

(int'l) Transport of NORM

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EAN-NORM 4th WS



IAEA Safety Standards

for protecting people and the environment

Regulations for the Safe Transport of Radioactive Material 2005 Edition

Safety Requirements
No. TS-R-1



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TS-R-1 does not apply to (exclusion)

- (§ 107): Radioactive material moved within an establishment (e.g. mining/processing site) which is subject to appropriate safety regulations in force and where movement does not involve public roads and railway
- (§ 401): Natural material and ores containing naturally occurring radionuclides which are either in their natural state, or have only been processed for purposes other than for extraction of the radionuclides, and which are not intended to be processed for use of these radionuclides, provided the activity concentration of the material **does not** exceed 10 times the values specified in Table 2,



but when it does....

- *Objective of TS-R-1:*
 - *To protect persons, property and the environment from the effects of radiation during transport of radioactive material*
 - Containment of the radioactive contents
 - Control of external radiation levels
 - Prevention of criticality: and
 - Prevention of damage caused by heat



Definitions

- **Consignor:** any person, organization or government which prepares a *consignment* for transport.
- **Carrier:** any person, organization or government undertaking the carriage of *radioactive material* by any means of transport
- **Consignee:** any person, organization or government which is entitled to take delivery of a *consignment*
- **Consignment :** any *package* or *packages*, or load of *radioactive material*, presented by a *consignor* for transport



Definitions (cont'd)

- **Package (Collo)**
 - *Excepted package;*
 - *Industrial package Type 1 (Type IP-1);*
 - *Industrial package Type 2 (Type IP-2);*
 - *Industrial package Type 3 (Type IP-3);*
 - ***Type A package;***
 - *Type B(U) package;*
 - *Type B(M) package;*
 - *Type C package.*



Definition (cont'd)

- LSA I, II and III
 - Low specific activity is a radioactive substance which originally has a modest concentration of radioactivity
 - IAEA $< 300 \text{ Bq/g} \rightarrow \text{LSA I} > 300 \rightarrow \text{LSA II}$
 - Dutch rules:
 - $\text{Bq/g} < 30 \times \text{EL} \rightarrow \text{LSA I}$
 - $\text{Bq/A2} > 0.001 \rightarrow \text{LSA II}$
 - $\text{Bq/A2} > 0.002 \rightarrow \text{LSA III}$

Industriël package (IP-I)

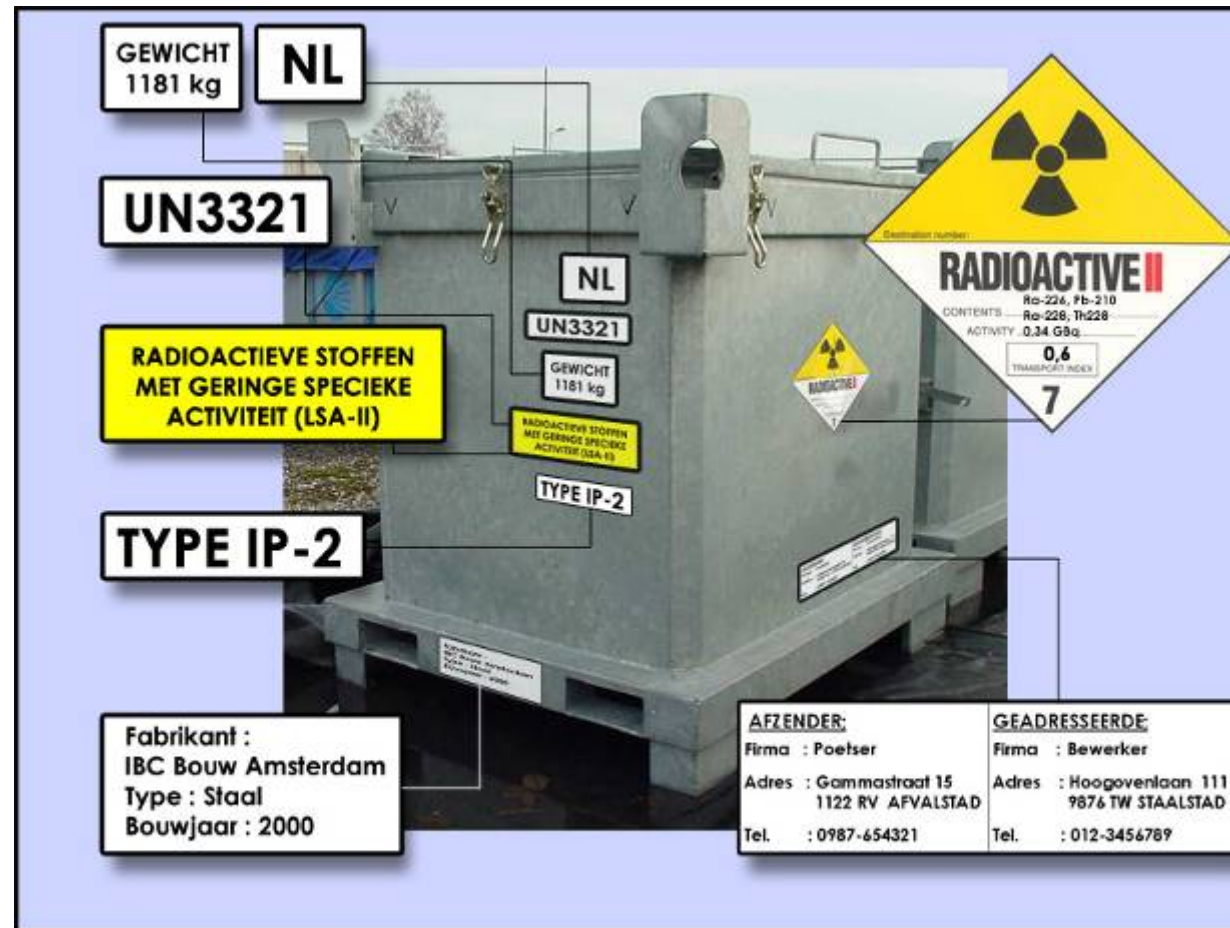


Transport van LSA-I materiaal in verpakking type IP-1: Stoffen met geringe specifieke activiteit.



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Industrial Package (IP-II)



IBC verpakking van het type IP-2 ten behoeve van het transport van stoffen met geringe specifieke activiteit (LSA-II).



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placarding



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Related IAEA publications

- Advisory Material for the IAEA regulations for safe transport of radioactive material (TS-G-1.1) Planning and preparing for emergency response to transport accidents involving radioactive material (TS-G-1.2)
- The management System for the transport of Radioactive Material (TS-G-1.4)



Radiation Protection Programme

- TS-G-1.3
 - Systematic and structured way of the framework of controls applied by transport (Consignor, Carrier, Port operator and Consignee)
 - To provide adequate consideration of RP measures
 - To ensure that RP system is adequately applied
 - To enhance Safety Culture
 - To provide practical measures to meet RP objectives



European Rules

- European agreement about international transport of Dangerous Goods by road (ADR)
- Transport of Dangerous Goods by rail (RID)
- Transport of dangerous Goods by water (ADN and ADN R)



Class

- Class 1: Explosives
- Class 2: Gases
- Class 3: Flammable liquids
- Class 4: Flammable liquids, self reacting substances
- Class 5: Oxidising substances, Organic peroxides
- Class 6 : Toxic substances, infectious substances
- **Class 7: Radioactive material**
- Class 8: Corrosive substances
- Class 9: Misc. Dangerous substances and articles



When using ADR ?

- Above exempted contamination levels
 - $> 0.4 \text{ Bq/cm}^2$ for β - and γ -emitters
 - $> 0.04 \text{ Bq/cm}^2$ α -emitters
- Maximum activity levels
 - A1 (special arrangement) \rightarrow certificate
 - A2 ($< A1$)
- Above exemption levels and NORM ($10 \times \text{EL}$)



Dutch regulation for safe transport of radioactive material

- Transport of fissile material, ore and radioactive materials Decree (1969)
- Prescriptions in Regulation about Transport of dangerous goods by land (VLG) are applicable
 - In-, out-, transit and storage during transportation of radioactive materials are arranged
 - De Recommendations of IAEA relating to transport of dangerous goods are implemented



Belgium regulation for safe transport of radioactive material

- In Radiation Protection Decree (ARBIS) chapter IV deals with in-,out- en transit of shipments.
- They need a license issued by Agency (FANC).



RP Publication

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Australian regulation for safe transport of radioactive material

- Code of Practise for the safe transport of radioactive material (ARPANSA)
 - Adopts TS-R-1
 - Modifying factor (10 x) applies to bulk material or individual items
 - Operator establish a NORM Management plan and discusses this with regulator (ARPANSA)



Radiation exposure in the transport of heavy sands (ARPANSA 2008)

- Dose in 16 different scenario's of transport investigated using γ -spec. TLD and PAS.
 - Transport of concentrate to concentrator
 - Transport of HMC from mine to plant
 - Transport of end product from plant to wharf
 - Transport of end product to customer
 - by road, by rail and by sea
- Highest exposure of worker 0,7 mSv per annum

Booklet: NORM transport

- To increase knowledge and awareness of radiological issues
- Combination of Dutch/Belgium method and Australian examples of transport



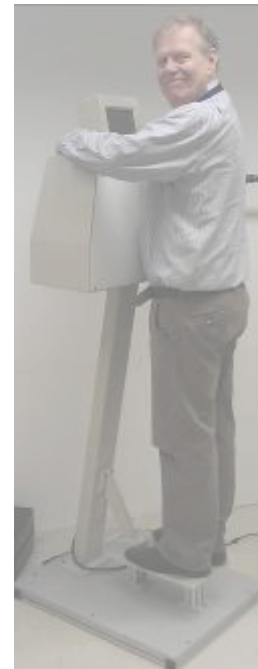
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Thank you for your attention



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