A quick guide for designers

Training by Spira

Visual Contrast & LRV

by Spira Design

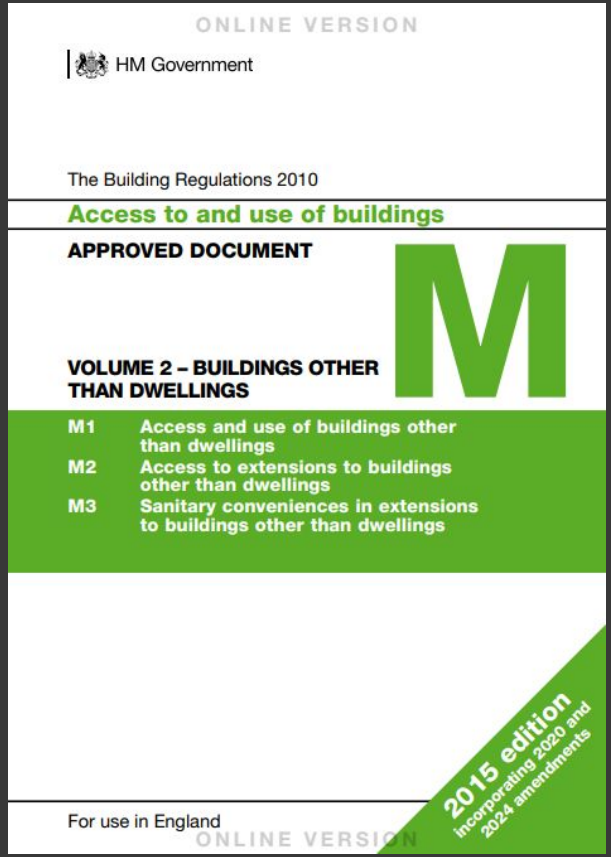
Relevant UK Standards & Legislation

Equality Act 2010	As designers, we have a duty to make “reasonable adjustments” for people with disabilities, including vision impairment.
Building Regs – Approved Doc. Part M (ADM)	This legally binding document requires the design of accessible, inclusive environments.
BS 8300-1:2018 & BS 8300-2:2018	Following this standards can demonstrate compliance to the Equality Act and Approved Doc M.
BS 8493:2008 + A1:2010	These standards cover the measurement of LRV.

Visual Contrast

Approved document M sets out requirements for providing ‘visual contrast’ in order to accommodate users with visual impairments.

‘Visual contrast’ in this sense is not a generic statement, but refers to the calculations of contrast between the light reflectance values- or LRV of different surfaces.



What is LRV?

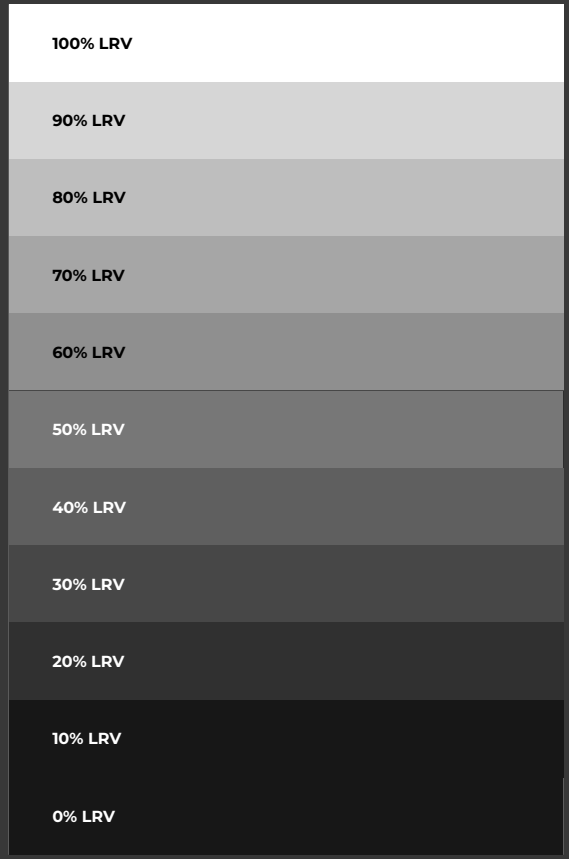
LRV (Light Reflectance Value) measures the amount of light a surface reflects.

The result is in the form of a percentage.

An LRV of 0% is pure black - no light is reflected

An LRV of 100% is pure white - all the light is reflected

Most surfaces fall somewhere between the two.



Who does LRV contrast affect?

People with visual impairments
Addresses reduced visual acuity and clarity.

The elderly
Addresses age-related vision loss.

People with Dementia or other cognitive impairments
Aids navigation by overcoming reduced depth perception and contrast sensitivity.

People with colour blindness
Bypasses unreliable colour perception.

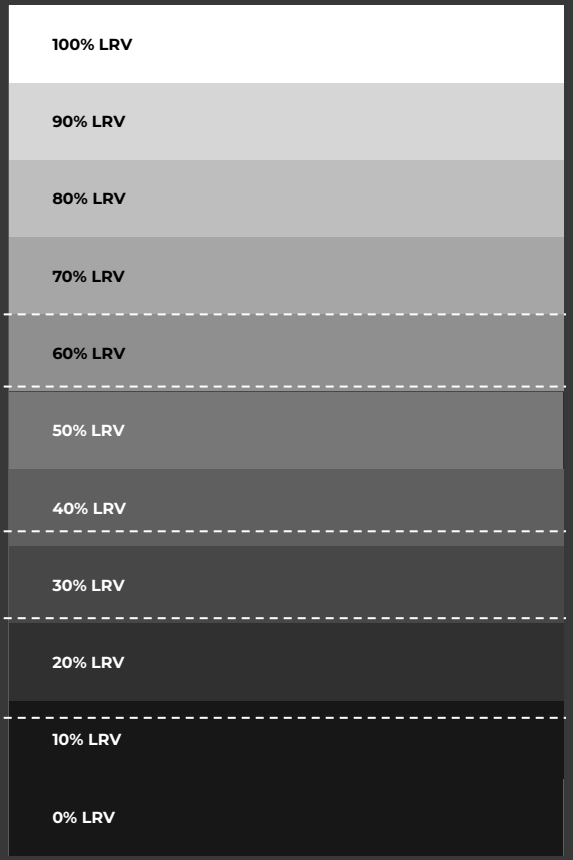
Neurodiverse people
Reduces sensory processing and anxiety.

Everyone, in a low light or emergency situation
Assists all users in challenging conditions.

Every surface has an LRV

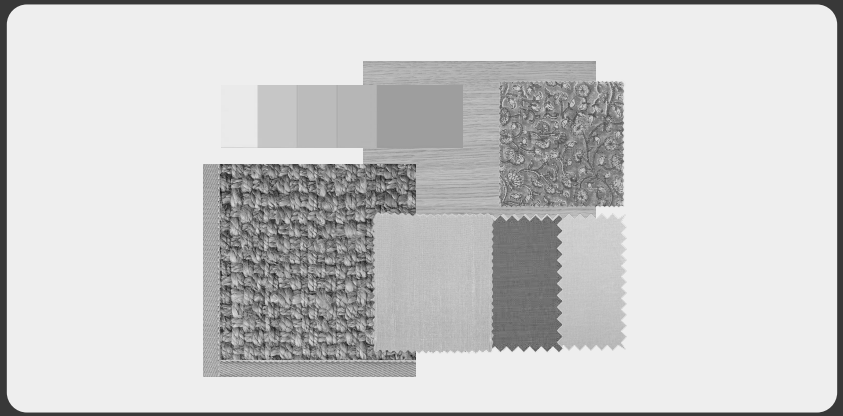
Every finish has an LRV value

It is not possible to detect an LRV visually, as it is separate from the surfaces hue (colour).



LRV vs Hue

A common misconception is that contrast can be created through hue:



Hue

Most people generally perceive colour through hue. Two colours can have contrasting hues but have no visual contrast in terms of LRV.

LRV

The materials in the example above do not create LRV contrast even though they have contrasting colours.

How to find an LRV Value?

Using a reader

LRV readers are small devices that can cost several hundred pounds.

By placing the reader on an object, the light reflectance value of the surface is measured and a figure is outputted.

The average of multiple figures can be calculated to find an approximate LRV value for patterned finishes.

Manufacturer Supplied

Many suppliers include LRV values for their products.

Most paint and flooring suppliers will include LRV values in their datasheets.

Many textile and wallcovering manufacturers do not yet include LRV measurements.

Spira's Guide

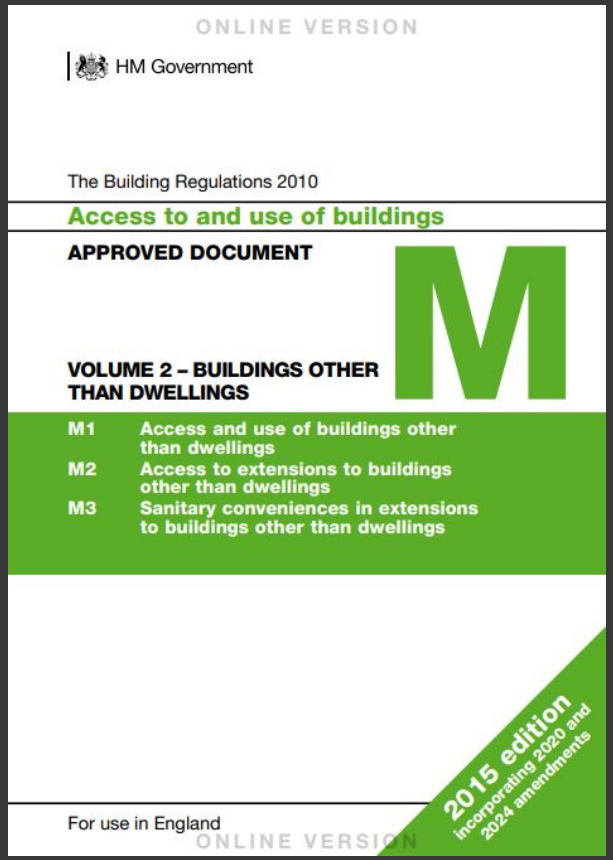
Spira has curated sets of finishes to achieve LRV compliant interiors.

How is visual contrast measured?

Document M sets out the following definition of visual contrast:

'**0.6:** 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.** Where illuminance on surfaces is greater than 200 lux, a difference in light reflectance value should be a minimum of 20 points. Where door opening furniture projects beyond the face of the door or otherwise creates enhanced differentiation and shade, a minimum difference in light reflectance value of 15 points is considered adequate.'

Put simply, this means there is a general requirement to achieve at least 30% difference in the LRV's of two surfaces.



Visual Contrast

Difference in colour does not mean visual contrast has been achieved

Hue

Selecting a green wall paint may appear to contrast a warm oak flooring.

LRV

But in actual fact, there is very little contrast between the two.

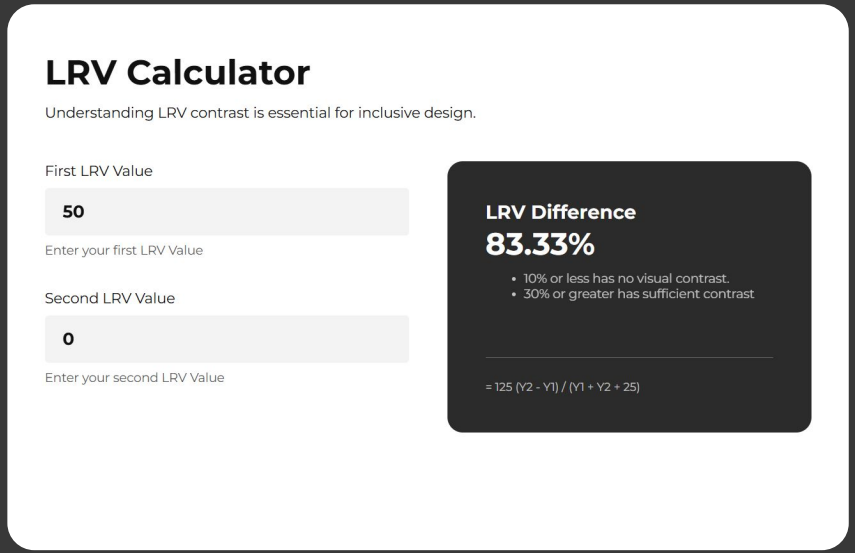
How to calculate LRV

Calculating the difference between two LRV values is not as simple as subtraction

Use Spira's free online calculator to work out the contrast between two values.

= 125 (Y2 - Y1) / (Y1 + Y2 + 25)

Use the Calculator



Summarising the principles

LRV (Light Reflectance Value) measure the amount of light that is reflected by a surface. It is the unit for measurement required to demonstrate compliance with Approved Document M

Document M sets out the situations in which require this contrast to be provided.

30% points of difference or greater are required to demonstrate compliance.

The shorthand term to encompass this is ‘visual contrast’. Everywhere the document requires ‘visual contrast’ refers to the 30 point difference in LRV values.

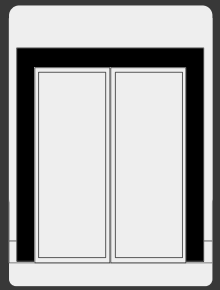
Where is contrast required?

Staircases & Ramps

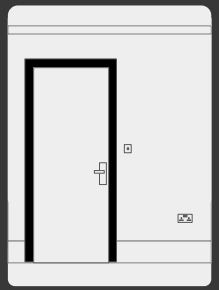
Doors

Doors

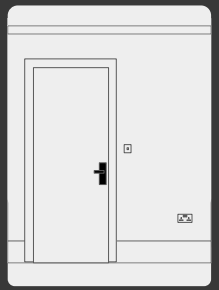
A minimum of 30% contrast is required in the following conditions:



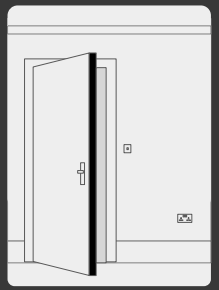
Doc M
2.7b
Building entrance



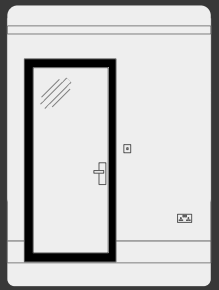
Doc M
3.10f
Door frame



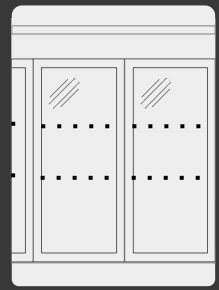
Doc M
2.17d / 3.10g / 4.24c
Door opening furniture (ironmongery, push plates, etc.)



Doc M
3.10g
Door Leading Edge & Door

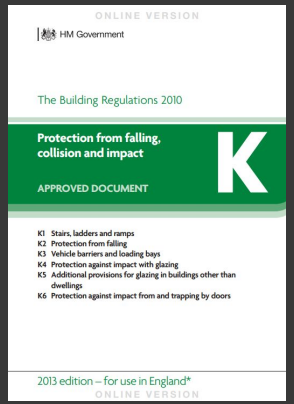


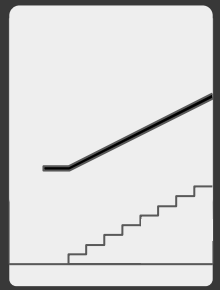
Doc M
3.12j
High contrast edges, when fully glazed.



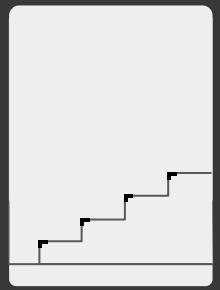
Doc k
7.4
Manifestation contrasts with background seen through glazing

Stairs & Ramps

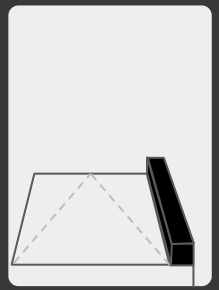




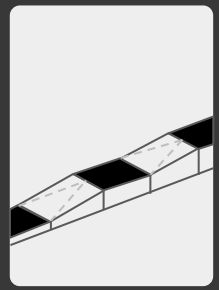
Doc M
3.16 / 3.37e
Doc K
1.36
Handrails



Doc M
1.33i
Doc K
1.7 / 1.10
Nosing &
Tread/Riser

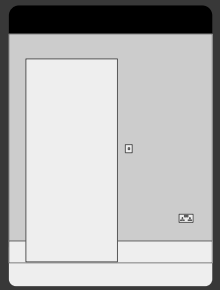


Doc M
1.26m
Doc K
2.5
Ramp curb &
surrounds

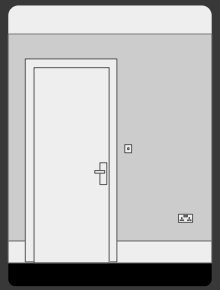


Doc M
1.26f
Doc K
2.4
Ramp &
Landings

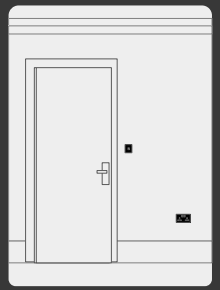
General



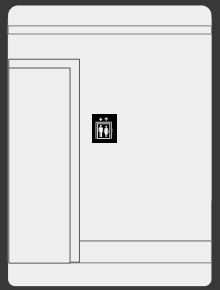
Doc M
3.12
Wall & Ceiling



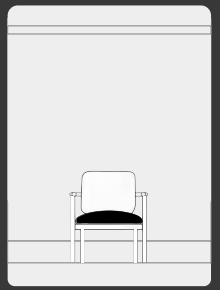
Doc M
3.12
Wall & Floor



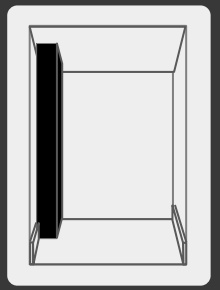
Doc M
2.21g / 3.28d 4.28 / 4.3i / 4.3m
Electrical controls



Doc M
3.18
Signage (lifting devices)

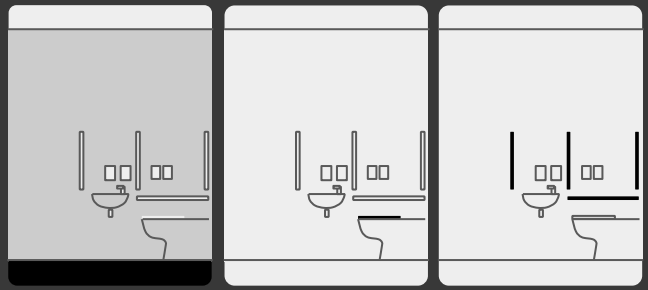


Doc M
4.7
Seating & Surrounds (Audience & spectator facilities)



Doc M
2.29h / 3.14a / 3.14f / 3.16f
Projecting Elements/Exposed edges/guard rails & surrounds

Bathrooms



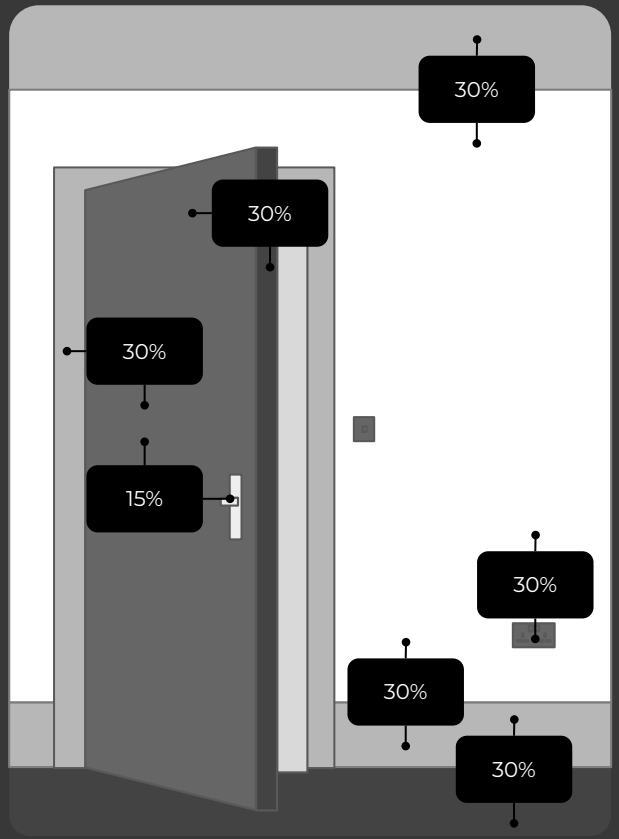
Doc M
5.4k
Wall & Floor finishes

Doc T
5.1
Toilet pan

Doc M
5.4k
Grab bars

LRV

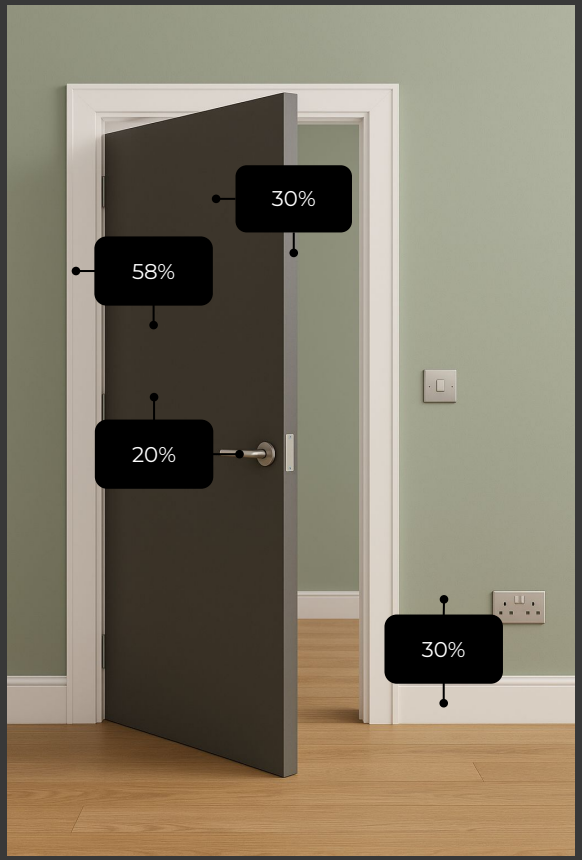
Doc M
3.12
Wall & Floor



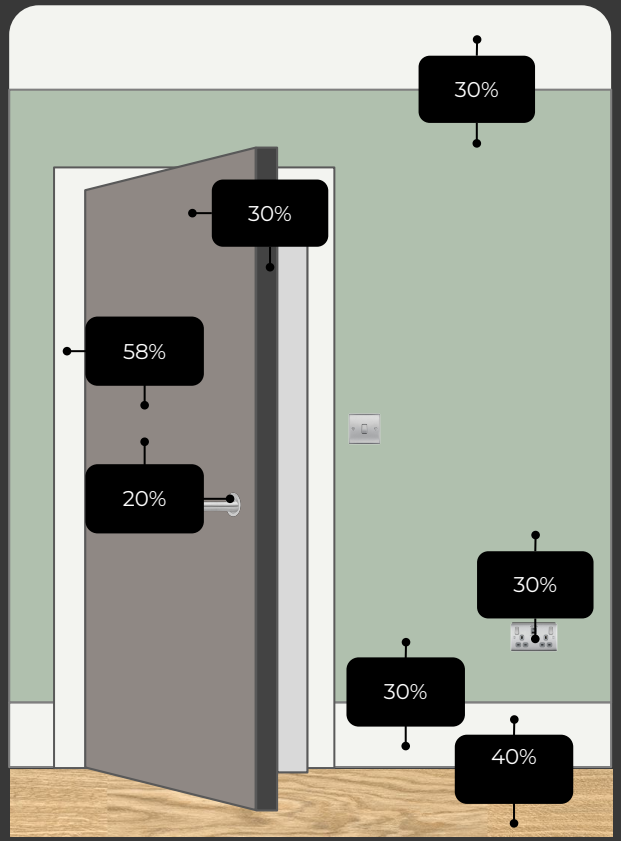
A successful scheme

A successful scheme won’t look like it’s been designed specifically for visual impairment.

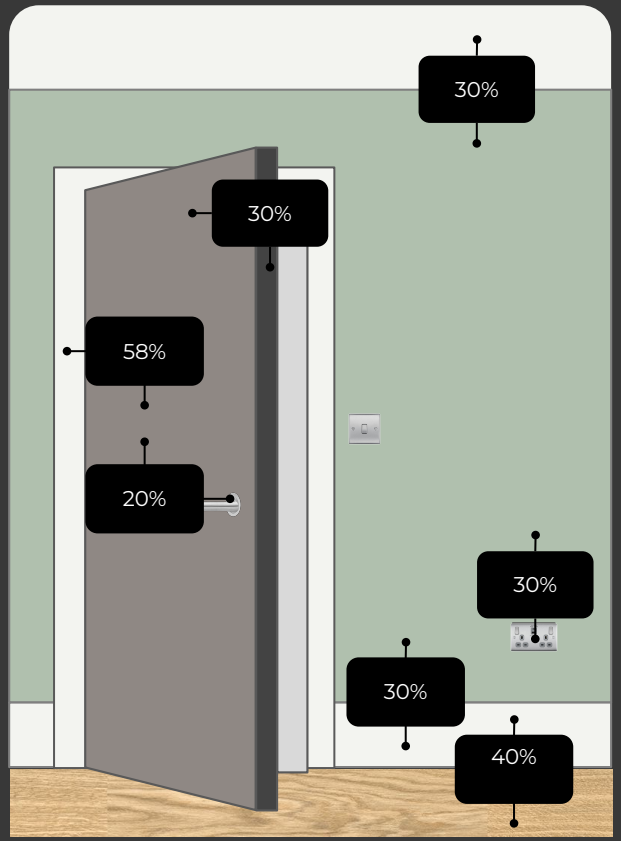
It is entirely possible to produce an attractive scheme which both meets the functional requirements set out in the approved documents without compromising the design intent.


30%
58%
20%
30%

General



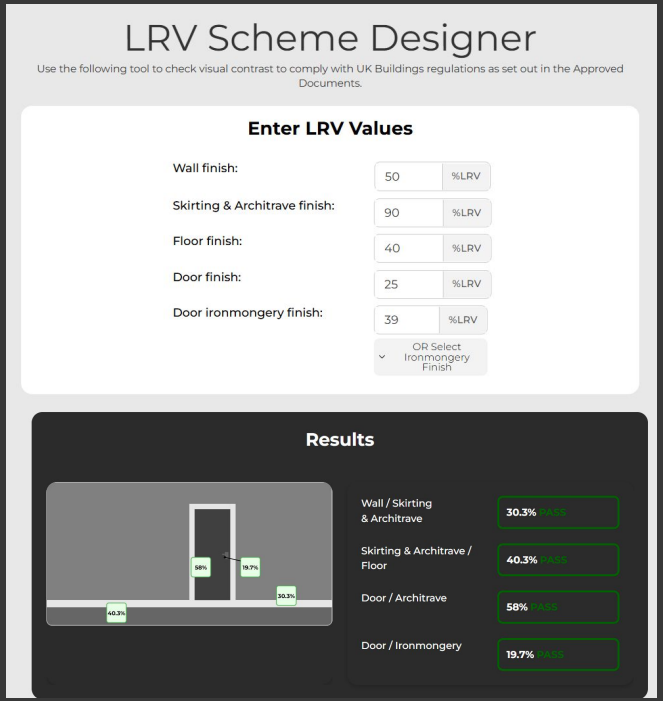
General

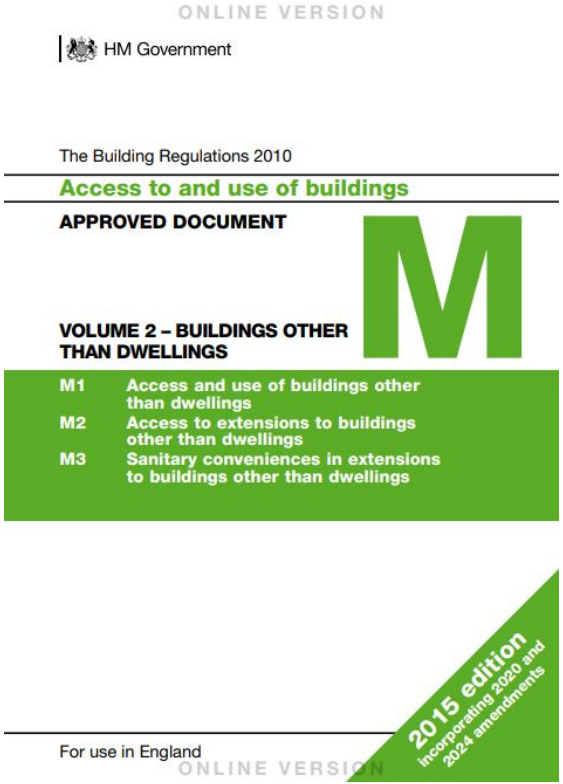


General

Spira is the sole provider of a complete scheme designer tool.

This tool takes the work out of compliance by allowing live visualisation of





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. Where illuminance on surfaces is greater than 200 lux, a difference in light reflectance value should be a minimum of 20 points. Where door opening furniture projects beyond the face of the door or otherwise creates enhanced differentiation and shade, a minimum difference in light reflectance value of 15 points is considered adequate. For further information, reference should be made to Colour, contrast and perception – Design guidance for internal built environments – Reading University.

- Accessible entrances
- 3.12 Visual contrast between wall and ceiling, wall and floor
- 5.4,k: the surface finish of sanitary fittings and grab bars contrasts visually with background wall and floor finishes, and there is also visual contrast between wall and floor finishes.
- 2.17, d all door opening furniture contrasts visually with the surface of the door and is not cold to the touch
- 3.8 The presence of doors, whether open or closed, should be apparent to visually impaired people through the careful choice of colour and material for the door and its surroundings. For example, when a door is open, people with impaired sight should be able to identify the door opening within the wall, as well as the leading edge of the door.

Why does this matter?

Visual impairments can cause the eye to have difficulty distinguishing between hues.

Having sufficient LRV contrast creates an inclusive, accessible environment.

Navigation

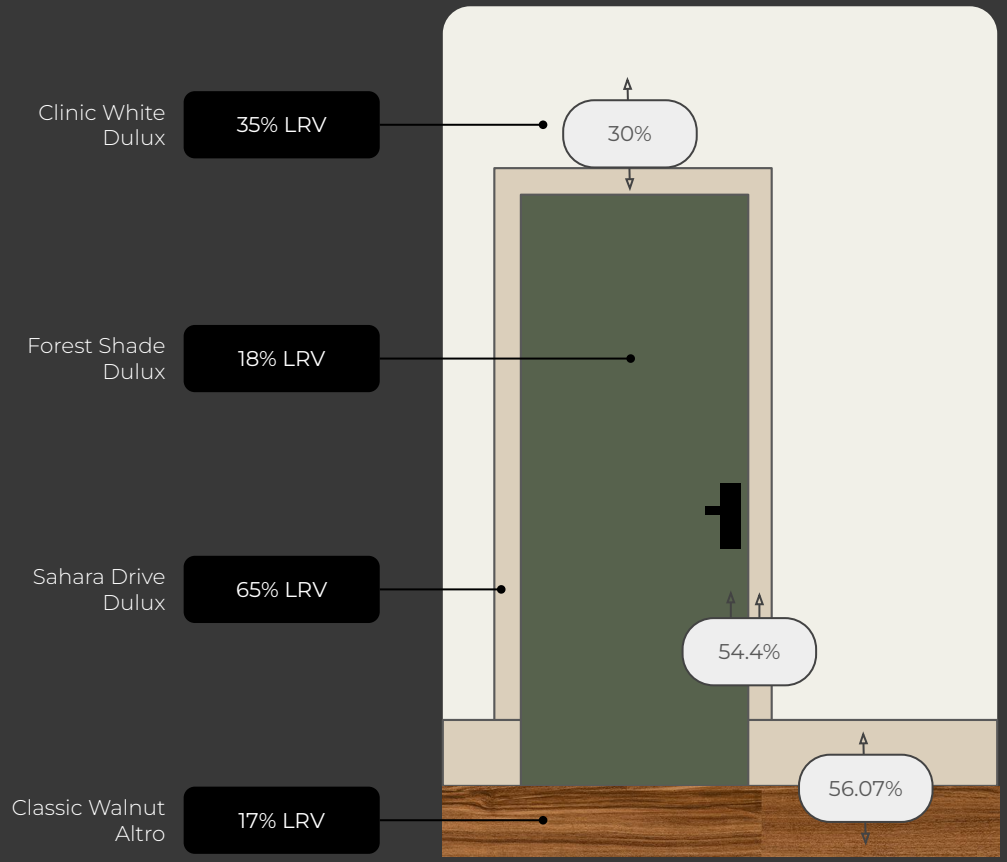
Being able to independently navigate a space is key in creating an accessible environment.

The recommendations are to create a contrast of at least 30% between:

- The floor finish and the skirting boards
- The skirting boards and the walls

Successful Design

Achieving a successful design does not mean compromising aesthetics.
A truly successful scheme should not make a user feel set apart due to their visual impairment.



Summary

Having correct LRV values creates an accessible space suitable for everyone.

Correct LRV contrast levels aid independent wayfinding.

LRV contrast levels can be calculated by determining the LRV values for the finishes and using an online calculator.

A point difference of 30% or greater is considered adequate contrast.

End