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IMPACT OF REGULATION (EC) NO. 1.907/2006 ON PRODUCTS FROM THE ROMANIAN ARMED FORCES ENDOWMENT

Teodora ZECHERU*

The European Union aims to reduce the pressure on the natural resources, to create real economic growth, while preventing losses in the ecosystem, and to achieve climate neutrality targets by 2050. To this end, it will intervene throughout the life cycle of products in terms of design, technological flows and consumption, taking into account also a much stricter kind of waste management. In the military field, workers are constantly exposed to a wide variety of chemicals, and the full impact of this continued exposure is unknown. Following an extensive analysis of the impact of the REACH Regulation on the field of defence in our country, it can be stated that most ammunition, equipment and military vehicles for all categories of forces need a reassessment in order to fulfil our country's obligations at European level. Such a process is extensive, requiring both the understanding of the phenomena and their medium- and long-term impact, the establishment of an action plan on types of military products, and a considerable financial effort.

Keywords: REACH; European Green Deal; military products; chemicals; hazardous substances.

In March 2020, the European Commission adopted a new action plan in the field of the circular economy[1], as an integral part of the European Green Deal for Sustainable Growth[2], the Strategy for Promoting Sustainability in the Field of Chemicals[3] and the Action Plan on Critical Raw Materials[4]. The European Union intends to reduce the pressure on natural resources, to create real economic growth, while preventing losses to the ecosystem, and to achieve climate neutrality targets by 2050. In this regard, interventions will be made throughout the products life cycle, in terms of design, technological flows and consumption, taking into account much stricter waste management, including from the raw materials reuse perspective, where possible.

In order to achieve these goals, additional legislative and technical measures are needed in all areas of interest.

One of the first such areas is the environment, and related European legislation is becoming increasingly restrictive both in terms of the requirements that raw materials must meet and their use throughout their life cycle, from utilization up to waste management and waste treatment.

From the perspective of chemicals, Regulation (EC) 1.907/2006[5] (REACH Regulation)[6] provides for an increasingly rigid European system of registration, authorization and restriction, in order to maintain and improve environmental conditions and to protect the health of workers from the risks which can be induced by chemicals. The REACH Regulation also promotes alternative methods for assessing the risks of substances, ensures the free movement of substances in the internal market of the European Union and supports the strengthening of the competitiveness of the chemical industry of the European Union, as a key sector for the Community economy.

Given that the defence industry relies on a very large number of chemicals vital for superior military capabilities, it is particularly important to emphasize both the implications of the REACH Regulation in this area in general, but also in terms of specific implications for our country.

From the perspective of the REACH Regulation, the use of substances as such, in mixture(s) and/or article(s) has important consequences for all actors in the chains of production and use in terms of their legal obligations. Thus, under the REACH Regulation, the concept applies to ammunition, equipment and vehicles that the defence industry produces, imports, places on the market or uses, but also to the raw materials related.

In the military field, workers are constantly exposed to a wide variety of chemicals, and the full impact of this continued exposure is unknown.

***General Directorate for Armaments, Bucharest**
e-mail: *teodora.zecheru@gmail.com*

However, we are becoming increasingly aware of the toxic potential of military products and the risks to which the military personnel are exposed not only in terms of safety, but also in terms of health.

Following an extensive analysis of the impact of the REACH Regulation on the field of defence in our country[7], it can be stated that most military products need a reassessment, in order to fulfil the obligations assumed by our country at European level. Below just a few insights are given on the most relevant substances in the field of defence, along with a discussion on how to approach them at present and in the future from the REACH Regulation viewpoint.

Ammunition and energetic materials

Ammunition includes in its composition various energetic materials: pyrotechnics, propellants, primary and secondary explosives. Of these, in our country, pyrotechnics are in very small quantities and are not subject to the provisions of the REACH Regulation, except for dyes containing chromium and lead and are nominated on the list of Annex XIV. Yet, all the other categories mentioned contain substances with compliance obligations.

Thus, propellants/powders are mixtures of substances consisting of oxidants, fuels, but also of various types of organic additives and solvents, which are added for stabilization, binding and/or modeling of the necessary technical performance. For example, in the case of a double-based propellant, it mainly consists of a mixture of nitrocellulose and nitroglycerin, but may also contain dibutylphthalate, dinitrotoluene, diphenylamine, ethyl-centralite, etc. Unlike the first two substances, the situation of stabilizers is different, given that some of them have characteristics that classify them as substances of particular concern for the health of workers and/or the impact on the environment, being nominated on the lists in Annexes XIV or XVII, which leads to the need for these substances to be authorized for use, once the mass exceeds 0.1% by composition. In addition, the handling of polymers[8] requires economic operators to fulfil certain legal obligations, often different from those for other substances. The REACH Regulation exempts polymers from the application of its provisions on registration and evaluation, but not for authorization and restriction, which requires both the study of the Regulation as such and the manufacturing technology to verify the raw materials needed to obtain those substances, in most cases being necessary to register substances that overweigh 1 ton per year.

Hydrazine is another substance that can be mentioned here, a particularly important additive used as rocket fuel propellants by the Air Forces, a substance which, together with its derivatives, is listed in Annex XVII as a highly toxic substance requiring special handling conditions[9].

As regards primary and secondary explosives, they are not listed in the REACH Regulation, thus the obligation for downstream users being only related to the registration of substances exceeding 1 ton per year. In the case of plastic explosives, however, the situation is different – they contain various additives (phthalates, phenols, etc.) and solvents (methylene chloride, etc.) nominated on the list of Annex XIV, and with obligations to authorize their use.

Diisocyanates are the main components in obtaining various protective films or as binders in various energetic compositions. And they are nominated to be restricted starting from 2023 for use as such or as components for other mixed substances for industrial and professional use.

Ammunition-related items, equipment and military vehicles

If, in the case of energetic materials in ammunition, reference is made to the chemicals needed to meet the performance objectives and it is necessary to know the chemical composition of the mixtures used to meet the requirements of the REACH Regulation, from the perspective of meeting the stability objectives in time and extreme environmental conditions, it is necessary, inter alia, to consider substances used for anti-corrosion coatings, passivation/surface treatments of ammunition elements, subassemblies and casings of land, air and naval vehicles. This material characteristic is particularly important, given, on the one hand, the need to guarantee ammunition in storage for a period of at least 10 years and, on the other hand, the use of military equipment and vehicles in difficult environmental conditions (temperature, humidity, salinity, biological deposits, wind and pressure).

Among the substances with the best results over the years in terms of this desideratum, various

chromates and dichromates and their derivatives have proved to meet the performance requirements in aging conditions. Unfortunately, substances such as chromic anhydride (chromic acid), dichromic acid and their salts (better known in the field as Cr(VI)-containing substances) are listed in Annex XIV of the REACH Regulation, with obligations to authorization for use, when exceeding 0.1% by weight in the composition used.

With regard to CBRN equipment, substances containing Cr(VI) cannot, for the time being, be replaced in filters and protective equipment materials, weighing up to 10% in the impregnation composition or material.

Substances used in fire-fighting systems

In the military field, at the level of all categories of armed forces, various fluorine-based fire extinguishing systems have been applied for many years with very good results, more precisely poly- and perfluoroalkylates (PFAS), a group of substances used on a large scale since the 1950s, particularly persistent substances, which are now found in the global environment. It should be noted here that fluorothelomers, a class of substances originally used in aqueous fire-fighting foams (AFFF)[10], are now also found in textiles with a role of protection against penetration, fire-retardant and anti-staining, but also in various lubricants compatible with liquid oxygen by the Air Forces.

The persistence of PFAS in the environment is indefinite throughout the life cycle of products, and the highest concern from the point of view of environmental authorities is the quasi-irreversibility of natural resources contamination. After extensive studies, these types of substances are now considered „ozone-depleting substances"[11], and researchers are focusing on a global plan to phase out the production and consumption of these ozone-depleting substances. The most recent intervention is the gradual reduction of hydrofluorocarbons (HFCs) due to greenhouse effects. They were originally used as a substitute for ozone-depleting substances, and eliminated by the original Montreal Protocol, in an example of what is often referred to as an unfortunate substitution. Without further research, there are significant risks of a scientifically unjustifiable restriction of all PFAS, as a large-scale restriction that is not based on comprehensive studies can lead to serious unintended consequences. It is necessary to collect information on a number of uses and conditions/restrictions, and applying this concept to such a large class of chemicals for the first time is a very ambitious task, which does not exclude the possibility of successful completion of research and the impossibility of a viable application in the military field.

Exemptions from the application of the provisions of the REACH Regulation

At the time of the entry into force of the REACH Regulation, the impossibility for certain military products to be fully compliant was also taken into account, which is precisely why it is stipulated in art. 2 para. (3) the possibility for the European Union's Member States to grant exemptions, in specific situations, for certain substances in the interests of defence.

Granting exemptions in the interest of defence is primarily a national responsibility, but consistency and coordination are needed for a common approach of Member States, otherwise divergence and inconsistency could conduct to a negative impact on the European defence technological and industrial base (EDTIB), to non-uniformities in production and procurement in the field of defence, as well as in the movement of substances within the European Union.

The main purpose of the exemptions from the application of the provisions of the REACH Regulation is to maintain: unrestricted operability and interoperability of the European armed forces; an EDTIB based on capability, competence and competitiveness; the highest possible safety and traceability standards.

It is important to note here that, from 5 January 2021, economic operators have the duty to also notify all items they place on the European market that contain substances of very high concern in concentrations above 0.1% by weight, from the perspective of hazardous wastes management, and the Ministry of National Defence is not exempted from fulfilling this obligation, but may use the provisions of the REACH Regulation to obtain an exemption. This situation can occur in the case of purchases of ammunition, weapons, equipment from outside the European space (USA, Israel, Great Britain, etc.), because these states do not have the obligation to comply with the provisions

of European legislation. On the other hand, the notification can highlight how military products and related substances can contribute to the circular economy, being a rather closed area compared to other industries and economies.

Conclusions

The general purpose of the REACH Regulation is to use hazardous substances only where the risks of use are adequately controlled and/or the benefits to society outweigh those risks. Thus, in most cases, a socio-economic analysis is needed to compare the costs and the benefits of a chemical that is subject to authorization or restriction. These assessments are intended to translate, in fact, fundamental moral and ethical choices into economic figures, what risks are acceptable and what types of industries they target.

Obsolescence is a major and ongoing concern in the field of defence endowment[12], but with a limited vision for upstream chemicals and technological processes in complex supply chains. It can be mentioned that the defence industry has already been significantly affected by the obsolescence related to the REACH Regulation, due to the unavailability or impossibility of supplying substances as such, in mixture(s) and/or in article(s) from upstream suppliers, both from the European and non-EU space. And the transition from the use of new substances from satisfactory results obtained during research for substitution to implementation/endowment can exceed 10 years. Thus, it is necessary to apply in the military field the concept of essential use on the process of restriction of various substances, as a restriction or even sudden elimination is premature and can create a precedent and negative consequences impossible to quantify at present.

That is why discussions on restricting the use of certain substances in the interests of defence are currently focused on the importance of the substance in the assigned field, on its non-essential, substitutable or essential use.

With regard to the substances mentioned above in relation with their military use, it can be stated that:

- certain uses of the substances are considered vital and without alternative;
- it is neither feasible nor reasonable to assess the essentiality of all uses of the substances at a time for different applications;
- phasing-out some substances is possible since functional alternatives exist, but this action has financial and time implications;
- essentiality, as it is considered according to technical performance standards, should not be considered permanent, but involving the constant effort to look for alternatives with a lower level of toxicity and more environmentally friendly.

Although the field of defence can currently be exempted from the application of the provisions of the REACH Regulation, this does not mean that no measures should be taken to phase out the risks to the health of the military and the contamination of the environment. In this regard, we can adopt the model of the Nordic states, which have begun to replace AFFF in training at military bases, or France, which has established a comprehensive program to replace ammunition containing hazardous substances.

Of course, such a process is extensive; it requires both understanding the phenomena and their impact in the medium and long term, the establishment of an action plan on types of military products, but also a financial effort.

Consequently, an up-to-date analysis of these costs is needed, including the development of a counter-scenario for a comprehensive cost-benefit assessment, taking into account the risks associated with the purchase of military products in the current configuration, the limitations of purchase possibilities to the European space, the risk of entering into infringement procedures due to non-compliance with European environmental and occupational health regulations and directives, but also the needs for research, development and innovation to determine and promote safe and sustainable chemicals in terms of toxicity.

NOTES:

1 *** *New Circular Economy Action Plan (CEAP).*

2 https://ec.europa.eu/environment/strategy/circular-economy-action-plan_en, accessed on 12.07.2021.

3 https://www.europarl.europa.eu/doceo/document/TA-9-2020-0201_RO.html, accessed on 01.07.2021.

4 https://ec.europa.eu/docsroom/documents/42849, accessed on 01.08.2021.

5 https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A02006R1907-20210705&qid=1628450660649, accessed on 20.07.2021.

6 *Regulation (EC) No. 1907/2006 of the European Parliament and of the Council of 18 December 2006*

concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH), establishing a European Chemicals Agency, amending Directive 1999/45/EC and repealing Council Regulation (EEC) No 793/93 and Commission Regulation (EC) No 1488/94 as well as Council Directive 76/769/EEC and Commission Directives *91/155/EEC, 93/67/EEC, 93/105/EC and 2000/21/EC*

7 R. Petre, T .Rotariu, T. Zecheru, N. Petrea, S. Băjenaru, "Environmental long term impact on a Romanian military testing range", *Central European Journal of Energetic Materials*, 2016, pp. 3-4.

8 T. Zecheru, *Biopolymers for military use: opportunities and environment implications – a review,* invited book chapter in Biopolymers, Sciyo Publishing House, 2010, p. 597.

9 https://theaviationist.com/2019/05/19/hydrazine-a-significant-hazard-each-time-an-f-16-crashes-or-fires-up-the-emergency-power-unit/, accessed on 02.08.2021.

10 AFFF = aqueous firefighting foams.

11 https://www.unep.org/ozonaction/who-we-are/about-montreal-protocol, accessed on 01.08.2021.

12 T. Zecheru, T. Rotariu, L. Haller, F. Dîrloman, "Lead obsolescence in ammunition", *23rd International Seminar „New Trends in Research of Energetic Materials*", Cehia, 2020.

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