Topten Product Criteria Paper on

Windows

Motiva Oy

Kimmo Rautiainen

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Supported by

Coordinated by

topten.info

The Project in brief

Topten is part of the international Euro-Topten Plus initiative supported by the European programme Intelligent Energy Europe and several national institutions (energy agencies, WWF, consumer associations, research institutes). On global level, Topten is coordinated by TIG, the Topten International Group. This association promotes to the Topten Charter, TIG statutes and Rules of Procedure (www.topten.info).

Topten is a service that supports the market for energy efficient products. It aims at making energy efficient products the first choice for consumers, by offering them a user-friendly tool for product comparison and selection. The key element is an online information platform for consumers presenting the most energy efficient appliances currently available in various product categories, including household appliances, office equipment, consumer electronics and cars. Information on energy consumption and performance of products as well as several other characteristics (i.e. brand, model, price, picture) is provided. Product data is based on labels and standardized declarations as well as tests from accepted well-known institutions. The service is independent of manufacturers and retailers.

Consortium

The Euro-Topten project is co-ordinated by the Agence de l'Environnement et de la Maitrise de l'Energie (ADEME). The 20 project partners are:

Project Partner	Country
Agence de l'Environnement et de la Maitrise de l'Energie (ADEME)	FR
Energy Research and Modernising Institute - ICEMENERG	RO
Ecologocal Center Luxembourg (Oeko-Zenter)	LU
Norwegian Society for the Conservation of Nature / friends of earth Norway	NO
Österreichische Energieagentur – Austrian Energy Agency (A.E.A.)	AT
WWF European Policy Programme AISBL (WWF EPO)	BE
ICLEI European Secretariat GmbH (ICLEI)	DE
WWF France	FR
WWF Belgium	BE
WWF Italy	IT
Quercus – National Association for Nature Conservation (Quercus)	PT
Wuppertal Institute for Climate, Environment and Energy (WIKUE)	DE
World wide fund for nature – WWF GR	GR
Polish Foundation for Energy Efficiency (FEWE)	PL
WWF Spain	ES
ESCAN, S.A.	ES
SEVEn, The Energy Efficiency Center (SEVEn)	CZ
Motiva Ltd	FI
Deutsche Energie-Agentur GmbH (DENA)	DE
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Criteria Paper for Windows

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1 Introduction

The criteria papers provide a central tool for the national partners to collect and analyse product data and to establish a national Topten selection. Appropriate selection criteria and technical specifications are a crucial precondition for meaningful and well-accepted Topten websites. The purpose of this criteria paper is to provide to the Topten teams a first overview of the window issue, so that they can decide whether to include windows on their national sites. The range of windows differs significantly in European member States in terms of minimum energy efficiency requirements (due differences in climate and types of windows). The choice of a window depends also on the building itself and its orientation (contrarily to other Topten products that are plugged in and easier to compare).

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This paper contains the product specification for qualified windows in the Finnish Topten-website.. Hopefully, this paper can be used as a guide in adding windows in national websites.

An ideal situation would be that the national criteria are based on international or European standards. There are different requirements for windows in European countries but there are European standards for defining the characteristics of a window.

2 Product Specification

This chapter provides a technical analysis of the product, explains EU and national product and test standards. It also gives an overview of windows in the Finnish market .

2.1 Product Definition

A *window* consists of *frame*, *sash* and *glazing* (1 to 4 glasses, possibly insulated glazing units filled with an inert gas, edge spacers between the glasses).

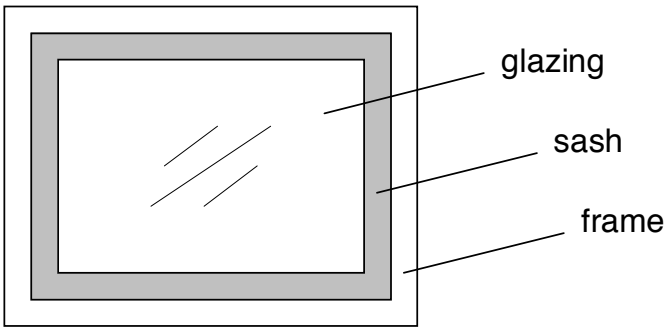


Figure 1 Window parts

The window is the weakest part of a building envelope when heat losses are considered. It is also important to notice that windows enable the use of solar energy (light and heat) indoors.

Usually the *U-value, thermal conductivity*, of the glass part is known and informed by the manufacturer. But glass is only one part of a window, thefore the U-value of the whole window (glass + frame + sash) should be known. The lower the U-value is, the lower the the heat losses.

There are also other measures that have to be taken into account when the total energy efficiency of a window is estimated. The *air-tightness* (L) of the window describes how much leak air gets trhough the window. The lower the L-value is, the tighter the window is.

The *g-value, solar energy transmittance through windows,* describes how well a window is able to let in the solar energy indoors. The bigger the g-value is, the more solar energy can used indoors. Usually, the better the U-value the lower the g-value is.

2.2 Product Types

The window types are different in different European countries. Typical window types in Finland are (Note: the types of windows may be different in each countries):

- MSE - a window with 2 sashes and 3 glasses
- MSK - a window with 3 sashes and 3 glasses
- SK - connected window with 2 frames
- MS - connected window with 2 frames
- SE - window with one sash, insulated glasing unit with 2 or three glasses
- SEK - a window with 2 sashes, 1 separate glass and 1 insulated glazing unit filled with gas (for example argon)
- MEK - fixed window with a glazing unit (2 or 3 glasses)

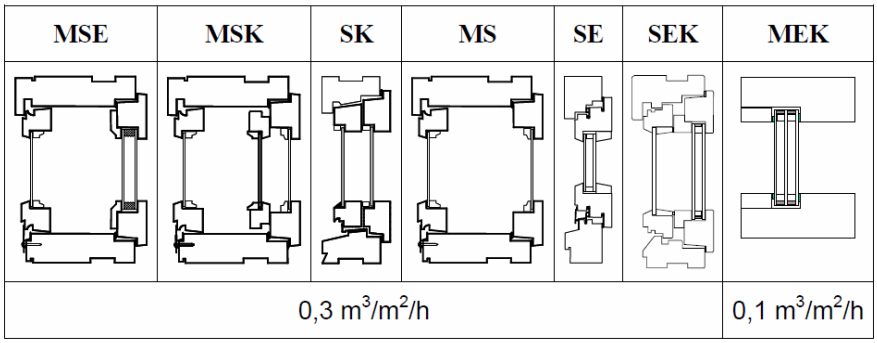


Figure 2 **Typical window types used in Finland and the values for air-tightness (if not measured).**

In Central Europe, a typical window structure includes:

- 1 sash
- Frame / sash is made of wood, plastic or aluminium
- 1 to 3 glasses
- Insulated glazing units are used in most energy-efficient windows

2.3 Best Available Technology

The most energy-efficient windows in the Finnish market have two insulating glazing units (total number of glasses is 4) with insulation gas inside. Alternatively, the window has one inulating glazing unit with three glasses with insulation gas inside.

The U-value of the best windows on the market is below 0,8 W/m²,K and the value of air tightness is less than 0,10 m³/m²,h.

Low emission layers

Low emission layer in the window glass is a transparent layer made of metal or metal oxide. The layer lets through selectively different wavelengths of radiation (light, heat). The low emission layer reduces heat radiation between the glasses thus reducing the heat losses. This means that the layer reduces the heat radiation from indoors to outside and it also reduces the heat radiation that gets indoors from the sun.

Insulated glazing units

A glazing unit is formed from two (or three) glasses that are separated with a spacer. The cavity between the glasses is filled with inert gas that moves slowlier than air. This decreases the heat transmission through the window. Argon, xenon and krypton are used as filling gases (argon most commonly used).

Air-tightness

Air tightness of the envelope of a house has a significant effect on the heat losses. It is important that the window and the installation is air-tight.

Solar gain (the g-value)

A window's ability to let in gain solar can be presented with g-value (range from 0 to 1). The lower the g-value, the less solar energy can be gained. Depending on the climate, solar gain may be desired or unwanted (Nordic countries vs. Southern Europe, heating versus cooling necessities).

Solar control glasses

In buildings with high internal load or in hot climates it is useful to reject solar radiation. This increases energy-efficiency by reducing the need for air-conditioning. With a layer that reflects the sun radiation, the need for cooling can be minimized.

Number of glasses

The heat losses of a window can be reduced by increasing the number of glasses (or insulated glazing units). In Finland, triple-glazing has been in use for decades and recently the first windows with 4 glasses have emerged on the market. It is very likely that the number of glasses will not increase after 4 because at this point increasing the number of glasses will not improve the energy efficiency.

Low conductive spacers

The material choice for the spacer between glasses has an effect on the conductive heat losses of a window. Sainles steel, TPS (Thermo Plastic Spacer) and plastic are in this sense better than aluminium, because aluminium conducts heat better than the other materials used.

New technologies

With vacuum glazing units, the conductive and conductance losses can be minimized. Such glazing units have been developed but they are not yet commercially available.

2.4 Current energy efficiency criteria for windows

Since there cannot be a single set of specificiations for windows valid for the whole of Europe, we hereafter present examples from countries which have been active on this issue.

2.4.1 The Finnish Building code (for new build)

At the moment (02/2009), the requirement for the U-value of windows is 1,4 W/m²,K. In the beginning of year 2010 new regulations state that the U-value may not be greater than 1,0 W/m²,K. The requirements for the insulation level of new buildings will be tightened further in year 2012.

Table 1 The development of U-value for windows in the Finnish Building Code.

Building Code	C3 1985	C3 2003	C3 2007	C3 2010 (from 1.1.2010)
Max U-value for windows	2,1 W/m²,K	1,4 W/m²,K	1,4 W/m²,K	1,0 W/m²,K
Typical solutions	3 frames, 3 glasses	Insulating glazing unit with low-emissivity layer + 1 separate glass		2 insulating glazing units with low-emissivity layer

For the existing buildings, there are no requirements, but usually one important reason for installing new windows is to improve the energy-efficiency of the building.

2.4.2 Other countries (new build)

The following table shows programmes on efficient windows, related labelling projects and the respective requirements on a worldwide scale.

Note: The table below is adopted from "Building regulation for Windows in European Countries" dated 1/3/2005. NB: The regulations in some of the countries have surely been changed since then.

Country	Window U-value for new buildings	Current standard practise
Austria	1,4 1,7 for public buildings	Low E double glazing and argon
Baltic States	-	Triple glazing or Low E double glazing
Belgium	3,5 (2,5 in Brussels region)	Double glazing (Low E double glazing)
Denmark	1,8	Low E double glazing
Finland	1,4	Triple (2+1) with Low E and argon
France	Total energy consumption with U-value limits (2,9)	Low E double glazing
Germany		Low E double glazing and argon
Greece	2,5 in the north, 3,0 in the south	Double glazing, increasingly moving to low E
Ireland	2,2	Low E (hard coat) double glazing
Italy	Volumetric	Double glazing in the north, single in the south
Luxembourg	2,0	Low E double glazing
Netherlands	Total energy consumption with U-value limits	Low E double glazing
Norway	1,6	Low E double glazing and argon

Poland	2,6	Low E double glazing
Portugal	Volumetric	Double glazing
Russia	1,8*	Low E double glazing or triple glazing
Slovakia	2.0 (for large buildings)	Double low E
Slovenia	1,6	
Spain	Volumetric	Double glazing
Sweden	Volumetric	Triple glazing, often low E and argon
Switzerland	Volumetric	Low E double glazing
UK	Metal windows 2.2, non-metal 2.0	Low E (hard coat) double glazing

Requirements in refurbishment

In many countries, for example in Finland, there are no requirements for the energy efficiency in refurbishment. However, there is more and more awareness about the importance of windows to improve the buildings' energy efficiency .

In Finland there is a subsidy for residential buildings with more than 3 apartments: if the U-value of the new window is 1,1 W/m²,K or less, the investment subsidy is 30 € per window-m². The subsidy has effectively changed the refurbishment market for windows.

Country	Window U-value for existing buildings	Conditions
Austria	1,4 whole window	Any window which is being replaced
Denmark	1,8	Any window which is replaced, (when a building permit is required)
Germany	1.7 whole window 1.5 glass	When 20% or more of windows in any façade are replaced
Poland	2.6	Any window which is being replaced
Ireland	2.2	Any window which is being replaced in houses
Netherlands	1.2 (glass)	
Poland	2,6	Low E double glazing
UK	Metal windows 2.2, non-metal 2.0	Any window which is being replaced

2.5 Voluntary energy labelling schemes

For windows, there is no European wide energy-labelling scheme as for example in domestic appliances. The SAVE project “European Window Rating System EWRS”

with participants from eight countries resulted in the full implementation of a rating system in two countries and a pilot project in two countries.

2.5.1 Finland

A voluntary labelling scheme, *Energiaikkuna* (www.energiaikkuna.fi "Energy Window") was launched in Finland in autumn 2006. Eight major Finnish window manufacturers participated a pilot project where the national labelling system was developed. When the labelling system was launched, there were about 200 windows from eight manufacturers (all the companies that participated the pilot project).

In summer 2008 a Finnish manufacturer *Skaala Ikkunat ja Ovet Oy* www.skaala.fi launched a new production line of energy efficient windows with a massive marketing campaign. The other companies followed and the number of windows with energy label increased significantly and at the moment (July 2009), there are about 470 windows with energy label from 10 manufacturers. After the launch of the labelling system, new technical solutions have emerged on the market: now there are windows that have even four glasses. The energy-label of windows has become an important marketing argument for the companies.

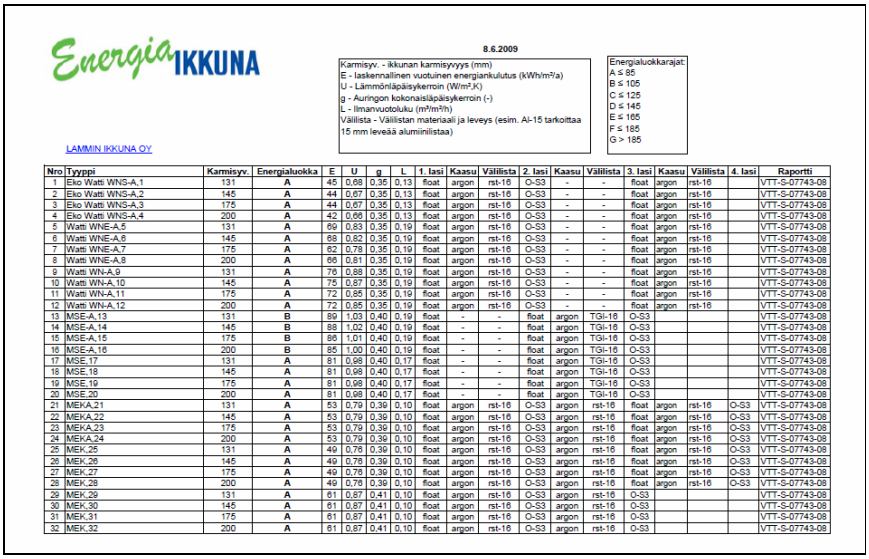
If a company wants to rate windows, it has to make calculations or measurement with a neutral party that has been accepted by the energy-labelling committee of windows. At the moment, there is only one organisation that has been accepted (VTT Technical Research Centre of Finland). Interest has been shown from other organisations as well and it is very likely that by the end of 2009 there will be at least one other approved organisation for measurements and calculations.

The calculations and measurements are made for a specified test window (size 110 mm × 1190 mm). After the tests, the company sends an application for the test results to the secretariat (Motiva Oy), who checks it and prepares all the applications to the labelling committee of windows. The labelling committee consists of representatives from:

- Confederation of Finnish Construction Companies (chairman of the committee)
- Puutuoteteollisuus ry; the association for wooden building products
- The Ministry of Environment
- The Finnish Real Estate Federation; the central association of property owners and landlords
- Suomen Omakotiliitto ry; the association of single-family house owners
- Motiva Oy (the secretariat)

- VTT Technical Research Centre of Finland (expert member)

The labelling committee accepts or rejects the applications. After this, the secretariat publishes summary tables of the accepted windows for each company at the website www.energiaikkuna.fi . The secretariat also prepares individual printable energy labels for each window for the manufacturers.



EnergiaIKKUNA

8.6.2009

Karmisyv. - ikkunan karmisyvyys (mm)
E - laskennallinen vuotuinen energiankulutus (kWh/m²a)
U - Lämmönläpäisykerroin (W/m²,K)
g - Auringon kokonaisläpäisykerroin (-)
L - Ilmanvuotoluku (m³/m²h)
Välilista - Välilistan materiaali ja leveys (esim. Al-15 tarkoittaa 15 mm leveää alumiinilistaa)

Energialuokkarajat:
A ≤ 85
B ≤ 105
C ≤ 125
D ≤ 145
E ≤ 165
F ≤ 185
G > 185

LÄMMIN IKKUNA OY

Nro	Tyyppi	Karmisyv.	Energialuokka	E	U	g	L	1. lasi	Kaasu	Välilista	2. lasi	Kaasu	Välilista	3. lasi	Kaasu	Välilista	4. lasi	Raportti
1	Eko Watti WNS-A,1	131	A	45	0,68	0,35	0,13	float	argon	rst-16	O-S3	-	-	float	argon	rst-16		VTT-S-07743-08
2	Eko Watti WNS-A,2	145	A	44	0,67	0,35	0,13	float	argon	rst-16	O-S3	-	-	float	argon	rst-16		VTT-S-07743-08
3	Eko Watti WNS-A,3	175	A	44	0,67	0,35	0,13	float	argon	rst-16	O-S3	-	-	float	argon	rst-16		VTT-S-07743-08
4	Eko Watti WNS-A,4	200	A	42	0,66	0,35	0,13	float	argon	rst-16	O-S3	-	-	float	argon	rst-16		VTT-S-07743-08
5	Watti WNE-A,5	131	A	69	0,83	0,35	0,19	float	argon	rst-16	O-S3	-	-	float	argon	rst-16		VTT-S-07743-08
6	Watti WNE-A,6	145	A	68	0,82	0,35	0,19	float	argon	rst-16	O-S3	-	-	float	argon	rst-16		VTT-S-07743-08
7	Watti WNE-A,7	175	A	62	0,78	0,35	0,19	float	argon	rst-16	O-S3	-	-	float	argon	rst-16		VTT-S-07743-08
8	Watti WNE-A,8	200	A	66	0,81	0,35	0,19	float	argon	rst-16	O-S3	-	-	float	argon	rst-16		VTT-S-07743-08
9	Watti WN-A,9	131	A	76	0,88	0,35	0,19	float	argon	rst-16	O-S3	-	-	float	argon	rst-16		VTT-S-07743-08
10	Watti WN-A,10	145	A	75	0,87	0,35	0,19	float	argon	rst-16	O-S3	-	-	float	argon	rst-16		VTT-S-07743-08
11	Watti WN-A,11	175	A	72	0,85	0,35	0,19	float	argon	rst-16	O-S3	-	-	float	argon	rst-16		VTT-S-07743-08
12	Watti WN-A,12	200	A	72	0,85	0,35	0,19	float	argon	rst-16	O-S3	-	-	float	argon	rst-16		VTT-S-07743-08
13	MSE-A,13	131	B	89	1,03	0,40	0,19	float	-	-	float	argon	TGI-16	O-S3				VTT-S-07743-08
14	MSE-A,14	145	B	88	1,02	0,40	0,19	float	-	-	float	argon	TGI-16	O-S3				VTT-S-07743-08
15	MSE-A,15	175	B	86	1,01	0,40	0,19	float	-	-	float	argon	TGI-16	O-S3				VTT-S-07743-08
16	MSE-A,16	200	B	85	1,00	0,40	0,19	float	-	-	float	argon	TGI-16	O-S3				VTT-S-07743-08
17	MSE,17	131	A	81	0,98	0,40	0,17	float	-	-	float	argon	TGI-16	O-S3				VTT-S-07743-08
18	MSE,18	145	A	81	0,98	0,40	0,17	float	-	-	float	argon	TGI-16	O-S3				VTT-S-07743-08
19	MSE,19	175	A	81	0,98	0,40	0,17	float	-	-	float	argon	TGI-16	O-S3				VTT-S-07743-08
20	MSE,20	200	A	81	0,98	0,40	0,17	float	-	-	float	argon	TGI-16	O-S3				VTT-S-07743-08
21	MEKA,21	131	A	53	0,79	0,39	0,10	float	argon	rst-16	O-S3	argon	rst-16	float	argon	rst-16	O-S3	VTT-S-07743-08
22	MEKA,22	145	A	53	0,79	0,39	0,10	float	argon	rst-16	O-S3	argon	rst-16	float	argon	rst-16	O-S3	VTT-S-07743-08
23	MEKA,23	175	A	53	0,79	0,39	0,10	float	argon	rst-16	O-S3	argon	rst-16	float	argon	rst-16	O-S3	VTT-S-07743-08
24	MEKA,24	200	A	53	0,79	0,39	0,10	float	argon	rst-16	O-S3	argon	rst-16	float	argon	rst-16	O-S3	VTT-S-07743-08
25	MEK,25	131	A	49	0,76	0,39	0,10	float	argon	rst-16	O-S3	argon	rst-16	float	argon	rst-16	O-S3	VTT-S-07743-08
26	MEK,26	145	A	49	0,76	0,39	0,10	float	argon	rst-16	O-S3	argon	rst-16	float	argon	rst-16	O-S3	VTT-S-07743-08
27	MEK,27	175	A	49	0,76	0,39	0,10	float	argon	rst-16	O-S3	argon	rst-16	float	argon	rst-16	O-S3	VTT-S-07743-08
28	MEK,28	200	A	49	0,76	0,39	0,10	float	argon	rst-16	O-S3	argon	rst-16	float	argon	rst-16	O-S3	VTT-S-07743-08
29	MEK,29	131	A	61	0,87	0,41	0,10	float	argon	rst-16	O-S3	argon	rst-16	O-S3				VTT-S-07743-08
30	MEK,30	145	A	61	0,87	0,41	0,10	float	argon	rst-16	O-S3	argon	rst-16	O-S3				VTT-S-07743-08
31	MEK,31	175	A	61	0,87	0,41	0,10	float	argon	rst-16	O-S3	argon	rst-16	O-S3				VTT-S-07743-08
32	MEK,32	200	A	61	0,87	0,41	0,10	float	argon	rst-16	O-S3	argon	rst-16	O-S3				VTT-S-07743-08

Figure 3 **An example of a summary table in the Finnish labelling system.**

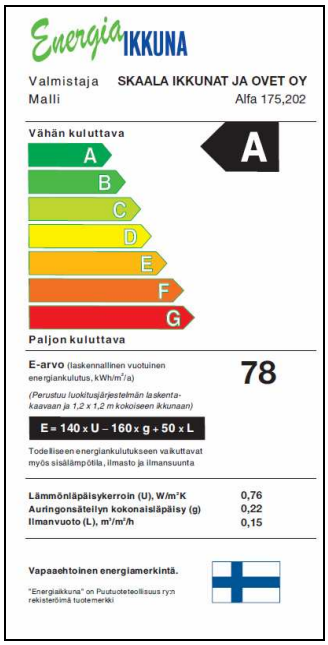


Figure 4 **An example of a energy label for windows in the Finnish labelling system.**

The energy-efficiency of windows is compared according to the calculated annual energy consumption (*E-value*). The E-value describes how much energy is lost through a 1 m²-window during a year. The E-value is used for comparison and it should give a general idea of the energy efficiency of windows. The E-value is calculated from the U-value (thermal conductivity, W/m²,K), g-value (solar energy transmittance through windows) and L-value (air tightness, m³/m²,h) with the following formula:

$$E = 140 \times U - 160 \times g + 50 \times L$$

It is important to note that the formula takes into account the solar gain from the windows (the g-value).

Table 2 Scale for energy classes used in Finland

Energy class	A	B	C	D	E	F	G
E-value (kWh/m² a)	E < 85	< 105	< 125	< 145	< 165	< 185	≥ 185

2.5.2 Denmark

In the Danish labeling system, http://www.energimarkning.dk/, there are three energy classes: A, B and C.

The energy balance of a window is calculated with a formula[1]:

$$E_{ref} = 196{,}4 \times g - 90{,}36 \times U$$

E_{ref}, the energy balance defines the windows energy class:

- Class A: $E_{ref} > 20{,}0$ kWh/m²
- Class B: 10 kWh/m² < E_{ref} < 20,0 kWh/m²
- Class C: $E_{ref} > 20{,}0$ kWh/m²

Windows with negative energy balance will not get an energy label.

Figure 5 An example of a Danish energy mark for windows

[1] Energimærkning - Tekniske Bestemmelser for ruder, Januar 2008

2.5.3 Sweden

The Swedish labeling system www.energifonster.nu shows the U-value and also shows how much daylight and solar energy pass through the window. The U-value has to be measured or calculated by a neutral test laboratory.

The fact that a window is energy efficient does not guarantee good quality. An important feature of the Swedish labelling system is that it can take also the quality of the windows into account. A window that has passed a number of quality tests gets an EQ-label.

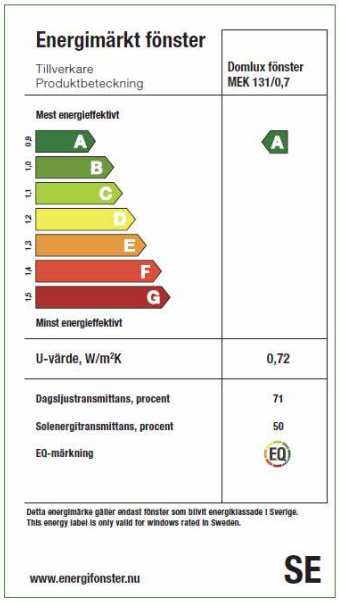


Figure 6 The Swedish energy label for windows and the EQ - quality mark.

There are rated windows from 14 manufacturers

2.5.4 The UK

The BFRC Scheme www.bfrc.org is the UK's national system for rating the energy efficiency of windows and is recognized within the Building Regulations as a method to show compliance for replacement windows installation.

The label displays the following information:

- The rating level

- The energy rating for example -3 kWh/(m²·*K*) in this example the product will lose 3 kilowatt hours per square meter per year
- The U-value
- The effective heat loss due to air penetration as *L*
- The solar heat gain (the g-value)

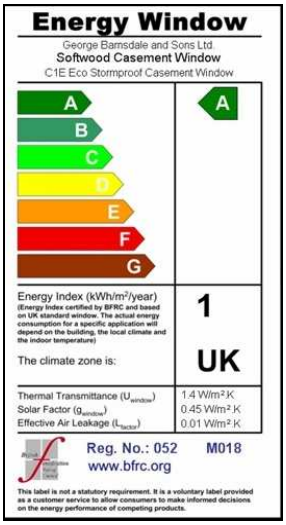


Figure 7 The energy label for windows in the UK.

2.6 Criteria of topten Finland

On Topten Finland, windows are divided into two categories. The E-value calculated in the Finnish energy rating system is used as criteria. The max. **E-value** for both openable and fixed windows is **60 kWh/m²,a.**

The criteria have been chosen so that it limits the number of Topten-windows in each category to 10-20 pcs. As the offer of energy-efficient windows has improved during the last two years, the criteria has been tightened (former criteria for both categories was max E-value 80 kWh/m²,a).

2.7 Test Standards

The following standards are relevant for the assessment of the energy consumption of windows.

> EN ISO 10077-2 Thermal performance of windows, doors and shutters. Calculation of thermal transmittance. Part 2: Numerical method for frames (ISO 10077-2:2003)). confirmed 2003-12-22. 30 p.

EN 673 Glass in building. Determination of thermal transmittance (U value). Calculation method. 18 p.

EN ISO 10077-1 Thermal performance of windows, doors, and shutters. Calculation of thermal transmittance. Part 1: Simplified method. Confirmed 2000-12-22. 60 s. / p.

EN 410 Glass in building. Determination of luminous and solar characteristics of glazing. Confirmed 1998-11-30. 39 p.

EN ISO 12567-1 Thermal performance of windows and doors. Determination of thermal transmittance by hot box method. Part 1: Complete windows and doors (ISO 12567-1:2000). Confirmed 2000-12-22. 49 p.

EN 1026 Windows and doors. Air permeability. Test method. Confirmed 2000-12-22. 9 p.

3 Market data

3.1 Sales data

Finland

The total window market in Finland is approximately 1,25 million unit per year (2008). The estimated value of the market with consumer prices is about 370 M€ (the exact value is unknown). The market is divided into two segments that are roughly the same size: new buildings and renovation.

The average size of a window is about 1 m², so annually about 1,25 million-m² window area is installed in Finland[2].

In Finland there are less than 100 window manufacturers. To most significant national manufacturers belong companies like Fenestra Oy www.fenestra.fi , Eskopuu Oy, Tiivituote Oy www.tiivi.fi, Skaala Ikkunan ja Ovet Oy www.skaala.fi .

Europe

In 2006 the size of European window market was about 76 million units and the value of the market was estimated to be about 18,3 milliard Euros.

3.2 Prices[3]

In Finland, the current U-value requirement for windows is 1,4 W/m²,K. A window with U-value 1,1 increases investment costs only by 10 %. As the energy efficiency further improves from this point, the cost rise significantly. The price difference between a window with U-value 1,4 W/m²,K and a window with U-value 1,0 W/m²,K is about 20 %. A window with U-value 0,8 W/m²,K is at the moment roughly 30-40% more expensive than a window with U-value 1,4 W/m²,K.

3.3 Effect on Energy Consumption

It has been estimated that the energy saving potential in the European housing stock is more than 400 TWh per year[4]. The saving potential is twice that much if the windows were upgraded to more energy efficient windows.

[2] Loukasmäki: Puutalojen ja rakennuspuusepäntuotteiden valmistus, Toimialaraportti 1/2008 / TEM, MMM, Työ- ja elinkeinokeskus, Finpro, Matkaislun edistämiskeskus

[3] Interview with researcher Kari Hemmilä from VTT technical Research Centre of Finland 10.8.2009

[4] "The European window energy labelling challenge", ECEE 2007 Summer Study, Diana Avasoo/ WSP Environmental, Sweden

3.4 Trends

As the energy price rises the pay-back time for energy-efficient windows becomes shorter.

In Finland, the demand for energy efficient window has raised significantly and a Finnish window manufacturer Skaala Ikkunan ja Ovet Oy has announced that about 50% of the windows sold can be categorized as energy-efficient windows.

Because of the economic resession, the importance of refurbishment has become more and more important for the window manufacturers.

3.5 Manufacturers

The window market in European countries is typically dominated by local companies. This is the case for example in the Nordic countries. Windows are exported abroad mainly in Central Europe. The reason for this is that the window types used and the window culture is different in European countries.

The window market is typically dominated by national companies due to different regulations and climate. However, there are large European glass and glazing unit manufacturers like Pilkington (www.pilkington.com), Saint Gobain Glass (www.uk.saint-gobain-glass.com), AGC Flat Glas Europe (www.agc-flatglass.eu, earlier name Glacverbel) and Euroglas (www.euroglas.com) operate all in several countries in Europe.

There are also companies that are specialized in processing flat glass with different kinds of layers (for example Interpane Glas Industrie AG www.interpane.com).

4 Topten Selection Criteria

4.1 Energy Efficiency Criteria

The following criteria should be taken into account at least – but the maximum values are to be established by naional experts:

- Thermal transmittance, the U-value
- Solar gain, the g-value
- Air-tightness, the L-value

For the consumer it would be useful if the windows effect on the energy consumption would be presented in a clear, understandable way to motivate them to choose an energy-efficient product instead of a product that only fulfills the minimum legal requirements.

The characteristics of a window should be tested by a neutral test laborary according to European standards.

4.2 Quality related product features

Additionally, the quality label used in the Swedish labelling system would benefit to the customer. The primary customer's need is to have reliable windows -energy efficiency being one criteria among others.

5 Additional Considerations

The direction and shading of windows

In the Nordic countries, it has been recommended for many years, that large window areas should be faced to south in order to gain as much light and heat as possible from the sun. As the thermal performance of windows has improved, this is no longer obvious. Also, as the low-energy buildings and passive houses become more popular, also the need for cooling (or avoiding it) in the summertime has to be taken into account for example with shades and eaves constructions.

Condensing

With a very well insulated window it may occur in some circumstances, that water is condensated on the outer face of the glas. This is a sign that the window has very good thermal qualities. This phenomenon has to be explained to the customers in order to avoid unnecessary reclamations.