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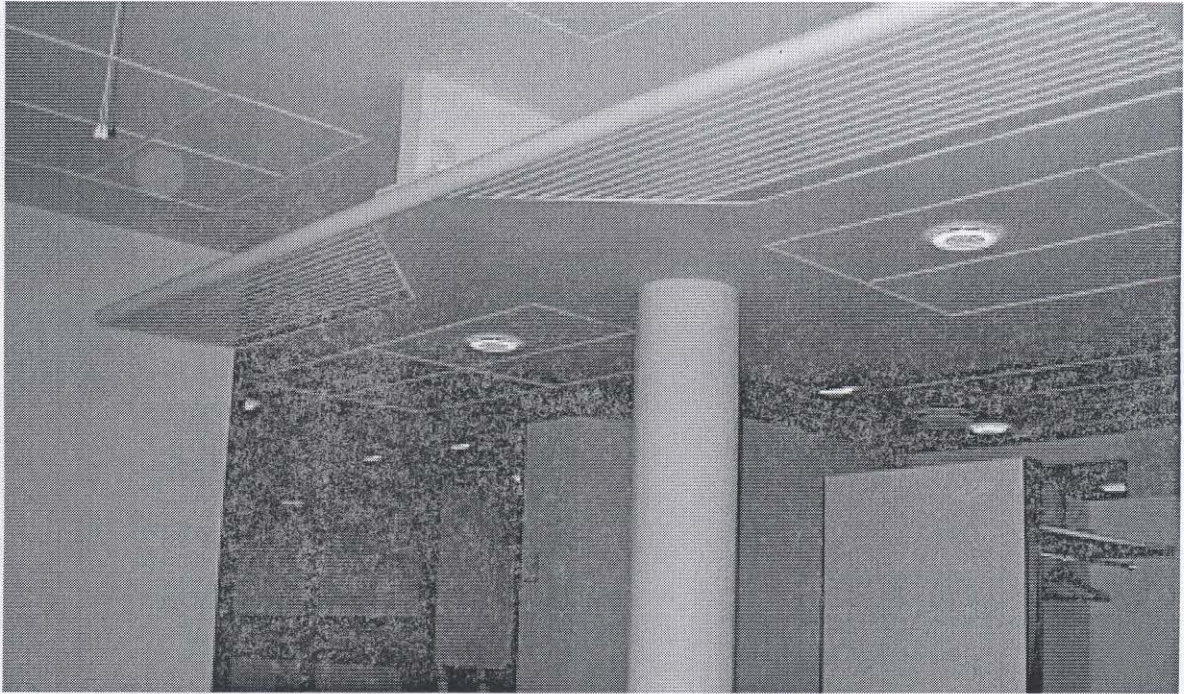
**The Palestra Building**

London, England

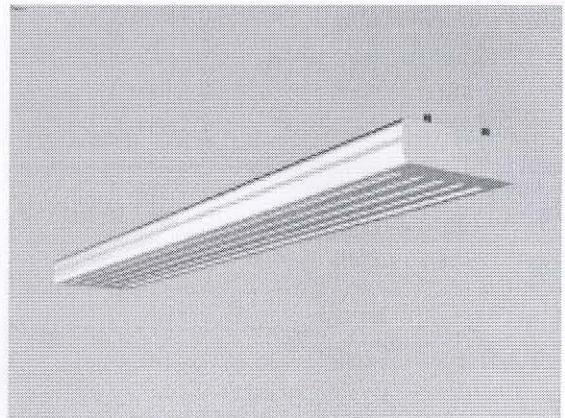


**APPENDIX C:  
DOAS Data**

# CLL - Cooling Panel with Radiant and Convective Cooling



- The CLL is a ceiling-mounted cooling and/or heating panel.
- Heat is absorbed by radiant and convective cooling.
- The unit is architecturally aesthetic and is easy to clean.
- Designed to be flush mounted within a suspended ceiling or fully exposed.
- The beam is suitable for spaces with a high cooling requirement, low humidity and ventilation loads.
- The CLL is suitable for a large range of building applications where requirement for good quality environmental conditions and individual space control is important.
- The CLL is available with factory-fitted 2- or 3-way control valves.
- Typically the CLL is used in offices, conference rooms and hotel rooms.



## QUICK DATA

Cooling capacity	275 W/m <sup>2</sup> ( $\Delta T=9\text{ }^{\circ}\text{C}$ )
Length	1100 - 4100 mm
Width	280,380,480,580,780 and 980 mm
Height	80 mm

## FUNCTION

The excess heat in the room is absorbed by both radiation and convection.

The CLL surfaces are cooled by water circulated in the unit. The cooled surfaces absorb heat from warm room surfaces and people. The radiant effect is as high as 25% of total cooling capacity.

The beam surfaces create circulation of room air with very low velocities. The airflow rate through the cooled beam varies with the cooling load, thus creating a partly self-regulating system.

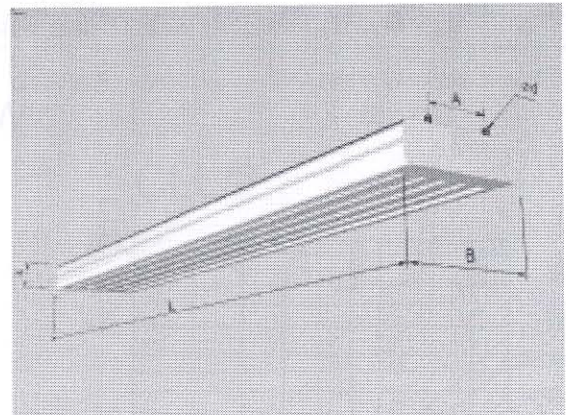
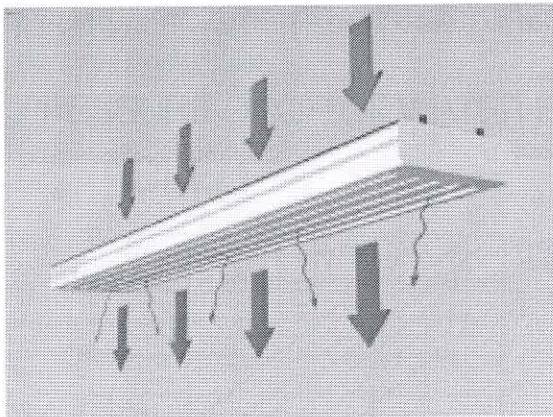
The cooling output is controlled using the room thermostat and valve to change water flow rate.

## MATERIAL AND FINISHING

The CLL is manufactured of extruded aluminium, white painted, with water pipes of copper. All parts are easily recyclable.

## ACCESSORIES

- Factory fitted 2-way control valve(CV/CLL-2)
- Factory fitted 3-way control valve(CV/CLL-3)
- Flexible connecting pipes (FT)
- Pipe connection straight (CP/CLL-S)
- Pipe connection up (CP/CLL-U)
- Factory fitted built-in control valve and thermostat (TV/CLL-O)
- External thermostats; capillary type (T1)
- External thermostats, electronic 24V (T2)
- External thermostats, electronic 240V (T3)
- Balancing and shut-off valve (BV)



## DIMENSIONS

B	H	d	A	L
280	80	12	140	4100
380	80	12	240	1100, 2100, 4100
480	80	12	340	1100, 2100, 4100
580	80	12	440	1100, 2100, 4100
780	80	12	640	1100, 2100, 4100
980	80	12	840	1100, 2100

## COOLING CAPACITY

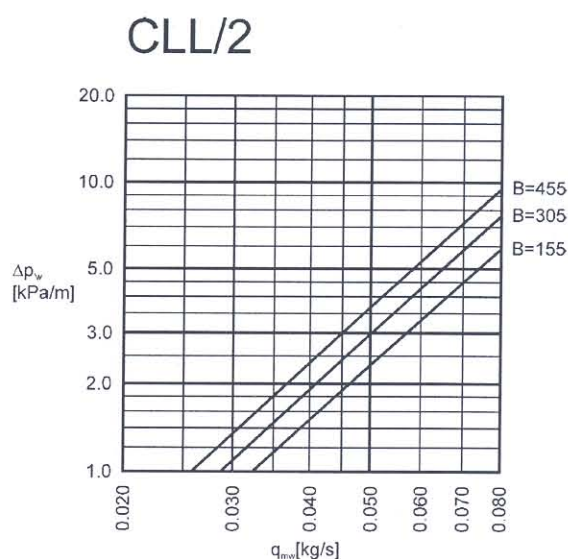
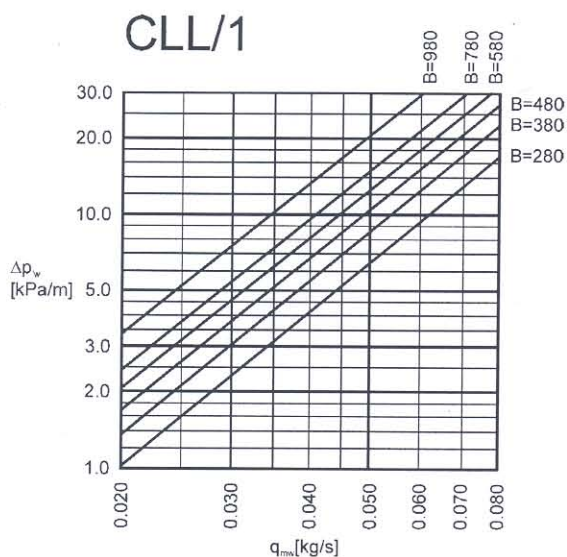
	Pw (W)						
	ΔT (°C)						
	6	7	8	9	10	11	12
CLL 280-4100	196	230	276	322	368	403	449
CLL 380-1100	71	84	101	118	134	147	164
CLL 380-2100	136	160	192	224	256	280	312
CLL 380-4100	265	312	374	437	499	546	608
CLL 480-1100	90	106	127	148	170	186	207
CLL 480-2100	172	202	242	283	323	354	394
CLL 480-4100	335	394	473	552	630	690	768
CLL 580-1100	109	128	154	179	205	224	250
CLL 580-2100	207	244	293	342	390	427	476
CLL 580-4100	405	476	571	666	762	833	928
CLL 780-1100	146	172	206	241	275	301	335
CLL 780-2100	279	328	394	459	525	574	640
CLL 780-4100	544	640	768	896	1024	1120	1248
CLL 980-1100	184	216	259	302	346	378	421
CLL 980-2100	350	412	494	577	659	721	803

## CORRECTION FACTOR -k- FOR OTHER WATER FLOW RATES

q <sub>mw</sub> (kg/s)	0,015	0,02	0,025	0,03	0,035	0,04	0,045	0,05	0,055	0,06	0,08
k <sub>c</sub> (CLL)	0,79	0,83	0,86	0,88	0,91	0,92	0,94	0,96	0,97	0,98	0

$$P_w = P_w(0,08\text{kg/s}) \times k_c$$

## PRESSURE DROP OF WATER FLOW



## NOTATIONS

Cooling capacity is measured according NVS 078

ΔT temperature difference  $T_r - (T_{w1} + T_{w2})/2$

P<sub>w</sub> water cooling capacity

q<sub>mw</sub> water mass flow rate

k<sub>c</sub> (CLL) correction factor for other water flow rates, cooling

Δp<sub>w</sub> pressure drop of water flow/length of device

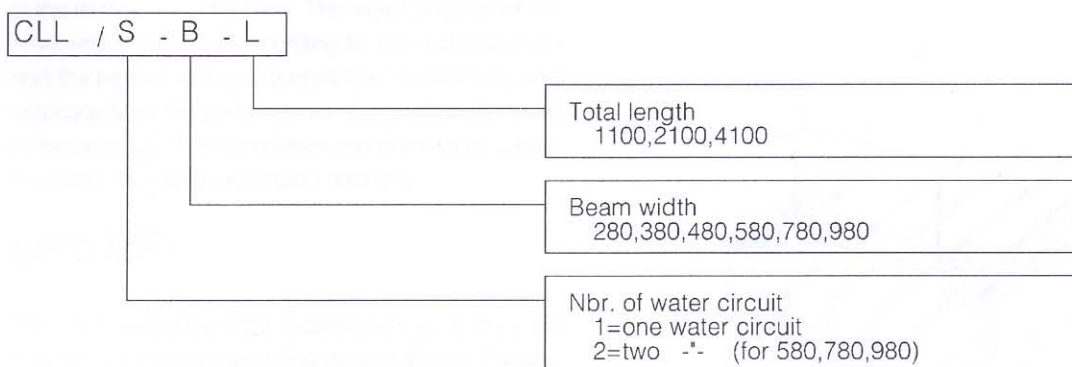


## SPECIFICATION

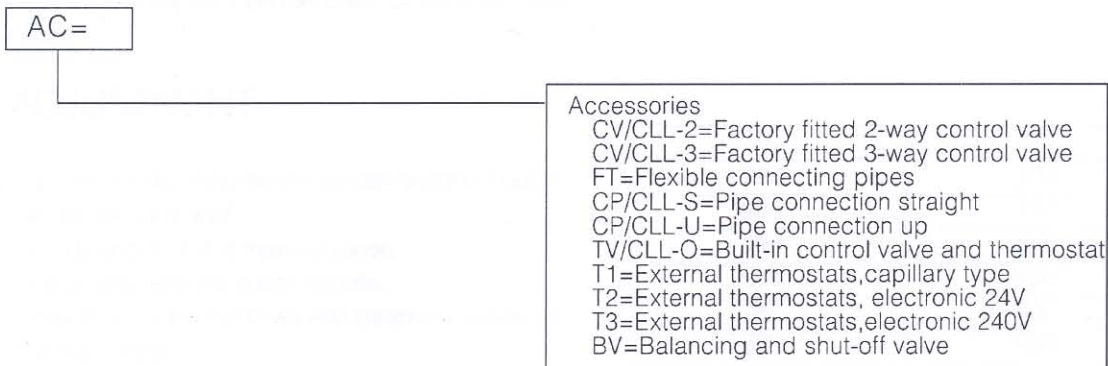
The static cooling panel shall be the Halton type CLL. The unit shall consist of heat transfer surfaces, with integrated water pipework and open slots for the air to pass through.

The cooling/heating surfaces shall be manufactured from aluminium profiles. The water circuit shall be constructed of copper pipes nominal 12 mm outside diameter. The water circuit maximum working pressure is 1,0 MPa. All the joints shall be fully soldered and factory pressure tested.

## PRODUCT CODE



## Specifics and accessories



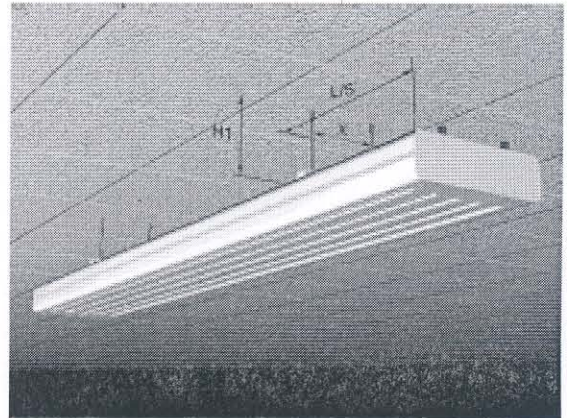
## Example

CLL/1-480-2100;AC=CP/CLL-S,BV  
CLL/2-780-1100;AC=BV

# INSTALLATION

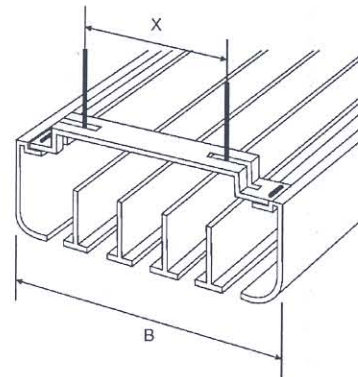
The cooled beam CLL can be installed flush with a suspended ceiling or fully exposed. In the case of flush installation, openings for return room air must be provided. To secure convection, the beam should be mounted so that the distance to the ceiling is 0,25 x the width of the beam when installed away from wall surfaces, or 0,35 x beam width when installed close to partitioning walls.

Each beam is fixed to the ceiling with expansion anchors and threaded drop rods (by others). On the beam, two (or three for 4100 mm) mounting brackets are fixed approx. 1/5 from the end of the beam (and in the middle on 4100 mm). The exact position of the brackets is adjusted according to the rod's position and the beam is easily adjusted both horizontally and vertically. Mounting brackets are supplied as standard in the package. The installation company must supply threaded rods and expansion anchors.



## SERVICE

The CLL requires little maintenance. It may be necessary to clean the cooling profiles after 3 -5 years, depending on room conditions and air quality. The cooling profiles are easy to clean with a vacuum cleaner, without the need to open or dismount the beam.

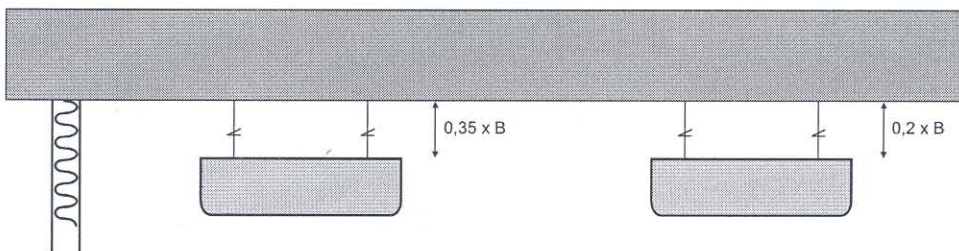


## ADJUSTMENT

Commissioning of the beam system is carried out in the conventional way.

- Fill up and flush the main pipelines.
- Fill up and vent the beam circuits.
- Adjust correct water flows with balancing valves for all main lines
- Adjust correct water flows for all beams.

B	X
280	100
380	200
480	300
580	400
780	600
980	800



Picture 1. Installation - distance from the ceiling