

Client: Joe & The Juice UK Ltd

Site Address: 77 Mosley Street Manchester M2 3FX

This purpose of this document is to explain why a Heating, Ventilation and Air Conditioning (HVAC) system is required within the proposed fit-out of a Coffee & Juice shop at 77 Mosley Street Manchester M2 3FX

Site Information & Use

The unit consists of a ground floor area and a basement and will operate as a Coffee & Juice bar with:

- Food preparation on ground floor
- Customer seating to ground and basement floors
- Customer & staff WC facilities to ground & basement floors
- Food & Dry good storage to ground and basement floors

Introduction

A commercial Coffee & Juice shop presents a highly specific set of environmental conditions that necessitate a properly designed commercial Heating, Ventilation and Air Conditioning (HVAC) system.

A commercial grade HVAC system is essential to:

- Regulate temperature and humidity precisely
- Control odours and maintain air quality
- Protect equipment and food products
- Ensure customer and staff comfort and reduce operational costs
- Comply with all legal legislation

Heat Load Management

Coffee shops generate substantial internal heat from:

- Espresso machines, grinders, and grilles
- Dishwashers, ice machines, refrigeration equipment and freezers
- Lighting and dense occupancy

Compact layouts and high traffic area amplify thermal loads along with heat from equipment exceeding the natural ventilation capacity of the space therefore a mechanical HVAC system is required.

A suitable HVAC system is required to ensure that refrigeration appliances can operate efficiently, effectively and within the required parameters to maintain the manufacturers warranties

Without a dedicated HVAC system to all areas, staff and customers experience thermal discomfort, which can reduce dwell time and negatively impact business performance.

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An adequate HVAC system to food storerooms and food preparation areas is required to prevent food spoilage and to maintain required hygiene standards.

Humidity Control

Steamers, dishwashers, and coffee preparation equipment significantly elevate humidity levels. Excess humidity leads to:

- Condensation on windows and metal surfaces
- Musty odours
- Accelerated spoilage of fresh products such as pastries

A precision HVAC system will prevent these

Odour Control

Coffee aroma is desirable but cooking odours and kitchen effluents must be contained. An effective HVAC design will reduce unwanted odours and balances positive pressure in seating areas and negative pressure in preparation zones. Sufficient extraction prevents cross-contamination and nuisance complaints.

Air Quality and Ventilation

High customer density and constant door traffic facilitate CO₂ and pollutant accumulation. A compliant HVAC system ensures that adequate fresh air supply is provided to all areas and an even distribution of conditioned air to prevent cold drafts and hot spots.

Regulatory Compliance and Hygiene

For commercial coffee shops HVAC installations must comply with several statutory and regulatory frameworks:

Building Regulations (Part F and Part L)

- **Part F (Ventilation):**
 - Provides standards for adequate ventilation, indoor air quality (IAQ), and the prevention of condensation
 - Requires minimal noise, maintenance access, and safe air distribution
 - Specific guidelines in non-dwellings (Volume 2) encompass monitoring air quality, protecting occupants from pollutants, and ensuring ventilation effectiveness near kitchens and equipment

Part L (Energy Efficiency):

- Covers energy performance of heating and cooling systems
- Requires installers to demonstrate compliance with minimum Seasonal Energy Efficiency Ratio (SEER) standards and proper commissioning

Energy Performance of Buildings (EPB) Regulations / TM44 Inspections

- Air conditioning systems with >12 kW total rated output must have regular inspections every 5 years by an accredited energy assessor
- Assessments provide guidance on efficiency, system sizing, and maintenance
- Owners or operators are responsible for compliance and record-keeping

Health and Safety / IAQ

- Control of Legionella Bacteria Regulations 2014: Prevent Legionnaires' disease through water system management
- Indoor Air Quality Regulations 2005: Limits on contaminants like carbon monoxide, radon, and mould
- Adequate HVAC systems are critical for compliance and occupant safety

CIBSE Standards

The Chartered Institution of Building Services Engineers (CIBSE) publishes guides, notably Guide B (Heating, Ventilating, Air Conditioning and Refrigeration), which provide best-practice engineering guidance on system design, performance, efficiency, indoor air quality, and controls whilst these guides are not mandatory legal standards; they are a professional benchmark used by engineers, architects, and building managers to ensure high-quality and energy-efficient HVAC systems

Food safety regulations and Hygiene

Food safety regulations in the UK, including the Food Standards Agency guidelines, require controlled environments to prevent contamination.

A mechanical HVAC system helps meet these standards by filtering air, controlling airflow patterns to avoid cross-contamination between raw and cooked foods, and maintaining clean surfaces and equipment.

HVAC systems form a critical component of food safety management, protecting both consumers and staff while ensuring efficient operations.

HVAC requirements for basements within commercial properties

The unit has the benefit of a basement which will be used for customer seating, WC facilities and food storage. However, the basement has no access to natural ventilation therefore the installation of a mechanical HVAC system is the only possible method to provide a suitable ventilation.

Building regulations specially require ventilation in commercial basements to ensure occupant health, control moisture, prevent structural damage and manage indoor air quality

Moisture and Air Quality Control

Commercial basements are prone to dampness due to their below-ground location, which allows moisture from the ground to seep through walls and floors. Without adequate ventilation, this moisture can condense on cooler surfaces, promoting mould growth, mildew, and stagnant air, which can trigger respiratory and allergic health issues for occupants

Mechanical Ventilation systems help remove humidity and maintain air circulation, preventing these problems

Additionally, proper ventilation ensures that pollutants, odours, and potentially hazardous gases like radon are effectively diluted and expelled from the basement space

Human Comfort and Safety

UK Building Regulations Approved Document F stipulates that ventilation must maintain acceptable indoor air quality by supplying fresh air and removing stale air. This protects workers and visitors from excess carbon dioxide, fumes, or hazardous substances, which could impair concentration, comfort, and health

A mechanical ventilation system is designed and sized to provide enough air changes per hour to match the basement occupancy, usage and heat generating activities

Structural Longevity and Maintenance

Moisture accumulation can damage building materials, leading to wood rot, corrosion, and deterioration of finishes, which would compromise the basement's structural integrity. By maintaining balanced humidity levels through mechanical ventilation this can avoid costly repairs and ensure the long-term durability of the basement

Legal Compliance

Failure to meet ventilation standards in commercial basements can result in enforcement actions, fines, and liability for health hazards. Compliance with regulations ensures that the basement is legally habitable, safe, and energy efficient.

HVAC requirements for toilet facilities within commercial properties

Under Workplace (Health, Safety and Welfare) Regulations 1992, Reg. 20, Building Regulations Approved Document T – Toilet Accommodation & Equality Act 2010 – Accessible Toilets we are required to provide suitable WC Facilities for staff & customers

The proposed fit includes the installation of Toilet facilities to the ground and basement floors.

Commercial toilets must have proper ventilation to comply with Building Regulations, ensuring the removal of odours, moisture, and airborne contaminants to protect occupant health, maintain indoor air quality, and prevent damage to building fabric.

Health and Hygiene Considerations

Ventilating commercial toilets is crucial for removing stale air, odours, and humidity, which can otherwise compromise indoor air quality and lead to respiratory discomfort or illnesses

High humidity levels without adequate ventilation promote mould and bacterial growth on surfaces, fixtures, and walls, posing a health risk to occupants and staff

Extraction systems ensure the air remains fresh and hygienic

Compliance With Building Regulations

In the UK, ventilation requirements are set out in Approved Document F of the Building Regulations (Part F), which applies to non-dwellings such as commercial buildings

. The regulations require that:

- Habitual rooms, bathrooms, and toilets must have adequate means of ventilation, either mechanical extraction or natural airflow
- For toilets, mechanical extraction typically requires a minimum airflow of 6 l/s to remove odours and moisture effectively
- Compliance ensures both the legal operation of the building and protection of occupants' health, with enforcement possible by local authorities

In essence, building regulations require ventilation in commercial toilets to:

- Remove odours and airborne contaminants, fostering a hygienic environment.
- Control humidity, thereby preventing mould growth and protecting building materials.
- Ensure compliance with legal requirements, mitigating potential penalties.
- Maintain occupant comfort and safety, which is the overarching goal of health and safety considerations in commercial buildings

Properly designed and maintained ventilation systems in commercial toilets are therefore both a legal obligation and a practical necessity for health, comfort, and building longevity.

Special Consideration for Listed Buildings

In the UK, listed buildings are protected for their historical or architectural significance but are still required to comply with the Building Regulations. However, certain relaxations are permitted to accommodate their special characteristics while maintaining legal compliance.

Relaxations are permitted, particularly where rigid compliance would damage historic fabric or significance.

Relaxations exist to protect the historic and architectural significance of listed buildings while allowing improved safety, energy efficiency, and habitability. These relaxations are discretionary, negotiated with local building control, and always balanced against the building's heritage value.

In this instance our Approved Inspector has agreed that our HVAC system is not required to fully comply with Part L (Energy Efficiency). However, we are still required to provide an adequate mechanical HVAC system to ensure that a suitable environment is provided and in compliance with Part F.

A relaxation in compliance with Part L would allow a different choice of HVAC equipment only.

A well-designed HVAC system will protect the fabric of the listed building against moisture accumulation that could damage building materials, leading to wood rot, corrosion, and deterioration of finishes, which would compromise the building's structural integrity.

Summary

Heating, Ventilation and Air Conditioning (HVAC) systems in this type of commercial use is mandated by building regulations to protect health, safety, and building structure, maintain comfort and air quality, and moisture management.

A suitable HVAC ensures legal compliance, reduces operational risks, and enhances the longevity and usability of the property.

HVAC Design Calculations

For a coffee shop, UK Building Regulations and ventilation guidance recommend an air change rate of approximately 10–15 air changes per hour (ACH), or around 8-12 L/s per person, depending on occupancy and equipment, in accordance with Approved Document F and CIBSE standards.

Under Approved Document F: Volume 2 – Buildings other than dwellings, ventilation requirements for non-residential buildings, including shops, cafes, and restaurants, are set to maintain indoor air quality, comfort, and safety

Compliance can be expressed in:

- Air changes per hour (ACH): how many times per hour the air in a space is replaced
- Litres per second per person (L/s per person) or per unit floor area (L/s m²)

The building regulations reference CIBSE Guide B and related standards (e.g., KS17, BS 5925) for detailed air-flow rates and performance verification

Typical guidelines for food and beverage spaces such as coffee shops (non-dwelling, low cooking load) are:

- Fresh air supply: ~8-10 L/s per person, which approximates 8–15 ACH, depending on space volume and occupancy
- For spaces with light cooking or brewing activity, mechanical extraction may be included to remove odours or steam, especially near espresso machines or small kitchen areas
- If a local exhaust system or kitchen equipment is generating heat, moisture, or fumes, the ventilation rate should be increased proportionally to maintain comfort and air quality

Summary of Design Calculations for the Proposed HVAC

- MVHR with a capacity of 347 l/s
- Temperature Exchange Efficiency of 80%
- Enthalpy Efficiency of 62.5 to 68%
- ErP Ecodesign Compliant c/w Automatic By-Pass

Unit to provide fresh air requirement for occupancy, make-up air for over counter extraction, equipment heat rejection extraction, waste room extraction and toilet extraction.

Ground Floor Total Supply Volume: 87 l/s

Occupancy 14 Seated customers plus standing/queuing and staff. 17 People at 8 l/s per person = 136 l/s (87 l/s from MVHR balance from open doorway)

Basement Floor Total Supply Volume: 260 l/s

Occupancy 30 Seated Customers, 2 Staff. 32 People at 8 l/s per person = 256 l/s.

Make-up Air for BOH (Fridge/Freezer heat rejection, waste room, and toilet extract) 100% served from fresh air provision extract.

Separate WC Extract providing 6-8 ACH. Make up air from MVHR (Basement) and MVHR/infiltration from open doorway (Ground)

All HVAC equipment within the proposed design has been sized to provide the above .

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