



# Creation of Civil Defence Shelter

## Activation and Operating Instructions

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The aim of the thesis was to develop instructions for the activation and operating phase of civil defence shelter for the Helsinki City Rescue Department. The purpose of the instructions is to combine and refine existing information in such a form that it can be used as a basis for an instruction manual. The work focuses on clarifying the planning, activation, and operation processes of the S1-class civil defence shelters.

A literature review and expert interviews were used as research methods, which provided a comprehensive understanding of the activation of S1-class civil defence shelters and their operation during wartime. Information was also collected from, among other things, civil defence guides, books, and legislation. The interviews provided in-depth and practical information about the topic.

The results show that clear and comprehensible instructions are necessary in order to quickly and efficiently activate civil defence shelters and to operate them correctly. The instructions created will help Helsinki City Rescue Department to provide clear operating instructions to housing companies that are responsible for the maintenance and operation of shelters. The instructions presented in the thesis can be used to improve the efficiency of the activation and operation of civil defence shelters.

The Helsinki City Rescue Department can use the results of the thesis widely for civil defence training, and to provide valuable information for the effective and correct use of civil defence shelters. The developed instructions are a significant addition to the development of civil defence guidelines.

Keywords: civil defence shelter, civil defense, preparedness, instructions, manual

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## 1 Introduction

In late 2022 the Ministry of Interior launched a research project called Väestönsuojien nykytila Suomessa (Current status of civil defence shelters in Finland) to examine civil defence shelters and civil defence as overall. One of the four recommendations of this project was to develop communications and instructions related to civil defence shelters. (Valtioneuvosto 2023)

The goal of this thesis is to research civil defence shelter activation and operating procedures. Based on this, the objective is to develop instructions for the Helsinki City Rescue Department that compiles and processes the existing information into a form that can be published as an instruction's booklet.

### 1.1 Goal and scope

The resulting instructions manual should be a clear, layman-oriented output that the Helsinki City Rescue Department can use in their training and also publish and distribute to a housing companies and other stakeholders. Based on the conversations with the client, the manual should contain instructions for planning the activation, emptying, and preparing the shelter and using it. Spending extended periods in the shelter might be necessary, making the ability to operate it valuable. The manual should not be shelter specific, but it should give overall information for all S1 class shelters.

At the centre of the development task is the need to collect, combine and refine scattered information about the activation and operating procedures of S1 civil defence shelter. Since the residents of the building, who are essentially laymen, are responsible for the activating and operating the shelter, it is essential that such information is presented in a form that is easy to understand and apply.

The Finnish National Rescue Association (SPEK) is an expert organization in preparedness, accident prevention, and the rescue sector. They conduct research activities and safety communication, offer training opportunities, and participate in societal discussions (SPEK n.d. a).

As part of its activities, it publishes various studies and guidebooks. It has published a guide titled Maintenance and Use of Civil defence Shelters - A Guide for Civil defence Shelter Holders. In addition, various rescue departments and private companies have prepared different guides and instructions, but their scope is broad, including, for example, instructions on the maintenance and structure of civil defence shelters. The actual activation

and especially operating phase is only a part of the content of these guides. Specific instructions for individual civil defence shelters have also been prepared.

## 1.2 Working life partner

The working life partner of this thesis is the Helsinki City Rescue Department. Its mission is to rescue victims of accidents and protect the environment and property in the Helsinki area. In addition, tasks include extinguishing fires, preventing imminent accidents, and warning the population in matters related to civil protection, for example. It has 12 rescue stations and 4 sea rescue stations. In 2023, the Rescue Department performed 9,597 rescue alert tasks and 60,914 first aid tasks. In terms of civil defence, the Rescue Department cooperates closely with the security organization of the City of Helsinki. (Pelastustoimi n.d. a)

## 2 Civil defence shelters in Finland

In 2022, there were approximately 50,500 civil defence shelters in Finland. In terms of shelter capacity, this corresponds to about 4.8 million individuals. This dated back to the Cold War era when the threat of nuclear war prompted many countries, including Finland, to spend more to civil defence infrastructure. Over the years, these regulations have evolved to adapt to new threats and technological advancements.

Shelters are designed to protect the population for example from pressure waves, explosion, and shrapnel effects as well as radiation and substances hazardous to health. Civil defence shelters are mainly found in the cities and population centres, where most of the population lives and large buildings are located. Most of these shelters are property-specific civil defence shelters. (Pelastustoimi n.d. b)

A large number of people living in cities, especially in apartment buildings, are used to storing their goods in storage spaces built in these shelters. Regardless of this use the requirement is that the shelter must be able to be emptied and put into use within 72 hours. This requirement comes from the Rescue Act (379/2011 § 76).

Even though Finland has enough civil defence shelters in terms of quantity, their condition varies considerably. Some shelters are well maintained and ready for immediate use, while others may require significant repairs and upgrades to meet current requirements. During the war, the responsibility for putting these shelters in working condition and operating them belongs to the residents of the houses themselves.

Finland has experienced decades of deep peacetime, and society has generally been stable. For these reasons, the true purpose of these spaces may have often been forgotten by the

civilian population. However, the war Russia started in Ukraine in 2022 brought civil defence back into the public debate.

## 2.1 Legislation regarding civil defence shelters in Finland

In Finland, regulations concerning civil defence shelters are specified in legislation. Key ones among these are the following laws and regulations:

**Rescue Act:** The general purpose of the act is to reduce accidents and thereby improve safety. It determines the responsibilities and obligations of various actors in terms of civil defence. The act also stipulates the obligation to build a civil shelter, the general criteria of the shelter and its activation readiness. Many parts of the act are specified by regulations. (Rescue Act 379/2011)

**Government Decree on Civil Defence Shelters:** The decree determines the technical details of civil defence shelters. These include, for example, the size of the shelter, the thickness of the structures, the dimensioning of the foundations and the shrapnel protection. These provisions are detailed for each shelter class if there is a difference in the requirements between the classes. (Government Decree on Civil Defence Shelters. 5.5.2011/408)

**Government Decree on Civil Defence Shelters' Equipment and Supplies:** The decree sets requirements for the characteristics, function, and manner of use of the equipment and supplies used in the construction and equipping of civil defence shelters. The regulation deals with, among other things, shelter doors and hatches, ventilation equipment, water and waste management, and the service life of the equipment. (Government Decree on Civil Defence Shelters' Equipment and Supplies. 409/2011)

**Ministry of the Interior Decree on the Technical Requirements for Civil Defence Shelters and Maintenance of Shelter Equipment:** The decree stipulates more details on the technical structure of civil defence shelters. Regarding the equipment, the decree stipulates that they must be inspected every 10 years. Ministry of the Interior Decree on the Technical Requirements for Civil Defence Shelters and Maintenance of Shelter Equipment. 506/2011

## 2.2 Key Concepts

The key concepts of the thesis are civil defence shelter, civil defence, activating the shelter, and operating the shelter. In addition, other concepts related to civil defence shelters and civil defence have been detailed upon.

Table 1 lists the most common classes of civil defence shelters. The classification is based on maximum space of the shelter as shown below

Actual shelter space up to m2		Class
135		S1
900		S2
4500		Rock shelter

Table 1: Civil Defence Shelter Classification. (Government Decree on Civil Defence Shelters. 5.5.2011/408)

S1-class: Government Decree on Civil Defence Shelters (5.5.2011/408) dictates that perimeter walls and roof of the S1-class civil defence shelter must be at least 300 millimetres thick reinforced concrete. The floor, load bearing reinforced concrete partition walls, pillars, and the reinforced concrete intermediate floor of a two-story civil defence shelter must be at least 150 millimetres thick reinforced concrete. This is the most common type of civil defence shelter and is built in connection with apartment buildings.

S2-class: The perimeter walls and roof of the S2-class reinforced concrete civil defence shelter must be at least 400 millimetres thick reinforced concrete. The thickness of the floor in areas other than those against the rock must be at least 200 millimetres thick reinforced concrete. (Government Decree on Civil Defence Shelters. 5.5.2011/408)

Rock shelter: The perimeter walls in the rock tunnel of the rock civil defence shelter, which are designed to withstand pressure loads, must be at least 800 millimetres thick reinforced concrete. (Government Decree on Civil Defence Shelters. 5.5.2011/408)

Civil defence shelter: A civil defence shelter is separate space or separate building constructed in or in connection with a building, whose purpose is to provide protection for people in emergency conditions, such as during a military attack. Shelter protects from explosions and shrapnel effects, building collapses, pressure waves, fires, chemical warfare agents and ionizing radiation. These requirements come from the Government Decree on Civil Defence Shelters (5.5.2011/408) and from the Rescue Act (379/2011).

Taking shelter into use: Taking the shelter into use means the measures that must be completed within 72 hours at the latest after the order given by the authorities to put the shelter into operational condition. Section 76 of the Rescue Act (379/2011) obliges to keep the civil defence shelter and its civil defence equipment and devices in such a condition that activation is possible within the time frame.

Operating the shelter: Operating the shelter refers to the actions by which the shelter's operation is organized, ensuring that taking shelter occurs safely and in a controlled manner. This includes, among other things, the allocation of tasks and roles, the distribution of sleeping shifts, and the arrangement of general practices.

Normal conditions: The primary state of society, in which society's vital functions can be secured without the need to enable authorities to use powers that deviate from the usual. In Finland, normal conditions prevail until the Government, in cooperation with the President, declares a state of emergency (Kokonaisturvallisuuden sanasto 2017).

State of emergency: As defined in the Emergency Powers Act, the state of society in which there are so many or such serious disturbances or threats that it is necessary to enable authorities to use powers that deviate from the usual. (Valmiuslaki. 29.12.2011/1552).

Civil defence: Action due to an armed attack, the purpose of which is the protection of the civilian population from the dangers of the attack and assistance in coping with the immediate effects of the attack, as well as creating the necessary conditions for survival (Kokonaisturvallisuuden sanasto 2017).

### 3 Methods and data collection

Format of the thesis is development project. There exists a relatively large amount of written source material, but it is scattered into different sources and manuals. The objective is to develop and produce a manual for working life partner. To gain enough background information the used methods for data collection are literature review and interviews.

The interviews will be unstructured. This type of interview has been chosen because the aim is to broaden the perspective on the subject. Interviews were conducted after the literature review was mostly done.

These methods, described below, allowed to get a comprehensive understanding of the measures related to the taking into use and operation of the S1 civil defence shelter. Since the purpose of this thesis is not to produce new information, but to structure, combine, and clarify existing information, no other analysis of written sources will be performed.

#### 3.1 Literature review as a method

A literature review is an academic writing piece that summarizes and evaluates existing research and literature on a specific topic. It provides context and understanding of the subject matter while critically analysing the material. A literature review involves not only

presenting key points but also offering personal evaluation of the literature. (The University of Edinburgh 2024)

Literature review can also highlight gaps in the current research and recommend areas where further research could be needed. By looking at different viewpoints and findings, it helps to create a full picture of the topic and shows how the current study fits into the bigger conversation. This also helps to build a solid base for new research.

### 3.2 Conducting the literature review and chosen literature

Data collection for this thesis began with a literature review. I systematically went through the legislation, regulations and guides that deal with civil defence shelters and preparedness. Some of the literature dealt with preparedness on a general level and did not take a position on the use of civil defence shelters on a practical level. In connection with the content analysis, the three phases of the use of civilian defence shelter mentioned in the report that is the basis of the thesis were selected as themes: planning, activation, and operation. The information was divided under these categories, which also form the main chapters of the future manual. Below the main headings, more detailed entities were formed, which are based on the material gathered in the literature review.

Following literature was used in literature review.

Government Decree on Civil Defence Shelters. 409/2011
Government Decree on Civil Defence Shelters' Equipment and Supplies. 5.5.2011/408
Kansalaisen varautumisopas by Riitta Björn ja Juha-Antero Puistola. 2023.
Rescue Act 379/2011
Stadin talosuojelu by Helsingin Pelastusliitto. 1998
Talon Turvaopas - Opas asumisturvallisuuden kehittämiseen ja pelastussuunnittelun tueksi by SPEK. n.d.
Talosuoja käyttökuntoon - Väestönsuojan käyttökuntokoe SUOJA 2007 by SPEK. 2008
Turvallinen koti - Varautuminen ja väestönsuojelu taloyhtiöissä by Kaci Bourdache. 2022.
Väestönsuojan huolto and käyttö - opas väestönsuojan haltijalle by SPEK. 2022.
Väestönsuojan käyttöönotto by Varsinais-Suomen Pelastuslaitos. 2022.

Väestönsuojien nykytila Suomessa by Ministry of interior. 2023.
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Table 2: Literature review

The literature mentioned above was mainly selected for the literature review based on the library catalogue search conducted in Helsinki Metropolitan Area Libraries. The search terms used were keywords such as civil defence, civil defence shelter and preparedness.

I mostly chose new and up-to-date sources for the literature review that correspond to current preparation practices. The older literature in the review was provided by Helsinki City Rescue Department to create context. Several guides produced by SPEK were selected for the literature review. I thought this was problematic at first, but considering the role of SPEK, it was not problematic, and the representatives of the Rescue Department also referred to SPEK's instructions as a reliable source.

The key legislation was practically a mandatory inclusion, as all measures must meet the requirements given by it. Without going through the legislation and taking it into account in the project, the use value of the instructions would be almost non-existent, and the Helsinki City Rescue Department would not be able to use them.

### 3.3 Interviews and interviewees

Interviews are a method to directly gather information from people. In this thesis these are used to gather background information from the experts. This will help the researcher better understand various perspectives and aspects related to the topic. These interviews are unstructured, so the answers can be quite diverse. This helps to obtain in-depth information about the topic and assists the researcher in drawing conclusions. (Scribbr 2023)

Representatives of Helsinki City Rescue Department gave me a list of people I could interview for the thesis. The list included civil defence instructors, experts, and a representative of a commercial company. From this list, the persons mentioned in table 3 were selected to be interviewed. In the selection, I emphasized experience and knowledge of practical work related to civile defence shelters.

Jaakko Koivula, Civil Defence Specialist, The Finnish National Rescue Association
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Pekka Kyrenius, Laboratory Manager, Aalto University
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Esko Pulkki, Safety Instructor, Länsi-Helsingin sopimuspalokunta Ry
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Lasse Wallius, Safety Instructor, Helsinki Rescue Association

Table 3: Interviewees

All interviews were conducted remotely, and recordings as well as transcripts are available. The interviews were structured around three themes: planning, activation, and operation. Discussions based on these themes lasted from one to one and a half hours. The topics were covered in the order that the actions progress in practice. Content analysis was used also as the method in analysing the interview results, with the themes used in the interviews forming the basis and the categories identified within them. Information gathered during the interviews was mixed with the information gathered from the literature review.

### 3.4 Content analysis

In the content analysis, I defined the topics that should be researched regarding civil defence. According to the scope given by Helsinki City Rescue Department, these topics are the planning, activation, and operation of the deployment of protection. Based on these, I created categories for organizing the material. This method is called deductive and in it these categories are predefined instead of emerging from the material. Under these categories, I identified the measures that belong to them, based on which I built a code set with which I structured and divided the material. In contrast to the deductive method, in this, inductive method, things emerging from the material are used. (Mind the Graph 2024)

After dividing the data, I systematically went through the categories and the codes below them. Based on them, I chose which are the key planning principles, which stages and factors affect the success of the activation and which issues regarding the operating the shelter are essential. In this context, I also compared the information I found from different sources. The connections between the different codes also turned out to be clear, as the operating the shelter becomes clearly more difficult if the preparatory measures have not been carried out correctly, or not done at all.

## 4 Planning, activation, and operating phases

The descriptions and measures of different phases given in this chapter below are based on information provided by both literature sources and expert interviews. In writing, an effort has been made to combine theoretical knowledge and practical experience into a unified whole. Each subject was handled in such a way that all important perspectives would be considered when writing the instructions itself.

Headlines structure for this chapter was created based on the content analysis. Content analysis was used to identify key themes and sub-areas that are essential for the planning, activation, and operating the shelter. An assessment of the created table of contents was requested from representatives of the Rescue Department, to ensure that all the necessary topics are covered.

The below served as the basis for the instructions written for the Helsinki City Rescue Department. Instructions were written in a format where the instructions are unambiguous and there is no longer a comparison between different sources, but the most effective instructions have been selected. This comparison was conducted while writing this chapter's report. These choices were relatively easy, as there was a consensus between the sources, except for individual points. The instructions also consider their consistency with the current legislation, so that the Rescue Department can use them.

#### 4.1 Planning phase

The successful activation and operation of a shelter rely on good planning. An important part of this plan is the division of tasks and responsibilities. This also clarifies the actions need to be done taken during the activation and operation. The plan should also address resource issues. These are for example the availability of necessary materials, equipment, and tools. Communication, training, and providing instructions to the residents of the housing building should also be considered in the plan. In the following paragraphs, I will go through the different areas to be considered in the planned activation and what is written about them in the source literature and highlighted by the experts during the interviews.

In the planning phase, it is important to take into account the fact that the plan is implemented in a crisis situation where stress levels are elevated. For this reason, the plan must be so clear and simple that laymen can implement it.

##### 4.1.1 Responsible personnel

During his interview, Lasse Wallius, a safety instructor at the Helsinki Rescue Association (Helpe) pointed out that the naming and training of shelter caretakers is a good basis for planning. He highlighted that once individuals are selected and trained, it is easier to consider what tasks should be included in the plan. This also helps to identify the personnel needs required for activation and operation. It's important to note that a shelter manager does not work alone but is the person who knows what needs to be done (Wallius. 2024. Pers. com.).

When selecting shelter manager, several factors should be considered, as mentioned not only in Wallius's (2024. Pers. com.) interview but also in Kaci Bourdache's book *Turvallinen koti -*

Varautuminen ja väestönsuojelu taloyhtiöissä (2022, 19). During crisis, there is a big chance that reservists have been called up for military service. Reservists are typically called up until the age of 50 for enlisted personnel. For officers and non-commissioned officers, the age limit is 60 years. Bourdache advises, if necessary, to clarify wartime placement from the Regional Offices of the Defence Forces.

Two other groups of personnel that should not be appointed as shelter caretakers are individuals reserved by their employer for critical tasks related to security of supply. Examples include personnel in healthcare, transportation, and the food industry. The third group consists of individuals reserved for municipal civil defence organizations due their hobbies. (Bourdache 2022)

This procedure aims to ensure that trained individuals are actually present when the need for shelter activation arises. Wallius (2024. Pers. com.) also emphasizes the importance of training backup personnel for the role and replacements for people moving out. Optimal situation would be that at least two individuals have completed shelter manager training course. This ensures that knowledge and skills are not reliant on one person.

#### 4.1.2 Personnel resources and tasks

During the planning phase, it is important to assess how much personnel will be needed to put the shelter into operational condition. Based on this task can be allocated, such as participants for emptying and cleaning. Jaakko Koivula (2024. Pers. com.), a civil defence specialist for The Finnish National Rescue Association (SPEK), mentioned during his interview that it would be a good idea to map out the practical skill sets of residents because these skills might come in handy during activation and operating phases. It is important to take into consideration that not everyone may be able to participate in tasks such as emptying the shelter due to their physical capabilities. Warehouse closets can include heavy objectives such as furniture.

Tasks and roles during operating phase are described later in this thesis.

#### 4.1.3 Emptying the civil defence shelter

Most of the shelters located in residential buildings are used by residents for storage purposes during normal conditions. Tampering with someone else's storage and the property within it is always a sensitive situation, and it would be good to have discussions about this in advance. As both the interviewees and SPEK (n.d. c, 24.) suggest in their Talon Turvaopas Guidebook, a good place to discuss this is at a general meeting of the housing company. During the meeting, an emptying plan should be made, outlining who is responsible for emptying, where items will be taken, and what actions will be taken if a resident is not present when the

emptying takes place. The finalized plan should be approved and attached into the emergency plan.

Regarding emptying, the interviewees also agreed on where items could be moved. In principle, everyone suggested moving items to each resident's apartment and, in emergencies, outside. Lasse Wallius (2024. Pers. com.) mentioned the idea of ordering a waste container where excess and unnecessary items could be directly thrown away for disposal.

#### 4.1.4 Checks and training

For activation to be smooth, it is necessary to keep the shelter and its equipment in working order. This requirement comes directly from the Rescue Act (379/2011). According to The Ministry of the Interior Decree on the Technical Requirements for Civil Defence Shelters and Maintenance of Shelter Equipment (506/2011), inspections should be carried out at least every ten years. This inspection and maintenance interval is long and in practice, annual inspections are often discussed. Bourdache (2022) suggests in his book linking this inspection to the inspection of the shelter's ventilation system. This inspection interval is usually one year, keeping the inspection frequency on acceptable level.

Regarding the inspection process itself, there are several guidebooks and instructions available, but one aspect that emerged in the interviews is worth of highlighting. Laboratory Manager Pekka Kyrenius (2024. Pers. com.) from Aalto University pointed out that during these inspections it would be extremely wise to also check the availability of nuts and bolts for ventilation duct flanges. These are items that are easily stolen and, in many cases, have been missing.

As part of planning and preparedness, it's good to try to include some kind of training. Holding a full-scale exercise where the shelter is activated isn't realistic, but the shelter caretaker can also organize different kinds of exercises for volunteer residents. It could be, as described in Kyrenius's (2024. Pers. com.) interview, a familiarization visit, or safety walk where the shelter's equipment are explained, how it works, and what the main procedures are when moving to the shelter. Koivula (2024. Pers. com.), on the other hand, emphasized in his interview that even just raising awareness about the topic is an important thing and counts as progress when compared to fact that average citizens are unaware of procedures and equipment regarding shelters. Such an exercise brings a certain realism, for example, to the amount of space allocated per resident in the shelter.

#### 4.1.5 Planning related to equipment resources

As mentioned earlier, the equipment should be checked during the annual inspection. However, in addition to the tools normally found in shelters, such as hacksaws, workshop hammers, line pliers and field shovels, it would be good to take shelter-specific needs into account in the planning.

All the interviewees pointed out that the housing company's residents' own tools can be used for various measures. In his interview, Kyrenius (2024. Pers. com.) mentioned wheelbarrows as a good tool for emptying and moving heavy objects out from the shelter. Working efficiency can also be improved if there are several pieces of certain tools. As an example of this in his interview, Wallius (2024. Pers. com.) brought up the metal storage cages often found in newer houses. Their dismantling is significantly faster if more than one person is doing it. To be able to do this requires several hexagon keys. In turn, no corresponding practical examples were highlighted in the material reviewed in the literature review.

#### 4.2 Activation phase

This paragraph deals with activating the civil defence shelter into working order. The measures are divided into different phases, and for them, the points raised in the interviews and the literature review, which should be considered in practical activities, are examined. As already mentioned earlier in this thesis, the shelter must be taken into use within 72 hours. This work is led by the shelter manager with help from the other residents.

##### 4.2.1 Emptying, cleaning and ventilating the shelter

When starting the emptying, the emptying plan made in advance must be followed. Excess goods are transported away from the shelter and the cage storages there are dismantled. Bourdache (2022, 54) mentions in his book that the extra structures inside the shelter should be removed or dismantled. Varsinais-Suomen Pelastuslaitos (2022), on the other hand, talks about dismantling of unnecessary structures in connection with evacuation in its guide *Väestönsuojan käyttöönotto*. Neither source takes a more detailed position on the fact that part of the structures, such as the cage storages, can be used in the arranging of the shelter. In his interview, Safety Instructor Esko Pulkki (2024. Pers. com.) from Länsi-Helsingin Sopimuspalokunta Ry brings up the point of view that part of the cage storages could be left in place. In this way, fixed structures would be in use, which could be used, for example, as dry toilets or sick bay. Pulkki (2024. Pers. com.) says that he also uses this advice in the civil defence shelter trainings he holds. Also Wallius (2024. Pers. com.) brought up during his interview the usage of cage storages as useful fixed structures.

Regarding cleaning and ventilation, the instructions in the written sources are short and simple. For example, SPEK's (2022, 25-26) Väestönsuojan huolto ja käyttö guide only talks about careful ventilation and removal of possible dust and debris from the ventilation ducts. It is true that cleaning is not a complicated procedure that could be done without precise instructions. In his interview, Jaakko Koivula (2024. Pers. com.) brings up a point worth noting. His view is that cleaning should always start from the emergency exit corridor. As a justification for this, he suggests that there can be decades of dust accumulation in the corridor and when dust start moving, it easily clogs the ventilation filters. His instruction is to clean the other spaces only after the emergency exit corridor has been cleaned. Also, the door of emergency exit should be closed before ventilating the shelter.

#### 4.2.2 Ventilation

Normal time ventilation of the shelter must be closed. The ventilation pipes are removed and closed with flanges. Among the interviewees, Pulkki (2024. Pers. com.) urged to note that the bolts and nuts used to fasten the flanges are not necessarily on hand when they are needed. It would be good to include the availability of bolts and nuts in the annual inspection.

SPEK's (2022, 25.) Väestönsuojan huolto ja käyttö guide reminds that when checking the overpressure valves, their condition should also be checked on the outside of the shelter. At this stage, you should also check the unobstructed air intake from the outside. For the shelters underground, check that the route is open all the way to the outside. Installing the air intake pipe may require digging up the ground. Finding a correct place to dig can sometimes be challenging. Among the interviewees, Kyrenius (2024. Pers. com.) proposed as a solution to this, for example, pushing concrete rebar diagonally through from the below. In this way, the right digging place can be easily found.

Regarding the testing of the ventilation equipment, all the interviewees pointed out that the testing should be started with a hand crank. This helps to oil the mechanism and the damage caused by a possible technical fault is smaller. Koivula (2024. Pers. com.) pointed out that the crank could already be rotated when the shelter being prepared. Only after this the test should be done with electricity. During the test, the functionality of the overpressure and air volume meters is also checked.

This is also a good time to decide whether to keep the heat on or turn it off. The people in the space are heat sources and heat the air significantly, so turning off the heat can be a good decision, especially in the summer.

#### 4.2.3 Emergency exit

In underground shelters, the commissioning of an emergency exit corridor often requires digging. Among the interviewees, Koivula (2024. Pers. com.) brought up the need for situational awareness about what is on the outside of the hatch of the emergency exit corridor. In many housing companies, there may be asphalt on top of the hatch, and in the worst case, a yard storage building. Breaking the pavement during digging can also cut off the emergency access road. According to SPEK's (2022, 25.) Västösuoja huolto ja käyttö guide, there is no need to completely dig out the whole exit hole, but it would be good idea to check that is the soil layer to be dug through easily. Leaving emergency exits partially covered is a risk and there should be strong reasons for taking it. In same guide SPEK justifies the issue with lack of time. This cannot be considered as an acceptable justification.

Checking the location of the exit of the emergency exit in advance is required. According to (2024. Pers. com.), in many houses there is a sign of this on the outer wall. If this is not the case, then, according to Kyrenius (2024. Pers. com.), you can also make this mark in your own style. For example, by 5 meters straight ahead from this mark and there is the hatch.

#### 4.2.4 Water and food supply

Filling drinking water into reserve water tanks should start immediately, whenever it is possible. The water flow through the tap can be very slow. This was evident in the activation test of civilian shelter conducted by SPEK (2008, 94) in 2007. Among the interviewees, Kyrenius (2024. Pers. com.) recommends anticipating this issue already in planning. It is possible to check the flow of the shelters water point by filling, for example, a 10-liter bucket and clocking the elapsed time. After this, it is easy to estimate how long the filling of reserve water tanks will last.

Everyone who comes to the shelter is responsible for their own food supply. Regarding this, Bourdache (2022, 56), SPEK (2022, 27) and Varsinais-Suomen Pelastuslaitos (2022) all instruct to use food found from home emergency supply kit, which should be found in every home. Basically, food is eaten cold because the equipment used for cooking creates heat. In addition, for example, gas cookers are prohibited as a fire safety hazard. If there is a pressing need to heat some food in the shelter, Kyrenius (2024. Pers. com.) mentions in his interview that an electric stove and a kettle are suitable for this.

#### 4.2.5 Sewage, toilets and waste

During the activation phase, the drain shut-off valve must be checked and closed. When drainage is out of use, the challenge is the management of liquid waste, mainly excrement. Some shelters may contain flush toilets, but as Kyrenius (2024. Pers. com.) points out in his

interview, they should not be used during full readiness because the shut-off valve should be closed. The reason for this is a possible pressure shock coming through the drain.

For this reason, the sanitary facilities are arranged with dry toilets. As mentioned in the chapter on emptying the shelter, interviewees Wallius (2024. Pers. com.) and Pulkki (2024. Pers. com.) urge to make use of existing cage storage in construction of dry toilets. The walls can be covered, for example, with waste sacks for the privacy. The dry toilets themselves can also contain a tent. It can be a free-standing design, or it needs to be hung upright. Also in this context, cage storage structures can be useful. The need for additional support structures was also noticed in the activation test of civilian defence shelter conducted by SPEK (2008, 94). For this reason, the wooden parts of the cage storages that had been dismantled and transported out the day before had to be brought back inside. This is something that could be taken into account when making an emptying plan.

A healthy adult produces 1-2 liters of urine per day (Terveyskirjasto. 2021). When there can be more than ten people in the shelter, handling this waste is challenging. SPEK's (2022, 32) Väestönsuojan huolto ja käyttö guide advises to take the waste out once a day. Among the interviewees, Wallius (2024. Pers. com.), on the other hand, states in relation to the handling of waste that in some situations the time to take it away can also come from the authorities.

### 4.3 Operating phase

When the civil shelter has been activated, sheltering there happens according to the authority's order. The Rescue Act (379/2011) states that the rescue authority of the wellbeing services county and the rescue authority of the Ministry of the Interior have the right to issue such an order. Operating of the shelter should be controlled and planned. A situation where you are ordered into the shelter is already stressful and certainly scary. The conditions in the shelter are also stark and constricted. Only 0.75 square meters of space has been reserved for each person taking shelter (Government Decree on Civil Defence Shelters. 409/2011), so the mere narrowness of the space brings challenges. The temperature of the shelter also rises high. In order for the shelter to be operated in a controlled and safe manner, various issues must be taken into account. These following topics emerged in the literature review and interviews.

#### 4.3.1 Daily routine and duties

In written sources, Turvallinen koti - varautuminen ja väestönsuojelu taloyhtiössä (Bourdache 2022) recommends building the daily program into three eight-hour periods. SPEK's (2022) Väestönsuojan huolto ja käyttö guide does not directly talk about a similar division, but the

example daily program it presents nevertheless follows the same formula. Kyrenius (2024. Pers. com.) also mentions the division into three shifts in his interview. The basic idea in all of these is that the division takes place into 8 hours of work, 8 hours of rest and, for example, training and 8 hours of sleep. This kind of routine and regularity increases the feeling of safety. In the interview, Kyrenius (2024. Pers. com.) emphasized the significance of people as a source of heat as one of the reasons for the need for rest and recovery. Heat output of humans is at its lowest when a person is resting, and this has a direct effect on the shelter's temperature.

When talking about roles and tasks in shelter. SPEK's (2022) Väestönsuojan huolto ja käyttö guide list, examples of these include ventilation machine operators, door access supervisors, maintenance personnel and first aid personnel. It's good to identify these roles already in the planning phase, but in practice they can be divided when you see who will arrive to the shelter.

#### 4.3.2 Communication and communication devices

Communications from the shelter to the outside world are critical. The main reason for their existence is to follow information and instructions from the authorities. However, they can be used to a limited extent to communicate with close ones. SPEK's (2022) Väestönsuoja huolto ja käyttö guide also highlights people's need for information about the general situation and recommends giving everyone the opportunity to listen to the news.

The authorities issue their announcements via radio, so a working radio is an essential item in the shelter. If the mobile network is in use and coverage is good, applications found on phones can be used for listening the radio and following the news. There are limited places to charge devices in the shelter, so the duration of the batteries must be ensured. In his interview, Wallius (2024. Pers. com.) presents the following operating model for this: The devices would be collected and removed from the occupants of the shelter upon arrival. Everyone would be able to use their own device during their shift when they are responsible for following the communication. Bourdache (2022) also talks in his own book that when this duty officer shift changes, so does the device. This can be understood as an arrangement along the same lines.

It is a good idea to check the radio's audibility, for example, during the annual inspection, but at the latest when the activation of shelter starts. At this stage, it still can be tried to improve the sound with a separate repeater or amplifier.

### 4.3.3 Use of ventilation machine

In the technical use of the shelter, the essential thing is the use of the ventilation device in different situations and to switch between operating modes. There are three operating modes: Shut-off mode, where no air enters the shelter, and no air leaves it. Due to the increase in the concentration of carbon dioxide in the air, this can only be in the shut-off mode for two hours at a time. In filtration mode, air is taken through a special filter. Regarding the filter in question, all the interviewees emphasized that its cover should not be opened during the trial use of the shelter. The same is also emphasized in SPEK's (2022) *huolto ja käyttö* guide of the civil defence shelter. In bypass mode, the special filter is turned to the bypass position and air can flow smoothly into the shelter. Of these three operating modes, the bypass mode is used in the shelter in a normal situation.

Among the interviewees, Kyrenius (2024. Pers. com.) brought up the need for instructions on changing from one operating mode to another. The starting point is that the exchange takes place by official order. The order in question can be received, for example, via radio. Kyrenius' concern regarding the matter is the limited lifetime of the special filter and its unnecessary consumption. He refers to the old practice, where the two-hour shut-off mode follows a 5-6-hour filtration mode before returning to the bypass mode. In this situation, the filter is easily consumed unnecessarily. In addition, he highlights a situation where the instructions of the authorities do not reach the shelter and the shelter manager must make his own decision on the matter (Kyrenius. 2024. Pers. com.).

## 5 Results and evaluation of the project

In this last section, I go through the main results of the thesis and evaluate their correspondence to the goals set for the work. In addition, I evaluate my own work during this process and the process itself.

The aim of the thesis was to create instructions for the Helsinki City Rescue Department on the use of civil defence shelter, which can be further refined by them and published as an instruction manual. The three areas of these instructions were the planning, activation, and operating the civilian defence shelter. These sub-topics were decided in cooperation with the representatives of the working life partner, and they are based on the development needs that emerged in the Ministry of the Interior's *Väestönsuojien nykytila Suomessa* (Valtioneuvosto. 2023) project. The final report of that project created the need for this development project.

## 5.1 Timetable and process

I started looking for a working life partner for this project in the early fall of 2023. Through my contact networks, I got in touch with the Helsinki City Rescue Department, where I was given this topic. At this point, we went through a preliminary schedule together and agreed that I will start working on the thesis in January 2024.

The first step of the work was to carry out a literature review where I familiarized myself with the topic and identify the actions and phases related to the use of civilian defence shelter. Based on the content analysis I did for these findings; I created a preliminary framework for the instructions.

In March 2024, I interviewed four different civil defence experts. Based on these interviews, I received clarifications on the various topics of the instructions. In addition, based on their own extensive practical experience, the interviewees were able to bring out practical instructions that were not in the material I went through in the literature review. In March, I also presented my thesis plan at the thesis seminar.

After the analysis of the interview results and the content analysis of them, I started the writing phase of the thesis. The work progressed quickly, and I returned the first interim version to the evaluation in mid-April. After I had written the mandatory parts of the work, such as the introduction, the theoretical framework, and the description of the methods, I moved on to write the information I received in the data collection. On May Day, I got the thesis report in such condition that it was missing the conclusions and evaluation of the project sections. At this point, I returned the text I had written so far to the second interim evaluation.

To evaluate the results of this thesis process and the process itself, we must also look at the instructions written for the Helsinki City Rescue Department. I started writing it at the beginning of May by creating a preliminary table of contents. I asked for and received feedback from the Helsinki City Rescue Department. The writing progressed fast, which was partly influenced by the fact that this text was written in Finnish at the working life partner's request. During the process, I sent two intermediate versions of the text to them. I received development suggestions and sparring. In the end, the extent of the instructions in question was 24 pages. In the mid-May, I returned a version of the text that we considered to be in such a form that it can be called finished and based on it the representatives of the Helsinki City Rescue Department are able to give final feedback.

Next step was to get back to the thesis report and start writing evaluations of the entire thesis project. The third version of the report was returned for interim evaluation after mid-May. In my opinion, this version was already close to completion, and after correcting the

issues raised in the feedback received, the report was ready to be returned for evaluation. I finished the thesis report and presented it at the seminar at the end of May.

The timetable I prepared for the project worked well and the all the work phases were completed on time. Schedule was relaxed because I was also taking courses for 30 credits at the same time. Communication with Helsinki City Rescue Department was good, and I was able ask advice and guidance when I needed it. I have also promised, if necessary, to modify the instructions I wrote even after this project.

## 5.2 Results

The final product of the thesis is instructions for the planning, activation, and operation of the civil defence shelter. These instructions are not tied to individual shelter but have been created as general guidelines that can be applied to different S1-class shelters. The content and structure of the instructions are largely based on the observations brought out in this thesis about the different phases of the use of civilian shelter.

The instructions are written for the layman and unnecessary technical details have been left out. It would be pointless to add too many technical instructions to the guide, as shelters and their equipment are different. These differences are based on the time of construction, the size and layout of the shelter, and the equipment installed there. For example, for the ventilation machines in the shelter, there should be device-specific operating and maintenance guidebooks. For this reason, including them in these instructions would have been unnecessary and contrary to the purpose of these instructions.

In connection with the data collection, the observation was that a significant part of the existing guidebooks focuses on the technical measures of activation. The instructions I wrote go through that as well, but the focus is on planning phase and operating the shelter.

The resulting instructions corresponds to the goals set for the project, and the feedback received from Helsinki City Rescue Department has been positive. As planned, the text can easily be refined into an instruction manual and to be published for example to all housing companies in Helsinki with S1-class civil defence shelters. The table of the contents of the instructions can be found in appendix 1.

## 5.3 Conclusion

Matters concerning civil defence shelters are defined in legislation and this legislation has been considered when preparing the instructions. During the project, Finland's good situation in terms of the number of civil defence shelters and places offered in them became evident. However, my own observations and the views of the experts I interviewed supports the findings of the Ministry of the Interior's (Valtioneuvosto. 2023) Väestönsuojien nykytila

Suomessa project: the know-how to use shelters is insufficient. This applies especially to smaller shelters, such as shelters in apartment buildings, which are during wartime operated by the residents of the building.

These deficiencies do not only apply to activation of the shelter, but also to operating its been put into use. The shelter is an unpleasant place to be in terms of conditions. It's safe, organized and, above all, correct use requires planning. It is also important to think about who actually are present there to use the shelter. As I show in this thesis report, other obligations on behalf of the Defence Forces and various employers have been planned for a significant part of the population during the war time.

Existing shelters must also be maintained. This maintenance is also regulated by law. However, in the Ministry of the Interior's (Valtioneuvosto. 2023) Väestösuojien nykytila Suomessa project, it is stated that many of the neglects of these obligations are based not only on lack of interest but also on a lack of knowledge. During the literature review and based on the discussions with the Helsinki City Rescue Department, it can be stated that there is information available. The problem is its fragmented availability. One can find instructions on the websites of rescue services and SPEK, but if you want information other than in electronic form, it requires your own activity. However, in the current world situation, it would be reasonable to offer this information in written form at a low threshold.

The vast network of civil defence shelters offers us excellent starting points to protect ourselves and survive during war. However, their mere existence is not enough, we need to be able to use them correctly and safely. Studying, reviewing, and training these skills are an important part of civic skills and also part of national preparedness.

#### 5.4 Self-Assessment

The subject of this thesis was not familiar or easy to me, as my own knowledge of civil defence and civil defence shelters was limited to one course related to my studies. For this reason, I had to learn a lot about the subject, so that I could form such a knowledge base that it was possible to move the project forward. I think I succeeded well in this and the interviews where I could also ask stupid questions were a big help.

Once the necessary knowledge had been obtained and the material I had gathered had been analysed, the writing process itself proceeded easily. In my opinion, I successfully identified the essential actions in the planning, activation, and operation of a civil defence shelter. As a result, I developed extensive and comprehensive instructions for these processes. The instructions are written in a manner that allows individuals unfamiliar with the subject to initiate the necessary actions, ensuring that the shelter can be operational within the 72 hours required by law and used correctly and safely.

The topic and the whole project itself turned out to be very interesting in the end. I am more than satisfied with the instructions I wrote for the Helsinki City Rescue Department, and in addition, my own knowledge of civil defence and civil defence shelters increased significantly.

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