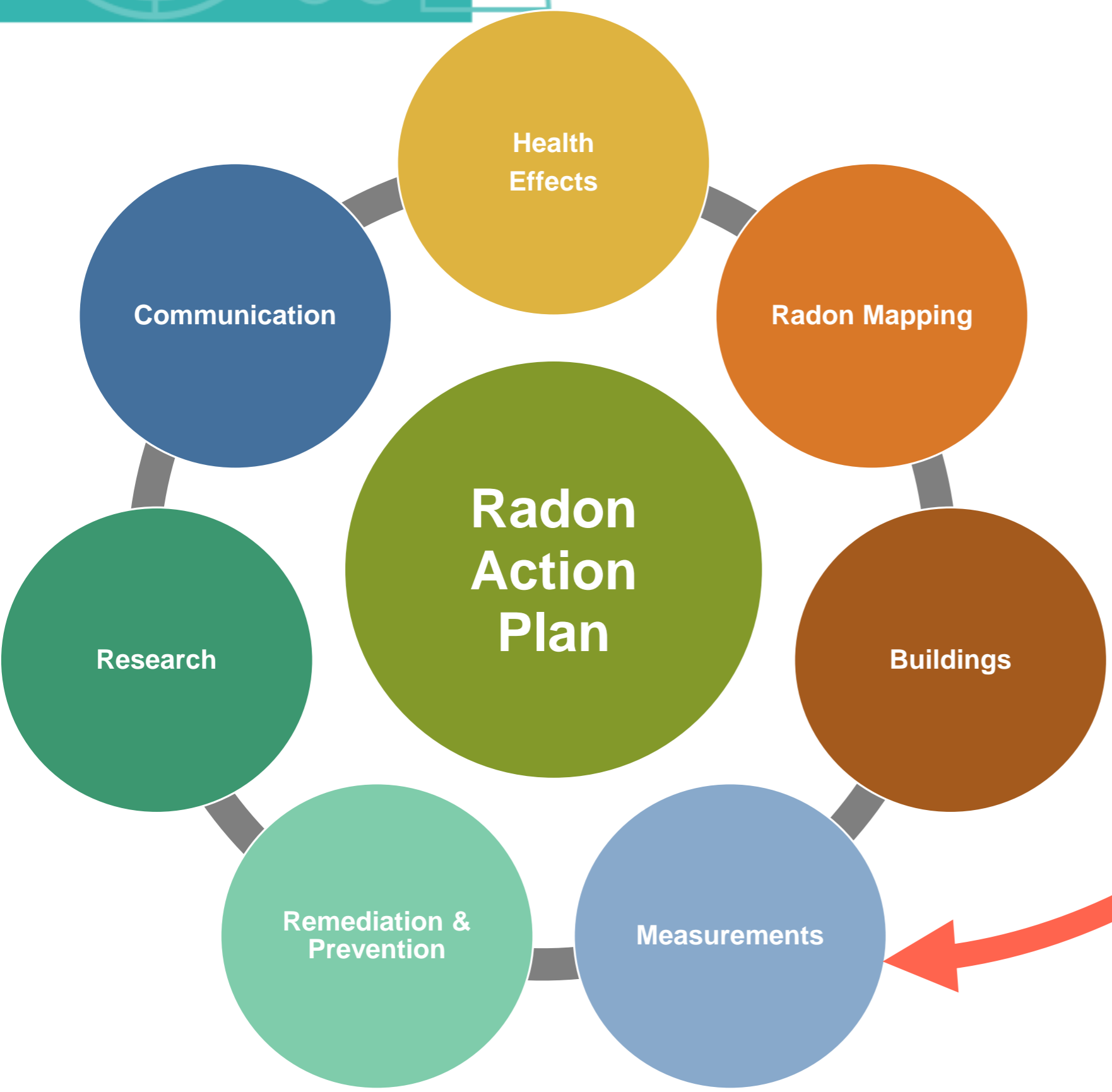




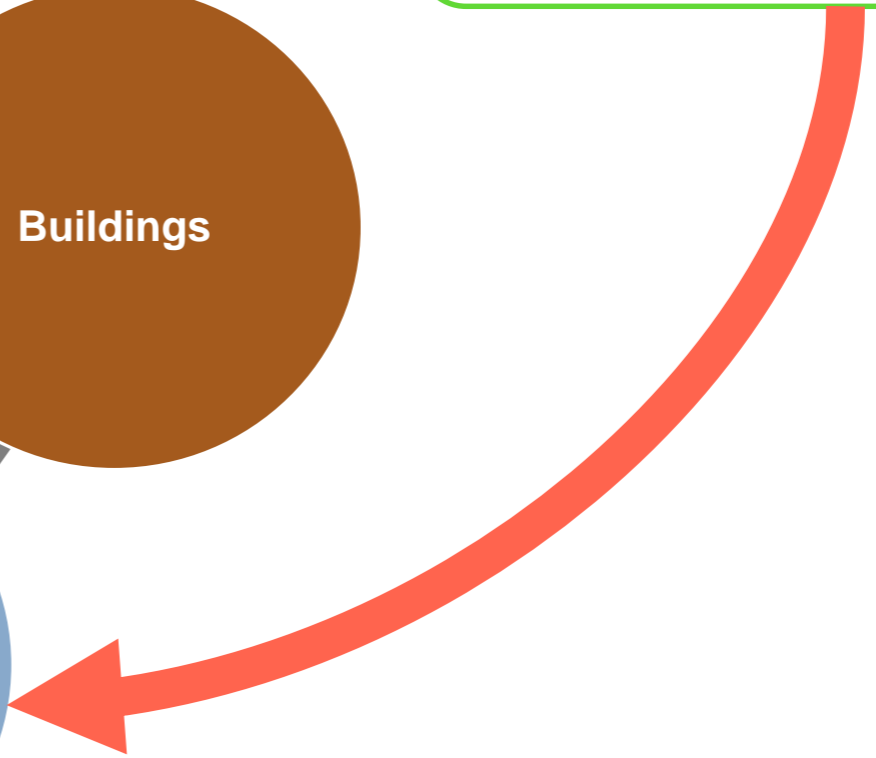
Guide for indoor radon measurement services providers

Radon Action Plan





Guide for indoor radon measurement services providers





Scope

- Promoting quality and specialization of radon measurement services
- Ensuring the consistency and quality of measurements
- Promoting public trust in results provided
- Enable public access to available services that follow the guidelines of the

Competent Authority

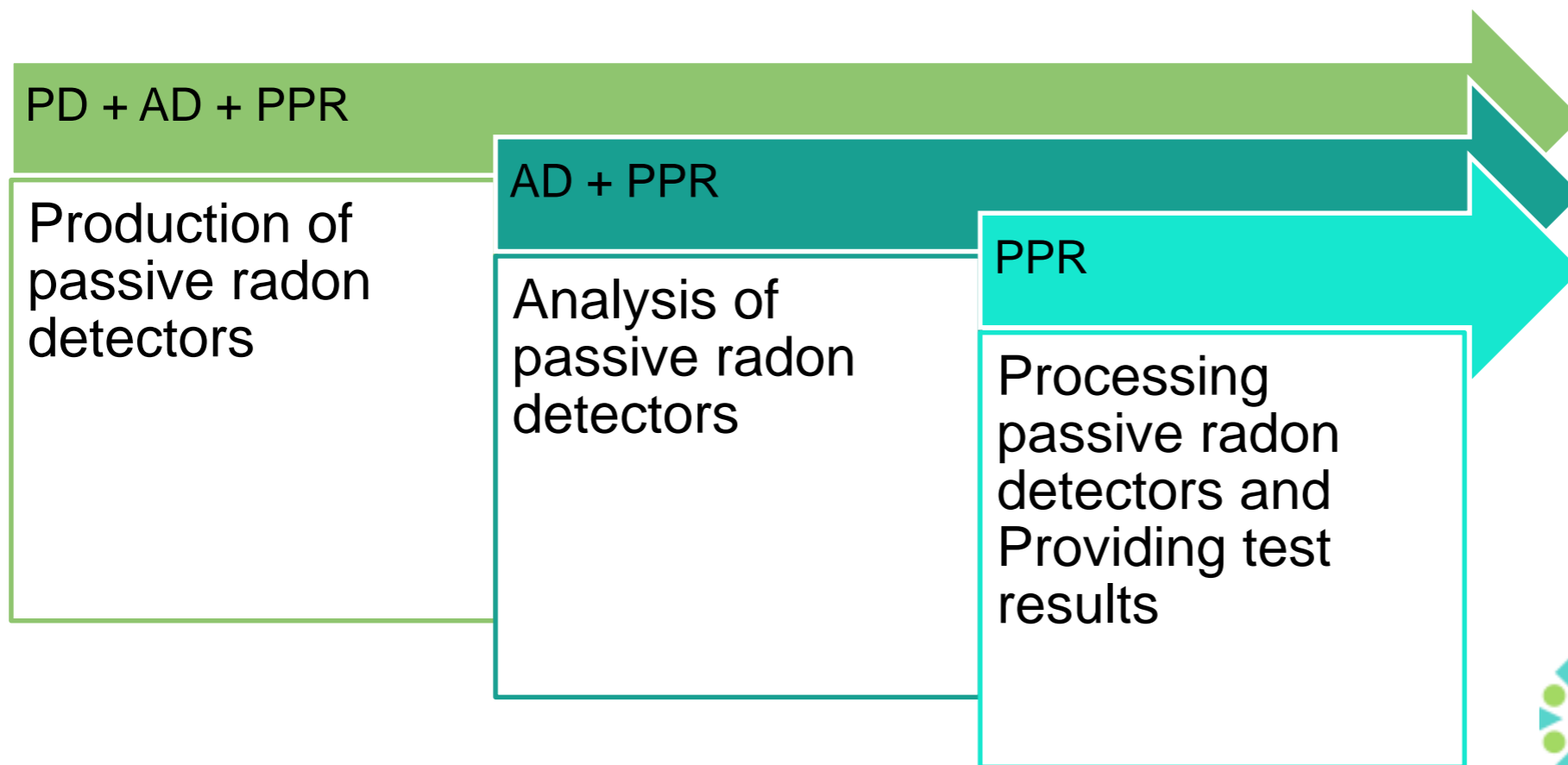


Quality



Radon Services Providers

- Production of passive radon detectors
- Processing passive radon detectors
- Analysis of passive radon detectors
- Providing test results





Assumptions

- Measurement results on an annual average must be comparable to the national reference level, 300 Bq / m³
- Quality control of radon measurements inside buildings
- Accreditation according to the NP EN ISO / IEC 17025
- Long-term measurements with passive detectors, from 3 months to 1 year
- Short-term measurements, between 7 to 30 days, or by active detectors only advised in the context of remediation
- Audits by the competent authority
- Applicants must comply with Portuguese law



Assumptions

- This guide establishes the minimum requirements that passive radon detector suppliers, measurement laboratories and test results suppliers must have to demonstrate the technical competence.
- The competent authority keeps updated and publicizes on its official website, the lists of radon services providers that have declared their commitment to comply with this guide;
- The commitment to provide anonymized radon data to the competent authority annually .



Service quality indicators and recommendations

- **Service quality indicators** are the requirements by which radon measurement services providers must demonstrate their technical and performance capacity.
- **Service quality recommendations** are considered the best practices that radon measurement services providers must adopt to promote the quality and trust of the service provided.



National and international radon detector producers

Recommendations

- Detectors must be able to integrate radon exposure for a continuous period of not less than 3 months.
- They must consist of a solid trace element and a radon diffusion chamber.
- The manufacturer of passive detectors must document all methods with the necessary degree of detail to ensure their correct manufacturing.
- Detectors must be produced in a way that guarantees the principles of reproducibility and sensitivity



National and international radon detector producers

Recommendations (cont.)

- The detector casing must be of a design that excludes radon decay products;
- The characteristics and technical specifications such as applicability, detection limits, calibration factors, background, saturation limit as well as its response to different environmental conditions, must provided to the customer;
- Environmental conditions for the proper functioning of the manufacturing equipment must be always satisfied, including an atmosphere with low radon concentrations;



National and international measurement laboratories and test results suppliers

Indicators for measurement laboratories

- The measurement laboratory must be accredited according to the NP EN ISO / IEC 17025 standard for determining the concentration of radon in the air by using passive detectors.

Indicators for suppliers of test results

- Submit a copy of the accreditation certificate according to the standard NP EN ISO / IEC 17025 of the subcontracted laboratory for determining the concentration of radon in the air by using passive detectors.



National and international measurement laboratories and test results suppliers

Indicators for suppliers of test results

- Have a quality assurance system for detectors with the following specifications:
 - a) Detectors must be stored in radon-free environments / atmospheres (before and after exposure).
 - b) The detectors must have a unique identifier in order to guarantee the traceability that must be maintained after the return of the customer together with the start and end dates of exposure.
- Have a customer management system.



National and international measurement laboratories and test results suppliers

Recommendations:

- The recommended method to make the initial measurement and the effectiveness measurement is by passive radon detectors.
- The analysis of passive detectors is recommended to be performed according to the measurement techniques described in ISO 11665-4 - Measurement of radioactivity in the environment - Air: radon-222
- Detectors must be able to integrate radon exposure in the air for a continuous period of not less than 3 months.



National and international measurement laboratories and test results suppliers

Recommendations (cont.):

- The detectors must consist of a solid trace component and a radon diffusion chamber;
- The detector casing/holder must be of a design that excludes radon decay products;
- The communication of results to costumers must be made clearly in the format specified in the guide.

National and international measurement laboratories and test results suppliers

Recommendations (cont.):

- Customers must be informed of the conditions of use, placement and shipping of the detectors.





Measurements in dwellings

Measuring principles:

- The detector must be placed in the room where the most time is spent (bedroom or living room).
- If placing more than one detector, the choice of location must be made with the same occupation principle.
- Do not place the detectors in unoccupied rooms such as corridors, garages or storage rooms.
- The detector must remain in the same room at all times for sampling.
- Measurements to test the effectiveness of corrective measures must be taken in the same occupied room as the initial measurement.



Measurements in dwellings

Measuring principles (cont.):

- The customer must receive appropriate instructions for placing and returning detectors.
- Radon concentrations in the air must be reported in units of becquerel per cubic metre of air (Bq / m³).
- The supplier must inform the customer of the estimated average annual concentration of radon in the air for the home. If the supplier places more than one detector, it must report the average concentrations of radon in the air measured by each detector, but they must clearly distinguish them from the estimated annual average.



Measurements in dwellings

Measuring principles (cont.):

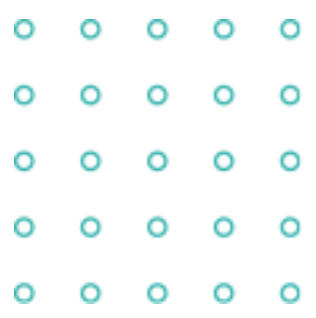
- The advice and information provided to the Client, in the final analysis report, must be based on the estimated average annual concentration of radon.

Reference Level	Advice
$\leq 300 \text{ Bq/m}^3$	The result is below the national reference level, it is not necessary to implement corrective measures.
$> 300 \text{ Bq/m}^3$	The result is above the national reference level, it is necessary to implement corrective measures. Perform a radon test after installation to verify the effectiveness of the measures implemented.

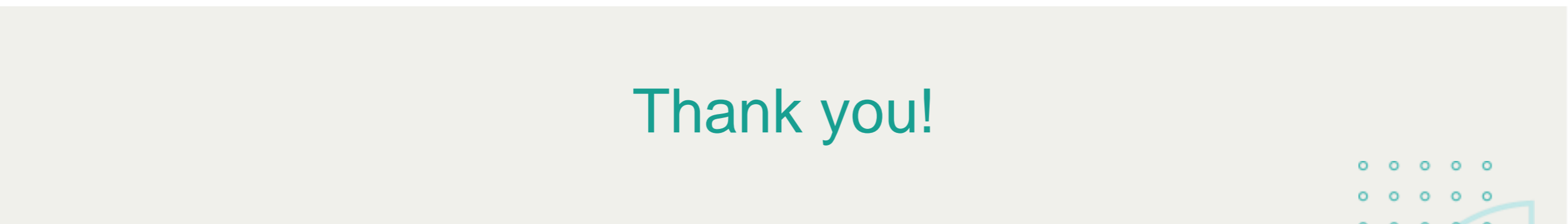


Measurements in workplaces

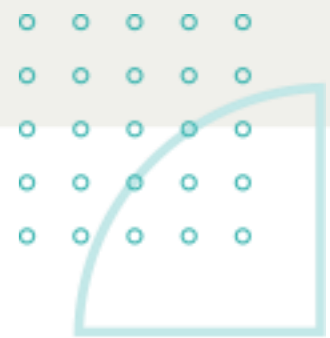
Decree-Law nº108 / 2018, of 3 December, determines employers' responsibilities in relation to the protection of exposed workers. Monitoring of radon in the workplace is therefore an obligation of the employer in accordance with article 147.



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Thank you!



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