WHO/V&B/02.30
ORIGINAL: ENGLISH

# How to look after a cold room or freezer room: self-assessment tool

Vaccines and Biologicals

World Health Organization

WHO

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**This document is available on the Internet at:**
www.who.int/vaccines-documents/

**Copies may be requested from:**
World Health Organization
Department of Vaccines and Biologicals
CH-1211 Geneva 27, Switzerland
• *Fax:* + 41 22 791 4227 • *Email:* vaccines@who.int •

# Contents

# Abbreviations

| | |
|---|---|
| °C | degrees centigrade |
| BCG | bacille Calmette-Guérin (tuberculosis vaccine) |
| DT | diptheria and tetanus toxoid vaccine |
| DTP | diphtheria–tetanus-pertussis vaccine |
| EPI | Expanded Programme on Immunization (WHO) |
| HepB | hepatitis B vaccine |
| Hib | *Haemophilus influenzae* type b vaccine |
| IPV | inactivated polio vaccine |
| MMR | mumps-measles-rubella vaccine |
| MR | measles-rubella vaccine |
| OPV | oral polio vaccine |
| Td | tetanus toxoid and diphtheria (reduced component) vaccine |
| TT | tetanus toxoid |
| WHO | World Health Organization |
| YF | yellow fever vaccine |

# Glossary

| | |
|---|---|
| Cold room | a purpose made insulated enclosure fitted with refrigeration equipment which maintains a set temperature above 0°C. |
| Cold store | a facility where the cold room/freezer room or other refrigeration equipment are located, including a packaging area. |
| Freezer room | a purpose made insulated enclosure fitted with refrigeration equipment which maintains a set temperature below 0°C. |

# Revision history

Originally issued as *Logistics and cold chain for primary health care: How to look after a cold room or freezer room.* EPI/LOG/83/20.

Revised July 1984.

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Revised November 1986.

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# 1. Introduction

## 1.1 How to use this handbook

The tasks in this booklet teach you how to look after a modern cold room or freezer room. You should answer the questions after you have read the *User's handbook for vaccine cold rooms or freezer rooms* (WHO/V&B/02.31).

If you have the old-fashioned type of site-built cold store you should read the November 1986 edition of this document together with the *User's handbook for vaccine cold stores* (EPI/LOG/84/22/Rev.1).

If possible, practise the tasks on a cold room or freezer room that has no vaccine in it. You will then have time to learn and ask questions without harming any vaccine.

If you practise the tasks in a store containing real vaccine, be extremely careful.

- Keep the door closed as much as possible.
- Do not switch off the power except by agreement with your instructor.
- Do not allow the *cold room* or *freezer room* temperature to rise above the safe level at any time.
- Do not let the *cold room* temperature drop below the safe temperature at any time.

**REMEMBER: If vaccine is damaged by excessive heat or excessive cold the damage cannot be made good and children's lives are put in danger.**

# 2. Personal safety

## 2.1 Actions for personal safety question sheet

*Tools required:* None.
*Materials required:* None.
*Handbook reference:* Section 4.

What are the seven things you must do to make sure you are safe when you work in a cold store? Write them down here.

| | |
|---|---|
| **1.** | |
| **2.** | |
| **3.** | |
| **4.** | |
| **5.** | |
| **6.** | |
| **7.** | |

Discuss your answers with your instructor.

## 2.2 Personal safety question sheet

*Tools required:* None.
*Materials required:* None.
*Handbook reference:* Section 4.

| | | |
|---|---|---|
| **Checks on cold store door** | | |
| 1. | Do you know where the key is kept? | Yes No |
| 2. | Does the lock work? | Yes No |
| 3. | Do you know how to switch on the interior light? | Yes No |
| 4. | Is there ice around the door seal?<br>If the answer is YES, explain the likely reason:<br>..... | Yes No |
| 5. | Can you open the door from the inside? | Yes No |
| 6. | Is the door difficult to open from the inside?<br>If the answer is YES, explain the possible reasons:<br>..... | Yes No |
| **Checks on warm clothing** | | |
| 7. | Is warm clothing available for the people who work in the store?<br>If the answer is YES:<br>• Write down the number of warm jackets.<br>• Write down the number of pairs of warm trousers.<br>• Write down the number of pairs of gloves.<br>• Write down the number of pairs of boots. | Yes No<br><br>.....<br>.....<br>.....<br>..... |
| 8. | Is the clothing kept in a safe place? | Yes No |
| 9. | Does any of this clothing fit you? | Yes No |
| 10. | If the clothing is inadequate, write down what you think is needed.<br>.....<br>.....<br>..... | |

Discuss your answers with your instructor.

# 3. Vaccine safety

## 3.1 Actions for vaccine safety question sheet

*Tools required:* None.
*Materials required:* None.
*Handbook reference:* Section 4.

What are the nine things you must do to make sure vaccine is stored safely in a cold store? Write them down here.

| | |
|---|---|
| **1.** | |
| **2.** | |
| **3.** | |
| **4.** | |
| **5.** | |
| **6.** | |
| **7.** | |
| **8.** | |
| **9.** | |

Discuss your answers with your instructor.

## 3.2 Storage temperature question sheet

*Tools required:* None.
*Materials required:* None.
*Handbook reference:* Section 4.

| 1. | **At what temperatures should the following vaccines be stored? First write down the full name of each vaccine. Then write down -15°C to -25°C or +2°C to +8°C. If both temperature ranges are equally safe, write down 'Both'.** ***Note: Cross out any vaccines that are not on your national schedule.*** | | |
|---|---|---|---|
| | | **Full name of vaccine** | **Temperature** |
| | BCG | | |
| | DT | | |
| | DTP | | |
| | DTP-HepB | | |
| | HepB | | |
| | Hib freeze-dried | | |
| | Hib liquid | | |
| | Measles | | |
| | MMR | | |
| | MR | | |
| | OPV | | |
| | Td | | |
| | TT | | |
| | YF | | |
| 2. | If diluent is supplied *separately* from the vaccine, where should you store it and at what temperature? | | ..... |
| 3. | If diluent is packed *with* the vaccine, at what temperature should you store the vaccine and the diluent? | | ..... |
| 4. | If you freeze a vaccine that is supposed to be stored at +2°C to +8°C, can it still be used? | | Yes No |
| 5. | If you store a vaccine at +5°C which is recommended to be kept frozen, can it still be used? | | Yes No |
| 6. | Imagine that you have received a new type of vaccine and that nobody has told you the temperature at which it should be kept. At what temperature would you store it until you find out? | | ..... |

Discuss your answers with your instructor.

## 3.3 Storage procedures question sheet

*Tools required:* None.
*Materials required:* None.
*Handbook reference:* Section 4.

Look inside the cold room or freezer room and answer the following questions:

| | | |
|---|---|---|
| 1. | Is the vaccine stacked correctly on the shelves?<br>If the answer is NO, explain what you think is wrong.<br>..... | Yes No |
| 2. | Are there any loose vials in the store? | Yes No |
| 3. | Is any vaccine stored too close to the evaporator? | Yes No |
| 4. | Is any vaccine stored on the floor? | Yes No |
| 5. | Is the store overloaded? If it is, explain what you think is wrong.<br>..... | Yes No |
| 6. | Is anything being kept in the store which should not be there?<br>If the answer is YES, write down what it is.<br>..... | Yes No |
| 7. | Is the vaccine organized correctly? If NO, explain what is wrong. | Yes No |
| 8. | Find out where diluent is stored and write down the location.<br>..... | |
| 9. | *Freezer rooms only*. Is there any diluent in the freezer room?<br>• If the answer is YES, can this diluent still be used? | Yes No<br>Yes No |
| 10. | Check the stock records on measles vaccine. Was the correct diluent issued with the last four batches of vaccine? | Yes No |
| 11. | If you cannot answer question 10, is this because the stock record does not give you the necessary information? | Yes No |
| 12. | Check the temperature records for the past four weeks. Was the room outside the recommended temperature range on any occasions during this period?<br>If the answer is YES, write down the times when this occurred.<br>..... | Yes No |

Discuss your answers with your instructor.

## 3.4 Temperature monitoring question sheet

*Tools required:* None.
*Materials required:* None.
*Handbook reference:* Section 4.

| | |
|---|---|
| **Checks on cold room** | |
| 1. | Write down the recommended maximum and minimum temperatures.<br>..... |
| 2. | Write down a list of vaccines that may be damaged by freezing if the temperature drops to 0°C or below.<br>..... |
| 3. | Which vaccine freezes first?<br>..... |
| 4. | If the temperature drops to 0°C or below, what should you do to protect the vaccines?<br>..... |
| 5. | What should you do if you think the vaccine has been damaged by freezing?<br>..... |
| 6. | If the temperature of the cold room is above the maximum allowed, what must you do to protect the vaccine?<br>..... |
| **Checks on freezer room** | |
| 7. | Write down the recommended maximum and minimum temperatures.<br>..... |
| 8. | What should you do to protect the vaccine if the temperature drops below the recommended minimum?<br>..... |
| 9. | What should you do to protect the vaccine if the temperature rises above the recommended minimum but remains below 0°C?<br>..... |
| 10. | What should you do to protect the vaccine if the temperature of the freezer room is above the maximum allowed for a cold room?<br>..... |

Discuss your answers with your instructor.

# 4. Routine and emergency maintenance

## 4.1 Cold store question sheet

*Tools required:* None.
*Materials required:* None.
*Handbook reference:* Section 4.

Check the cold store.

| | | |
|---|---|---|
| 1. | Listen to the cooling equipment. Ask your instructor to demonstrate how the equipment should sound when it is working correctly and how long it should run under different conditions. | |
| 2. | How many cooling units does the cold store have? | One Two |
| 3. | If the answer to question 2 is TWO:<br>• Is there an automatic duty sharing system?<br>• If not, write down the duty sharing procedure.<br>..... | Yes No |
| 4. | What general factors affect the length of time that the cooling equipment runs during the day?<br>..... | |
| 5. | Is the room housing the cold store cool and well ventilated?<br>If the answer is NO, what should be done to improve the ventilation?<br>..... | Yes No |
| 6. | Find the condenser unit(s). Are they adequately ventilated?<br>If the answer is NO, what should be done to improve the ventilation?<br>..... | Yes No |
| 7. | Find the main switch and electrical fuses for the cold store.<br>• Where are the switch and fuses? .....<br>• How many fuses are there? .....<br>• What size are the fuses? .....<br>• How many spare fuses are there? ..... | |
| 8. | Find out how to contact the cold store supplier, service agent or service technician. Write down the details here:<br>• Name .....<br>• Address .....<br>.....<br>• Telephone number ..... | |

Discuss your answers with your instructor.

## 4.2 Standby generator question sheet

*Tools required:* None.
*Materials required:* None.
*Handbook reference:* Section 4.

| | | | | | |
|---|---|---|---|---|---|
| 1. | Is there a standby generator? | | | Yes | No |
| 2. | If the answer is YES:<br>• Where is it located?<br>..... | | | | |
| | • How it is started (hand start, battery start or automatic start when the mains power supply fails)?<br>..... | | | | |
| | • If the generator is hand-started, can you find the handle? | | | Yes | No |
| | • If there is a battery, is it a sealed unit? | | | Yes | No |
| | • If the battery is not sealed, check the electrolyte level. Does the electrolyte cover the plates? | | | Yes | No |
| | • Is the battery fully charged? | | | Yes | No |
| | • Are the battery terminals clean? | | | Yes | No |
| | • How full is the fuel tank? | Empty | ¼ Full | ½ Full | Full |
| | • Is the oil level correct? | | | Yes | No |
| | • Is the coolant level correct *(water-cooled units only)*? | | | Yes | No |
| 3. | Ask your instructor for permission to start the generator. Does it run correctly? | | | Yes | No |
| 4. | Find out how to contact the generator supplier, service agent or service technician. Write down the details here:<br>• Name .....<br>• Address .....<br>.....<br>• Telephone number ..... | | | | |

Discuss your answers with your instructor.

## 4.3 Daily checks question sheet

*Tools required:* None.
*Materials required:* None.
*Handbook reference:* Section 4.

Write down the six checks that you should make every day.

| | |
|---|---|
| **1.** | |
| **2.** | |
| **3.** | |
| **4.** | |
| **5.** | |
| **6.** | |

Discuss your answers with your instructor.

Now examine the cold store and carry out the checks that you have described. Write down your findings here.

| | |
|---|---|
| **7.** | |
| **8.** | |
| **9.** | |
| **10.** | |
| **11.** | |
| **12.** | |

Discuss your answers with your instructor.

## 4.4 Weekly checks question sheet

*Tools required:* Any tools that may be necessary to inspect the liquid sight glass.
*Materials required:* New chart and pens for temperature recorder. Fuel, oil and battery electrolyte for the generator.
*Handbook reference:* Section 4.

Write down the seven checks that you should make every week, in addition to the daily checks.

| | |
|---|---|
| **1.** | |
| **2.** | |
| **3.** | |
| **4.** | |
| **5.** | |
| **6.** | |
| **7.** | |

Discuss your answers with your instructor.

Now examine the cold store and carry out the checks that you have described. Write down your findings here.

| | |
|---|---|
| **1.** | |
| **2.** | |
| **3.** | |
| **4.** | |
| **5.** | |
| **6.** | |
| **7.** | |

Discuss the results of these checks with your instructor.

15. Examine the temperature record chart for the past week. Look for any occasions when the temperature was not within the correct limits. Write down how many times this has happened.

- What was the temperature on each occasion? .....
- For how long was the temperature incorrect? .....
- Is the vaccine likely to have been damaged? Yes No

16. What should you do if you see bubbles in the liquid sight glass?

.....

- What do these bubbles mean?

.....

17. What colour do you see inside the liquid sight glass?

.....

- What does the colour tell you, and what should you do?

.....

- What other colour might you see?

.....

- What would this other colour tell you and what would you do if you saw it?

.....

Discuss your answers with your instructor.

## 4.5 Monthly checks question sheet

*Tools required:* None.
*Materials required:* Vaccine stock register.
*Handbook reference:* Section 4 and Section 5.

Write down the three additional checks that you should make every month, in addition to the daily and weekly checks.

| | |
|---|---|
| **1.** | |
| **2.** | |
| **3.** | |

Discuss your answers with your instructor.

Now examine the cold store and carry out the checks that you have described. Write down your findings here.

| | |
|---|---|
| **4.** | |
| **5.** | |
| **6.** | |

Discuss your answers with your instructor.

## 4.6 Routine and emergency maintenance question sheet

*Tools required:* None.
*Materials required:* Maintenance agreement and maintenance record sheets.
*Handbook reference:* Section 4 and Section 5.

Look through the maintenance record sheets for the past 12 months.

| | | |
|---|---|---|
| 1. | How many times was *routine* maintenance carried out in the past 12 months? | ..... |
| 2. | Read the maintenance agreement. How many routine maintenance visits should there have been in the past 12 months? | ..... |
| 3. | Is there a written record of the routine maintenance work that was carried out during each visit? | Yes No |
| 4. | If the answer to question 3 is NO, should there be a written record? | Yes No |
| 5. | How many *emergency* call-outs have there been in the past 12 months? | ..... |
| 6. | Write down how long it took for each emergency to be dealt with.<br>.....<br>.....<br>..... | |
| 7. | Read the maintenance agreement. What is the maximum time allowed for dealing with emergency repairs? | ..... |
| 8. | Do you think the cold store is being well maintained? Yes No<br>If the answer is NO, write down your reasons.<br>.....<br>.....<br>.....<br>.....<br>..... | |

Discuss your answers with your instructor.

## 4.7 Spare parts and tools question sheet

**Note: Use this question sheet only if spare parts and tools are stored on site.**

*Tools required:* None.
*Materials required:* Spare parts stock register.
*Handbook reference:* Section 4 and Section 5.

Look at the spare parts store and the spare parts register.

| | | |
|---|---|---|
| 1. | Can you identify all the spare parts in the store? | Yes No |
| 2. | If the answer to question 1 is NO, ask your instructor to explain the purpose of each spare part. | ..... |
| 3. | Are the spare parts in the store the same as those listed in the spare parts stock register? | Yes No |
| 4. | Do you think the stock of spare parts is adequate?<br>If the answer is NO, make a list of additional spare parts that you think are needed.<br>.....<br>.....<br>..... | Yes No |
| 5. | Write down a list of tools that are needed to make the daily, weekly and monthly maintenance checks. | |
| | ..... | |
| 6. | Can you find all these tools in the store?<br>If the answer is NO, what tools are missing?<br>.....<br>.....<br>..... | Yes No |

Discuss your answers with your instructor.

# 5. The room enclosure

## 5.1 Room enclosure question sheet

*Tools required:* None.
*Materials required:* None.
*Handbook reference:* Section 5.

| | | | |
|---|---|---|---|
| 1. | Look at the inside and outside of the cold store enclosure. List any problems that you find.<br>.....<br>.....<br>..... | | |
| 2. | Look at the door and the internal curtain (if there is one). List any problems that you find.<br>.....<br>.....<br>..... | | |
| 3. | Is there a pressure relief vent? | Yes | No |
| | If the answer is YES, is it working correctly? | Yes | No |

Discuss your answers with your instructor.

# 6. Cooling equipment and controls

## 6.1 Cooling equipment question sheet

*Tools required:* Tools necessary to remove protective covers from cooling equipment.
*Materials required:* None.
*Handbook reference:* Section 6.

With your instructor's permission, turn off the power to the cooling equipment. Carefully remove the covers to expose the machinery.

| | |
|---|---|
| 1. | Find the evaporator coil. What is inside it? ..... |
| 2. | Find the expansion valve. What does it do? ..... |
| 3. | Find the air circulation fan. What does it do? ..... |
| 4. | Explain how to defrost the evaporator. ..... |
| 5. | Find the condensate drip tray and pipe. What does it do? ..... |
| 6. | Find the compressor. What does it do? ..... |
| 7. | Find the condenser. What does it do? Why does it have a fan? ..... |
| 8. | Find the liquid storage receiver. What is inside it? ..... |
| 9. | Find the filter drier. What does it do? When should it be replaced? ..... |
| 10. | Find the liquid sight glass. Write down two changes you should look for.<br>.....<br>..... |
| 11. | What does each of these two changes mean? ..... |

Replace the covers and switch on the cooling machinery. Then discuss your answers with your instructor.

## 6.2 Instrumentation question sheet

*Tools required:* None.
*Materials required:* None.
*Handbook reference:* Section 6.

**Note: This question sheet assumes that the room is fitted with a chart recorder. If the room is fitted with an electronic recorder, ask your instructor to explain how it works.**

| | |
|---|---|
| 1. | Find the thermostat. What does it do? ..... ..... |
| 2. | Explain how the thermostat should be adjusted. ..... ..... |
| 3. | Find the temperature recorder. What does it do? ..... ..... |
| 4. | Show your instructor how to change the chart on the temperature recorder. |
| 5. | Find the temperature alarm. What does it do? ..... ..... |
| 6. | Show your instructor how to test the alarm. |

Discuss your answers with your instructor.

## 6.3 Safe working question sheet

*Tools required:* None.
*Materials required:* None.
*Handbook reference:* Section 6 (fault-finding tables).

Write down the six rules for safe working.

| | |
|---|---|
| **1.** | |
| **2.** | |
| **3.** | |
| **4.** | |
| **5.** | |
| **6.** | |

Discuss your answers with your instructor.

## 6.4 Fault-finding tables

*Tools required:* As necessary.
*Materials required:* Spare parts as required to demonstrate repairs.
*Handbook reference:* Section 6 (fault-finding tables).

1) Read through the fault-finding tables with your instructor.
2) Ask her/him to explain and demonstrate how to use them.
3) Agree which faults you are going to be trained to identify.
4) Agree which faults you are going to be trained to repair.
5) Mark these items clearly on your copy of the fault-finding tables.
6) Ask your instructor to give you the relevant training.

# 7. Contingency planning

## 7.1 Safe storage question sheet

*Tools required:* None.
*Materials required:* Written contingency plan.
*Handbook reference:* Section 7.

Write down the three rules for storing vaccine safely in an emergency.

| | |
|---|---|
| **1.** | |
| **2.** | |
| **3.** | |

## 7.2 Contingency planning question sheet

| | | |
|---|---|---|
| 1. | Is there a written contingency plan?<br>If the answer is YES, how many alternatives are described? | Yes No<br>..... |
| 3. | Describe the contingency plan or plans.<br>.....<br>.....<br>.....<br>..... | |
| 4. | Imagine that it is Saturday afternoon. The cold room has broken down and the temperature inside is +10°C.<br>List the actions you would take.<br>.....<br>.....<br>.....<br>..... | |
| 5. | Write down the details of the two most important emergency contacts.<br>• Name .....<br>• Address .....<br>.....<br>• Telephone number .....<br>• Name .....<br>• Address .....<br>.....<br>• Telephone number ..... | |

Discuss your answers with your instructor.

The Department of Vaccines and Biologicals was established by the World Health Organization in 1998 to operate within the Cluster of Health Technologies and Pharmaceuticals. The Department's major goal is the achievement of a world in which all people at risk are protected against vaccine-preventable diseases.

Five groups implement its strategy, which starts with the establishment and maintenance of norms and standards, focusing on major vaccine and technology issues, and ends with implementation and guidance for immunization services. The work of the groups is outlined below.

The *Quality Assurance and Safety of Biologicals team* team ensures the quality and safety of vaccines and other biological medicines through the development and establishment of global norms and standards.

The *Initiative for Vaccine Research* and its three teams involved in viral, bacterial and parasitic diseases coordinate and facilitate research and development of new vaccines and immunization-related technologies.

The *Vaccine Assessment and Monitoring team* assesses strategies and activities for reducing morbidity and mortality caused by vaccine-preventable diseases.

The *Access to Technologies team* endeavours to reduce financial and technical barriers to the introduction of new and established vaccines and immunization-related technologies.

The *Expanded Programme on Immunization* develops policies and strategies for maximizing the use of vaccines of public health importance and their delivery. It supports the WHO regions and countries in acquiring the skills, competence and infrastructure needed for implementing these policies and strategies and for achieving disease control and/or elimination and eradication objectives.


## Department of Vaccines and Biologicals

Health Technology and Pharmaceuticals
World Health Organization
CH-1211 Geneva 27
Switzerland
Fax: +41 22 791 4227
Email: vaccines@who.int
or visit our web site at: http://www.who.int/vaccines-documents


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