

DOMINO'S PIZZA GROUP LTD

1.0 STANDARD SPECIFICATION FOR VENTILATION AND AIR CONDITIONING SYSTEM (Revision G 22.4.09)

1.1 GENERAL

- a) The project includes all of the mechanical services works associated with the fitting out of an existing shell unit to create a fully operational pizza delivery operation. Domino's bake-off operation produces very little grease and the extract system is predominantly removing heat and gas combustion fumes.
- b) All work shall be carried out in accordance with the latest relevant British (or Irish where appropriate) and European Standards, Statutory Regulation and Byelaws together with the following publications:
 - CIBSE Codes and Guides to Current Practice
 - Water Authority By Laws
 - HVCA – DW143 Practical Guide to Ductwork Leakage Testing
 - HVCA DW144 Specification for Sheet Metal Ductwork
 - HVCA DW172 Guide to Good Practice for Kitchen Ventilation Systems
 - HVCA – RUAG70 Guide to Good Practice Refrigeration
 - The Building Regulations
 - Gas Safety (Installation and Use) Regulations 1998

All plant, ducts, pipes cables etc. shall be adequately protected against accidental damage, corrosion and external environment and shall be capable of safe decontamination and removal in the future without disturbing other services. Pipes and ducts shall be adequately sized, kept as short as practicable, leak-proof with a minimum number of joints and have provision for routine maintenance.
- c) All facilities shall be designed to prevent the ingress or egress of rodents, vermin and insects.
- d) The HVAC contractor shall supply the client with system design drawings, prior to manufacture and installation.
- e) The HVAC contractor shall supply a comprehensive operation and maintenance manual on completion of the works.
- f) *For projects in England and Wales,* the HVAC contractor shall also demonstrate compliance with Building Regulations Approved Documents L2A & L2B. This will include:
- g) Provision of details of the efficiency and controls of heating, cooling and ventilation systems in accordance with the Non- Domestic Heating, Cooling and Ventilation Compliance Guide (2006).
- h) Provision of commissioning certificates including air leakage tests on the ductwork.
- i) Supply and exhaust ventilation systems shall be installed in accordance with the standards and regulations listed and the requirements of the oven manufacturers.
- j) All systems shall be low velocity in accordance with DW 144.
- k) Fire/smoke dampers shall be installed in all fire compartment walls to Building Control requirements.
- l) The system shall normally terminate with a narrowed vertical discharge, to increase efflux velocity, unless specifically required otherwise by the Local Authority.
- m) The HVAC contractor shall ensure that externally the ductwork conforms to the supplied drawings in terms of its route, height and termination. These drawings will have formed part of our Planning Approval and must not be deviated from without express permission from the DPG Project Manager.

1.2 VENTILATION – EXTRACT SYSTEM

- a) An appropriately sized extract canopy located over the ovens shall be installed which shall be connected to a range of ductwork and be complete with an axial flow extract fan discharging to a convenient location at high level outside the building.
- b) The noise level outside the building shall not exceed NR40 at a distance of 3m from the discharge point.
- c) If required, any sound attenuators used shall be suitable for use in a hot, catering extract environment.
- d) The air resistance shall be calculated by the Contractor to suit each installation and the fan selected accordingly. The selected fan shall have a duty nominally 20% greater than the calculated resistance of the system but shall have a minimum duty of at least 1m³/sec, or as otherwise specified by the oven manufacturer. (This is to allow for reduced efficiency as the system ages and any 'as installed' variation in the ductwork resistance.)
- e) The fan shall always be mounted on anti-vibration mountings, and be attached to the fixed ductwork with flexible connections.
- f) **Under no circumstances may flexible ductwork be used on the extract system, other than the fan connections.**
- g) The fans shall be mounted in such a manner as to be easily accessible for maintenance purposes and easily removable in the event of fan failure.
- h) The system should be designed to allow the use of double stacked PS555/ XLT3255 ovens. To allow for initial installation of PS540 ovens, speed controllers should be supplied and installed adjacent to both fans, **for engineers use only**, to enable the system to be tuned as required for either oven model.
- i) The standard canopy dimensions shall be 2.5m long x 2.0m wide x 0.55m high and be constructed in Stainless Steel, such that all visible joints are welded, and ground and polished.
- j) The hood shall incorporate a gutter around all edges with a plugged drain connection at the lowest point and be complete with at least 4No. removable **mesh type** grease filters. Baffle filters are very efficient at grease removal but offer a far higher air resistance than the mesh type. Domino's bake-off operation produces very little grease and the extract system is predominantly removing heat and gas combustion fumes. Mesh filters are much more efficient at removing any fine flour particles which may be caught in the airflow.
- k) The filters shall be of a size which will allow them to be cleaned in the sinks available in the kitchen
- l) The filters shall be arranged within housings as part of a plenum system which provides balanced extract over the length of the oven.
- m) **It is important with the big PS 555, XLT3255 and PS 570 ovens, that the extract does not draw noticeably from only one end, or one side. The traditional filter bank running along the back edge only, has caused problems in this respect, so the preferred option, therefore, is a filter bank running front to back at both ends of the canopy (not a central double faced filter bank) and joined via suitable ductwork or plenum.**
- n) NOTE: The parameters listed above are applicable to the Middleby Marshall PS 555 oven. This extract system should normally be installed irrespective of which oven is actually being installed, to allow for future upgrading. However, there will be some instances where the physical constraints of the building will restrict the size of oven, canopy or ductwork, in which case the canopy size may be reduced to 2300mm x 1650 x 550, with 3No. filters **for the PS 200/540 oven only**.
- o) The main site electrician will be required to supply simple on/off switches and wire to isolators adjacent to each fan.
- p) *The electrical supply to each oven socket shall be independent so that in the event that one circuit breaker trips, power is not lost to both ovens at the same time. Note also that although the PS 200/540/360 and XLT3255 ovens will run from a standard 13a S/S/O, the PS 555 and PS360 series will require 20A rated sockets (Reyrolle type)*

- q) The hood shall be completely covered with a decorative finish externally. Care should be taken to ensure that the hood is properly suspended from the structure of the building and not the decorative boxing frame. The hood shall be installed to leave a clear 2.1m from finished floor.
- r) Wherever possible the internal ductwork shall be arranged to run above the suspended ceiling. Where this is not possible, either the exposed section shall be constructed in stainless steel or painted with a heat resistant, washable, white paint system incorporating a suitable primer, undercoat and finish coat.
- s) The duct will be taken to discharge vertically at high level wherever possible, either internally or externally. The duct must be provided with a drain point at the bottom of the final riser to allow the escape of any rainwater which may collect whilst the system is not in operation. If the drain point is within the building then it must plumbed to a suitable discharge point.

1.3 VENTILATION – FRESH AIR SUPPLY

- a) The supply air installation shall take the form of a suitable inlet louvre with bird/rodent guard and which shall be sized on a minimum free area of 50% and maximum velocity of 2.5m per second. The system shall be complete with a fresh-air filter to EU4 standard, an axial flow fan, and a range of ductwork terminating in ceiling mounted diffusers, with integral dampers accessible through the diffuser face, and finished in white. The fresh-air systems shall be designed to replace approximately 80% of the extract air volume.
- b) As part of the initial installation, the HVAC contractor shall include 12 months supply of replacement fresh air filters.
- c) The design of the system must take into account the requirement for store staff to be able to change the fresh air filters on a regular basis, without need for specialist equipment or contractors. Therefore the fresh air filter **must** be located in an accessible position, and orientated so that the store staff are able to change the filters easily – this includes positioning it so that the access panel is not obstructed by walls, ceilings, pipework, etc and that there is sufficient space in front of it to take the replacement panel. Liaison with the main contractor to achieve this aim, will be required.
- d) Both exhaust ductwork outlet and fresh-air inlet points shall be located to minimise short circuiting and so that exhaust air cannot be drawn back into the building through openable windows etc.
- e) At the conclusion of the installation, the HVAC contractor shall fully commission the entire system including both duct systems and the gas safety interlock, and shall check by on-site measurement that the airflows are within the appropriate designed parameters.
- f) The ventilation of internal toilets shall be controlled by the light switch, being interlinked with the extract fan timer. Internal offices shall have a further fresh air supply, either with independent control or as part of the supply air system.

1.4 SPECIFIC VENTILATION REQUIREMENTS FOR DOUBLE STACKED BOFI XLT-3255-TS GAS FIRED OVENS



BOFI
XLT 3255-TS Double Stack Oven

- a) The BOFI ovens use less gas than the Middleby Marshall ovens and therefore have a lower requirement for extract air volume.
- b) The manufacturers required extract figure is: 1800cfm for the double oven, of which we will replace 80% via the fresh air supply fan.

- c) The canopy size will remain at 2500mm x 2000mm x 550mm in all cases.
- d) The gas safety interlock system will be required under UK legislation, as at present. **Please note** that because the gas requirement is lower, in theory the pipe size for a double oven can be reduced to 32mm, however to allow for future upgrades, it has been decided to remain with the 42mm standard pipe from meter to ovens, and the solenoid valve can also be downsized to suit.
- e) All other general ventilation considerations noted above for the Middleby Marshall ovens will apply equally to the BOFI oven.

1.5 FRESH AIR HEATING:

- a) It is now standard to fit a low pressure hot water (LPHW) heater battery in the fresh air intake duct, to temper the intake air in cold weather conditions. (Note that this is not intended to provide a guaranteed ambient, nor minimum, temperature within the store.)
- b) The hot water will be provided by the central heating circuit of a gas fired condensing combi-boiler, installed as part of the shopfitting contract. This boiler will provide approximately 18Kw of heat, and the HVAC contractor should supply and install a heater battery to at least this rating.
- c) The final water plumbing connections will be made by the site plumber but the HVAC contractor should supply a suitable 3-way valve, and thermostat, to control the system according to the air temperature in the duct. It is NOT acceptable to rely solely on the boiler thermostat to switch the heating circuit. The HVAC contractor must liaise with the plumber to ensure that the system is left working and provide any instructions that may be necessary to achieve this.
- d) **NOTE:** In rare circumstances it may not be possible to provide the LPHW system, in which case an equivalent electrically powered heater battery will be required instead. The final connections will be made by the site electrician, but the liaison noted above with the plumber, will in this case be liaison with the electrician.

1.6 GAS SAFETY INTERLOCK

- a) Under the CORGI / HSE regulations for the UK, it is now a requirement that the gas supply to the ovens is interlocked in a failsafe manner with the ventilation system.
- b) Specifically: There must be detection of both the extract airflow and the fresh air duct airflow, such that if either of these do not register positive airflow, a gas solenoid valve immediately cuts off the gas supply to the oven. Additionally, the system should then cut off the power supply to both fans. The control box for this system must incorporate status indicator lights and should include fan circuit overload protection.
- c) The control box will require an adjacent 13A fused spur, to be provided by the main contractor. The control box will also have cables feeding to it from the ceiling void above. These cables must be chased into the wall or otherwise neatly covered and protected.
A separate chased conduit to a flush mount back box at 1200 affl should also be provided by the main contractor, to allow **the panel installer to install an on-off switch**.

See also **Section 1.9 above**, for more detail on the control box requirement.

- d) The control panel supplier will also supply a suitable gas solenoid valve for installation in the oven supply pipe by the main contractors plumber. **It is the main contractors responsibility to ensure that the gas pipe is purged through the valve before hand-over of the system.** If this is not done and the oven installers are unable to complete their commissioning, any subsequent call backs will be charged to the main contractor.
- e) The HVAC contractor is responsible for commissioning the system and ensuring that everything is working correctly PRIOR to the oven commissioning.
- f) **NOTE:** We have occasionally experienced problems in windy areas with gusts of wind entering the fresh air duct and unbalancing the detectors. This can cause a passing 'pseudo fault' situation, causing the gas supply to be cut, and then restored almost immediately before being noticed. Unfortunately, this will also trip the oven flame-failure device and take the ovens off line for at least 30mins. For information - This situation has been alleviated by fitting a baffle in front of the intake grilles to prevent direct wind pressure up the duct.

1.7 MECHANICAL VENTILATION TO TOILETS:

- a) The mechanical extract ventilation of internal toilets shall be controlled by the light switch, being interlinked with the extract fan timer to give minimum 15l/s air change with 20 minute overrun.
- b) All fittings to have anti-vibration mountings where appropriate.

1.8 MECHANICAL VENTILATION TO INTERNAL ROOMS:

- a) All internal rooms to be provided with forced ventilation, either via external fan and ductwork, or by independent local wall mounted fans. To comply with the new ADF (2006). i.e. 10 l/s/person
- b) All fittings to have anti-vibration mountings where appropriate.

1.9 AIR FILTRATION (as DW171)

GENERAL:

- a) Filtration will be provided within the extract canopy by a washable mesh filter, which is usually positioned at the point of extract within a filter housing manufactured from the same material as the structure of the canopy. Disposable panel type filters should not be used for grease extraction.

GREASE FILTERS:

- b) The most economical filter is the mesh type which comprises a number of layers of a galvanised or stainless mesh material within a stainless or aluminium housing. The filter relies on the dirty air particles depositing onto the non-corrodable mesh. This type of filter is suitable for use in Domino's where the cooking is only of the dry bake-off type with no free oil or grease involved. Mesh filters that are thinner than 50mm are unlikely to be effective.
- c) The performance of the filter varies with use and temperature and may need to be cleaned twice weekly to avoid a build up of debris which increases the resistance to air flow. When clean, these filters have the least resistance to air flow - typically 40 pascals.
- d) There is no barrier to flame within the filter, and it is accepted that mesh filters can not therefore be used on their own in applications where there is appreciable risk of fire. However this does not apply in the Domino's operation which only uses hot air for baking, with no oil or grease being used.

CARBON FILTERS:

Additional information regarding installations where the Local Authority has requested the use of carbon filter.

Generally the installation of carbon filters is as follows:

- e) The fan selection is changed from a cased axial fan to an in-line mixed flow fan, to overcome the increased resistance given by the carbon filters.
- f) The area of carbon filter panels/ carbon weight required is calculated (in conjunction with the carbon supplier if necessary) based on duct size, air velocity, etc. In general terms, for each cu.m of air moved, 50kg of carbon will be required to give a dwell time of 0.1 sec, which is the minimum necessary contact time with the vitiated air. The carbon filter granules are bonded together and formed into panels which are contained in metal frames.
A purpose made housing is designed to contain the required number of panels, installed in a vee section, through which the air must pass.
- g) The recommended carbon grade used is Sutcliffe Carbon 207c, or similar and approved
- h) The life of the filter is dependant upon many factors, including use, grease and water content of the dirty air, etc. Pre-filtration is essential to remove these gross contaminants and prolong the life of the carbon panel and it is recommended that these are changed bi-monthly.

1.10 AIR CONDITIONING

- a) 'Comfort cooling' will normally be provided in the form of a split system ceiling mounted cassette unit to provide both a cooling **and heating facility**. The equipment shall be supplied by a recognized reputable manufacturer and the HVAC contractor shall be responsible for selecting suitable and appropriate equipment for the purpose.
- b) The unit shall be sized with regards to the size of the store and the operating conditions to be found therein.
- c) The system shall generally comprise an indoor cassette unit, outdoor wall/floor mounted condensing unit and all inter-connecting refrigerant pipework, insulation and associated power and control wiring from an isolator left by the electrical subcontractor.
- d) The indoor unit shall be controlled by a wall mounted hard wired matching controller.
- e) The outdoor condensing unit will be wall or floor mounted, as shown on the project drawings, at a position to give access for maintenance.
- f) The main electrical contractor shall run a 30amp single phase supply to the position of the outdoor unit, terminating in a suitable outdoor weathered, lockable isolator.
- g) Condensate from the indoor unit shall be run to a suitable drain position, in concealed pipework.
- h) Refrigeration pipework and wiring shall be neatly clipped to the structure and fixed to cable tray as appropriate. Insulation shall be a cellular foam product using CFC – free blowing agents, such as by Armaflex.
- i) Refrigeration medium shall be R407C or other approved and suitable gas.

1.11 Testing and Completion

- a) Upon completion of the installations, **all** must be fully tested and proved, including airflows.
- b) The Contractor must produce an Operating and Maintenance Manual containing:
 - i) details of all equipment supplied,
 - ii) a record drawing of the complete mechanical services installation
 - iii) copies of all Test Certificates.
 - iv) Maintenance Schedules based on the manufacturer's recommendations.
- c) *For projects in England and Wales*, the HVAC contractor shall also demonstrate compliance with Building Regulations Approved Documents L2A & L2B. This will include:
- d) Provision of details of the efficiency and controls of heating, cooling and ventilation systems in accordance with the Non- Domestic Heating, Cooling and Ventilation compliance Guide (2006).
- e) Provision of commissioning certificates including air leakage test on the ductwork.
- f) The contractor shall provide a typical 12months spare filters for mechanical supply air installations.

1.12 TYPICAL AIR CONDITIONING AND COLD ROOM COMPRESSOR DETAILS

AIR CONDITIONING		COLD ROOM	
Model (typical unit)	Fujitsu AUYA30LB	Model (typical unit)	Silensys H49Z-1ph
Dimensions	W 900mm D 330mm H 830mm	Dimensions	W 1018mm D 392mm H 615mm
Weight	62 kg	Weight	81 kg
Airflow	3600 cu.m/h	Compressor	Model CAJ4519Z 1.5HP motor 15.4 MRA 31 LRA
Current	Start 15.0 A Running 12.2 A	Refrigerant Connections	Suction 15.9mm Liquid 9.5mm
Capacity	Cool 8.5 kW Heat 10.0kW	Condenser Fan Motor	220-1 Volts/Phase 0.6 Amps each 2800 m3/hr Air Flow
Noise	54 dBA @ 1m	Watts	4-6kW
Refrigerant	R410A	Electrical Details	16 MRA 32 LRA 2215 P.abs
		Noise	35 dBA @ 10m

1.13 M & E REQUIREMENTS FOR ALL COMMON OVENS USED BY DOMINO'S STORES

OVEN (Gas models)	DIMENSIONS w x d x height (mm)	BELT WIDTH	GAS REQ. btu/hr	ELECT. REQ.	EXTRACT REQ.	APPROX OUTPUT 14" pie/hr (Mfrs figs)
MM PS540 double	2032 x 1537 x 1543	32"	240,000	2 x 13a	1400 - 2400cfm	132
MM PS540 triple	2032 x 1537 x 1962	32"	360,000	2 x 13a		198
MM PS360 double	2286 x 1194 x 2083	32"	270,000	2 x 13a	1800 - 2800cfm	176
MM PS360 WB double	2286 x 1410 x 2083	40"	340,000	2 x 13a	1800 - 2800cfm	222
MM PS360 EWB double	2286 x 1610 x 2083	44"	340,000	2 x 13a		244
MM PS555 double	2311 x 1610 x 1594	32"	300,000	2 x 20a	2400 - 3000cfm	176
MM PS555 triple	2311 x 1610 x 1835	32"	450,000	3 x 20a		264
BOFI XLT 3255 double	2369 X 1529 X 1065	32"	238,000	2 x 13a	1800cfm	176
BOFI XLT 3255 triple	2369 X 1529 X	32"	357,000	3 x 13a	3000cfm	264