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Window Energy Data Network

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WIS DATABASE

Data Submission Procedure for Glass and Coatings (non-scattering) Glazing Products

Version 1.0

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1 BACKGROUND

WinDat is a European RTD Thematic Network (2001-2004). It aims to make available and freely distribute a European software tool (WIS) for the calculation of the thermal and solar properties of commercial and innovative window systems on the basis of known component properties and thermal and solar/optical interactions between the components. It is intended that this tool will be collectively supported and used in research, industry, standardisation, education and design throughout Europe. WIS will be used to compare, select and promote innovative windows and window components for the optimum use of renewable energy and maximised energy savings and indoor comfort.

European glass and glazing manufacturers submit sets of spectral data files on commercially available non-scattering glazings. These data are reviewed within WinDat to enable population of the WIS database with comprehensive sets of certified component data.

This document provides instructions to European manufacturers on the procedures to be followed when submitting information about non-scattering glass and glazing products for inclusion in the WIS database. This document was developed from consultation and review within the WinDat Thematic Network [12],[13]. Data are submitted to Oxford Brookes University (Brookes), the coordinator of WinDat WP2.1 Glass and Coatings (Non –Scattering) Glazing Products subgroup (GCNS). Data received from European manufacturers are subject to review by the members of the GCNS Peer Review Group. The membership of this group is given in Appendix 1. This Data Submission Procedure document should be read together with the associated WIS Database Verification Procedure for Glass and Coatings (non –scattering) Glazing Products Data [5] which addresses issues directly pertinent to the quality of data stored.

Procedures for the submission to the WIS database of data on scattering materials and solar protection devices and edge constructions and window frame profiles are defined separately [6], [11].

Data submission to the International Glazing Database (IGDB), maintained by the Lawrence Berkeley National Laboratory (LBNL), USA, can be done directly to LBNL or through Oxford Brookes University. Brookes acts as the European Data Reception Institute for IGDB. Data submission to IGDB through Brookes is explained in section 5 of the WIS Database Verification Procedure for Glass and Coatings (non –scattering) Glazing Products Data [5].

The WinDat instructions described herein are designed to be compatible with the data submission procedures required for IGDB [1],[8]. Much of the text of this document has been derived from the LBNL International Glazing Database Data Submission Procedure [1] and LBNL International Glazing Database: Data File Format [8].

Neither the European Commission, nor TNO, nor the other members of the WinDat Steering Committee makes any warranty, expressed or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information obtained with the WIS software.

2 SCOPE OF GLAZING PRODUCTS COVERED AND DEFINITION OF THE TERMS

2.1 TYPE OF GLAZING PRODUCTS

The types of glazing products covered in this document include:

- Glazings with specular reflection and transmission. These can be monolithic glazings, coated glazings, laminates, applied films, interlayers
- Glazings which are slightly diffusing, where the diffusivity is the result of internal homogenous dispersion properties only
- Dynamic glazing (Electrochromic, gasochromic etc)

The types of glazing products not covered in this document include: (this list is not exhaustive):

- Glazings that are not plane parallel, such as lenses
- Glazings that are dispersing, such as prisms
- Glazings that are polarizing
- Glazings that are highly diffusing
- Complex glazings, usually characterized by BTRF, such as with Venetian blinds
- Glazings with macroscopic patterns

2.2 DEFINITIONS

Glazing product: A reference to the pane itself, it is not the name of an IGU incorporating the pane.

Glass substrate: A basic glass, thermally toughened safety glass, thermally toughened borosilicate glass, heat strengthened borosilicate glass, laminated glass, or laminated safety glass. [2].

Coating: One or more thin solid layers of inorganic materials applied on to the surface of a glass substrate by various method of deposition. The properties of a coating cannot be considered separately from those of the glass substrate to which is attached. The coating-glass substrate is the finished product, i.e. the coated glass [2].

Dynamic Glazing: A switchable glazing with reversible optical properties (Spectral optical properties data must be submitted as 2 files for the fully bleached and fully coloured states respectively). (Future Option)

Types of glazing

Type Monolithic: A homogeneous uncoated 'slab' of material. This may be a substrate or component of another glazing.

Type Coated: A Coated glazing is a monolithic substrate with thin- film coating deposition on it.

Type Applied Film: An applied film glazing is an adhesive backed film applied to a monolithic substrate.

Type Laminate: A combination of Monolithic and/or Coated glazing layers and adhesive interlayers. May have coatings on outside and/or internal interfaces.

3 PROPERTIES REQUIRED

The following tables give the required number of fields (shown in bold fonts) that should be included in the file header of the supplied spectral data files for inclusion in theWIS database.

The properties requiring definitions may vary depending on components but can be grouped into four classes: *product identifiers*, *geometrical*, *optical and thermal* and *other*. The required number of fields that should be included in the file header of the supplied spectral data files depends on the type of glazing. Examples are given in Section 5. The format of the spectral data is described in Section 3.3 and the header format in Section 4.

The properties definitions and the corresponding information required in the file header are shown in Table 1. Fields that are compulsory are indicated by [c].

Table 1. Product identifiers

Field Name	[c]	Definition	Comments
Manufacturer	**c**	**The name of the company manufacturing the product**	
Product name	**c**	**Trade name or product code**	**Free to choose**
Type	**c**	**One of the categories given in 2.1**	**Defined in 2.2**
Material	**c**	**The material that the glazing is made of.**	**See** Table 2**.**
Coated Side	**c**	**Indicates which surfaces are coated, if any.**	**See** Table 2
Coating class	**c**	**Classification of coated glass products according to EN 1096**	**The value is set as a combination of two letters AU, UC etc. The position of the letters in the combination should correspond to the data orientation in the text file and the coated side. Defined in Section 4.2.13 and** Table 2**.**
Appearance		**Terms related to product appearance indicating colour etc.**	**Free text up to 255 characters. Displayed for information only.**

Table 2. Header field values as a function of the field "Type" of glazing

Type	**Applies to:**	**Material**	**Coating Class***	**Coated Side**
Monolithic	Monolithic uncoated only	Glass, PVB, Polycarbonate, Acrylic, Pet, N/A	UU	Neither
Coated	Monolithic coated only	N/A	AU, UC etc	Front, Back, Both
Applied Film	Applied Film	N/A	AU, UC etc	Front, Back, Both Neither
Laminate	Uncoated Laminate	N/A	UU	Neither
	Coated Laminate		AU,UC etc	Front, Back, Both

* The definitions of the coating class are given in Section 4.2.13.

3.1 GEOMETRICAL INFORMATION

The only geometrical information needed is Thickness.

Table 3.. Geometrical information

Field name	[c]	Definition	Comments
Thickness	**c**	**The exact, measured when possible, thickness of the entire glazing in mm..**	**When possible, shall be the exact measured thickness of the sample that was used to measure the spectral data, not the nominal thickness.**

3.2 OPTICAL PROPERTIES

The required optical data should be supplied in the form of a text file with file header.

The spectral data text files should be given filenames with extension of maximum 3 digits. There is no restriction of the length of the filenames (up to 255 characters). The extension could be chosen by the manufacturer to reflect the manufacturer name.

The contents and format of the spectral data in the text file are described below. The file header format is given in Section 4.

The required optical properties in the file header are given in Table 4.

Table 4. . Optical properties

Field name	[c]	Definition	Comments
Units, Wavelength Units	**c**	**System of units used for thickness and conductivity and system of units used for wavelengths.**	**Units must be: *SI(mm),* Wavelength Units must be chosen from: *Nanometers, Microns***
Conductivity	**c**	**Thermal conductivity of the glazing in $W \cdot m^{-1} \cdot K^{-1}$ for SI Units,**	**A generic value is highly recommended.**
IR Transmittance		**The thermal infrared transmittance of the glazing.**	**All glass-based layers have a TIR of zero. Only very thin uncoated polymers have a non-zero TIR.)**
(Emissivity, front back)	**c**	**The thermal hemispherical emittance/Corrected Emissivity value of the surfaces of the glazing. The first value corresponds to the side of the glazing with data in Column 3(front), the second value to the data in Column4(back) respectively. (Section 3.4, Table 5)**	**When the specified surface is uncoated a generic value is highly recommended.**
Angle of Incidence		**Angle of incidence for transmittance and reflectance data**	**Near normal incidence is assumed if no entry is made**

3.3 SPECTRAL DATA FORMAT

3.3.1 SPECTRAL DATA – ORIENTATION IN THE TEXT FILE

The spectral data shall be given in four columns with four values on each line each separated by a space, a tab or a comma according to Table 5

Table 5. Spectral data format

Column Number (left to right)	Column name	Content	Comments
1	Wavelength	Wavelength	The column name **is not** included in the data file.
2	Transmittance	Measured near normal specular transmittance of the glazing	
3	Front	Measured near normal specular reflectance of one side of the glazing	
4	Back	Measured near normal specular reflectance of the other side of the glazing	

Note: The column name **is not** included in the data file. The reference to this name is used to link the properties like Coated side and Emissivity in the file header with the position of the corresponding data in the text file. For example: If the reflectance data for the coated side of the product is in Column 4, the entries in the file header for the field Coated side, given below should be equivalent:

{Coated side: Back}↔ {Coated Side: Surface 2}. ↔ {Coated side: indoor}

The names "front" and "back" by convention make association with a possible orientation of the product in normal use. The link between column position of the data and the respective information in the file header is established by naming the columns by convention.

The front side is defined as the side of the glazing normally facing exterior.

The back side is defined as the side of the glazing normally facing interior.

By convention, the spectral data and other information are presented so that the glazing is orientated in its 'usual' fashion. The following schemes are usually equivalent:

- front ↔ outside ↔ surface 1
- back ↔ inside ↔ surface 2

3.3.2 MAXIMUM WAVELENGTH INTERVAL

- The measured data shall start preferably at a wavelength of 280 nanometers (or 0.28 microns). It could start from 300 nanometers.
- The measured data shall end at a wavelength of 2 500 nanometers (2.5 microns) or at a wavelength of at least 25 000 nanometers (25 microns). The preferred maximum wavelength is 50000 nanometers (50 microns).

The maximum wavelength interval needed in each part of the solar spectrum is defined according to Table 6

Table 6. . Maximum wavelength intervals

Wavelength Range (nm)	Maximum Wavelength Interval (nm)
280-400	5
400-1000	10
1000-2500	50
2500-5000*	- no requirement -
5000- 25000+*	1000

* - The WIS database does not use the spectral data to determine the emissivity. The data submitter should always provide emissivity values.

3.3.3 FORMAT OF NUMBERS

- Fractional numbers in the data file use a point (.) as the decimal separator.
- All values shall be given in 3 significant digits (examples: 0.302 or 0.094)
- Do not use scientific notation (such as 3E—2)

3.3.4 SPECTRAL DATA - GENERAL REQUIREMENTS

- In principle, all data should be physically correct:
    - All transmittance, reflectance and emittance values shall be between 0 and 1. However, values just outside these regions (e.g. due to measurement noise) may be allowed. This will be decided through the data review process
    - For each wavelength transmittance plus reflectance shall be less than or equal to 1.
- The spectral data files should be given filenames with extension of maximum 3 digits. There is no restriction of the length of the filenames (up to 255 characters). The extension could be chosen by the manufacturer to reflect the manufacturer name.

4 HEADER DATA FORMAT

4.1 INTRODUCTION

The header in the text file consists of two parts.

- **Units, Wavelength Units**
- **Thickness**
- **Conductivity**
- **IR Transmittance**
- **Emissivity, Front Back**

The format of each line in this part is typically given by:

{ Keyword } Value

Note that each line consists of one or more keywords between curly brackets, followed by the values belonging to these keywords. These lines must be included *in the order shown* (but may have other lines between them).

The second part contains the following information and may be given in any order.

Product Name

- **Manufacturer**
- **Type**
- **Material**
- **Coated Side**
- **Angle of Incidence**
- **Appearance**
- **Coating class**

The format of these lines is usually given by

{ Keyword: Value}

4.2 HEADER FORMAT DESCRIPTION

4.2.1 UNITS, WAVELENGTH UNITS

Definition: System of units used for thickness and conductivity and system of units used for wavelengths.

Field Name (Keyword)	Format	Value
Units, wavelength units	text	Units: SI Wavelength units: can be chosen from Nanometers or Microns

Header line examples:

```
{ Units, Wavelength Units } SI Microns
{ Units, Wavelength Units } SI Nanometers
```

4.2.2 THICKNESS

Definition: When possible, the exact measured thickness of the entire glazing in mm.

Field Name (Keyword)	Format	Value
Thickness	Number	Greater than 0.0

Header line examples:

```
{ Thickness } 2.997
{ Thickness } 0.500
```

4.2.3 CONDUCTIVITY

Definition: Thermal conductivity of the glazing in $W \cdot m^{-1} \cdot K^{-1}$ for SI Units.

Field Name (Keyword)	Format	Value
Conductivity	Number	Greater than 0.0

Remarks:
In the case of generic materials such as glass, the standard values for conductivity should be used. These values are tabulated in EN 12524:2000, NFRC 101:2001 and EN673 [10], [9], [3].
The standard values for conductivity according to those standards are:

For regular float glass: 1.000 W .m $^{-1}$·K $^{-1}$.

For high density PET (polyethylene/polyethene): 0.500 $W \cdot m^{-1} \cdot K^{-1}$

For low density PET (polyethylene/polyethene) : 0.330 . $W \cdot m^{-1} \cdot K^{-1}$.

For PVB (polyvinyl butyral): 0.212 $W \cdot m^{-1} \cdot K^{-1}$

For all other materials the reference to EN 12524:2000 or NFRC 101:2001 should be made [10],[9].

The conductivity value of laminates may be calculated with the following formula, when the conductivity and thickness of each layer are known:

$$k_{lam} = \frac{d_{lam}}{\sum_i d_i / k_i} \quad or \quad k_{lam} = \frac{\sum_i d_i}{\sum_i d_i / k_i}$$

where
k_{lam} is the thermal conductivity of the laminate
k_i is the thermal conductivity of the i-th layer
d_{lam} is the thickness of the laminate
d_i is the thickness of the i-th layer
$\sum$ means the sum of

Header line examples:

```
{ Conductivity } 1
{ Conductivity } 0.180
```

4.2.4 IR TRANSMITTANCE

Definition: The thermal infrared transmittance of the glazing

Field Name (Keyword)	Format	Value
IR transmittance	Number	Between 0.0 and 1.0

Header line examples:

```
{ IR Transmittance } TIR=0
{ IR Transmittance } TIR=0.100
```

4.2.5 EMISSIVITY, FRONT BACK

Definition: The thermal hemispherical emissivity value of the surfaces of the glazing. The first value corresponds to the side of the glazing with data in column 3(front) , the second value to the data in column 4(Back) respectively (Table 4, Table 5).

Field Name (Keyword)	Format	Value
Emissivity, **Front Back**	Numbers separated by space	between zero and one

Remarks: When the specified surface is uncoated a generic value is highly recommended.

For example: according to EN 673 the emissivity value for uncoated glass is specified as 0.837.
For most other generic materials a value of 0.9 is specified in the EN 12524 and NFRC 101:2001.

The values of corrected emissivity are mandatory and shall be determined according to EN673.

The emissivity value should be hemispherical or corrected emissivity (EN673).

Header line examples:

```
{ Emissivity, Front Back } Emis=0.837 0.837
{ Emissivity, Front Back } Emis=0.9 0.9
```

4.2.6 ANGLE OF INCIDENCE

Definition: Angle of incidence for the transmittance and reflectance data.

Field Name (Keyword)	Format	Value
Angle of incidence	Number	0, 30, 60

Remark: If no entry is made or the value is set to 0 a Near Normal Angle of Incidence is assumed.

Header line examples:

```
{Angle of Incidence} 30
{Angle of Incidence} 60
```

4.2.7 PRODUCT NAME

Definition: Trade name or product code of the glazing

Field Name (Keyword)	Format	Value
Product name	Text, maximum 50 characters	Free to choose.

Remarks: Do not include if possible other information (like thickness, colour, etc) than just the product name. Other fields, e.g. Thickness & Appearance shall be used to store thickness, colour, etc.
The trade name or product code does not need to be unique – for example, all glazings of the same product type but different thickness can have the same product name. Some manufacturers may prefer to have the thickness included in the product name.
The field is not compulsory but is highly recommended.

This value is displayed for information only

Header line examples:

```
{ Product Name: Activ™ on Clear }
{ Product Name: Your Product Name }
```

4.2.8 MANUFACTURER

Definition: The name of your company

Field Name (Keyword)	Format	Value
Manufacturer	Text	Free to choose.

Remarks: The name shall be exactly the same for all submitted data files. This is to avoid products from the same manufacturer being listed under two different (but nearly identical) manufacturer names, such as "ABC ltd." & "ABC Ltd."

Header line examples:

```
{ Manufacturer: Guardian Europe }
{ Manufacturer: Glaverbel S.A. }
```

4.2.9 TYPE

Definition: Type of glazing (e.g. monolithic, coated, laminate, etc.). The type of glazing is defined in Section 2.2 and Table 2.

Field Name (Keyword)	Format	Value
Type	Text	Pick from the list below

Remarks: The glazing type shall be chosen from the following list:

Monolithic
Coated
Applied Film
Laminate

Header line examples:

{ Type: Coated }
{ Type: Laminate }

4.2.10 MATERIAL

Definition: Material that this product consists of

Field Name (Keyword)	Format	Value
Material	Text	Depends on the Type of glazing (see Table 2)

Remarks: This field is used for Monolithic glazing products only and shall be picked from the following list. It shall be equal to *N/A* for all other types of glazing products.

Glass
PVB
Polycarbonate
Acrylic
PET
N/A

If a product is made from a material not listed above, choose N/A

Header line examples:

{ Material: Glass }
{ Material: N/A }

4.2.11 COATED SIDE

Definition: For *Coated* type glazings: indicates which surface(s) is (are) coated, if any.
For *Applied Film* type glazings: indicates the surface the film is applied to.
For *Laminate* type glazings: indicates which outer surfaces are coated, if any.

Field Name (Keyword)	Format	Value
Coated side	Text	Depends on the Type of glazing (see Table 2)

Header line examples:

```
{ Coated Side: Front }
{ Coated Side: Neither }
```

4.2.12 APPEARANCE

Definition: Terms related to product appearance indicating colour etc – do not include information on usage or product name

Field Name (Keyword)	Format	Value
Appearance	Text, less than 255 characters	Colour etc.

Remarks: Displayed for information only.

Examples:

```
{ Appearance: Clear }
{ Appearance: Blue-Green }
```

4.2.13 COATING CLASS

Definition: Classification of coated glass products according to EN 1096 [2].

Header line Num	Field Name (Keyword)	Format	Value
20	Coating class	Text – combination of two letters	Depends on the Type of glazing (see Table 2)

The value is set as combination of two letters AU or UC or etc. The position of the letters in the combination should correspond to the data orientation in the text file and the coated side.

The letters A, B, C, D, S, X denote the coating class.

The letter U denotes that the surface of the glass is uncoated.

The coating class should be chosen from the list below:

Class A: The coated surface of the glass can be positioned on the outer or inner face of the building.
Class B: The coated glass can be used as monolithic glazing but the coated surface shall be on the inner face of the building.
Class C: The coated glass shall be used only in sealed multiple glazing units and the coated surface should be facing into the unit cavity.
Class D: The coated glass shall be incorporated into sealed units, with the coated surface facing into the unit cavity, as soon as they are coated. They are not available as monolithic glass.
Class S: The coated surface of the glass can be positioned on the outer or the inner face of the building but these types of coated glasses can only be used in specifically defined applications e.g. shop fronts.
Class X: The coated surface of the glass is of an unspecified type.

Header line examples:

```
{ Coating class: AU}
{ Coating class: UU}
{ Coating class: UX}
```

5 EXAMPLES OF WIS SPECTRAL DATA FILES

Example 1: A monolithic glazing product: with transmittance and reflectance measured at 30° angle of incidence.

{ Units, Wavelength Units } SI Microns
{ Thickness } 2.997
{ Conductivity } 0.187
{ IR Transmittance } TIR=0
{ Emissivity, Front Back } Emis= 0.9 0.9
{ }
{ Product Name: SolarBest }
{ Manufacturer: ABCD }
{ Type: Monolithic }
{ Material: Acrylic }
{ Coated Side: Neither }
{ Angle of Incidence: 30 }
{ Appearance: Clear }
{Coating Class: UU}
0.300 0.003 0.042 0.043
0.305 0.005 0.042 0.043
.

Example 2: A coated glazing product

{ Units, Wavelength Units } SI Microns
{ Thickness } 2.235
{ Conductivity } 0.9
{ IR Transmittance } TIR=0
{ Emissivity, Front Back } Emis= 0.833 0.837
{ }
{ Product Name: Activ™ on Clear }
{ Manufacturer: Company ABC }
{ Type: Coated }
{ Material: N/A }
{ Coated Side: Front }
{ Appearance: Clear }
{Coating Class: CU}
0.300 0.001 0.378 0.059
0.305 0.003 0.384 0.058
. . . .

Example 3: An applied film, coated .

{ Units, Wavelength Units } SI Microns
{ Thickness } 3.226
{ Conductivity } 0.846
{ IR Transmittance } TIR=0
{ Emissivity, Front Back } Emis= 0.837 0.568
{ }
{ Product Name: Solis® Clear on Clear }
{ Manufacturer: Southwall Technologies, Inc. }
{ Type: Applied Film }
{ Material: N/A }
{ Coated Side: Back }
{ Appearance: Clear }
{Coating Class: UC}
0.300 0.000 0.011 0.014
0.305 0.000 0.011 0.014
. . . .

Example 4: An uncoated laminate.

{ Units, Wavelength Units } SI Microns
{ Thickness } 6.76
{ Conductivity } 0.646
{ IR Transmittance } TIR=0
{ Emissivity, Front Back } Emis= 0.837 0.837
{}
{ Product Name: Uncoated laminate }
{ Manufacturer:Glaverbel S.A.}
{ Type: Laminate }
{ Material: N/A }
{ Coated Side: Neither }
{ Appearance: Clear }
{Coating Class: UU}
0.300 0.000 0.055 0.055
0.305 0.000 0.054 0.054
. . . .

Example 5: A coated laminate

{ Units, Wavelength Units } SI Microns
{ Thickness } 5.99
{ Conductivity } 0.637
{ IR Transmittance } TIR=0
{ Emissivity, Front Back } Emis= 0.837 0.833
{ }
{ Product Name: YourProduct }
{ Manufacturer: YourNameHere }
{ Type: Laminate }
{ Material: N/A }
{ Coated Side: back }
{ Appearance: Clear }
{Coating Class: UC}
0.300 0.000 0.043 0.378
0.305 0.000 0.043 0.384
. . . .

6 DATA SUBMISSION REQUIREMENTS

For data to be accepted a number of requirements should be met. These requirements can be distinguished in 4 different groups:

1. Requirements on the data submitter
2. Requirements on the glazing product
3. Administrative requirements
4. Requirements on the data

The exact requirements are listed in the following paragraphs.

6.1 REQUIREMENTS ON THE DATA SUBMITTER

The data submitter must have proven that the company meets the minimum requirements by participating in proficiency testing. One of the conditions is participation in interlaboratory comparisons, proficiency testing under auspices of national and international organizations such as WinDat, NFRC or other. In some cases this may be a focused test on a new type of glazing, e.g. electrochromic.

6.2 ADMINISTRATIVE REQUIREMENTS

When submitting new data an e-mail containing the following package, should be sent to the WinDat coordinator

- One or more text files (one file for each glazing product) containing the spectral data and the correct header information.
- A completely filled in Data Submission Form, see section 7.
- A preliminary check on each spectral data file should be performed. A checklist for this preliminary check is given in section 8.

6.3 REQUIREMENTS ON THE DATA

The data that are submitted must meet certain requirements regarding format, accuracy, wavelength interval, etc. Data can only be accepted if they comply with the following:

- The format of the header shall be in accordance with the specifications laid down in Section 4 of this document. Examples of the header format are given in Section 5.
- The format of the spectral data shall be in accordance with the specifications laid down in Section 3.3 of this document.

7 DATA SUBMISSION FORM

Company
Name: _____
Post address: _____
_____
_____
_____

Contact for data submission
Name: _____
Telephone: _____
Fax: _____
E-mail: _____

Data measured by
Name: _____
Telephone: _____
Fax: _____
E-mail: _____

Data
Filenames: _____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____

Other Information:

Submission date: _____

Signature of contact for data submission
Name: _____
Date: _____

8 PRELIMINARY CHECKS

Before submitting new data to WIS Database the data submitter shall perform a number of preliminary checks on the data files. The following checklist may be used:

- Unit system and thickness and conductivity agree? ..... ☐
- Wavelength units and values agree ? ..... ☐
- Header format ok ..... ☐
- Spectral data format ok ..... ☐
- If the product belongs to a range of products with different thickness, does the spectral data fit into the expected pattern? ..... ☐

9 REFERENCES

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2. EN 1096-1 Glass in building – Coated glass – Part 1: Definitions and classification, Nov 1998.

3. EN 673 Glass in building- Determination of thermal transmittance (U value) – Calculation method, RefEN 673:1997/prA1:2000 E.

4. EN 410 Glass in building – Determination of luminous and solar characteristics of glazing, April 1998.

5. WIS Database, Verification Procedure for Glass and Coatings (non –scattering) Glazing Products Data, Version 1.0, May 2004 (**WinDat_N2.02**)

6. WIS Database Data Submission Procedure for Shading and Diffusing Components, Version 1.0, April 2004 (**WinDat_N2.07**)

7. WinDat WP2.1 Pane data format.

8. R. Versluis, R.Powles, M. Yazdanian, M. Rubin, International Glazing Database: Data File Format (http://windows.lbl.gov/materials/IGDB/Documentation/Documentation.htm)

9. NFRC 101:2001 (2002) - Procedure for Determining Thermo-Physical properties of materials for use in NFRC-Approved Software Programs.
10. EN 12524:2000 - Building materials and products. Hygrothermal properties.
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13. M G Hutchins, WINDAT WP2.1 Glass and Coatings (non-scattering) Subgroup, Data Collection for Non-Scattering Glazings, *Response to the Consultation Paper*, Oxford Brookes University, February 2002

APPENDIX 1 MEMBERSHIP OF THE WINDAT GCNS PEER REVIEW GROUP

The members of the current GSNS Peer Review group are listed in the table below. The list is not constant and will be updated regularly in the WIS website.

Table 7 Members of the GCNS Peer Review Group

Name	Organisation	Acronym
Mr Dick van Dijk	TNO Building and Construction Research	TNO Bouw
Mr Richard Versluis	TNO Building and Construction Research	TNO Bouw
Mr Peter van Nijnatten	TNO Institute of Applied Physics	TNO TPD
Mr Thomas Nussbaumer	Swiss Federal Laboratories for Materials Testing and Research	EMPA
Mr Michael Hutchins	Oxford Brookes University	Brookes
Mrs Neviana Kilbey	Oxford Brookes University	Brookes
Mr Jean Roucour	Glaverbel	Glaverbel
Mr Frank Rubbert	Saint-Gobain Glass Deutschland GmbH	SGGD
Mr Nils-Peter Harder	Saint-Gobain Glass Deutschland GmbH	SGGD
Ms Helen-Rose Wilson	Interpane Entwicklungs- und Beratungs-gesellschaft	Interpane
Mr Karl Haeuser	Interpane Entwicklungs- und Beratungs-gesellschaft	Interpane
Mr Ismael Rodriguez Maestre	Universidad de Cádiz	UCA
Mr Bruno Chevalier	Centre Scientifique et Technique du Bâtiment, the Materials Department	CSTB MD
Mr Franco Geotti-Bianchini	Stazione Sperimentale del Vetro	SSV
Mr Arne Roos	Uppsala University	Upps
Mr Jaap de Nijs	Guardian Luxguard	Guardian
Mr Francesco Tritta	Guardian Luxguard	Guardian
Mr Robert Davies	Pilkington	PKT
Mr Svend Svendsen	Technical University of Denmark	TUD
Mr Jean Rosenfeld	Private Consultant	