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## The applicant's guide of the French nuclear safety authority

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### Abstract

The “applicant’s guide” of the French nuclear safety authority (ASN) is dedicated to the designers of radioactive material transport packages or any other entity who wish to apply for package or transportation approval. It describes the requirements and recommendations of the competent authority for such an application and presents the French positions concerning specific points of safety demonstration.

### Introduction

The French nuclear safety authority (ASN) publishes since 2009 a guide dedicated to the applicants for package or transportation approvals [1]. This so-called “applicant’s guide” aims to facilitate the preparation of the application file and in particular of the safety assessment report of the package design in view of its technical evaluation by the ASN’s technical support, the Institute for nuclear safety and radiation protection (IRSN).

Besides basic administrative information, the guide includes ASN’s recommendations concerning design, manufacturing, use and maintenance of the package design to be assessed and positions concerning specific points of safety demonstration. In addition, it includes a feedback from past technical assessments.

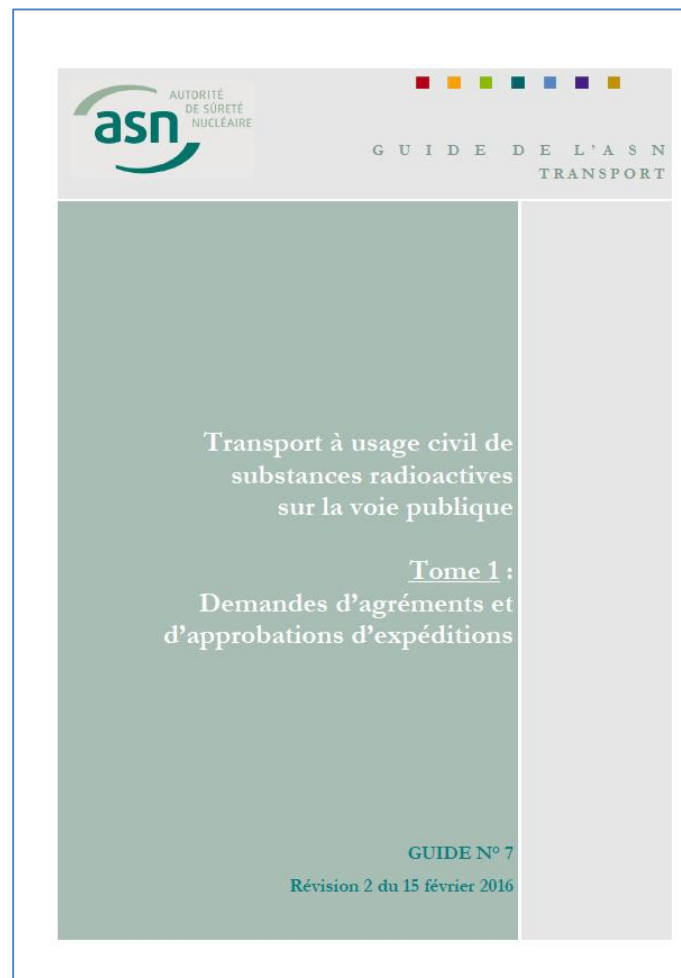
The applicant’s guide is thus a useful tool of communication between the competent authority and the transport package designers. It clarifies the authority’s expectations and specifies the French positions in transport safety. Hence, it contributes to a stable and efficient technical assessment process. This reference document is widely used and appreciated today among the applicants for package design approvals in France.

The last revision of the guide has been prepared with the participation of IRSN and takes into account the comments from the main approval applicants in France. It was submitted to public consultation in October 2015 and published in early 2016.

This article presents the contents of the guide, the process of its updating and highlights some of the ASN’s recommendations and positions.

## 1. Guide contents

The applicant's guide is structured as follows. An introduction describes the goal of the guide, the regulatory context and includes a reminder about sanctions. Then, the process of package design approval is presented for all the different cases: new design, approval prorogation, approval extension, modification of an existing design, and validation of a foreign approval. An indication of typical durations of instruction for the different cases is given in order to help the applicant plan ahead his strategy. These durations are only indicative since the real instruction time can vary depending on the complexity of the file (e.g. number of different contents), the novelty of the design, the response from the applicant to technical questions during assessment etc. Models of certificates are described. Then a section is devoted to the responsibilities of the approval applicants regarding packaging design, manufacturing, use and maintenance. In annex, ASN's positions concerning safety demonstrations are given. Some of these positions will be presented later in this paper. Another annex gathers feedback from past technical assessments. It lists technical aspects that led to difficulties in past safety analyses and that are specifically examined by the experts. On this subject the reader may refer to another contribution to this symposium [2]. Finally, templates of certificates are given. They are also available in electronic format on the ASN website.



**Figure 1: Cover of the applicant's guide**

## **2. Revision and public consultation**

The applicant's guide is updated on a regular basis in order to take into account regulatory changes, and new inputs such as:

- the results and conclusions of generic studies performed by the applicants under the supervision of ASN,
- experience capitalization in safety assessment,
- the positions issued by permanent groups of experts on specific topics,
- the sharing of experiences in packagings' use and maintenance.

The latest revision of the guide (version 3) was prepared with the participation of IRSN. A draft version was submitted to the main applicants in France for comments. Then an updated version taking into account some of those comments was published on the ASN website for public consultation during one month. Four comments were collected from this consultation, all issued by companies involved in package design or transportation. The final version was then published in February 2016 and is available on the ASN website [1].

## **3. Recommendations to package-approval applicants**

The applicant's guide contains ASN's recommendations regarding package design, manufacturing, use and maintenance. The main recommendations are the following.

### **Recommendations concerning package design process**

It is recommended that the final users be involved already in the early stages of the package design process, including design of associated tools and equipment. Indeed, there were examples in the past of new designs or design modifications which turned out to be incompatible with equipment or facilities or generated operational difficulties. Such incompatibilities or difficulties when occurring during operation could generate safety issues. For example, personnel might be exposed to a larger dose rate because of longer times of operation. The involvement of final users in the design of packages and tools is thus a good approach to improve the level of adequacy of packages and associated tools. This recommendation is consistent with the approach of human-centered design which tends to be more and more applied in general industry.

Moreover, it is recommended to perform a blank test before the first use of a new package design. This practice which was already implemented by the main transport stakeholders in France is now formalized as a recommendation.

### **Recommendations concerning manufacturing**

These recommendations concern the quality assurance program which must be included in the package design's safety assessment report. It is recommended that this program specify that ASN must be informed in advance of the manufacturing programs, the manufacturers and their first-tier subcontractors. This information is important for ASN to control the manufacturing process and target dedicated inspections.

In a recent past, during an ASN inspection, it was noted that a repair, that could have affected the package safety, was performed during the manufacturing of a packaging without notification to the competent authority. In order to avoid such situations, the quality assurance program should specify that ASN must be informed of non-compliances detected during manufacturing and their treatment when the latter leads to design modification. It should also specify that ASN must be informed, before realization, of repairs planned in the course of manufacturing when they possibly have a significant impact on the package design safety.

Having these requirements implemented in quality assurance programs and, thus, in safety reports provides a better guaranty of their fulfilment. Moreover, it has the virtue to cover the cases where the package owner or the entity which orders the manufacturing program is different from the applicant.

#### Recommendations concerning use and maintenance

It is asked that the list of safety requirements related to package use or maintenance be transmitted to all the package users. As the applicant has the knowledge of the safety analysis, he is responsible for this transmission.

#### **4. Positions regarding safety demonstrations**

The guide presents ASN's positions concerning specific points of safety demonstrations: regulatory tests realization, interpretation of the regulation concerning the exclusion of water penetration in a fissile material package, auxiliary equipment, stowage, secondary impact due to package contents, brittle fracture, containment gaskets, post-combustion of wooden shock absorbers, duration of transportation. We present here some of these positions.

##### Risks of gasket extrusion

In many package designs, elastomer gaskets participate in the containment barrier or the package's water tightness. ASN requires a minimum gasket compression rate of 15 %, considering a justified compression set, in order to guaranty tightness. In addition, positions concerning gasket properties are formalized in the guide in order to exclude the risks of gasket extrusion out of their groove when temperature increases in normal and accidental transport conditions. Indeed, even partial extrusion can lead to the gasket being mechanically damaged and/or maintained exposed to fire in accident transport conditions possibly leading to a loss of containment. First, it is demanded for new package designs and approval prorogations that the value of the thermal dilatation coefficient of the elastomer used in the safety assessment report be justified by representative experimental tests. Moreover, the maximum filling rate of the gasket groove must remain below 100% in volume in both normal and accidental transport conditions, taking into account the most conservative geometric configuration within fabrication tolerances for both gasket and groove and the maximum temperature. However, higher filling rates in accidental transport conditions can be accepted provided the applicant performs representative experimental tests which demonstrate the absence of extrusion.

##### Brittle fracture risks and controls in fabrication

If a packaging component is made of a material susceptible to brittle fracture depending on defect size

(e.g. carbon steels and die casts), then, the methodology of the ultrasonic examination to be conducted must at least comply with that of quality class 3 of standard NF EN 10228-3 [4] regarding defect investigation, recording level, and acceptance criteria. Moreover, the ASN position is to require that the components considered important for package safety such as those participating in the containment system be controlled at 100% in volume.

### Features added to package during transport

Consistently with § 612 of SSR-6 [3] which states that any feature added to the package at the time of transport should not affect its safety, the French position is to require that safety demonstration take into account both mechanical and thermal effects of auxiliary equipment used during transport. Transport frames are a common case of additional features having possible mechanical effects. In particular, the mass of a transport frame attached to the package should be taken into account as for the demonstration of the regulatory drop tests. However, ASN considers that if the mass of the frame does not exceed about one tenth of that of the package then no specific demonstration is needed. If the frame mass exceeds one tenth of that of the package then a complementary demonstration taking into account mechanical effects on the package due to the equipment is required.

Some packages are also transported in confined systems such as tarpaulins and canopies or in a vessel's hold. The use of features or means of transportation confining the package in a closed space can reduce the package's capacity to evacuate the heat generated by its contents. A safety demonstration must be transmitted to ASN unless the power flux out of the package remains below  $15 \text{ W/m}^2$ .

### Drop test targets

The applicant's guide specifies requirements concerning the targets used to perform the regulatory drop tests. These requirements are mostly based on the IAEA recommendations of SSG-26 [5]. A demonstration of target's conformity to these recommendations must be joined to the safety assessment report. If a target is intended to be regularly used to test package specimen, then the conformity demonstration can be transmitted to ASN for assessment prior to its use independently of package approval applications. Currently, six targets have been approved in France for regulatory drop tests other than type-C.

### Transport duration

The transport durations on the public road to be taken into account in the safety analyses are respectively:

- one year in routine or normal conditions of transport,
- one week in accident conditions of transport.

These durations are defined in order to cover respectively the duration taken in § 229 of the SSR-6 [3] relative to the definition of the maximum normal operating pressure and the time necessary for package recovery in the event of a severe transport accident. However, a shorter maximum transport duration in routine or normal conditions of transport can be specified in the consignment specifications defined in the framework of a multilateral approval.

## **Conclusions**

The “applicant’s guide” of the French nuclear safety authority has proven to be a useful tool to facilitate the implementation of the transport regulation and the communication between the radioactive transport stakeholders. It gives visibility to the French positions concerning the interpretation of regulation, in particular about safety demonstration and contributes to a more stable and efficient assessment process. At the international level, a similar guide has been developed jointly by several competent authorities, including France, to provide common recommendations for package design safety reports [6].

## **References**

- [1] Guide de l'ASN n°7: Transport à usage civil de substances radioactives sur la voie publique, 2016, published on the ASN website ([www.asn.fr](http://www.asn.fr))
- [2] Contribution to PATRAM 2016 by B. Eckert et al.
- [3] IAEA Specific Safety Requirements No. SSR-6, Regulations for the Safe Transport of Radioactive Material, 2012
- [4] European standard, French standard NF EN 10228-3, Non-destructive testing of steel forgings, 1998
- [5] Specific Safety Guide No. SSG-26, Advisory Material for the IAEA Regulations for the Safe Transport of Radioactive Material, 2012
- [6] European PDSR Guide ISSUE 3, 2014, available on the EACA website ([www.euraca.eu](http://www.euraca.eu))