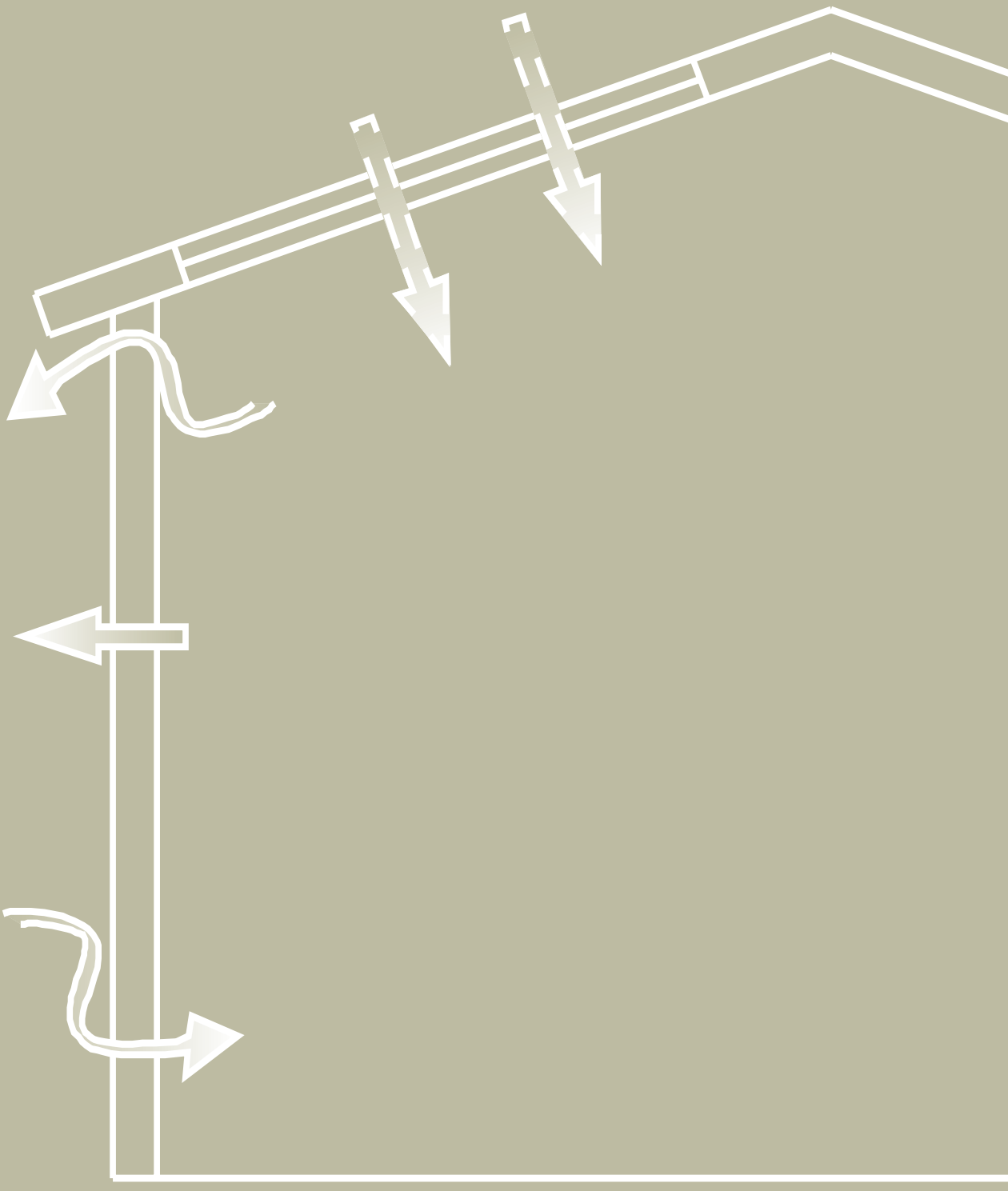
Cl/SfB (4-) Nh2
October 2006

Corus Colors

Colorcoat® Technical Paper

Irish Building Regulations
Technical Guidance Document L



Corus and Part L

Over 40 years, Corus has developed close strategic relationships with a number of market-leading roof and wall cladding system manufacturers.

Specifying Colorcoat® products through one of these strategic partners ensures access to the very best technical guidance and the highest levels of quality and service. Together we can provide a quality building envelope solution that delivers peace of mind.

Working together to deliver Part L (2006) compliance

Corus has worked closely with key profilers to prepare for the changes to the Building Regulations Technical Guidance Document L (2006).

This has involved developing a consistent approach, testing all systems for air-tightness and sharing best practice on thermal modelling of details.

We have developed guidance which will help architects to not only comply with the latest regulations but also achieve the most energy efficient buildings using pre-finish steel building envelopes.

Technical Guidance Document L is published in a single document covering Dwellings and Buildings other than Dwellings in new build, extensions, material alteration and where a material change of use takes place to an existing building. This summary considers the requirements for Buildings other than Dwellings.

The new edition of Document L came into effect on the 1st July 2006. However the transitional arrangements are generous and where work started before 30th June, or where planning approval or permission had been applied for on or before 30th June 2006, and where 'substantial work' *(which means that the external walls have been erected)* has been completed by 30th June 2008, compliance will be assessed against the previous edition.

Technical Guidance Document L only partly addresses the EU *The Energy Performance of Building Directive* - which required member states to implement a whole building calculation method by the 4th January 2006. The methodology for calculating the building energy performance based on CO_2 emissions for buildings other than dwellings will be introduced at the next amendment scheduled for 2007.

Heat Loss

There are two methods which may be used to demonstrate compliance for the heat loss through the building elements from a heated space:

The Overall Heat Loss Method

This method is applicable to new buildings and extensions to existing buildings. A maximum acceptable level of transmission heat loss through the fabric of the building is set in terms of a maximum average U value (U_m) of all fabric elements contributing to heat loss.

This method gives the designer flexibility by allowing compensation for a reduction in insulation provision in one element by an increase in provision in another element, and also flexibility in relation to the area and types of glazing. Worst acceptable U values have been set for roofs at 0.25 W/m^{2}K, walls 0.37 W/m^{2}K and floors 0.37 W/m^{2}K allowing this high level of flexibility.

The level of the maximum average U value (U_m) depends on the ratio of the total area of these elements (A_t) to the building volume (V) and is specified as:

$$U_m = 0.24 + 0.19(V/A_t)$$

As a ready-reckoner, the Technical Guidance Document L gives a table of maximum acceptable average U values for the V/A_t ratios, although many large buildings will fall outside of this table, in which case the formula should be used.

Table 1: Maximum average U value (U_m) as a function of building volume (V) and fabric heat loss (A_t)

Area of Heat loss Elements/Building Volume (m)	Maximum Average U value (U_m) (W/m^{2}K)
1.3	0.39
1.2	0.40
1.1	0.41
1.0	0.43
0.9	0.45
0.8	0.48
0.7	0.51
0.6	0.56
0.5	0.62
0.4	0.72
0.3	0.87

A building is deemed to comply with this requirement when the area weighted average U value is less than or equal to U_m.

For small buildings, where the envelope area is relatively high compared to the enclosed volume, compliance with this will require increased insulation, but for the majority of commercial buildings of larger area, the maximum U values given above are likely to be sufficient.

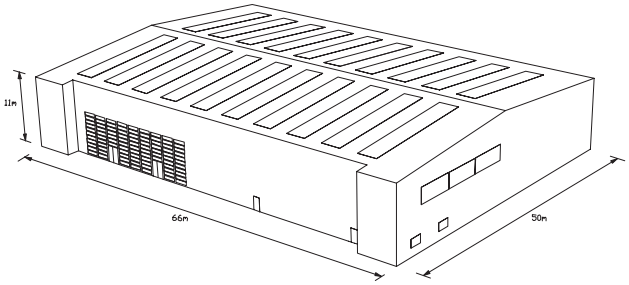
Example calculation using the overall heat loss method

The example is a single storey industrial building which is being used as a retail outlet.

U values are based on common values which would be specified for the roof, walls, glazing and doors for this type of building.

Table 2: Heat Loss Element

	Heat loss area (A_t) (m^2)	U value (W/m^2K)	Area U value (W/K)
Roof	2885	0.25	721
Walls	2452	0.35	858
Floor	3192	0.25	798
Rooflights-10%	320	2.2	704
Glazing	224	2.1	471
External personnel door	6	1.7	10.2
Industrial sectional vehicle access doors	15	1.2	18
Totals	9094		3580



$$U_{av} = \frac{\text{Total AU}}{A_t} = \frac{3580}{9094} = 0.39\ W/m^2K$$

Building Volume, V = 38439 m^3

so $U_m = 0.24 + 0.19(V/A_t) = 1.04\ W/m^2K$

The proposed construction is acceptable as U_{av} is less than U_m.

The Elemental Heat Loss method

This method is suitable for any building but is more appropriate for small buildings less than 300 m^2 floor area or small sections of large complex buildings where geometry may make the overall heat loss method difficult to achieve.

To demonstrate compliance by this method, worst acceptable average U values for individual buildings elements should not be exceed. These elemental U values are set out in the Guidance Document and are significantly more stringent than the worst acceptable values given where the overall heat loss method is used. The maximum area for glazing and rooflights are also set out; for industrial and storage buildings the glazing must not exceed 15% and rooflights 20%, with a worst acceptable U value of 2.2 W/m^2K. These levels are maximum levels and care must be taken to avoid solar over heating which must be checked to achieve compliance.

Calculations indicate that the overall heat loss method should, as the Guidance Document states, be used for single storey industrial buildings. By using this method, less severe U values can be specified.

Thermal Bridging

Provision has to be demonstrated to limit thermal bridging to a reasonable level. This means that total energy loss through thermal bridging requires calculation, as in previous regulations, and should be limited to no more than 16% of total planar fabric heat losses. When using the overall heat loss method for calculating U values, any excess in thermal bridging over 16% must be included in the heat loss calculations. Using well constructed details, pre-finished steel cladding systems should have no problems complying with this criterion. More information on typical efficient details which would comply with this stipulation can be found on **www.colorcoat-online.com.**

Heat Gain

The building should be designed and constructed so that those occupied spaces that rely on natural ventilation do not risk unacceptable levels of thermal discomfort due to overheating by solar gain or those spaces that incorporate mechanical ventilation or cooling do not require excessive plant capacity to maintain the desired temperature.

Compliance is achieved by showing that either the average daily solar heat load per unit floor area during the period of occupancy would not be greater than 25 W/m^2 or alternatively in the absence of mechanical cooling or mechanical ventilation, the space temperature will not exceed 28°C for an unacceptable period of occupation, as defined in CIBSE guide A, chapter 5. This second method will require computer simulation modelling.

For the example building given earlier, calculation of the daily solar heat load gives a value of 28.2 W/m^2, so in this case compliance through the second route would depend on building occupancy and usage patterns, but consideration should be given to reducing solar gain through either reducing glazing or rooflight areas or provision of shading.

Air Infiltration

There are no requirements to carry out air-tightness testing. The only requirements are to limit unintentional air paths as far as practical by incorporating a continuous air barrier over the whole building envelope. However, provision of an air-tight building envelope is one of the key means of minimising the heating costs of a building and for this reason, should be considered at all stages. Best practice guidance on achieving an air-tight building envelope is given within the Colorcoat® Technical Paper *"Achieving an air-tight building envelope"* which is available from **www.colorcoat-online.com**.

Building Services

Space and water heating systems, and any air conditioning systems should be designed and effectively controlled to operate efficiently over the range of loading likely to be encountered to limit the energy used by these systems. Guidance is provided within the Technical Guidance Document as to how this should be achieved. Guidance is also provided to ensure that energy efficient lighting with appropriate control systems are fitted.

The Future

It was noted earlier that this revision to Technical Guidance Document L does not fully satisfy the requirements of the European Energy Performance of Buildings Directive to implement a whole building calculation method. Following problems with the introduction of such a method in the UK, the government have specifically stated that it is their intention to further modify Technical Guidance Document L in 2007 to incorporate this kind of energy calculation for buildings other than dwellings. This methodology is likely to be based on that used in the UK with some minor modifications.

The European directive also requires that energy certification of buildings is introduced by 2009 and although detailed plans for this have not yet been made public, this can be seen to be another major change in the way that energy performance of buildings is considered, not only at the construction phase, but throughout the use of the building and having a long-term impact on building value.

There's only one true Colorcoat®

Ensure that it's **Colorcoat®** by Corus

www.colorcoat-online.com

Trademarks of Corus

Colorcoat and Colorcoat Connection, are trademarks of Corus.

Care has been taken to ensure that the contents of this publication are accurate, but Corus Group plc and its subsidiary companies do not accept responsibility for errors or for information that is found to be misleading. Suggestions for, or descriptions of, the end use or application of products or methods of working are for information only and Corus Group plc and its subsidiaries accept no liability in respect thereof.

Before using products supplied or manufactured by Corus Group plc and its subsidiaries the customer should satisfy themselves of their suitability.

Sales Contact Details:
Corus Colors
Leeson Court
88 Lower Leeson Street
Dublin 2
T: +353 (0) 1631 0615
F: +353 (0) 1676 5413

Colorcoat Connection helpline
T: +353 (0) 1631 0615
F: +353 (0) 1676 5413
colorcoat.connection@corusgroup.com