Commercial EPC Conventions Issue 1 – 1st June 2010

#	Issue	Agreed Convention(s)	Implementation date
1. Fundamentals			
2. General Information			
2.01	Assessment Level	Refer to accompanying 'Commercial EPC Conventions (Issue 1): Assessment Level Decision Flowchart' and 'Accompanying Notes'.	1st June 2010
2.02	Use of Defaults	The energy assessor shall only use the default values within the Software Tool in the absence of any conventions identified within this document or more specific information on the building. Where a default value is selected the assessor must provide evidence detailing why the default value has been selected to enable their Accreditation Scheme to verify appropriate use of default values during Quality Assurance processes. Use of default values should be avoided where possible.	1st June 2010
2.03	Air permeability	The SBEM default value of 25 m^3/hr m^2 for all existing buildings shall be amended as follows :- • Less than 10 m^3/hr m^2 – only with an accredited air pressure test result • 15 m^3/hr m^2 – buildings <= 500 m^2 built to 1999 Building Regulations • 25 m^3/hr m^2 – buildings built to Building Regulations pre 1999 • 35 m^3/hr m^2 – to be considered where buildings are pre 1999 regulations and where suitable evidence of high permeability exists, e.g. single skin metal clad structure within Planning Use Class B2 – B8 with large roller shutter doors and poor constructional details etc.	1st June 2010
3. Project Database			
3.01	Sunpipes	Sunpipes and similar devices to be ignored	1st June 2010
3.02	Adjacency assumed - party walls	Unless evidence to the contrary is readily and easily available, all buildings adjoining that building or part building which is being assessed, are assumed to be conditioned unless they are of Planning Class B2 to B8 in which case they are assumed to be unconditioned.	

4. Geometry			
4.01	Light wells	Light wells to be treated as external envelopes.	1st June 2010
4.02	Atria	All atria to be treated as Level 5 CEPC assessment feature. Refer to accompanying 'Commercial EPC Conventions (Issue 1): Assessment Level Decision Flowchart' and 'Accompanying Notes'	1st June 2010
4.03	Dimensions	Horizontal and vertical (inc. zone height) measurements to be carried out in accordance with diagrams and notes in accompanying 'Commercial EPC Conventions (Issue 1): Dimension Convention'.	1st June 2010
5. Global Building Services			
6. HVAC			
6.01	Variable speed pumps other than central heating	Ignored unless using approved DSM software which allows for this input option.	1st June 2010
6.02	Passive stack ventilation	Treat as per natural ventilation	1st June 2010
6.03	Electric room heaters	Any form of fanned or unfanned electric 'room heater' whether panel, bar, convector or storage heater shall have a user amended efficiency of 100%.	1st June 2010
7. Lighting			
8. EPBD Audit Trail			
9. Recommendations			
10. Appendices			
10.01	Commercial EPC Conventions	Refer to accompanying 'Commercial EPC Conventions (Issue 1): Glossary of Terms'.	1st June 2010

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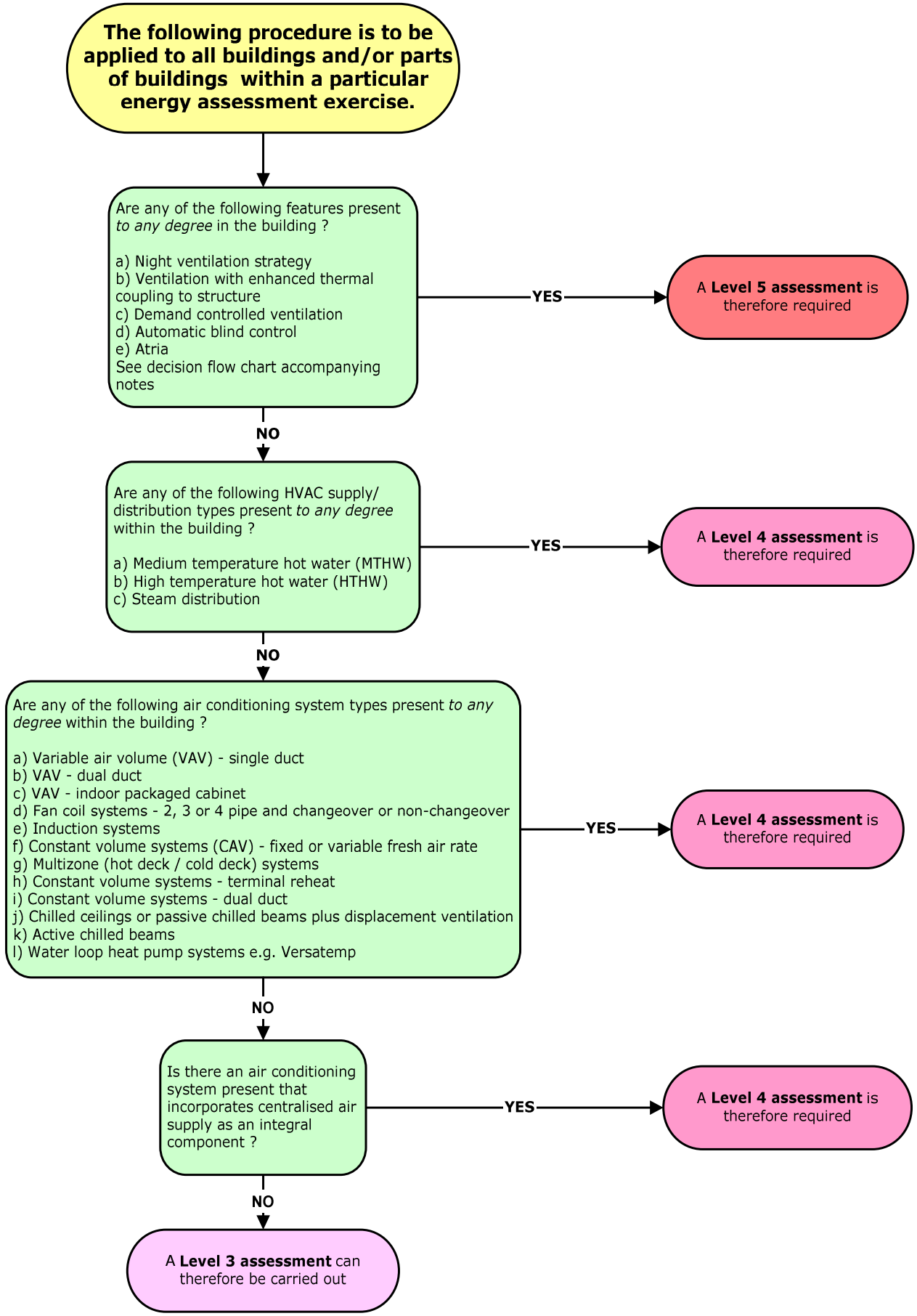
Assessment Level Decision Flow Chart



Night Ventilation Strategy

Can be defined as the presence of suitable systems, controls and operating strategy such that overnight ventilation (passive and/or mechanical) is used to cool down the exposed building mass and thereby offset daytime cooling demands. If no such operation and subsequent offset is possible through the *automatic* operation of systems and controls then night ventilation strategy is deemed to be not present as part of the building energy asset rating.

Ventilation with Enhanced Thermal Coupling to Structure

This is a further development of the *Night Ventilation strategy* such that significant components of the building structure in addition to its ordinary surfaces are exposed to night ventilation, in order to enhance the building's capability of offsetting daytime cooling demands. An example of this procedure is the *TermoDeck* system where night ventilation is passed through ducts in the solid floors of the building, thereby increasing the 'coolth' contained in the thermal capacity of the building structure available to offset subsequent summertime daytime cooling loads.

Demand Controlled Ventilation

Is defined as supply and/or extract ventilation that is modulated to match the needs of the actual occupation level of each zone, rather than operating at a constant level defined by the activity database. Thus the energy required to adjust the condition of the supply air and that required to move the air can be reduced. The rate of ventilation would typically be controlled by presence detectors, CO_2 sensors or another device that senses the varying requirement.

Automatic Blind Control

In this context internal or inter-pane (but not exterior) blinds that are motorised so that the position can be modified to control solar heat gain and/or glare, controlled by automatic sensors. The control regime must also open the blinds as the heat gain and or daylight levels decrease, so that the use of these natural resources can be optimised for each zone. Note that exterior shading devices can be modelled using iSBEM in the definition of each window; however SBEM currently does not model the re-radiation effects of blinds where solar gain has entered the space before it is modulated by the shading device.

Atrium

In this context, a non-continuously occupied interior space within a building, often several stories high, bounded on at least one side by occupied spaces set to the conditions determined from the activity database. There may or may not be building elements (such as glazing) surrounding the atrium (although there may need to be something for smoke control in case of fire). The atrium itself is not maintained to the conditions set by the activity database for adjoining spaces. The technical purpose of the atrium can be one or more of the following :-

- providing a buffer between the thermal conditions in the adjoining spaces and the exterior, to reduce the direct impact of the exterior on those zones. In this case it should not be maintained to conditions as though it is occupied. (If it is conditioned and the features below do not apply, in this context it is not considered to be an atrium.)
- providing a means for daylight to reach the middle of deep plan spaces that would otherwise not receive it
- encouraging stack effect or other passive ventilation to draw extract air from the adjoining spaces.

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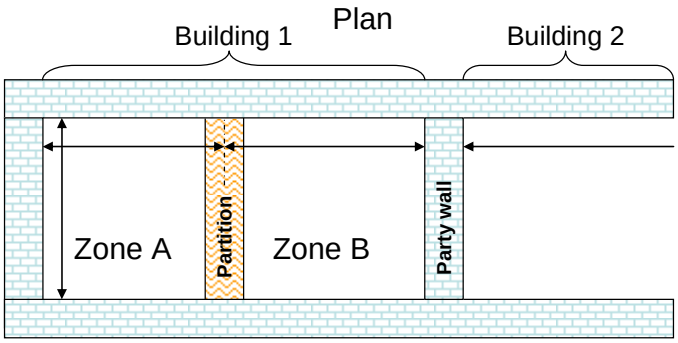
Dimensions Convention

Horizontal dimensions

Consider

- Plan view of two buildings in a terrace
  - Separated by a party wall
  - Building 1 has two zones
- Wall types
  - "Perimeter" surrounds each building (external and party walls)
  - "Internal" refers to walls within each building (partitions)



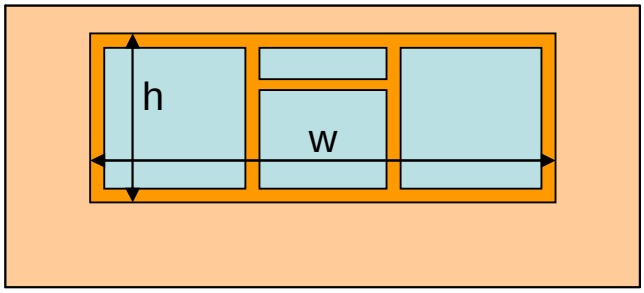
Generally follow RICS definition of Gross Internal Area

Need to measure

- Inside perimeter walls
- Mid point of internal walls
- Party walls are perimeter, so measure to surface, not mid point

Openings

- Inside structural opening (w x h)
- *Not just glass area*
- Percentage glazing is as viewed from inside
  - i.e. percentage of wall area to full zone height (defined below)

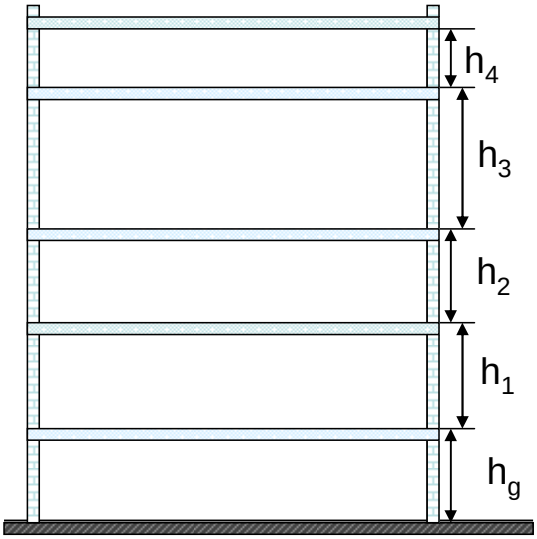


- 100% Glazing
  - Enter a wall of total area
  - Enter glazing with same area (or as 100%)

Zone height and element areas

Generally zone height is top of slab to top of slab for ground and intermediate floors, or soffit/eaves level at roof level

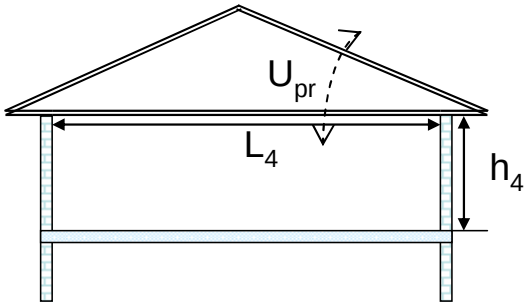
- For ground and intermediate floors
  - Zone height is top of floor to top of floor
- For top floors with flat roof
  - Zone height is top of floor to soffit/underside of roof slab



Dimensions Convention (continued)

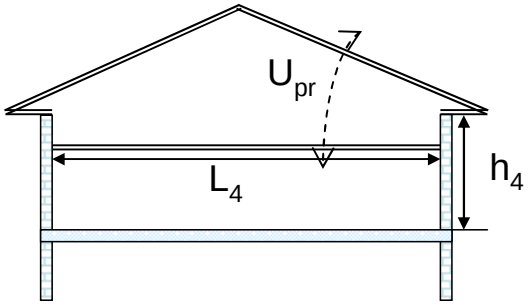
- For top floors with pitched roof but flat ceiling

  - Zone height is top of floor to underside of soffit/eaves level
  - U value is from under ceiling to outside roof including insulation wherever it is
    - that is, consistent with the area being entered
  - Area of gable wall is that below soffit/eaves level i.e. length L_4 x h_4



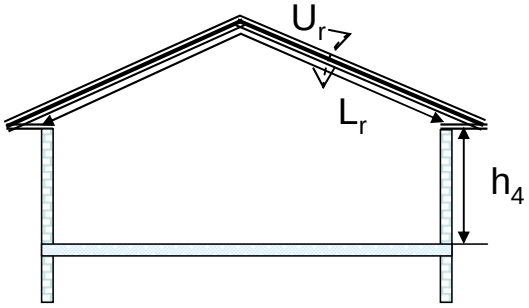
- For top floors with pitched roof and dropped ceiling with or without insulation at ceiling level

  - Zone height (h_4) is top of floor to underside of soffit/eaves level (not ceiling)
  - U value is from under ceiling to outside roof
  - Side and end wall areas are calculated to soffit/eaves level i.e. dropped ceiling is treated as though it is at soffit/eaves level



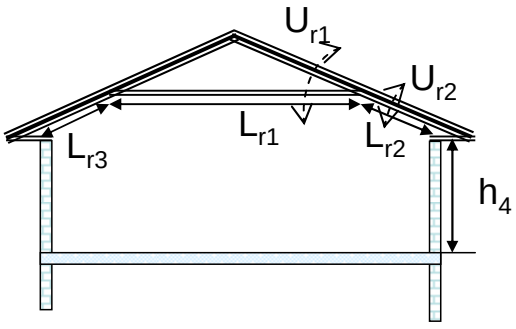
- For rooms with pitched ceiling (e.g. where ceiling is fixed in line of pitched roof)

  - Zone height (h_4) is top of floor to underside of soffit/eaves level *(not average room height)*
  - Roof heat loss area is as seen from underside of ceiling, i.e. L_r x d (zone depth)
  - U value is from under ceiling to outside roof (U_r)
  - End wall area is whole gable up to roof apex (as this is all exposed to inside temperature)



- If there is a horizontal ceiling half way up the pitched roof, split the area into

  - The part with a void (L_{r1}), using the U-value including the void (U_{r1})
  - The part where there is no void (L_{r2}, L_{r3}), using the U-value without a void (Ur2)
  - Zone height is still to underside of soffit/eaves level

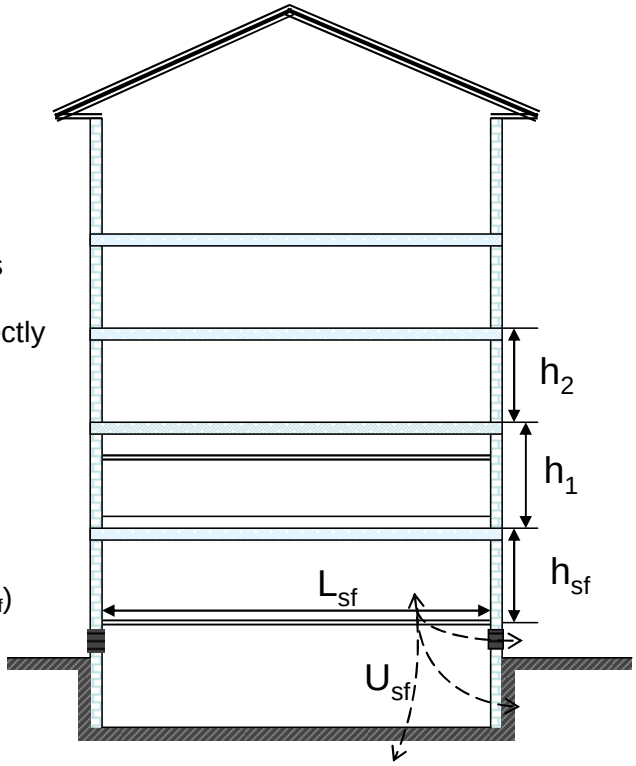


So the general rule is always to **input the area exposed to the inside temperature, and the U-value between this surface and outside.**

Dimensions Convention (continued)

- Intermediate floors with suspended ceilings and raised floors

  – Zone height is top of floor slab to top of next floor slab e.g. h_1
  – So, ignore the suspended ceilings and raised floors for the purposes of
    - zone height
    - surrounding wall areas
  – But include their impact on Kappa values of the slabs above and below so that thermal mass effects are calculated correctly



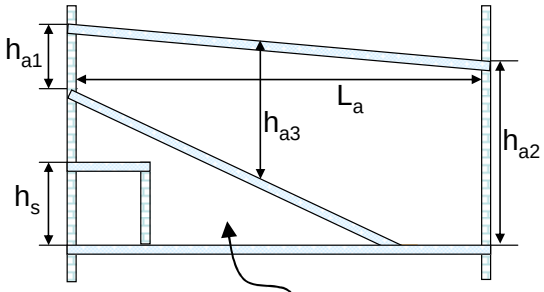
- With suspended timber ground floor and ventilated void below

  – Zone height is top of suspended floor surface to top of first floor surface (h_{sf})
  – Where the floor U value is calculated it should take account of the ventilated void (U_{sf})

When there are walls of different heights to consider:

- For sloping floors and ceilings (eg auditoria)

  - If the activity above and under the floor is the same, or the void is inaccessible, choose normal zone height, otherwise
  - zone height = weighted average wall height h_{a1}, h_{a2}, h_{a3}, etc (from where floor adjoins each wall to top of floor above)
  - Zone area A_a is projected area/plan area as per RICS GIA standard
  - Make sure in addition that all external (and internal) wall and slab areas are input so that all heat loss/gain and thermal mass is calculated
  - ***Note that zoning for daylit areas must be carried out manually in these circumstances (do not use automatic daylight zoning)***

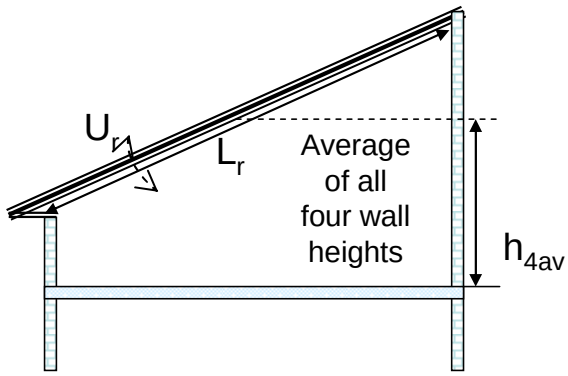


Don't forget this void is another zone if it has a different activity! Its zone height = area weighted average vertical wall height.
If it has the same activity or is inaccessible, then merge with auditorium and enter zone area as though the floor is flat (L_a x d). However, the sloping floor area must be input so that thermal mass is calculated.)

- For cubical rooms under the sloping floor
  – Zone height = top of slab to top of slab (h_s)

Dimensions Convention (continued)

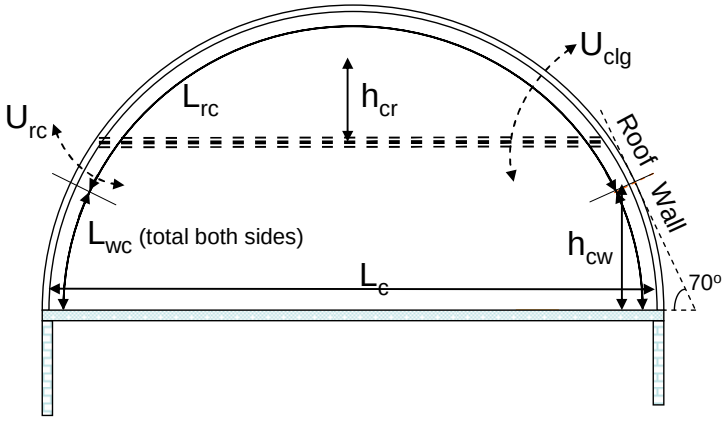
- For rooms with mono-pitched ceiling
  - Zone height is top of floor to weighted average height of all walls - h_4
  - Area of roof (A_r) is as seen from underside i.e. L_4 x zone depth
  - U value from under ceiling to outside roof is U_r
  - Use total area of gable wall
  - ***Note that zoning for daylit areas must be carried out manually in these circumstances***



- If there is a horizontal ceiling under the mono-pitched roof
  - Level with or below eaves: zone height at eaves
  - Above eaves: zone height = average exposed wall height
  - Roof area would have to be divided into areas with different U-values with and without void

- **Curved roof** – all buildings with curved roof sections shall be approximated as in the diagram:
  - Circular (not elliptical or other shapes)
  - Semi-circular so that width = 2 x height

- Walls are 70-90° from horizontal, roofs are <70°
- So zone height h_{cw} = dividing point between wall and roof, where slope = 70° at "eaves"



- If a floor (eg as shown dotted) meets roof at <70°, there is no wall, so zone height h_{cr} = average height of space

- If the dotted line represents the ceiling with an unoccupied void above, remember to input
  - the area of roof where the slope < 70° between this ceiling and the "eaves", with its U value (U_{rc}), and
  - the flat ceiling with U value (U_{clg}) including the void above the ceiling

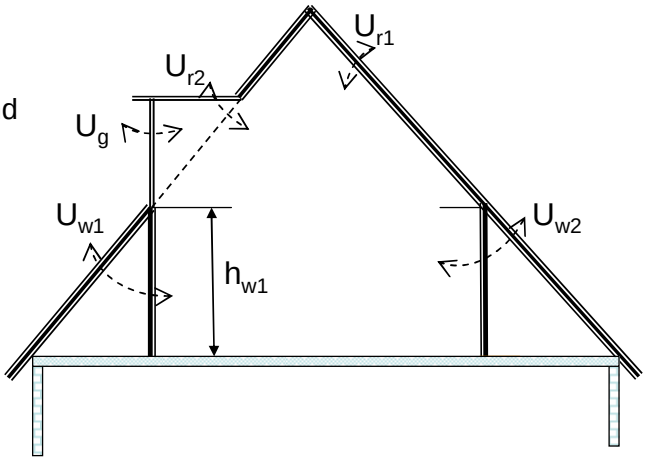
- Treat dormer windows the same as for a room in a pitched roof (see below)

For consistency, the convention is to assume all such roofs are semi-circular. If floor width = L_c and building depth is d

- Zone height h_{cw} = 0.34 x L_c
- Wall height L_{wc} = 0.7 x L_c
- Area curved walls = L_{wc} x d
- Curved roof width = 2.44 x L_c
- Area curved roof = L_{rc} x d

Dimensions Convention (continued)

- For room in roof (or mansard roof):
  - Areas and U values should correspond
  - U values for walls should include any voids – U_{w1}, U_{w2}
  - Zone height (h_{w1}) = height of vertical part of wall
  - If this varies, calculate area weighted average height



- Where there are dormer windows
  (i.e. window bays that project through the roof)
  - Do not adjust zone height for the dormer windows
  - Zone manually for daylit areas (if the glazing > 20% of vertical wall area)
  - Enter the glazing details and areas as normal
  - ***Note that zoning for daylit areas must be carried out manually in these circumstances***

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Glossary of Terms

Air Permeability.

Air permeability is expressed as volume flow per hour (m^3 h) of air supplied to the space per square metre (m^2) of envelope area for an internal to external pressure difference of 50 Pa i.e. 25 m^3 hr^{-1} m^{-2} at 50Pa.

Atrium

In this context, a non-continuously occupied interior space within a building, often several stories high, bounded on at least one side by occupied spaces set to the conditions determined from the activity database. There may or may not be building elements (such as glazing) surrounding the atrium (although there may need to be something for smoke control in case of fire). The atrium itself is not maintained to the conditions set by the activity database for adjoining spaces. The technical purpose of the atrium can be one or more of the following:-

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In this context internal or inter-pane (but not exterior) blinds that are motorised so that the position can be modified to control solar heat gain and/or glare, controlled by automatic sensors. The control regime must also open the blinds as the heat gain and or daylight levels decrease, so that the use of these natural resources can be optimised for each zone. Note that exterior shading devices can be modelled using iSBEM in the definition of each window; however SBEM currently does not model the re-radiation effects of blinds where solar gain has entered the space before it is modulated by the shading device.

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Lightwell

A lightwell is a space surrounded by the walls of a building but that has no roof or glazing above it. It is therefore similar to a courtyard in appearance. The walls that surround the lightwell are exposed to external air.

Glossary of Terms (continued)

Night Ventilation Strategy

Can be defined as the presence of suitable systems, controls and operating strategy such that overnight ventilation (passive and/or mechanical) is used to cool down the exposed building mass and thereby offset daytime cooling demands. If no such operation and subsequent offset is possible through the *automatic* operation of systems and controls then night ventilation strategy is deemed to be not present as part of the building energy asset rating.

Sunpipes

A sunpipe is a tube/pipe, consisting of internal reflective surfaces, which channels daylight to an internal area.

Ventilation with Enhanced Thermal Coupling to Structure

This is a further development of the *Night Ventilation strategy* such that significant components of the building structure in addition to its ordinary surfaces are exposed to night ventilation, in order to enhance the building's capability of offsetting daytime cooling demands. An example of this procedure is the *TermoDeck* system where night ventilation is passed through ducts in the solid floors of the building, thereby increasing the 'coolth' contained in the thermal capacity of the building structure available to offset subsequent summertime daytime cooling loads.