Contents

GN 1  An Introduction to Health and Safety in the Meat Industry  3
GN 2  Training for Health and Safety  6
GN 3  Risk Assessment in Meat Processing  10
GN 4  COSHH  13
GN 5  High Voltage Electrical Stimulation (HVES)  17
GN 6  BSE - In Revision  21
GN 7  Machinery Safety and Hygiene Standards  22
GN 8  Manual Handling  24
GN 9  Safe use of Knives  26
GN 10  Bandsaws  29
GN 11  Bowl choppers  31
GN 12  Brine Injectors  32
GN 13  Gas Flushing  33
GN 14  Dicers and Cubers  35
GN 15  Frozen Meat Cutter  36
GN 16  High Speed Slicing Machines  37
GN 17  Tenderisers  38
GN 18  Degristlers  39
GN 19A  Pig Dressing Equipment – Scald Tanks  40
GN 19B  Pig Dressing Equipment – Dehairers  41
GN 19C  Pig Dressing Equipment – Gambrel Tables  42
GN 19D  Pig Dressing Equipment – Singers  43
GN 19E  Pig Dressing Equipment – Scrapers and Polishers  44
GN 19F  Pig Dressing Equipment – Hand held torch type Singers  45
GN 20  Mincemasters and Lowboys  46
GN 21  Smokers and Cookers  47
GN 22  Hopper-fed Sausage Fillers  48
GN 23  Patty Formers and Extruders  49
GN 24  Derinders, Skinning and Membrane Machines  51
GN 25  Loin Pullers  52
GN 26  Cleaning Operations  53
GN 27  Workplace Transport  56
GN 28  Thermal Comfort  58
GN 29  Mechanical Deboning Machine System  62
GN 30  Insect Killers  64
GN 31  Safe Methods for Preparation of Fresh Meat Chops  65
Other useful publications and guidance  66

These Guidance Notes have been prepared by representatives of the BMPA and following organisations in consultation with the Health and Safety Executive and published on their behalf by BMPA
An Introduction to Health and Safety in the Meat Industry

Meeting the demands of the seemingly ever increasing legal requirements affecting the meat industry can seem an overwhelming task. Health and safety requirements may seem the last straw, especially for small companies. However, with the help available in these guidance notes the task is made easier and companies can reduce costs by getting to grips with health and safety.

In a typical year the meat industry reports about 200 major injuries and 3,000 other reportable injuries to employees. These figures take no account of the under-reporting known to exist or of the many other injuries where time off work is less than 3 days. These figures put the meat industry amongst the worst performing sectors of the food industry, which itself is one of the worst performing sectors of the manufacturing industry generally. For example, in 1991 an employee in the slaughtering sector was 10 times more likely to be injured than the average person at work.

Apart from pain and suffering, legal consequences, and problems with enforcement authorities, the losses these accidents represent must be enormous. Studies in other industries by the Health and Safety Executive (HSE) have shown that accidents are a major cost to organisations. For example, a creamery employing around 300 people lost almost £250,000 in 3 months when the true cost of all accidents were known. In a similar study, a transport company’s losses amounted to 37% of their annual profits. The HSE/Meat Trades Joint Working Party is where inspectors from the HSE Food Section and representatives of the industry trade associations, trade unions and others get together to identify the health and safety issues the meat industry needs to face and prepare guidance on what can be done. Guidance notes have been produced for over 20 years and contain a large amount of useful material.

In recent times the health and safety legal framework has changed significantly and the emphasis has now moved from specific requirements to assessment of risk and the setting of goals. While this makes the law simpler, it makes it more difficult for employers to know exactly when they have done enough to meet the law’s requirements, both in practical and management terms.

For this reason, some guidance notes of a different style have been prepared. These do not concentrate on technical matters but help employers in the meat industry adapt to the new legal framework. The guidance on risk assessment is designed to complement HSE and Food and Drink Federation guidance. Identifying significant risks and priorities is important. Some kinds of accidents such as slips, trips and falls or knife injuries have long dominated the statistics and the numbers still stubbornly refuse to come down. It is now recognised that active management of safety can successfully reduce these numbers. In essence, organisations which succeed do so by identifying hazards, risks and priorities, planning and setting performance standards; and then actively measuring performance against these standards. Of course, there are many other factors such as clear communication, understanding and access to information. Much of this is now an explicit requirement of the Management of Health and Safety at Work Regulations. Against this background of risk assessment, setting priorities and performance standards, new guidance notes will be prepared or reviewed to ensure that useful material exists for all significant risks. These will set out standards agreed to be acceptable and are used by employers and inspectors alike in assessing conditions in workplaces against legal requirements, other solutions may of course be possible – and technical progress will be made.

Making sure your company meets the standards agreed in the guidance may take some effort. However, if employers make that effort the number of accidents in the meat industry can be significantly lowered.

Any questions you have on the guidance can be raised through your trade association, local inspector or directly with the HSE, Food Section, 375 West George Street, Glasgow G2 4LW, telephone 041 275 3000.
ACCIDENTS IN THE MEAT INDUSTRY

The following statistics show how the meat industry compares with other industries and what are the most common types of accidents.

Incidence rates are calculated according to the HSE standard, i.e. number of accidents divided by number of employees, multiplied by 100,000. When this guidance note was first published in 1990 the accident incidence rate for the slaughtering sector was 8125 and for the meat processing industry, 4852.

A small survey of meat plants that carry out the full range of processes from slaughtering to retail packing, shows that 30% of the accidents occur in packing. Typically, where packing is not carried out the accident split is 50% boning, 40% other and 10% slaughter.

Major injuries include fractures to limbs, amputations, 24 hour hospitalisation and injuries (including electric shock) leading to unconsciousness. 03D (over three day) injuries are those which keep an employee off normal work for more than 3 days. For a complete list see RIDDOR explained: HSE leaflet HSE 31 (Rev).

**TABLE 1**

<table>
<thead>
<tr>
<th>Industry</th>
<th>No of Emp.</th>
<th>Major</th>
<th>O3D</th>
<th>Total</th>
<th>Major Rate</th>
<th>All injury rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Slaughtering and by-products</td>
<td>17500</td>
<td>31</td>
<td>1 fatal</td>
<td>164</td>
<td>196</td>
<td>177</td>
</tr>
<tr>
<td>Bacon curing and meat processing</td>
<td>66200</td>
<td>149</td>
<td>787</td>
<td>936</td>
<td>225</td>
<td>1414</td>
</tr>
<tr>
<td>Poultry slaughtering and processing</td>
<td>17400</td>
<td>41</td>
<td>221</td>
<td>262</td>
<td>236</td>
<td>1506</td>
</tr>
<tr>
<td>Total all food manufacture average</td>
<td>417105</td>
<td>1118</td>
<td>5 fatal</td>
<td>6487</td>
<td>7608</td>
<td>267</td>
</tr>
<tr>
<td>All manufacturing industry average</td>
<td>6037</td>
<td>42 fatal</td>
<td>26355</td>
<td>32444</td>
<td>196</td>
<td>1041</td>
</tr>
</tbody>
</table>

**TABLE 2**

<table>
<thead>
<tr>
<th>KIND</th>
<th>SLAUGHTERING</th>
<th>MEAT PROCESSING</th>
</tr>
</thead>
<tbody>
<tr>
<td>Injury while handling, lifting, carrying including sprains and strains</td>
<td>4</td>
<td>33</td>
</tr>
<tr>
<td>Slip, trip or fall on same level</td>
<td>6</td>
<td>40</td>
</tr>
<tr>
<td>Hit by moving, flying or falling object</td>
<td>10</td>
<td>24</td>
</tr>
<tr>
<td>Fall from a height</td>
<td>4</td>
<td>6</td>
</tr>
<tr>
<td>Injury by an animal</td>
<td>5</td>
<td>0</td>
</tr>
<tr>
<td>Contact with moving machine or material being machined</td>
<td>3</td>
<td>27</td>
</tr>
<tr>
<td>Hit something fixed or stationary</td>
<td>1</td>
<td>7</td>
</tr>
<tr>
<td>Exposure to or contact with harmful or hot substance</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>Fire</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Hit by moving vehicle</td>
<td>0</td>
<td>5</td>
</tr>
<tr>
<td>Accident not falling into the categories listed</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>TOTAL</td>
<td>32</td>
<td>150</td>
</tr>
</tbody>
</table>
TABLE 3

OVER 3 DAY INJURIES BY KIND IN SLAUGHTERING & MEAT PROCESSING 2004/5

<table>
<thead>
<tr>
<th>KIND</th>
<th>SLAUGHTERING</th>
<th>MEAT PROCESSING</th>
</tr>
</thead>
<tbody>
<tr>
<td>Injury while handling, lifting, carrying including sprains and strains</td>
<td>51</td>
<td>319</td>
</tr>
<tr>
<td>Slip, trip or fall on same level</td>
<td>32</td>
<td>164</td>
</tr>
<tr>
<td>Hit by moving, flying or falling object – includes accidents involving power tools</td>
<td>51</td>
<td>160</td>
</tr>
<tr>
<td>Contact with moving machine or material being machined</td>
<td>10</td>
<td>53</td>
</tr>
<tr>
<td>Hit something fixed or stationary</td>
<td>5</td>
<td>32</td>
</tr>
<tr>
<td>Exposure to or contact with harmful or hot substance</td>
<td>6</td>
<td>20</td>
</tr>
<tr>
<td>Fall from a height</td>
<td>4</td>
<td>17</td>
</tr>
<tr>
<td>Injury by an animal</td>
<td>7</td>
<td>0</td>
</tr>
<tr>
<td>Hit by a moving vehicle</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>Contact with electricity</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Assault</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>Accident not falling into the categories listed</td>
<td>5</td>
<td>8</td>
</tr>
<tr>
<td>TOTAL</td>
<td>172</td>
<td>780</td>
</tr>
</tbody>
</table>

REPORTABLE ACCIDENTS IN SLAUGHTERING 2004/05

- Injury while handling, lifting, carrying including sprains or strains
- Slip, trip or fall on same level
- Hit by moving, flying or falling object
- Contact with moving machine or material being machined
- FFH, Hit by vehicle, Exposure to harmful substance
- Accident not falling into the categories listed

REPORTABLE ACCIDENTS IN MEAT PROCESSING 2004/05

- Injury while handling, lifting, carrying including sprains or strains
- Slip, trip or fall on same level
- Hit by moving, flying or falling object
- Contact with moving machine or material being machined
- Hit something fixed or stationary
- FFH, Hit by vehicle, Exposure to harmful substance
- Accident not falling into the categories listed
Health and Safety Guidance Note GN2

Training for Health and Safety in the Meat and Poultry Industry

INTRODUCTION
This guidance note summarises the current legally required health and safety training needs of companies and gives suggested training outlines for different grades of staff. Areas of particular relevance to the meat and poultry industry are listed at appendix 1 and the specific legal duties on training most applicable to the meat industry are listed at appendix 2.

WHAT TRAINING IS REQUIRED?
Under the Health and Safety at Work etc Act 1974 (HSW Act) and the Management of Health and Safety at Work Regulations 1992 all employees, including supervisors and managers, need to receive training to ensure competence in health and safety aspects of their job. There are specific requirements under individual pieces of legislation (see appendix 2).

Training needs at all levels are likely to be greater on recruitment. All new employees should receive basic induction training covering such things as company rules, individual responsibilities, first-aid, fire and emergency procedures. Beyond this, training needs to be tailored to the job and responsibilities of employees concerned. Supervision, practice and development of skills are also important. All health and safety training and assessment sessions are to be documented and included in the employees training records.

In small firms training may have to take the form of individual tuition. The extent of such training will vary between individuals depending upon existing competence. The training need should always be assessed. This is particularly important with young people and others new to the sector. It should never be assumed that appropriate or effective training has been given e.g. by previous employers. It is equally important to assess the outcomes of training to ensure competence. National and Scottish Vocational Qualifications (NSVQs) contain units on health and safety and provide for such an assessment to nationally agreed standards. The Meat Training Council is happy to advise on NSVQs and training courses, materials and organisations offering training. Where safety representatives have been appointed by trade unions under the 1977 Safety Representative and Safety Committee Regulations or elected under the 1996 Health and Safety (Consultation with Employees) Regulations, there is a duty to consult with them in good time on the arrangements for health and safety training. The views of the safety representatives will help in assessing the adequacy and effectiveness of the training provided.

Senior Managers
Senior managers (this includes partners or directors of small firms) need to know enough about health and safety matters to determine priorities and assess the performance of people further down the management line.

They need to make sure that a responsible and professional attitude is exhibited throughout, by themselves, by departmental managers and, via supervision, all other employees. They should make clear that failure by employees at any level to obey safety rules will be taken as seriously as failure to obey other company rules such as those, which govern hygiene, production, etc. This commitment to health and safety, together with a commitment to training, should be given in the company safety policy.

Managers and Supervisors
Health and safety training for managers and supervisors is essential. They have a key responsibility for maintaining a safe working environment.

They need to be aware of hazards within their area of responsibility, company standards and the procedures for ensuring standards are maintained and used when necessary, e.g. wearing of protective gloves during knife work or emergency evacuation and rescue procedures in the event of an ammonia leak.

Employees
For employees, training is most needed to ensure competence and safe performance in their work tasks.
INDUCTION TRAINING FOR ALL

Company Structure
This should be explained by a director, company secretary, or a senior manager responsible for health and safety. It should include the names of the departments and managers.

Company Safety Policy
Copies of the current policy should be provided for employees. The meaning of the document and the company's commitment to it should be explained. Particular attention is to be given to arrangements for monitoring health and safety standards and the role of supervisors and departmental managers.

Safety Committee
- Terms of reference and membership.
- Arrangements for calling meetings and actioning matters agreed
- Copies of the minutes of the last meeting should be distributed

Safety Representatives
- The role of the safety representative and agreed arrangements for joint consultation on health and safety at work.

Occupational Health Arrangements
- Including first-aid arrangements and facilities, any specific arrangements for health-related issues, services of any medical and nursing staff.

Responsibilities of Individuals
- The need to obey the company rules: disciplinary procedures.
- Reporting of accidents, near misses and work-related health problems

Hazards and Standards for Safe Working
- General overview of significant site hazards which may affect all and relevant precautions.

Fire and other Emergencies
- State whether there is a fire certificate; describe means of escape and the need for good housekeeping to maintain them.
- Rules on smoking; fire extinguishers, alarms and evacuation

TRAINING OUTLINE FOR EMPLOYEES

Training should not be used to compensate for inadequacies such as poorly safeguarded machinery or badly designed workstations. All health and safety training should be recorded.

Identifying Training Needs
- Consider risks and hazards in the workplace.
- Consider accident, ill health and incident records relevant to the job, to identify how such events have occurred and how they can be prevented.
- Information from workers about how jobs are done.
- Observation of tasks, comparison with known good practice

Basic Instruction
- Equipment to use, how it works, what it does
- Dangers associated with use
- Proper use of equipment including safety and health precautions
- Cleaning of equipment
- Fault reporting
- What protective equipment to wear

Final Check
To ensure effectiveness of training techniques like close supervision during introduction to work and questionnaires designed to test understanding of safe operating procedures should be used. Information on training and testing should be kept with employee records.

TRAINING OUTLINE FOR SUPERVISORS AND MANAGERS

Responsibilities
- Explanation of supervisors' and managers' responsibilities for the health and safety of those under their role as defined in the company's safety policy and job description.
- Encouragement of employees by personal example
- Consultation with safety representatives, where they have been elected, and organising paid release for their training and for carrying out their functions.
- Identification of training needs of workers
- Company commitment not to tolerate the breaking of safety rules.

Hazard identification and risk assessment
- Significant hazards and risks in their area of responsibility
Health and Safety Guidance Notes for the Meat Industry

Precautions
- The precautions necessary to avoid hazards and control risks

Monitoring of health and safety standards
- Regular preventive inspections
- Preparation of safety check lists
- Occupational health provision
- Initiation of remedial action

Accident investigation
- Typical causes of accidents; relationship between near misses, minor and serious accidents.
- Reporting of accidents and identification of actions needed to prevent recurrence

Relevant legal requirements
- Acts, e.g. Health and Safety at Work etc Act 1974
- Regulations, e.g. Noise at Work Regulations 1989, Control of Substances Hazardous to Health Regulations 1988, Electricity at Work Regulations 1989, Management of Health and Safety at Work Regulations 1992 and other regulations implementing European Community Directives
- Approved codes of practice, e.g. COSHH, first aid at work
- Powers of Inspectors

Sources of information
BMFA Guidance Notes, Trade Unions e.g. USDAW, Health and Safety Executive (HSE), Meat and Livestock Commission (MLC), Meat Training Council (MTC), National Federation of Meat and Food Traders (NFMFT) etc.

TRAINING OUTLINE FOR SENIOR MANAGERS
- The purpose and implications of the company safety policy
- Provision of adequate resources for implementing the policy
- Consideration of health and safety implications when planning and decision-making
- Personal accountability
- The need to encourage interest in and commitment to, health and safety; safety culture
- Assessment and review of company health and safety performance. Use of safety audits. Role of the competent person/safety adviser. Role of occupational health services
- Causes of accidents, ill health and hearing loss. Costs of these losses
- Training needs of employees including those of managers with additional health and safety responsibilities
- Functions of safety representatives and safety committees
- The requirements of relevant acts, regulations and approved codes of practice, including legal duties to visitors and contractors
- Knowledge of the work of HSE and an understanding of the role and power of inspectors.
- Existence of relevant standards, e.g. BMFA Guidance and HSE publications and commitment to apply these throughout the company

APPENDIX 1
Health and safety areas where training is of particular relevance in the meat and poultry industry are as follows:

1. Slips and trips
   - Correct selection of footwear and its maintenance
   - Correct avoidance of spillages and cleaning up
   - Correct ways of moving around to minimise risk

2. Prevention of cuts and stabs during use of knives and hand tools
   - Correct use of knife for particular job
   - Correct sharpening of knife
   - Misuse, bad practice, storage
   - Correct use of protective equipment
   - Emergency first aid

3. Dangerous machines
   - Meat mincing machines
   - Bowl choppers
   - Bandsaws
   - Circular knife slicers
   - Machines with circular saw blades

4. Manual handling
   - Sides and quarters of meat
   - Boxed meat

5. Fork lift truck driving
   - Selection of drivers
   - Approved code of practice
6. Health risks
   Range
   Symptoms
   Upper limb disorders
   Frost bite
   Infections

7. Handling/use of corrosive and acidic materials
   General cleaning
   Cooker/smoker cleaning
   Personal protective equipment

8. Emergency rescue/evacuation
   Ammonia leakage
   Use of breathing apparatus
   Emergency first aid

9. Electrical safety
   Danger from wet environment
   Maintenance work
   Use of high voltage equipment
   Fault finding on equipment

This list is not exhaustive and employers need to consider their own needs carefully.

APPENDIX 2
SPECIFIC LEGAL REQUIREMENTS FOR HEALTH AND SAFETY TRAINING

Management of Health and Safety at Work Regulations 1992
   Training in health and safety on recruitment on being exposed to new risks, new work equipment, systems etc; training of the required competent person, and persons required to be competent to implement procedures for dealing with serious dangers

Personal Protective Equipment at Work Regulations 1992
   Training in risks PPE will avoid, use of PPE, maintenance of PPE.

Health and Safety (Display Screen Equipment) Regulations 1992
   Training in use of workstations

Provision and Use of Work Equipment Regulations 1992
   Training in use of equipment
   Training of supervisors
   Training for maintenance

Manual Handling Operations Regulations 1992
   Training on manual handling risks and prevention

Noise at Work Regulations 1989
   Training on risk, steps to minimise risk, obtaining ear protectors, employee obligations

Control of Substances Hazardous to Health Regulations 2002
   Training in risks and precautions

Electricity at Work Regulations 1989
   Training to ensure competence to prevent danger

Health and Safety (First Aid) Regulations 1981
   Appropriate first aid training
Health and Safety Guidance Note GN3

Risk Assessment in Meat Processing

INTRODUCTION
This guidance note is intended to assist in assessing risks as required by the Management of Health and Safety at work Regulations 1999. It lists common hazards related to the meat industry and identifies priority risks for attention.

WHY DO WE NEED RISK ASSESSMENT?
Apart from being a legal requirement of the Management regulations, the purpose of a risk assessment is to identify what has to be done to make work safe. It means no more than:

- Identifying what may harm people at work (hazards)
- Estimating the chance of harm occurring, who may be affected and how much (risk).
- Gauging whether existing precautions are adequate.
- Carrying out improvements where the existing precautions are unacceptable.

WHAT SHOULD THE RISK ASSESSMENT COVER?
All risk needs to be considered, but trivial risks can be disregarded. Only significant risks need to be recorded.

Hazards
Based on the accident and ill health data known to the HSE and drawing upon the collective experience of inspecting slaughter-houses and meat processing plants, a list of common hazards in the meat industry has been compiled and is attached as an appendix to this guidance. The list is not exhaustive and will need to be adapted to suit individual circumstances.

As far as is practicable assessments should cover all aspects of work and should reflect what does happen rather than what should.

The assessment must cover all groups of employees from management and should also include visitors and the public if they have access.

Trained persons, who are familiar with the operation being assessed, should carry out the assessment. The "competent person" required by the regulations should be able to assist.

Risk
It is important to distinguish between hazard and risk. Risk means the chances of a hazard actually causing harm. For example, a head-dropping guillotine can be extremely hazardous, but carry no risk if being operated by a robot in a sealed area. On the other hand if it is being operated manually in such a position that other workers have to pass nearby it would represent an unacceptably high risk. The assessor must consider:

a) The likelihood of an accident or ill health occurring.
b) The seriousness of any injury or ill health caused.
c) The number of people exposed.
d) Special risk such as that to pregnant women or disabled persons.

Controls
Once the assessments have been carried out it is important to ensure that they are updated as the tasks change or are modified. Health and safety law, hygiene requirements and special local conditions will all influence the final outcome. Trade associations and the local HSE will give advice. Appendix 2 lists relevant guidance material.

Action
Where risk assessments highlight shortcomings then action should be planned and initiated to remove or control the risk. A system of checks or audits should be used to ensure continuing control. There should be robust systems to ensure that new and modified tasks are assessed before being put into operation.

Employers have a legal duty to consult with staff and safety representatives when developing risk assessments and control measures. This is vital to ensure that all important risks are identified and that control measures are practicable. In addition feedback from staff and safety representatives is an effective way of continually monitoring the effectiveness of the controls.
Prioritising risks
The main causes of fatal accidents are well known. Transport accidents are a major cause and special attention must be given to safe systems for workplace transport. Vehicle movements, including forklift truck operations, should have special attention. Other major risks are falls from height and serious knife wounds. Accident and ill health records can give guidance to “hotspots” in the business.

Common accidents in meat processing
(Guidance Note 1 has more detailed information on accident causes)
Major injuries are generally caused by:
Slips, trips and falls.
Machinery such as derinders and bandsaws.
Struck by objects such as knives and meat hooks.
Falls from height.

Less serious injuries that result in 3 or more days off work
Slips, trips and falls.
Machinery (often conveyors).
Hand and upper arm knife injuries.
Manual handling.

Health risks
Ill health in the meat processing industries follows a pattern directly connected with the work activity and includes: upper limb disorders and back pain (boners and poultry workers); hearing damage from noise (carcass splitting saws, frozen meat choppers, bowl choppers and lairages); occupational dermatitis (caused often by the high hygiene standards requiring frequent washing of hands) and infections from animals and poultry.

Conclusion
The meat processing industry ranks quite high in terms of accidents and ill-health. Good quality risk assessments and planned control action can substantially reduce accidents and ill health, leading to a safer, more efficient workplace.

Records and reviews
Companies with 5 or more employees must record the significant findings of the risk assessments and make them available to the employees. There is no need for this to become an all-consuming task. Many risk assessments can cover a large number of tasks, particularly where the tasks are the same. (For example, where a production line has many people doing the same job, one risk assessment will cover them all) Equally where a task comes up very rarely it is often easier to write the risk assessment just prior to starting the task. This is particularly useful for engineering departments and saves writing hundreds of risk assessments “just in case”. It is important to review risk assessments on a regular basis but the level of risk and the type of task will dictate the frequency. Long term tasks with very low risk may only require review once every 5 years, but a high risk task with frequent changes such as a band saw operation might require review every 3 months.

APPENDIX 1
KNOWN HAZARDS IN THE MEAT INDUSTRY

Struck by Objects
Cuts and stabings from knives
Goring, kicking, crushing by animals
Collision with moving carcasses
Captive bolt pistol

Slips, Trips and Falls
Broken uneven floors
Wet slippery floors
Unsuitable footwear
Smooth floors
Slippery stairs
Obstructions
Stairs in poor condition, badly lit or with no handrails
Outside yards (rain, ice)
Uncovered drainage channels

Manual Handling
Quarters of meat
Boxes of meat, trays of meat
Pushing/pulling bins
Vehicle loading/unloading
Bowl chopper knives
Machinery
Hide strippers
Flaying devices
Dehairing machines
Pig singeing furnaces
Power hand tools
Bandsaws
Derinders
Packaging machinery
Bowl choppers
Mincers
Pie and tart machines
Slicing machines

Falls/Falling Objects
Raised work platforms
High level cleaning
Roof repairs
Light bulb changes
Maintenance
Storage racks
Steps
Ladders
Fork lift truck work platforms
Mezzanine storage areas
Falls from vehicles
Feed chutes in floors
Falling carcasses
Falling hooks
People climbing on equipment

Transport
Vehicle movement in yard
Vehicle deliveries
Reversing
Delivery bays
Vehicle loading

Mechanical Handling
Fork lift trucks
Offal carriers
Conveyors (belt, screw)
Bin lifts
Goods lifts or hoists
Elevators
Passenger lifts

Ergonomic
Use of hand tools
Packaging
Poor design of work stations

Electricity
Electric shock especially from equipment in wet environment, pressure washers, electric stunners.

Noise
Animals in lairage
Pneumatic exhausts
Stunning guns
Machinery including bowl choppers, large mincers, large saws
Scalding tanks (steam injection)
Tray washers

Hazardous Substances
Carbon dioxide
Nitrogen
Biological hazards including from animals and Legionella
Ammonia
Corrosive cleaners

Fire and Explosion
Ammonia
Fuel storage (LPG)
Gas fired ovens
Welding equipment
Bulk gas storage
Pressure cookers
Oxygen (controlled atmosphere packaging)
Debris in ovens
Flour silos
Fryers
Polystyrene, polyurethane cored building panels

Temperature Extremes
Burns from hot surfaces
Work in cold environment (chills, freezers)
Entrapment in chills, freezers
Handling frozen products
Steam
Hot water

References
“Recipe for Safety” on the HSE website: www.hse.gov.uk
Five steps to risk assessment
Health and Safety Guidance Note GN4

Control of Substances Hazardous to Health (COSHH) Regulations

Regulations to control substances hazardous to health were first introduced in October 1989. Since then the regulations have been updated and new advice on compliance has been developed by the Health and Safety Executive. This guidance note explains the main principles involved in the COSHH Regulations and gives advice on further sources of information.

WHAT DOES COSHH COVER?

COSHH applies to most substances in the workplace which are known to be toxic, harmful or irritant. The exceptions are asbestos and lead which have their own separate regulations. COSHH does not apply to radioactivity or to fire and explosion hazards.

The range includes:

• chemicals or substances that are used in the workplace such as cleaning chemicals or spices and seasoning products
• dust or fumes that are produced as by-products such as cooking fumes
• biological hazards such as bacteria, viruses or fungal infections.

HOW CAN HAZARDOUS SUBSTANCES AFFECT WORKERS?

There are three main routes of exposure:

Inhalation: Dust, fumes or aerosols in the air can easily be breathed in. This can cause damage to the nose, upper respiratory tract and lungs. It is also the most efficient way of absorbing chemicals into the blood stream.

Skin Contact: Hazardous substances that come into contact with the skin can damage the skin itself causing burns or dermatitis. Some substances can trigger an allergic reaction. Others can be absorbed through the skin to affect other organs in the body.

Ingestion: Lastly, people can swallow hazardous substances. In a workplace setting this is usually less of a risk than inhalation or skin contact. However, it can happen. For example, poor hygiene practices could mean that workers hands are contaminated when they take a meal break.

Generally the effects on health include:

Acute Effects: Immediate effects such as irritation, burns, shortness of breath are called acute effects. They are often easy to spot and the need to control the chemical that causes them may be fairly obvious. For example, it is well known that Sodium Hydroxide solution is caustic so the need to protect against exposure when using it as a cleaning product is clear.

Chronic Effects: Longer term damage, such as cancer or liver damage are called chronic effects. It is also possible for an acute problem such as dermatitis to develop into a chronic problem if there is repeated exposure over a period of time. Chronic effects may often be much more difficult to recognize.

NEW AND EXPECTANT MOTHERS

The Management of Health and Safety at Work Regulations 1999 require employers to do a more detailed risk assessment on risks to pregnant workers. Some substances may pose particular risks to these women. For example, toxoplasmosis poses a particular risk during pregnancy and can be contracted through accidental ingestion when handling raw meat such as pork, lamb or venison. Where women of child-bearing age are employed any substances that pose a particular risk should be assessed and the woman who may be at risk should be informed. The assessment should be reviewed for any woman who does become pregnant.

MATERIAL SAFETY DATA SHEETS

For substances that are supplied for use in the workplace, the supplier should provide a Material Safety Data Sheet (MSDS). The MSDS should contain standard Risk Phrases that should help to identify any chemicals that may be hazardous. It should also provide information on safe storage, recommended use and safe disposal.
MANAGING HAZARDOUS SUBSTANCES UNDER COSHH

A risk assessment should be done for any hazardous substances in the workplace. Suppliers’ MSDSs are a good place to start for substances that are used in manufacture or cleaning. Other sources of advice about hazardous substances that may be present include the HSE, trade associations and trade unions. The assessment should identify the hazards, the groups of workers who may be exposed and the prevention and control measures to be used. Remember to include foreseeable abnormal situations that may cause greater exposure – e.g. a spillage, a burst pipe or occasions where normally enclosed machinery has to be broken down for cleaning.

Under COSHH there is a hierarchy of control measures that should be considered:

**Eliminating the Hazard**
Is there a safer substance that can be used? Can the process be changed to prevent the production of hazardous fumes or dust? Can a safer form of the substance be used – e.g. if a powder produces a dust hazard, is there a pelletised form which is less dusty or can a pre-mixed solution be used to avoid the need for mixing?

**Enclosure**
Isolating the source from the majority of workers can help. However some people may be exposed if there is a rupture in containment or if maintenance work has to be done inside the enclosed area.

**Ventilation**
General ventilation that provides sufficient fresh air may be suitable for low-grade hazards. For some substances local exhaust ventilation (LEV) may be needed at the point where the dust or fume is produced. LEV should be designed to remove dust or fumes before they get into workplace air. The shape, size and location of the intake and the design of ducting and pipework can greatly affect the efficiency of the extraction. Dust or fumes drawn into the extraction system must be disposed of safely.

**Material Handling**
Dust or fumes are often produced when workers have to handle substances – e.g. to load products into a mixing vessel. Automation or mechanical aids can reduce the need to pour from sacks, drums or kegs. This can reduce the risk of dust, fumes or splashing and may also reduce manual handling risks.

Organisational Controls
Restricting access to areas where hazardous materials are present reduces the number of workers exposed to risk. Good housekeeping to clean up spills and make sure that hazardous substances are properly stored can help. Washing and changing facilities may be needed for some workers. Workers exposed to the risk must be informed and should be trained so that they can follow the control procedures.

**Personal Protective Equipment**
As a last resort or as a temporary measure – e.g. in emergency situations – workers may have to use Personal Protective Equipment (PPE). PPE should be suitable for the job in hand and should comply with the relevant European standards.

For tight-fitting respirators (e.g. disposable masks, half masks and full face masks) the initial selection should include a fit-test to make sure that it is suitable for the wearer. The test must be done by a competent person using the appropriate test equipment and the test results should be recorded. Advice should be available from the supplier. Workers who are required to wear Respiratory Protective Equipment (RPE) should be trained in its use.

**MONITORING AND MAINTENANCE**
As with any risk management system, there should be regular monitoring and review to make sure that control measures are working.

Under COSHH there are specific duties to test LEV systems at least once every 14 months and to regularly test RPE, other than one-shift disposable masks. Frequency of testing of RPE will vary and advice should be sought from suppliers. RPE that is rarely used – e.g. emergency breathing apparatus – must also be regularly checked and maintained in line with the supplier’s instructions.
**Health and Safety Guidance Notes for the Meat Industry**

**OCCUPATIONAL EXPOSURE LIMITS**

For approximately 500 substances there are legal exposure limits. At present there are two types:

- **Maximum Exposure Limits (MELs)** have been set for 72 substances. The MEL should never be exceeded and exposure should be reduced as low as reasonably practicable below the MEL. In practice few of the substances normally encountered in meat processing will have an MEL. One exception may be flour dust (a significant cause of occupational asthma) for which an MEL of 10 mg. per cubic metre of air averaged over 8 hours, with a 15-minute short-term exposure limit of 30 mg. per cubic metre, has been set. If flour is used at any stage of processing in the factory then exposure to dust must be reduced to the lowest reasonably practicable level below the MEL.

- **Occupational Exposure Standards (OESs)** exist for just over 400 other substances. There is no legal duty to reduce exposure below the OES, but if an OES is being exceeded, the duty is to lower the level to the OES as soon as is reasonably practicable.

  Again few of the substances used in the meat industry have an OES, but there may be some. Certain areas like QC laboratories may use a range of solvents and other chemicals. Some cleaning products may give off fumes that contain chemicals that have an OES. There is an OES for Carbon Dioxide. Argon and Nitrogen do not have OESs and are not directly harmful. However, they can act as asphyxiants. In areas where gases of this type are used it may be necessary to monitor oxygen levels.

  There is a general OES for all inhalable dusts of 10 mg. per cubic metre over 8 hours or 4 mg. per cubic metre for dust that is fine enough to be respirable (i.e. breathed deeper into the lungs). However some dusty materials will have their own OES or MEL.

  Because of scientific uncertainty about many OESs and confusion over the two different types of exposure standard, the HSE is proposing to simplify the system by reducing the number of substances that have an exposure standard and using a simple maximum exposure standard for all substances that require it. The focus for compliance with COSHH is moving toward making sure that the appropriate control measures are in place for any hazardous substances whether or not it has an exposure limit.

**HEALTH SURVEILLANCE**

COSHH requires health surveillance to be used where there is known exposure to a substance that causes a specific effect that can be detected by valid techniques. Health surveillance could be something as simple as training a supervisor to inspect the hands of workers where there is a known risk of dermatitis, or it could be something more sophisticated – e.g. lung function testing where there is exposure to a substance that is known to cause asthma. Where health surveillance is needed a health record should be kept for each employee.

Monitoring of airborne exposure levels and health surveillance are not alternatives to controlling exposure, but they do help to monitor the effectiveness of the control measures that are used.

**COSHH ESSENTIALS – PRACTICAL GUIDANCE ON CONTROL MEASURES**

To help employers decide on the appropriate control measures for chemicals they use, the HSE has developed a guidance approach called COSHH Essentials. An electronic version can be accessed free of charge on [http://www.coshh-essentials.org.uk/](http://www.coshh-essentials.org.uk/). The website gives instruction on how to work through the guidance for the particular chemical or substance you are interested in and allows you to print out records and details of control methods for your risk assessment.

The starting point for COSHH Essentials is the MSDS from the supplier. Health hazards should be identified by standard risk phrases like “R21 Harmful in contact with the skin” or “R43 May cause sensitisation by skin contact”. The guidance explains how to use these risk phrases to allocate the substance to one of five hazard groups. It then advises how to score the substance depending on the quantity used and how dusty or volatile it is. Finally, it refers the user to a set of guidance sheets with the appropriate control measures depending on the score the substance achieves. The guidance sheets cover common manufacturing processes like sack emptying, mixing, etc.
SOME COSHH HAZARDS IN THE MEAT INDUSTRY

Infectious Risks There is a possibility of “zoonotic” infections from the handling of animals. Possible hazards include bacteria such as Campylobacter and Salmonella, viral infections such as “Orf” from sheep, fungal infections such as ringworm and parasites such as toxoplasmosis. In practice serious infections are rare among slaughterhouse workers and meat handlers. The standard hygiene controls appear to be effective at controlling the risk. However there may still be a risk so in some plants the risk will have to be assessed and employees informed about it. The HSE produces guidance on the common occupational zoonoses.

Cleaning and Disinfectant Materials Many cleaning materials used in the industry are irritant and some are toxic. Problems can be worse if certain types of material are mixed together. The HSE publishes a useful information sheet on disinfectants.

Food Ingredients Although they are safe to eat some food additives and ingredients can be hazardous when workers are exposed in the workplace. Flour dust is the second commonest cause of occupational asthma in the UK. Other spices or seasoning products can be irritant or can cause allergies. The Seasoning and Spice Association provide advice on appropriate exposure levels. E.g. ground black and white pepper, ground chilies or ground mustard are irritants. The SSA recommends an exposure limit of 3 mg. per cubic metre (as opposed to 10 mg. per cubic metre for general nuisance dusts). Garlic powder, celer powder and celer seeds are identified as potential sensitizers (i.e. they may cause asthma) and exposure should be reduced as low as is reasonably practicable – certainly well below the nuisance dust exposure limit.

Advice is available from the Seasoning and Spices Association.

FURTHER INFORMATION


COSHH Essentials: Easy Steps to Control Chemicals, HSG193, HSE Books (Electronic version on http://www.coshh-essentials.org.uk/)

Seven Steps to Substitution of Hazardous Substances, HSG110, HSE Books

Occupational Exposure Limits: Containing the list of Maximum Exposure Limits and Occupational Exposure Standards, EH40, HSE Books (Electronic version on http://www.hse.gov.uk/pubns/eh40sup.pdf)


Fit testing of respiratory protective equipment facepieces, HSE Information Document 282/28 (Electronic version on http://www.hse.gov.uk/pubns/ asbestos.pdf)

Maintenance, Examination and Testing of Local Exhaust Ventilation HSG54, HSE Books

An Introduction to Local Exhaust Ventilation HSG37, HSE Books

The Occupational Zoonoses, ISBN 0 11 886397 5, HSE Books

Controlling exposure to disinfectants used in food and drink industries, HSE Food Information Sheet no. 29 (Electronic version on http://www.hse.gov.uk/pubns/fis29.pdf)

Occupational Dermatitis in the Catering and Food Industries, HSE Food Information Sheet No. 17 (Electronic version on http://www.hse.gov.uk/pubns/fis17.pdf)

For advice on hazards from seasoning and spice ingredients contact Seasoning and Spice Association
6 Catherine Street, London WC2B 5 JJ
Tel: 020 7836 2460 Fax: 020 7836 0580
INTRODUCTION
This guidance note contains information and advice on preventing injury from electric shock and burns during use, maintenance and cleaning of High Voltage Electrical Stimulation (HVES) systems.

Electrical stimulation of carcasses uses voltages typically in the range 700 to 1100 volts AC or over for the prevention of cold shortening of meat.

All existing systems have an exposed electrode that forms a rubbing bar along which the moving carcasses brush for about 90 seconds as they are carried along by an overhead conveyor. Current flowing from the electrode through the carcass to the earthed conveyor causes tenderisation of the meat.

The voltage and power available from the electrodes create a risk of electric shock and burns which may be fatal for anybody who may come into contact with it. The wet environment that exists in abattoirs will tend to increase the risk of injury. It is therefore important that persons cannot be in or enter the hazardous area of the stimulator while the electrodes are live. This can be achieved by a combination of measures including enclosure of the equipment; personnel detection and trip devices; earthing, emergency stop controls and warning indicators supported by instruction and information.

ENCLOSURE
The HVES system must be installed within an enclosure (see figure and photo) that prevents anybody touching the live electrodes from outside and causes the system to shut down if personnel attempt to enter the enclosure.

To achieve this in practice the enclosure should have walls to ceiling height or 2.5 metres high, whichever is the lowest and be roofed to prevent access from above and to prevent water from hoses or power washers making contact with the live conductors. Walls and roofs should be solid. All exposed conductive parts associated with the enclosure should be electrically bonded together and connected to the main earth terminal of the installation.

At the carcass exit and entry apertures there must be a barrier to let staff know that they are near a hazardous area and to dissuade them from entering. The barrier may be a ground level barrier (e.g. a rail or a 45° sloping threshold) and the opening for the carcass should be the minimum size necessary. There must also be warning lights to indicate the status of the stimulator.
To prevent the possibility of people touching the live rubbing bar from the carcass entry and exit points, an adequate separation between the bar and the entry/exit points must be provided. There is also the possibility that carcasses being stimulated may become bunched on the overhead rail. Carcasses other than the one being stimulated may then become live and create a hazard. Taking these factors together, a minimum distance of 2 metres or 3 successives, whichever is the greater, should be provided between the personnel barriers and the live parts of the rubbing bar. This distance may have to be increased for stimulation of cattle carcasses. The installer of the system should assess this.

Where practicable, a separate and interlocked access door should be provided for maintenance, cleaning, product recovery etc. Opening of the door must immediately cause the HVES to be switched off, and restarting must only be possible by means of a start control located outside the hazardous area. Interlocking devices such as a captive key, an interlocking switch with guard locking, or dual positive and negative mode interlocking devices would be suitable. Where practicable a window should be provided to allow staff and visitors to see the stimulation process without needing to enter the enclosure or stand where they might block the entry and exit points.

If there is any risk of water jets hitting the rubbing bar through the carcass entry and exit points, hoses should be relocated or screens installed. Alternatively, water supply to hoses that could reach into the HVES must be automatically turned off when the HVES is in use.

**ELECTRICAL STANDARDS**

The electrical supply to the installation should conform with BS 7671:1992 Requirements for electrical installations and the electrical parts of the stimulator itself should comply with BSEN 601204-1. Safety of machinery - Electrical equipment of machines Part 1 Specification for general requirements.

**PERSONNEL DETECTION**

If staff climb over or through the physical barriers at the carcass entry and exit points their presence shall be automatically detected and the HVES shut down immediately. This can be achieved by installing an Active Opto-Electronic Protection Device (AOPD) such as a light curtain. The preferred solution is to locate the light curtain so that it scans the entire floor area of the enclosure. This floor detection system does not rely on the operator to decide if it is safe to switch on. Every time the unit is switched on it will automatically check that the floor is clear of personnel or fallen carcasses and will prevent start-up of the stimulator if an obstruction is detected. This solution also ensures that no one can be present inside the enclosure when the system is operating.

Another possibility is to install the light curtains so that they scan the floor horizontally inside the enclosure at the entry and exit points for the carcasses. To ensure that staff cannot step over the beams they should be at least 1200mm wide in the direction of entry or exit. Moreover, the equipment must be installed such that personnel cannot enter the stimulator by walking on the AOPD transmitter and receiver units. However, this system has the disadvantage that it leaves large areas of the floor unscanned and relies on the operator to check that no one is in the enclosure before the system is switched on. It is essential that whoever starts the system has a clear view of the entire stimulation area to ensure that no one is inside the area at start up. If there is a blind spot in the stimulation area other means of checking must be provided. CCTV might be used but this has not always been reliable in a slaughterhouse environment.

Whatever system is used, the AOPD should comply with the requirements of BS EN 61496 Safety of Machinery - Electrosensitive protective equipment. Part 1 General requirements and Part 2 Particular requirements for equipment using active opto-electronic protective devices, or to an equivalent standard of performance. Guidance on the application of this standard is published by the HSE in guidance note HSG180 Application of electrosensitive protective equipment using light curtains and light beam devices to machinery. Systems that are already in use and which use photoelectric safety systems to BS 6491 and which have an installation standard derived from HSE Guidance Note PM41 Application of photo-electric safety systems to machinery will meet the required standard.
The degree of risk on HVES systems and the importance of the light curtains in achieving adequate risk reduction means that Type 4 light curtains (as defined in BS EN 61496) should be used. These have 2 output switching devices that provide for 2-channel interfacing with the HVES control systems such that a single fault will not lead to the loss of the safety function. All HVES systems presently installed use electromechanical contactors as the primary control elements. In accordance with the guidance contained in HSG180, the contactors used as the primary control elements should incorporate suitable means to monitor the ‘on/off’ positions of the main contacts configured in such a way that a failure of a contactor will be detected. This can sometimes be achieved by using auxiliary contacts on the same former as the main power contacts.

The safety-related parts of the HVES control systems should not rely on software, such as ladder logic in Programmable Logic Controllers, for their operation.

If the HVES is tripped by the AOPD, the HVES should only be capable of being restarted by a deliberate reset action. Reset switches must be located outside the HVES enclosure.

MAINTENANCE
The installation must be provided with means for ensuring positive electrical isolation for maintenance work. The installation must therefore have a power isolator or disconnector fitted and which is capable of being locked in the off position.

An alternative system uses a captive key that is contained in a remote control box adjacent to the personnel door. The key must be used to open the personnel door and removing the key from the control box automatically shuts down and isolates the HVES system, providing a safe working environment.

It is highly advisable to enhance safety by providing facilities for earthing the electrode during maintenance and cleaning work. One manufacturer fits a lockable earthing bar that must be used each time anyone has to enter the stimulation enclosure. This is interlocked with the main control system to ensure that staff cannot operate the HVES unit with the earthing bar still in place.

CONTROLS AND INDICATORS
All start and reset controls must be located outside the enclosure in an easily accessible position with a clear view of the inside of the stimulation area. An emergency stop control must be provided at the control panel and at the carcass entry/exit points to allow the HVES to be switched off in an emergency.

The control system should be protected from unauthorised use by means of a key operated switch with the key held by a competent person who has been trained in the operation of the stimulation unit.

To avoid confusion, the main warning lights at the entry and exit apertures should be very simple, green for “safe to enter” and red for “do not enter”. A set of lights should be provided at every possible personnel entry point.

It is very important that the interlocking devices are interfaced with the control system to maintain the overall integrity of the safety related sub-systems. The system should be designed and commissioned by a qualified engineer. It is not acceptable to allow persons who do not have sufficient knowledge of the system to commission it.

The carcass conveyor must be interlocked with the stimulation system to stop the conveyor in the event of any problems. For cleaning purposes, however, the conveyor should be able to run when the stimulation equipment is switched off.

NOTICES
Warning notices should be placed at all possible personnel entry points warning of the dangers of electric shock and the policy concerning entry to the stimulator.

INSTRUCTIONS, INFORMATION AND TRAINING
A full instruction manual should be provided with the equipment. This manual must include instructions on the safe installation, operation and cleaning of the HVES.

All operators must be given training on safe operation and cleaning of the HVES.
Instructions on routine maintenance tests and examination of the HVES, its guards and protective devices, must also be included. Routine tests must include insulation resistance and earth continuity tests, as well as proof tests of the safety systems such as the AOPD and interlocking devices.

USEFUL PUBLICATIONS

1  Supplying New Machinery – HSE leaflet, INDG 270
2  Buying New Machinery – HSE leaflet, INDG 271
4  Application of electro-sensitive protective equipment using light curtains and light beam devices to machinery

FURTHER INFORMATION

For further information please contact the Meat and Livestock Commission or your Local Health and Safety Executive Office.
Health and Safety Guidance Note GN6

Safeguarding against Possible Exposure to the BSE Agent in Cull Abattoirs

Due to the concerns that abattoir workers may be exposed to the BSE agent during the cull of animals in the Over Thirty Month and associated schemes HSE has prepared this reminder of the required protective measures. The main risk is splashing of broken skin or mucous membranes with materials containing the agent. Action must be taken to avoid cuts and to ensure the wearing of adequate Personal Protective Equipment (PPE).

This checklist is intended to highlight the main precautionary measures required to prevent and control possible exposure to the BSE agent during the slaughtering and carcass handling processes in abattoirs. Failure to comply with the advice given in this checklist is likely to be in breach of the Control of Substances Hazardous to Health Regulations.

Abattoirs MUST
5 *Use bungs to plug the captive bolt hole after stunning
6 Use PPE, appropriate to the task (see BMMA Guidance Note 55 attached) which will include,
   - impervious overalls and boots
   - impervious gloves which cover hands and arms
   - chain-mail or equivalent cut protection
   - full face visors during back splitting and stunning (a fixed guard may be substituted
   for a visor during stunning but such a guard must be shown to be effective as there is evidence that neural material from stunning may be ejected up to 2 meters)
7 Use protective clothing which is disposable, for preference, or washable and stored separately after cleaning
8 Ensure that skips used for disposal of carcasses are in good condition and do not leak

*These measures are required by the contract between the RPA and the cull abattoirs.

Abattoirs must NOT
1 *Pith
2 *Centre split carcasses
3 Use high pressure water jets ¹
4 Allow employees to eat, drink or smoke in the workplace

¹ Water pressure should be as low as practicable consistent with hygiene needs but not more than 500psi.

In Revision

Health and Safety Guidance Note GN6

British Meat Processors Association
Health and Safety Guidance Note GN7

Machinery Safety and Hygiene Standards


Compliance with the directive must be achieved by ensuring that the "essential health and safety requirements" (EHRR) have been met. The EHRRs are described in the directive but for an increasing range of machines there are now specific standards and compliance with these standards is considered to be compliance with the directive.

These standards are harmonised across the EU and published in the UK as BS ENs.

The list below is a selection of standards covering the main topics for the meat and bakery industry. BS EN documents can be purchased from BSI. 389 Chiswick High Road, Chiswick, London W4 4AL (tel 020 8996 9000).

1. STANDARDS FOR SPECIFIC MACHINES

Meat Machinery
- BS EN 1974 Slicing machines
- BS EN 12267 Circular Saws
- BS EN 12268 Bandsaws
- BS EN 12885 Rotating bowl cutters
- BS EN 13871 Cube Cutting machines
- BS EN 12331 Mincers
- BS EN 12463 Filling machines
- BS EN 12984 Portable / hand operated machines
- BS EN 13570 Mixers & Blenders
- BS EN 13870 Chop Cutters
- BS EN 13288 Bowl lifters
- BS EN 13885 Clipping machines

Bakery Machines
- BS EN 453 Dough mixers
- BS EN 454 Planetary mixers
- BS EN 1673 Rotary rack ovens
- BS EN 1674 Dough and pastry brakes
- BS EN 12041 Moulders
- BS EN 12043 Intermediate provers
- BS EN 13390 Pie and tart machines

Packaging Machinery
- BS EN 415 Pt 1 Terminology and classification
- BS EN 415 Pt 2 Pre-formed rigid container machines
- BS EN 415 Pt 3 Form, fill and seal machines
- BS EN 415 Pt 4 Palletisers and depalletisers
- BS EN 415 Pt 5 Wrapping machines

Hygiene
- BS EN 1672 Pt 2 Basic concepts, Hygiene requirements

2. RELATED TO PEOPLE

- BS EN 294 Safety distances to prevent danger zones being reached by upper limbs.
- BS EN 811 Safety distances to prevent danger zones being reached by lower limbs.
- BS EN 349 Minimum gaps to avoid crushing parts of the human body.
- BS EN 547 Pt 1 Principles for determining the dimensions required for opening for the whole body access into machinery.
- BS EN 7250 Basic human body measurements for technological design.
- BS EN 999 Positioning of protective equipment in respect of approach speeds of parts of the human body.
- BS EN 1005 Pt 1 Human physical performance – Terms and definitions
- BS EN 563/A1 Temperatures of touchable surfaces (amended 1999)
| **3. MACHINE DESIGN** | BS EN 292 | Pt1 Basic terminology – general principles for design. |
| | Pt2 | Technical principles and specifications. |
| | BS EN 953 | General requirements for the design and construction of fixed and movable guards. |
| | BS EN 982 | Fluid power systems and their components (Hydraulics). |
| | BS EN 983 | Fluid power systems and their components (Pneumatics). |
| | BS EN 60204-1 | Electrical equipment of machines (1997). |
| | BS EN 60529 | Degrees of protection provided by enclosures (IP code). |

| **4. MACHINE CONTROLS** | BS EN 418 | Emergency stop equipment, functional aspects. |
| | BS EN 574 | Two-handed control devices. |
| | BS EN 954 Pt1 | Safety-related parts of control systems – General principle. |
| | BS EN 1037 | Prevention of unexpected start-up. |
| | BS EN 1088 | Interlocking devices associated with guards. |
| | BS EN 61496Pt1 | Electro-sensitive protective equipment – general requirements and tests. |

| **5. SIGNS AND AUDITORY SIGNALS** | BS EN 981 | System of auditory and visual danger and information signals. |
| | BS EN 61830 Pt1 | Indication, marking and actuation. |
| | Pt2 | Requirements for visual, auditory and tactile signals. |
| | Pt3 | Requirements for marking. |
| | BS EN 61830 Pt3 | Requirements for the location and operation of actuators. |

| **6. NOISE (ACOUSTICS)** | BS EN 3743 Pt1 | Determination of sound power levels of noise sources. Comparison method for hard-walled test rooms. |
| | Pt2 | Methods for special reverberation test rooms. |
| | BS EN 3744 | Determination of sound power levels of noise sources using sound pressure. Engineering method in an essentially free field over a reflecting plane. |

| **7. RISK ASSESSMENT** | BS EN 1050 | Principles for risk assessment. |

| **8. MISCELLANEOUS** | BS EN 13478 | Fire prevention and protection. |
| BS EN 1175 Pt1 | Electrical requirements. General requirements for battery-powered trucks |
INTRODUCTION
This guidance note summarises current health and safety legislation applicable to manual handling risks. The information is intended to outline issues relevant to the meat industry and provide practical guidance on methods of reducing risk. It should not be considered as an alternative to the requirements of the legislation or a risk assessment.

Manual handling risks fall into the general category of musculoskeletal disorders (MSDs) which are problems affecting the muscles, tendons, ligaments, nerves or other soft tissue or joints.

1.2 million people in GB suffer from work-related musculoskeletal disorders (WRMSD). This accounts for approximately 60% of reported ill health. 9.9 million working days are lost per year and (based on 1995/96 prices) the cost to the economy is c£523-556m. More than half result from back injuries.

CHALLENGES
The meat industry has traditionally needed to use the manual skills of its employees in most of its processing tasks. Automation and mechanisation have been progressively introduced but it can be difficult or expensive to automate these tasks. Knife work, packing, and picking, for example, have relied on manual dexterity and in some situations, replacing operatives with machinery may not be practicable.

Skilled workers tend to remain on certain jobs e.g. boning, often for many years. This is challenging for employers to manage, particularly where work patterns encourage employees to work at a fast pace such as on piecework, at premises where workers can finish early if they complete their set tasks or where bonus schemes operate. These factors increase the risk of developing musculo-skeletal disorders.

Larger businesses have more scope to reduce and control risks, but smaller companies, like butchers, may not be able to afford specialist handling equipment. However, by taking a fresh look using risk assessment techniques, some of the risk factors can be reduced or eliminated. For example, simply keeping floors free of slip and trip hazards may significantly reduce the risk.

WHAT IS MANUAL HANDLING?
The Manual Handling Operations Regulations 1992 States: "Manual handling operations" means any transporting or supporting of a load (including the lifting, putting down, pushing, pulling, carrying or moving thereof) by hand or bodily force. A 'load' includes any person and any animal.

Table 1 outlines some of the more common manual handling risks in the meat industry.

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<tr>
<th>LARAGE</th>
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<tr>
<td>Opening its closing gates</td>
<td>Slinging</td>
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<td>Pushing &amp; pulling animals</td>
<td>Reaching from platforms</td>
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<th>PACKING</th>
<th>MAINTENANCE</th>
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<td>Toolboxes</td>
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<td>Lifting pallets</td>
<td>Large components</td>
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<td>Handling bones</td>
<td>Moving pallet trucks</td>
<td>Gas cylinders</td>
</tr>
<tr>
<td>Pushing tote bins</td>
<td>Moving equipment</td>
<td>Awkward access</td>
</tr>
</tbody>
</table>

WHAT DOES THE LEGISLATION REQUIRE?
The Health and Safety at Work etc. Act 1974 Section 2 requires that employers provide systems of work that are safe, so far as is reasonably practicable. The Manual Handling Operations Regulations 1992 (as amended) require, so far as is reasonably practicable, the avoidance of manual handling likely to cause injury. Where manual handling cannot be avoided, employers are required to:

1. Carry out a suitable and sufficient assessment of risks from manual handling.
2. Take appropriate steps to reduce risk of injury from manual handling.
3. Provide information to people engaged in manual handling about the weight and characteristics of the load.
4. Provide suitable and sufficient information, instruction, training and supervision to enable employees to work safely.
LIMITATIONS WHEN LIFTING AND HANDLING
The guidance on the regulations provides guidelines for the maximum weights that should be lifted or lowered by a person in particular zones around the body. This varies significantly between males and females, whether one or more people lift an object together, the frequency of lifting, the nature of load itself and the prevailing environmental conditions.

MAKING AN ASSESSMENT
The regulations and associated guidance provide employers with a systematic method of assessing which risk factors that may apply during manual handling tasks. The assessment table contained in the code of practice breaks the task of manual handling into elements and asks what risk factors may be present.

It is essential for legal compliance to have a competent person carry out risk assessments. Some simple assessments require a basic competence, which can be gained from reading the regulations and following the guidance. More complex risks will require greater competence, for example; where young or pregnant workers are involved or employees who may have an existing health condition which limits their capacity for lifting and handling.

MANUAL HANDLING ASSESSMENT CHART (MAC)
The Health and Safety Executive has designed the MAC to help inspectors assess the most common risk factors. The MAC is also available to employers. The publication examines elements of manual handling tasks involving; lifting, carrying and team handling operations. Each element can then be assessed and risks levels classified as Low, Medium, High and Very High using the numerical and colour coded guides.

REDUCING THE RISK
The task itself will dictate what measures can be taken to reduce manual handling risks. Some simple measures include: tool balancers for heavy equipment; maintenance of wheels on pallet trucks; cleaning and maintaining floors to provide good grip; reducing the weight of loads and carrying distances; reducing twisting and reaching; simple handling equipment e.g. using a sack barrow instead of carrying sacks and brakes on trolleys used on ramps.

REFERENCES
Moving food and drink: Manual handling solutions for the food and drink industries. HSE Books HSG196 ISBN 0 7176 1731 9
Manual Handling Assessment Chart Tool (MAC), HSE website
Health and Safety Guidance Note GN9

Safe use of Knives

HAZARDS

Hand knives cause a large number of accidents in the meat industry.

The accidents usually involve cuts or stabs to the non-knife hand and forearm but stabbing injuries to the body cause very serious injury and there have been fatalities.

Most of the fatalities and serious injuries happen during deboning operations. For this work meat is held down on the block or table and moved with one hand, while the knife is gripped firmly in the other hand, blade downward. The knife is extremely sharp and is pulled through the meat towards the body. Accidents happen when the knife slips or skids off the bone and stabs the operator.

Other work involving knives includes cutting, slicing, dicing, skinning etc. The risk to the body is not as great during these operations because the knife is pushed down towards the work surface rather than drawn towards the body. However there is still a risk of cuts and stabs particularly to the non-knife hand and forearm.

Serious facial injuries including lost of sight have occurred when knives have been used to handle meat and when the knife has been kept in the hand while handling other items such as trays or boxes.

PRECAUTIONS

Select the right knife for the task. Deboning knives normally have a plastic handle that is designed to prevent fingers slipping onto the blade.

For sticking or other operations mainly involving pushing movements of the knife, the handle should have a suitable cross guard. The knife should be comfortable to grip and it should have raised portions at the junctions of the handle and the blade to minimise the possibility of the knife hand sliding over the blade.

Knives should not be used when sharpening has reduced them to thin narrow blades that can pass through protective aprons or snap under pressure.

Steel should have handle guards large enough to prevent cuts.

SAFE STORAGE OF KNIVES

Knife racks or other storage facilities should be provided, next to the workstation. Scabbards should be provided if workers need to move around the workplace with knives. The scabbards should be divided into compartments and be easily dismantled for cleaning.

When not in use knives must never be left lying around.

PROTECTIVE EQUIPMENT

Most injuries can be prevented if operators wear the right protective clothing, in particular protective aprons and gloves.

Aprons

Suitable protective aprons, usually chain mail or overlapping metal discs, must be worn during all deboning work or during other work where the knife is pulled with the point towards the body.

The apron should cover the body area from mid-breast bone to mid-thigh. The weight should be borne by the wearer’s shoulder and not their neck. The apron should be fully adjustable with shoulder straps and waist/hip belts so that it sits neatly against the body. The bib should not sag when the wearer bends forward.

Aprons should be properly maintained. Loose or missing links or discs should be replaced immediately and straps and fastenings should be kept in good condition.

“Stab pads” made of Balata belting or similar materials are not suitable as protection against stabbing injuries.

Aprons, trousers and vests should comply with the penetration test set out in BS EN ISO 13998:2003, Protective Clothing—Aprons, trousers and vests protecting against cuts and stabs by hand knives.

Apron and Leggings

An apron with the lower half divided to form knee length leggings secured to each leg by straps should be worn by persons in abattoirs engaged in “legging out” (skinning of the leg) which involves holding the leg of the carcass between the thighs and drawing the knife towards oneself along the carcass shin bone. The danger is of stabbing, particularly in the thigh or abdomen.
Gloves
A suitable protective glove providing 3 or 5 digit protection, usually chain mail or overlapping metal discs, should be worn on the non-knife hand during deboning work.

Protective gloves are also recommended for other hand knife operations particularly when an operator is inexperienced or under training.

Chain mail gloves should comply with BS EN 1082-1:1997

Forearm Protectors
Some gloves are designed to give wrist and forearm protection but forearm protectors made of clear plastic and either attached to or independent of the gloves can also be obtained.

Footwear
Boots or shoes must be non-slip. A slip or fall whilst holding a knife is potentially lethal. A dropped knife easily penetrates soft shoes.

Training
All new employees must be given a thorough basic grounding in the use, care and maintenance of knives and other equipment including steels and scabbards. It is important to check whether a person is right or left handed before commencing instruction.

All new employees must also be given a thorough grounding in the dangers associated with misuse of knives.

The use and maintenance of protective aprons, gloves and trousers should also be explained and attention should be drawn to the employee’s obligation to wear such protective equipment.

Instruction should be given either by the foreman or an authorised training instructor. Whoever carries out the training must be satisfied that the employee has understood and absorbed all information supplied. The training should include grinding and steelping to full proficiency. Newly trained staff must be introduced gradually to full speed production. They must be carefully supervised until sufficiently skilled to work with safety at full production rates.

Children (under the statutory school-leaving age) MUST NOT be allowed to use, handle or clean knives.

WORKPLACE
Working areas must be clean and tidy. Working surfaces and surrounding floor areas in particular should be free of debris and production waste. Floors should be slip resistant.

Lighting levels should be sufficient to ensure good visibility. There should be enough space for each operator to work safely. Working tables should be at the right height for the operator.

FIRST AID
Most of the fatalities and serious injuries occur during deboning or similar operations. A serious stabbing injury can result in heavy external bleeding, particularly if a main artery is punctured. In a number of cases the victim has bled to death in a few minutes. Prompt first aid action could save a life.

During deboning operations someone should be available who knows how to deal with stabbing injuries and heavy bleeding. The first thing to do is to immediately apply firm pressure to the wound using a pad. Lay the victim down while continuing to press the wound. Call for help.

APPENDIX
SAFETY WITH KNIVES: ADVICE TO USERS

1. Never use a blunt knife.
2. Know your own knife and how sharp it is.
3. Employ correct sharpening methods and learn the right way to use a sharpening stone and steel.
4. Do not grind your knife blade until it is dangerously narrow.
5. Never use a steel that does not have a hand guard.
6. Always replace knives in the scabbards when not in use. Never lay them down on a working surface where they may be covered by other objects.
7. Always pick up a knife by the handle.
8. Keep the working area as tidy and as dry as possible.

10. Direct the knife away from the body whenever possible. Never cut towards your fingers, hand or an unprotected part of the body.

11. Keep all knives, steels and scabbards clean and sterilise them at the end of the working day.

12. Never carry a knife in the hand when away from the point of work, unless the blade is covered.

13. Never try to catch a falling knife.

14. Make full use of protective clothing that is provided, including gloves and aprons.

15. Get first-aid treatment for all cuts, however small. Septic cuts and scratches can be dangerous.

16. Do not use knives to lift or move meat.

17. Do not have a knife in your hand if you are using your hands for anything other than the cutting task.
Health and Safety Guidance Note GN10

Bandsaws

DESCRIPTION
Bandsaws are used in the meat industry for portioning meat and other products. They consist of an endless saw-blade running over and driven by pulleys which presents a forward facing vertical cutting edge against which product is pushed for cutting. They are the cause of a disproportionately high number of machine accidents, frequently resulting in deep cuts and finger amputation.

HAZARDS
Contact with the blade during cutting or removing product is the greatest hazard and the most common cause of accidents.

PRECAUTIONS
The first precaution is to make sure that a bandsaw is not used where another machine or process will do.

Certain operations on bandsaws are unacceptably high risk and should not be carried out. In general the cutting of fresh meat that necessitates close approach of the fingers to the blade is too hazardous but courts and tribunals have held the following operations to be unacceptable:

(a) trimming of butt ends of lamb carcasses (that is, trimming off the thick fatty ends of the breast);
(b) splitting of legs or shoulders of lamb (that is, cutting across the leg or shoulder of lamb to produce the cuts called a half-leg and half-shoulder)
(c) preparation of pork chops from loin of pork.
(d) cutting cooked chickens in half by hand feeding

If a bandsaw has to be used for other operations then users should consider a conveyor feed to a totally enclosed blade or the use of jigs to avoid hand approach to the blade.

When it has been decided that a bandsaw with an exposed blade is the only practical way of doing the job then the risk must be reduced as much as possible. These are some of the ways to reduce the risk:

(a) make sure you have the right machine for the job with enough power so that operators don’t need to force product against the blade too hard and with a table big enough to support the product.
(b) only the minimum of blade, enough to make the cut, should be exposed and the rest of the blade should be guarded.
(c) access to dangerous parts should be interlocked so that opening any doors cuts off the power and the machine will not start unless these are closed. A time lock prevents access during run-down.

Using a bandsaw safely needs care and concentration. The machine should be sited where the operator can have plenty of space or the working area should be barriered off to prevent people bumping into him. As well as keeping the floor clean the use of slip resistant materials and shoes should be considered. Good lighting is important and a value of 500 lux is recommended.

As operators may be at the bandsaws for long spells, the materials and workspace should be organised to make using the machine as easy as possible. Particular care should be taken about ensuring table heights are set to prevent backache as discomfort can be a cause of accidents.

Only selected and trained people should use bandsaws and to remind operators and others about the dangers, clear notices should be displayed at the machine saying, for example, DANGEROUS MACHINE and DO NOT DISTRACT THE OPERATOR.

Nothing should be worn which could become entangled in the blade. Chain mail gloves must not be worn when a toothed blade is being used but roughened rubber gloves may add grip when handling some products.

Even when removing or fitting blades there is a risk of serious cuts so care must be taken and protective gloves may be worn for these tasks.
CHOP CUTTING

The Tribunal decision of Gateway Foodmarkets Limited v Sheila Patricia Walton, London Borough of Redbridge on 16, 17, and 28 March 1988 clarified that hand feeding of bandsaws with fresh meat in the preparation of chops presented unacceptably high risks of injury and that such a practice had rightly been the subject of a Prohibition Notice issued under the Health and Safety at Work etc. Act 1974. Bandsaws are inappropriate for the preparation of fresh meat chops where hand feeding is involved.

Where the quantities of fresh meat chops being produced is small the traditional methods involving the use of knife and cleaver are appropriate.

An alternative safe method where larger numbers of chops are to be produced is the use of the proprietary chop-slicing machine. These machines have high speed scimitar-shaped rotating blades with access to the blade being protected by interlocked guard tunnels at both ends.

REFERENCES

BS EN 12268:2003
Food processing machinery-Bandsaw machines

Guidance Note PM33
Reducing bandsaw accidents in the food industry
Health and Safety Guidance Note GN11

Bowl Choppers

DESCRIPTION

Bowl choppers are used extensively within the meat industry to mince meat to a fine degree and to blend and emulsify proteins. The machine comprises a rotating bowl into which meat, protein and other ingredients are deposited, manually on small machines or by means of a mechanised container tipper on large machines. Ingredients are minced in the bowl by a multi-bladed revolving knife positioned at the rear of the bowl and revolving in the vertical plane. Most machines have a selected range of knife speeds.

Manual removal of product is common on small machines but large machines are usually fitted with an uploading scraper which discharges the product from the bowl into a container via a chute.

HAZARDS

- Contact with moving and stationary blades.
- Electrical hazard from wet cleaning.
- Dusty product
- Injury by contact with moving container tippers.
- Noise.

PRECAUTIONS

1. The knife blades and associated drive shaft must be guarded to the greatest practicable extent. As a minimum they should be protected by a hood which extends to the width of the machine and to at least half the bowl diameter. The hood should be interlocked with the machine drive and fitted with a suitable overrun device. In addition to the hood at the rear of the machine, it is recommended that the following additional safeguards are provided.
   (a) A non-return flap should be fitted to the outfeed side of the rear hood, so arranged that with no material in the bowl, it falls by gravity to the vertical position and with material in the bowl, it rides on top of material being processed. Suitable stops should be fitted to ensure that the flap cannot be raised upwards beyond the horizontal position.
   (b) A suitable grid fixed to the discharge side of the hood should be provided with bars running parallel to the front of the hood and positioned far enough apart to allow easy feeding of material into the bowl.

2. An identifiable isolator switch should be positioned adjacent to the machine. The machine should be isolated using the switch before cleaning commences.

3. During the cleaning of the machine a guard or cover should be in position over the blades, except when they are being cleaned.

4. Blades should only be removed or refitted by a competent person using a blade guard or carrier.

5. The floor around the machine should be kept clean and clear of other persons. On machines incorporating a container tipper, the operator needs to see the motion of the tipper to avoid danger to other persons in the area.

6. Potentially dusty ingredients should be pre-damped or pre-mixed to ensure that dust is not evolved during the adding of material to the machine. Where this is not practicable, it may be necessary to provide local exhaust ventilation to remove the dust.

7. Noise levels should be assessed in accordance with the Noise at Work Regulations.

Since a high proportion of noise results from contact between the blades and product, noise reduction hoods and the use of lower speeds may achieve a significant reduction.

Worn shafts and bearings on older machines may be a significant noise source. Badly balanced blades also cause noise as does a lack of proper lubrication.

Where noise reduction cannot be achieved, segregation of noisy machines may be necessary along with the use of hearing protection.
Health and Safety Guidance Note GN12

**Brine Injectors**

**DESCRIPTION**

Brine injectors are used extensively within the meat industry to inject brine evenly into meat, for example for curing.

Meat is transported to the injection position by means of a conveyor belt, which forms an integral part of the machine. Brine from a storage tank is pumped to the head of a machine and then into the bank of needles. The brine is injected into the meat via either a pneumatically or hydraulically operated vertical needle beam. On some types of machine a pneumatically driven meat stripper puts adjustable pressure on the meat during the injection period to ensure that any meat which is held on the needles when the needle beam starts its upwards stroke is retained on the conveyor.

**HAZARDS**

- Traps associated with the injector needles and the needle beam
- Possible dangers from electrical fittings while cleaning.
- Traps associated with the meat conveyor belt.
- Possible access to the drive mechanism.

**PRECAUTIONS**

1. Fixed guards should be provided at the feed and discharge ends of the conveyor to a distance of at least 1,000 mm from the outside of the needle beam to prevent access to the traps formed by the injector needles.

2. The side panels of the machine enclosing the drive mechanism should be fixed by means requiring a tool other than a screwdriver for their removal.

3. It is recommended that an additional emergency stop button should be positioned at the discharge side of the machine in addition to the one provided normally at the feed side of the machine. The emergency stop button should stop not only electrically driven components but those driven by hydraulic or pneumatic power.

4. An earth-leakage circuit breaker should be fitted to the machine to ensure operator safety especially whilst the cleaning operation is taking place.

5. Any traps between the conveyor belt and the tail and head pulleys of the conveyor should be provided with suitable fixed guards.
Health and Safety Guidance Note GN13

Gas Flushing Systems

DESCRIPTION
Gas flushing is incorporated into packaging machines to improve product shelf life. Typical gases used are Carbon Dioxide, Nitrogen, Oxygen or a mixture of inert gases. The gas flush is performed at the pre-final sealing stage and is normally carried out at low pressure.

HAZARDS
- Storage of gases.
- Gas leaks.
- Excess gas from chamber machines. (The gas outside the package).
- Oxygen enrichment. Normal air contains 21% oxygen. In concentrations higher than 21%, substances are more readily ignited, burning faster and at higher temperatures. Oxygen enrichment to around 25% should be considered dangerous.
- Inert gases and oxygen depletion. Leakage of inert gases can deplete the room air of oxygen and create an asphyxiation risk.

Occupational exposure limits for some gases are contained in the HSE publication EH40 entitled “Occupational Exposure Limits”.

PRECAUTIONS
1. Bulk storage of oxygen should comply with the British Compressed Gases Association (BCGA) Code of Practice CP19 entitled “Bulk Liquid Oxygen Storage at User’s Premises”.
2. Bulk storage of liquid nitrogen and liquid inert gases should be in accordance with guidance from HSE reproduced as Appendix 1.
3. Bulk storage of Carbon Dioxide should be in accordance with the HSE Note CS9 entitled, “Bulk storage and use of liquid carbon dioxide: Hazards and procedures”.
4. All gas bottle storage should be in a well-ventilated area preferably external to the building. A cage or similar protection is required to prevent impact damage from vehicles. All bottles should be made stable by the use of secure anchorages. If it is not possible to site bottles outside, good bottle management should be encouraged to ensure that a minimum of filled bottles is inside the building. Empty bottles should be removed as soon as possible.
5. All pipework should be installed to BCGA CDP 4. Wherever possible the gas pipework should be of a continuous pipework run and protected from external damage. Flexible pipework should be kept to a minimum length so that it does not become a trip hazard. Rupture or leakage of pipework can give rise to an oxygen enrichment fire hazard and/or an inert gas asphyxiation hazard.

Pressure gauges should be fitted at the gas source and local to the packaging machine. The use of a “No Gas-No Operation” detector is recommended.
All distribution pipework should be provided with a means of isolation clearly marked and upstream of any flexible hose.
Reducing valves should be fitted at the gas source (bottles or bulk) so that all piped gas lines within the building are at low pressure.
All gas lines should be colour coded with flow direction marked.
6. The gas supply should be isolated at the main source during any period of non-production.
7. A gas analyser should be made available for frequent periodic checks on room atmosphere.
8. Local exhaust ventilation should be considered at the point of use to avoid gas build-up, particularly if the operation is in a confined space.
9. Only qualified persons should adjust or change the operation of any gas flushing system.
10. Supervisory staff must ensure all operatives are aware of hazards arising from gas flushing operations.
APPENDIX 1

PRECAUTIONS FOR BULK LIQUEFIED NITROGEN AND LIQUEFIED INERT GAS STORAGE INSTALLATIONS

1. Simple asphyxiating liquefied gas storage installations should, whenever possible, be located in the open air and not in a space immediately surrounded by structures, which may unduly restrict natural ventilation. They should be kept well away from cellars and other areas which may be occupied and in which gas, which has leaked from the installation, may be liable to accumulate. If the storage installation has to be inside a building, it should be sited in a dedicated storeroom which is normally unoccupied, is isolated and is separated from any occupied parts of the building by means of a barrier that is impervious to gas. At least one side of the storeroom should be an outside wall.

If an indoor installation is necessary, the maximum possible natural ventilation should be achieved by fitting a louvred outside door and fitting louvres or steel mesh instead of windows etc. In underground rooms mechanical ventilation extracting at a low level in the room may also be necessary. Any mechanical ventilation system should discharge to a safe place in the open air. Basement or semi-basement locations and occupied rooms are the least desirable locations. There should be two separate exits to permit means of escape in the event of a significant release of nitrogen or inert gas into the storeroom.

2. For indoor installation the storeroom outside door should be secured in the fully open position during coupling and uncoupling of transfer hoses and during transfer of liquefied gas from road tanker to the bulk storage tank. The filling connection should be sited near to the main door.

3. All vent pipes and any trycock from the bulk liquefied gas storage tank should discharge to a safe place in the open air as far from doors, windows and air intakes as is possible.

4. The overpressure relief devices provided for the bulk liquefied gas in the storage tank and any interspace over pressure relief devices should generally be discharged to a safe place in the open air as far from doors, windows or air intakes as is possible.

5. Transfer hoses and any sealing rings or gaskets associated with transfer hoses should be maintained in good condition.

6. Adequate provision should be made to prevent unauthorised access to any liquefied nitrogen or liquefied inert gas bulk storage installation.

7. Road tankers should be situated in the open air when discharging liquefied nitrogen or liquefied inert gas. The location should be such as not to restrict the dispersion of liquefied gas or heavy vapour. If possible the road tanker off-loading position should not be in a public thoroughfare. In cases where this cannot be avoided, warning notices to deter persons not concerned with the discharging operation from approaching should be erected and adequate supervision provided.

8. A suitable system of work should be implemented to ensure that Dewar flasks are not overfilled. Any indoor decant lines used to fill Dewar flasks should be of the minimum necessary internal diameter for the flow rate required. Dewar flasks should not be left unattended.

Local exhaust ventilation should be provided if the filling of Dewar flasks directly from the bulk storage installation is carried out indoors. The maximum rate of flow of liquefied gas, which if spilled will subsequently vaporise to form a large volume of gas, may be used as a guide for the required capacity rating of the exhaust ventilation system.

A competent person should periodically inspect the gas storage installation.
Health and Safety Guidance Note GN14

Dicers and Cubers

DESCRIPTION

Dicing or cubing machines are used to size reduce fresh meat and meat products into cubes.

There are several types in two main categories. These are:

1. Machines that push product through a lattice, forming strips and cutting those strips into cubes with a rotating sickle blade, and,
2. Machines that cut product into strips then use a multi-segment cutter head to produce cubes.

All types can have manual feed or semi-automatic or automatic feed with conveyors or loading devices.

Discharge is normally into a container but may be onto a conveyor.

HAZARDS

- Access to the rotating blades at the discharge end.
- Access to the hopper or feed chamber.
- Crushing by a ram extending beyond the end of the feed tunnel.
- Trapping between a loading device and the machine.
- Handling blades during cleaning and maintenance

PRECAUTIONS

The discharge aperture should not exceed the dimensions specified in BSEN 294 in relation to the distance from the blade. Alternatively, the machine should discharge into a container enclosure or on to a conveyor that prevents access to the blade and is interlocked so that the machine will not operate without these in position.

All non-fixed doors and covers giving access to dangerous parts should be interlocked.

When the cutting chamber door is opened by 20mm or a discharge system (container or conveyor) is removed, the cutting blades should stop in 0.15 seconds.

Hoppers should have some means of preventing access to the danger points. These include interlocked grids, trip bars or light barriers. On larger machines with hoppers over 1600mm there should be a mirror to see into the hopper or a fill level indicator.

If danger points in the hopper can be reached from steps or platforms these should be interlocked.

The ram should be set so that there is no gap between it and the tunnel and the machine should not operate unless the tunnel is in position.

There should be a gap of at least 120mm between the base of the machine and the loading device. Descent of the device should be controlled by a hold-to-run switch and should be no faster than 0.4 metres per second (mps). If the descent is automatic it should be at 0.1 mps and the last 0.5 metres should be controlled by hold-to-run.

Gloves should be worn which can protect against knife cuts when changing cutting tools or working near them.

REFERENCES

BS EN 13871 Cubes cutting machinery
Frozen Meat Cutter

**DESCRIPTION**
This machine is used to break up frozen blocks of boneless meat. This is done by an hydraulically operated guillotine blade or a rotary cutter blade that cuts the product into slices about 50mm thick in preparation for further mincing.

Product is loaded manually onto the machine before being pushed to a sloping feed tunnel to be carried by gravity to the blade. The sliced meat falls into a container placed beneath a hinged cover that protects the outlet. Options are available such as a hydraulically operated feed platform, adjustments for size and shape of meat to be cut and a totally enclosed cutlet container.

**HAZARDS**
Access to the blade by the in-feed apparatus. This is possible if the operator stands on a platform or the feed slope is not protected by a loading table. Attempts to speed up the process by pushing the meat block or efforts to free any blockage are particularly dangerous.

Failure to interlock the hinged outlet cover would allow easy access to the moving blade. In some models access to the blade is possible from beneath the outlet cover either when a close fitting wheeled container is not in position or small containers such as trays are used.

**PRECAUTIONS**
1. The guarding of the blade should be in accordance with the safety distances in BS EN 294: so that the operator cannot reach the blade. It should be impossible for a person to reach the blade when standing in any position next to the machine, and feed tables or loading devices should be incorporated into the machine in such a manner as to achieve this.

2. The safety devices at the feed opening of this machine can only ensure safety as long as an operator is standing at floor level and close supervision is necessary to ensure that elevated working platforms are not used.

3. The outlet cover should be fitted with an interlocked switch of suitable design that fails to safety.

4. When the discharge for the machine discharges into a collecting bin, either,
   (a) the bin should be situated inside a suitably interlocked enclosure which completely encazes it; or,
   (b) where the bin when in position prevents access to the dangerous parts, a suitable sensing mechanism should be provided to ensure that the machine can only be run when the bin is in position.

5. When delivery is by conveyor, fixed or interlocked guards should be provided between the discharge of the machine and the conveyor to prevent access to the blade. Where the conveyor is removable, it should be interlocked with the machine in such a way that the machine cannot be run unless the conveyor is in position.
Health and Safety Guidance Note GN16

High Speed Slicing Machines

DESCRIPTION
These slicers are used mainly for cooked meats. They have a variable cutting speed and are adjustable for slice thickness. The inclined blade is mounted eccentrically to provide the cutting action. The sliced meat discharges onto a conveyor. The machines can be gravity or power fed.

HAZARDS
- Access to the blade from either the feed or discharge side or if the blade cover is opened.
- Handling the blade for cleaning or maintenance.
- Electrical hazards from wet cleaning.

PRECAUTIONS
1. Suitable guards should be provided to prevent access to the blade from the feed chute area. Where a fixed tunnel guard is used it should not be possible for a person standing at floor level to reach down the tunnel guard to the blade. Where a fixed tunnel guard is used however, it will be necessary to ensure that no person can stand in an elevated position where he may gain access to the blade. A suitable routine should be established to ensure that the machine is isolated before any cleaning is attempted.

2. Guarding the blade from the feed chute may also be done by means of interlocked guard which when in position prevents any access to the blade. Opening on the interlocked guards should only be possible either;
   a) after the blade is stationary; or,
   b) after a shutter has come into position over the blade thereby preventing access during loading.

3. A suitable tunnel should be provided at the discharge end of the machine with openings that conform to the safety distances in BS EN 294. Where the discharge conveyor forms part of the guarding and can be removed for cleaning it should be suitably interlocked with the movement of the blade to ensure that the machine cannot be run unless the discharge conveyor is in position.

4. The blade itself should be completely encased, apart from the openings necessary for feed and discharge, should be suitably interlocked with the drive and be fitted with an overrun device where necessary. Suitable arrangements should be made for the collection of trim pieces of product and it should not be possible to reach up any discharge chute to the blade. Where the removal of a container for scraps allows access to the blade it should be suitably interlocked with the drive for the blade and fitted with suitable overrun protection where necessary.

5. Cleaning of the machine should only be done by persons who have been specifically trained in the hazards of the machine and the routine followed for cleaning.

6. Undue vibration can occur if the blades are not kept properly balanced and a routine to ensure proper maintenance and balancing of the blades is essential.

7. The use of suitable anti-vibration and anti-slip floor mountings is recommended in instances where the machine is not secured to the floor.

8. Effort should be made to ensure that foreign bodies do not come into contact with rotating blade.

ADDITIONAL HAZARDS OF POWER FED MACHINES
Trapping caused by the powered feeding device to feed the meat into rotating blade.

On some machines there may be additional hazards from the discharge mechanism to the conveyor.
Health and Safety Guidance Note GN17

Tenderisers

DESCRIPTION
Mechanical tenderisers provide a quick means of breaking up tough connective tissue and supply a product of uniform tenderness prior to further processing.

The machines consist essentially of sharp serrated discs mounted on twin rotating shafts into which unfrozen meat is fed by means of an endless belt conveyor. Discharge is normally into another conveyor or into a suitable container.

HAZARDS
1. The main hazard associated with the machine is contact with the serrated tenderising discs.
2. Hazards associated with the infeed and outfeed belt conveyors.
3. Electrical hazards due to the wet environment in which these machines are often used.

PRECAUTIONS
1. The guard over the serrated discs to protect the infeed at the serrated tenderising discs should extend to a distance of 1000 mm along the infeed conveyor. Any part of the guard which requires to be removed for cleaning should be suitably interlocked.
2. The guarding provided at the outfeed end of the machine will depend on whether or not the product is removed by conveyor or fed into a collecting bin. If the product is removed from the machine by conveyor the conveyor should be guarded to a distance of 1,000 mm from the danger point. Any part of the guard which is removable for cleaning should be suitably interlocked.
3. When the discharge for the machine discharges into a collecting bin either:
   (a) the bin should be situated inside a suitable interlocked enclosure; or
   (b) where the bin when in position prevents access to the dangerous parts a suitable sensing mechanism should be provided to ensure that the machine can only be run when the bin is in position.
4. Where the machine is fed by the conveyor or where the delivery is affected by conveyor and the conveyor is removable, the conveyor should be interlocked with the machine in such a way that the machine cannot be run unless the conveyor is in position.
5. Suitable fixed guards should be provided to protect the intake between the conveyor belt and the head and tail drums of the conveyor.
6. An earth leakage circuit breaker should be fitted to the machine.
7. An emergency stop button should be provided and located at the infeed point of the conveyor.
8. A safe system of work should be established and enforced for the cleaning of this type of machine.
Degristlers

DESCRIPTION
These machines, sometimes called "separators", are really modified mincers. By alterations and additions to the plates and discharge, the meat is minced normally while the gristle is separated and discharged through a central tube. They are fed by a hopper that is filled from a hoist.

HAZARDS
• Access to feed worm from above.
• Access to knives through front plates.
• Hazards associated with hoists.
• Removal of feed worm.
• Hazards associated with cleaning and electrical equipment.

PRECAUTIONS
1. The height of the hopper should prevent access to the feed worm. If this is not practical the access ladder to the platform should be hinged and interlocked.
2. To prevent access through mincer plates, which have holes over 10mm, a hinged portable interlocked hood may be fitted. Due to the size of the hood required a lift-off one would be too heavy. The front plate has access for the gristle discharge tube to be inserted and screwed into place. When lifted the hood is secured by means of a snap-on clip on the front of the hopper. This allows free access for dismantling and cleaning.
3. Hoists should be fitted with side guards and the carriage with a positive lock arrangement for the container and a safety chain. A hold-to-run control should be used for the hoist.
4. The feed worm may be removed by pushing a suitable wheeled trolley against front of the machine, the worm pulled out onto it for cleaning and replaced in a similar manner.
Health and Safety Guidance Note GN19A

Pig Dressing Equipment
Scald Tanks

DESCRIPTION
A scald tank is a tank, usually rectangular, filled with water at 60°C. The water is heated by steam, either directly or indirectly via a coil.

Pigs are immersed in the water in order to soften the hair prior to removal in the dehairer.

Manual
Here the pig is lowered into the water and it is propelled down the tank towards the dehairer cradle by operators using poles.

Automatic
Pigs are fed into the tank and pulled through, either by the continuation of the bleed conveyor, or by the pigs being de-shackled and pushed through by a conveyorised frame.

Automatic tanks tend to be considerably longer than the manual type, in order to give the pigs sufficient dwell time (6 minutes).

Another type is quite deep and the pigs are carried into the water by means of a rotary cradle device.

HAZARDS

Manual
• Contact with steam piping.
• Splashing by the hot water.
• Steamy conditions.
• With rapid fall entry systems there is a danger of operators being struck by carcass/shackle.

Automatic
• Entanglement or contact with in-feed conveyors, de-shackling devices etc.
• Trapping by the discharge cradle.

PRECAUTIONS

Manual/Automatic
1. Piping should be lagged.
2. In the case of direct heating, a steam control valve should be used to reduce the amount of steam bubbling to the surface. Special care is needed at the point where the pigs enter the water.
3. Area should have adequate ventilation and have a good standard of lighting.

Automatic
1. Only personnel involved in the operation should be in the vicinity of the tank.
2. Floor should be easy draining and floor drains must be kept clear.
3. Automatic lines should be enclosed.
4. All drive mechanisms should be guarded.
5. An emergency stop switch should be positioned in the automatic scald tank area at an operator position.
6. The scald tank conveyor, and the in-feed and discharge mechanisms must be switched off and isolated, with the isolator locked, before operators try to dislodge or retrieve any carcass caught in the mechanism or any cleaning or maintenance work is attempted.
7. On automatic lines, care must be taken at startup to ensure all personnel are clear of the system.
8. On some machines the use of a propping device may be necessary to support the discharge cradle before anyone enters the tank.
Health and Safety Guidance Note GN19B

Pig Dressing Equipment
Dehairers

DESCRIPTION
The machine comprises a metal box containing one or more shafts to which are attached beaters. These are pads in hard rubber or similar material to which are attached curved hardened steel plates.

The action of the rotating shafts and beaters removes the hair from scalded pigs.

The entry and exit of pigs is usually by means of manual or automatic cradles.

HAZARDS
• Contact with rotating beaters and loading cradle.
• Steamy conditions due to adjacent scald tank.
• Hair and debris on floor.
• Gap between cradle, tank and fixed frame of machine.

PRECAUTIONS
1. Machine should have flaps or similar guards on the rotating parts on the scald tank side and to prevent debris flying out on discharge side.
2. Automatic lines should be enclosed.
3. Floors should be cleaned regularly of hair and other debris.
4. Floor should be easy draining and the drains kept clear.
5. Only personnel involved in dehairing operation to be in vicinity of machine.
6. Machine should only be loaded in accordance with manufacturers specification.
7. An identifiable stop switch should be positioned adjacent to the machine, preferably on the scald tank poling side.
8. Machine must be switched off, electrically isolated and locked-off before operators attempt to dislodge any carcase caught in the beaters and before any cleaning or maintenance work is attempted.
9. If the machine is of the type that requires the shafts to be set wider to handle sows, the machine must be electrically isolated when this is done.
10. The machine should be electrically isolated when the gambrel table is removed.
11. The beaters should be inspected on a regular basis to check for cracks and loose or missing bolts/nuts.
12. Scald tank poles must not be used to assist carcases into or out of machine.
Health and Safety Guidance Note GN19C

Pig Dressing Equipment
Gambrel Tables

DESCRIPTION
A table constructed of stainless steel or galvanised mild steel and situated at the discharge side of de-hairer and used for lifting sinews on pig hind legs for insertion of gambrel.

HAZARDS
• Carcase falling from table.
• Hair and debris on floor.
• Knife used by hocking operator.
• Trapping between gambrel and elevator.

PRECAUTIONS
1. A retaining bar around the edge of the table, will prevent carcasses dropping onto floor or on to an operator’s foot. This retaining bar needs to have a open section to enable the hocking/gambrelling operation to be carried out.
2. Floors should be cleaned regularly of hair and other debris.
3. The table should be easily drained and moveable to assist cleaning of de-hairer and floor.
4. The table should be wide enough to prevent operator from reaching into de-hairer.
5. There should be a knife holder for the hocking operator.
6. Any gambrel return device should be located so as to minimise the risk of an operator being struck by gambrels.
Health and Safety Guidance Note GN19D

Pig Dressing Equipment
Automatic/Hand Operated Singers

DESCRIPTION
A vertical metal cylinder with a burner in the base, split vertically, and lined with firebrick. It is used to harden the skin for bacon production, to remove hair missed in de-hairer and to give the skin colour and depth.

HAZARDS
- Open flame and lighting of the burner
- Hot surfaces.
- Noise.
- Trap on automatic machines between closing halves of the cylinder
- Steam.

PRECAUTIONS
1. Barriers to keep personnel away from the flame.
2. A long torch to light the burner.
4. Operators should ensure that water is turned on to cool the rail when singer is operating.
5. Screening to cut down noise.
6. Regular inspection of the rail and supporting steelwork for distortion etc. and a check that the water supply piping is clear of any obstructions that may affect water flow.
7. In the case of a breakdown or a carcass failing, the singer should be allowed to cool down before any work is done.
Health and Safety Guidance Note GN19E

Pig Dressing Equipment
Black Scraper, Polisher and White (or Dry) Scraper

DESCRIPTION
Carcasses from the singer enter each of these three machines in turn. They remove marks or blemishes from the skin.

A black scraper has a water spray and moving metal scraper blades that remove the scorch marks.

A polisher is a similar machine containing rotary brushes or nylon claws that remove any hair or particles left on the pig carcass after the black scraper.

The white scraper blades remove particles of water and a thin layer of skin from the carcass.

HAZARDS
• The main danger is from entanglement or contact with drive mechanisms, blades and brushes etc.

PRECAUTIONS
1. The dangerous parts including drive mechanisms must be properly guarded.
2. There should be an emergency stop in the scraper/polisher area, at an operator position.
3. Machines must be switched off and isolated, with the isolator locked before maintenance, lubrication, changing of blades or brushes and cleaning of equipment.
4. Should a pig become dislodged from a gambrel, the machine must be switched off and isolated before the carcass is retrieved.
Health and Safety Guidance Note GN19F

Pig Dressing Equipment
Hand held torch type Singers

DESCRIPTION
Hand held gas torches used to remove carcass hair missed in de-hairer.

HAZARDS
• The danger from this equipment is the open flame

PRECAUTIONS
1. Operator must be properly trained.
2. Use of a flint gun is recommended to light the torch.
3. A stand should be provided to support the torch when not in use. Flame should be directed away from work point when the torch is on the stand.
4. Fuel storage must be located separately.
5. The operator should have adequate room for this task.
Health and Safety Guidance Note GN20

Mincemasters and Lowboys

DESCRIPTION
These machines are used to mince meat to a fine degree and to blend and emulsify proteins.

Mincemasters comprise of a hopper mounted vertically above a revolving knife assembly directly driven from a base motor. Product is minced through a fixed cutting plate and ejected by an impeller blade through a chute into a container.

Lowboys are in effect horizontally mounted mincemasters using a worm to feed the knife assembly.

HAZARDS
- Access through the feed opening to the worm feed on lowboys and knife assembly on mincemasters.
- Access to the impeller blade on both mincemasters and lowboys through the discharge opening.
- Ejection of product from mincemerster feed hopper.
- High noise levels, particularly when using frozen materials.

PRECAUTIONS

Mincemasters
1. Access to the knife assembly via the feed opening in the conical hopper should be restricted by a fixed plate.
2. Access through the feed chute should be restricted, for example by a grid or bars, or the safety distance should comply with BS EN 294.
3. Time delay interlocks should be used when removal of parts like the hopper and the feed chute can give access to dangerous areas during rundown.
4. A hinged flap should be provided to prevent ejection of product.

Lowboys
1. An interlocked infeed grid should be fitted to prevent access to the worm assembly.
2. The knife assembly adjustment should give sufficient time delay for over-run. The cutting chamber assembly should be interlocked so that the machine cannot be operated unless the machine is fully assembled.

Noise
1. Noise levels on these machines are high and a noise assessment should be done and suitable measures taken to reduce noise at source.
2. The fitting of rigid or flexible plastic enclosures including tops can reduce levels by 10 – 15 dB (A).
Health and Safety Guidance Note GN21

Smokers and Cookers

DESCRIPTION
These units typically consist of an enclosed chamber in which meat or meat products are cooked and/or smoked. Door(s) to the chamber can be at both front and rear. Heat can be introduced either by steam, electricity or by a friction burn method.

Depending on the cooker size, product is carried on racks either as single trays or multi-tiered trolleys.

Control of temperature, smoke, cooling showers (if fitted) and time cycle is achieved either by individual controls or jointly with a Programmable Logic Controller Unit (PLC).

HAZARDS
• Burns from hot product racks or trolleys.
• Slips and falls whilst manoeuvring loaded trolleys into/out of cookers over chamber floors coated with fat and water.
• Heat exposure.
• Exposure to wood smoke, which contains carcinogens.
• Exposure (e.g. skin contact) to smoke condensate, which is carcinogenic.
• Burns while tending the smoke generator.
• Fire (from smoke generator).
• Injury from premature turning on of steam, gas, electric services or smoke generator whilst persons are present inside the chamber (e.g. for maintenance or cleaning).
• Corrosive and/or toxic chemicals used for cleaning the cooker smoker, the product racks or trolleys and smoke generators.

PRECAUTIONS
1. Where fitted, the cold-water shower should be used to cool the chamber before removing product. Otherwise suitable personal protective equipment should be used.
2. The floor should have a grip face finish together with drains to remove excess water.
3. Door interlocks should:
   • prevent doors opening during high temperature phases of the cooking cycle when entry would be dangerous,
   • prevent start of cooking or smoking cycles until doors are closed,
   • prevent doors being opened whilst smoke is present within the chamber or close down smoke generation and start extract fan purge to clear the smoke if the door is opened before the smoking cycle is complete.
4. Chamber door seals should be checked regularly and maintained in good condition.
5. Smoke generators should be maintained as directed by the makers. Particular attention is needed to clear ash and keep combustible material safe.
6. Hazardous substances (including cleaning chemicals and smoke) must have a COSHH assessment.

MAINTENANCE
Before undertaking maintenance work the cooker services must be isolated and locked off. Special attention should be given to retained heat on internal parts, steam valves, fans, baffles etc.

All safety systems, interlocks etc should be checked for operation before the machine is returned to normal use.

CLEANING AND HYGIENE
A ‘clean as you go’ procedure is recommended to avoid build up of debris on cooker racks etc. The cooker/smoker cabinet and the product support racks should cleaned according to a schedule that states the method, materials, water temperature and the PPE to be used.
Health and Safety Guidance Note GN22

Hopper Fed Sausage Fillers

DESCRIPTION

Sausage fillers are widely used to fill both natural and artificial casings with sausage meat.

Meat from a feed-hopper under a partial vacuum is fed by a pump or through a worm/scroll to a nozzle where it is squeezed into the casing.

Casings are fed onto the nozzle either manually or mechanically through a forming attachment.

Large machines may be manually fed or by a hoist, tipper or electric clamp truck.

The feed hopper on some machines can be tipped over for cleaning on release of a clamp. On large machines the hopper may be swung in and out of position under power.

HAZARDS

• Contact with the pump mechanism or worm/scroll feed in the bottom of the hopper, either via the hopper when the machine is in operation or when the hopper is tipped over for cleaning etc.
• Contact with any scraper mechanism as it moves round over the internal surface of the hopper.
• There is a possible trapping point between the hopper and frame of the machine where the hopper moves under power.
• Most injuries at this class of machine occur at the end of the production run or during cleaning when operators reach into the hopper to push meat residue down onto the feeding mechanism.

PRECAUTIONS

1. Access into the feed hopper, to the scraper mechanism and to the feeding device in the bottom of the hopper should be prevented when the machine is in operation.
2. Where machines are manually fed, then irrespective of their size, a suitable hopper guard should be provided.
3. Where machines are mechanically fed, then unless the safety distance as described in BS EN 294 can be achieved, a suitable hopper guard should be provided. The distance to the danger point should be measured from the highest operating position. This might be the floor or a set of steps etc. The danger point will be measured be the scraper where one is fitted.
4. Even where the “safety distance” can be achieved it is recommended that a suitable hopper guard be fitted unless it is not reasonably practicable to do so.
5. Where the hopper can be tipped over, it should be interlocked so that the machine cannot be operated with the hopper out of position. If necessary a time delay device should be fitted so that moving parts at the bottom of the hopper are stationary before it is removed.
6. Where the hopper is driven in and out of position the controls should be hold-to-run.
7. Hoppers should only be tipped when empty.
8. Where operators need to see into the hopper then a mirror can be clamped on to the rim of the hopper so its contents can be visually checked from the floor.
Health and Safety Guidance Note GN23

Hamburger (Patty) Forming and Extruding Machines

DESCRIPTION
Although designs vary, the principle of these machines is the moulding of minced or ground product into portions. A mould is filled in one position and moved to another for the completed product to be ejected. Material is fed via a feed tray or, more commonly, into a hopper. This may be done manually or mechanically using a hoist, tipper or electric clamp truck or automatically via a conveyor. Scrapers or paddles may be fitted inside the hopper to aid mixing and feeding. A feeding device in the hopper takes the material to the forming station. The feeding device may be a worm/scroll or piston (or set of pistons).

The product is pressed into a mould plate and from here a tool known as a knock-out cup ejects it.

Machines may be categorised according to the way the mould plate operates:

Reciprocating machines. Here the mould plate (a plastic slide with circular holes cut in it) emerges from the forming station and at the end of its outward travel an injection plunger (the knock out cup) pushes the formed shapes out of the slide, usually onto a discharge conveyor.

Rotary machines. On these machines the mould plate is round with a number of circular holes or forming pockets in it. As the mould plate rotates a plunger ejects the shape and it is removed by a conveyor as above or by a scraper, which can be manual or mechanical.

Both machines may be fitted with a mechanism that places a piece of paper between each formed portion.

HAZARDS
- Contact with the feeding device (whether pistons or scroll feed etc) or with the scrapers and paddles in the hopper.
- On some machines access may be possible via the hopper or the outfeed to the traps created by cams and blades etc at the forming station.
- There are shear traps between the ejection plunger and the mould plate.
- Shear traps between the mould plate and the frame of the machine as the mould plate either rotates or reciprocates.
- Traps created by the moving parts at the paper interleaving mechanism if fitted.
- Traps associated with scoring attachments sometimes fitted at the outfeed.
- Contact with mechanical feeding devices and/or containers of meat being lifted or lowered.

PRECAUTIONS
1. Access into the feed hopper, to the scraper/paddles or to the feeding device should be prevented when the machine is in operation. A suitable hopper guard should be provided. This guard should normally be interlocked with the machine so the machine cannot be operated until the guard is in position and opening the guard stops the machine. The guard may be a grid with suitably placed bars.

2. If the feed machine is fitted with a feed tray then a restrictor plate similar to the ones found on mincing machines should be fitted over the feed opening to prevent access to the feeding device.

3. Guards (which normally form the body of the machine) should be fitted to prevent access to the various trapping points that exist at the forming station. Fixed and/or interlocked guards may be used.

4. Suitable guards should be provided at the discharge to prevent access to the forming station and to the traps associate with the ejectors and paper interleaving mechanism (if fitted).
5. The guard at the discharge is removed frequently for cleaning and clearing blockages etc; it should be interlocked with the power supply.

6. Suitable interlocked guards should be provided over the scoring attachments.

**Extrusion machine.** This is an attachment to a standard mincing machine. Meat is extruded from the mincer to form a continuous strip on top of a slip of paper. The strip is cut into portions by a solenoid-operated guillotine.

With the exception of the outfeed mechanisms the hazards and the precautions are broadly similar to those of patty formers. The guillotine presents a different hazard and it should be covered with a tunnel guard whose dimensions comply with the safety distances of BS EN 294. As the cover is lifted frequently for cleaning it should be interlocked with the power supply.

**GENERAL**

If it is necessary to push meat down onto the feeding device then a suitable scraper should be used. This should be designed so that the scraper cannot become entangled on the feeding device itself.

Where it is necessary to see into the hopper then a mirror should be clamped to the rim of the hopper.
Health and Safety Guidance Note GN24

Derinders, Skinning and Membrane Machines

DESCRIPTION
These machines consist of a rotating toothed or serrated roller set beneath a fixed blade. When product is fed into the machine the roller grips the skin or membrane and leads the product to the blade where meat is separated and the skin or membranes fed to a waste chute.

The machine can be hand fed or conveyor fed. Only round or irregular product such as hams can be processed on hand fed machines. Where possible all other product must be processed on conveyor fed machines with suitable tunnel guarding.

For most purposes on hand fed machines the gap between the roller and the blade is kept very narrow. On membrane or skinning machines this feed gap is normally non-adjustable and set at <1 mm. BS EN 12355 allows a maximum gap of 5mm but normally a maximum gap of 3mm should be used for derinding purposes.

HAZARDS
- The main hazard is on hand fed machines and these have been a common cause of accidents. Usually, the hand is drawn onto the blade by the roller and skin is lost from the fingertips and fleshy parts of the hand or the wrist. Skin grafting is often required.

PRECAUTIONS
1. The correct machine should be chosen for the job. Hand fed machines must not be used where product is suitable for conveyor fed machines. Derinders should not be used where skinning machines are more suitable as, for example, with fish.
2. The blade must not be inserted upside down. Very severe accidents have been caused in this way.
3. A low voltage shrouded foot pedal should be used as the machine start/run control. A belly bar should only be used as a stopping device.
4. Blades and rollers must be kept in good condition as blunt parts encourage operators to stab product on to the machine increasing the risk of injury.
5. Suitable rubber gloves, often with thickened rubber fingertips, can be used. BS EN 12355:2003 advises the use of such gloves if “manufacturer approved”.
6. Chain mail gloves must not be worn. Serious accidents have occurred when chain mail gloves were drawn in to the mechanism causing such serious crushing injuries that fingers had to be amputated.
7. Suitable training is very important. Operators must be fully trained to understand the machine controls and the dangers of the machines so that they know what to do in the event of an emergency.
8. Only competent persons over the age of 18 should operate the machines.
9. To protect third parties the machine should be sited where the operator will not be distracted by those working in the vicinity and so that access to the dangerous parts is prevented as much as possible.
10. On conveyor fed machines dimensions of guards should be to BS EN 294.

TOUCH-STOP/ DISCONNECT DEVICES
- Machines are available fitted with electrical devices that include the operator in an electrical circuit and which stop the machine when the device detects a circuit change. The operator is required to wear conductive gloves, which are connected to the machine and rubber overgloves of the type mentioned above. If the rubber gloves are damaged and the conductive material or the operator's skin completes a circuit to earth, the machine will stop its motion and reverse for part of the roller circumference. Such machines have been in service for some years and appear to work satisfactorily.

REFERENCE
BS EN 12355 Derinding machines
Loin Pullers

Loin pullers are used to produce a high quality loin with the required thickness of rind and fat removed. The two main types of machine have either a fixed or a moving knife.

**FIXED KNIFE MACHINE**

**DESCRIPTION**
The loin is placed back down on the infeed side of the belt conveyor. A driven ribbed roller pulls the loin into the machine and a pneumatic hold-down clamp is triggered. The oscillating cutting blade mounted just to the rear of the clamp cuts off the required thickness of rind. The depth of cut can be adjusted manually or, on some machines, automatically.

**HAZARDS**
- Contact with the blade
- Trapping under the clamp
- Nip point between driven roller and the conveyor belt.

**PRECAUTIONS**
1. A fixed and/or interlocked guard should be provided to prevent access to feed roller, clamp and blade. Tunnel guards should comply with the safety distances in BS EN 294

**MOVING KNIFE MACHINE**

**DESCRIPTION**
The machine comprises an adjustable height receiver bed, a pneumatically operated hold down bar, and a pneumatic piston to draw and return a shaped knife through the loin. A small steam jet is used to heat and clean the blade to make cutting easier. The loin is placed in the receiver bed rind down. The bed is adjusted to the required height and the start valve button is depressed starting a sequence of automatic operations. First, the hold-down bar clamps the loin, then the knife is drawn through it. Next, the bed is released to drop the rind and loin onto the discharge conveyor, and the machine returns to the start position.

**HAZARDS**
- Contact with the cutting knife.
- Trapping by hinged receiver bed and the hold down bar.
- Scalding by steam/hot water jet.

**PRECAUTIONS**
1. Guarding should be provided to prevent dangerous access to the knife blade and associated pneumatic equipment. Opening of an interlocked guard should arrest the automatic sequence and exhaust the air in the system.
2. Where the machine delivers onto a conveyor then a tunnel guard should be provided and should comply with the safety distances in BS EN 294
3. Where the machine discharges into a collecting bin this should be interlocked such that its removal isolates and exhausts the pneumatic supply.
4. The steam/hot water jet should be enclosed in a suitable tundish.
Cleaning Operations

INTRODUCTION
Cleaning of workplaces, plant and machinery is of prime importance in the meat trade for hygiene reasons. This note is not intended to give guidance on hygiene standards but to recommend the adoption of safe methods of achieving the hygiene required by other legislation or codes of practice.

HAZARDS
- During cleaning operations machinery may need to be dismantled and guards removed. Serious injury can result from uncovenanted movement or deliberate running of machinery under these conditions.
- Machines incorporating heavy or sharp cutters present a handling risk to workers. Strains and falls as a result of incorrect handling of heavy items of plant are significant hazards.
- Steam and hot water used in cleaning create burning and scalding hazards. The source of steam may be direct injection pipes used to heat tanks of water, mixer valves or portable pressure washers. Hot water is handled via hoses or various containers such as bins, mobile baths, buckets and tanks. Serious burns may occur by contact with large quantities of hot water because of dangerous systems of work or inadequate protective clothing. A particular hazard is the use of incorrect equipment such as plastic buckets, which soften and detach from the handle at high temperature.
- There are dangers associated with electrical equipment in wet conditions, particularly if hosed down at high pressure.
- Certain chemicals used in cleaning operations may be harmful to health if incorrectly stored or used. Some chemicals become more hazardous when mixed than when used separately.
- To carry out satisfactory cleaning of plant, access may be needed to equipment or places not otherwise approached, for example, high level pipes, overhead conveyors or very large machines. Falls from height are a prime cause of fatal and major injuries.
- Persons entering confined spaces may be affected by harmful fumes/vapours or lack of oxygen.

PRECAUTIONS
1. A responsible person should be in charge of all cleaning operations. They must be adequately trained and have sufficient knowledge and experience to enable them to supervise and control a system of working. Complex installations may need a written safe system of work for cleaning.

2. Machinery dismantling and reassembly
Supervision should assess the requirements for the specific cleaning operation to be done, identify the potential hazards and the precautions necessary to avoid danger. Typical precautions might include:

Machine isolation
If dismantling includes removal of guards, whether fixed in place or interlocked, the machine should be electrically isolated. It is not sufficient for the machine isolator to be switched to the off position. Some form of positive isolation should be provided, such as a facility on the isolator to enable it to be padlocked. Such a facility allows the use of securing hasps such as Islok or Scissorlok that enable several maintenance personnel to use their own personal padlock. Whilst any one padlock remains in position the isolator cannot be moved to the on position. On smaller machines the plug may be simply removed from the socket.

3. Handling machine components
Where heavy or unwieldy components are to be moved, arrangements should be made for safe handling. This might include providing lifting equipment for the operation or ensuring that adequate manpower is available.
Machines incorporating sharp cutters, e.g. slicers, should have suitable devices for safe handling during dismantling and cutter cleaning.

Persons required to handle heavy or unwieldy objects should be trained in handling procedures including the use of lifting equipment where appropriate. Safety footwear should be provided and worn.

4. Safe means of access
Where practicable, permanent access and working platforms should be provided. Platforms should have a sound surface and be surrounded on open sides by a handrail, intermediate rail and toeboard.

Where scaffolding is used as a temporary working platform or means of access, it should be a sound structure. Guidance on scaffolding is contained in the HSE Guidance Note GS15 General Access Scaffolds.

Drain covers, manhole covers and any similar covers in floors should be replaced immediately after work has been completed. If openings are left unattended, suitable barriers are necessary to prevent persons tripping or falling.

Forklift trucks should only be used for access when fitted with a suitable working platform and in accordance with a safe system of work. Further advice is given in HSE Guidance Note PM 28 – Working Platforms on Forklift Trucks.

Power operated mobile work platforms (extending work/access platforms, power access platforms, aerial work/access platforms or mobile work/access platforms are other descriptions) may be used during cleaning operations. Hazards associated with such equipment and the precautions necessary are contained in the HSE booklet, HS(G)19.

5. Electrical Equipment
Precautions should be taken to prevent ingress of water to electrical equipment. Employees using high-pressure jets should be instructed and supervised to minimise the risks both to the equipment and operators. It should be recognised that even protected electrical equipment is unlikely to withstand direct high pressure jetting and fogging.

Equipment used for the purpose, such as steam or water pressure cleaners, should be constructed and maintained to a high standard. Guidance on their use is given in HSE Guidance Note PM 29 – Electrical Hazards from Steam/Water Pressure Cleaners.

6. Chemical Safety
The Control of Substances Hazardous to Health Regulations (COSHH) require an assessment of the risks to health posed by any hazardous substances so control measures can be selected applied and maintained to control those risks.

Management must obtain and keep information about hazardous chemicals. This information should include details about the potential hazards, the precautions to be taken, first aid action and the proper method of use. These details are available from the suppliers in a data sheet.

Any person who has to use harmful or toxic substances must be made aware of the hazards and instructed/trained in the appropriate precautions. Adequate supervision should be provided to ensure that the correct procedures are being followed.

Every chemical container must be clearly marked with its contents and correct method of use. Dispensing from bulk into other containers should only be permitted after the container has been thoroughly cleaned and re-marked to indicate the new contents. Old markings should be removed. The use of food containers for this purpose should be prohibited. In addition, chemicals should not be transferred by pouring direct from the container but should be transferred by the use of suitable dispensing equipment.

Mixtures of certain chemicals can produce toxic gases, which may be dangerous to persons and liable to contaminate the products. Violent chemical reactions may also occur. This can be a particular problem if incompatible chemicals mix in drains. Instructions for the proper use of the chemicals should be specified and the procedures monitored by supervision.

Supplies of acids and alkalis should be physically separated. Where large quantities are kept, it may be appropriate to provide clearly marked separate storerooms.
Concentrates should be kept well away from water supplies and should be added to water not water to concentrate.

The recommended dilution rate should be observed, i.e. solutions should not be prepared at increased strength.

Protective clothing should be provided to minimise the risk of accidental splashing of the skin and eyes by cleaning chemicals. These chemicals may be acidic or alkaline, both of which can be corrosive to skin and eyes or they may contain bleaches or solvents having a harmful chemical action on skin and eyes. Protective clothing supplied should be impervious to the chemical being used and will normally consist of apron, goggles and gloves in addition to overalls and wellington boots.

Eye wash bottles/drenching facilities should be provided at suitable locations.

7. **Entry into confined spaces:**

   Serious accidents continue to occur whilst work is being done in confined spaces. The chief risk is of toxic gases or fumes inside the space to be entered. Typical spaces might include cookers, boilers, tanks, pits, sewers etc. There are specific regulations that must be complied with, the Confined Spaces Regulations 1997 and there is an HSE guidance leaflet IND (G) 258 aimed at employers and the self-employed who carry out work in confined spaces. It explains, simply, what action is necessary to meet the Regulations.

8. **Use of steam and hot water**

   Employees working with steam or hot water should receive training and information about the potential hazards.

   All taps, valves, connections and hoses should be maintained in good repair.

   Live steam should never be discharged from a hosepipe.

   Steam mixer valves should display clear instructions about correct use, e.g. always turn on water before steam. Controls should be clearly marked.

   Preference should be given to the installation of calorifiers to heat water if steam is utilised.

   Mobile tanks or baths should not be filled beyond a safe level in order to prevent spilling and splashing.

   Plastic buckets or containers not designed for carrying hot water should never be used for this purpose.

   Wherever possible, hot water should be dispensed from tanks and vats by means of taps or valves. Never fill buckets from a tank or other vessel if this involves lifting the bucket above chest height.

   The correct protective clothing should be provided and worn when working with steam or hot water, namely long wellington boots and a waterproof apron, which covers the front of the body and overlaps the boots.

   Hot water hoses should never be directed at other persons.

   Areas being cleaned should be clear of all personnel before swilling or hosing with water.

   Water or steam hoses should not be directed at electrical equipment.
Health and Safety Guidance Note GN27

Workplace Transport

INTRODUCTION
This Guidance Note is intended to cover both the general requirements for safety in the use of workplace transport and the requirements for the meat trades in regard to loading and delivery operations. The information in this document can be used in compiling risk assessments for transport activities.

Workplace transport-related accidents are the major cause of deaths in the food industry and a significant cause of serious injuries. In the meat industry, loading and unloading of vehicles is the cause of many manual handling lost time accidents.

Being struck by vehicles, including forklift trucks, accounts for almost 60% of transport-related injuries and half of these accidents were during reversing.

PRECAUTIONS
Three main priority areas have been identified for action,
• pedestrian/vehicle separation
• vehicle reversing
• falls from vehicles

1. Pedestrian/vehicle separation
• Have safe traffic routes been planned - preferably with one-way systems and, if needed, pedestrian crossing points?
• Are vehicles and pedestrians kept safely apart by, for example, provision of safe pedestrian routes both outside and, where possible, inside buildings?
• Do vehicles and pedestrians have separate doors into buildings with suitable barriers where required?
• Are appropriate speed limits enforced and, where required, speed bumps installed?
• Are adequate signs in place, e.g. indicating direction, speed limit, no entry, etc., and mirrors fitted on blind corners?
• Are vehicles, including private cars, parked in designated areas?
• Is access to loading yards restricted to essential personnel and are they wearing high visibility clothing where necessary?
• Can deliveries etc. be planned to avoid unsuitable times such as shift changeover?

2. Vehicle reversing
• Can reversing be eliminated or at least reduced, for example by one-way systems?
• Do vehicles have adequate all round visibility? Are mirrors or other visibility devices fitted?
• Is there need to mark ‘reversing areas’ so these are clear to drivers and pedestrians?
• Is there a need for a signaller (banksman) to direct reversing vehicles? Does the banksman have somewhere safe to stand?
• Has the signaller been trained to keep the reversing area clear of people and to make sure the reversing manoeuvre is done in a safe manner. Do the signaller and driver both understand what signals are to be used. The HSE gives guidance on recommended signals in the leaflet Reversing Vehicles, INDG148.
• Do the vehicles need to have reversing alarms fitted?

3. Falls from vehicles
• On Fork Lift Trucks (FLTs), are make-shift platforms (e.g. pallets) used to raise workers on the forks? Deaths regularly occur from this unsafe practice. It is a legal requirement that only properly constructed cages are used designed especially for lifting persons, and that operators are competent and trained.
• On flat bed vehicles can loading/unloading/sheeting be done without getting onto the vehicle? For example, by using FLTs to put the load on and take it off the vehicle, and using sheeting gantries.
• On flat bed vehicles where access onto the vehicle is required, can this be achieved from loading bays to stop injuries while ascending/descending?
• On all vehicles, are access to cab arrangements well designed with suitable slip-resistant steps and handholds?
• On refrigerated vehicles, is access to controls and instruments possible without ascending ladders?

4. Lighting
All roads, manoeuvring areas and yards should be adequately lit, with particular attention being given to areas near junctions, buildings, plant, pedestrian areas and places where there is regular movement of vehicles or mobile equipment.
5. Vehicle design and maintenance
   • The floor should be of slip resistant material where practicable
   • At the rear a substantial stepping bar and a good hand grip should be provided
   • Rail hooks must be free running and strong enough to withstand spreading
   • There should be safety catches on rail ends which prevents a runner falling
   • Lifting equipment should be examined in accordance with the Lifting Operations and Lifting Equipment Regulations (LOLER) 1992.
   • Part loads and other loads liable to fall must be properly secured while the vehicle is moving

6. Loading Bays
   Where possible the height of the loading bay and the floor of the vehicle should be equal but where this is not the case ramps or steps may be used.
   Steps should;
   • Be sufficiently strong and rigid
   • Be at least 900mm wide (36”)
   • Have slip resistant treads about 250mm deep with risers about the same
   • Be fitted with a handrail on the left-hand side
   • Have a landing area at the top
   • Be fixed securely when in use
   Ramps should;
   • Be slip resistant
   • Have a maximum slope of 1 in 6
   • Be fitted with a handrail on the left-hand side
   • Be sufficiently strong and rigid
   • Be fixed securely when in use

7. Loading and Unloading
   Accidents have been caused by premature departure of vehicles from loading bays. Vehicle restraint systems or traffic lights can be effective at preventing this. Alternatively, the person in charge of the loading/unloading can retain the keys to the vehicle with the consignment paperwork.

8. Systems of Work
   • Carcasses, quarters and primal cuts should be hung so that bone or ligament tissue supports the weight.
   • S hooks with sharp points should be avoided particularly the smaller versions
   • Boxed meat, offal or poultry should be bonded during loading particularly at the rear door of vehicles.
   • Vehicle doors should be opened carefully and used as protection against badly stacked and displaced loads
   • Good housekeeping is important. Grease, fats and uncut box bands must be regularly removed.

REFERENCES
Workplace (Health Safety and Welfare) Regulations 1992
HSE Publications:
HSG 76 Health and Safety in Retail and Wholesale Warehouses
HSG 6 Safety in Working with Lift Trucks
Reverse and safety signals for guidance of drivers Road Transport Industry Training Board (RTITB)
The HSE website also gives advice on workplace transport at the following sites:
http://www.hse.gov.uk/workplacetransport/index.htm
INTRODUCTION
Workers in the meat trades may have to work in a variety of thermal environments.

The main part of this guidance is concerned with work in cold stores where the air temperature is well below zero. But there can be health and welfare issues for workers in chilled areas from +12 degrees down to just below zero. These are explained in the HSE Food Industry Information Sheet ‘Workroom temperatures in places where food is handled’.

The ‘comfort zone’ for most workers is in the range of 13 degrees C to 24 degrees C. Once temperatures start to rise above about 24 degrees it can start to get uncomfortably warm. Thermal comfort in this temperature range is a complicated issue. It relates to the individual worker’s perception of how hot or cold they feel. This in turn can be influenced by a range of factors such as air temperature, sources of radiant heat, air velocity, humidity, the clothing the worker wears and how physically strenuous the work is. The HSE gives some guidance on its website on how to manage thermal comfort.

At temperatures above 27 to 30 degrees C, the issue of heat stress becomes more important. Heat stress may also be a problem at lower temperatures for heavy work, high humidity or when workers have to wear certain types of protective equipment.

Heat stress occurs when the normal cooling mechanisms are unavailable and the body's core temperature starts to rise. Initial symptoms include irritability, loss of concentration, excessive sweating. In the extreme heat stroke can result in loss of consciousness and even death. HSE has published a useful information sheet for workplaces with cookers or ovens etc. where heat stress can be an issue.

WORKING IN COLD STORES
The rest of this Guidance refers to cold stores operating below freezing, typically –12 to below -30 Celsius.

Working in the cold conditions of Cold Stores is very different and requires special attention to safety by operators, maintenance engineers and management alike.

Operators should be healthy, a health check up before commencing duties and annually thereafter is recommended. The extremities of the body cool quickest and therefore fingers and head (nose, chin, ears) are the first to suffer. Protective clothing should at least ensure that the skin temperature does not fall below + 12o C at any of these parts of the body.

Health/ Welfare
A recent literature review conducted by the Health and Safety Laboratory concluded that there is insufficient information to say whether repeated exposure to cold environments has long-term effects on health. However there is evidence that some people may be more susceptible to injury and that the physiological and mental changes caused by exposure to cold may exacerbate other risks.

People suffering from certain medical conditions may be unsuited to work in cold stores. These include chronic respiratory disease, asthma, arthritis, cardiovascular disease and Raynaud’s syndrome.

Hypothermia occurs when the core body temperature falls below 35 Celsius. Early symptoms include shivering, slurred speech and mental confusion. Victims may often be unaware of what is happening to them. Without re-warming death will result. Repeated brief interval exposures (such as workers entering and exiting freezers) can have a cumulative chilling effect. Although severe hypothermia is unlikely in a work setting, early symptoms can cause discomfort and can contribute to increased accident rates.

Other health problems can include frost nip, frost bite and chilblains. Risks of frost bite are greater where frozen product has to be handled without adequate protective clothing.

Thermal Comfort

Guidance 2006 6/2/07 10:47 am Page 58
Accidents
The presence of ice and slippery surfaces, combined with reduced manual dexterity because of bulky PPE and the mental and physical effects of cold temperatures can lead to an increased risk of accidents. Ice build up is likely to be most serious at the entrance to the cold store, which is also likely to be the busiest area.

Musculoskeletal Disorders
Difficulty with gripping loads or manoeuvring because of PPE and reduced circulation of blood to the extremities can increase the risk of musculoskeletal injury. Cold draughts are particularly linked to shoulder and neck pain.

Being Locked In
Safe means of exit must be available at all times, even if the door is locked from the outside. A ‘man down’ alarm controlled by a low level cord switch positioned near an order picking station gives a means of warning in the event of single operators becoming incapacitated.

Slipping
This is the most common type of accident, usually on ice that has formed on the floor under the coolers. The defrost cycle must be maintained to prevent ice build up on coolers or let water be blown off during defrost. Drain lines should be heated throughout their length to minimise ice accumulation.

Access to high level racking link to MHE
Never climb on racking or temporary steps without secure fastening. Do not stand on a pallet that is elevated by a fork truck – there are proprietary pieces of equipment to provide safe access. If high level access is required close off aisles to create a safe working area, free from other traffic.

Fire
Whilst it is not obvious, the air in Cold Stores is very dry. Wooden pallets and cardboard stored for some time become tinder dry and can quickly catch fire given a source of ignition. Maximum diligence is required on the safety of electrical wiring and equipment and of work involving heat is undertaken.

The site fire alarm system should alert people working inside the cold store of emergencies occurring outside. This may require sounders within the store.

Lighting
General light levels for access purposes are recommended as 120 – 150 lux and at least double this if order-picking operations are required.

Emergency lights are important, sufficient number of battery powered fittings should be positioned in working areas and by exits to show escape routes in the event of power failure. Ensure the batteries and equipment can operate at the room temperatures.

Housekeeping
This is particularly important as otherwise areas can become dangerous with spillage and/or rubbish accumulating to be a tripping hazard or entangling in truck wheels.

Fork Lift Trucks
Manufacturer’s or supplier’s advice should be sought to make sure that trucks are suitable for work in cold temperatures. Where possible, trucks with enclosed cabs are preferred as these give protection to the operator without the need for PPE. It is advisable for battery-powered trucks to be retained in the cold store at all times. This reduces condensation and ice build up and prolongs battery life.

Refrigerants
While all refrigerants are contained within a sealed system, leakage is possible for instance as a result of accidents with forklift trucks or pallet handling, seal failures etc. Given the wide range of refrigerants now used, including ammonia, HFC, HCFC, hydrocarbons, liquid carbon dioxide, and nitrogen it is not practical in this guide to examine each in detail. Seek advice from your refrigeration engineers. Data is also available in the Codes of Practice mentioned at the end of this guidance paper.

In cases of leakage persons in the affected area should be evacuated and the area ventilated. Remember cold refrigerant gases sink to lower levels so areas below ground level, plant rooms, basements, stairwells etc may pose extra risk. However ambient temperature ammonia gas is lighter than air and so will rise.

DO NOT ENTER WITHOUT APPROPRIATE PERSONNEL PROTECTIVE EQUIPMENT AND TRAINING.
Refrigeration Plant Rooms
Refrigeration plant rooms should be kept locked and secure against unauthorised entry. They should not be used for storage. The area should be well ventilated.

All equipment should be well maintained by competent refrigeration engineer(s). Copies of the Electric Shock poster and suitable fire precautions should be displayed.

Personal Protective Equipment
Protective clothing should protect the body core temperature and also the extremities. The degree of protection will depend on the temperature, "wind chill" caused by air movement and the physical effort involved in the work. A British standard provides advice on the appropriate level of PPE. The best protection is offered by several layers of clothing (this also gives flexibility of choice to workers). Clothing that becomes damp loses a lot of its insulation value so inner layers that wick sweat away from the skin are a good idea. Changing facilities that allow protective clothing to dry after use are needed.

Conventional steel-toed safety footwear may not be suitable as it provides little insulation for the feet.

Direct contact with cold surfaces can also cause damage. Contact with metal at temperatures below -7 degrees C can cause burns to the skin. Suitable insulated gloves or mitts are needed where workers handle frozen products or come into contact with cold surfaces.

According to the Cold Storage Association, the recommended protective clothing for temperatures below -5 Celsius includes:

- Thermal undergarments
- Jacket and salopettes or all in one coverall
- Cold store gloves with thermal liners
- Safety boots with thermal socks
- Safety helmet with thermal liner, thermal balaclava and thermal hood.

Exposure periods
Measures to counteract the overall heat loss or peripheral cooling in the hands and feet may include limiting the length of time spent in the cold area. In temperatures below -25 Celsius, protective clothing can never provide complete protection and it is necessary to restrict the time of exposure and to allow time for the workers to re-warm themselves. There are no hard and fast rules but the table below is based on a German DIN standard.

<table>
<thead>
<tr>
<th>Air temperature °C</th>
<th>Maximum uninterrupted exposure to cold min.</th>
<th>Recommended recovery period as a percentage of cold exposure</th>
<th>Recommended recovery period min.</th>
</tr>
</thead>
<tbody>
<tr>
<td>below -5</td>
<td>90</td>
<td>20</td>
<td>15</td>
</tr>
<tr>
<td>1st - 18</td>
<td>90</td>
<td>30</td>
<td>30</td>
</tr>
<tr>
<td>below -30</td>
<td>60</td>
<td>100</td>
<td>60</td>
</tr>
</tbody>
</table>

Note: Recommended recovery periods (column 4) has been rounded off using the percentages in column 3.
REFERENCES – FURTHER READING

Workroom temperatures in places where food is handled.
HSE Food information sheet No. 3 –
http://www.hse.gov.uk/pubns/fisd03.pdf

HSE thermal comfort webpages
http://www.hse.gov.uk/temperature/thermal/index.htm

Heat stress in the workplace: what you need to know as an employer. HSE general information sheet No.1

Health and Safety Laboratory Report No. PE0407
Health Effects of Working in Cold and Frozen Food Environments.

British Standard BS EN 378 parts 1– 4
Refrigeration Systems and heat pumps – Safety and environmental requirements.

British Standard BS 7915:1998
Ergonomics of the thermal environment – Guide to design and evaluation of working practices for cold indoor working environments.

Codes of Practice for Refrigeration
The Institute of Refrigeration, Kelvin House, 76 Mill Lane, Carshalton, Surrey, SM5 2JR publish a series covering most refrigerants

DIN Standard 33403-5
Climate at workplaces and their environments.
Ergonomic design of cold workplaces January 1997
Health and Safety Guidance Note GN29

Mechanical De-Boning Machine System

INTRODUCTION
Mechanical de-boning machines or liberators have largely replaced table boning in beef boning plants in recent years. This is because it has become more difficult to attract skilled employees or people who are capable of attaining the necessary skill. The mechanical system reduces both the skill level required and the number of boners needed. A table-boning line might typically have had twelve boners but a mechanical system will need just three or four. Liberators also help with controlling WRULD problems by reducing the manual force required on the knife and by eliminating the need to lift quarter and primal cuts.

DESCRIPTION
The machine system comprises a support cradle and bone saw, a drop rail and two metal boxes, each containing a hydraulic ram and fitted with suitable controlling devices. (e.g. on/off pulleys, adjustable limit switches to control speed/air pressure and emergency stop buttons.) These machines can be situated either parallel or at a right angle to the rail system. The basic function of the machine system is to provide a systematic method of de-boning and to aid the de-boning process by applying tension to leg-bone, hipbone and rib cage while cutting.

HAZARDS
- Knife/Saw injuries.
- Slip injuries due to build up of meat, fat and bone-dust on floor.
- Being struck by quarters falling from rails
- Being struck by quarters moving at speed on rails
- Noise from saw and machinery.
- Manual Handling and ergonomic issues e.g. muscular-skeletal disorders, back injuries.

PRECAUTIONS
1. Knife Injuries:
   Appropriate equipment should be used to protect against cuts. A chain mail apron to cover the chest down to below the knee, "shoulder length" chain mail glove on non-knife hand or complete shoulder and arm chain mail garment and cut resistant glove on knife hand.
   - Knives must be sharp. Suitable sharpening equipment must be provided and operatives must be trained unless a sharpening service is provided.
   - Adequate working space should be provided between operators. (normally a minimum of one metre around the operative).
   - Scabbards should be worn by all operatives to hold knives when not in use.
   - Designated walkways and clearly visible danger signs should be provided.
   - All operatives must be trained in the safe use of knives.

2. Saw Injuries:
   - Eye protection must be worn.
   - Operatives must be trained on the safe working procedure.
   - Segregation/protection should be provided for third parties.

3. Slip Injuries
   Floor gratings should be in place at the work stations to prevent build up of waste. If this is not possible with a built up stand because of the need to change the working height then the grating should be let into the floor. Gratings should be of the light carbon type rather than metal which present handling problems for cleaning staff. Any loose waste around the area should be removed frequently during the working shift.

4. Struck-by Injuries
   All possible precautions should be taken to ensure that quarters cannot leave the rail system. Points to pay particular attention to are as follows;
   - At any point at which the quarter is hoisted from a low to high rail or vice-versa, stops should be fitted to hold the roller in place.
   - Guardrails should be put in place at any curved part of the rail where the roller may be more likely to leave the rail.
   - Care should be taken when hooking the quarter through the carpal tunnel on the fore and Achilles tendon on the hind before it enters the system. If the tendon is weak or damaged the operative should revert to hooking the quarter securely under a bone.
• Care should also be taken when transferring the boneless quarter at the second machine. As before, if the tendon is damaged the quarter should be broken down while attached to the bone.
• If possible the pulling machines should be at a right angle to the rail to avoid the quarter speeding along the rail. If this is not possible then an appropriate brake should be fitted to control the speed of the quarter.
• Head protection must be worn.

5. Noise
• Where noise exposure is above the permitted thresholds an assessment should be carried out and steps taken to reduce exposure. However hand held saws cannot usually be quietened sufficiently, in which case these stations should be moved outside the main boning hall to reduce the number of people at risk of exposure. The wearing of hearing defenders should be the last step in the hierarchy of control, although this will be necessary for saw operatives.

6. Manual Handling
• If there is a potential risk of injury a manual handling assessment should be carried out to identify the risks and measures needed to eliminate or reduce the risk. However all handling tasks should be eliminated by flighted conveyors on these systems to lift the meat onto the main line.

7. Ergonomics
Deboning machines have largely removed conditions experienced by boners in the past such as tendonitis. Problems that do occur now are usually caused by poor working positions.
• Workstations should be equipped with a support cradle designed to support the quarter at an angle so enabling the operator to adopt a comfortable posture and limiting the strain on the non-knife hand.
• The rail system should be at a median height of 2.2 m adjustable up and down. This can reduce both working with arms raised and stooping to work on lower parts of the quarter.
• Saws should be on a pulley, tensioned adequately so as to pull the saw above head height when not in use. Saws should be serviced regularly and blades changed when blunt.
• Job rotation should be considered as one of the means of reducing risk.

INSTALLATION SAFETY.
• When installing the pulling machines, the following points should be considered:
  • Where possible, the first pulling machine should be positioned at a right angle to the rail to avoid the risk of quarters moving at speed along the rail.
  • The machine should be fitted with adequate controlling devices that the operative can adjust according to the type and size of the beef being processed.
  • The support arm, which holds the quarter in place whilst being pulled, should have a height adjustment to suit the varying height of the operatives.
  • The workstation design should provide enough space for all activities, while keeping the working points within convenient reach.
  • At the second preparation station there should be a drop rail fitted to hold the quarter stationary and adjust the height of the quarter whilst working on it.
  • At the final breakdown station there should be a stop to hold the quarter against while it is worked on. There should be a feed belt positioned directly below the workstation to limit both the lifting of the primals and the necessity for a pulling hook.

REFERENCES
Guidance on Regulations
Reducing Noise at Work  L108
Guidance on the Noise at Work Regulations
Slips and Trips  HS(G) 155
Guidance for employers on identifying hazards and controlling risks
Insect Killers

DESCRIPTION
These devices are ultra violet lamps that attract insects and then kill them by contact with an electrical grid charged at high voltage. Dead insects are caught in a tray, which has to be periodically emptied.

HAZARDS
- Electric shock
- Ultra violet radiation

PRECAUTIONS
1. Electrical
   The equipment should comply with the Electrical Equipment Safety Regulations 1994 and be made to BS EN 60335-2-59:1995 Safety of household and similar electrical appliances.
   Contact with hazardous live parts of the grid is prevented by ensuring that the grid is electrically isolated from other circuits or that the earth side is outermost or that the supply is current limited.
   The fly tray should be removable without exposure to live internal parts. This should be achieved by means of fixed mechanical guards or an interlocked access hatch.
   The equipment should be manufactured from materials that can withstand sustained exposure to ultra violet light.
   Certain materials (e.g. PVC and rubber) may become brittle and have been known to cause fires in the fly tray.
   Some models, and in particular those of the industrial type which have no grid guard, must only be installed by competent persons and placed out of reach to be safe by position.
   Danger notices should be fixed at each unit warning that the equipment should be isolated prior to any work on it and the device should be easy to isolate, by being plugged into a fused socket for instance.

2. UV
   Provided the device is fitted with a lamp that produces almost entirely UVA, the radiation hazard is negligible.
   It is essential that replacement lamps of the correct type be fitted. Lamps that produce UVB and UVC radiation cause skin reddening and eye irritation.
INTRODUCTION

The Tribunal decision of Gateway Foodmarkets Limited v Sheila Patricia Walton, London Borough of Redbridge on 16, 17, and 28 March 1988 clarified that hand feeding of bandsaws with fresh meat in the preparation of chops presented unacceptably high risks of injury and that such a practice had rightly been the subject of a Prohibition Notice issued under the Health and Safety at Work etc. Act 1974. Bandsaws are inappropriate for the preparation of fresh meat chops where hand feeding is involved.

SAFER METHODS

Where the quantities of fresh meat chops being produced is small the traditional methods involving the use of knife and cleaver are appropriate.

An alternative safe method where larger numbers of chops are to be produced is the use of the proprietary chop-slicing machine. Typical types are the Treif, Holac, and Varlet machines amongst many similar. The machine comprises a high speed scimitar-shaped rotating blade with both feed and delivery to the blade being protected by interlocked guard tunnels which prevent access whilst the blade is in motion.
Health and Safety Guidance Note

Other useful publications and guidance

A reference list of relevant publications and guidance has been included in individual notes where relevant.

In addition the following publications may be helpful.

HSE Publications:
- HSG 156 Slips and Trips: Guidance for the food processing industry
- HSG 196 Moving food and drink. Manual handling case studies
- HSG 232 Sound solutions for the food and drink industries
- HSG 252 A Recipe for Safety

These publications are available from
HSE Books,
PO Box 1999,
Sudbury,
Suffolk CO10 2WA.
Tel: 01787 881165

Food Information Sheets (FIS)
available on the HSE website http://www.hse.gov.uk/index.htm

- FIS3 Workroom temperatures in places where food is handled
- FIS6 Slips and Trips
- FIS7 An index of H&S guidance for the food and drink industries
- FIS14 Priorities for H&S in the slaughtering industry
- FIS15 H&S priorities in the meat processing industry
- FIS22 Preventing slips and trips in the food and drink industries
- FIS23 Injuries and ill health caused by handling
- FIS24 Hygienic design for machinery in food and drink industries
- FIS25 Safeguarding flat belt conveyors
- FIS26 Safeguarding thermoform, fill and seal machines
- FIS27 Safeguarding palletisers and depalletisers
- FIS28 Controlling exposure to disinfectants
- FIS30 Preventing falls from height
- FIS33 Roll cages and wheeled racks