

Module 3.6

Calculation of U-value for
elements adjacent to an
unheated space.

Learning Outcomes

- On successful completion of this module learners will be able to
 - Describe the procedure for the calculation of U-values for elements adjacent to unheated spaces.

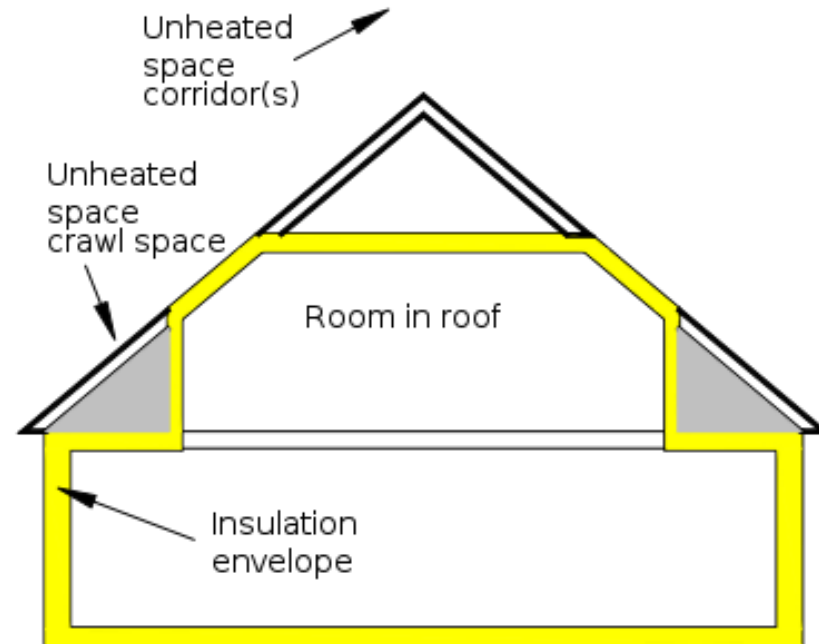
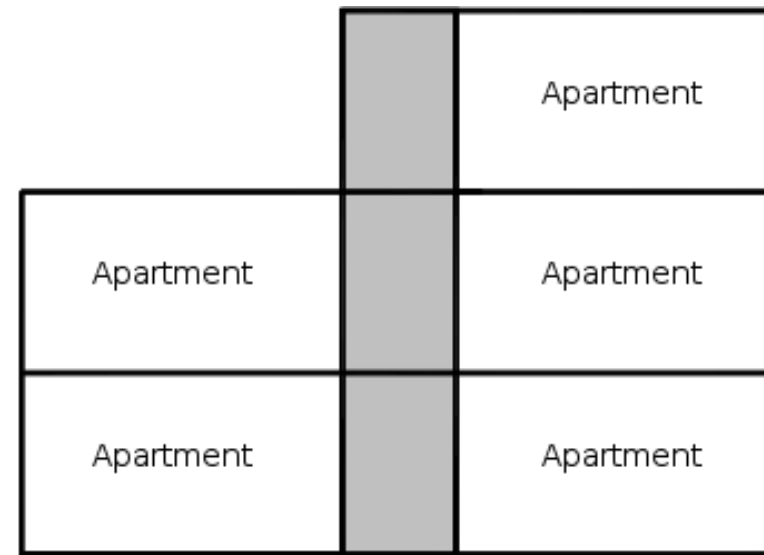
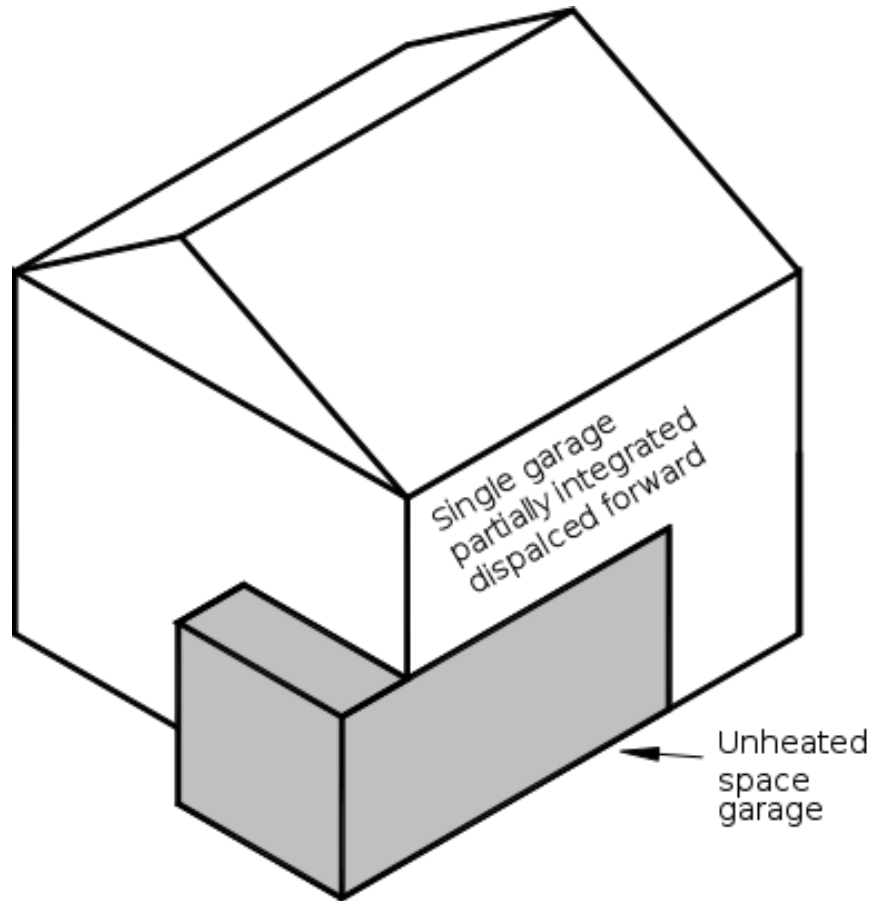
Forward.

- This document makes references to a number of standards relating to calculation of U-values for elements adjacent to unheated spaces. The content of this document is not a substitute for these standard. To properly apply the standards one must have the complete documents.

Description of unheated spaces.

- An unheated space is typically
 - a) Unheated.
 - b) Large enough for a person to crawl or walk in.
i.e. not an air layer.
 - c) Between a heated space and the external environment.
 - d) Ventilated by outside air.
- Examples include garage, access corridor in apartment buildings, some conservatory, crawl space next to room in roof, external store, etc

Examples of unheated spaces.



Treatment of unheated spaces.

- An unheated space will reduce the heat loss between a heated space and the external environment.
- Depending on their construction, position, and air change rate, unheated spaces can be allocated an effective thermal resistance R_u .
- Thermal resistance of unheated spaces are described in EN ISO 6946 and EN ISO 13789.

Treatment of unheated spaces - continued.

- A number of European countries have used the procedures described in the relevant ISO standards to develop typical R_u values for some unheated spaces.
- These typical R_u values can be used when the exact dimensions and air change rate for the structure providing the unheated space are not available, or are not crucial.
- In all other cases refer to EN ISO 6946 and EN ISO 13789.

Treatment of unheated spaces - continued.

- The typical R_u can be used to adjust the original U-value of the element between the heated room and the unheated space, as follows :-

U	=		1	
		1	+	R_u
		U_o		

Units = $W / m^2 K$

Treatment of unheated spaces - continued.

where

U = the adjusted U-value of the element between the heated room and the unheated space.

U_o = the original U-value of the element between the heated room and the unheated space, calculated as if there were no unheated space.

Note: $1/U_o = R_o$ = original resistance

R_u = the typical effective thermal resistance of the unheated space.

Sources of R_u , typical effective thermal resistance of unheated spaces.

- International standards.

- EN ISO 6946 : 2007 – Building components and building elements – Thermal resistance and thermal transmittance – Calculation method.

- National standards.

- BRE 443 : 2006 – Convention for U-value calculations. ISBN 1 86081 924 9

[http://www.bre.co.uk/filelibrary/pdf/rpts/BR_443_\(2006_Edition\).pdf](http://www.bre.co.uk/filelibrary/pdf/rpts/BR_443_(2006_Edition).pdf)

- SAP 2005 : (2009)

<http://projects.bre.co.uk/sap2005/>

- continued.

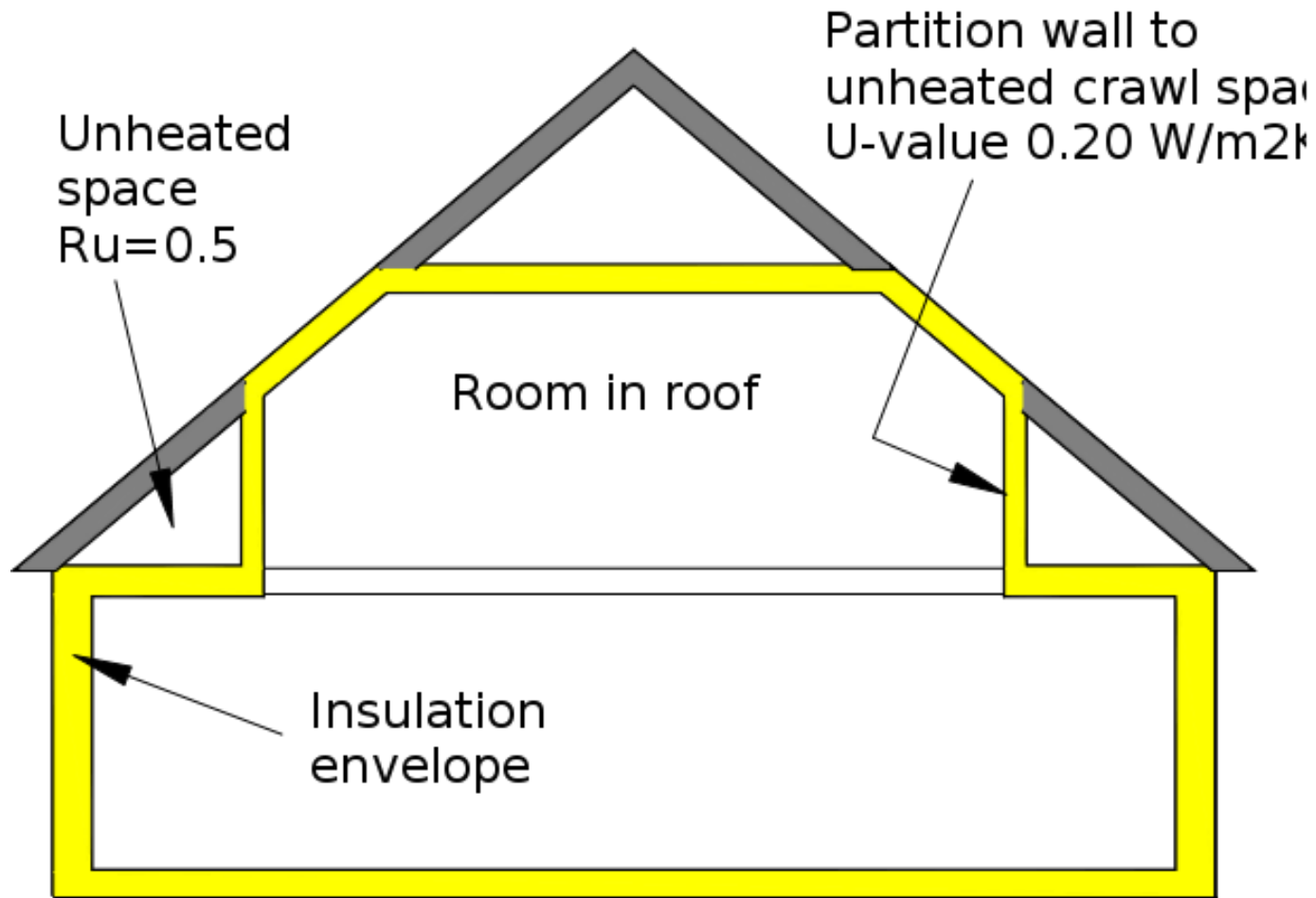
- From the sources quoted above, R_u the typical effective thermal resistance of the unheated space can be selected from tables.

Tables are available for

- Integral garages, i.e. garages with one or two walls and some or all of the roof in contact with heated rooms.
- Stairwells and access corridors in apartments.
- Room in roof construction where the insulation follows the shape of the room.

Sample calculation.

Calculate the adjusted U-value for the partition wall adjacent to an unheated crawl space



Sample calculation - continued.

U	=		1	
		1	+	R_u
		U_o		

Units = $W / m^2 K$

U	=		1	
		1	+	0.5
		0.2		

U	=	0.18 W/m^2K
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Module summary.

- Unheated spaces adjacent to heated rooms will reduce the rate of heat loss from that room.
- Task.

How would you describe a typical unheated space?

Give some examples of an unheated space.

Module summary – continued.

- A number of European countries have used the procedures described in the relevant ISO standards to develop typical R_u values for some unheated spaces.
- Task.

What are the relevant ISO standards?

Where can the typical values of R_u be found?

When should typical values of R_u not be used?

Module summary – continued.

- The U-value of the element between the heated room and the unheated space can be adjusted to take account of the reduced heat flow.
- Task.

Write out the equation that can be used to adjust the U-value of the element between the heated room and the unheated space.

References.

- International standards.
- EN ISO 6946 : 2007 Building components and building elements - Thermal resistance and thermal transmittance - Calculation method
- EN ISO 13789 : 2007 Thermal performance of buildings – Transmission and ventilation heat transfer coefficients – Calculation method.
- National standards.
- BRE 443 : 2006 – Convention for U-value calculations.
- SAP 2005 : (2009)
- Building Regulations (Part L Amendment) Regulations 2008. Technical Guidance Document L – Conservation of Fuel and Energy – Dwellings. (Ireland)