Nex—

—The British Museum

King Edward Building
Ventilation Upgrade
Design & Access Statement
R01

22 October 2021

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Revision	Date	Comments
0	18.10.2021	Draft Issue for Comment
1	22.10.2021	Issue for Listed Building Consent

Contents

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Introduction
This Design and Access Statement has been prepared by Nex on behalf of The British Museum to illustrate proposals for the installation of temporary mechanical ducts and equipment to the south elevation of the King Edward Building.

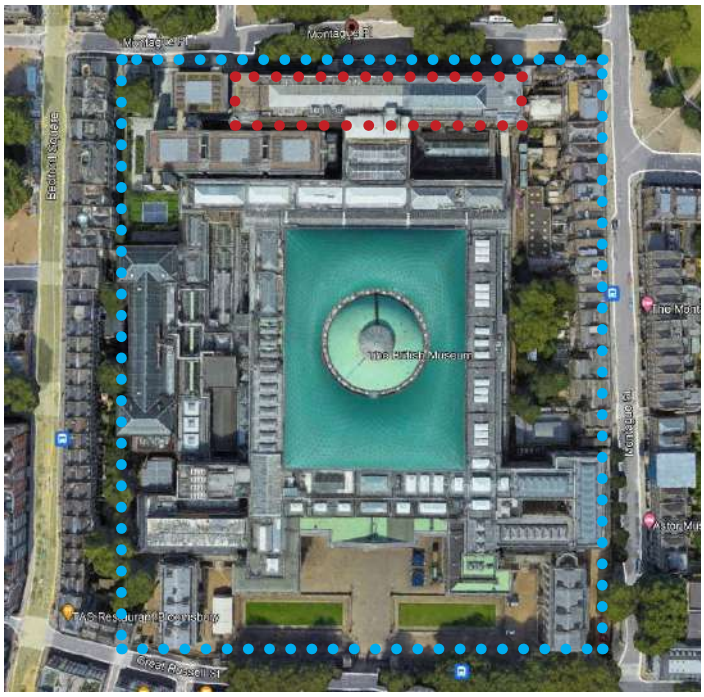
Project Location & Context
The King Edward Building is located on Montague Place on the north side of the museum's Great Court. It is a Grade I listed building designed by Sir John Burnet & Partners, completed in 1915.

The building contains Gallery 33, along with the Galleries 33a, 67, 95, Prints and Drawings galleries, and Anthropology Library. These spaces are supplied with fresh air through the sub-basement level of the King Edward Building (KEB), commonly referred to as the KEB tunnels. This is in line with the original design of the building.

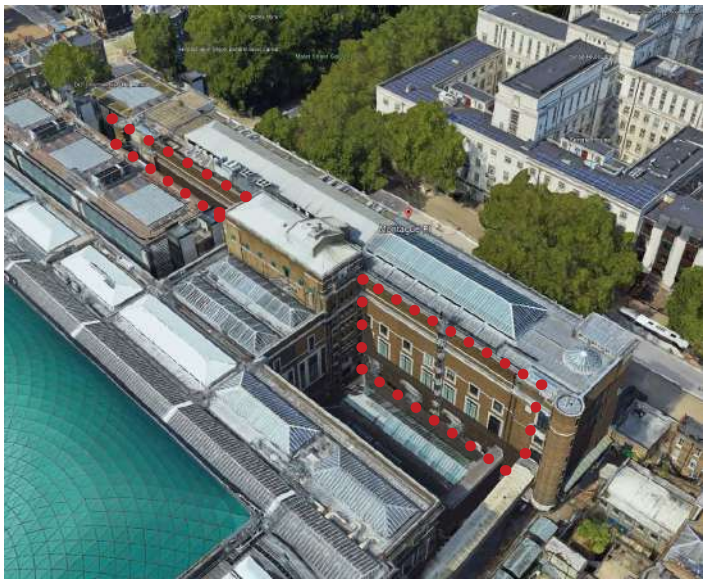
The building runs in an east-west direction with it's main elevation fronting onto Montague Place. The proposed interventions are located on the south east and south west elevations. These elevations look onto back-of-house services areas, which are not accessible to members of the public, nor visible from the street.

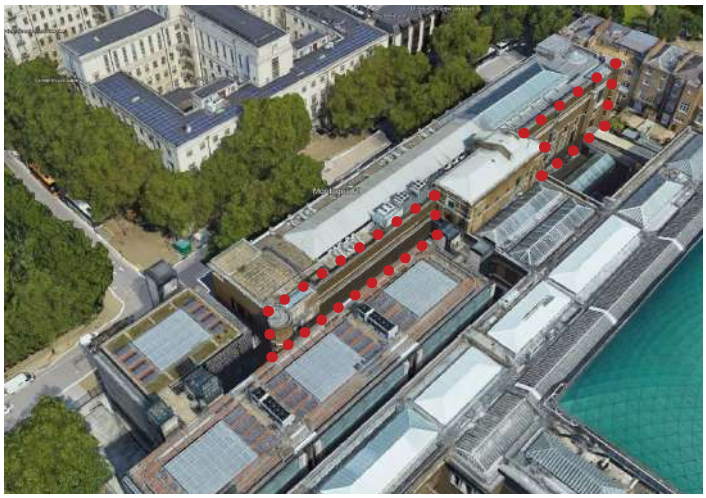
The southern elevations are constructed from glazed brick, London stock brick, and stone sets dressed around window and door openings. A detailed description of the building fabric and its historic significance is contained in the Heritage Impact Statement.

The south-east elevation has been altered over time and hosts multiple services and ventilation ducts. The south-west elevation is largely intact in its original condition and free from services additions.



Aerial view of museum outlining KE building


Aerial view of south east elevation of the KEB


Aerial view of south west elevation of KEB

The Project Need

During a building inspection in December 2019, water ingress was identified within the KEB tunnels, resulting in mould and bacterial growth, and it appears that the area has been subject to historic water issues. The water ingress has also resulted in damage to electrical control systems responsible for ventilation in the tunnels and air supply to Gallery 33 and the other KEB spaces noted above.

To mitigate the risk to health, the galleries were closed to the public following the survey. Employee access to the tunnels was also restricted until they were sanitised by a specialist contractor in early 2020 to facilitate safe entry into the space for remedial works and further surveys.

Investigations into the cause of water ingress into the tunnels has revealed that the problem is likely to have occurred through a combination of factors, and that diagnostic and long-term remedial measures will take significant time to implement.

This proposal seeks permission for urgent temporary measures to enable galleries 33 and 33a to safely reopen to the public by introducing an interim fresh air supply to the building.

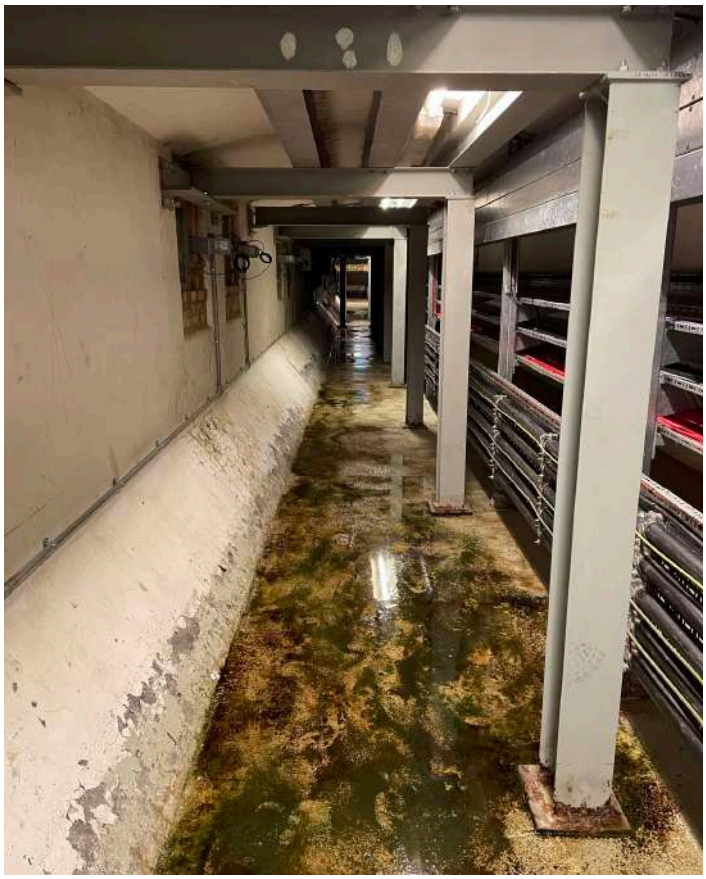
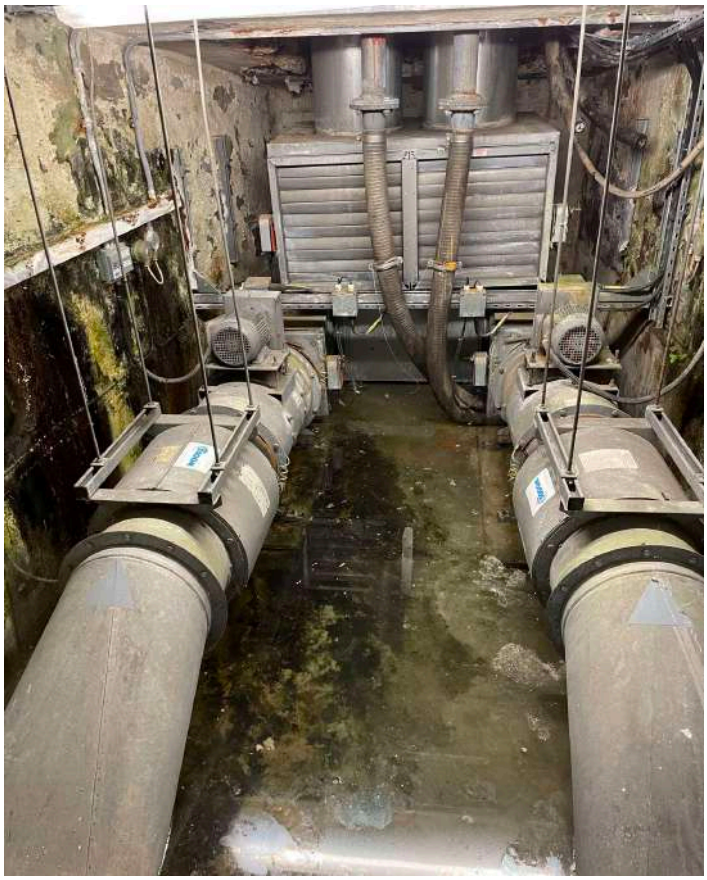


Photo of flooded KEB tunnel with mould growth on floor and walls

Photo of mould growth on floor and walls



Flooded KEB tunnel with damaged air handling unit

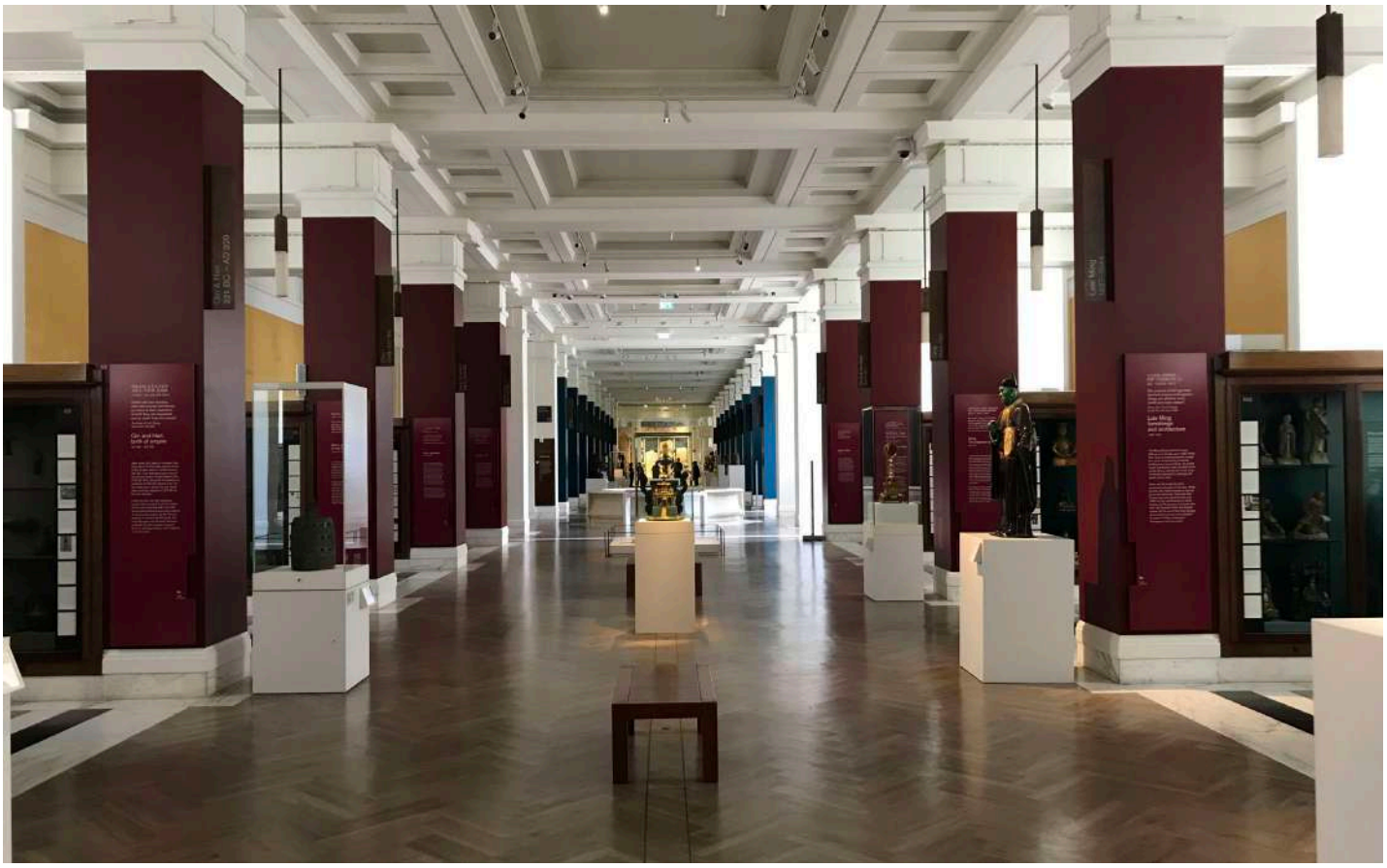


Photo of Hotung Gallery (Gallery 33)

Museum Brief

The Museum's brief is to reopen the galleries to the widest possible public audience as soon as possible, and to allow the galleries to continue to operate independently, while remedial works to repair the KEB tunnels are undertaken.

A short-term temporary solution based on a natural ventilation strategy has already been developed and implemented to enable the gallery to re-open in a limited capacity.

However, this solution is based on the natural background infiltration of air into the gallery from the entrance and leakage through the building envelope. The low levels of air exchange place significant restrictions on occupancy levels, and detectors are being installed in the room to monitor CO^2 levels.

As there is uncertainty about the extent of works required to address the water ingress issues in the basement tunnels, the museum require an interim solution to enhance the ventilation levels in the space, and enable the room occupancy limits to return to 150 people at a time.

Access

The project will have a significant public benefit by restoring increased public access to the Sir Joseph Hotung Gallery. This gallery contains a nationally important collection of artefacts from China and South Asia.

Development of Proposals

The proposed works will not impact the surrounding properties or streetscape along Montague Place. They have been located in back-of-house services areas, which are not accessible to members of the public nor visible from the street. Proposed installations have been designed to minimise the visual impact of new the ducting and extract unit on the external elevations. Proposals also include reversible alterations to window frames in Gallery 33 to accommodate supply ventilation grilles.

The new duct work will remain in place for a period of no more than 5 years while investigations are completed and remedial works commissioned to reinstate a naturally ventilated air supply via the KEB tunnels.

South East Elevation Proposals

The proposals will retain the existing air handling unit which serves the KEB, and alter the existing duct work outside the building on the south east elevation so that supply air can be ducted directly into the gallery via new air supply grilles integrated within the windows to the south east of Gallery 33.

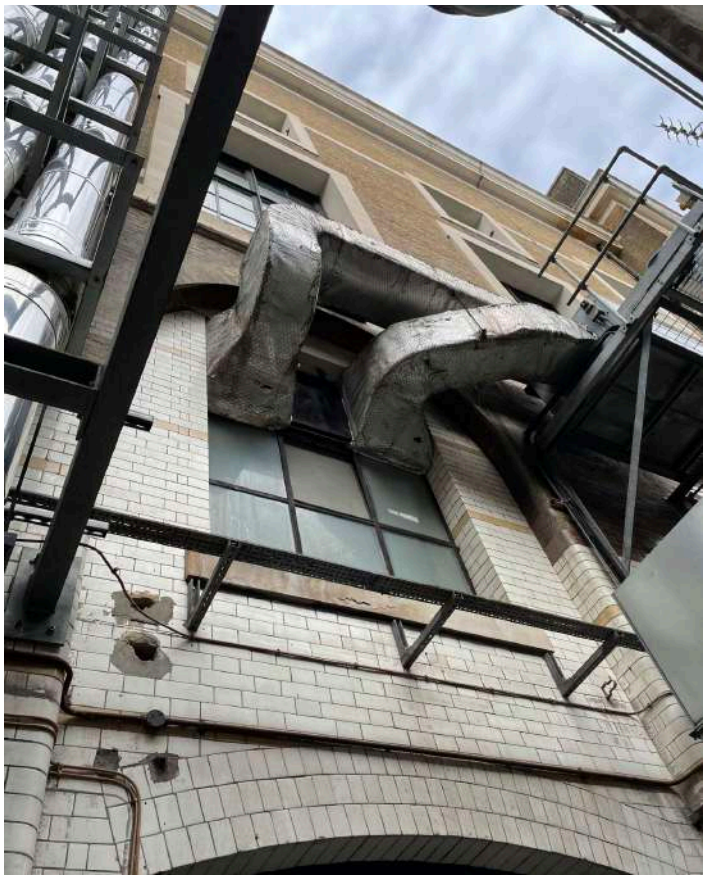


Photo of existing mechanical ducting on south east elevation

Photo of existing mechanical ducting on south east elevation

Photo of existing mechanical ducting on south east elevation

South East Elevation Proposals (cont.)
The existing elevation on the south east elevation contains extensive service ducting. The proposed additional ducting has been sized to accommodate the ventilation requirements for the gallery while also being low profile to sit closely to the wall.

Ducting will be supported on standard unistrut brackets that are fixed to the brickwork, taking care to avoid fixing to stone dressings and sills.

Fixing spacings are likely to be spaced at wide intervals and be of a lightweight M6 or M8 sleeve anchor screw type, which will create low stress on the brick. Final fixing details will be designed by a specialist installer and reviewed by the architect and heritage consultant prior to installation.

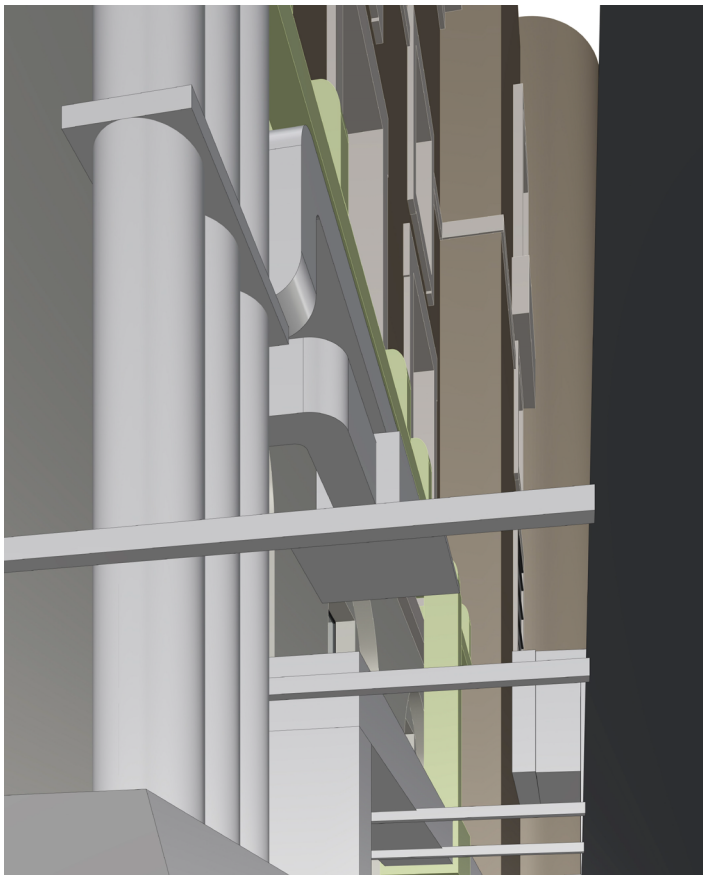


Image of proposed additional ducting in green. Existing ducting is shown in grey.

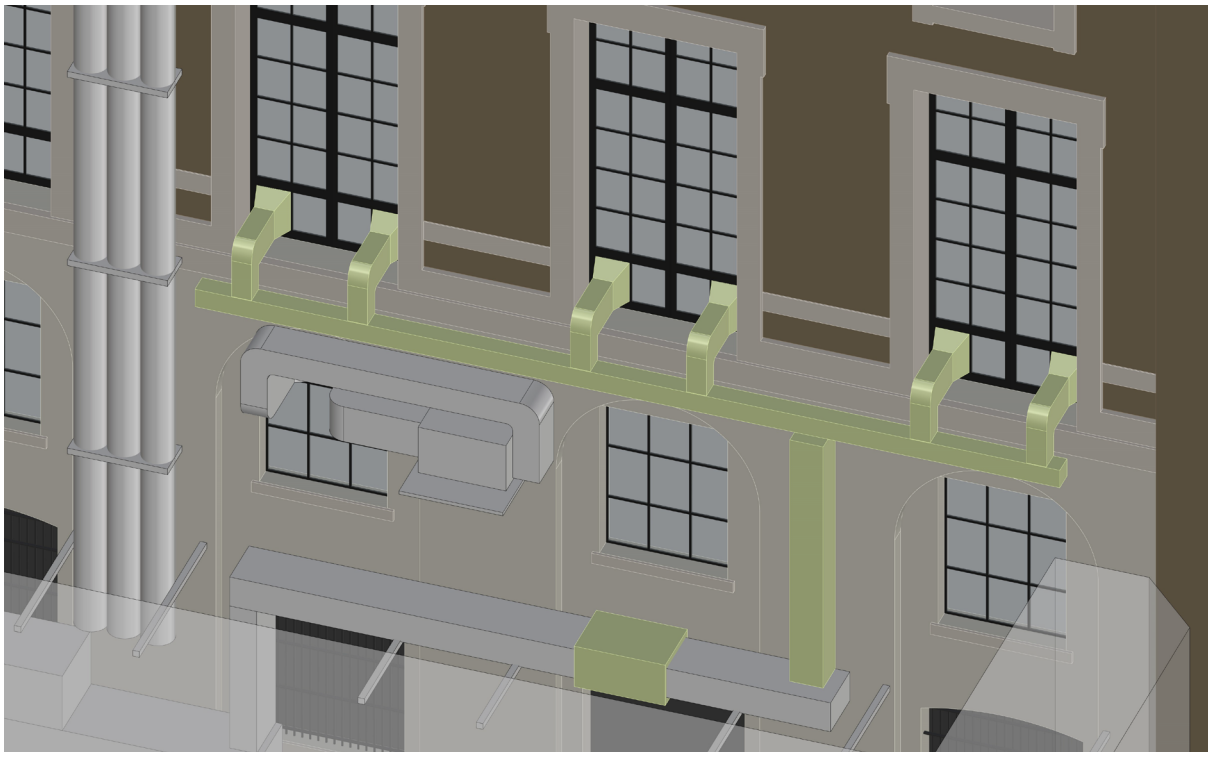


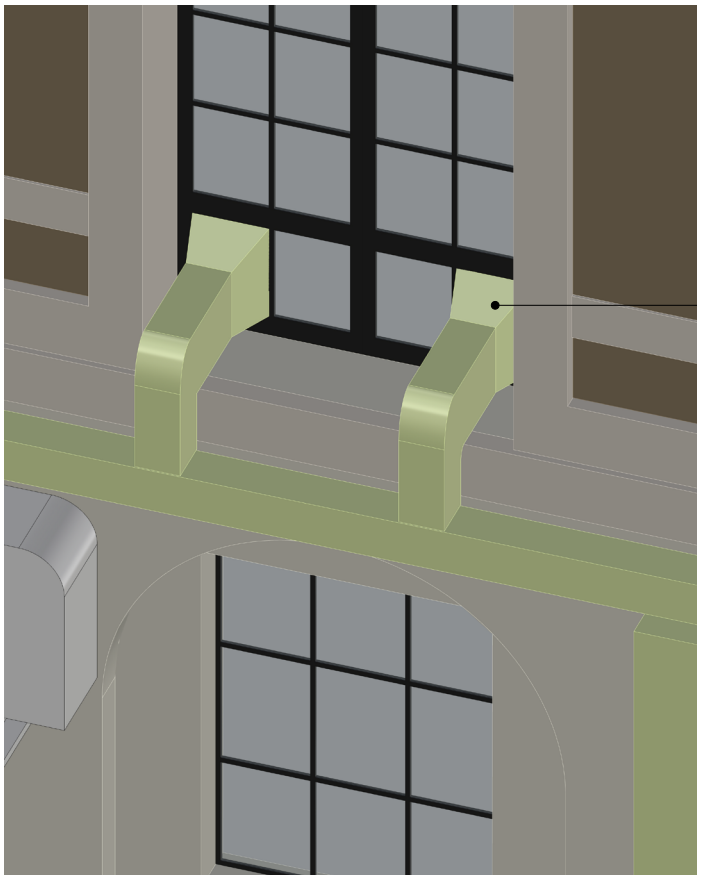
Image of proposed additional ducting in green. Existing ducting is shown in grey.

South East Elevation Proposals (cont.)
On each window, two panes of glass located in the bottom corners will be temporarily removed and carefully stored for later reinstatement.

Self-supporting ducting will be fitted to the open frames and sealed to the window by a non-intrusive clamp to the grille mounted on the inside of the window. The internal grille will be powder coated to match the colour of the surrounding window frame.

Once the KEB tunnels have been refurbished, the grilles and ducting will be removed and the glass reinstated in the window frames.

Proposed grille to be fitted to windows with edge screws to avoid window frame.



Proposed additional ducting interface with window

Photo of window from inside

South West Elevation Proposals
A stand-alone extract system is also proposed on the south west elevation to help improve the distribution of supply air throughout the gallery space.

The system would comprise a new externally mounted extract fan and associated ductwork connected to the existing high-level louvres above two windows in the south-west corner of the gallery. The existing louvres cover the top three panes in each window, which will be covered by a single duct plenum.

The ducting will terminate into a new extractor fan unit mounted on the ground on suitable dampers. A specification for the unit is provided by Steenson Varming and a noise impact assessment for this unit is provided by RSK Acoustics.

As with the proposals for the south east elevation, the ducting will be self-supporting and be carefully fixed to the wall using standard unistrut supports, taking care to avoid stonework.

The extract plenums will be fixed to the window frames in a similar manner to the ducts on the south east windows.

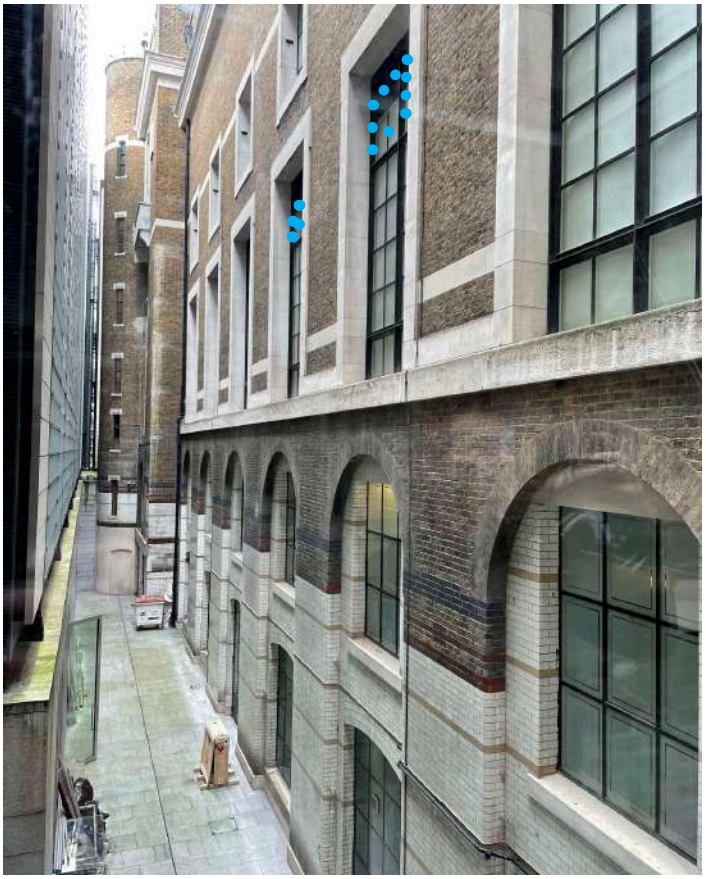


Photo of south west elevation showing existing grilles

Proposed new ducting and extract fan unit in the bottom corner

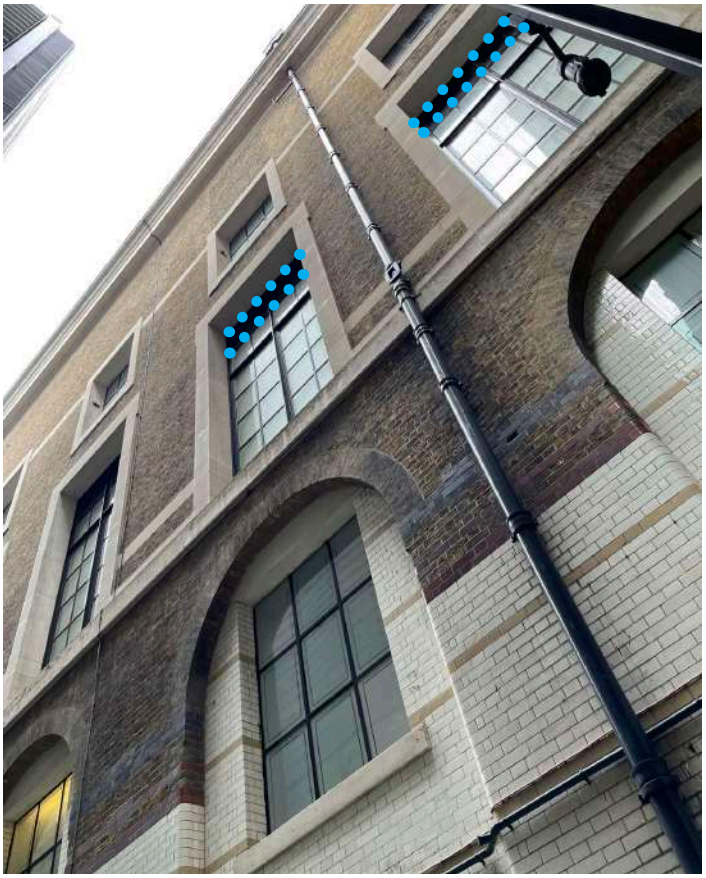


Photo showing location of existing grilles at the top of all windows

Acoustic In-Line Fans (ACQ)

- Acoustically treated housing, Class 'O' rated, sandwich construction selected for maximum noise absorption
- Motors protected to IP44
- Motor insulation Class 'B'
- Maximum operating temperature 50°C
- Standard Thermal Overload Protection
- Aluzinc construction for internal or external mounting as standard
- All models speed controllable
- Manufacture controlled to BS EN 1S0 9001
- Performance tested to ISO 5801

The ACQ fans feature an acoustic foam of dual density sandwich construction specially selected for maximum sound absorption and quiet operation. The housing is designed to be as compact as possible for concealed false ceiling applications.

Manufactured in Aluzinc sheet metal, with integral anchorage points to allow the fan to be suspended at any angle, via drop rods or anti vibration mounts, ensuring a quick and easy solution to installation of the in-line acoustic fans. The access panel is easily removed for inspection.

The full range of Acoustic fans manufactured from Aluzinc and as such are suitable for both internal and external mounting as standard.

Ten models are available in sizes 100, 125, 150, 160, 200, 250, 315, 400 and 500, providing air volumes from 0.075m^3/s to 1.609m^3/s (270m^3/h to 5,792 m^3/h) at free air. Designed for pressures up to 550 Pa.

Motors

At the heart of the range is a proven external rotor motor and backward curved impeller selected for low noise and high efficiency impeller assembly specially selected for its performance. The assembly is dynamically balanced to ISO 1940. Motors are rated to IP44 according to BS EN 60529. Ball bearings are greased for life and allow the fan to run at any angle. Insulation is Class 'B' (from -15°C to +50°C).

All Acoustic fans are suitable for speed control with either an Electronic or Auto Transformer. An Auto Transformer is recommended to ensure minimum noise levels during speed control so eliminating any possibility of motor harmonic noise.

Terminal Box

An IP54 Terminal Box is supplied with all models with 20mm cable gland entry.

Sound and Performance

Tested to ISO5801. Published dB(A) figures are free field sound pressure levels at 3m with spherical propagation at a reference level of 2 x 10^{-5}Pa (20 micro-Pascal). The inlet, outlet and breakout sound power level spectra figures are dB with a reference of 10^{-12} Watts (1 pico-watt).

Electrical

The ACQ range is supplied with motors wound to suit a 230V/1ph/50Hz supply capacitor start and run.

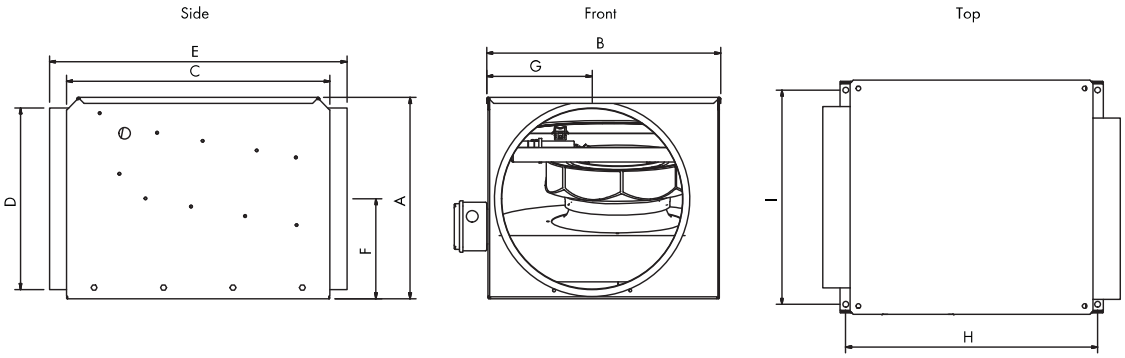
Quality Assurance

Design and manufacture is in accordance with BS EN ISO 9001.

Vent-Axia

Appendix A: Extract Fan Details

Fan Dimensions (mm)

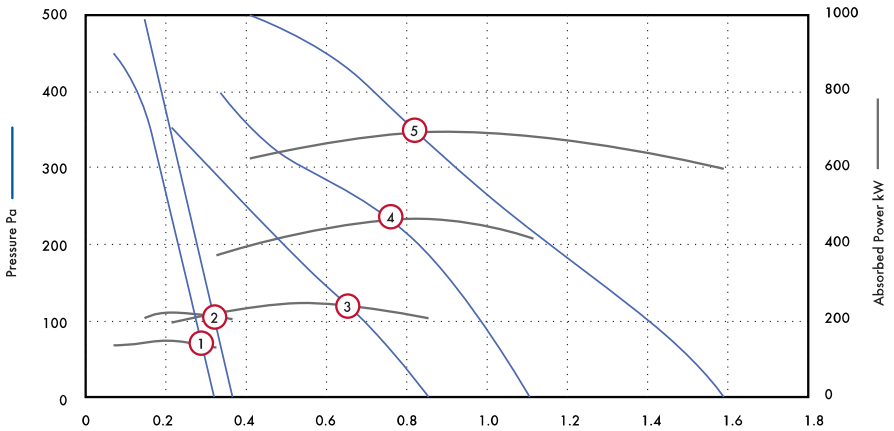


Stock Ref.	A	B	C	D	E	F	G	H	I	kg
ACQ10012D	190	310	400	100	460	94	111	380	275	11
ACQ12512D	190	310	400	125	460	94	111	380	275	11
ACQ15012D	190	310	400	150	460	94	111	380	275	11
ACQ16012D	190	310	400	160	460	94	111	380	275	11
ACQ20012D	285	364	455	200	515	141	127	435	330	17
ACQ25012D	285	364	455	250	515	141	127	435	330	17
ACQ31512LD	348	404	455	315	515	173	182	435	370	21
ACQ31514HD	456	572	730	315	795	227	243	710	540	45
ACQ40014D	456	572	730	315	795	227	243	710	540	46
ACQ50014D	575	769	918	500	1006	286	326	898	735	77

Vent-Axia

Appendix A: Extract Fan Details

Performance Curves



Motor Phase	Stock Ref	r.p.m	Curve Ref.		Airflow, m³/s @ Pa 0	50	100	150	200	300	400	Motor kW	S.C. Amps	F.L.C Amps	dBA @ 3m
1	ACQ25012D	2500	1	m³/s	0.32	0.30	0.27	0.25	0.23	0.18	0.13	0.16	1.25	0.68	34
				kW	0.13	0.14	0.14	0.14	0.15	0.15	0.14				
1	ACQ31512LD	2700	2	m³/s	0.37	0.35	0.32	0.30	0.27	0.23	0.19	0.23	2.4	0.97	36
				kW	0.20	0.21	0.21	0.22	0.22	0.22	0.22				
1	ACQ31514HD	1330	3	m³/s	0.85	0.78	0.69	0.59	0.49	0.30		0.27	2.2	1.18	36
				kW	0.21	0.22	0.24	0.24	0.24	0.22					
1	ACQ40014D	1340	4	m³/s	1.11	1.05	0.99	0.92	0.83	0.55	0.34	0.47	5.9	2.33	38
				kW	0.42	0.44	0.46	0.47	0.47	0.44	0.37				
1	ACQ50014D	1330	5	m³/s	1.59	1.51	1.40	1.28	1.15	0.92	0.72	0.73	6.27	3.21	46
				kW	0.60	0.62	0.64	0.66	0.68	0.70	0.69				

Sound Data

Stock Ref	Spectrum	63	125	250	500	1k	2k	4k	8k	dBA @ 3m
ACQ25012D	Inlet	64	74	72	67	57	55	56	53	48
	Outlet	64	74	75	69	70	71	65	64	56
	Breakout	52	57	68	52	44	40	36	38	39
ACQ31512LD	Inlet	72	69	79	67	63	62	60	61	52
	Outlet	69	68	74	70	70	71	66	70	56
	Breakout	60	61	67	56	55	51	44	42	41
ACQ31514HD	Inlet	66	78	68	60	52	49	42	40	45
	Outlet	67	75	77	71	69	62	56	49	53
	Breakout	53	67	61	52	47	41	34	33	36
ACQ40014D	Inlet	73	82	79	68	62	55	50	49	52
	Outlet	72	78	78	75	74	66	58	53	57
	Breakout	57	68	61	56	51	45	39	34	38
ACQ50014D	Inlet	77	85	78	71	64	62	54	52	54
	Outlet	74	83	82	78	77	72	64	58	61
	Breakout	66	78	71	62	56	49	42	41	46

Vent-Axia