

Distributing the samples for indoor radon measurements

Recommendations for teachers

1. The number of samples should be such that it is enough for all students whose parents have given consent. In addition to the homes of schoolchildren, two measurements must be carried out in the school building. One measurement is carried out in the same classrooms to demonstrate the procedure for filling in the questionnaire and starting the measurement using the mobile phone (this can be combined with clause 3). Another measurement is carried out in one of the classrooms, which is located either on the ground floor or in the basement. If there are remained samples, they should be distributed among the teachers and school staff for radon test in their homes. **In all other buildings except the school, only one radon test is conducted** (additional measurements in the same building distort the overall statistics for Israel).

If unused samples remained, please put them into a separate package.

2. Indoor radon measurements are carried out in the bedroom where the occupant spends most of the lifetime. Usually the radon levels in basements are higher than in upper floors, however basements are rarely occupied. Therefore, the radon test in the basement, which is not a bedroom, should not be carried out.

3. It will be useful if during the distribution of the samples, the schoolchildren try to scan the QR code on their sample, but WITHOUT pressing the START button in the mobile application. If someone does not use a mobile scanner, we recommend downloading the mobile application for scanning the QR code, such as "i-nigma".

Everyone must carefully read the instructions in the mobile application before measuring (the instructions in English and Hebrew and Russian are enclosed).

4. It is important to note that the geolocation and the start of the test are recorded only using a mobile phone. **To stop the test at the appointed time, it is necessary once again to scan the QR code and press the STOP button in the mobile application.**

5. The start of the test should be on the day of distribution of samples on **Tuesday**. The teacher should remind about the start of the test on **Wednesday**, if someone did not start the test on Tuesday. Test duration must be at least 3 days. The students should stop of the test and return the samples on **Sunday or Monday** (in the morning). The samples must be returned to the Technion on **Monday**. **The teacher should remind the students (a) how and when to stop the test, and (b) not forgetting to return the samples on Monday morning at latest, if someone by some reason did not stop the test on Sunday.**

Address for delivery of samples to the Technion on **Monday (at any time)**: Haifa, Adam HaCohen, 17, Andrei Tsapalov, Tel.: 053-232****, geolocation: 32°46'47.4"N 35°00'59.4"E; <https://goo.gl/maps/n9JSYAP17QR2>

6. If not all the samples are collected on **Monday**, please do not change the plan to return the exposed samples (including unused and not relevant samples) to the Technion. All the samples that were not returned to the school at the scheduled time should be collected later and mailed to the address: National Building Research Institute (NBRI), Technion City, Haifa 3200003, Dr. Andrei Tsapalov.

7. Teachers should keep the records of the number of samples received and returned to the Technion.

8. This document, as well as the Radon Map with measurement results and important information about radon, is available on the Technion NBRI website (Activities > Radon Project): <https://nbri.net.technion.ac.il/en/radon-project>

Guide to sampling

- 1) Permit the use of your current location by your mobile telephone
- 2) Select a place of sampling in the bedroom: (a) away from sources of cold, heat, moisture, winds and direct sunlight, (b) at a height of 0.5 to 2 meters from the floor (on the surface or inside the furniture), (c) providing the charcoal flacon integrity during the sampling period.
- 3) Remove the flacon from the package, open the lid, install the flacon vertically and click the button **“Start sampling”** (the duration of passive sampling is 4 to 5 days).
- 4) After starting the sampling, the recommended date and time (morning) for the completion of the sampling will be indicated. Please set a reminder in your phone about the end of the sampling at the defined time.
- 5) If the opened flacon fell during the sampling, indicate this via the Web-application (re-scan the QR code).
- 6) To complete the sampling at the defined time, tighten the lid of the flacon with effort, put it into the package and close the Zip-lock. In addition, rescan the QR code and then click the button **“Stop sampling”** in the application.
- 7) After the end of sampling, the sample must be delivered to the laboratory for analysis as soon as possible (within 4 days), since the reliability of the result significantly decreases due to the decay of adsorbed radon.

הנחיות לדגימה

1. התר את השימוש במיקום הנוכחי שלך (מיקום גיאוגרפי) באמצעות הטלפון הנייד.
2. בחרו מקום לדגימה בחדר השינה על פי הקריטריונים הבאים:
 - א. הרחק ממקורות של קור, חום, לחות, רוח ואור שמש ישירים.
 - ב. בגובה של 0.5 עד 2 מטר מהרצפה (ניתן להניח על פני השטח ועל רהיטים).
 - ג. שמור על שלמות בקבוק הפחם בזמן תקופת הדגימה ומנעו את נפילתו.
3. הוצא את בקבוק הפחם מן החבילה, פתח את המכסה, הנח את בקבוק הפחם במצב אנכי ולחץ באפליקציה על הכפתור "התחל" (משך הדגימה הוא 4 עד 5 ימים).
4. לאחר תחילת הביצוע הדגימה, תראה את התאריך ואת הזמן המומלץ (בוקר) לסיום חשיפת הפחם הפעיל בבקבוקון, כולל השעות הקרובות. הגדר תזכורת בטלפון הנייד שלך על סיום הדגימה של הבקבוקון.
5. אם בקבוק הפחם הפתוח נפל במהלך הדגימה, דווחו על כך דרך האפליקציה באמצעות סריקת חוזרת של קוד ה-QR.
6. ביום ובשעת היעד, סיגרו את המכסה בחוזקה, הניחו את בקבוקון הפחם בחזרה בחבילה וסגרו את הרוכסן. לבסוף, סרקו שוב את קוד ה-QR ואז ללחוץ על כפתור "סיום חשיפה" בטלפון.
7. לאחר סיום הדגימה, יש להעביר את הדוגמה למעבדה לניתוח תוצאת הבדיקה מוקדם ככל האפשר (תוך 4 ימים), כי אמינות התוצאה פוחתת משמעותית עקב התפרקות הראדון הנספח בזמן.

Инструкция по экспонированию

- 1) Разрешите использование текущего местоположения (геопозиции) Вашим мобильным телефоном
- 2) Выберите место экспонирования в спальне, отвечающее следующим требованиям:
(a) удаленное от источников тепла, холода, влажности, сквозняков и лучей солнечного света, (b) на высоте от 0.5 до 2 метров от пола (на поверхности или внутри мебели), (c) исключающее вибрации, перемещение или падение флакона во время экспозиции (когда открыта крышка).
- 3) Извлеките флакон из пакета, открутите крышку и установите его в вертикальном положении, затем нажмите кнопку **“Начать экспонирование”** (продолжительность экспонирования флакона составляет от 4 до 5 дней).
- 4) После запуска экспонирования вы увидите дату и рекомендуемое время (утро) завершения экспонирования флакона. Пожалуйста, установите напоминание в своем телефоне об окончании экспозиции флакона в назначенное время.
- 5) Если во время экспозиции флакон падал, укажите это в анкете (для входа в анкету отсканируйте QR-код).
- 6) Для завершения экспозиции в назначенное время с усилием закрутите крышку на флаконе, уложите его в пакет и застегните Zip-lock. Кроме того, отсканируйте QR-код и затем в приложении нажмите кнопку **“Завершить экспонирование”**.
- 7) После завершения экспонирования образец должен быть доставлен в лабораторию для анализа как можно быстрее (в течение не более 4 суток), поскольку достоверность результата резко снижается вследствие распада адсорбированного радона.

Annex A. The Web-application including Guide to sampling and Questionnaire
(English version)

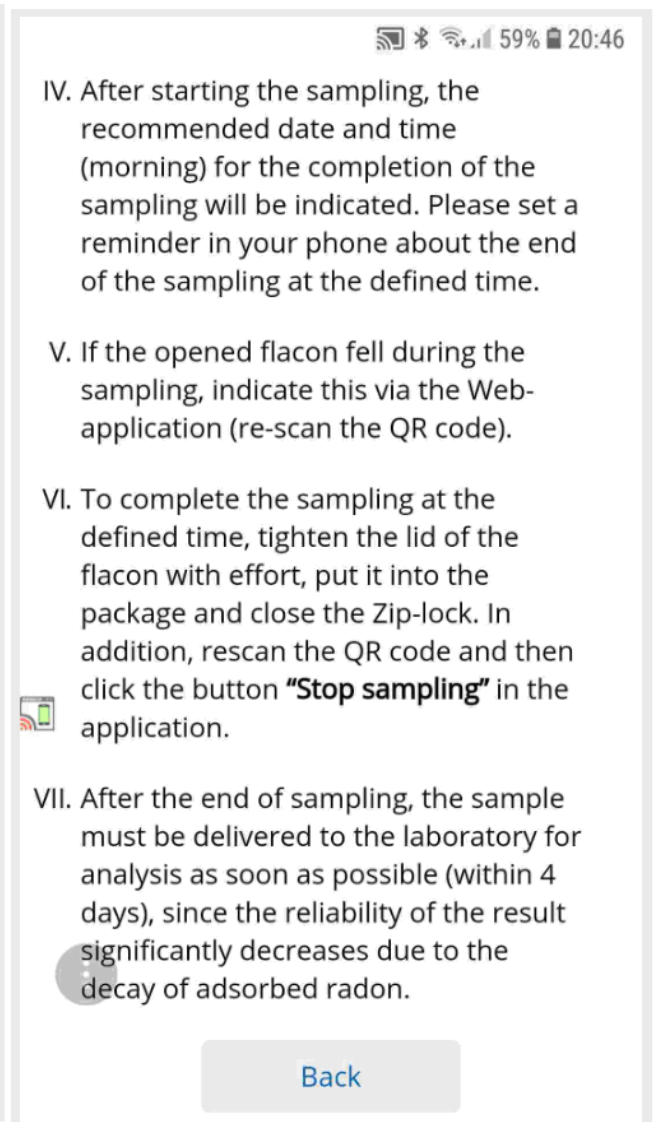
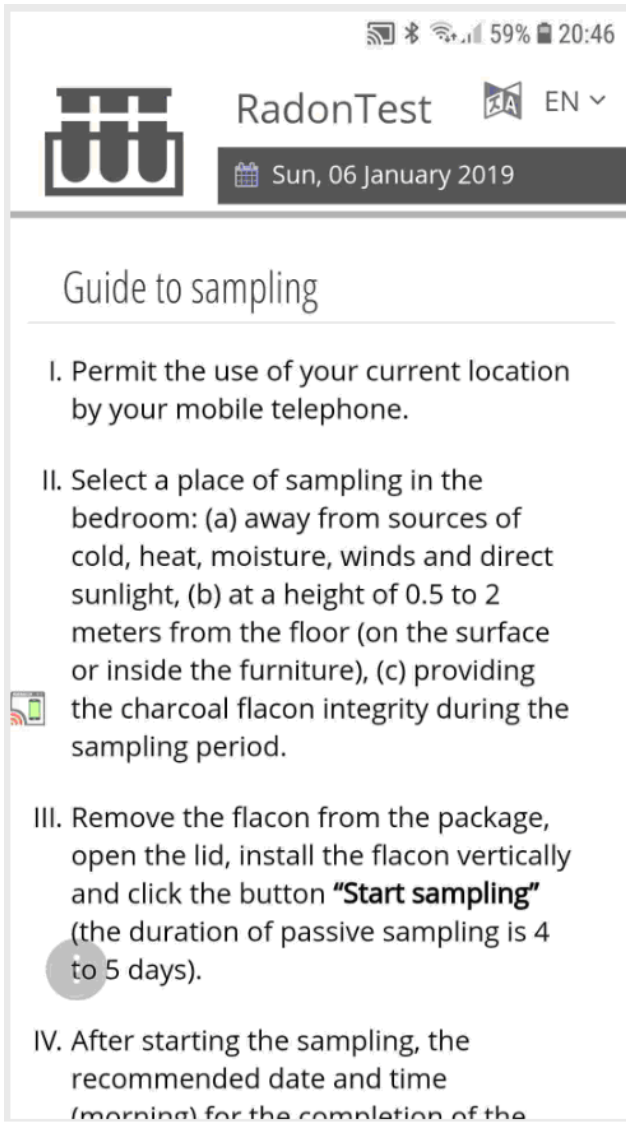


Figure A1. Guide to sampling

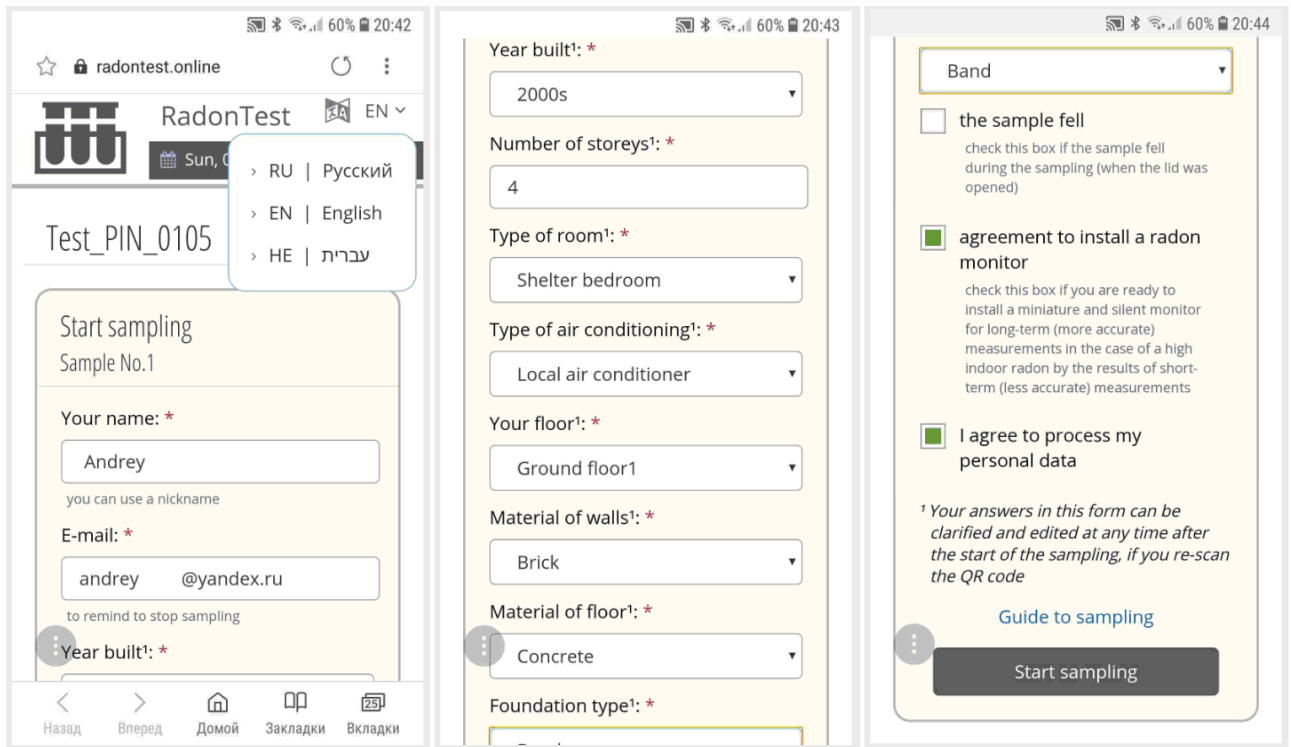


Figure A2. Questionnaire (the responses are selected from the lists by clicking the relevant item)

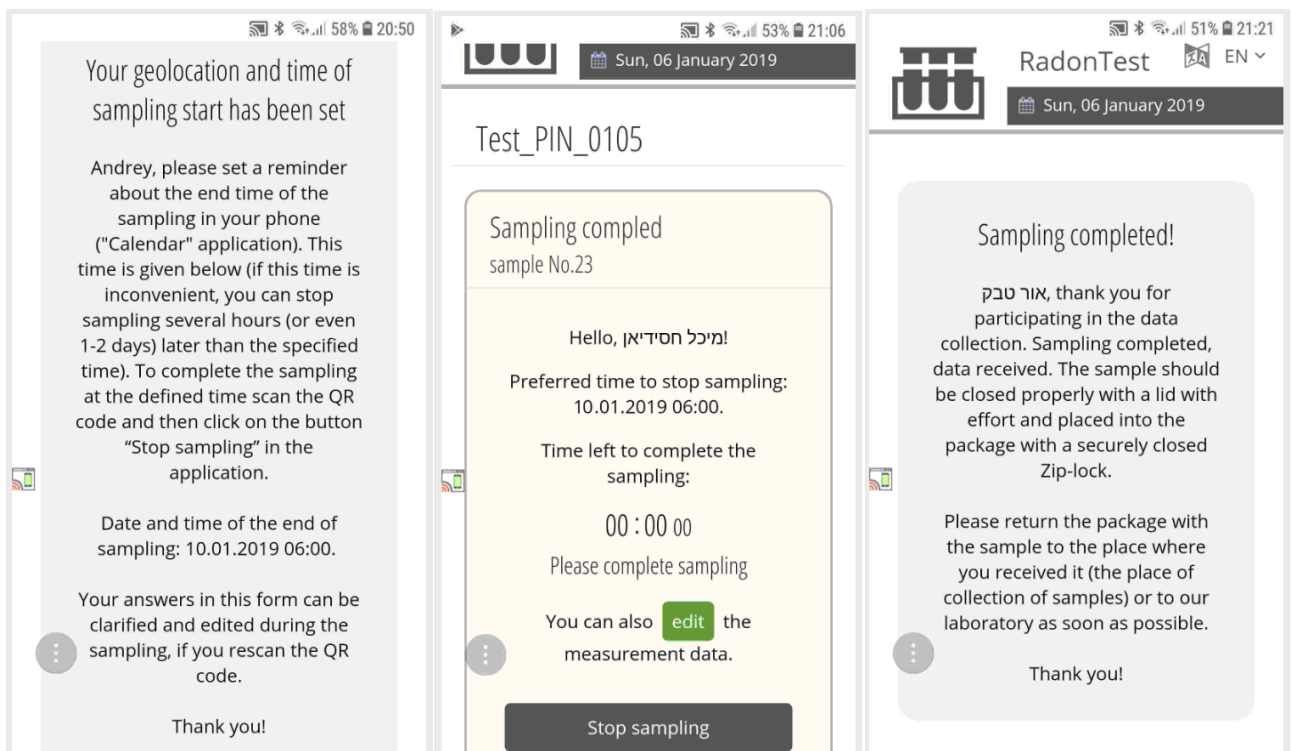


Figure A3. The most important messages in the application after start and stop of sampling