
Scope of the document: This standard is aimed at defining the performances of mobile leak detectors and of room controllers of halogenated refrigerants. They are designed for detecting CFC, HCFC, HFC, PFC-type halogenated gases and their sensibility is verified by means of a calibrated leak. A new edition is under approval (draft produced in October 2010) with some minor changes (definition, checking modes...) and ought to supersede the present edition of April, 2005. This standard has been prepared by the technical committee TC 182 "*Refrigerating systems, safety and environmental requirements*" from CEN. National transpositions exist, such as standards DIN EN 14624 (June 2005) and BS EN 14624 (December 2005).
Rationale for selection: This standard is relevant for the main following reason: a better management of the refrigerant (as a resource) in case of any replacement of a polluted refrigerant (that becomes a waste) during maintenance or dismantling operations on refrigerating and air conditioning systems installed inside aircraft, vehicles and vessels, with the necessity of controlling any leakage in the atmosphere.
How to apply / key points: This standard may have an interest for air, land and naval system. It may be considered as guidance (G) and has to be used by maintenance and/or dismantling personnel (particularly during hot work). This standard gives some definitions related to refrigerants and halogen gas detectors, and gives some recommendations for the detectors location and calibration. Some examples of tests are given.

8.10) Annex X - List of relevant ISO Standards related to WASTE MANAGEMENT

a) Liquid waste (oil and oily water, sewage and grey water, ballast water and sediments)

Name: Water quality – Determination of Biochemical Oxygen Demand after n days (BOD_n)
Reference: ISO 5815
Date: Adoption in April 2003
Link to standardisation: ISO
Scope of the document: This standard deals with 2 methods for the determination of the Biochemical Oxygen Demand after n days (BOD_n) index in effluent: a dilution and seeding method with allylthiourea addition (part 1) and a method for undiluted samples (part 2). This standard has been prepared by a technical committee from ISO and supersedes the previous edition of August 1989.
Rationale for selection: Part 1 of this standard is linked to the Annex IV of the MARPOL convention and is directly requested by resolution MEPC.159(55) for the measurements of the BOD_5 index in samples of effluent taken during the test period. Part 2 is not used. Usually n=5.
How to apply / key points: This standard is specific to naval systems due to its reference to an IMO MEPC resolution. It has to be applied in contracts (A) and has to be used during trials, for any new ship design, or during retrofit for any new installation. This standard has to be used at each time a sewage treatment plant is tested on shore and/or on board, for which a chemical analysis is required for knowing the quality of the sewage to be treated and/or the quality of the permeate after the treatment (BOD_5 index). Usually n=5.

Name: Water quality – Determination of the Chemical Oxygen Demand index (COD)
Reference: ISO 15705
Date: Adoption in November 2002
Link to standardisation: ISO
Scope of the document: This standard deals with a specific method for the determination of the Chemical Oxygen Demand (COD) index in effluent: the small-scale sealed-tube method. This standard has been prepared by a technical committee from ISO. National transpositions exist, such as standards BS ISO 15705 (December 2002) and DIN ISO 15705 (January 2003).
Rationale for selection: This standard is linked to the Annex IV of the MARPOL convention and is directly requested by resolution MEPC.159(55) for the measurements of the COD index in samples of effluent taken during the test period.
How to apply / key points: This standard is specific to naval systems due to its reference to an IMO MEPC resolution. It has to be applied in contracts (A) and has to be used during trials, for any new ship design, or during retrofit for any new installation. This standard has to be used at each time a sewage treatment plant is tested on shore and/or on board, for which a chemical analysis is required for knowing the quality of the sewage to be treated and/or the quality of the permeate after the treatment (COD index).

Name: Ship and marine technology - identification colours for the content of piping systems
Reference: ISO 14726
Date: Adoption in May 2008
Link to standardisation: ISO

Scope of the document: This standard applies to ships and marine structures. It specifies main colours and additional colours for identifying piping systems in accordance with the content or function on board ships, but can also be used for piping systems on drawings and diagrams. This standard does not apply to medical and industrial gases and cargo. This standard has been prepared by the technical committee TC 8 "*Ships and marine technologies*" from ISO and supersedes the previous editions of 1999 and 2002 (part 1) which have been technically revised. National transpositions exist, such as standards BS ISO 14726 (February 2009) and DIN ISO 14726 (October 2010).
Rationale for selection: This standard is relevant for Navy vessels. It gives a uniform shipboard knowledge for the content of pipes containing liquids (impact on safety and maintenance, ship dismantling).
How to apply / key points: This standard is specific to naval systems. It may be considered as guidance (G) and has to be used for any new ship design. For the marking of pipes, ship builders have to use the right chromaticity of the colours for each essential category of media (sea water, fresh water, black water, grey water, fuel, bilge water, steam, air in ventilation systems …), with additional colours for specific functions and media.

b) Solid waste (garbage such as plastic and non-plastic waste)

Name: Series 1 Freight containers - Specification and testing
Reference: ISO 1496
Date: Adoption in July 2008
Link to standardisation: ISO
Scope of the document: This standard consists of several parts under the general title *"Serie 1 freight containers*": general cargo containers for general purposes (part 1), thermal containers (part 2), tank containers for liquids, gases and pressurised dry bulk (part 3), non-pressurised containers for dry bulk (part 4), platform and platform-based containers (part 5). This standard has been prepared by the technical committee TC 104 "*Freight containers*" from ISO. This 5th edition cancels and replaces the previous edition (October 1996) which has been technically revised. National transpositions exist, such as standard BS ISO 1496 (December 2008). Old transposition may also exit, but for previous editions.
Rationale for selection: Part 2 dealing with "thermal container" is relevant for both naval and land forces (Navy vessels, naval bases, military compounds). It has been selected due to the fact that *Waste Management* takes into consideration waste storage. Military forces may have the necessity to use thermal containers for storing under hot climates their operational waste during a long time during military operations.
How to apply / key points: This standard may have an interest for air, land and naval system. It has to be considered as guidance (G) and part 2 of this standard may be used if such thermal containers are needed for waste management. The design requirements and test methods for producing thermal containers (use under hot climate, necessity to have a low temperature inside) have to be known by defence industries.

Name: Shipboard incinerators - Requirements
Reference: ISO 13617
Date: Adoption in November 2001
Link to standardisation: ISO
Scope of the document: This standard applies to ships and marine structures. It specifies some requirements for the design of shipboard incinerators (emission standard, fire protection, shipboard location, incinerator integrated with heat recovery units, flue gas temperature). This standard has been prepared by the technical committee TC 8 "*Ships and marine technologies*" from ISO and supersedes the previous edition of August 1995. National transpositions exist, such as standard BS ISO 13617 (June 2002).

Rationale for selection: This standard is relevant for Navy vessels. It gives some recommendations for the design of shipboard incinerators. It directly refers to the Annex V of the MARPOL convention.
How to apply / key points: This standard is specific to naval systems. It may be considered as guidance (G) and has to be known for any new ship design or during retrofit in case of any new installation of incinerator.

Name: Ship and marine technology - Marine environmental protection – Arrangement and management of port waste reception facilities
Reference: ISO/CD 16304
Date: Adoption in February 2011
Link to standardisation: ISO
Scope of the document: This standard applies to ships and marine structures and to the management of ship-generated waste. It deal with the design of port reception facilities (PRF) and covers principles and issues that need to be considered in both the development of a port waste management plan (PWMP), its implementation and its operation. This standard has been prepared by the technical committee TC 8 "*Ships and marine technologies*" from ISO.
Rationale for selection: This standard is relevant for Navy vessels and ship-to-shore facilities in naval bases. It directly refers to the Annexes I, IV and V of the MARPOL Convention, and particularly to the document MEPC.1/Circular 671 (guide to good practice for port reception facility providers and users). Even if this standard essentially concerns PRF, its knowledge is considered as relevant by the stakeholders.
How to apply / key points: This standard is specific to naval systems. It may be considered as guidance (G) and has to be known during any new ship design, considering that the design choices for waste management systems have to minimize any future risk of inadequacy between the vessel and the port reception facilities (particularly about shipboard waste segregation). The use of this standard by ship-builders is complementary to standard ISO/DIS 21070 (Ship and marine technology - Marine environmental protection - Management and handling of shipboard garbage). Ship-owners have also to use this standard for any port visit.

Name: Ship and marine technology - Marine environmental protection - Management and handling of shipboard garbage
Reference: ISO/DIS 21070
Date: Adoption in August 2010
Link to standardisation: ISO
Scope of the document: This standard applies to ships and marine structures. It gives some definitions on the key area waste management, some requirements on the classification of waste (reference to a colour coding and marking for garbage and other residues), their shipboard storage and treatment. This standard is issued from an initial draft from DIN (2003) and has been prepared by the technical committee TC 8 "*Ships and marine technologies*" from ISO.
Rationale for selection: This standard is relevant for Navy vessels and ship-to-shore facilities in naval bases. It directly refers to the Annex V of the MARPOL Convention and to European Directive 2000/59/EC on port reception facilities for ship-generated waste and cargo residues.
How to apply / key points: This standard is specific to naval systems. It may be considered as guidance (G) and has to be known for any new ship design. Particularly, ship builders may use these recommendations, particularly those giving some examples for calculating the expected amount of daily domestic waste and some examples of treatment processes used onboard ships to reduce the volume of garbage.

c) Hazardous waste (chemical materials, such as refrigerants or gaseous fire extinguishers…)

Name: Refrigerants – Designation system
Reference: ISO 817
Date: Adoption in January 2005
Link to standardisation: ISO
Scope of the document: This standard gives a set of recognised definitions and numbering about refrigerants (and their blends). It is linked to international protocols dealing with substances that deplete the ozone layer (CFC and HCFC management: production limitation, use limitation, importation, leakages, inspection), and particularly the EC regulation 1005/2009 that replaced the EC regulation 2037/2000. This standard is also linked to greenhouse gases and particularly the EC regulation 842/2006 about fluorinated greenhouse gases. This standard has been prepared by the technical committee TC 86 "*Refrigeration and air conditioning*" from ISO and supersedes the first edition (September 1974), which has been technically revised. National transpositions exist, such as standard BS ISO 817 (February 2009).
Rationale for selection: This standard is linked to greenhouse gases and particularly fluorinated gases that are regulated by EC regulation 842/2006. Its knowledge and use are relevant for any armament systems using new refrigerating agents to be compliant with EC regulations (such as HFC) and for which a perfect understanding has to be ensured between the stakeholders. Even if this standard does not directly deal with waste management, the good practices that are described in the present standard have to be considered as relevant for a refrigerating system design and resource management.
How to apply / key points: This standard has a relevant interest for air, land and naval systems. It may be considered as guidance (G) for any new armament system design or any existing system retrofit. When managing technical specifications and design documents about air conditioning and refrigerating systems, the stakeholders have to use this standard for the only refrigerants currently authorised by EC regulations.

Name: Gaseous fire extinguishing systems - Physical properties and system design
Reference: ISO 14520
Date: Adoption in February 2006
Link to standardisation: ISO
Scope of the document: This standard consists of several parts that give some useful recommendations for the specification, design, installation, testing, approval, inspection, operation, maintenance and safety of fire fighting systems using a wide range of extinguishers that are always manufactured (HCFC, HFC, inert gases). It ensures a uniform understanding of some additional data about their physical characteristics. This standard has been prepared by the technical committee TC 21 "*Equipment for fire protection and fire fighting*" from ISO and supersedes the first edition (February 2002), which has been technically revised. National transpositions exist, such as standard BS ISO 14520 (May 2006).
Rationale for selection: This standard is directly mentioned in EC regulation 842/2006. Its knowledge and use are relevant for any armament systems using fire-fighting agents to be compliant with this EC regulation (such as FM200, NOVEC-1230, and potentially inert gases and their mixtures, such as Ar, N_2, CO_2) and for which a perfect understanding has to be ensured between the stakeholders. Even if this standard does not directly deal with waste management, the good practices that are described in the present standard have to be considered as relevant for a gaseous fire-fighting system design and resource management.
How to apply / key points: This standard has a relevant interest for air, land and naval systems. It has to be applied in contracts (A) for safety consideration, inspection and maintenance, testing and training. When managing technical specifications and design documents about fire-fighting systems, the stakeholders have to use this standard for the only following fire-fighting extinguishers currently authorised by EC regulations: NOVEC 1230 (part 5), FM 200 (part 9), inert gases and mixtures, such as Ar, N_2, CO_2 (parts 12 to 15).