

SPANDREL

This invention relates to spandrels.

Spandrels traditionally comprise a glass sheet to which an enamel based paint layer has been fired so as to render the glass opaque. They may be used to visually match or contrast in external appearance with vision glazing panels in a building's facade and are generally used to conceal portions of a building's structure that it is desirable to hide from the outside.

According to a first aspect, the present invention provides a glazing panel in accordance with claim 1. Other aspects are defined in the other independent claims. The dependent claims define preferred or alternative embodiments.

Use of a low light transmission glass as the second sheet of glass in a double glazed unit (rather than an opaque fired enamel glass commonly used in prior art configurations) may present one or more of the following advantages :

- An aesthetically pleasing visual external appearance, particularly a sharpness and lack of diffusion of the image reflected from the spandrel when compared with traditional enamel spandrels
- Matched external appearance to vision glazings in a building facade, for example where an external sheet of glass of the vision glazing has a similar level and/or colour in reflection, in particular when the external glass sheets of the vision glazing and of the spandrel are provided with the same or with comparable optical coatings ;
- A sufficiently low level of light transmittance from the exterior and/or interior to permit use as a spandrel ;

- Ease of stock and manufacture as the seconds glass sheet may be cut and processed by the assembler from sheet size rather than requiring the logistics and delay often associated with ordering cut size enamel spandrels.

5 The spandrels of the invention do not require the use of a completely opaque sheet as has generally been thought necessary in the past but allow for the use of a sheet having a sufficiently low light transmission, for example, a coloured glass sheet, which may carry an optical coating, rather than an enamelled glass sheet. The desired effect is achieved provided that the defined levels of light transmission are respected.

10 The light transmission levels defined herein are expressed using illuminant C at 2° observer.

Arranging the light transmission of the spandrel to be

- greater than or equal to 0.2%, preferably greater than or equal to 0.3%, 0.4%, 0.5%, 0.6%, 0.7%, 0.8%, 0.9% or 1% ; and
- 15 ▪ less than or equal to 5%, preferably less than or equal to 3%, 2.5%, 2.2%, 2%, 1.8%, 1.6%, 1.5%, 1.4%, 1.2% or 1%

allows for use of a glass sheet that provides the desired effect of the spandrel without requiring complete opacity.

20 It is preferred that the light transmission of the spandrel be 1.5% or less as this level has been determined to provide good spandrel characteristics; reducing the light transmission of the spandrel below 1.5% is possible but the improvement in visual appearance is slight.

When arranged in a double glazing configuration, the desired light transmission of the spandrel may be provided by the combination of the two glass sheets. When the first glass sheet has a relatively high light transmission, for example

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in the range 65% to 75% or indeed higher, it is necessary to use a second glass sheet having a very low light transmission to achieve the desired overall light transmission. When the first glass sheet has a lower light transmission, for example in the range 35% to 65%, it may be possible to achieve the desired overall light transmission using a second glass sheet having a higher light transmission. However, it may be advantageous to select a second glass sheet having a sufficiently low level of light transmission to enable it to be used over a desired range of spandrels and to use this second glass sheet even in configurations in which a higher light transmission would provide an acceptable visual appearance. Such a practice may facilitate stock management and product standardisation.

It is particularly surprising that the use of a second glass sheet having the defined levels of light transmission may be used to provide spandrels as such levels of light transmission are attainable with body tinted glasses, particularly body tinted grey glasses.

The desired light transmission of the second glass sheet may be provided by an optical coating, preferably by the combination of an optical coating and a body tinted glass, particularly a body tinted grey glass. This may be more economical than achieving the desired level of light transmission using a glass sheet that consists of a body tinted glass or which consists of a clear, coated glass. The coating on the second glass sheet may be arranged at position 3 but is preferably arranged at position 4 of the assembled spandrel.

When a light absorbing coating is present, it is preferably a temperable coating; this may facilitate processing.

The spandrels are particularly adapted for use in double glazing configurations where the first sheet of glass carries an optical coating, for example a solar control coating layer which may be arranged at position two of the glazing i.e.

at the inside surface of the external glass sheet. The light reflectance of the first sheet of glass may be in the range 8% to 20%, preferably 10% to 18%.

The spandrels may be used to hide structural elements of a building and/or to provide privacy glazing. They are particularly adapted to provide a matching appearance to adjacent vision glazing but may be used to provide a contrasting external appearance. When providing a matching appearance, the difference in reflected colour measured on the CIE lab scale between the vision glazing and the associated spandrel as measured from the external side of the glazing and from the external side of the spandrel is preferably such that the difference in a^* is less than or equal to 1.2, more preferably less than or equal to 1, 0.5, or 0.3 and the difference in b^* is less than or equal to 2.2, more preferably less than or equal to 2, 1.5, 1 or 0.5. When the first glass sheet has a light transmission of less than or equal to 60%, the difference in reflected colour measured on the CIE lab scale between the vision glazing and the associated spandrel as measured from the external side of the glazing and from the external side of the spandrel is preferably such that the difference in a^* is less than or equal to 1, more preferably less than or equal to 1, 0.8, or 0.5 and the difference in b^* is less than or equal to 1.5, more preferably less than or equal to 1 or 0.5

In an alternative configuration, a body tinted glass carrying a light absorbing coating may be used as a spandrel in a monolithic configuration. In this case, the light absorbing coating is preferably arranged at position 2. An insulating material may be secured or adhered to the rear of the spandrel.

An embodiment of the invention will now be described, by way of example only, with reference to

FIG 1 which is a front view of part of the external glazing of a building ;
and

FIG 2 which is a cross section (not to scale) taken along line 2-2 of FIG 1.

The external facade of a building comprises an arrangement of horizontal vision glazings 11 and horizontal spandrels 12. In this example, both the spandrels and the vision glazing are assembled as double glazing units using the same coated glass sheets as the external sheets with the spandrels 12 providing a matching appearance to the vision glazings 12.

The spandrel 12 of Fig 2 has an outer, first glass sheet 21 assembled with an inner, second glass sheet 22 by means of a peripheral spacer 23 and a peripheral elastomeric seal 24. The first glass sheet 21 is a clear sheet of soda lime float glass having a reflective, coating 25 arranged at position 2. Second glass sheet 22 is a body tinted grey soda lime float glass carrying a light absorbing coating 26 arranged at position 4.

The following table shows various configurations for the first and second glass sheets of the spandrel, not all of which are in accordance with the invention. Each example uses a different coated glass for the first glass sheet.

First glass sheet: 6mm clear glass with sputtered optical coating arranged at position 2	Second glass sheet	Light transmission	Light reflection from face 1	a* in reflection from face 1	b* in reflection from face 1	Comments
Example 1a	6mm clear float glass	70	11,8	-2	-5,6	Vision glazing
Example 1b	6mm body tinted grey glass	6	9,5	-1,1	-7,4	Light transmission too high to provide desired level masking
Example 1c	6mm body tinted grey glass + light absorbing coating arranged at position 4	2,5	9,6	-1,2	-7,3	coating at position 4 has insignificant effect on the colour in reflection from face 1 compared with example 1b
Example 1d	8mm body tinted grey glass	2,6	9,5	-1,1	-7,4	
Example 1e	8mm body tinted grey glass + light absorbing coating arranged at position 4	1,1	9,5	-1,1	-7,4	
Example 2a	6mm clear float glass	66,7	13,7	-5,6	-1,3	Vision glazing
Example 2b	6mm body tinted grey glass	5,6	11,7	-5,4	-2	Light transmission too high to provide desired level masking
Example 2c	6mm body tinted grey glass + light absorbing coating arranged at position 4	2,4	11,7	-5,5	-2	
Example 2d	8mm body tinted grey glass	2,5	11,6	-5,4	-2,1	
Example 2e	8mm body tinted grey glass + light absorbing coating arranged at position 4	1	11,7	-5,4	-2	
Example 3a	6mm clear float glass	60,7	14,6	-3,3	-7,6	Vision glazing

Example 3b	6mm body tinted grey glass	5,1	12,9	-2,6	-8,6	Light transmission too high to provide desired level masking
Example 3c	6mm body tinted grey glass + light absorbing coating arranged at position 4	2,2	13	-2,7	-8,6	
Example 3d	8mm body tinted grey glass	2,3	12,9	-2,6	-8,6	
Example 3e	8mm body tinted grey glass + light absorbing coating arranged at position 4	1	12,9	-2,6	-8,6	
Example 4a	6mm clear float glass	51,5	13,4	-0,8	-12	Vision glazing
Example 4b	6mm body tinted grey glass	4,4	12,2	-0,1	-13,3	
Example 4c	6mm body tinted grey glass + light absorbing coating arranged at position 4	1,8	12,3	-0,1	-13,2	
Example 4d	8mm body tinted grey glass	1,9	12,2	-0,1	-13,3	Acceptable visual appearance
Example 4e	8mm body tinted grey glass + light absorbing coating arranged at position 4	0,8	12,2	-0,1	-13,3	
Example 5a	6mm clear float glass	39,5	16,1	-2,1	-6,1	Vision glazing
Example 5b	6mm body tinted grey glass	3,3	15,4	-1,5	-6,4	
Example 5c	6mm body tinted grey glass + light absorbing coating arranged at position 4	1,4	15,4	-1,6	-6,4	
Example 5d	8mm body tinted grey glass	1,5	15,4	-1,5	-6,4	Good visual appearance
Example 5e	8mm body tinted grey glass + light absorbing coating arranged at position 4	0,6	15,4	-1,5	-6,4	
Example 6a	6mm clear float glass	50,3	12,1	-0,5	-0,4	Vision glazing

Example 6b	6mm body tinted grey glass	4,2	11	-0,2	-0,3	
Example 6c	6mm body tinted grey glass + light absorbing coating arranged at position 4	1,8	11	-0,3	-0,2	
Example 6d	8mm body tinted grey glass	1,9	11	-0,2	-0,3	
Example 6e	8mm body tinted grey glass + light absorbing coating arranged at position 4	0,8	11	-0,2	-0,3	
Example 7a	6mm clear float glass	60,6	17,7	-0,9	-2,1	Vision glazing
Example 7b	6mm body tinted grey glass	5,1	16	-0,2	-2,8	Light transmission too high to provide desired level masking
Example 7c	6mm body tinted grey glass + light absorbing coating arranged at position 4	2,2	16	-0,2	-2,8	
Example 7d	8mm body tinted grey glass	2,3	15,9	-0,2	-2,8	
Example 7e	8mm body tinted grey glass + light absorbing coating arranged at position 4	1	16	-0,2	-2,8	

The examples of spandrels having a light transmission in the range 0.6 to 1.5% were found to present extremely good characteristics, even when used in unfavourable lighting conditions that would tend to show the weakness of the spandrels and/or when a background with a high level of contrast was arranged behind the spandrels. Those having a light transmission between 1.5 and 1.9% were found to provide an acceptable performance other than in particularly unfavourable lighting conditions. Those having a light transmission greater than 1.9% and less than 5% were found to provide acceptable performance in some but not all lighting conditions.

CLAIMS

1. A spandrel comprising
a first sheet of glass ;
a second sheet of glass spaced from and arranged substantially parallel to the first
sheet of glass;
5 a seal extending around the periphery of and joining the first and second sheets of
glass, the combination of the seal and the sheets of glass enclosing a gas containing
space between the two sheets of glass ;
characterised in that
the light transmission of the spandrel is within the range of 0.2 % to 5%.
- 10 2. A spandrel in accordance with claim 1, in which the light
transmission of the spandrel is within the range of 0.4 % to 2.2%.
3. A spandrel in accordance with any preceding claim, in which the
light transmission of the spandrel is within the range of 0.4 % to 1.8%.
4. A spandrel in accordance with any preceding claim, in which the
15 light transmission of the second glass sheet is within the range of 0.4 % to 5%.
5. A spandrel in accordance with any preceding claim, in which the
light transmission of the second glass sheet is within the range of 0.4 % to 2.5%,
preferably within the range of 1 % to 2%, more preferably within the range of 1.2 %
to 1.6%.
- 20 6. A spandrel in accordance with any preceding claim, in which the
second glass sheet comprises a sheet of body tinted glass having a grey colour in
reflection and in transmission and having a light transmission of less than 10% at a
thickness of 6mm.

7. A spandrel in accordance with any preceding claim, in which the second glass sheet consists essentially of a coloured glass sheet carrying an optical coating, the optical coating being such that applied to a 6mm thick sheet of clear soda lime float glass, it would give a light transmission in the range 25-70%,
5 preferably 25 to 45%, more preferably 30 to 45%.

8. A spandrel in accordance with any preceding claim, in which the second glass sheet consists essentially of a coloured glass sheet carrying a pyrolytic, light absorbing coating.

9. A spandrel in accordance with any preceding claim, in which the
10 second sheet of glass has a thickness in the range 5.5 to 6.5mm.

10. A spandrel in accordance with any preceding claim, in which the second sheet of glass has a thickness in the range 6.5 to 8.5mm.

11. A spandrel in accordance with any preceding claim, in which the first sheet of glass has a light transmission within the range 20% to 55% and
15 comprises an optical coating and in which the second glass sheet consists essentially of a sheet of coloured glass having a thickness in the range 7.5mm to 12.5mm.

12. A spandrel in accordance with any one of claims 1 to 10, in which the first sheet of glass has a light transmission within the range 55% to 75% and comprises an optical coating and in which the second glass sheet consist
20 essentially of a sheet of coloured glass having a thickness in the range 7.5mm to 12.5mm carrying a light absorbing optical coating.

13. Use of a sheet of coloured glass carrying a light absorbing coating and having a light transmission in the range 0.3 to 3% as the second sheet of glass in a range of spandrels, the range of spandrels comprising a first spandrel comprising a
25 first sheet of glass having a light transmission in the range 55% to 75% and a second

spandrel comprising a first sheet of glass having a light transmission in the range 35% to 55%.

14. A spandrel comprising a sheet of body tinted glass carrying a light absorbing coating and having a light transmission in the range 0.2 to 2%.

5 15. A spandrel comprising a sheet of coloured glass carrying a light absorbing coating and having a light transmission in the range 0.4 to 1.8%.

16. A spandrel in accordance with claim 14 or claim 15, in which the spandrel consists essentially of the sheet of body tinted glass carrying the light absorbing layer.

10 17. A spandrel in accordance with claim 16, in which the sheet of glass has a thickness in the range 7.5 to 8.5mm.