

ConverLight® Dynamic Glass

Technical Product Specification

ConverLight75

This document is intended to describe the product ConverLight75 Dynamic Glass. Technical aspects of the product are addressed in detail.



Performance

Every batch of material used for ConverLight® Dynamic Glass is tested at ChromoGenics to ensure its electrochromic performance meets the requirements. Specifications of requirements during the product lifetime are shown below. For a detailed description on how tests are performed to represent 20 years of service life, see section *Internal validation*.

Optical transmittance range

Range at delivery ($LT_{\max}$ - $LT_{\min}$)	75-40% ($\pm 3\%$)
Accepted ageing after 10 years of service life	3.5% - units loss of transmittance
Accepted ageing after 20 years of service life	7% - units loss of transmittance

Switch speed

The switch speed depends on glass Width but is typically around 20 minutes.

Uniformity

Transmittance uniformity	No visible variations (<5%) at completed switch
Color uniformity	Color coordinates within specification over entire Dynamic Glass <i>For specification see section Color Coordinates</i>
Haze	No appreciable haze, corresponding to < 2%

Mechanical Defects

Distortion	No appreciable distortion. Measured according to ISO 12543-6.
Mechanical defects	No appreciable mechanical defects. Measured according to ISO 12543-6.

Edges

The edge area is defined as a 25 mm wide frame along the glass edge. In this area there are no requirements for performance or defects.

Foil deformations

During glass lamination minor deformations can occur in the ConverLight® foil. Sometimes these can be observed when viewing the glass in reflection, from certain angles from the outside. If the foil deforms during the glass lamination, a certain waviness may occur. In other cases, more local deformations can occur. The deformations have no effect on the durability of the product. Deformations that are only visible in reflection and when viewed from certain angles are approved by ChromoGenics internal quality controls and are not grounds for complaint nor reclamation.

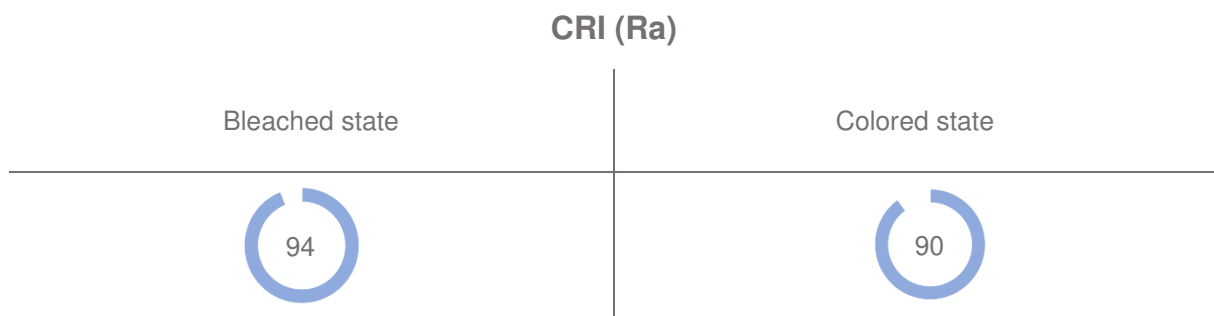
Optical defects in the field of view

When laminated glass is inspected at the factory, the method described in EN 12543-6 applies. When assessing glass that has been installed, normal viewing distance and normal daylight conditions shall apply. By normal viewing distance, it refers to the distance that applies in the specific case, or as specified in industry guidelines, typically 3 meters and perpendicular to the glass. An example where a greater distance is applied during the assessment is glass roofs. By normal daylight, it refers to a day with diffuse light, meaning without direct sunlight or any other light source entering at an abnormal angle to the glass and amplifying any imperfections. The use of lamps or magnifying aids is not allowed, nor is it permissible to detect defects up close and mark them so that they become visible from the normal viewing distance.

Color coordinates

The color rendering index (CRI) for glass indicates how different colors of objects behind the glass will be rendered compared to objects under natural daylight. ConverLight75 has a high CRI in all states.

In reflection, color variation may be visible.



The color coordinates of a ConverLight75 glass in its bleached state are shown in Figure 1. The allowed color coordinates in both transmission and reflection of ConverLight75 are within the red rectangle in Figure 1.

Color coordinates are within specification over the entire Dynamic Glass. Due to the inherent properties of electrochromic technology, minor variations in color uniformity may occur, especially when glazing is viewed at an angle or under certain lighting conditions. The perceived color uniformity can depend on environmental factors such as sky conditions, light intensity, and the observer's position.

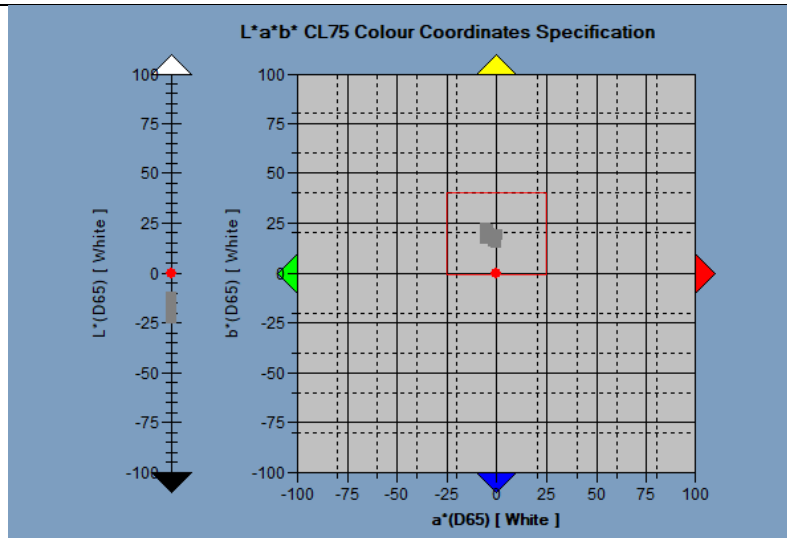


Figure 1: CL75 Color coordinates specification in transmission and reflection. Grey dots are color coordinates in transmission measured in the bleached state according to CIE L*a*b coordinate system.

External validation

To ensure that the material complies with international testing standards, an ISO 18543:2021 test has been performed and validated externally by RISE institute. ConverLight75 is approved in this test.

ISO 18543:2021

Test conditions	Accelerated aging test for electrochromic glass. Cycling under UV radiation (1 sun) BBT ¹ : 65°C, 30,000 cycles
Test institute	RISE
Result	30,000 cycles (>20 years of service life)

¹ Black Body Temperature

The sound reducing properties of ConverLight® Dynamic Glass have been tested externally.

EN ISO 10140-2

Test	Sound reduction
Test institute	RISE-SP
Result	R _w (C; Ctr) = 35 (-1; -3) dB

ConverLight® Dynamic Glass has been tested for durability and mechanical strength according to international standards for laminated glass.

External tests

Test standard	Property	Result	Test institute
EN ISO 12543-4	High UV irradiation	Approved	Ift Rosenheim
EN ISO 12543-4	High temperature	Approved	KIWA
EN ISO 12543-4	High humidity	Approved	KIWA
EN 356	Vandalism and burglar resistance	P4A	RISE
EN 12600	Pendulum body impact resistance	1(B)1	RISE

Internal validation

ConverLight® Dynamic Glass is thoroughly tested at ChromoGenics to ensure its electrochromic performance meets the requirements. The tests performed at ChromoGenics are described in the following sections.

The test matrix used is based on internally developed tests and international test standards (ASTM standards). Internal tests are accelerated tests developed to represent at least 20 years of service life. The internal tests have been developed in consultation with experts in lifetime tests for electrochemical systems (e.g. batteries).

Internal tests

Tests represent at least 20 years of service life.¹

Test	Test conditions	% of switching range	Temperature	Comments
Cycling test ²	Long-term operation, 6 000c	80%	22°C	Accelerated aging test
	Mid-term operation, 1000c	120%	65°C	Accelerated aging test
	Mid-term operation, 3000c	100%	65°C	Accelerated aging test
	Long-term operation, 6000c	80%	65°C	Accelerated aging test
	Short-term operation, 200c	80%	-20°C	Function test extreme temperature
	Short-term operation, 200c	80%	85°C	Function test extreme temperature
Calendar test ³	Long-term storage, 4400h		80°C	Accelerated aging test

¹ Defined as defect-free and performance >80%.

² Quickly moving between light and dark mode repeatedly.

³ After storage in extreme temperature, the function is tested to verify that 80% of original performance remains.

Any questions, please contact ChromoGenics.