



Code of Practice

For Operating Controlled Atmosphere and Cold Storage



Contents Page

Contents Page	2
Introduction	3
The Dangers associated with Cold Stores	4
The Dangers associated to CA Stores.....	4
Description of a Controlled atmosphere storage system	4
Operations involved in the use of a Controlled Atmosphere Store.....	5
Store monitoring	5
Samples	5
Procedure for collecting netted samples directly from CA stores	6
Key Risks associated with controlled atmosphere stores.....	7
Oxygen criticality (chart)	7
Risk control measures	8
Main symptoms of Carbon Dioxide Toxicity (diagram).....	10
Consultation with employees and non-employees	11
Training and supervision	11
Training	11
Induction training.....	11
Task-specific training.....	12
Emergency Procedures	12
Legal obligations	13
Health and Safety at Work Act 1974.....	13
Confined Spaces Regulations 1997	13
Provision and Use of Work Equipment Regulations 1998	14
The Management of Health and Safety at Work Regulations 1999	14
Safe Systems of Working (SSOW) – Lone Working	15
Building design and structure	16
Structural Support.....	16
Air flows	17
Flooring systems	17
Further information	18

Introduction

Cold storage and Controlled atmosphere (CA) storage facilities pose a range of occupational health and safety risks.

This Code of Practice document provides health and safety information specific to cold storage and controlled atmosphere facilities to help employers, Health and Safety Representatives (HSRs) and employees identify hazards and implement appropriate risk controls.

This Code of Practice has been produced by Fruition PO Ltd as a guide for business owners, it is important however to advise that it is the responsibility of the duty holder to ensure they comply with the legal requirements placed upon them, and Fruition PO Ltd is not responsible for the safe management of a duty holder's workplace.

This document also provides advice for employers on how to ensure they comply with their duties and obligations under the **Health and Safety at Work Act 1974** and other related legislation by:

- Understanding the health and safety impact created by the tasks undertaken in cold work environments,
- Identifying the importance and benefits associated with consultation during the design, construction and operation of cold storage facilities,
- Identifying work areas and work processes involving tasks that present a risk to health and safety and could be adversely affected by environmental and atmosphere conditions (e.g. contaminated or oxygen deficient atmospheres),
- Providing practical examples of risk control solutions to identify hazards and eliminate or reduce risks by developing appropriate controls.

The Dangers associated with Cold Stores

Standard cold stores are run at between 0°C and 5°C, therefore the biggest risks are through exposure to cold temperatures for long periods and being accidentally locked in the store.

- Before entering a cold store staff should check there is 21% oxygen present and that the temperature is not debilitating
- Where people are working in Cold Stores they should notify any fork lift truck drivers and 'yard' staff of their presence
- Where the risk assessment dictates, suitable personnel protective equipment (PPE) must be present and worn
- There needs to be a sign on the door informing people are working inside the store
- A physical barrier needs to be in place to prevent the door from being closed
- Door mechanisms should be maintained in good working order and operational from both sides of the door
- Staff should be inside for as short a time as possible
- Fruit samples should be taken and assessed in a warm
- A final check that no persons are inside before stores are locked

The Dangers associated to CA Stores

Description of a Controlled atmosphere storage system

Controlled atmosphere storage is a system for holding produce in an atmosphere that differs substantially from normal air in respect to CO₂ and O₂ levels. This type of storage provides constant monitoring and adjustment of the CO₂ and O₂ levels within gas tight chambers. The gas mixture will constantly change due to metabolic activity of the respiring fruits in the store and leakage of gases through doors and walls. The gases are therefore measured regularly and adjusted to the predetermined level by the introduction of fresh air or nitrogen or passing the store atmosphere through a scrubber to remove CO₂.



There are different designs of controlled atmosphere storage depending mainly on the method or degree of control of the gases. Access hatches to modern CA units are usually found on the front (see adjacent image) but older units have hatches in the roof space.

Operations involved in the use of a Controlled Atmosphere Store

Store monitoring

As fruit is loaded into the store representative sub-samples from each orchard are placed in nets under the hatch. Experimental work at East Malling Research has shown the number of fruit needed to obtain an accurate assessment depends on the attribute being measured. Therefore every month a sample of 20-fruits is examined, increase to 30 fruits from 30 different bins if the orchard has a history of Diffuse Browning Disorder (Boggy Bank) or Braeburn Browning disorder. Firmness is measured using an electronic penetrometer. External appearance including an estimate of background and the presence of internal disorders are assessed.



Samples

It is essential to examine fruit at regular intervals to check on its quality and internal condition, but it is important to remember that the atmosphere inside a C.A. store is lethal, and under no circumstances should the head or the body other than possibly the arm enter the store. The only way this can be done is by placing representative samples taken at harvest in a bin of fruit under the hatch. Thus as each orchard is loaded into the store one sample should be taken for every proposed month of storage after October. The object of this sampling is twofold, first to produce a sample that is representative of the whole orchard and secondly to provide a series of samples that can be examined from month to month from the same orchard.



To ensure samples are representative of the orchard we advise you to take one apple from every tenth bin from the orchard as it is being loaded into the store. If less than 200 bins from an orchard are going into the store, fruit should be taken more frequently. The 20 fruits should be placed in a string net and labelled with the orchard name, harvest date and store number. This procedure should be repeated for each proposed month of storage after October, by taking apples from the same bins. Netted samples to be placed in a part-filled bin within easy reach of the inspection hatch with drawstrings accessible. It is very important that these samples are treated carefully and not left out in the sun but placed immediately in the store they are to represent. If a second orchard is to be loaded into the store, or that orchard is to be included in a second store, then another set of samples should be taken using different coloured labels.

Procedure for collecting netted samples directly from CA stores

- When taking samples from Controlled Atmosphere stores, at least two members of staff to be present at all times with a form of communication to contact the emergency services if needed.
- Robust emergency procedures must be in place and known by all appropriate staff
- Switch off fan and switch on store internal lights. If the head-space above the store roof is limited hard hats to be worn.
- When walking on top of a store, keep to the designated walkways.
- Where access to the sample hatch is via a 'Jacobs ladder', then only nominated staff may carry out the operation and hard hats must be worn
- When not in use a mechanism must be present to prevent unauthorised access i.e. a secured scaffold board
- When ascending or descending the ladder three physical points of contact should be made at all times, i.e. two hands one foot or one hand and two feet. At no time should samples be carried up or down the ladder.
- Suitable and sufficient safety rails should be present along all open edges where there is a risk of fall from height
- Controlled Atmosphere stores contain a lethal atmosphere, and at no time should any part of the head or body, other than the arm be placed in the store. 1.2% oxygen is fatal to life.
- Danger Low Oxygen Levels and No Entry To Unauthorised Personnel signs should present on all hatches
- All hatches should be locked and the key restricted to trained and authorised staff.
- Unlock and remove the hatch and place it down securely in an area where it will not cause a potential hazard
- To prevent personnel accidentally falling into the store it is strongly recommended the size of ceiling hatches should be reduced using a metal grid that is fit for purpose i.e. to take the weight of a person falling on it. It must be secured in a way that it cannot be removed using standard tools.
- A hook should be placed at each corner of the metal grid and the draw string from the netted sample attached to facilitate easy removal of samples
- Staff should be on their knees and no part of their torso be over the hatch
- For door mounted inspection hatches samples should be placed in a adapted bin with draw strings hanging over the side or placed in boxes at waist height covered with polythene just inside the door
- Where inspection hatches open into a corridor the end doors should be opened to allow a flow of fresh air
- Using a 'boat hook' remove netted samples by 'hooking' drawstring and pulling sample out.
- Replace hatch and establish gas tight seal.
- Samples should be carried to edge of store roof space to where ladder access and a guard-rail is in place.
- Place samples in a suitable container and lower over guard-rail using a strong rope.
- Switch off store internal lights switch back on refrigeration plant.

Key Risks associated with controlled atmosphere stores

The key risks associated with cold and controlled atmosphere stores are:

- low temperatures
- low oxygen
- high carbon-dioxide exposure

Oxygen deficiency is the main hazard when working with controlled atmosphere stores due to the conditions under which the fruit is held. There are substantial risks if the concentration of oxygen in the atmosphere varies significantly from normal (i.e. 20.8%). A relatively small reduction in the oxygen percentage can lead to impaired mental ability. The effects are very rapid and generally there will be no warning to alert the senses. This can happen even where only a person's head is adjacent or inside a confined space. Very low oxygen concentrations (i.e. below 16%) can lead to unconsciousness and death. Any difference in oxygen content from normal should be investigated, the risk assessed, and appropriate measures taken in the light of the risk.



Oxygen criticality (chart)

Effect	Atmosphere Oxygen (dry air, sea level)	
	Concentration %	Pressure - mm Hg
no symptoms	16 to 20.9	122 to 159
increased heart and breathing rate, some loss of coordination, increased breathing volume, impaired attention and thinking	16	122
abnormal fatigue upon exertion, emotional upset, faulty coordination, impaired judgment	14	106
very poor judgment and coordination, impaired respiration that may cause permanent heart damage, nausea and vomiting	12	91
nausea, vomiting, lethargic movements, perhaps unconsciousness, inability to perform vigorous movement or loss of all movement, unconsciousness followed by death	<10	<76
convulsions, shortness of breath, cardiac standstill, spasmodic breathing, death in minutes	<6	<46
unconsciousness after one or two breaths	<4	<30

Some examples of dangerous situations are:

- If a CA system is activated while a person is locked inside the store;
- Entering an activated CA store (Never enter an operating CA store);
- When a person opens an activated CA store;
- Entering into a CA store which has recently been opened and is being ventilated
- If a person is located in a poorly ventilated area adjacent to a recently opened and vented CA store
- Opening access hatches and being overcome by CO₂

Access hatches to modern CA units are usually found on the front, but older units have hatches on the top of the units and the persons requiring samples usually need to climb a ladder to access the hatch. This in itself will provide difficulty should the person lose consciousness and emergency services needing access to that person. The person may also fall off the designated walkway if there are not specific safety measures in place. For example: safety rail installed.

Risk control measures

Entry must **NOT** be made to a CA store while it is operating.

Persons working within the vicinity of CA stores must **NEVER** put their head or any part of their body other than possibly the arm directly into the store.

Ensure that opening and closing of CA stores is done by a person authorised by the employer who oversees the safe work procedures.

A documented safe work practice outlining the operation of the CA store needs to be developed and put into practice in consultation with health and safety representatives.

A documented safe work procedure should address the following points:

Closing a CA Store

- Ensure all people have left the CA store, close and secure the doors, and if possible remove main door handle;
- Signpost the doors with clear and prominent signs that warn people not to enter the store (e.g. **DANGER. Keep Out. Atmosphere deadly if inhaled**), and
- Activate the CA system.

Opening a CA Store

- Ensure the opening of the CA store is closely supervised and observed by a second person who understands and follows the safe work procedures;
- Provisions must be considered to **stop unauthorised access** to the vicinity of the store(s) being opened;
- Ensure people not involved with opening the doors are kept well away from the immediate vicinity. These persons need be instructed and trained;
- Place a prominent DANGER sign adjacent to the stores being opened;
- If the store to be opened is located within an enclosed tunnel, you must ensure there is adequate ventilation within this enclosed area to prevent gases from building up.

- If the main door to the CA store opens directly to the outside environment, there must be no obstructions (for example stack of empty bins) in front of the door to ensure full ventilation.
- Open up all ventilation points on the store first.
- Undo the bolts securing the door and open to its fullest extent. Ensure people opening the door reduce their risk of exposure to an oxygen deficient atmosphere by quickly moving away from the store to a well-ventilated area.
- Record the time of opening on the sign;
- Ventilate the store with fresh air until the oxygen level is at least 19.5%;
- Ventilation is usually carried out by opening the doors and turning on the refrigeration fans;
- The time taken to ventilate will vary depending on the store size, internal structure, bins used and the ventilation rate. It may assist to determine how long it takes to ventilate the CA store. This information will help to work out the time required to undertake future ventilation;
- Measure oxygen levels just inside the store using a low oxygen detector that is correctly calibrated and maintained as recommended by the manufacturer
- Measurements should be taken by a competent person who is able to follow the manufacturer's instructions and correctly interpret the results, and **MUST NOT** enter the store itself.
- Declare the store safe for entry only when the oxygen level is 19.5-21% within the store;
- Record the atmosphere test results and the time the store was declared safe
- Remove signs and start normal work activities again.

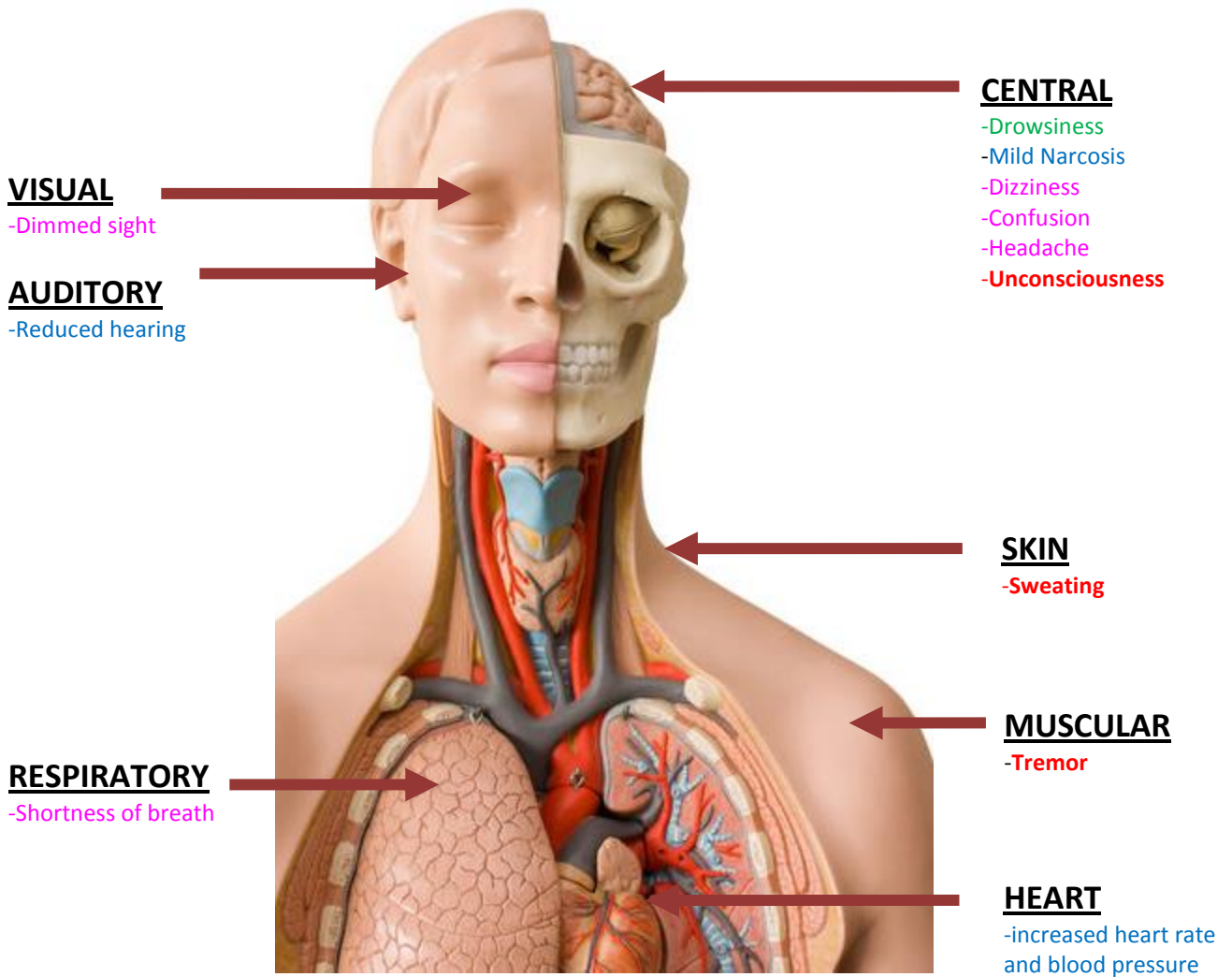
Administrative controls

- Prohibit entry to a CA store while it is in operation;
- Ensure the control system for the CA store is **isolated** so it cannot be operated while people are in the store;
- Put robust emergency procedures in place which includes first aid
- Training for employees should include:
 - health effects and warning signs of oxygen deficiency,
 - control measures in place, including documented safe systems of work,
 - the correct and safe use of atmosphere testing equipment
 - emergency procedures
- To prevent unauthorised access, all hatches of running CA Stores must be locked and a key held in a secure location and made available only to a trained member of staff. The key must be signed out and signed in by a trained member of staff;
- Site security must be strictly applied, monitored and reviewed regularly. Effectively control and monitor all access to and from the site.
- There must be supervisory control over all visitors and contractors.
- It is essential that all staff working around CA stores are in pairs, leave instructions as to where they are going and the expected duration of work
- Persons working around CA stores need to be equipped with a personal low oxygen alarm to provide an awareness of the level of oxygen in the environment around them.

Main symptoms of Carbon Dioxide Toxicity (diagram)

Volume % in air

- 1%
- 3%
- 5%
- 8%



Consultation with employees and non-employees

There are specific duties within the **Health and Safety at Work Act 1974** and sections of specific regulations that require employers to consult with employees who are, or likely to be, affected by a workplace health and safety matters. This includes identifying or assessing hazards and associated risks, implementing control measures, or when changes are proposed that may affect the health, safety and welfare of employees or non-employees.

Consultation must occur with contractors and employees of contractors, – provided that the action or decision involved is one the duty holder has control over.

There are many benefits that can be gained through meaningful consultation between employers and employees including:

- Better outcomes resulting from employee input and a more comprehensive identification of potential workplace hazards and risk control options;
- Ownership by employees in relation to any of the decisions that are made to eliminate or reduce risk;
- A more effective and efficient design and operation of plant and work processes;
- A better and more effective workplace layout that produces considerable efficiency gains;
- A healthy and safe workplace culture with a strong emphasis on cooperation

It is important to recognise that effective consultation during the initial design and ongoing operation of facilities will assist employers and operators. It ensures plant and equipment, as well as the structure and layout, are efficient and suitable for the safe operation of the facility.

Training and supervision

Training

Employers and operators of cold storage and controlled atmosphere storage facilities have prescribed responsibilities to provide employees with suitable and sufficient information, instruction, training and supervision to enable them to perform work in a safe manner without risk to their health. These same duties extend to contractors and the employees of contractors.

Induction and on-going training for employees and non-employees i.e. contractors should be regularly reviewed, and where necessary training is modified to ensure it remains relevant to current working operations, and provides appropriate information and instruction to employees/non-employees on any additions or changes to policies and safe working practices.

The employer must make sure there are accurate records of who is trained including refresher training, and kept up to date. This should be kept on the company file for tracking purposes and ensuring the person/s trained understands all legal responsibilities that they have, and importance of the training given to them.

Induction training

Induction training is required for each site and/or task, and be provided to permanent, part time, or casual employees and non-employees i.e. contractors.

Any training should include information identifying the relevant emergency procedures, points of contact and site familiarisation.

The level of site induction training required may depend on factors such as:

- Type of work and the level of expertise required by the person performing the work;
- Hazards and risks associated with the work;
- Specific area/s where the work is to be undertaken and any hazards that may exist there;
- Workplace hazards and the integrity and level of risk control measures in place and
- Level of supervisory control required and the contractual arrangements with the person and/or company involved.
- Procedures for reporting faults.

Task-specific training

Any task or hazard-based training provided by the employer to employees, contractors or others who may visit or undertake work at the site should:

- Reinforce and/or complement the induction training already provided by employer
- Include information on any risks associated with any hazard identified.
- Include information and specific instruction or procedures for eliminating or mitigating any risk associated with identified hazards.
- Encourage discussion and questions from participants to confirm understanding and clarify any misunderstandings.
- Include some form of competency-based assessment to ensure the training achieves desired outcomes.

Emergency Procedures

It is important to develop and implement appropriate and robust site emergency procedures that are clear and concise and translated where a person's first language is not English. Procedures must be including;

- A Pictorial site plan including site entrance and exit points, locations of telephone points/where to contact assistance, fire extinguishers and first aid.
- Full address including postcode. Consider ordnance survey map grid references and global position (GPS) co-ordinates.
- Telephone numbers of duty holder and/or responsible personnel (mobile + landline numbers).
- Location of nearest hospital including accident and emergency procedures.

Practical training for all employees and where necessary non employees on the process steps to follow in the event of an emergency situation, Including having people at key points on the site to guide emergency services to the scene of an accident.

Training MUST include the correct procedure in the event of a person becoming affected by low oxygen/collapse. Under NO circumstances MUST a second person place themselves at risk by attempting to rescue a fellow colleague or non-employee.

Please note that no two storage sites are the same and emergency procedures must be suitable to the specific location.

Legal obligations

Health and Safety at Work Act 1974

The **Health and Safety at Work Act 1974** requires the duty of every employer to ensure, so far as is reasonably practicable, the health, safety and welfare at work of all his employees.

- (a) the provision and maintenance of plant and systems of work that are, so far as is reasonably practicable, safe and without risks to health;
- (b) arrangements for ensuring, so far as is reasonably practicable, safety and absence of risks to health in connection with the use, handling, storage and transport of articles and substances;
- (c) the provision of such information, instruction, training and supervision as is necessary to ensure, so far as is reasonably practicable, the health and safety at work of his employees;
- (d) so far as is reasonably practicable as regards any place of work under the employer's control, the maintenance of it in a condition that is safe and without risks to health and the provision and maintenance of means of access to and egress from it that are safe and without such risks;
- (e) the provision and maintenance of a working environment for his employees that is, so far as is reasonably practicable, safe, without risks to health, and adequate as regards facilities and arrangements for their welfare at work.

The law requires employers, so far as is reasonably practicable, to provide and maintain a working environment that is safe and without risk to employees' health. Part of this is providing employees with information, instruction, training and supervision to ensure they are able to perform their work in a safe manner and without risk to health.

This duty extends to contractors, employees of the contractor and the general public. Employers and operators of cold storage and controlled atmosphere facilities should be aware they have a responsibility to others apart from employees.

While the **Health & Safety at Work Act 1974** prescribes the general principles and duty of care provisions of health and safety legislation, there are a number of specific regulations that require employers to identify and control risks, and consult with employees who are likely to be affected by any activity that relates to their health and safety.

Confined Spaces Regulations 1997

The hazards that the **Confined Spaces Regulations 1997** address arise through the combination of the confined nature of the place of work and the possible presence of substances or conditions which, taken together, could increase the risk to the safety or health of people. Remember that a hazard can be introduced to a substantially enclosed space that otherwise would be safe.

Duties to comply with the **Confined Spaces Regulations 1997** are placed on:

- Employers in respect of work carried out by their own employees and work carried out by any other person (e.g. contractors) insofar as that work is to any extent under the employers' control; and
- The self-employed in respect of their own work and work carried out by any other person insofar as that work is to any extent under the control of the self-employed.

Where employers or the self-employed have duties in relation to people at work who are not their employees then the duty is to do what is '**reasonably practicable**' in the circumstances. In many cases, the employer or self-employed will need to liaise and co-operate with others (e.g. other employers) to agree the respective responsibilities in terms of the regulations and duties. It is also necessary to take all reasonably practicable steps to engage competent contractors. In this way, those in control can be clear about what they can reasonably do to ensure that those undertaking the work in the confined space comply with these and other relevant regulations.

Provision and Use of Work Equipment Regulations 1998

Preventing the need for entry - No person at work shall enter a confined space to carry out work for any purpose unless it is not reasonably practicable to achieve that purpose without such entry. In the case of a controlled atmosphere store stores, this is a high risk of death of a Safe Systems of Working is not carried out and this SSOW must be adhered to and prevention for access must be provided on all counts. Also, the **Provision and Use of Work Equipment Regulations 1998 (regulation 4)** places a duty on employers to ensure that work equipment is so constructed or adapted so that it will not affect the health or safety of any person when used or provided for the intended purpose.

The Management of Health and Safety at Work Regulations 1999

The Management of **Health and Safety at Work Regulations 1999** apply across all industries and all work activities. The principal duty, regulation 3, requires all employers and self-employed persons to identify the measures they need to take by means of a suitable and sufficient assessment of all risks to workers and any others who may be affected by their work activities (insignificant risks can be ignored). Employers with five or more employees are required to record the significant findings of the assessment.

In accordance with regulation of the **Confined Spaces Regulations 1997**, the priority when carrying out a risk assessment is to identify the measures needed so that work in confined spaces can be avoided. If, in the light of the risks identified, it cannot be considered reasonably practicable to carry out the work without entering the confined space, then it is necessary to determine what measures need to be taken to secure a safe system for working within the confined space in accordance with regulation 4(2). The risk assessment will help identify the necessary precautions to be included in the safe system of work.

If it is not reasonably practicable to prevent work in a confined space the employer or the self-employed will need to assess the risks connected with entering or working in the space. The assessment will need to identify the risks to those entering or working there, and also any others, for example, other workers including contractors and the general public in the vicinity who could be affected by the work to be undertaken. Assessment upon which a **safe system of work** is to be based must be carried out by those competent to do so.

A competent person for these purposes will be someone with sufficient experience of, and familiarity with, the relevant processes, plant and equipment so that they understand the risks

involved and can devise necessary precautions to meet the requirements of the Confined Spaces Regulations. In complex cases more than one person may be needed to conduct assessment of risks relating to specific required areas of expertise.

Safe Systems of Working (SSOW) – Lone Working

How must employers control the risks?

Employers have a duty to assess risks to lone workers and take steps to avoid or control risks where necessary. This must include:

- Involving workers when considering potential risks and measures to control them;
- Taking steps to ensure risks are removed where possible or putting in place control measures, e.g. carefully selecting work equipment to ensure the worker is able to perform the required tasks in safety;
- Information, Instruction, training and supervision;
- Reviewing risk assessments periodically or when there has been a significant change in working practice.

This may include:

- Being aware that some tasks may be too difficult or dangerous to be carried out by an unaccompanied worker;
- Where a lone worker is working at another employer's workplace, informing that other employer of the risks and the required control measures;
- When a risk assessment shows it is not possible for the work to be conducted safely by a lone worker, addressing that risk by making arrangements to provide help or back-up.

Risk assessment should help employers decide on the right level of supervision.

Working with controlled atmosphere storage poses a high-risk activity where at least one other trained person needs to be present.

Building design and structure

There are a number of structural design factors that should be considered when planning, designing or modifying any storage facility. When planning the design specifications for a new cold storage facility or modifications to an existing facility, the owners and operators are presented with an opportunity to capitalise on past experience and ensure the design, layout and selection/installation of plant and equipment utilises new technology to eliminate or reduce risk while at the same time improve productivity.

The following building design factors should be considered during the design of any new storage facility or modifications to any existing facility.

Suspended ceilings

High risk examples	Medium risk solutions	Low risk solutions
<p>Insulated ceiling spaces or cavities used by employees or contractors for storage or maintenance that have:</p> <ul style="list-style-type: none"> • Not been designed and constructed with safe means of access and egress; • No visible or prescribed maximum load capacity to ensure it will support the weight of persons and or material and • No perimeter or other appropriate fall protection. 		<p>Suspended ceilings and ceiling cavities that have:</p> <ul style="list-style-type: none"> • Appropriate means of access to and egress from the ceiling cavity; • Sufficient space and lighting for maintenance or the conduct of other activities in the space; • Appropriately designated walkways and/or work platforms; • Suitable weight rating and are capable of supporting workers and materials; • Capability of bearing additional load from a build up of ice and water if the ceiling becomes wet; • Strategically positioned drainage points capable of removing any build up of water and • Provisions for a hoist or other mechanical aid used for raising and lowering tools and equipment.

Structural Support

High risk examples	Medium risk solutions	Low risk solutions
<p>Structural supports or columns throughout buildings that:</p> <ul style="list-style-type: none"> • Are positioned in or adjacent to vehicle or forklift traffic areas; • Are not clearly visible and easily defined; • Impede or restrict the movement of forklift and pedestrian traffic and • Increase thermal conduction. 	<p>Structural supports or columns within traffic areas that are:</p> <ul style="list-style-type: none"> • Painted to increase visibility and • Appropriately covered to reduce impact and increase visibility. 	<p>Building and structure designed or modified to ensure:</p> <ul style="list-style-type: none"> • No internal structural columns hinder or obstruct forklift or order picking activities; • Any internal structural supports or columns positioned within the building structure or racking and • Are insulated and heated to limit thermal conduction.

Air flows

High risk examples	Medium risk solutions	Low risk solutions
<p>Poor workplace design and layout with refrigeration plant and equipment that has:</p> <ul style="list-style-type: none"> • Unnecessarily high air velocity that creates high wind chill; • Fans directed onto employee work or traffic areas and • Noise levels at or above the exposure standard. 		<p>Design layout and selection of plant to ensure:</p> <ul style="list-style-type: none"> • Evaporators are positioned to reduce air flows and limit wind chill and ice formation; • There are safe and easy means of access to plant for maintenance staff; • Air curtains or rapid roller doors provide warm work areas for employees while maintaining cold environment for product and • Interlocked refrigeration fans that stop when people are in area.

Flooring systems

High risk examples	Medium risk solutions	Low risk solutions
<p>Poor concrete flooring system design and construction resulting in:</p> <ul style="list-style-type: none"> • Tripping hazards created by uneven, cracked or broken concrete; • Excessive number, size, and position of expansion joints and • Unsafe internal forklift traffic areas and roadways created by uneven floor surface (due to number, size and position of expansion joints or frost heave). 	<p>Flat concrete flooring system that has:</p> <ul style="list-style-type: none"> • A racking system strategically positioned over expansion joints and • Metal plates fixed over expansion joints. 	<p>A well designed, constructed and maintained concrete slab floor that:</p> <ul style="list-style-type: none"> • Is solidly constructed, level and free of cracks or damage; • Is post-tensioned to remove need for expansion joints; • Minimises the number and impact of expansion joints at design stage; • Has sufficient insulation with a suitable vapour barrier or sub-floor heating to prevent frost heave; • Is sealed to prevent or minimise concrete dust and • Has joints protected with steel angles.

Further information

For further in depth information regarding legislation and safe working guidance can be found on the Health and Safety Executive website

www.hse.gov.uk

Direct links to key regulations and guidance below:

Health and Safety at Work Act 1974

<http://www.legislation.gov.uk/ukpga/1974/37/contents>

Confined Spaces Regulations 1997

<http://www.hse.gov.uk/confinedspace/legislation.htm>

Management of health and safety at work Regulations 1999

<http://www.legislation.gov.uk/uksi/1999/3242/regulation/8/made>

Provision and Use of Work Equipment Regulations 1998

<http://www.hse.gov.uk/pubns/priced/l22.pdf>

Personal Protective Equipment at Work Regulations 1992

<http://www.hse.gov.uk/pubns/priced/l25.pdf>

Health and safety guidance on the risks of lone working

<http://www.hse.gov.uk/pubns/indg73.pdf>