

Belfast ICC ventilation details

1. Ventilation at the Belfast International Convention Centre

1.1 Ventilation

Fresh air will be supplied to all areas at a minimum rate of 10 l/s/person based on occupancy.

Toilets will be provided with extract ventilation at a minimum rate of 10 air changes per hour.

The ventilation systems are primary heating and cooling methods for the building, the system consists of several Air Handling Units (AHU) located in each of the three plant areas.

At each AHU ambient air is drawn from the outside by the AHU, and heated or cooled to a supply air temperature determined by the BMS as required to service the occupied spaces. These include the Foyer, meeting rooms, offices, kitchens, and main hall areas.

The supply air is delivered into the larger spaces by displacement ventilation terminals located at high level with stale air extracted also at high level through extract terminals.

There is a standalone dirty extract system this system is for the central core toilets.

In addition to the AHU's Fan coil Units provide ventilation to some of the individual rooms. These units consist of supply and extract fans and a heater and cooling battery and bypass dampers

A co2 sensor has been installed in each space and within the return ductwork.

During the occupancy time schedule, the VAV dampers will open to the minimum fresh air setting. Should the co2 concentration in the space rise above 1000ppm, then the VAV damper will be modulated to provide additional fresh air. Once enabled the BMS will provide a modulating control signal to the VAV controller until the co2 concentration falls to below 800ppm, when the VAV damper will be driven to its minimum fresh air position. This condition will override any of the space temperature settings for the VAV control.

Each multi-purpose room has been provided with its own time schedule linked to the conference booking system. During its occupancy time, the VAV controller will operate at 10 l/s fresh air and control the space to the set temperature. The lighting PIR is linked to the BMS via the lighting interface, when activated the extract co2 will operate the VAV to provide space conditions of less than 800ppm.

Waterfront Hall Riverside AHU units are all equipped with heat recovery wheels which have been disabled from the Ventilation strategy.

1.1.1 Main auditorium ventilation / air conditioning

The Auditorium is air conditioned using the principle of displacement ventilation whereby slightly cooled air is introduced into the occupied zone at low level with the hot exhaust air being extracted at high level.

This principle relies on the fact that the warm thermal currents inducted by the occupants are encouraged to rise away from the occupied zone to be replaced by cooler, more comfortable air.

The Main Auditorium seating tiers are served by a double deck supply and exhaust air handling unit. This unit operates on 100% fresh air drawn from a fresh air inlet plenum. The air is heated or cooled as required.

By the air handling unit to a pre-determined temperature which is calculated and controlled by the building management system (BMS). The air is distributed via a combination of sheet metal and builders work ducts to the seating and tiers.

The extract air handling unit is connected to a sheet metal ductwork system which is in the dome level. Warm foul air is extracted from the auditorium at high level and discharged to atmosphere.

A combination of attenuators and acoustic treatment to the ductwork ensures that the strict noise criteria for this area is achieved.

1.1.2 Stage area

This system provides conditioned air for the stage, choir and lower tiers. This system also forms an integral part of the smoke control system. This system uses displacement ventilation as described for the Main Auditorium system. The Auditorium stage, choir and lower tiers are served by a double deck supply and exhaust air handling unit located in the level 3 upper plantroom. This unit operates on 100% fresh air drawn from a fresh air inlet plenum. Air is heated or cooled as required by the air handling unit to a pre-determined temperature which is calculated and controlled by the building management system. The air is distributed via a combination of sheet metal ductwork and builders work shafts/plenums to serve the various TRE-B , TRE-C , and LVA terminals.

Due to the high versatility of the stage area a system of moveable seating wagons has been provided. Each of the seating wagons can be moved to a number of positions as required. A ductwork system together with motorized dampers has been installed underneath the stage area that provides an installation which can cater for various scenarios of seating wagon positions.

The extract air handling is connected to a sheet metal ductwork system which extracts warm foul air from the Auditorium and discharges it to the atmosphere.

1.1.3 Foyer air conditioning

The system provides air conditioning to all levels of the main Foyer area.

The main Foyer area is served by a supply air handling unit located in the level 3 plant room. The main Foyer is air conditioned using displacement ventilation as described for the Main Auditorium.

The main Foyer area is served by a supply air handling unit located in level 3 upper plantroom and an extract air handling unit located in the upper plantroom of the minor hall. The supply unit operates on 100% fresh air drawn from an inlet Plenum and heated or cooled as required to a pre-determined temperature which is calculated and controlled by the building management system.

The conditioned air is distributed by a combination of sheet metal ductwork and builders work shafts/ plenums to the terminal LVA units on each floor.

A combination of attenuators and acoustic treatment to the ductwork ensures that the strict noise criteria for this area is achieved.

				Supply total flow rate	Extract total flow rates
AHU 11 Cityside	Used for Mezz rooms, Board Rooms ,	Fan speed set 80%			
Café/Bars AHU Cityside	Used for Bar 1 Bar 2 Arc Bar	Fan speed set 100%	co2 set point 400 ppm	14.303m3/ s	15.68m3/s
Foyer AHU Cityside	Used for Foyer Concourse , Gallery 1, Gallery 2	Fan speed set 100%	co2 set point 400 ppm	17.328m3/ s	18.26m3/s
Internal Left AHU Ventilation Plant cityside	Back of house /Mez corridors level 0,1,2,	Fan speed 100%	co2 set point 400 ppm	3.91m3/s	3.91m3/s
Internal Right AHU ventilation Plant cityside	Back of house Concourse toiles / Toilets	Fan speed 100%	No co2	1.48m3/s	1.455m3/s
Arc Kitchen AHU Ventilation Plant cityside	Arc Kitchen	Fan speed 67%	No co2	3.45m3/s	3.48m3/s
Arc Kitchen AHU Dishwasher supply cityside	Arc Kitchen dish wash area	Fan speed 100%	No co2		
Main Auditorium AHU Ventilation Plant cityside	Main Auditorium High Level	Fan speed 100%	Co2 set point 800 ppm	14.502m3/ s	14.502m3/ s
Main Auditorium Stage AHU Ventilation Plant cityside	Main Auditorium Low Level	Fan speed 60%	Co2 set point 800ppm	11.06m3/s	
Studio AHU Ventilation Plant Cityside	Studio	Fan speed 100%	Co2 set point 400ppm	5.476m3/s	3.74m3/s
RIVERSIDE					

AHU -01 & 2	Riverside halls 1c and 1D	Feeding VAV 403/404 and 403A and 404A	co2 space sensors in rooms	Min 10 l/s co2 800 ppm	
AHU -03	Riverside Hall 1B	VAV 4001-4004	co2 space sensors in rooms	Min 10 l/s co2 800 ppm	
AHU -04	Riverside Hall 1 A	VAV 2001-2004	co2 space sensors in rooms	Min 10 l/s co2 800 ppm	
AHU -05	Riverside Halls 2A/2B	VAV 401-402	co2 space sensors in rooms	Min 10 l/s co2 800 ppm	
AHU -06	Riverside reception	Reception	co2 space sensors in rooms	Min 10 l/s co2 800 ppm	
AHU -07	Riverside Level 1 Concourse	VAV001-002	co2 space sensors in rooms	Min 10 l/s co2 800 ppm	
AHU -08	Concourse Level 3 and Meeting rooms	VAV 501-510	co2 space sensors in rooms	Min 10 l/s co2 800 ppm	