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# Finishes and Services

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## **SECTION 7 FINISHES AND SERVICES**

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# 7 Finishes and Services

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## 7.1 INTRODUCTION

This section defines the standards and finishes that are needed to meet the requirements of MOD catering facilities.

The design of a catering facility is required to meet all current statutory legislation including, the Food Safety (General Food Hygiene) Regulations 1995, The Food Hygiene (England) (No.2) Regulations 2006. (Regulation (EC) No.852/2004 on the hygiene of foodstuffs,<sup>1</sup> the Health and Safety at Work Act 1974 and its subsequent supporting Acts. Refer to Section 1 for the detail. The success of managing Food Safety and Health and Safety is ultimately more efficient if the design eliminates the risk of cross contamination, and provides finishes and services layouts designed for efficiency, longevity, energy conservation, ease of cleaning and ease of maintenance.

Part A details the types of finish and planning considerations required for the infrastructure and fabric of the facility including floors, walls, ceilings, doors and windows.

Part B details the type, installation and planning considerations for the services provision including treated, potable and domestic water supply, drainage, electrical supply and lighting, gas supply, ventilation, services coordination and heating.

Part C details the planning considerations for the control of infestation.

Part D details the planning considerations for energy conservation.

Part E details the applications of waste management commencing with food waste management.

All sections should be read in conjunction as each has implications on the other; and the final design of the catering facility will be determined by the agreed specification.

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<sup>1</sup> and equivalent regulations in Scotland, Wales and Northern Ireland.

# Part A - Infrastructure

## 7.2 FLOORS

Floors need to provide a slip resistant surface even when wet, to prevent exposure of any person of a risk to their safety, and designed to be easy to maintain, clean and disinfect. Materials are to be impervious, non-absorbent, washable and non-toxic. Construction Design Management (CDM) requires that contractors, specifiers and suppliers have a duty to build safety into the design.

Where it is determined that there may be a significant risk of slipping in the workplace then the slip resistance shall not be allowed to fall below the Pendulum Test Value (PTV) of 36 when wet. This requirement also applies to the End Users and operators responsible for the maintenance and cleaning of floors and risk assessments should be carried out as required to determine the PTV where the requirement may be compromised. *(See under for specifications for the installation of new floors)*

Installations in showers and surrounding areas should meet a minimum of the Wet Ramp Test – Class B for wet, barefoot areas.

### TILED FLOORS

#### Applicable Areas

Food preparation and behind counter servery areas.  
utensil wash and crockwash areas, service and delivery lobbies.  
storerooms, pantry, circulation routes, including entrance areas,  
shower rooms and toilets.

#### Planning Principles

Ceramic tiles shall comply with the relevant standards defined at BS6431. For new ceramic tile floor installations a PTV of 50(wet) shall be specified for areas where there may be a significant risk of slipping. Dimensions shall be a minimum 8.5mm thick, (measured from the flat base of the tile, not from any raised profile). fully vitrified and unglazed. Class 4 tiles shall be selected for standard commercial kitchens, Class 5 tiles shall be selected for areas where there is particularly heavy pedestrian traffic or use of heavy trolleys or hand operated fork lift machinery; the relevant standard shall be quoted in the specification.

Tiles shall be laid in accordance with British Standard BS5385 and The Tile Association (TTA) Technical Advice Note 7 *(The design and installation of ceramic wall and floor tiling in food preparation, treatment and processing areas)*.

Each individual location within a particular area shall be given separate consideration at the design stage; tiles, adhesives and grouts shall be selected to suit the service conditions.

Walk-in cold rooms shall provide a continuation of the adjacent tiled floor surface within; a suitable floor heating system shall be provided within walk in deep freeze rooms.

There shall be no raised plinths or open channels.

## COVING

Coved skirting tiles are to be fitted with a radius upturn to provide a flush finish with the adjacent floor tiles and to the face of the wall. A proprietary expansion joint with filling strip and sealant shall be provided between the penultimate row of floor tiles and the coving to provide a flush finish. Internal corners should be finished with a proprietary internal radius angle coving to allow ease of cleaning and effective protection from trolley traffic etc. External corners may be finished with proprietary external radius angle coving or the corner protection be installed to run to the floor tile and the coving about each side. Grouting lines, wherever possible, should run continuous from the floor tile.

## GROUTING

Grouts should conform to BS EN 13888:2002; adhesives should conform to BS EN 12004:2007. Where vibrations or background movements can be expected, deformable adhesives conforming to S1 or S2 of BS EN 12002:2002 shall be specified

Grouting shall be of a proprietary epoxy-resin grout and ideally contain an *anti-bacterial additive*, finished flush with the surface face of the tile. Joints between the tiles shall not exceed 4mm. (A standard cementitious grout may be used in shower rooms, toilets etc, and in circulation route where food is unlikely to be stored or transported.)

## EXPANSION JOINTS

Where there is a requirement for structural movement joints, the joints should be fitted in accordance with British Standard BS5385, Part 5. Movement joints shall take account of the degree of heavy traffic within kitchens and the weight of the mobile equipment. Joints should be fitted with a suitable non corrosive material profile and suitable insert; mastic joints are unacceptable.

## DRAINAGE

Drainage is required within several areas of the kitchen to allow effective wash down, (normally the kitchen, crockwash, utensil wash, larder, raw meat preparation, pastry room, vegetable preparation room and to the rear of the servery area.). Floors shall be laid level except where required to fall to a gully. Where a floor gully is sited in an open area, the tiling shall be cut to form a shallow dished surround to 300mm or two complete tiles from the gully grid cover. A suitable sealed finish shall be provided between the tiles and the stainless steel gully plate. (See also 7.7)



Ponding or pooling of water is not acceptable as stated by food hygiene regulations. Falls away from the floor gully or pools of water at the room perimeters or corners are unacceptable.

## RESILIENT FLOOR COVERINGS

### Applicable Areas

Food preparation and servery areas, utensil wash and crockwash areas, service and delivery lobbies, storerooms, pantry, circulation routes, including entrance lobbies, offices, staff changing areas and rest rooms, dining rooms, and toilets. Bar cellars (Resin systems only)

Resilient floor coverings including vinyl sheet or resin based systems may be considered within kitchen facilities. Installations shall meet a PTV of 36(wet)<sup>2</sup>

### Vinyl Floor Coverings

#### Planning Principles

Materials shall be of non-flammable PVC sheet with a plain surface. Sheets in heavy duty areas, where it is considered that there is a significant risk of slipping, shall be specified as a minimum of 3mm thickness. Other areas such as staff facilities and public areas may be specified as 2-2.5mm thickness according to the particular density of usage.

The floor covering shall be easily cleaned and all joints hot welded to form an impenetrable seal. Sheeting shall be bonded to a suitably prepared substrate as recommended by the manufacturer.

The junction between the floor and the wall shall be radiused by a solid 'cove former' to provide a flush and sealed finish with the wall to provide an effective bond and smooth finish and to avoid dirt traps or harbourage for pests. Internal and external corners shall also be radiused and any subsequent joint hot welded to provide an effective seal. Junctions with floor fittings e.g. floor gullies shall be bonded to form an effective waterproof seal between the sheeting and the stainless steel gully plate. A shallow dished surround to 300mm of the gully grid cover should be formed to provide a suitable catchment area to provide effective drainage. (See also 7.7)

### Resin System Floors

#### Planning Principles

Resin based floors may be installed in differing formulations and finishes to meet the particular specifications of the project. In kitchen and ancillary areas they should be rated under the Federation of Resin Formulators and Applicators (FeRFA) as Type 8, being 6mm to 9mm thick according to the particular density of usage, and be slip, chemical and impact resistant. The product and installation shall meet the requirements of the European Directive on the Hygiene of Foodstuffs. (93/43/EEC) In all other areas the installation should be rated as Type 5, being 2mm to 3mm thick and be slip, chemical and impact resistant.



<sup>2</sup> Source: - Defence Estates Property Directorate Safety Alert. (SA 07/09)

## **SOFT FLOOR COVERINGS**

### **Applicable Areas**

Dining rooms and Staff Rest Rooms.

### **Planning Principles**

Soft floor finishes should be used in dining rooms of establishments that need to host formal occasions and/or where daily usage is of a sedentary nature. They should not be fitted in establishments where the daily usage will incur heavy soiling. The provision of a soft finish should be agreed with the Project Sponsor and the relevant KDEA.

Soft floor finishes shall be hardwearing and easily cleaned. Carpet tiles may be considered to provide flexibility and ease of replacement.

The soft floor covering should be laid on a smooth screed surface, pre-treated with a sealing agent and on a suitable underlay as approved and recommended by the manufacturer.

Where it is proposed to use alternative floor finishes to those listed above, the relevant KDEA should be consulted.

## **7.3 WALLS**

### **CONSTRUCTION**

Internal walls throughout the catering facility shall be of solid construction. Where cavities or service ducts are unavoidable they should be filled and sealed to prevent the harbourage of insects and pests.

Finishes to walls shall be impervious, washable, of non-toxic materials, provide a smooth surface to a height appropriate for the operation and must be easy to maintain, clean and disinfect.

Colour finishes shall be of light or pastel colours, with an eggshell/satin finish to avoid glare.

### **DWARF WALLS**

Many messes are planned with a central kitchen surrounded by the ancillary working areas and stores. To allow maximum benefit of available natural light and to provide a conducive working environment, it is recommended that, where appropriate, dwarf walls be used to separate the working areas e.g. pastry room or utensil wash from the kitchen.

Dwarf walls should be approximately 1200/1500mm high, with a sloping or ridged 16SWG, 304-grade stainless steel top, angled at 20°. Dwarf walls in cool zone rooms such as the Larder and Raw Meat Preparation rooms should be a minimum of 1800mm high to avoid any risk contamination from splashing .

## PROTECTION OF WALLS



Damage occurs from the use of mobile equipment. To provide additional protection and reduce through-life maintenance costs, all exposed vertical corners shall be fitted with stainless steel or a proprietary high-impact resistant PVC protection to the full height of the room or a minimum height above finished floor level (AFFL) of approximately 1600mm and/or in line with the top edge of any horizontal decorative banding. The fitting may sit on the top edge of the coving tile or, in heavy usage establishments, sit on the floor tile to form a more robust corner installation. Corner guards are to be fitted prior to tiling with a secure fixing to the wall structure, the tiling is to abut the protective angle to provide a flush finish. This application will also apply to customer service areas where the pedestrian traffic is considered to be heavy.

Horizontal protection of proprietary high-impact resistant PVC shall be provided on main trolley routes and free standing areas to the rear of all mobile equipment. The system used shall be close fitting to the wall and fixed at a height of approximately 700mm, extending up to 900mm AFFL. In particularly heavy traffic areas such as delivery bays and low-level storage areas such as dunnage racking in the Vegetable Preparation room, or where low height equipment is in use, consideration should be given to additional horizontal protection at a lower level of approximately 300mm, extending up to 500mm AFFL. The fittings to be sealed at the top and lower edges with the ends stopped to prevent harbourage of pests.



## DINING ROOMS

Dining rooms and customer areas should provide modern and pleasant surroundings with due consideration being given to the PAYD strategy in junior ranks dining rooms. The selected finishes should be durable, impervious and easy to clean. Wall protection is required in the entrance, queue space and servery areas.

## CELLARS – BEER STORE

Walls shall be finished with an epoxy resin coating applied direct to a plastered wall. This may also be applied directly to a sealed breeze block finish, however, this should only be considered where the finish of the block is smooth.

Stainless steel sheeting may be provided to the lower levels to provide a finish and additional protection from damage.

Vertical and horizontal wall protection shall be fitted according to the particular specification to prevent damage from the movement of barrels etc. (*See also Section 9 - Bar and Cellars*)

## CERAMIC TILES

### Applicable areas

All food preparation and cooking areas.  
Utensil and Crockwash areas.  
Servery area and Pantry.  
Food storage areas.  
Circulation routes including kitchen entrance areas.  
Staff and customer showers and toilets.

### Planning Principles

Ceramic tiles shall comply with the relevant standards defined at BS6431 and shall be laid in accordance with British Standard BS5385 and The Tile Association (TTA) Technical Advice Note 7 (*The design and installation of ceramic wall and floor tiling in food preparation, treatment and processing areas*). The relevant standard shall be quoted in the specification.

The use of overall white tiles shall be avoided; pastel coloured tiles with an eggshell/satin finish shall be selected. Colour banding or other colour schemes with stronger or contrasting colours shall be featured; a glazed tile may be included for the banding only. The details of any colour banding should be co-ordinated with all other wall fixtures such as; wall and corner protection, window sills, power sockets, isolators, high level equipment and the positioning of adjacent dwarf walls to provide a visually co-ordinated elevation.



Dimensions shall have a minimum thickness of 5mm.

Tiles shall have a plain, smooth surface to allow ease of cleaning and lay flush with the floor coving to the ceiling without the inclusion of projections or ornamentation. (See 7.2)

Where there is a requirement for movement joints, the joints should be fitted in accordance with British Standard BS5385, Part 1. Movement joints shall take account of existing and other structural movement joints, large tiled areas and where large degrees of thermal movement are likely. Joints should be of a suitable width to permit the sealant to accommodate the expected structural movement. Where movement joints necessitate the use of a cut tile, the uncut edge should form the edge of the joint.

Grouting shall be of a proprietary epoxy-resin grout and ideally contain an *anti-bacterial additive*, finished flush with the surface face of the tile. Joints between the tiles shall not exceed 4mm. (A standard cementitious grout may be used in shower rooms, toilets etc, and in circulation route where food is unlikely to be stored or transported.)

## **PAINT ON HARD PLASTER**

### **Applicable areas:**

Staff accommodation, customer areas and storage areas including cellars (beer store).

### **Planning Principles**

In heavily used areas painted walls shall be of an oil-based eggshell finish, be impervious, smooth and easily cleaned. In lighter use areas, an emulsion satin finish may be used.

Epoxy wall finishes may also be considered for short-term use (up to five years) for the refurbishment of existing kitchen facilities.

## **WALL CLADDING SYSTEMS**

### **Applicable areas**

Food preparation areas.  
Utensil and crockwash areas.  
Pantry and main circulation routes including entrances.  
Serveries.

### **Planning Principles**

Sheeting shall conform to current European Regulations for PVC products for use in food preparation areas.

Sheeting shall be extruded or laminated PVC, 2.5mm thick. It shall be directly fixed to a sound, dry and smooth substrate with an approved adhesive. Fixing to battens or any other system that creates a cavity is unacceptable.

PVC sheeting can be adversely affected if its surface temperature exceeds 60°C. Where it is anticipated that the temperature will be in excess of this, then a thermoplastic PVC sheet with a glass fibre core or stainless steel sheet should be installed. All PVC cladding should have a minimum Fire Rating: Class 1 and Class 0, BS 476; Parts 6 and 7.

Joints between sheets shall be connected either by welded joints or by extended joining strips. All corners shall be thermo-formed and all perimeter edges are to be effectively sealed with a food-safe silicon sealant.

The use of overall white surfaces shall be avoided; pastel colours with an eggshell/satin finish shall be selected. Colour banding or other colour schemes with stronger or contrasting colours shall be featured.

## **7.4 CEILINGS**

Ceilings and overhead fixtures shall be designed, constructed and finished to prevent the accumulation of dirt, reduce condensation and the growth of undesirable moulds and the shedding of particles. Integrated ceilings shall be provided which contain integral vapour-proof lighting and ventilation systems in a sealed unit.

Materials used must be non-combustible and provide a smooth, impervious hygienic surface that is easily cleaned and maintained.

The ceiling void should be of a sufficient size to accommodate ventilation ductwork and mains services and be provided with adequate access for cleaning, maintenance and pest control purposes. All ducts, pipe work and conduits etc shall be correctly caulked and sealed.

Ceiling heights should be set between 2.5 and 3.0m AFFL according to the particular performance requirements.

All aspects regarding the installation of ceilings and associated ventilation systems should be referred to the Defence Fire Adviser.

## **VENTILATED CEILINGS**

### **Applicable Areas**

Kitchen, pastry preparation, crockwash and utensil wash.

### **Planning Principles**

See Section 7.11 - Ventilation.

## **SUSPENDED CEILINGS**

### **Applicable Areas**

All catering areas, serveries, beer cellars and entrance halls.

### **Planning Principles**

Where it is not practical to provide a ventilated ceiling, a suspended ceiling should be used in conjunction with traditional extract canopies and an integral ventilation system.

Ceiling tiles shall be impervious with a plain smooth surface for ease of cleaning. Metal tiles having a white powder coating or PVC finish are the preferred option. Polystyrene and fibre tiles are unacceptable. Tiles shall be appropriately secured to the frame to prevent lifting and provide for ease of access for cleaning, maintenance and pest control.

In temperature controlled rooms insulation contained in vapour proof bags shall be provided to the back of the tiles to prevent condensation; loose insulation is unacceptable. Particular attention should be made to the thermal transmittance properties of the ceiling tiles (- 'U value') in the larder and raw meat preparation areas to ensure that there is no condensation and that a constant temperature of +13°C can be maintained.

## 7.5 DOORS

### Applicable Areas

All catering areas, serveries, dining rooms, staff facilities, beer cellars and plant rooms.

### Planning Principles

Doors shall be of robust construction, able to withstand heavy usage and shall have a smooth easy to clean finish. Frames shall be of solid construction and any resultant voids shall be adequately sealed to prevent the harbourage of insects etc.

In areas where there is extensive movement of heavy trolleys or hand operated fork lift trucks, consideration shall be given to the installation of additional stainless steel protection to the doors and the door frames.

In all working areas single door apertures shall be of sufficient dimension to allow the ease of movement of mobile catering equipment through the area and where appropriate, be not less than 900mm wide. (accessible width) In smaller messes where space and access is at a premium, door aperture dimensions should reflect the need to be able to move large items of equipment from room to room. Double door apertures shall be not less than 1600/1800mm wide. 1½-leaf doors may be provided where there may be frequent passage of goods or equipment.

In all working areas doors shall be fitted with a vision panel with a zone visibility of 900mm to 1500mm and be fitted with 16swg, 304-grade stainless steel or hygienically approved proprietary protection push and kick plates to both sides. Kick plates shall extend to 450mm AFFL. Doors located in the goods delivery area, on main trolley routes and main preparation and service areas shall be additionally fitted with stainless steel or hygienically approved proprietary protection to the 'strike' side extended to 1200mm AFFL. (Push plates will not be required where the door finish is of GRP, laminate or melamine finish) In other areas push and kick plates shall be provided as necessary and in consultation with the KDEA.



Louvered or cut out grills within doors are not acceptable.

External delivery doorways shall be designed with a level threshold to enable the ease of movement of delivery trolleys etc.

External doorways and doors shall be sealed to prevent entry of vermin and pests. De-mountable fly screens shall be fitted to prevent the entry of insects. (See also Part C, 7.15) Consideration may be given for the installation of air curtains coupled with movement sensors.

External, offices and storeroom doors shall be lockable. Other doors will require being lockable to secure the working areas during silent hours and should be agreed with the Unit and KDEA. Locks to internal and external doors are to be suited under a master key and be individually lockable. Plant room locks are to be on a separate suite to the kitchen.

Ironmongery shall be of heavy-duty stainless steel for external and catering areas use. All doors are to be fitted with the appropriate signage, the finish to be food safe and easily cleaned.

Doorstops are to be fitted, where appropriate, to prevent damage to the infrastructure and be so positioned so as not to present a trip hazard when the door is closed.

The Defence Fire Adviser should be consulted on the means of escape, including the location and requirements for fire doors.



## 7.6 WINDOWS

### Applicable Areas

All catering areas, serveries, staff rest facilities.

### Planning Principles

In all catering areas including the utensil and crockwash areas, serveries and pantries, windows shall be sealed and do not, therefore, require a fly screen to be fitted. Where opening windows are provided, fly screens shall be fitted as required by the EHO. Fly screens should be of robust construction and be capable of being easily removed and fitted for cleaning and maintenance purposes.



Internal sills should slope from the window frame at an angle of approximately 20° for ease of cleaning and to prevent items being placed upon them.

Wherever possible, to enable the best use of natural light, high-level windows should be provided in stores areas and refrigeration rooms to make the

best use of wall space for racking and refrigeration cabinets.

For safety reasons, glazing shall not be fitted below 800mm AFFL.

Standard roof lights shall not be provided within catering areas. Where refurbishment is being undertaken, existing roof lights may be removed or permanently sealed. Where natural daylight is required to be introduced into corridor areas etc, then sealed reflective light systems may be installed.

Certain locations may be sensitive security areas and windows may require additional protection. The KDEA should be consulted.

## Part B – Services and Services Co-ordination

### 7.7 DRAINAGE AND WASTE DISPOSAL

Drainage facilities shall be adequate for the purpose intended and be designed and constructed to avoid the contamination of foodstuffs. They shall have sufficient fall to allow all solid and liquid waste to flow away with the minimum number of bends.

The direction of flow shall be away from 'clean' areas to 'dirty' areas and toilets should feed into the system after the kitchen.

All appliances and floor gullies connected to the drainage system shall be provided with an effective trap. Where de-waterers are installed, the main drainage outlets should be trapped underground. (See *Waste Disposal*)

Manholes and inspection chambers must not be installed in food rooms. Rodding points should, where possible be located in a position outside the catering area and be effectively sealed.

Grease traps shall not be installed within the catering premises. (See *Waste Disposal*)

#### FLOOR DRAINAGE

##### Applicable Areas

Kitchen, utensil wash, crockwash, larder, raw meat preparation, vegetable preparation, pastry preparation, refuse areas and beer cellars.  
Provision of gullies in other areas should be agreed with the KDEA

##### Planning Principles

Floor drainage is required for cleaning purposes and to receive discharge from cooking appliances.

Trapped gullies shall be manufactured from an austenitic 304-grade, 14swg (2mm) minimum, stainless steel, designed with a vertical gully i.e. bottom out discharge and fitted with removable foul air trap and stainless steel strainer/silt basket. An anti-slip grade-304 stainless steel grating shall be fitted; its perimeters reinforced with stainless steel angular frame suitably sealed with the surrounding floor finish to provide an effective seal. All floor gullies should, wherever possible, be positioned to align with the floor tiling grid layout.



Where gullies are sited for cleaning purposes, the floor surface surrounding the gully to approximately 300mm radius should be dished to avoid ponding of water. (See photo at Section 7.2) The gully in the vegetable preparation area will be used to empty the mobile sinks and should be positioned and sized accordingly.

Floor gullies receiving discharge from cooking appliances shall be set level with the floor. The trapped gully grating and catchment area shall be sized and positioned to

allow the individual items of equipment to discharge into the centre. Attention should be made to determine the tilting arc of bratt pans and tilting kettles; the grate areas to be of a single proprietary grating to fit the tiling grid layout and be a minimum of 600mm wide x 900mm deep.

## DRAINAGE FROM EQUIPMENT

### Applicable Areas

All catering areas.

### Planning Principles



All visible drainage services, together with associated joint connections, supports and quick-disconnect units, shall be of chromium-plated copper or stainless steel.

Sufficient underground connection points shall be installed to ensure that waste pipes from equipment do not need excessive long horizontal runs of pipe work, and should not exceed 500mm.

At the point of penetration into the floor and main drain, a neat finish shall be provided that is capable of being easily cleaned all round. The differential in pipe diameters to be taken up with a flexible seal below floor level, the floor tiles to be close cut around the outlet pipe and be effectively sealed with an appropriate silicone sealant.

Each waste outlet shall have a trapped connection close to the equipment prior to connection to the drainage system. Cleaning eyes should be provided to traps below each item of equipment, the waste outlet being easily de-mountable for clearance of blockages.

Where a combined waste disposal unit and de-waterer are installed, to achieve maximum efficiency, the 'fall' of the waste pipe from the de-waterer should be a minimum of 1:7 with the minimum of bends, leading to a tundish with the main drainage pipe being 'trapped' underground with access for rodding.



Gullies receiving discharge from cooking appliances shall be set level with the floor.

Potato peelers and vegetable preparation equipment shall discharge via an approved waste dilution unit and trap to the drainage system. The branch waste pipe should be as short as possible and connection to the head of the system should be avoided. Where walk-in refrigeration and air-cooling plant is installed, drainage will need to be provided to accept the defrost condensate.

## FOOD WASTE DISPOSAL

### Applicable Areas

Kitchens, utensil wash, crockwash and vegetable preparation, refuse area.

### Planning Principles:

The disposal of waste food into the main drainage system shall be planned to take account of current regulations and environmental considerations. Every effort shall be made to ensure that the system is kept free from Fats, Oils and Grease (FOG).

The Local Authority (LA) policy regarding the disposal of waste food products should be sought prior to designing the waste disposal system. Similarly, where units have their own sewage treatment works, consultation should be made with the Property Manager or Project Aquatriner.

The disposal of waste food by means of waste disposal units (maceration) is the standard method adopted. Where the LA policy rejects the entry of macerated food waste into the main sewage system, to prevent food solids from entering the drainage system, in-line de-waterers may be installed to extract and dispose of the macerated solids into a separate container, (for later disposal to a compliant adopted system) leaving the liquid element to continue into the drain. To achieve maximum efficiency, the 'fall' of the waste pipe from the de-waterer should be a minimum of 1:7 with the minimum of bends, leading to a tundish with the main drainage pipe being 'trapped' underground.

The disposal of waste food should take due consideration of the Environmental Protection Act 1990, the Animal By-products Regulations 2003, and subsequent Waste Control Regulations and Landfill Directives.

Potato peelers and vegetable processors should discharge into the drainage system via an approved waste dilution unit and avoid passing through any external grease traps.

Where it is anticipated that the levels of FOG will be high, consideration may be given to the installation of an approved automatic FOG recovery and removal unit. Consult the relevant KDEA.

Alternative systems of food waste disposal may be considered within the unit Environmental Health Policy. Consideration may be given to the installation of a food waste vacuum system; this may incorporate food maceration equipment connected to a dedicated waste system and storage tank/separator for subsequent collection by sealed tanker transport. The resulting 'slurry' may be sent for processing at a waste handling facility or alternatively to a bio-gas or composting plant for processing or recycling. Consult the relevant KDEA. (*See also Part E - 7.17 Food Waste Management*)

## BIO-REMEDIATION

FOG shall be treated by an approved bio-remediation system designed to incorporate automatic dosing of the biological product into the head(s) of the drainage system. As a minimum, the areas that require treatment are, the drain runs from the crockwash, utensil wash and kitchen cooking suite where combination ovens are sited.

The dosing equipment should be located in the plant room or in a location accessed directly from outside, not via the catering areas. The system shall be dispensed by a timed system allowing overnight injection into the drainage system to allow maximum treatment time. Replenishment and maintenance of the product and auto-dosing equipment shall be the responsibility of the Facilities Manager.

Chemical based products shall not be used to treat FOG.

Grease traps may be installed on the external drainage system in addition to the bio-remediation system. The installation of under-bench recovery, separation or grease traps within the building are not acceptable.

## 7.8 WATER SUPPLY

### INTRODUCTION

#### Applicable Areas

All catering areas staff facilities and customer toilets.

#### Planning Principles

An adequate supply of clean hot and /or cold potable water is required and must meet the statutory requirements of the water supply authority.

All visible supply services, together with associated joint connections, supports and quick-disconnect units, shall be of chromium-plated copper or stainless steel.

Supply services to equipment should avoid the installation of excessively long horizontal runs and should not exceed 500mm. Services should be brought to the nearest point to the relevant equipment via a ceiling or service duct and Dropped to Lower Level (DTLL) adjacent to the connection point to the equipment.

Pipes shall not be fixed closer than 35mm to the wall, and be not lower than 450mm AFFL. All pipework shall be adequately secured by smooth finish stainless steel pipe brackets. Multiple services DTLL shall be set at a minimum of 50mm apart.



Pipe penetrations into walls and ceilings shall be fully caulked with mastic or grout as appropriate and fitted with cloaking rings or roses. (The fitting of cloaking rings and roses over unsealed penetrations is unacceptable)



Prime cooking equipment requiring water connections shall be fitted with flexible final services connections and quick disconnect valves. These and associated brake/safety devices shall comply with the relevant Regulations.

Preparation sinks shall be fitted with 22mm taps, having a flow rate of not less than 0.35 lts/sec. (5gals/min)

Water hoses shall be permanently coiled and retractable to the appropriate bore and length of the host unit. They shall be constructed from spiral polyurethane with brass end fittings. They shall be fitted with a brass two way quick disconnect fitting, smooth outer sleeve suitable for catering installations.

### WATER QUALITY & TREATMENT

Potable cold water shall be supplied from the mains supply pipe to all food preparation sinks, drinking water points, cooking equipment, beverage making equipment and ice making machines.

All sinks and wash hand basins require a hot and cold water supply with the exception of the potato preparation sink.

An external cold water supply suitably protected from frost conditions should be supplied to the refuse area.

'Grey water' may be considered for the flushing of toilets.

Many items of equipment have exacting requirements for the constant quality of water supply to enable them to function efficiently. These include minimum/maximum pressure ranges, the degree of mineral content that could cause scale formation and the pH level.

The layout and design for the provision of the water supply shall take account of the individual equipment requirements in order that manufacturer's warranties are not invalidated. Equipment manufacturers and the KDEA should be consulted. (See *also- Water Storage*)

In all circumstances, the water hardness should be measured on the Clark scale. Water hardness above 6° Clark scale shall be softened at source through a salt base exchange unit for treatment of the water supply to: -

- Sanitation sinks
- Dishwashers
- Utensil washers
- Glass washers
- Bains-marie

Individual stand-alone softening units or filter systems adjacent to the equipment may only be considered in exceptional circumstances. Consult the relevant KDEA.

Treated, conditioned drinking water, by a food-safe method such as in line electronic or digital systems, in-line filter cylinders or replacement filter cartridge systems shall be supplied to: -

- Combination ovens
- Pressure/pressureless steaming ovens.
- Beverage making equipment
- Water boiler

Where the conditioning apparatus is sited adjacent to the equipment, suitable storage racking or space within a service spine shall be provided to ensure that the surrounding area is capable of being easily cleaned.

Where the cold water supply is not potable throughout the unit, drinking water points shall be suitably labelled.



## **WATER STORAGE AND METERING**

The storage of hot and cold water shall comply with current regulations including the relevant water authority regulations - Statutory Instrument 1999 No. 1148 The Water Supply (Water Fittings) Regulations 1999 and BS 6700: 1997 -Design, installation, testing and maintenance of services supplying water for domestic use within buildings and their cartilages.

Hot and cold water consumption and storage capacities shall be based on the recommendations in the relevant CIBSE and Defence Estates guides and in particular should take account of the following:

- NTBF.
- That each unit serves a minimum of three meals per day.
- PAYD/CRL operating times.
- The unit's individual demand pattern.
- Any special unit requirements including out of hours functions.
- Specific items of catering equipment that require large volumes of treated water.
- Male and female staff facilities inclusive of showers.

Water storage for the catering facility may be separate from any other storage that may be required for living or other accommodation within the building. Where the storage facility is combined, adequate provision should be made to take account of equalised peak usage times. e.g. early morning wake up - v - breakfast service.

Account shall be taken of the capacity of the water treatment plant, and the availability of treated/conditioned water to the catering equipment, to be able to supply sufficient water to all items of equipment throughout the working day.

Water consumption in the catering facility shall be separately metered from any other consumption within the building.

Consumption should be measured via a digitally pulsed meter, complete with an interface unit and 30-minute recording facility, linked to the Building Energy Management System (BEMS). Where considered to be viable, the system should be linked to a PC and software package located in the Kitchen Office and be capable of inter-facing with the BEMS.

## 7.9 GAS

### INTRODUCTION

Natural gas is the preferred fuel for prime cooking equipment. Installations shall meet the requirements of the Gas Safety Regulations Apr 2009, the Health & Safety Commission Approved Code of Practice (ACOP) "Safety in the installation and use of gas systems and appliances."1994, BS 6173:2001.

### Applicable Areas

Kitchens.

### Planning Principles

All gas installations shall comply with current Gas Safety Regulations, the relevant British Standards Codes of Practice, Defence Estates Specification and Functional Standards publications, CIBSE publications and any relevant European Normalisations.

An interlock of the gas supply and the mechanical ventilation system that will shut off the gas supply in the event of an air movement failure shall be provided and meet the Emergency Isolation Requirements of BS 6173 (including Gas and Electric isolation and the interlocking of gas supply with any mechanical supply or extract ventilation system). (*See also-Ventilation 7.11*)

Gas supply pipes should be kept as short as possible and be concealed within a service spine or ceiling void. Where exposed, they should be painted with acrylic non-chip yellow paint.

Prime cooking equipment requiring gas connections shall be fitted with flexible final services connections and quick disconnect valves. These and associated brake/safety devices shall comply with the relevant Regulations.

The gas hose shall be constructed from 304-grade stainless steel helical wound, annealed with an external stainless steel wire braid connection, finished with a permanently bonded PVC heat resistant dipped coating. The quick disconnect valve shall be brass, 'push to connect' operation with a flat face finish and a Thermal Shut off/fusible link complete with a ¼-turn isolation valve. Both ends of the hose shall be fitted with a Supr-swivel multi-plane elbow, fitted so as to provide 360° in one plane and 270° rotation in the opposing plane. (*See also-Services Co-ordination – 7.13*).

Isolators shall be easily accessible, be sited in a safe location to the user and be clearly labelled.

### METERS

Gas consumption in the catering facility shall be separately metered from any other consumption within the building.

An automatic gas meter should be installed specifically for the catering area consumption via a digitally pulsed meter complete with an interface unit and 30-minute recording facility linked to the BEMS. Where considered to be viable, the system should be linked to a PC and software package located in the Kitchen Office and be capable of inter-facing with the BEMS.

### EMERGENCY ISOLATION

Emergency isolators (panic buttons) shall be installed adjacent to the main entrances/exits and emergency exits. They shall be manually operable, suitably protected against accidental use and clearly labelled. The design shall be such that a single emergency isolator shall cut off both the gas and electrical supplies and that authorised staff such as the Works Services Manager (WSM) can only carry out the re-connection of the supply.

The Defence Fire Adviser should be consulted on all matters regarding the installation, position and isolation of gas supplies.



## 7.10 ELECTRICITY AND LIGHTING

### Applicable Areas

All catering areas and cellars.

### Planning Principles

#### INTRODUCTION

All electrical installations shall comply with the Electricity Council requirements for approval and safety, the current IEE Wiring Regulations, current British Standards Codes of Practice, Defence Estates Specifications and Functional Standards publications, CIBSE publications and any relevant European Normalisations.

Electrical services and all other cables shall be concealed. Surface mounted cables or trunking is not acceptable.

Each electrically powered appliance shall have its own clearly marked isolation switch and be suitably positioned to ensure safe usage and be clearly visible at all times. Isolators shall be flush mounted wherever possible and permanently labelled with the name of the equipment that it services.



Combination ovens should be fitted with interlocking isolation switches to prevent disconnection of the unit without prior isolation.

Sockets and switches shall be flush mounted and manufactured of impact resistant fascias, preferably of stainless steel, 'domestic type' plastic fascia plates are not acceptable. Sockets shall be provided for each item of equipment listed in the catering equipment schedule and be located at a height suitable for the item of equipment. Mid-height sockets and switches etc, should be positioned in the centre of the colour banding centred on the centre of four tiles as illustrated. Additional sockets should be provided to allow for the use of mobile cleaning and preparation equipment and additional activities. Generally, the following heights are required:



- Refrigerator/freezer cabinets at a height of 2200mm (min) AFFL.
- Bench-mounted appliances at a height of 1450mm (or to suite with the banding level of the tile) AFFL.
- Cleaning machines etc and office equipment at a height of 550mm (min) AFFL.
- Winged insect killers, according to the final location height, finished to avoid excessive trailing cable. Consideration may be given to siting the socket within a suspended ceiling where appropriate.

Electrical sockets to refrigeration cabinets shall be located on a single ring circuit to allow simplification to the installation of the temperature monitoring system and allow partial 'power down' to the unit without affecting refrigeration and freezer storage.

Consideration should be given to the provision of additional sockets at mid height adjacent to preparation benches for the use of ancillary catering equipment that may not be included within a catering equipment schedule. e.g. electrical stick blender. Floor sockets in dining rooms or other locations where mobile catering equipment

may be utilised should be suitably covered and insulated. The design should allow the socket to remain covered whilst in use to avoid a trip hazard. Floor sockets are not acceptable within the kitchen areas.

Individual equipment isolators and switchgear shall be located so as not to endanger the user and shall not be concealed by equipment when in its normal working position. The use of isolator boxes should be avoided where possible. Wiring should be suitably enclosed in an approved service duct and led to flush-mounted isolators of stainless steel or polycarbonate finish with rotary switch, grouped adjacent to the equipment and be clearly labelled.

Distribution boards and control panels are not to be sited within food preparation or cooking areas. They should be sited in an area adjacent to the kitchen that can be secured and accessed by authorised staff only.

Back bar equipment that is unsecured within public (servery) areas shall be wired to its own individual isolator. Each isolator shall be wired to a single isolator located in an easily accessible location for use in an emergency. The back bar shall be capable of being totally isolated at a remote location within a secure area to prevent unauthorised usage of the equipment.

## **EARTH BONDING**

Earth bonding to catering equipment shall be carried out in accordance with current IEE regulations.

Mobile benches or storage racks are not considered to be 'an exposed or extraneous conductive part' therefore earth bonding is not normally required to be fitted. Where it is applicable, a permanently coiled wound earth cable (helicoil) shall be fitted to equipment to allow it to extend and retract to a distance of 2 metres and to ensure that the cable does not touch the floor. Cables should be adequately sheathed with PVC liner.

## **LIGHTING**

The design of the lighting layout shall take account of the kitchen equipment layout and the presence of obstructions etc, that may cast shadows across areas where high-risk activity occurs.

The lighting design and installation shall consider the use of energy saving systems.

The lighting shall provide a safe operational working environment. The required lux levels to be provided as measured at bench height are:

- 500-lux in the kitchen, pastry preparation larder preparation, raw meat preparation, vegetable preparation and pantry.
- 300-lux in the crockwash, utensil wash, kitchen food store, grocery store, refrigeration/deep freeze walk in facilities and servery area.
- 125-lux in the equipment store, crockery, glass and linen store, cleaner's room, wet and dry refuse/compactor areas and insulated container washroom.
- 350-lux in the kitchen office.

Light fittings shall be vapour proof in all catering areas and form an integral part of the ceiling system. Surface-mounted systems are not acceptable.

Where extraction canopies are installed, vapour proof light fittings shall be fitted within the canopy to ensure that there is adequate lighting for safe working.

External weatherproof lighting shall be provided at entrances, loading and refuse areas.

Spot lighting and the use of tungsten filament lamps may be considered for use in the dining room and other customer areas to provide a more convivial environment.

## METERS

Electricity consumption in the catering facility shall be separately metered from any other consumption within the building.

An automatic electricity meter should be installed specifically for the catering area. Consumption shall be measured via a digitally pulsed meter complete with an interface unit and 30-minute recording facility linked to the BEMS. Where considered to be viable, the system should be linked to a PC and software package located in the Kitchen Office and be capable of inter-facing with the BEMS.

## EMERGENCY ISOLATION



Emergency isolators (panic buttons) shall be installed adjacent to the main entrances/exits and emergency exits. They shall be manually operable, suitably protected against accidental use and clearly labelled. The design shall be such that a single emergency isolator shall cut off both the electrical and gas supplies and that authorised staff such as the Works Services Manager (WSM) can only carry out the re-connection of the supply.

The Defence Fire Adviser should be consulted on all matters regarding the installation, siting and isolation of services.

## 7.11 VENTILATION

### Applicable Areas

All catering areas, storerooms, staff facilities, dining rooms, cellars and toilets areas.

### Planning Principles

### INTRODUCTION

Ventilation design is fundamental to the efficient environmental operation of a catering unit and must incorporate a number of features including: the capture of smoke, steam, fumes and odours; grease extraction and disposal; reduction of carbon monoxide levels; fire protection and the maintenance of acceptable air quality and temperature.

The design of the ventilation system shall be in accordance with current British Standards Codes of Practice, Defence Estates Specifications and Functional Standards publications, CIBSE publications and any relevant European Normalisations. In particular, the design shall meet DW172 Heating & Ventilation Contractors Association (HVCA)– Standards for Kitchen Ventilation Systems unless specified differently.

The design shall comply with the Food Safety (General Food Hygiene) Regulations 1995, The Food Hygiene (England) (No.2) Regulations 2006. (Regulation (EC) No.852/2004 on the hygiene of foodstuffs)<sup>3</sup> and the Workplace (Health, Safety & Welfare) Regulations 1992 in that:

- There must be suitable and sufficient means of natural or mechanical ventilation to ensure that heat and/or humidity do not build up to levels that could compromise the safety of food. (*See also Section 7.6-Windows*)
- Mechanical airflow must not be from a contaminated area to a clean area. i.e. air drawn into 'clean' preparation areas must not be drawn from 'dirty' areas such as waste storage areas or rooms used for dirty processes such as the utensil wash.
- Construction shall be such that filters and other parts requiring cleaning or replacement are easily accessible and wherever possible, be located outside the food preparation rooms.
- Effective and suitable provision shall be made to ensure that every enclosed workplace is ventilated by a sufficient quantity of fresh or purified air.

**The Defence Fire Adviser should be consulted on all matters regarding the installation and design of the ventilation system including the installation of fire rated ducting and zone separation.**

### CONTROLS

A variable fan speed control, with the appropriate indicator light and speed setting, should be located in the kitchen office to suit the particular design. Where individual stand-alone systems are installed, such as back bars, then a single local control may be installed with the appropriate on/off control, indicator light and variable control.

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<sup>3</sup> (and equivalent regulations in Scotland, Wales and Northern Ireland)

Where the ventilation system is controlled by the BEMS, an over ride and control facility should be provided in the kitchen office.

### **DRAUGHTS AND ODOURS**

The balance of the ventilation system shall be such that there are no draughts within the buildings or 'wind tunnels' between rooms.

The location and style of air supply ventilation grids, particularly in servery areas and above hot service counters, should be planned to avoid the risk of cool air passing over food, which, in turn, may result in food being held below the temperatures required by food hygiene regulations.

Where air transfer grills have to be installed, ease of access to the void without the use of special tools shall be provided for maintenance and cleaning. Transfer grills shall not be fitted into doors.

Where the catering facility is an integral part of a building, and there is living or working accommodation or it is in close proximity to residential areas, the external outlets from the extraction system shall be located so that cooking smells, noise etc shall not cause a nuisance.

The system design shall ensure that cooking odours do not drift from the kitchen to the customer areas.

Where the external 'drift' of cooking odours is difficult to control and may be a nuisance, consideration may be given to the installation of an appropriate filter system or the use of ultra violet light within the extract system to neutralise any odours.

### **AIR COOLING – LARDER**

In addition to the provision of fresh air and extraction, the larder and raw meat preparation areas the temperature shall be controlled at +13°C during working hours.

The cooling system shall be a ceiling mounted cassette unit of an adequate size to maintain the desired room temperature, be draught free, easy to clean and incorporate a bactericidal filter. Drainage may be required to receive condensate from the equipment.



The thermostatic variable control should be manually operated, incorporate a timer with override and be located locally or in the kitchen office.

Refrigeration equipment is normally located in this area. Consideration should be given to the design of the ventilation system to this room, allowing it to run continuously out of hours to prevent the build up of heat from the refrigeration and be interlocked with the cooling system to prevent simultaneous running during working hours. (See also *Services Co-ordination-7.13*)

### **EMERGENCY ISOLATION**

Interlock of the gas supply and the mechanical ventilation system that will shut off the gas supply in the event of an air movement failure shall be provided and meet the Emergency Isolation Requirements of BS 6173 (including Gas and Electric isolation

and the interlocking of gas supply with any mechanical supply or extract ventilation system). (See also-Gas 7.9)

### HEAT RECOVERY

Where it may prove to be economically viable, heat recovery plant shall be installed in the extract system. The recovered heat may incorporate an air to air or an air to water system. The installation will need to be justified and approved by the Project Sponsor or Property Manager.

### VENTILATED CEILINGS

Where ceiling heights allow, the installation of a wall-to-wall suspended modular cassette-ceiling system is the preferred system within kitchens. The optimum ceiling height shall be in accordance with the recommendations set out in the Heating and Ventilation Contractors' Association - Specification DW/172 according to the particular performance requirements. Consideration may also be given to their installation in the pastry preparation, crockwash and utensil wash.



The system shall be designed to provide a modular ceiling system with facilities for 85% minimum grease extraction, make up air and lighting. Sealed, integrated lighting units shall be incorporated, and be installed in sufficient number and distribution to provide an overall 500lux at work surface height without shadows.

The suspension system shall be manufactured of galvanised mild steel or stainless steel; the use of aluminium is not acceptable within any aspect of the ceiling installation. All visible grid components and modules shall be manufactured from 304-grade stainless steel.

Vertical plenum partitions or plenum boxes shall be manufactured of suitably protected galvanised steel or stainless steel.

Where the system provides for sealed easily cleaned extract and supply plenum areas, the walls and ceiling within the area shall be suitably prepared and sealed with an acrylic type, anti-fungicidal, washable paint to allow ease of maintenance and cleaning and to prevent dust contamination.

Where the system provides for extract and supply directly from or into a sealed galvanised mild steel or stainless steel plenum box, the surrounding ceiling void areas shall be suitably treated and sealed for ease of maintenance and cleaning and to prevent dust contamination.

The modules shall be easily removable for cleaning without the use of special tools, weigh not more than 4kg to allow ease of handling and be of a size that will pass through a conventional dishwasher (500mm maximum). The finish may be of stainless steel or colour powder-coated or a combination of both.

The overhang of the extraction modules (i.e. the extent in plan beyond the edges of the equipment) shall be set according to the finished height of the ceiling and meet the guidelines set out in HVCA DW/172.

## EXTRACTION CANOPIES

Where a ventilated ceiling is not viable, a canopy shall be fitted to provide dedicated extraction to prime cooking equipment in the kitchen, the dishwasher in the crockwash, the steriliser sink in the utensil wash and to pressure and large expansion water boilers. Additionally, they shall be sited above any gas equipment, including servery counters where fitted. A box or low-profile canopy is the preferred option above back bar units.

Canopies shall be of box construction, manufactured from 304-grade stainless steel, suitably braced and stiffened to prevent distortion, with welded and polished joints. Canopies with sloping sides are not acceptable.

An integral, full perimeter condensate channel at the bottom edge shall be included and suitably dimensioned to include a captive finger-tight drain plug to the front edge to provide ease of cleaning and draining.

Ductwork to the canopy shall be designed to provide an even extraction of air across the length of the canopy.

Where canopies are installed over cooking equipment, grease filters shall be fitted to the full length of the canopy. All components shall be of stainless steel and the baffle filter system be installed to include a grease collection drawer suitably located to prevent re-entrainment. (Mesh impingement filters are not acceptable as primary grease filters) All fittings shall be easily removable for cleaning without the use of special tools.

Where conditions apply, consideration may be given to incorporating a perimeter air supply within the canopy in conjunction with the overall ventilation system incorporated within the building.

Where the production of grease-laden air is excessive, consideration may be given to the installation of a water wash or cold-water mist system.

Where the location of the kitchen extract may impact on environmental issues such as residential areas, consideration may be given to the incorporation of an ultra-violet grease and odour destroying cassette within the extraction ductwork.

Canopies installed over dishwashers, sterilising sinks and water boilers should be fitted with an adequate air-handling unit to ensure the efficient removal of water vapour and prevent condensation to the surrounding area.

Sealed, integrated lighting units shall be incorporated within the canopy area, to provide an overall 500lux at work surface height in kitchens and 300lux in the crockwash and utensil wash.

The bottom edge of the canopy shall be installed at a minimum of 2 metres AFFL. The overhang of the canopy (i.e. the extent in plan beyond the edges of the equipment) shall be not less than 450mm above all general prime cooking equipment and 600mm above combination ovens, 300mm above dishwashers, sterilising sinks and glass washers and 150mm above beverage suites, expansion and pressure water boilers.

The back bar cooking equipment must be served by a suitable ventilation system that meets the requirements of Crown Fire Standards, Para. 4.10 of Standard E5. (See also Section 3.2.

## 7.12 HEATING

### Applicable Areas

All catering areas, storerooms, offices, staff facilities, dining rooms and toilets areas.

### Planning Principles

Heating shall be in accordance with CIBSE recommendations and be capable of achieving the temperatures stated in JSP 315, Scale 39, Parts 1, 2, 3a, 5 and 6. Reference should also be made to DE Specification 36 – Heating, hot and cold water, steam and gas installations.

In catering areas and storerooms the preferred method of heating is by means of the ventilation and fresh air supply system, avoiding the use of radiators and the associated pipe work. In the remainder of the applicable areas, the installation of conventional panel radiators is acceptable. Panel radiators may also be considered for siting in some lobbies and corridors etc, principally to prevent condensation and provide frost protection. Precise locations need to be carefully considered with regard to being prone to damage. Exposed pipe work should be kept to a minimum and be finished with chip-resistant paint. The KDEA should be consulted.

Heaters with an enclosed element are not to be used as they provide harbourage for insects.

Heating pipe work must not pass directly through food stores.

## 7.13 SERVICES CO-ORDINATION

### Applicable Areas

All catering areas, storerooms, offices, staff facilities, dining rooms and toilets areas.

### Planning Principles

#### INTRODUCTION

This section should be read in conjunction with all other paragraphs within Section 7b.

Considerable attention should be paid to the co-ordination of all services, equipment, fixtures and fittings to present an efficient and hygienic working environment or create harbourage for insects.

Wherever possible, services should be concealed. Where services are exposed, they should be designed so that fittings and the surrounding area and equipment can be easily accessed and cleaned.

#### EQUIPMENT

Each sub-division by type of catering equipment (i.e. prime cooking, refrigeration and fabrication) should be obtained from a single manufacturer to allow the rationalisation of type and finish, installation of services and through-life maintenance.

All equipment shall be of heavy-duty construction and supplied strictly in accordance with DE Specification 42 – Catering Equipment Specification.

Equipment should be mobile; where this is not possible, floor mounted equipment on pedestals should be sealed to the floor to prevent the ingress of fluids, insects etc.

The siting of equipment should be carried out in accordance with the manufacturer's instructions and with particular regard to the spacing of equipment adjacent to heat sources and ventilation grids to ovens etc. As a general rule, prime cooking equipment should be located a minimum of 150mm apart and 150mm from the wall or service spine. Designers may consider the provision of mobile benching between the main items to provide an appropriate space, ease of access and available 'put –down' space.

The siting of equipment should provide for the front edges to be in-line and co-ordinated with other services provisions including tundish positions (.e.g. floor drainage channels positioned to allow tilting kettles, bratt pans etc, to pour into the centre of the channel).

Sinks and benches etc should be designed to be located 100mm clear of the walls.

#### SERVICES

Services should be concealed; where this proves not to be possible they shall be placed well apart to allow ease of cleaning. Cables and trunking shall be run within the ceiling void. Service pipes shall not run through food rooms.

All visible horizontal water supply and drainage runs shall be kept to a minimum. The associated pipe work together with joint connections and quick disconnect units, shall be chromium-plated copper or stainless steel.

Bio-remediation capillary feed pipes and other such services shall be contained within chromium-plated copper or stainless steel pipe work.

Prime cooking equipment requiring water and gas connections shall be fitted with flexible final services connections and quick disconnect valves. These and associated brake/safety devices shall comply with the relevant Regulations.

Where in-line water conditioning equipment, filter cylinders or cartridges need to be located adjacent to the individual equipment, suitable storage racking or space within a service spine shall be provided to ensure that the surrounding area is capable of being easily cleaned.

Services to equipment in island locations shall be contained within a purpose designed service spine. The spine shall be manufactured in 16-gauge, 304-grade stainless steel and designed to meet the requirements of the particular layout.

Earth bonding to catering equipment shall be carried out in accordance with current IEE regulations.

Where applicable, a permanently coiled wound earth cable (helicoil) shall be fitted to equipment to allow it to extend and retract to a distance of 2 metres and to ensure that the cable does not touch the floor. Cables should be adequately sheathed with PVC liner.

Where hard-wired temperature-monitoring equipment is fitted that link to the recording unit by the earth, all items of equipment linked to the system should be on a single circuit.

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Insect killers should be wired such that at least one unit will remain active following shut down of the kitchen.

Isolator switches to individual items of equipment shall be located such that access does not offer a danger to the user, can be easily reached, seen at all times and are clearly labelled. Flush fitted switches are the preferred choice. Where equipment is sited in an island situation, the isolator switches should be located to one end of the service spine adjacent to the riser.

## 7.14 FIRE PRECAUTIONS

### Applicable Areas

All areas.

### Planning Principles

Compliance with the Building Regulations and other primary legislation relating to fire safety is mandatory. In addition, compliance with Crown Fire Standards is mandatory for all MOD works and projects on the MOD estate. The Building Regulations have been formulated to protect the health and safety of the occupants of buildings. The Crown Fire Standards generally require higher standards, as they exist to cover asset protection as well as life safety issues.

Personnel of the Defence Fire Risk Management Organisation (DFRMO) advise and assist on the full range of fire safety matters. This includes the implementation of MOD fire safety policy, procedures and standards to ensure compliance with all current regulations and legislation. A Project Fire Officer will be appointed by the Regional Fire Focal Point/Command Fire Focal Point of DFRMO for all major projects within an area of authority. The Project Fire Officer will be responsible for representing the MOD interests and forwarding advice on fire related matters to the project.

Before work begins, plans in relation to the works will require approval from the Project Fire Officer confirming that necessary fire protection measures are in place. The Project Fire Officer should be consulted on all matters regarding fire safety at the design stage to ensure that fire protection requirements are established and approved before building work commences.

Portable fire fighting equipment is issued under Joint Services scales and is advised by the Project Fire Officer.

### **Open plan Servery areas –Back Bar/Call Order Cooking Suites**

Where the installation includes equipment such as deep fat fryer, bratt pan, char-grill or other intense heat cooking equipment, a suitable fire suppression system must be provided to cover the equipment in question. The system must be automatically operated and be provided with the facility to operate manually in case of emergency, the operation of this system should be linked in such a manner that its operation closes off the power to the equipment. (See also section 3.2)

The back bar cooking equipment must be served by a suitable ventilation system that meets the requirements of Crown Fire Standards, Para.4.10 of Standard E5. (See also Section 7.11)

## Part C Infestation

### 7.15 INFESTATION

#### Applicable Areas

All areas.

#### INTRODUCTION

Infestation can lead to immediate closure of catering facilities and prosecution of individuals by the Local Authority Environmental Health Officer (EHO). The design of catering facilities shall be such that there are no areas where insects and vermin may breed or easily gain access. Where infestation does occur the design should allow for it to be effectively controlled.

#### Planning Principles

All internal walls shall be of solid construction.

Surface mounted services should be avoided. Where it is necessary, the length should be minimised and fixed with sufficient clearance for ease of cleaning all round. (See Section 7.8)

Services should not pass directly through food rooms. Services passing through the floor, walls and ceilings should be sleeved and the sleeves sealed with a food safe sealant. Penetrations through walls and ceilings shall be sealed and finished with cloaking rings. Drainage pipe penetrations into the floor must be adequately sealed and provide a clear accessible area all round for ease of cleaning.

Service ducts should be avoided. Where they are unavoidable, they shall have close fitting access covers over the full length for ease of cleaning. Ducts should not pass through food rooms. Where boxed in vertical pipework is unavoidable, the resulting cavities shall be suitably sealed to prevent the ingress and harbourage of insects etc.

Sealed windows are preferred for food rooms. However, windows and other access points that open to the outside environment shall be fitted with insect proof screens that are easily removable without the use of special tools for cleaning.

Doorways leading directly into a food room should be suitably screened to prevent access to insects etc. All external doors shall be rodent proof by the fitting of flexible seals to the base and vertical gaps.

Screens should be designed to be easily removed for cleaning and provide ease of access to trolleys etc during deliveries.

Refuse areas shall be similarly protected from pests, insects and rodents.

Winged insect killers shall be installed at strategic points to protect all food rooms from the external environment and sited in conjunction with the EHO. Insect killers are not necessarily required within individual food preparation rooms. The power supply should be designed to ensure that at least one predominant unit may be left on overnight when the main power supply has been switched off.

## Part D Energy Management

### 7.16 ENERGY MANAGEMENT

#### INTRODUCTION

Saving energy results in less environmental pollution from CO<sub>2</sub>, acid rain and particulates. In addition, it will help to meet the UK Energy/CO<sub>2</sub> reduction targets.

Catering is a diverse and labour intensive activity and therefore offers potential for large savings in energy consumption through the efficient design and layout of the facilities. Many successful energy saving initiatives are achieved by good housekeeping practices, however, the installation of energy conservation features is essential to the longer-term efficiency of the unit. The design or refurbishment of catering facilities shall incorporate energy conserving features. Design teams are to demonstrate and provide details of the energy saving features that are proposed to be introduced together with an indication of the efficiency and payback potential.

The detailed design shall take full account of the Energy Conservation Act 1981, the CIBSE Energy Code, the Building Regulations, DE Design & Maintenance Guides 17 and 22, MOD/DETR Energy Consumption Guide 75 and take advantage of the initiatives provided in the Government Strategic Energy Plan for "Creating our energy future and reducing carbon emissions".

The installation shall be designed to meet any relevant Strategic Energy Plan and provide the appropriate systems to enable reductions in the costs of the Climate Change Levy (CCL)

#### Planning considerations

Systems shall be considered to reduce the energy consumption through everyday work practices, by minimising the movement of food and staff, providing flexibility of equipment and the use of standardised storage, cooking and service systems. (e.g. gastrornorm system).

Automatic sub metering for gas, electric and water consumption is to be installed specifically for catering area consumption via digitally pulsed meters complete with an interface unit and 30 minute recording facility linked to the Building Energy Management System. (BEMS). Where considered to be viable, the system should be linked to a PC and software package located in the Kitchen Office and be capable of inter-facing with the BEMS.

#### EQUIPMENT

The selection of the most energy efficient equipment provides major energy saving opportunities. Catering equipment has a long life expectancy so correct selection initially will improve the potential for saving energy. Prime consideration should be given to the energy ratings and efficiency of appliances. Equipment shall be selected to comply with DE Specification 42 – Catering Equipment Specification.

The installation of specific energy saving equipment, or additions, will invariably incur higher capital input costs but, in most cases will provide longer-term reductions. Designers shall assess the through life costs to determine the viability of energy conservation solutions.

## Considerations

There should be a clear visible indication that the equipment is switched on or running and is easy to switch off after use. Consideration should be given to the provision of automatic pan sensors to turn the hob off, or down, following the removal of a pan.

Induction hobs can provide substantial energy savings. Initial capital costs may be high but offer the opportunity to reduce the amount of ventilation extraction needed.

Re-circulation and heat recovery features are preferred options on high-energy usage equipment such as combination ovens and dishwashers.

Gas fired equipment is generally cheaper to run than electric or steam equivalents. Installation and purchase price costs tend to be more expensive, however, the payback may prove to be viable.

Controls should be conveniently placed, easy to read and adjust with calibration marks permanently engraved so that they do not wear with prolonged use. Equipment with Hi-Low or economy settings is preferred when intermittent use is expected.

All equipment should have adequate thermal insulation to prevent heat loss into the kitchen and maintain temperatures in refrigerators and freezers.

Large viewing windows may be fitted to ovens and similar equipment to allow food to be viewed and examined without the need to open the door with associated heat loss. Where fitted the windows should be double or preferably triple glazed.

## WATER

Water is an expensive resource both to buy and dispose of; added to which the cost of heating and maintaining temperature makes it an extremely expensive energy cost. High-energy usage is easily over-looked as the power source is often taken for granted. The need for hot water is constant, however, significant savings can be achieved.

## Considerations

Appropriate water-softening systems to reduce scale formation and thereby reduce energy use.

Variable thermostat and control settings, to suit the peaks and troughs of daily production and service, with a manual over ride to account for unplanned off peak activity.

Sub meter for water consumption.

Automatic cut off devices to prevent prolonged or continuous drawing of water with spray taps installed in staff hand wash facilities.

Rainwater collection systems may be considered as a supplement to part of the toilet flushing system.

## VENTILATION

Heating and ventilation account for about 28% of the total energy cost within kitchens, of which approximately half is lost in the air exhausted through the ventilated ceiling or canopies. Good design and air change considerations shall be carried out to provide the basis of an energy efficient operation.

### Considerations

Ventilation requirements and the canopy or ventilated ceiling design and dimensions need to be determined by considering the different types of cooking equipment to be installed and their thermal conductivity and emissions.

Calculations must be made to determine the maximum rate of air extraction needed to maintain thermal equilibrium. The thermal convection should be calculated and combined with the Air Change Rate required. To avoid excessive heat loss, the kitchen size and the intensity of use of equipment must be taken into account when calculating air changes.

The volume of air extracted from the kitchen must be determined carefully and be kept to a minimum since it must be replaced by 'make-up' air, (i.e. fresh air that usually will require heating or cooling).

Air movement must be provided to combat excessively high temperatures radiated from catering equipment. Air movements from adjacent areas should always be towards the kitchen to prevent odours escaping into unwanted areas. (i.e. negative pressure).

All ventilation plant should be fitted with adequate controls. (e.g. variable speed drives for fans), manually controlled from the Kitchen Office, allowing ventilation rates to be varied to meet the requirements.

Consideration should be given to the installation of air quality and temperature sensors to automate ventilation control.

Consideration should be given to recovering a significant amount of heat through the ventilation system when the installation is considered not to be complicated or involve excessive lengths of ducting.

## LIGHTING

Lighting accounts for about 11% of energy used in catering establishments. Levels of illumination in kitchens should be maintained at the recommended levels and be well distributed to avoid shadow.

### Considerations

Fluorescent lighting is considered to be the most efficient. Significant savings can be made without loss of light quality or a lowering of illumination levels, by the use of brighter decoration and improved luminaries. 26mm tubes consume 10% less electricity than the older 38mm tubes for the same light output, will fit the same end cap fittings and, furthermore, they are cheaper to buy.

New electronic starters enable the tube to strike without flickering, extend life and require less maintenance than the older canister-type glow starter.

High frequency electronic ballasts should be considered. These units display even lower running costs with reduced energy costs in the control gear and reduces the stroboscopic effect sometimes experienced with conventional fluorescent lamps.

Locations of light switches should be grouped and designed to enable the user to turn off all lights easily. (e.g. at the exit to the catering area).

Areas that are infrequently used may be fitted with occupancy sensors or automatic controls.

# Part E Waste Management

## 7.17 FOOD WASTE MANAGEMENT

### INTRODUCTION

Food waste management is a core issue within MoD catering facilities; wherever food is handled, waste is produced. Food waste can create food hygiene risks whether stored in local containers, double bagged within external bins or during transportation and its handling can be a time, energy and space consuming process. The management of food waste needs to be considered as a specific issue within MoD establishments in conjunction with the Unit Environmental Policy. The standard rate of landfill tax as at April 2010 stands at £48 per tonne and is pledged to rise by £8 per tonne up to April 2013; i.e. £72 per tonne.

### THE EUROPEAN LANDFILL DIRECTIVE

With affect from 30 Oct 07 non-hazardous wastes destined for landfill must be 'treated' before it is disposed of at non-hazardous and inert landfill sites. The regulations are a result of the European wide requirement in the European Landfill Directive.<sup>4</sup> This and other recent legislation issued under the Environmental Protection Act 1990, Section 34 – Waste Management will have a direct impact on the way the MoD and its agents manage its waste strategy, in particular waste food.



The Directive represents a step change in the way we dispose of waste through waste minimisation and increased levels of recycling and recovery. Its overall aim is “to prevent or reduce as far as possible negative effects on the environment, in particular the pollution of surface water, groundwater, soil and air, and on the global environment, including the greenhouse effect, as well as any resulting risk to human health from the land filling of waste, during the

*whole life-cycle of the landfill.*” The key points applicable to compliance with the regulations include: -

Waste must be treated before it is disposed of at non-hazardous and inert landfills and must comply with a '3 point test'. It must be a physical, thermal, chemical or biological process including sorting and it must do so to change the characteristics of the waste in order to: -

- Reduce its volume; or
- Reduce its hazardous nature; or
- Facilitate its handling; or
- Enhance its recovery.

<sup>4</sup> Council of European Communities (1999) Council Directive on the Landfill of Waste 1999/31/EC

There are some limited exceptions to the need for treatment owing to a lack of available treatments that would contribute towards the aim of the Directive. The exceptions are: -

- Inert waste for which, treatment is not technically feasible.
- Waste other than inert waste where treatment would not reduce its quantity or the hazards that it poses to human health or the environment.

Certain wastes are banned from landfill by the Directive; the list is extensive, however, the major items affecting food waste from MoD kitchens and galleys are liquid waste and raw meat product waste.

Waste producers are not obliged to treat the waste themselves and may simply buy the service from a waste contractor, however, MOD Caterers do have a duty of care to ensure that waste is appropriately separated to allow the appointed waste contractors to comply with the regulations when taking waste to landfill. Several composting systems are available that may be operated locally, which are in use in several MOD establishments. Whichever option is chosen there is a statutory requirement for a transfer note, together with a full description of the waste to accompany each consignment.. Records of all waste must be kept by both the producer and the waste contractor for at least 2 years.



If the waste producer wants to send their waste to landfill, they will need to provide confirmation to the landfill operator that the waste has been treated, stating the type of treatment and the amount of waste sorted out for recovery or alternative treatment.

Government wishes to maximise energy recovered from unavoidable residual waste (that would otherwise go to landfill) and promote greater energy recovery from food waste via anaerobic digestion to capitalise on the potentially significant energy and carbon benefits. Several waste processing technologies are available including anaerobic digestion, incineration, pyrolysis, gasification and plasma arc heating. Government does not have a preference for one technology over another, with the exception of anaerobic digestion for the treatment of food waste.<sup>5</sup> The 3 principal by-products of anaerobic digestion are: -

- Biogas. A gaseous mixture comprising methane, carbon dioxide and hydrogen that can be burned to create electricity.
- Acidogenic digestate. A stable organic material resembling domestic compost that may be used in the manufacture of low-grade building by-products or non-agricultural fertiliser.
- Liquid (Methogenic digestate). Rich in nutrients and can be an excellent fertiliser dependent on the quality of material digested.

## FOOD WASTE SYSTEMS

Current management of food waste is carried out in conjunction with MoD Multi Activity Contractors (MACs) to include the in house management, collection, processing, segregation, marketing and sale of reclaimed materials, and arranging

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<sup>5</sup> Source: DEFRA published 24 May 07.

the disposal of final waste residues. There is a duty of care required to ensure that there is sufficient plant, space and resources provided to the MAC to enable it to meet its responsibilities. MOD caterers should address the management of food waste and consider ways to reduce costs and consider alternative sustainable food waste disposal methods. Several methods for the processing of food waste prior to collection by a waste contractor are employed in MoD kitchens and galleys and include: -

### **Stand-alone Waste Disposal Units.**

The system processes food waste through maceration with direct disposal to the waste water collection and treatment system through the LA or Unit sewage treatment plants. In recent years an increasing number of LAs have banned or restricted the disposing of commercial food waste into their systems “in order to avoid an unjustified increase in the quantity of sewage sludge.” Despite counter arguments and policy statements from The Chartered Institute of Water & Environmental Management (CIWEM), Feb 2003, this remains to be the case and has had a dramatic effect on the way we dispose of food waste in the MoD.

Operationally, this is an efficient system and will remove the majority of food waste apart from the larger bones etc with little to complicate the system other than:

- Ensuring the separation of refuse and plastic waste from the food waste.
- Ensuring basic maintenance of the system.
- Ensuring that the design of the drainage system from the building by-passes the external grease trap to avoid it filling with deposits of macerated food waste.
- Ensuring that the drainage system is clear of FOG by the installation of an enzyme based dosing system.

This is the generally preferred method of food waste disposal by the end user as it requires no further handling or processes by themselves or an appointed waste contractor. However, many of the sewage plants, particularly those operated locally, have difficulty in processing the amount of sludge created by commercial food production, hence the generic ban.

### **Waste Disposal Units combined with a De-watering system.**

Food waste is processed through maceration from where it is passed through a de-waterer that extracts up to 80% of the liquid from the macerated food mass. The



liquid goes direct to drain as above, and the solids are collected for direct disposal to the refuse collection system.

The majority of new installations in MoD kitchens and galleys employ this system in order to comply with local bye law restrictions described above, however, it does present several operational problems and is not an efficient method of disposal.

- The installation criteria is very exact, requiring minimal falls and numbers of bends within the drainage system. To avoid the number of bends etc, the system is best suited to the drainage being ‘trapped’ underground, which can

only be achieved cost effectively if specified prior to commencing the building drainage installation.

- The mechanical parts to the equipment are quite complex to remove and fit, are quite heavy and not easy to manipulate within the usually restricted space available.
- The solid food waste requires additional processing by double bagging and forwarding to the refuse skips for subsequent collection by the appointed waste contractor; no separation from the general refuse is specified at the current time therefore decomposition will take place in the uncontrolled environment of the skip or standard Euro-bin.

### **Double bagging**

Where there is no food waste process installed, food waste, including liquids, is currently double bagged and forwarded to the refuse skips for subsequent collection by the appointed waste contractor. This may include elements of general refuse such as paper, cardboard and plastics according to the management of the clearing system. This is also a costly way of food waste disposal as invariably, it is by nature, very wet and therefore heavier per cubic metre. Additionally, further separation may have to be carried out which will inevitably add to the costs of the contract.

Future environmental legislation may require the further separation of organic materials prior to landfill resulting in the requirement of bulk food waste required to be stored separately; this may give rise to the risk of infestation from decomposing waste unless it is stored in a temperature-controlled environment (as is the case in some European countries), which in itself will provide an additional outgoing energy requirement and an increased spatial requirement within the building footprint.

### **Vacuum food waste removal system**

A system that helps to meet the Landfill Directive by providing the means of sorting and storing food waste as a dedicated waste stream whilst reducing hygiene risks and the Health and Safety risks associated with the movement of heavy food waste within a catering facility. A recently introduced system aimed at the larger units, it operates by processing and transporting food waste from the point of disposal to a holding tank that can be located some distance away. Food waste is collected periodically by tanker vehicle and transferred to a treatment facility such as an anaerobic digestion plant, Biogas production, a renewable energy source or an automotive fuel. This system has already been installed in several new build facilities within the MOD including HMS Collingwood, HMS Raleigh and Thiepval Bks, NI. Whilst the initial capital costs are quite expensive, the pay back period is approximately 5 years and does promote greater energy recovery from food waste via anaerobic digestion to capitalise on the potentially significant energy and carbon benefits.

**Accelerated decomposition system.** Relatively new to the UK, this system provides the means for the disposal of food waste directly to drain. The system operates in conjunction with a formula of micro organisms within a climatic controlled chamber that provides rapid and safe decomposition of food the waste of which turns to water and allowed to go to drain. The unit is available in several capacities that will suit both large and small kitchens.

The advantages of the system are reduction in landfill usage and cost, waste collection and transport cost with future proof operations against increasing waste collection charges.