

Implementation of International Guides and National Law for Gamma Radiography in Germany

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Abstract

Non-destructive testing (NDT) is the determination of the structure integrity of material or components using non-destructive techniques as there is e. g. radiographic testing (RT). For radiographic testing x-ray and gamma devices are used. Gamma devices for NDT contain sealed radioactive sources with high activities of several TBq. Due to the potential risk working with high-activity radioactive sources many requirements on their safety and security are made. The european and accordingly the german requirements (Fig. 1) regarding radiation protection are based on the international standards published by IAEA and ICRP. These requirements cover all fields of radiation protection (RP) such as: training on radiation protection (Fig. 2), technical safety (Fig. 3), surveillance (Fig. 4), safe transport (Fig. 5) and security (Fig. 6).

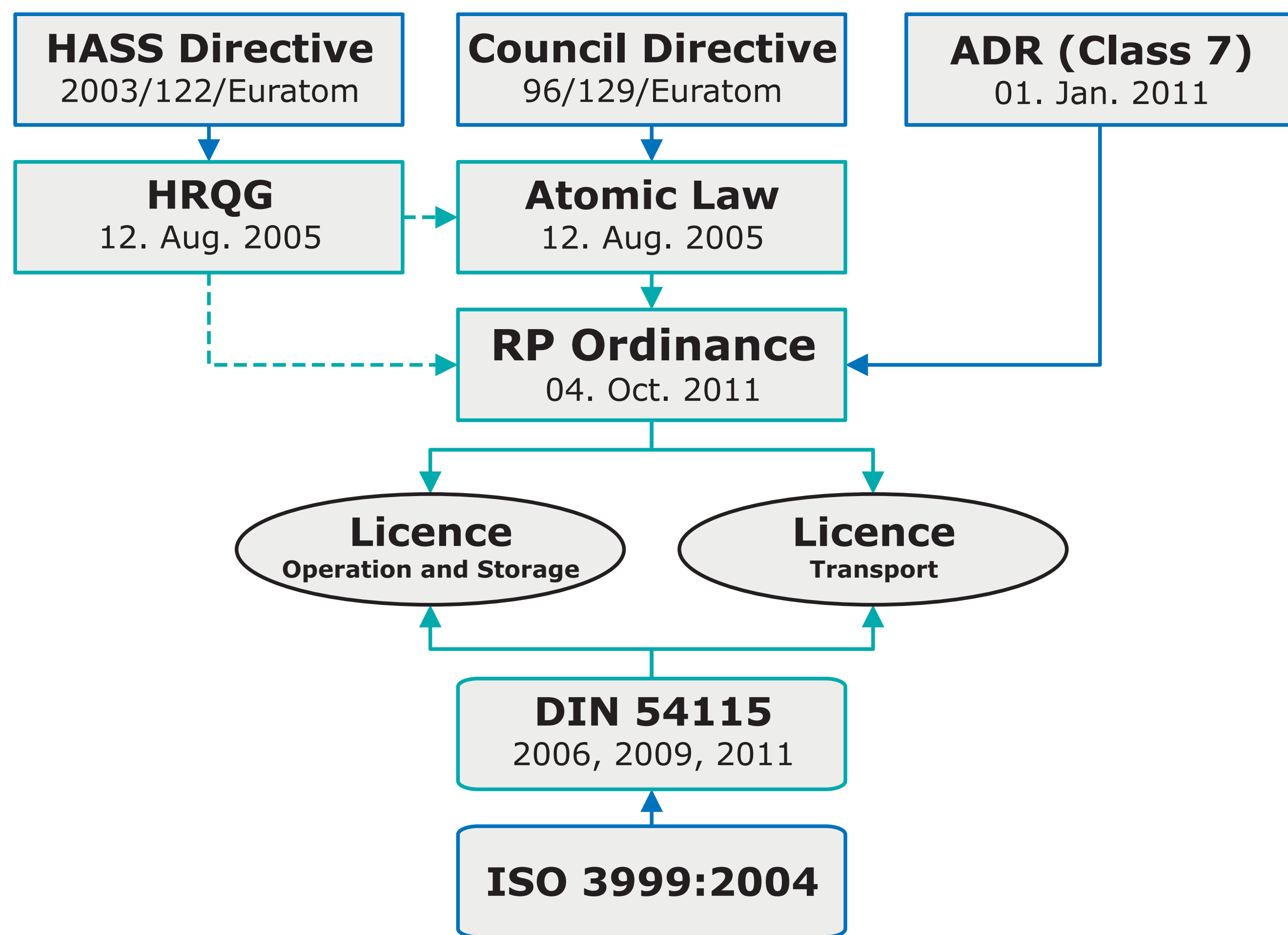


Figure 1: Law structure, international and national law

In Germany the requirements on radiation protection are laid down by the Atomic Law (AtG), Gesetz zur Kontrolle hochradioaktiver Strahlenquellen (HRQG, engl. Surveillance of High-Activity Radioactive Sources), Radiation Protection Ordinance and the german standard DIN 54115. These regulations are based upon the european directives e.g. EURATOM Council Directive (96/29/EURATOM), the European HASS Directive (2003/122/EURATOM) and ISO 3999:2004.

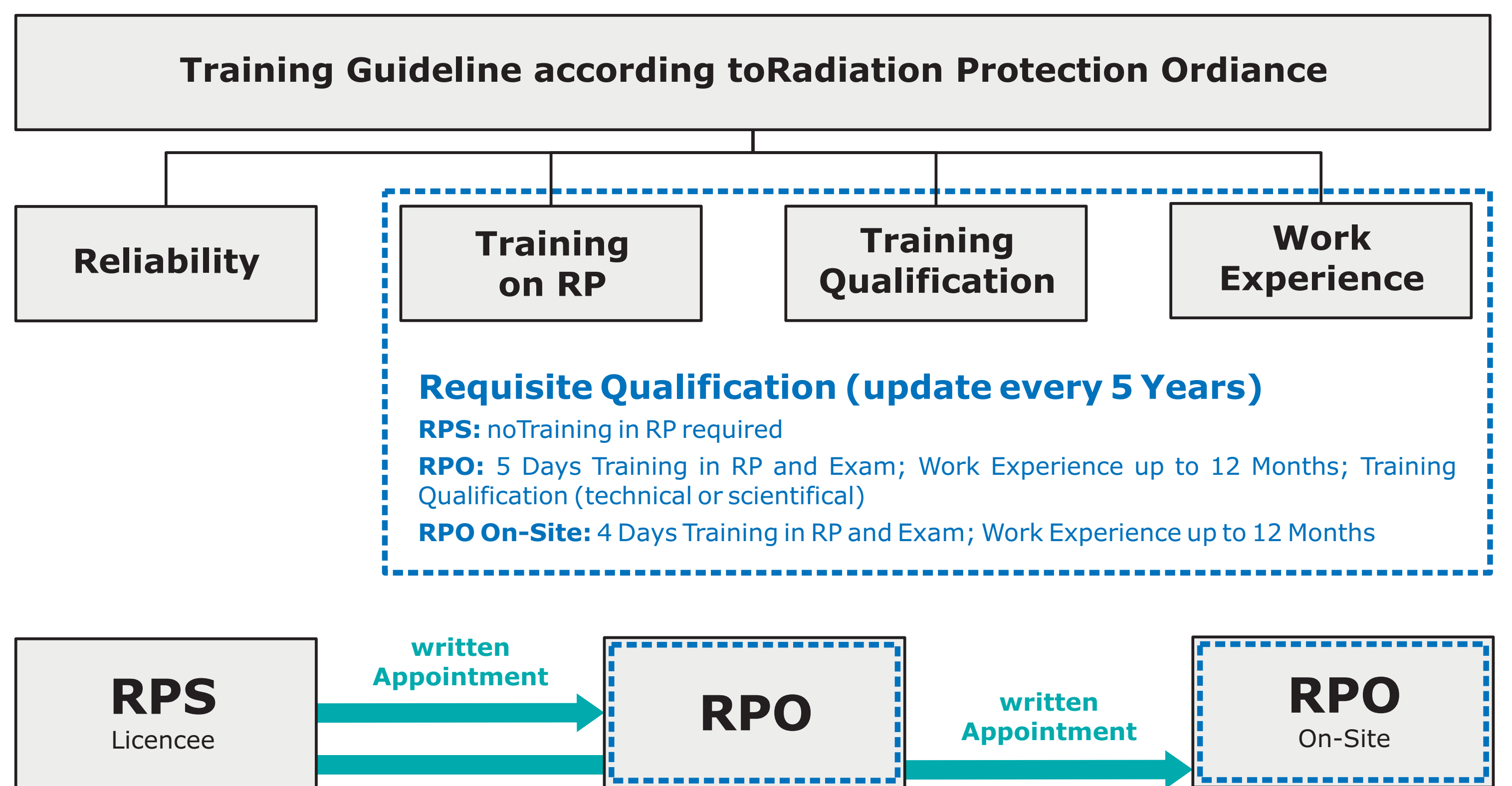


Figure 2: Training and organization of radiation protection

Training on radiation protection shall impart knowledge of how to handle a gamma device safely and how to prevent health or environmental damage. In Germany the licensee is the radiation protection supervisor (RPS), who appoints a sufficient number of radiation protection officers (RPO). The requirements on RPO-training are laid down by the German Training Guideline according to Radiation Protection Ordinance. The requisite qualification in radiation protection must be updated at least every five years.

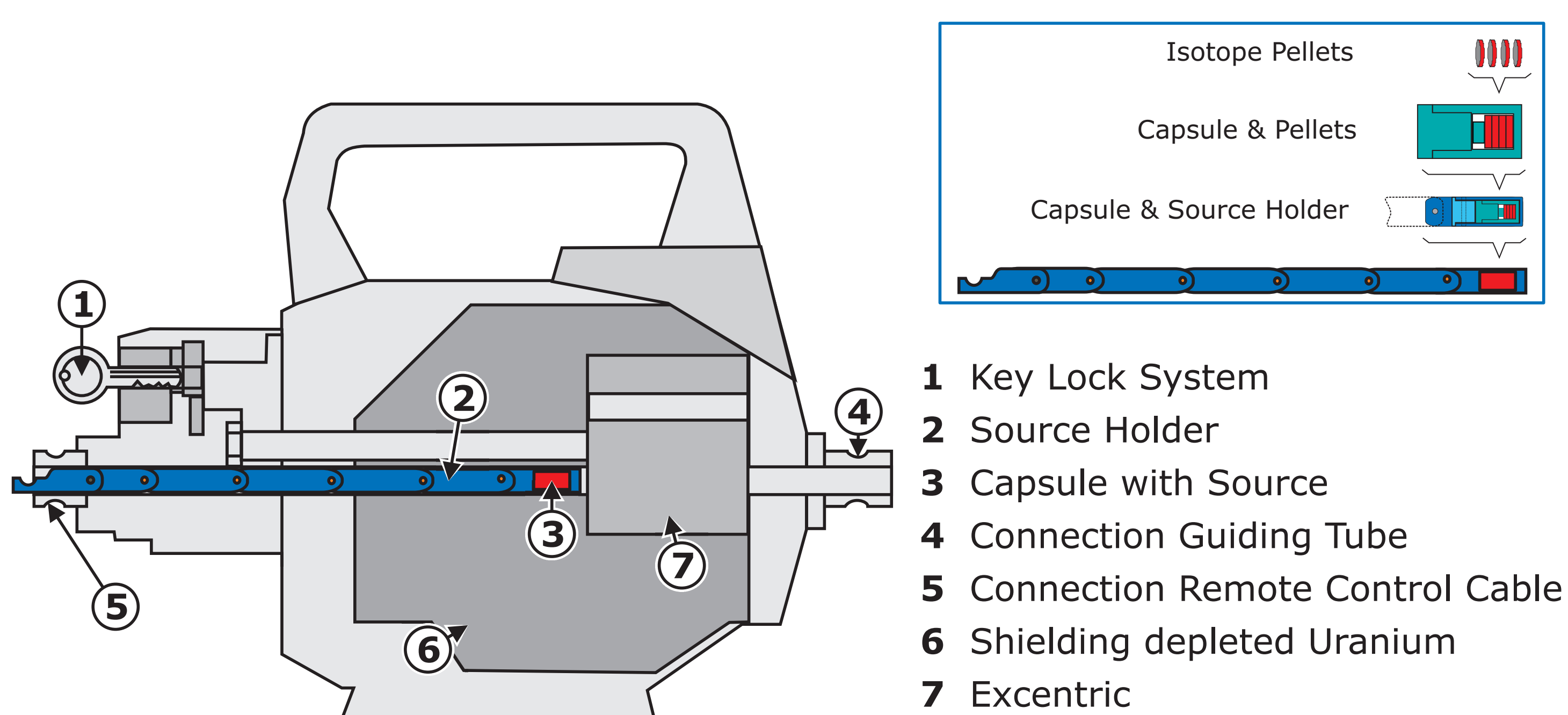


Figure 3: Technical Safety

Technical safety is subject to all parts of gammagraphy equipment with are source and source holder, exposure container, remote control cable, guiding tube and every other component part e. g. collimators. Gammagraphy equipment shall be serviced periodically (once a year) including leak tests and maintenance. Additionally an authorized expert has to inspect gamma devices every 3 years.

Figure 4: Surveillance

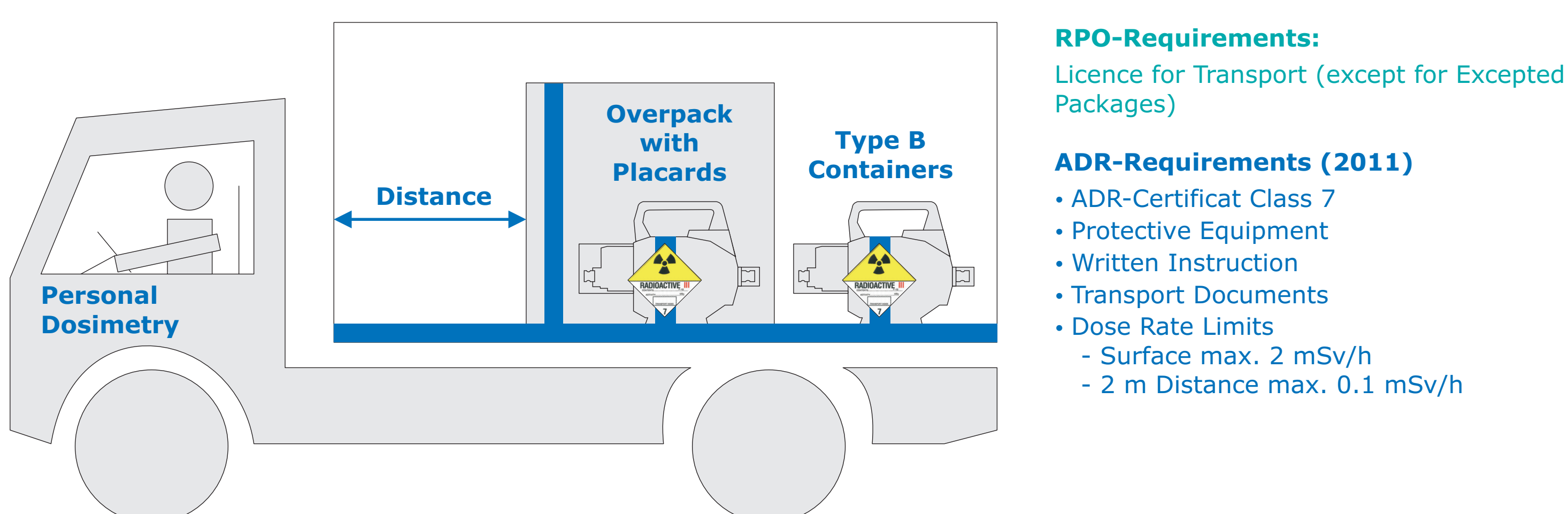
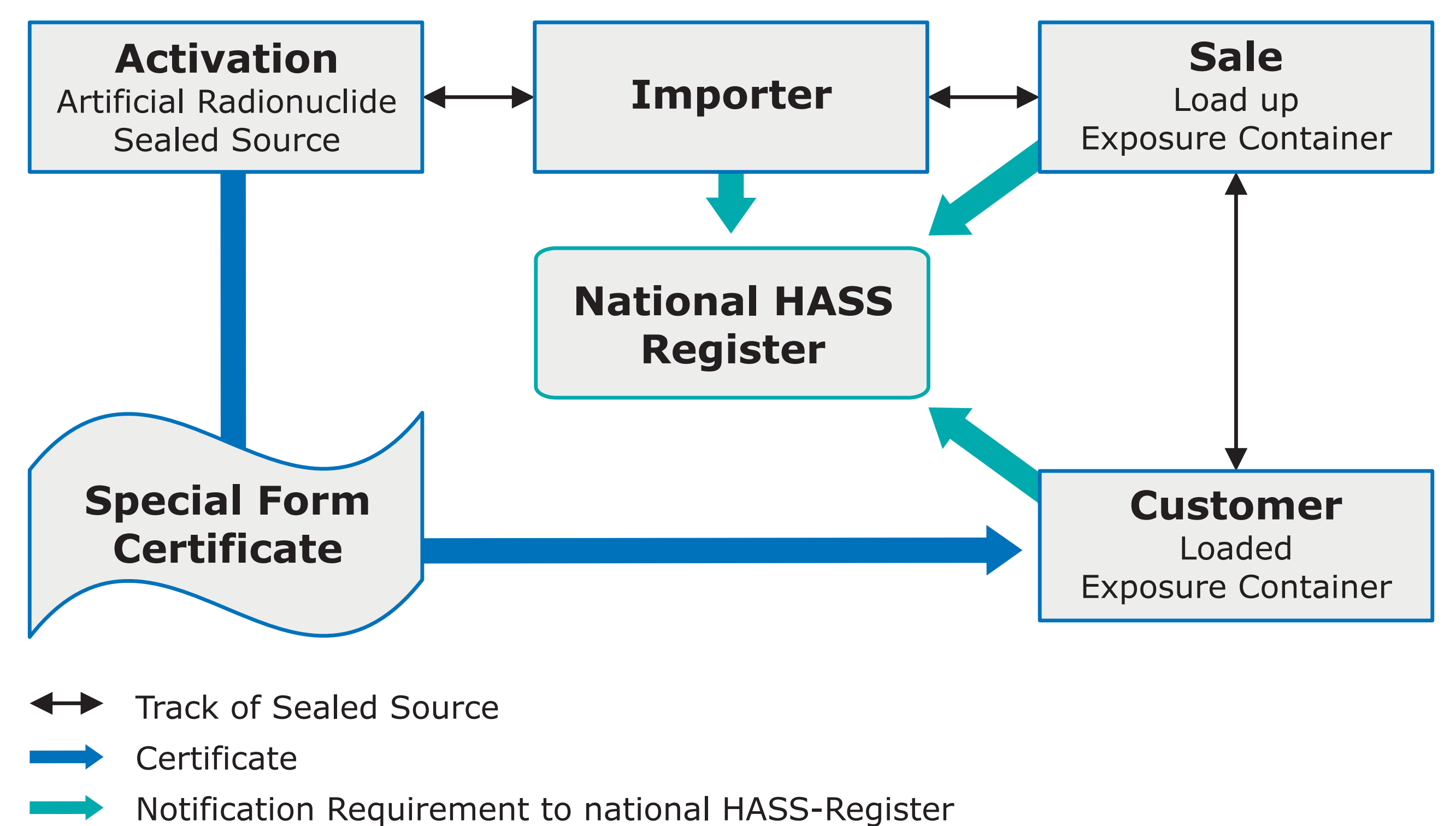


Figure 5: Transport

The requirements of the carriage by road of radioactive material are fixed on the ADR and national on the GGvSEB. The objective is to protect persons, property and the environment. This protection is achieved by requiring the containment of radioactive contents, the type of packaging, the control of external radiation levels, the training of the driver and to implement a radiation protection programme.



In Germany high-activity sealed radioactive sources (HASS) are supervised by the Federal Office for Radiation Protection (BfS). The BfS holds a register (HASS-register) where the features of each HASS such as owner, activity, storage location and application are documented. Source exchanges and change of storage location (stationary or mobile) shall be reported to HASS-register and regulatory body.

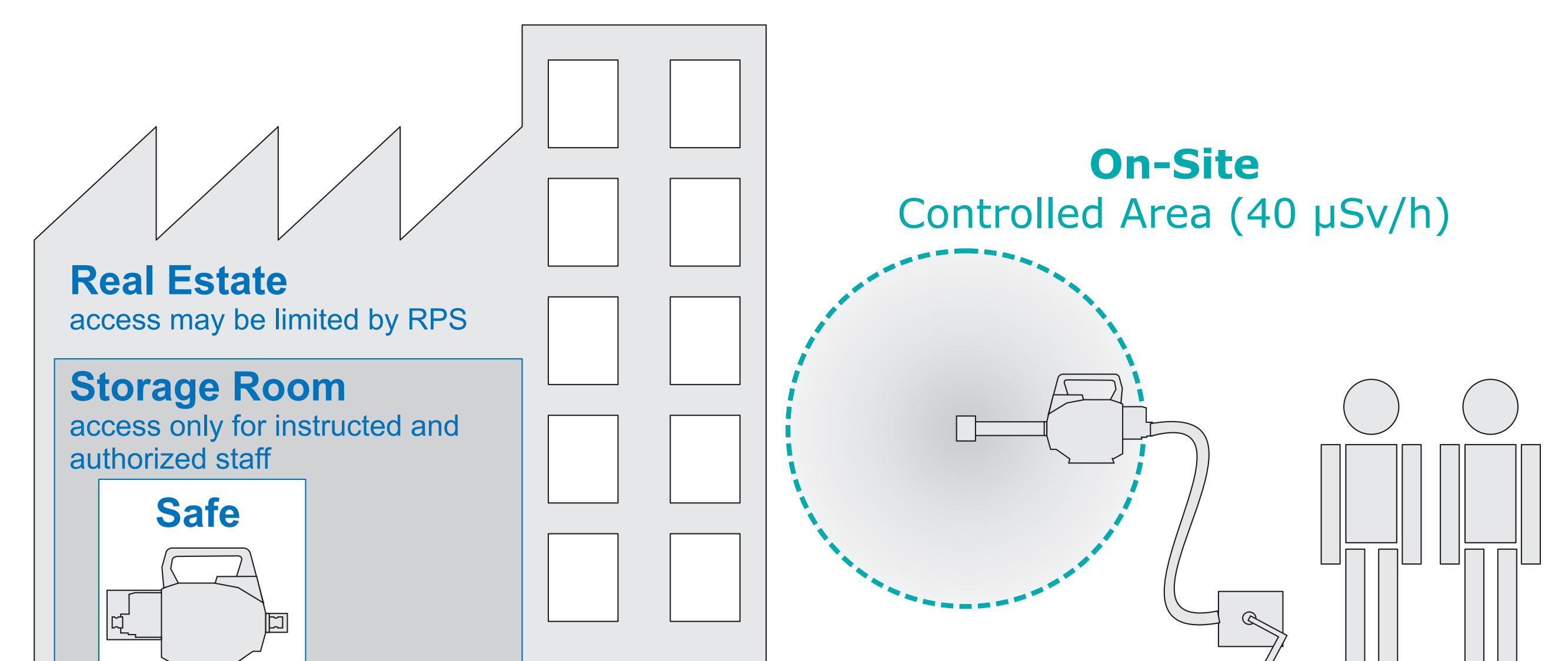


Figure 6: Security (storage and on-site inspection)

Security means protection and precautions to prevent damages, fire and theft. According to DIN 54115-7 gamma devices shall be stored in a lockable and alarm secured storage place. The storage place shall be only accessed by authorized personal instructed in radiation protection and device handling. Regarding on-site testing security will be realized by four-eyes principle. Admittance to the controlled area and unauthorized access to gamma source has to be avoided in any circumstances.

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