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Healthcare organization management — Pandemic response (respiratory) — Walk-through screening station

Management des organisations de soins de santé — Réponse en cas de pandémie (respiratoire) — Station de dépistage ambulatoire

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Foreword

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The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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This document was prepared by Technical Committee ISO/TC 304, *Healthcare organization management*.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

Pandemics demand swift, decisive and sustained action by governments and public health authorities. Actions that have proved effective are widespread testing, contact tracing and rigorous treating. For testing, walk-through screening stations (WTSS) can be used to test thousands of people each day. A WTSS involves a test subject going through the screening process of a medical interview, a temperature check and specimen collection in a positive, negative or adaptable pressure booth. The use of WTSS can reduce the risk of transmission of the disease (including in hospital waiting rooms), relieve pressure on hospitals (which otherwise can be inundated with requests for testing) and free hospital resources for treating people the disease (including those that are otherwise necessary to disinfect areas used for specimen-taking).

This document was developed based on experience gained from, and procedures implemented to deal with, the COVID-19 pandemic, which was characterized as a pandemic by the World Health Organization (WHO) in March 2020. South Korea, in particular, used WTSS to control the spread of the virus without shutting down the country and without imposing extreme restrictions on people's movement.

Healthcare organization management — Pandemic response (respiratory) — Walk-through screening station

1 Scope

This document specifies the operation of a walk-through screening station (WTSS) for mass testing as part of pandemic response management.

NOTE COVID-19 is an exemplary disease for which such a station is developed.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

3.1
adaptable pressure booth
booth with switchable directions of airflow

EXAMPLE From negative to positive pressure or from positive to *negative pressure* (3.7).

[SOURCE: Non-pharmaceutical Standard Models for Managing Pandemic[5]]

3.2
confirmed case
person confirmed to be infected with the pathogen of the infectious disease according to the testing criteria for diagnosis, irrespective of clinical signs and symptoms

[SOURCE: Central Disaster and Safety Countermeasures Headquarters[6]]

3.3
coronavirus
virus that is part of a large family of viruses that cause illness in animals or humans

Note 1 to entry: In humans, several coronaviruses are known to cause respiratory infections ranging from the common cold to more severe diseases such as Middle East Respiratory Syndrome (MERS) and Severe Acute Respiratory Syndrome (SARS). The coronavirus discovered in 2019 causes the coronavirus disease *COVID-19* (3.4).

[SOURCE: WHO Western Pacific, 2020[7]]

3.4
COVID-19
infectious disease caused by the *coronavirus* (3.3) discovered in 2019

Note 1 to entry: This virus and disease were unknown before the outbreak began in Wuhan, China, in December 2019.

[SOURCE: WHO, 2020[8]]

3.5
disinfection
process to reduce the number of microorganisms, but not usually of bacterial spores, without necessarily killing or removing all organisms

[SOURCE: ISO 15190:2020, 3.9]

3.6
high efficiency particulate air filter
HEPA filter
retentive matrix having a minimum particle-collection efficiency of 99,97 % (that is, a maximum particle penetration of 0,03 % for 0,3 µm particles)

[SOURCE: ISO 13408-1:2008, 3.23]

3.7
negative pressure
pressure less than that of the ambient atmosphere

3.8
negative pressure room
room in which the air pressure differential between the room and the adjacent indoor airspace directs the air flowing into the room (i.e. room air is prevented from leaking out of the room and into adjacent areas such as the corridor)

[SOURCE: WHO[10]]

3.9
negative pressurized medical container
NPMC
portable screening/testing facility that ensures the safety of the healthcare workers and testees by maximizing ventilation with *HEPA filters* (3.6), *negative pressure* (3.7) and managing the direction of airflow to prevent cross infection during disease testing

[SOURCE: Kyunggido Screening Station[11]]

3.10
pandemic
worldwide spread of a disease

[SOURCE: ISO/PAS 45005:2020, 3.5]

3.11
personal protective equipment
PPE
device or appliance designed to be worn or held by an individual for protection against one or more health and safety hazards

EXAMPLE Clothing, gloves, helmets, footwear, face protection.

[SOURCE: ISO 15384:2018, 3.12, modified — The example has been added.]

3.12
mobile walk-through screening station
mobile WTSS
disinfected single mobile booth, which requires minimized consumption of *personal protective equipment* (3.11) and is targeted to provide rapid testing for early detection of viruses and mitigates cross-infection between healthcare workers and test subjects in a *pandemic* (3.10)

[SOURCE: Government of the Republic of Korea[9]]

3.13
suspected case
case that is compatible with the clinical description and has an epidemiological link to a confirmed or suspected case

[SOURCE: WHO[12]]

3.14
walk-through screening station
WTSS
screening station with disinfected, single or multiple, mobile or fixed booths with negative, positive or an adaptable pressure which enables minimized consumption of *personal protective equipment* (3.11)

[SOURCE: Government of the Republic of Korea[9]]

4 Overview of WTSS

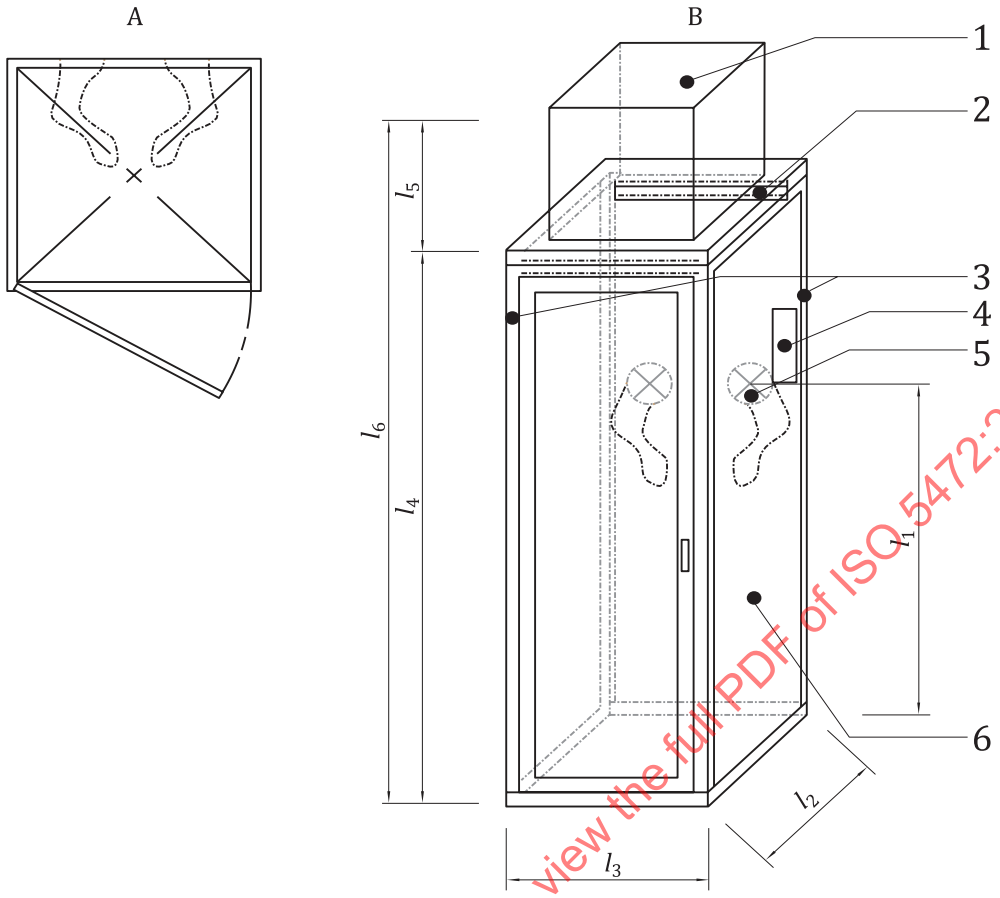
4.1 Fundamental concept

Rapid and safe testing capabilities are an integral part of the fight against an endemic or pandemic. An infectious agent can be transmitted by direct contact, droplet spread or airborne. Therefore, effective ways to minimize contact between test subjects and testers are critical.

WTSS have received attention as demand for screening tests has soared while test resources such as negative pressure tents are limited, and reduction time for disinfection and ventilation after specimen collection is much sought after. Schematic blueprint of walk-through booth is given in Figure 1.

Healthcare workers in a WTSS do not have to wear personal protective equipment (PPE), as shown in the benefits listed in Figure 2, as it takes only one or two minutes for each sampling, especially in a positive-pressure booth.

Dimensions in millimetres



l_1	l_2	l_3	l_4	l_5	l_6
1,150 1,250 1,400	700	700	2,100	500	2,600

Key

A top view
B perspective view
1 HEPA filter (99,999 %)
2 LED lamp
3 frame (made of 1,2 mm thick stainless steel)
3 frame (made of 1,2 mm thick stainless steel)
4 interphone
5 sanitary glove hole
6 wall (made of 5 mm thick polycarbonate)

Figure 1 — Schematic blueprint of walk-through booth (negative pressure booth example)

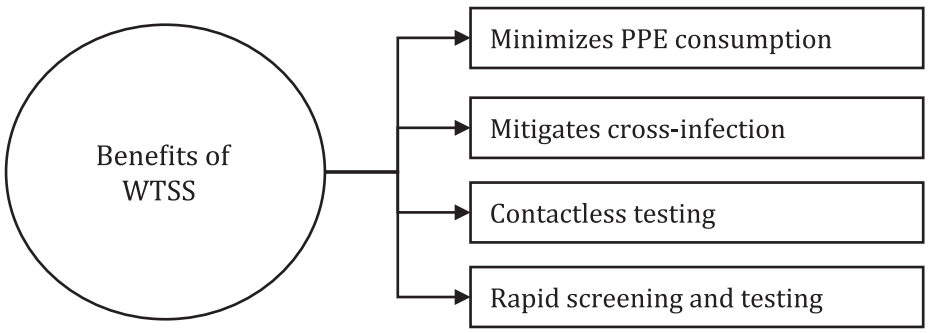


Figure 2 — Benefits of WTSS

4.2 Four types of WTSS

The key principle is to improve the way in which people are tested. There are four types of WTSS:

a) open, applicable to inspection of entrants at any open areas (see Clause 5);

b) negative pressure (see Clause 6);

c) positive pressure (see Clause 7);

d) adaptable pressure (see Clause 8).

5 Open WTSS

5.1 Operational principles

For an asymptomatic case, a diagnostic test is performed in an open-space screening clinic. For a symptomatic case, a test should be performed in a separate space (i.e. quarantine laboratory, quarantine facility/room). This type of station uses natural ventilation, so the risk of environmental disinfection is low. However, it requires sufficient outdoor space, and inspections can be subject to weather conditions. An example snapshot of an open walk-through station is given in Figure A.1.

5.2 Screening process

5.2.1 Registration

A test subject shall provide information (name, passport number, contact information, etc.) on an application form during registration.

Personal data shall be processed lawfully, fairly and in a transparent manner. Personal data shall be adequate and relevant to the purpose of collection and limited to only the data necessary for the registration purpose. The application form shall specify explicitly the purpose for personal data collection.

NOTE Local, regional or national guidelines for the processing of personal data can apply.

A staff member should guide the test subject to fill in the form in a dedicated waiting area in the arrival hall to reduce the time required for registration.

A guide (a staff member) should guide the test subject to the medical staff for examination.

5.2.2 Examination

The medical staff should check the identification (ID), the history of contact with confirmed cases, symptoms and other relevant data.

When necessary, additional checks should be performed, including checks on body temperature and respiratory symptoms.

The guide should guide the test subject to an available booth.

5.2.3 Specimen collection

Specimen collection procedures should follow the manufacturers' instructions or public health guidance on sample collection and storage.

5.2.4 Notification of test result

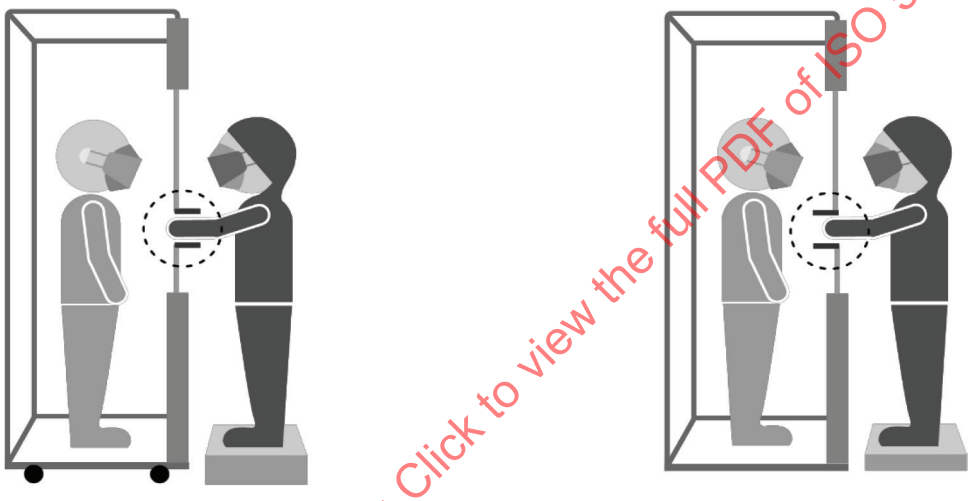
The laboratory notifies the test result to the screening station.

6 Negative pressure WTSS

6.1 Operational principles

The negative pressure type uses lower air pressure to allow the outside air into the segregated environment. It keeps potentially harmful particles within the negative pressure booth by preventing the internal air from leaving the booth. The booth isolates suspected cases, protecting the people outside from exposure.

In a negative pressure WTSS, a test subject goes inside the booth while the healthcare workers remain outside, effectively cutting off direct contact and enabling a quick sample collection (see Figure 3). The station generally requires a smaller area for testing booths and a shorter time for testing. This set-up gives people quick access to screening, and at the same time adequately protects healthcare workers and reduces PPE consumption. A multiple-fold increase in testing capacity is easily achieved. Annex A gives detailed explanations on negative pressurized medical containers (NPMCs) with indoor and outdoor settings.



a) Fixed **b) Mobile**

Figure 3 — Negative pressure booth

6.2 Screening process

6.2.1 General

The usual flow of the process is as follows:

— registration and questionnaire (see 6.2.2);

— wait;

— examination (see 6.2.3) and specimen collection (see 6.2.4);

— education;

— payment;

— exit.

From the entrance to the exit, all test subjects should keep their masks on.

Personal data shall be processed lawfully, fairly and in a transparent manner. Personal data shall be adequate and relevant to the purpose of collection and limited to only the data necessary for the purpose. The questionnaire shall specify explicitly the purpose and reason for personal data collection, and the scope of the use of personal data.

NOTE Local, regional or national guidelines for the processing of personal data can apply.

6.2.2 Registration and questionnaire

A test subject registers and fills out a questionnaire through a kiosk or on his/her mobile phone. In absence of such means, healthcare workers help the person to fill out the questionnaire.

The questionnaire should include the following:

a) Demographics: name, age, social security number or passport number, mobile phone number, address, reason for consultation.

b) Epidemiologic information: travel history, association with an outbreak.

c) Clinical information: symptoms, body temperature measured by a healthcare worker, intake of antipyretic drugs and other symptoms.

In cases using a kiosk or mobile phone, after the questionnaire has been filled out, a text message with a registration number and the number of people waiting is sent to the test subject. In the waiting area, the test subject shall wear a mask and keep a distance of at least two meters from others.

6.2.3 Examination

The completed questionnaire is delivered to the healthcare worker. The doctor examines the questionnaire and if a medical exam or sample collection is warranted, the doctor calls the test subject in.

6.2.4 Specimen collection

The doctor verifies the ID, conducts a physical exam, and collects upper and lower respiratory tract specimens through the glove wall.

The test subject wears his/her mask again once the specimen is collected and stays in the booth for some time (i.e. 1 min) before exiting in order to remove 99,9 % of the virus in the air (ventilation phase 1). The specimen is stored in a specimen bottle and/or a sputum cup. The test subject exits the booth.

6.2.5 Ventilation

There are three phases of ventilation in negative pressure booths, as follows:

— Ventilation phase 1 prevents virus leakage from the booth when a person leaves it.

— After the departure of the person, the booth stays empty for 5 min to remove the remaining viral particles (ventilation phase 2).

— Then, the healthcare worker should enter the booth to perform environmental disinfection, after which the booth remains empty for 5 min to inactivate the virus and to remove the potential toxic effect of the disinfectant (ventilation phase 3).

For further details, refer to Table 1.

Table 1 — Ventilation phases after specimen collection

Specimen collection	Ventilation phase 1	Ventilation phase 2	Ventilation phase 3
The test subject wears his/her mask again after specimen collection.	The subject stays in the booth for 1 min.	After the subject leaves the booth, it remains empty for 5 min.	After disinfection, the booth remains empty for 5 min.
	Removes 99,9 % of the virus in the air of the booth.	Removes the remaining virus in the air of the booth.	Allows sufficient contact time to inactive the virus. Removes the potential toxic effect of the disinfectant.

6.2.6 Disinfection

6.2.6.1 Principles

The following principles apply:

— Disinfectant: Only proved virus disinfectants shall be used.

— Disinfection method: Wipe the inside of the booth with a mop sufficiently moistened with disinfectant so that the disinfectant remains on the surface for the contact time specified in the manufacturer's instructions. Disinfection shall be started from the less contaminated surface; therefore, disinfect in order of door, both walls and glove wall.

— PPE: The disinfection staff should wear proper PPE according to the public health guidance. It is recommended to wear PPE of Level D or a N95 respirator, a waterproof gown, a goggle or face shield and gloves. The use of disposable plastic gowns or gloves is also recommended to save PPE.

— Staff should not wear or use the same mask longer than recommended by the mask manufacturer or specified by organizational guidelines for the use of such masks.

— Used mops shall be disinfected prior to being disposed. Mops may be reused when they are adequately disinfected.

6.2.6.2 Protocols of disinfection

The following protocols apply:

— Conduct ventilation phase 2 after each test subject.

— After ventilation phase 2 is completed, the cleaning staff member starts disinfecting the inner surface of the booth from the door to the glove wall. The surface of the ledge inside the booth should also be disinfected.

— When cleaning the glove-wall surface, remove the outer gloves and disinfect the inner gloves. If any flaws are found, replace the inner gloves. Disinfect the stethoscope if one is installed.

— Conduct ventilation phase 3.

— Place new outer gloves on the inner gloves and put the diagnostic kit on the ledge.

— The booth is ready for the next test subject.

6.2.7 Storage of the collected specimen

The specimen from the test subject should be properly packed and immediately refrigerated (4 °C) in accordance with the public health guidance.

6.2.8 Notification of test result

The test subject receives a message/notification of the test result. If possible, the test subject is notified of the possible time by which the result will be available to him/her.

7 Positive pressure WTSS

7.1 Operational principles

A mobile WTSS using positive pressure offers extensive testing capabilities (see Figure 4). The testing booth allows for a safe environment that removes the risk of cross-infection between test subjects and healthcare workers. A positive pressure booth is designed to provide health workers with an effective means to collect specimens. It facilitates comparatively large sample collections (e.g. possibly 10 sample collections per hour) compared with, on average, one sample collection per hour in a regular screening centre. The whole processing time of a test subject can take minutes from "registration – examination – specimen collection – booth disinfection – education". Healthcare workers in the booth do not necessarily have to wear PPE, and each sampling takes around one minute.

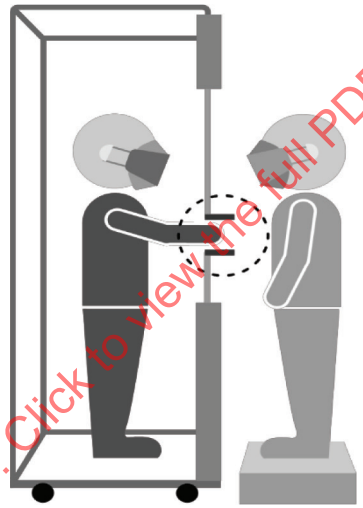


Figure 4 — Positive pressure booth

7.2 Screening process

7.2.1 Reservation

A reservation system should be implemented in order to reduce waiting time. When available, the review of health conditions and travel history can be carried out when arranging a visit, and such information is provided by the health centres and healthcare organizations in advance.

Confirmation of a reservation is desirable, which includes at least the subject name, visit date/time and location to visit.

7.2.2 Registration

The registration process is the same as for an open WTSS (see 5.2.1).

7.2.3 Medical examination

The medical examination process is the same as for the open WTSS (see 5.2.2).

7.2.4 Specimen collection

A specimen from the test subject is collected as instructed in the specimen collection kit. The test subject receives further information on contamination prevention.

7.2.5 After specimen collection

After a specimen is collected, a doctor or healthcare worker bends the top of the cotton swab to be contained in the sample virus transport medium (VTM). The test subject then puts the cap back on the sample VTM (the doctor may put the cap back on but, with a resistance of their latex gloves, the cap can be closed improperly.) The test subject puts the sample VTM on the rack and disinfects his/her hands.

7.2.6 Disinfection

For disinfection, the surfaces should be wiped with disinfectant or disinfection methods recommended by the Centers for Disease Control and Prevention (CDC) should be applied.

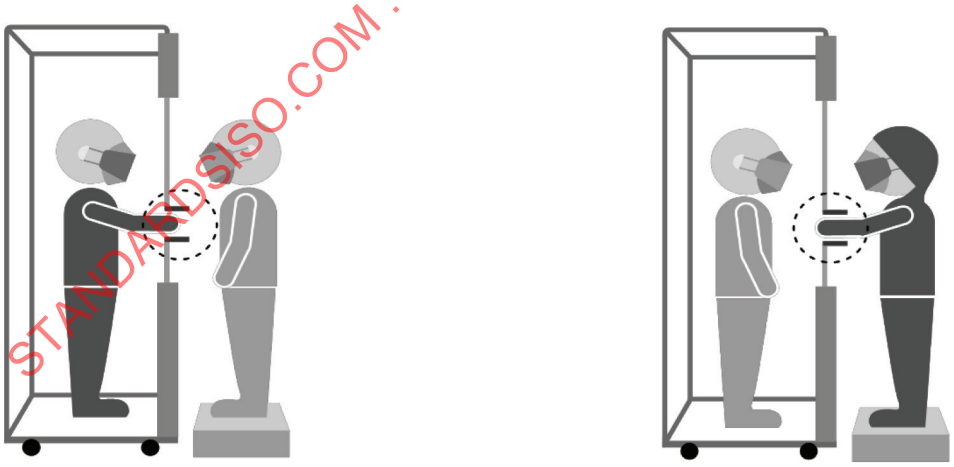
7.2.7 Notification of test result

The test subject receives a message/notification of the test result. If possible the test subject is notified of the possible time by which the result will be available to him/her.

8 Adaptable pressure

An adaptable pressure booth (see Figure 5) switches the airflow direction from time to time (negative pressure to positive pressure, positive pressure to negative pressure). Transition from positive to negative can be done without a filter change; however, the opposite transition requires a filter change.

When both negative and positive pressure booths are in use, the majority of examinations are conducted in the positive pressure booth, and the negative pressure booth is reserved for testing test subjects with a positive symptom or who require the collection of a lower respiratory tract specimen, in order to prevent contamination of the surrounding environment.



a) Positive b) Negative

Figure 5 — Adaptable pressure booth

Annex A
(informative)

Example of WTSS — Negative pressurized medical container

A.1 General

A pandemic is a crisis that undermines the sustainability of not only the healthcare system of a country, but also its society. In the case of a newly discovered infectious disease that is easily spread, in particular by high-density contact, an effective infection control strategy is to quickly identify, isolate and treat patients through rapid examination, given that there is no vaccine or treatment available. An NPMC completely separates the healthcare worker from the patient and prevents cross-infection by directing the airflow from the healthcare worker to the patient (see Figure A.1). Examination/diagnosis may be done using a microphone/amplifier, without direct contact with the patient. In addition, since sputum collection rooms have a greater risk of exposure, the NPMC may be operated as an isolated negative pressure room, so that the safety of the healthcare worker and the patient is ensured (see Figure A.2).

Since the air passes through high efficiency particulate air (HEPA) filters, which are designed to exhaust the polluted air completely from the inside in about 30 min, and goes outside, the outflow of pathogens is prevented. Each NPMC allows for an increased number of patients in a shorter period of time than in a screening station. In addition, a reservation system is in place in order to prevent cross-infection in portable screening stations. With the reservation and questionnaire processes carried out in advance, test subjects have less chance of being exposed to contamination at the testing site.

In addition, testing may be performed with fewer medical healthcare workers. In other settings, it takes on average three members per container: one medical staff member, one disinfecting member and one assistant. Since the NPMC may be mobile with a multiple number of screening rooms in it, it is possible to examine a relatively large number of suspected patients.

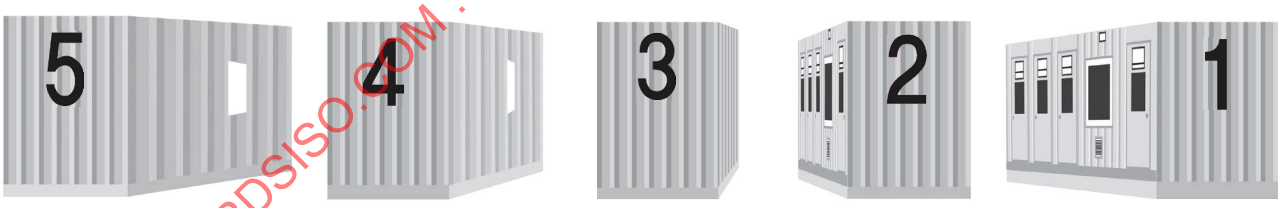


Figure A.1 — Example of a negative pressurized medical container