

Enclosure 3 to E-51440

**French Approval Certificate Number F/381/AF-96
(Revision Dk) in English**



DIRECTION DU TRANSPORT ET DES SOURCES

**CERTIFICATE OF APPROVAL
OF A PACKAGE MODEL****F/381/AF- 96 (Dk)
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The French Competent Authority,

Given the application submitted by the TN International company in the letter CEX-17-00186360-032 dated March 29th, 2017,

Given the TN International Safety Analysis Report DOS-06-00037028-000 Rev. 9 of June 1st, 2017, and the technical note NTE-18-005200-000 Ind. 2.0,

certifies that the package design called "TNF-XI", as described in appendix 0 revision k and loaded with uranium in uranium oxides form, uranyl nitrate form, sodium diuranates form or ammonium diuranate form, enriched to a maximum of 20% of ²³⁵U as described in appendix 8 revision k, (content n°8) ;

complies, as a Type A package containing fissile materials, to the requirements of the regulations, agreements or recommendations listed below:

- Safety Standards Series– Regulations for the Safe Transport of Radioactive Materials – International Atomic Energy Agency n° SSR-6, 2012 Edition ;
- European Agreement concerning the International Carriage of Dangerous Goods by Road (ADR) ;
- Regulations concerning the International carriage of Dangerous goods by Rail (RID) ;
- European Agreement concerning the International Carriage of Dangerous goods by inland waterways (ADN) ;
- International Maritime Dangerous Goods Code (IMDG Code from IMO) ;
- Order of May 29th, 2009 concerning the carriage of dangerous goods by terrestrial ways (TMD Order) ;
- Order of November 23th, 1987 modified concerning the Ship Safety, section 411, attached (RSN Order).

This certificate does not relieve the consignor from compliance with any requirement of the government of any country through or into which the package will be transported.

This certificate expires on **31/12/2021**.

Registration number: **CODEP-DTS-2018-013769**

Montrouge, **9th April 2018**

APPENDIX 0

TNF-XI PACKAGING

1. DESCRIPTION OF THE PACKAGING

The packaging is designed, manufactured, inspected, tested, maintained and used in compliance with the Safety Analysis Report TN International DOS-06-00037028-000 Rev. 9 of June 1st, 2017.

The TNF-XI packaging, of a generally rectangular shape, is presented in Figure 0.1.

The design drawing of the packaging is the drawing COGEMA LOGISTICS 12986-01 Rev. K.

The outer overall dimensions of the packaging are:

- Nominal height of body: 940 mm,
- Maximal nominal height of packaging: 1040 mm,
- Cross section of body: 1100 × 1100 mm (overall nominal dimensions).

The maximal mass of empty packaging (± 10 kg) is 660 kg.

The maximal mass of loaded packaging allowable in transport is 1050 kg.

The packaging comprises the main components described below.

1.1 Body

The body of the packaging consists of a steel external casing of rectangular shape, and four cylindrical internal enclosures, also made of steel, separated by a layer of shock-absorbing and thermally insulating material.

Each internal enclosure consists of two steel shells separated by a filling of neutron shielding material and of a flat stainless steel bottom welded to these enclosures.

Each internal enclosure is intended to receive three pails, each pail containing the radioactive material.

1.2 Closing device

Each internal enclosure is closed by a primary lid equipped with an elastomer gasket. A “bayonet system” located on the inner face of the primary lid allows closure of the inner enclosure onto the flange.

The primary lid is protected by an upper plug formed by a stack of discs surrounded by a thin steel casing. A “bayonet system” located on the upper face of the plug allows closure of this one onto the flange of the packaging body. Leaktightness between the plug and the body is guaranteed by a seal.

1.3 Handling and storage components

The lower face of the packaging is equipped with steel forklift paths.

1.4 Safety functions

The main safety functions and the most important elements for safety are:

- **the containment** of the packaging which is provided by:
 - the four stainless steel cylindrical inner enclosures;
 - the four primary lids and their seal;

- **the radiological shielding** mainly provided by:
 - the resin contained between the shells of each inner enclosure;
 - the foam in the packaging body;
 - the steel sheets, borated if appropriate, especially those in the primary lids, the inner enclosures, the upper plugs, and the packaging body;
- **the protection against criticality** provided by the confinement system constituted of the elements described in chapter 5A of the safety analysis report ;
- **the protection against shock** is mainly provided by the shock absorber material contained in the body of the packaging ;
- **the protection against fire** mainly provided by insulating material.

2. MEASURES TO BE TAKEN BY CONSIGNOR BEFORE SHIPMENT

The package must be used in compliance with the operating instructions described in chapter DOS-06-00037028-600 Rev. 5 (Chapter 6A) of the Safety Analysis Report.

The correct closing of the pails used for the packaging of the contents must be checked by a visual inspection before loading in the cavity of the package.

3. MAINTENANCE PROGRAM

The maintenance program of the packaging is described in chapter DOS-06-00037028-700 Rev. 0 (Chapter 7A) of the Safety Analysis Report.

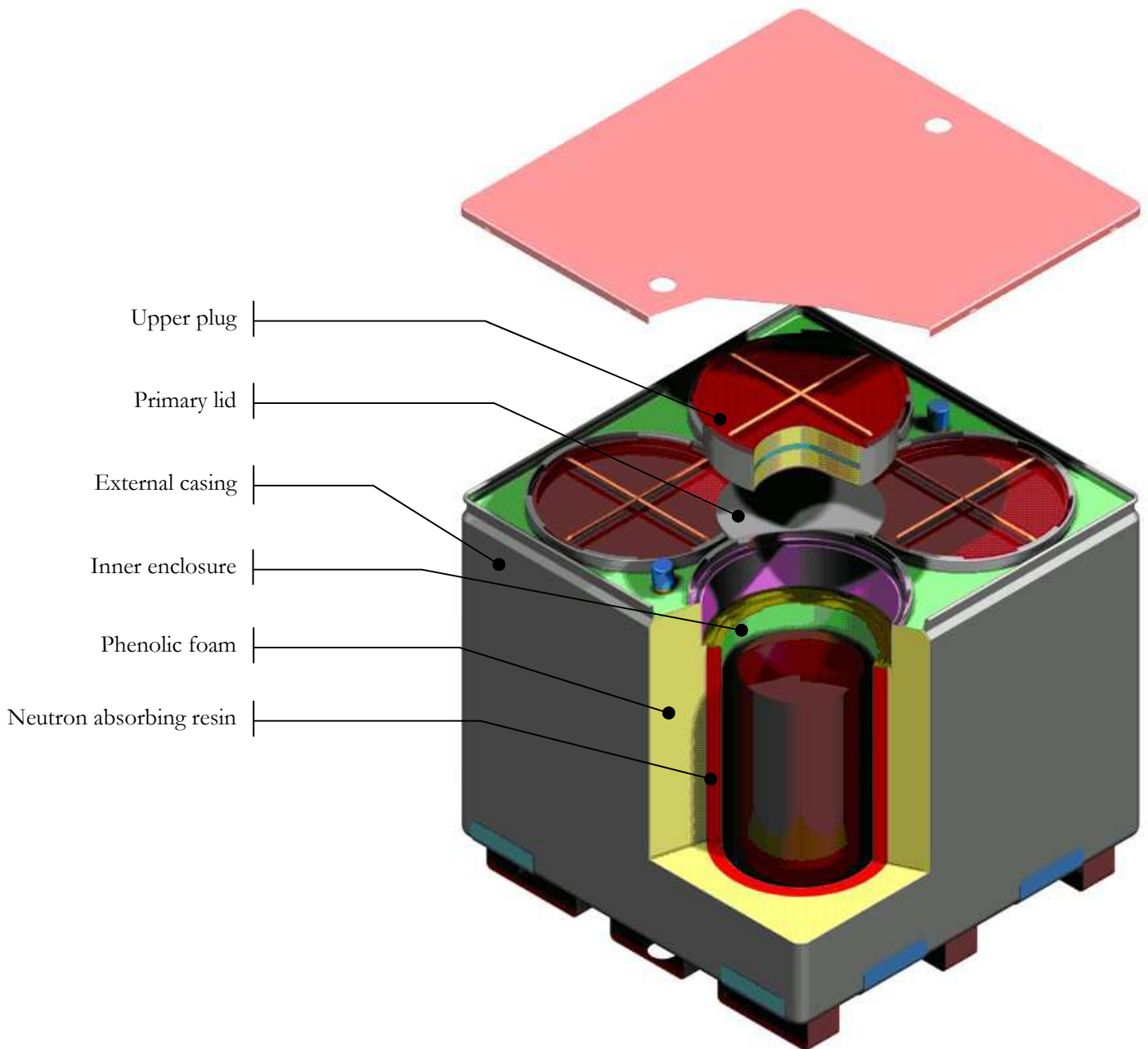
4. NOTIFICATION AND REGISTRATION OF SERIAL NUMBERS

Should a packaging be disposed of or change ownership, this must be notified to the competent authorities. Accordingly, the party relinquishing ownership of a packaging shall forward the name of the new owner.

5. QUALITY ASSURANCE

The applicable quality assurance principles for the packaging design, manufacture, inspection, tests, maintenance and use must be compliant with these described in chapter DOS-06-00037028-800 Rev. 1 (Chapter 8A) of the Safety Analysis Report.

FIGURE 0.1
SKETCH OF THE TNF-XI PACKAGE



APPENDIX 8

CONTENTS N° 8: URANIUM IN URANIUM OXIDES FORM, URANYL NITRATE FORM, SODIUM DIURANATES FORM OR AMMONIUM DIURANATE FORM, MIXED WITH RESIDUES

1. AUTHORIZED CONTENT DEFINITION

1.1 Physical form

The radioactive content is constituted of uranium in of uranium oxides form, uranyl nitrate form, sodium diuranates form or ammonium diuranate form. These uranium complexes, in solid form, may be mixed with residues that are:

- either inorganics residues: metallic oxides and precipitates, glass or mineral complexes in solid form. These residues are mainly composed of:
 - Either calcined filter aid (silicon dioxide, aluminium oxides, calcined aluminosilicate), with small amount of iron oxides and gadolinium oxides,
 - or calcium and aluminium fluorides,
 - or sodium nitrates and gadolinium (hydr)oxides,
 - or glass,
 - or glass wool or rock wool,
 - or concrete and cement,
 - or gypsum,
 - or aluminium oxides and brick.
- or organic residues in solid form mainly composed of:
 - either polyethylene resin with or without carbon black,
 - or polyvinyl chloride laden or not with carbon black,
 - or rubber (natural and synthetic),

Other organic compounds may be present in form of traces.

- or organic and inorganic residues mainly composed of aluminium in form of thin sheet, kraft paper and composite fibres (synthetic fibres or glass fibres).

The shipment of dangerous good other than class 7 is only allowed for aluminium fluoride (ONU n°: 1759) and Sodium Nitrate (ONU n°: 1498). The quantity per cavity of these compounds is limited to the limited quantities required in the ADR, RIS and IMDG code, that is to say:

- in the limit of 1 kg for aluminium fluoride classified in the group II and 5 kg for the one classified in the group III,
- in the limit of 5 kg for Sodium Nitrate.

Aluminium is not under pulverulent form.

In order not to damage the pails, the radioactive content shall not present any peak or sharp edge made of material at least as hard as the material of the material of the pails.

1.2 Isotopic composition and maximal allowable weight

Only unirradiated uranium may be present in the packaging.

The maximal allowable mass of uranium, under every possible listed forms listed in the paragraph 1.1, is limited per inner enclosure to:

- 5 kg for a mass enrichment in ^{235}U lower or equal to 5%;
- 0.5 kg for a mass enrichment in ^{235}U higher to 5% and lower or equal to 20%;

The maximal allowable mass of uranium and residues is limited to 75 kg per inner enclosure.
The thermal power of the content is below 0.5 mW per inner enclosure.

In case of a mix of both enrichments in one packaging, the most restrictive allowable mass of fissile material applies.

For a temperature lower or equal to 100°C, the content must:

- be chemically stable,
- contain no liquid,
- be compatible with the material of the plastic bags, the pails, the inner enclosure and the seal of the primary lid,

1.3 Maximal activity

The content being unirradiated uranium, the allowable A2 activity is infinite.

1.4 Maximal weight of powder

The content, before to be loaded in the inner enclosure, has a total mass not exceeding 300 kg, cumulative value of the four inner enclosures.

2. CONDITIONING

Inner primary containers: pails

The radioactive material may be packed in bags constituted of material more hydrogenated than water. Packed (or not) radioactive material is placed in pails.

Each inner enclosure must always contain three pails equipped with their ring made of steel or borated steel. These pails, in stainless steel and placed in vertical position, have a nominal diameter of 287.4 mm, an empty mass of approximately 7 kg and a lid in stainless steel with a closing system.

The ring in steel or borated steel has a minimal height of 180 mm, a thickness of 2 mm and an external diameter between 280 mm and 285 mm. This ring may have a longitudinal weld.

The material of the plastic bags must withstand a temperature at least equal to 100°C.

Before loading of the content, a visual check must be done in order to ensure absence of salient parts that could damage the pails.

3. CRITICALITY ANALYSIS

It is subject of chapters DOS-06-00037028-500 Rev.6 (chapter 5A), DOS-06-00037028-506 Rev.0 (chapter 5A-6) the Safety Analysis Report.

Confinement system considered is described in the chapter DOS-06-00037028-500 Rev.6 (chapter 5A) of the Safety Analysis Report.

Criticality Safety Index (CSI): 0.