Colour & Contrast

A design guide for the use of Gradus products incorporating light reflectance values (LRVs)
Introduction

This leaflet provides information about colour and contrast within the built environment and why it is important to provide a colour contrast between different surfaces for people with a visual impairment.

Details from research that has been undertaken into colour and contrast are included, in addition to recommendations from the latest legislation and guidelines, what light reflectance values (LRVs) are, why they are important and what the implications are for Gradus products.

Colour coded sheets for Gradus products are also available, detailing the LRV of each colour within the range.

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Where to get LRVs (CIE Y values) for flooring accessories, wall protection, barrier matting and carpet
Improving access to buildings for all users in line with the Equality Act 2010 is fundamental and specifiers are using as many tools as possible to ensure that buildings are designed or refurbished in order to create an inclusive environment.

Studies, including Project Rainbow (a research project carried out by Reading University in conjunction with the Royal National Institute of Blind People (RNIB), The Guide Dogs for the Blind Association (GDBA) and ICI Paints) identified the importance of colour and contrast in improving the built environment for visually impaired people.

Project Rainbow identified that colour and contrast can provide designers with a mechanism for highlighting critical surfaces and special features and can provide the basis for wayfinding for visually impaired people.

Project Rainbow states that:

**Critical Surfaces**: identified as large areas of an interior that form the impression of shape, space and proximity when scanned by a visually impaired person, i.e. floors, walls, ceilings, stairs and doors. Project Rainbow continues to inform that ‘navigating through a building is much easier if these areas are colour contrasted’ and expands on specific details:

- **Patterns**: ‘In general, some critical surfaces may be covered in a subtle pattern or striped finish, but highly contrasting colours in irregular, busy or geometric patterns are very unhelpful and should be avoided. If a pattern is used on a critical surface it is the colour that occupies the largest proportion of the area which is the most important.’

- **Reflective Finishes**: ‘On critical surfaces, the use of highly reflective shiny surfaces can cause considerable confusion for visually impaired and fully sighted people. Such finishes should always be used with caution, and wherever possible, matt or mid sheen finishes are recommended. This will also allow for the full benefit of colour differentiation to be realised.’

- **Two Colours Used**: ‘On critical surfaces where two colours are to be used…the upper part of the wall should be sufficiently different from the ceiling colour and the lower wall should be sufficiently different from the colours used for the floor.’

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**Patterns**: patterned carpet and no stair edgings - looks like a ramp

**Reflective finishes**: flooring should not be shiny - looks like puddles of water

**Two colours**: panelling same colour as floor - makes the room look bigger than it actually is
Colour & Contrast — Design Guidelines

Special Features: identified as areas that need to be highlighted to allow a building to be used effectively by visually impaired people, i.e. stair edgings, handrails and door opening furniture.

‘Special features are additional areas, smaller that critical features, that need to be highlighted to allow the building to be used more easily by visually impaired people. Such features include sanitary ware, handrails, door handles, finger plates, switches, socket outlets, and stair nosings etc, all of which should be contrasted against the background against which they will be seen. Smaller items such as these will need a greater colour difference from their surroundings in order to be identified.’

Trim: ‘Special attention is needed to those items used in an internal environment to improve the decorative appeal and overall finish of an interior. Such items, which include coving, skirting, architrave, dado rail etc, should be decorated in colours used on larger critical surfaces.”


British Standard BS8300:2009+A1:2010 states that light reflectance values (LRVs) are used to assess visual contrast using the method of measurement detailed in BS8493:2008. Approved Document M (ADM 2004) directly refers to colour and contrast in the definitions section, stating:

‘Contrast visually, when used to indicate the visual perception of one element of the building, or fitting within the building, against another means that the difference in light reflectance value between the two surfaces is greater than 30 points.’

ADM 2004 then refers to Colour, Contrast & Perception – Design Guidance for Internal Built Environments, Reading University (Project Rainbow).

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Crown Copyright material is reproduced with the permission of the Controller of HMSO and the Queen’s Printer for Scotland.
The ‘Colour Contrast & Perception’ document produced by Reading University uses light reflectance values (LRVs) to measure colour and contrast in products/surfaces and determines whether or not a suitable contrast has been achieved between surfaces.

The study concluded that visually impaired people may be unable to perceive some or all colours. However, many people with a visual impairment can perceive light and dark and, therefore, LRVs are a suitable method to measure contrast.

Reflectance is the proportion of light that a surface reflects compared to the amount of light that falls on the surface. An LRV is a value given to a surface to denote the amount of light reflected.

LRVs are marked on a scale of 1 to 100 depending on the percentage of light reflected. Dark, matt and/or textured surfaces absorb a large amount of light and, therefore, have low reflectance values. On the other hand, light, glossy and/or smooth surfaces reflect the majority of light that falls on them and have high reflectance values.

For example, a colour with an LRV of 60 (which means it reflects 60% of the light that falls on it) will reflect more light than that of a colour with an LRV of 30.

**Light Reflectance Values (LRVs) explained**

**Light reflectance scale**

In order to achieve a suitable contrast between different surfaces, Project Rainbow and ADM 2004 recommend that there is at least a 30 point (not 30%) difference in the LRVs of the two surfaces.
How to measure LRVs


Previous to this standard being published, two widely used methods of measurement had been used - the CIE L value (fluorescent light) and the CIE Y value (natural daylight), causing confusion and potentially dangerous specifications. This new standard has adopted the CIE Y value as the single consistent method of measurement for LRVs that is to be used across all industries.

BS8493:2008 stipulates that a spectrophotometer (apparatus) is used to measure the LRV using CIE Tristimulus Y, Illuminant D65 (natural daylight) and the 10° colorimetric observer. Further to this, the standard details the number of measurements that need to be taken from each specimen, using a measurement grid (see figures 1 and figure 2 below).

The standard states that the results of the LRV measurements shall then be put into a test report.

All relevant Gradus products have been measured using the CIE Y value and a test report is available upon request.

Illustrations based on BS8493:2008
- Light Reflectance Value (LRV) of a surface - method of test

LRVs should be considered when specifying:

Flooring Accessories
- Stair Edgings

Wall Protection
- Dualrail
- Pushplates
- Wallguards
- Kickplates

Matting
- Primary Barrier Matting
- Secondary Barrier Carpet

Floorcoverings
- Carpet
What the colour & contrast guidelines mean for Gradus flooring accessories:

Stair Edgings

Gradus is the market leader in contract flooring accessories and offers the widest choice of product solutions for stairs and floors. Gradus stair edgings help to reduce accidents on stairs by offering increased slip-resistance in both interior and exterior environments. The range of stair edging colours from Gradus allows specifiers and users to achieve colour contrast to the surrounding floorcovering, ensuring the provision of an inclusive environment for all building users.

BS8300:2009+A1:2010: ‘Each step nosing should incorporate a permanently contrasting continuous material for the full width of the stair on both the tread and the riser to help blind and partially sighted people appreciate the extent of the stair and identify individual treads. The material should be 50mm to 65mm on the tread and 30mm to 55mm on the riser, and should contrast visually with the remainder of the tread and riser.’

ADM 2004: ‘All nosings are made apparent by means of a permanently contrasting material 55mm wide on both the tread and the riser.’

Colour, Contrast & Perception (Project Rainbow): ‘The nosing of every flight of stairs should be adequately colour or luminance contrasted with the remainder of the step and the floor coverings adjacent to the top and bottom of the flight.’

Skirtings

Gradus skirtings can help define where the floor ends and the wall begins whilst providing a neat, attractive join between the wall and the floor. The wide choice of colours and materials available provides a solution for every environment from healthcare through to commercial office.

BS8300:2009+A1:2010: ‘To avoid giving the wrong impression about the size of a room, skirtings should have the same LRV as the wall so that the junction between the skirting and the floor marks the extent of the room.’

Colour, Contrast & Perception (Project Rainbow): ‘Skirting should be either decorated the same colour as the wall, the same colour as the floor or, if different to one or the other or both, must be decorated in a colour which highlights even further the junction.’

Best practise is considered to be to match the skirting to the wall or floor if height is 150mm or less. If the skirting is over 150mm in height it should match the wall to ensure that the room does not appear larger than it actually is.

Tactile Warning Tile

Tread Alert is a rubber tile with raised ribs that act as a tactile warning surface for visually impaired people to meet the criteria for tactile surfaces stipulated in the DTLR publication ‘Guidance on the use of tactile paving surfaces’

BS8300:2009+A1:2010: ‘To give advance warning of a step, tactile paving with a corduroy hazard warning surface should be provided at the top and bottom of each flight. Where the approach to the stair is wider than the flight, the tactile surface should extend beyond the line of each edge of the flight.’

Colour, Contrast & Perception (Project Rainbow): ‘Colour or luminance contrast of tactile warning floor coverings at the top and bottom of each flight (of stairs) will also assist in the identification of an imminent potential hazard.’
What the colour & contrast guidelines mean for Gradus wall protection & matting:

Wall Protection

Gradus Wall Protection systems provide an essential barrier against damage caused to walls, corners and doors by both pedestrian and wheeled traffic. The comprehensive range of products is available in a wide choice of colours to provide suitable contrast with surrounding surface finishes, aiding access around a building for all uses.

BS8300:2009+A1:2010: ‘A handrail should be finished so as to provide visual contrast with the surroundings against which it is seen.’

‘Large, repeating patterns that incorporate bold, contrasting colours should not be used for the wall surfaces in parts of the building where visual acuity is critical.’

ADM 2004: ‘All door opening furniture contrasts visually with the surface of the door.’

‘A handrail should contrast visually with the background against which it is seen, without being highly reflective.’

Colour, Contrast & Perception (Project Rainbow): ‘Finger plates and kick plates on doors should be sufficiently different in colour to the door.’

‘Handrails should be adequately contrasted with the adjacent wall finish.’

Barrier Matting

Gradus barrier matting provides an effective barrier against dirt and moisture at entrances, access points and circulation areas in all contract environments. All Gradus matting efficiently removes and retains soil and moisture from pedestrian and wheeled traffic to give superior long term performance and reduce slip accidents.

BS8300:2009+A1:2010: ‘The ingress of soil and surface moisture to buildings, or their transfer between adjacent internal areas, should be reduced to the lowest practicable level, e.g. through the use of appropriate entrance flooring systems, conforming to BS 7953.’

‘Deep pile carpets and coir matting on the surface of the floor or within a mat well should not be used.’

ADM 2004: ‘Floor surface materials within the lobby do not impede the movement of wheelchairs e.g. not coir matting, and changes in floor materials do not create a potential trip hazard.’

‘The floor surface helps to remove rainwater from shoes and wheelchairs.’

‘Where matwells are provided, the surface of the mat is level with the surface of the adjacent floor finish.’

BS7953:1999: ‘The function of the entrance flooring system is to reduce the incidence of slip accidents by reducing the amount of soil and moisture tracked onto hard and resilient floors

… an entrance flooring system should have the following qualities:

• Removal and retention of soil
• Ease of cleaning and maintenance
• Retention of physical characteristics’
What the colour & contrast guidelines mean for Gradus carpets:

Carpet

Unrivalled in the healthcare and education sectors, Gradus offers an extensive range of premium quality broadloom and impervious backed carpets, specifically designed for these demanding markets, which are available in a broad spectrum of colourways. Gradus also offers a number of ranges with exceptional sustainability credentials.

More recently, a contemporary range of carpet design tiles have been introduced, providing designers with unlimited creativity and installation options, making them ideal for commercial, retail and hospitality environments.

There are a number of colour and contrast design guidelines to assist with specifying a suitable floorcovering in order to achieve an inclusive environment in line with Equality Act 2010:

BS8300:2009+A1:2010: ‘Floor patterning that could be mistaken for steps, e.g. stripes, should not be used for floors in corridors.’

‘Deep pile carpet should not be used on stair treads.’

‘Differences in LRV should be used to assess the degree of visual contrast between surfaces such as floors, walls, doors and ceilings and between key fittings/fixtures and surrounding surfaces. The LRV of a wall should be 30 points different from that of the ceiling and of the floor.’

‘Large, repeating patterns that incorporate bold contrasting colours or simulate steps should not be used for any floor surface.’

ADM 2004: ‘In order to help people with visual impairment to appreciate the size of a space they have entered, or to find their way around, there should be a visual contrast between the wall and ceiling, and between the wall and floor. Such attention to surface finishes should be coupled with good natural light and artificial lighting design.’

‘Floor surface finishes with patterns that could be mistaken for steps or changes in level are avoided.’

Colour, Contrast & Perception (Project Rainbow): ‘In general, some critical surfaces may be covered in a subtle pattern or striped finish, but highly contrasting colours in irregular, busy or geometric patterns are very unhelpful and should be avoided. If a pattern is used on a critical surface it is the colour that occupies the largest proportion of the area which is the most important.’

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Colour Coded LRV Sheets and Additional Information

A sheet has been produced for each of the flooring accessories, wall protection, matting and floorcoverings ranges offered by Gradus, depicting all colours within the range and the light reflectance value (LRV), using the Y value method of measurement, which corresponds to each colour. Individual sheets are available from Gradus technical support on 01625 428922.

If you would like additional information or advice on LRVs, how they relate to Gradus products or a copy of a test report, contact Gradus technical support on 01625 428922.

How LRVs are measured

These values have been determined with reference to the CIE Tristimulus Y’9 Illuminant D65 and the 10° colorimetric observer, in accordance with BS8493:2008. The Y co-ordinate represents lightness and extends from 0 (black) to 100 (white) and has been used as a measure of light reflectance values (LRVs).

Please note: Due to the limitations of the printing process, colours within this leaflet should not be relied upon for colour matching. An accurate colour match can only be achieved by requesting the relevant product sample(s) from Gradus Technical Support on 01625 428922.
LRVs for stair edgings – channel colours

PVC-u hardnose - satin finish (XT profiles)

- **Black**: 4.99
- **Brown**: 7.15
- **Burgundy**: 5.89
- **Buttercup**: 62.62
- **Canvas**: 55.43
- **Clay**: 51.33
- **Dove**: 26.19
- **Glacier**: 42.73
- **Granite**: 11.69
- **Ink**: 5.40
- **Jade**: 55.54
- **Sky**: 55.38
- **Snowdrift**: 80.54
- **Wisp**: 56.62

PVC-u hardnose - satin finish (traditional profiles)

- **Black**: 4.99
- **Brown**: 7.15
- **Burgundy**: 5.89
- **Buttercup**: 62.62
- **Bluebell**: 9.76
- **Canvas**: 55.43
- **Dove**: 26.19
- **Evergreen**: 6.63
- **Glacier**: 42.73
- **Granite**: 11.69
- **Ink**: 5.40
- **Linen**: 37.50
- **Midnight**: 6.77
- **Snowdrift**: 80.54

PVC-u hardnose - metallic finish

- **Burnt Almond**: 9.92
- **Doubloon**: 22.01
- **Silver**: 48.29
- **Zinc**: 15.91

Remaining stair edgings channel colours continued on the next page

How LRVs are measured

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## LRVs for stair edgings – channel colours continued

### Flexible Pvc

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<tr>
<td>Brown</td>
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<td>Dove</td>
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<tr>
<td>Granite</td>
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<td>Snowdrift</td>
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### Metal finish

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<tr>
<td>Bronze</td>
<td>63.00</td>
</tr>
<tr>
<td>Chrome</td>
<td>49.79</td>
</tr>
</tbody>
</table>

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**How LRVs are measured**

These values have been determined with reference to the CIE Tristimulus Y',9 Illuminant D65 and the 10° colorimetric observer, in accordance with BS8493:2008. The Y' co-ordinate represents lightness and extends from 0 (black) to 100 (white) and has been used as a measure of light reflectance values (LRVs).

Please note: Due to the limitations of the printing process, colours within this leaflet should not be relied upon for colour matching. An accurate colour match can only be achieved by requesting the relevant product sample(s) from Gradus Technical Support on 01625 428922.
LRVs for stair edgings – insert colours

Xtra-grip and Xtra-grip Plus inserts

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<tr>
<th>Colour</th>
<th>LRV</th>
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<tr>
<td>Breeze / Melwater</td>
<td>61.13</td>
</tr>
<tr>
<td>Carbon / Raven</td>
<td>5.01</td>
</tr>
<tr>
<td>Deepsea / Navy</td>
<td>5.94</td>
</tr>
<tr>
<td>Iceberg / Diamond</td>
<td>61.58</td>
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<tr>
<td>Oat / Bone</td>
<td>50.66</td>
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<tr>
<td>Pampas / Vine</td>
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Metal finish

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<td>27.61</td>
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<tr>
<td>Rock / Marl</td>
<td>10.91</td>
</tr>
<tr>
<td>Truffle / Conker</td>
<td>7.85</td>
</tr>
<tr>
<td>Vapour / Lunar</td>
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</tr>
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<td>Zest / Sulphur</td>
<td>51.11</td>
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Interior insert - standard finish (XT profiles)

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<tr>
<th>Colour</th>
<th>LRV</th>
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<tbody>
<tr>
<td>Burgundy</td>
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</tr>
<tr>
<td>Buttercup</td>
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<tr>
<td>Clay</td>
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</tr>
<tr>
<td>Coffee</td>
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<tr>
<td>Glacier</td>
<td>42.09</td>
</tr>
<tr>
<td>Ink</td>
<td>4.96</td>
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<tr>
<td>Jade</td>
<td>53.98</td>
</tr>
<tr>
<td>Jet</td>
<td>4.56</td>
</tr>
<tr>
<td>Lead</td>
<td>12.77</td>
</tr>
<tr>
<td>Snowdrift</td>
<td>83.77</td>
</tr>
<tr>
<td>Sky</td>
<td>52.63</td>
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Interior insert - standard finish (Traditional profiles)

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<tbody>
<tr>
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<tr>
<td>Buttercup</td>
<td>55.54</td>
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<td>Canvas</td>
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<td>Cloud</td>
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<td>Coffee</td>
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<td>Lead</td>
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</tr>
<tr>
<td>Ocean</td>
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<tr>
<td>Photoluminescent</td>
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<td>Poppy</td>
<td>10.39</td>
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<tr>
<td>Snowdrift</td>
<td>83.77</td>
</tr>
<tr>
<td>Steel</td>
<td>26.99</td>
</tr>
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</table>

How LRVs are measured

These values have been determined with reference to the CIE Tristimulus Y_9 Illuminant D65 and the 10° colorimetric observer, in accordance with BS8493:2008. The Y co-ordinate represents lightness and extends from 0 (black) to 100 (white) and has been used as a measure of light reflectance values (LRVs).

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LRVs for stair edgings – insert colours

**Interior insert - grained finish**

- Black: 6.47
- Brown: 12.13
- Dove: 29.40
- Granite: 13.44

**Standard exterior insert**

- Tornado: LRV: 4.49
- Sandstorm: LRV: 50.77
- Hurricane: LRV: 30.43
- Blizzard: LRV: 83.25

**Heavy duty exterior insert**

- Ash: 24.77
- Avalanche: 73.00
- Charcoal: 4.07
- Firestorm: 43.96
- White: 58.38
- Black: 3.70
- Yellow: 44.92

How LRVs are measured

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LRVs for tread alert®

How LRVs are measured

These values have been determined with reference to the CIE Tristimulus Y_109 Illuminant D65 and the 10° colorimetric observer, in accordance with BS8493:2008. The Y co-ordinate represents lightness and extends from 0 (black) to 100 (white) and has been used as a measure of light reflectance values (LRVs).

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LRV for safety track™

How LRVs are measured
These values have been determined with reference to the CIE Tristimulus Yₙ₉ Illuminant D65 and the 10° colorimetric observer, in accordance with BS8493:2008. The Y co-ordinate represents lightness and extends from 0 (black) to 100 (white) and has been used as a measure of light reflectance values (LRVs).

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LRVs for skirtings, capping strips & accessories

How LRVs are measured

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LRVs for InPro colours (including Sanparrel)

How LRVs are measured
These values have been determined with reference to the CIE Tristimulus Y'9 Illuminant D65 and the 10° colorimetric observer, in accordance with BS8493:2008. The Y co-ordinate represents lightness and extends from 0 (black) to 100 (white) and has been used as a measure of light reflectance values (LRVs).

Please note: Due to the limitations of the printing process, colours within this leaflet should not be relied upon for colour matching.
An accurate colour match can only be achieved by requesting the relevant product sample(s) from Gradus Technical Support on 01625 428922.
LRVs for Boulevard 1500

Calculus
9.03

Marinus
2.71

Tempestas
2.14

Terra
10.89

How LRVs are measured
These values have been determined with reference to the CIE Tristimulus Y9 Illuminant D65 and the 10° colorimetric observer, in accordance with BS8493:2008. The Y co-ordinate represents lightness and extends from 0 (black) to 100 (white) and has been used as a measure of light reflectance values (LRVs).

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LRVs for Boulevard 5000HD

- **Corncrake**: 9.52
- **Cuckoo**: 5.63
- **Jackdaw**: 1.73
- **Kestrel**: 5.42
- **Moorhen**: 2.98
- **Redpoll**: 4.14
- **Shelduck**: 5.20
- **Swallow**: 2.08

**How LRVs are measured**

These values have been determined with reference to the CIE Tristimulus Y₉ Illuminant D65 and the 10° colorimetric observer, in accordance with BS8493:2008. The Y co-ordinate represents lightness and extends from 0 (black) to 100 (white) and has been used as a measure of light reflectance values (LRVs).

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LRVs for Boulevard 6000

Atlantic 1.90
Galaxy 2.56
Indigo 4.01
Nickel 3.70
Nightfall 1.48
Rosemary 4.45
Shadow 5.36
Walnut 2.86

How LRVs are measured
These values have been determined with reference to the CIE Tristimulus Y,9 Illuminant D65 and the 10° colorimetric observer, in accordance with BS8493:2008. The Y co-ordinate represents lightness and extends from 0 (black) to 100 (white) and has been used as a measure of light reflectance values (LRVs).

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**LRVs Adventurer**

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<td>Cliff Shadow</td>
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<td>Nile Brown</td>
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<td>Blue Mountain</td>
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<td>Lunar Gray</td>
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<td>Red Sands</td>
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<td>Kalahari</td>
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<td>Seafarer</td>
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<td>Lost Horizon</td>
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<td>Gulf Stream</td>
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<td>Oregon Forest</td>
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<tr>
<td>Aquarelle</td>
<td>10.94</td>
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</table>

**How LRVs are measured**

These values have been determined with reference to the CIE Tristimulus Yₙ Illuminant D65 and the 10° colorimetric observer, in accordance with BS8493:2008.

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**How LRVs are measured**

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LRVs Cityscene

Caramel 06102  LRV 14.94
Willow 06104  LRV 12.02
Tin 06103  LRV 16.93
Raffia 06101  LRV 18.73
Ice 06105  LRV 11.73
Ocean 06108  LRV 6.26
Shale 06106  LRV 11.22
Granite 06109  LRV 10.83
Basalt 06110  LRV 7.49

How LRVs are measured
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These values have been determined with reference to the CIE Tristimulus Y, I illuminant D65 and the 10° colorimetric observer, in accordance with BS8490:2008. The Y co-ordinate represents lightness and extends from 0 (black) to 100 (white) and has been used as a measure of light reflectance values (LRVs).

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<table>
<thead>
<tr>
<th>Colour</th>
<th>Code</th>
<th>LRV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ciron</td>
<td>06801</td>
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<td>Mane</td>
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<td>Loire</td>
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<td>Bordeaux</td>
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<td>Sevran</td>
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Gradus Ltd Park Green Macclesfield Cheshire SK11 7LZ England UK Tel: 01625 428922 Fax: 01625 433949
LRVs Lafite Stripes

Toulouse 06810
LRV 7.94

Maronne 06811
LRV 8.63

Lyon 06812
LRV 8.88

How LRVs are measured

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LRVs Lafite Connect

How LRVs are measured

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LRVs Lafite Connect

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<table>
<thead>
<tr>
<th>Colour</th>
<th>LRV</th>
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<tbody>
<tr>
<td>Peebles</td>
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<td>Morden</td>
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<td>Wetheral</td>
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LRVs Stratus

How LRVs are measured
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LRVs\n
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<thead>
<tr>
<th>Color</th>
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<td>Electric Blue</td>
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<td>06609</td>
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