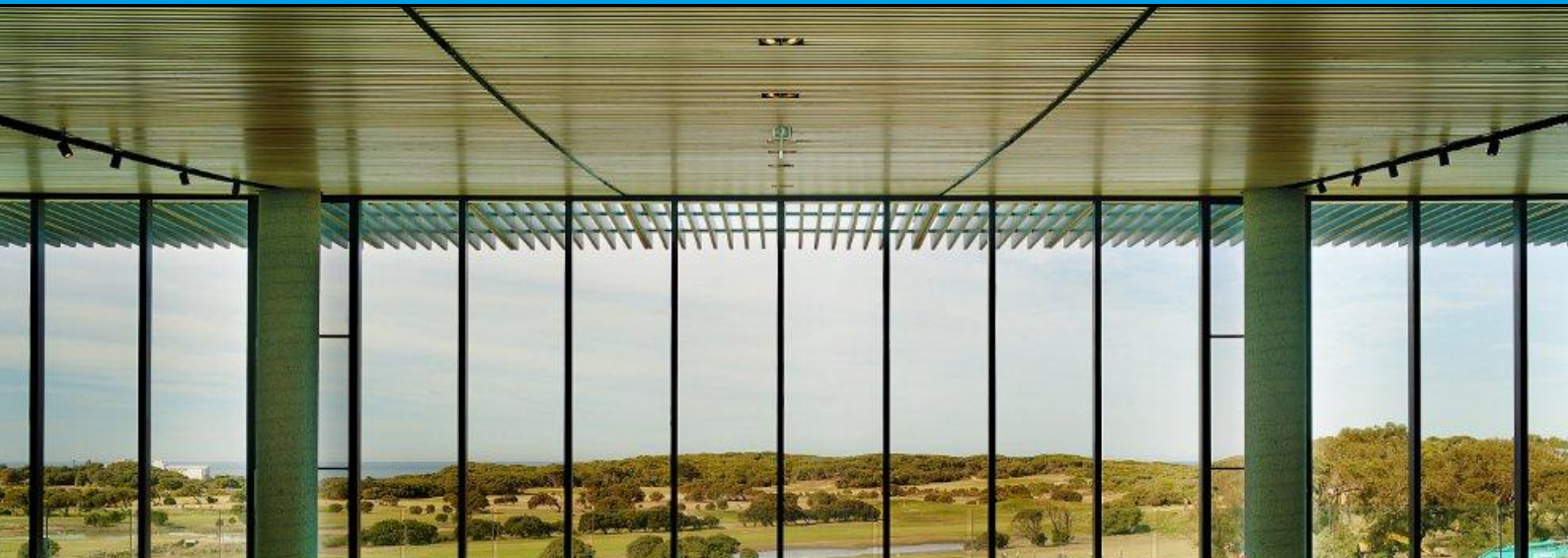


Why glass type should be a TOP consideration in building design



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Introduction

It's no revelation that glass is one such building material most able to influence energy consumption and is integral to projects chasing Green Star ratings.

Low-emissivity (low-e) glass was a game changer for energy-efficiency in buildings and made a rapid resurgence due to its ability to reduce heat transfer in summer and reflect interior heat back into the room in winter. As low-e technology evolves, various complex glazing configurations for different climates and building elevations[^] keep emerging and raising the bar in building performance.

If energy-efficiency and thermal comfort are at all a priority, specifying the appropriate glass is essential. However these are not the only factors to take into consideration - this whitepaper explores the less obvious longer term impacts of the window glass used and the ways in which **overall glass performance saves companies, institutions and individuals more than just energy consumption.**

[^]please see our Performance Glass guide for details

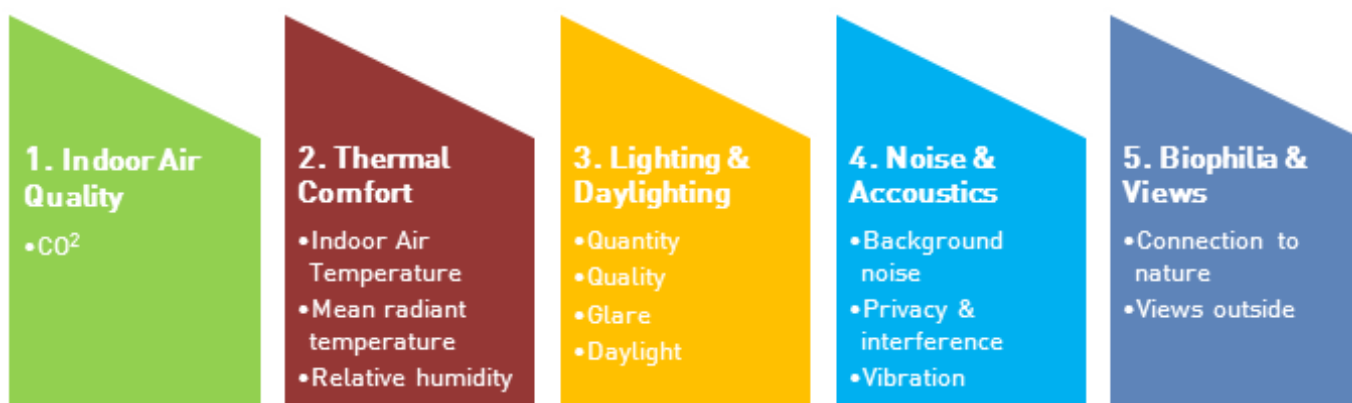
The impact of glass on the Physical Office Environment

The importance of glass should not be underestimated given that it is undoubtedly the most pertinent factor in the physical office (and of course home) environment.

The World Green Building Council released a report¹ in 2014 entitled Health, Wellbeing & Productivity in Offices which outlines the eight key factors making up the office environment, how they can be evaluated and the impacts they have on the health and wellbeing of occupants right through to the associated financial impacts.

The function of glass is present in five out of the eight overall factors and measurable in 43% of the ways to evaluate these factors, bearing in mind that this report was not focussed on glass but the overall environment. The glass relevant five factors are extracted below, while the other three factors related to office layout, look and feel and location.

Staff costs can account for approx. 90% of a business' operating costs. Therefore anything that impedes employees' ability to be productive has significant financial implications.



The impact of the Physical Office Environment on productivity

There is little doubt that thermal comfort, access to natural light and noise reduction directly impacts productivity but what is underestimated is the associated financial impact.

The aggregate cost to business of ill-health and absenteeism in Australia is estimated at \$7 billion per year, while the cost of 'presenteeism' (not fully functioning at work due to medical conditions) is estimated to be A\$26 billion².

Neuroscientists suggest employees with more access to white light at work received more quality sleep during the night³, and therefore perform better the next day.

A study in 2011 also revealed the relationship between view quality, daylighting and sick leave of employees with a significant 6.5% variation in sick leave reported⁴.



The impact of natural light and visibility on Healthcare & Education

For the healthcare sector, the right glass selection and amount of window glass used affects more than just the productivity, performance and mood of nurses, doctors and other members of staff. Studies show that access to natural daylight and views of the outdoors can result in faster recovery rates for patients, decreased reliance on medication and improved overall patient wellbeing⁵.

Access to natural light, thermal comfort and, visibility, noise control and glare are of utmost importance in the education sector. Studies suggest that children learn 20-26% faster with access to natural light⁶, and not surprisingly excess heat, noise and glare significantly hinder students' concentration right up to university level, just as it does in the workplace.



The impact of glass on Green Star credits

Glass has the potential to earn credits in various Green Building Council (GBCA) Green Star rating tools⁷

Green Star - Performance v1 & v1.1, Interiors v1 & v1.1

11.1 Daylight Access

11.2 Views & Line of Sight

Green Star - Design and As Built v1, v1.1

12.1 Daylight

12.2 Views

Green Star - Office v3, Education v1, Public Building V1 IEQ

Daylight

IEQ External Views

Green Star -Office Interiorsv1.1

IEQ-3 Daylight

IEQ-7 External Views

For calculating daylight in the above rating tools, GBCA requires proof of a Visible Light Transmission (VLT) figure >40%. Double glazed clear glass produces a VLT of between 70-80%⁶ with tinted single glazed glass producing a VLT of about 20%⁶. While double glazed low-e glass' VLT varies between 40-70%⁶, the trouble is balancing the VLT with favourable thermal performance. Traditionally the higher the VLT, the more the Solar Heat Gain Coefficient (SHGC) would be compromised.

Only the most sophisticated low-e technologies can provide the best of both worlds.

Glassworks'solution

Glassworks' offers some of the most advanced low-e glass on the Australian market and a Solar Responsive Thermo-chromic (SRT) self-tinting PVB interlayer which couples perfectly with low-e glass coatings for outstanding dynamic performance, (see Whitepaper for details).

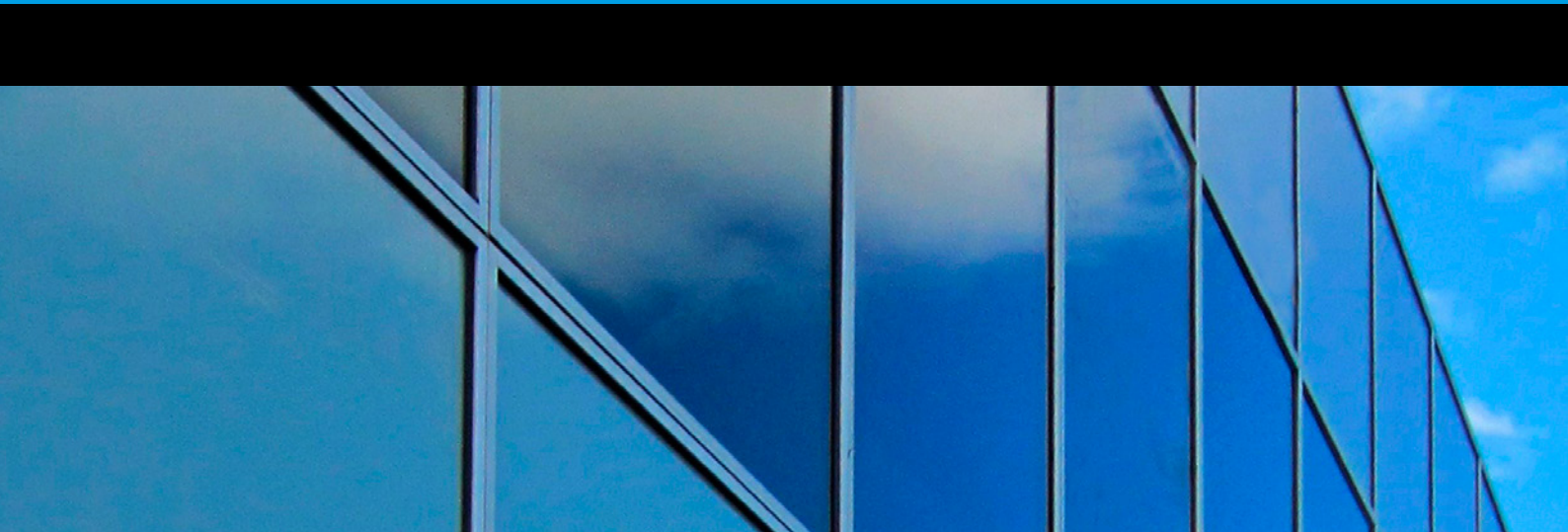
Recognising it's not a case of one glass fits all, the range has been carefully selected based on customer needs and staying ahead of industry standards. LoE-366, LoE-340 and LoE-i89 are all suited to different conditions, a snapshot of their performance figures is shown below.

LoE-366®			LoE-340®		LoE-i89®			
	6mm LoE366 @12mm Arg 6mm Clear Float	6mm LoE366® 12mm Arg 6mm i89	6mm LoE340® 12mm Arg 6mm Clear Float	6mm LoE340 12mm Arg 6mm i89 Clear	6mm i89 Clear Mono	6mm i89 Clear 12mm Arg 6mm Clear Float	6mm i89 Grey mono	6mm i89 Grey 12mm Arg 6mm Clear Float
VLT	63%	61%	38%	37%	87%	80%	30%	26%
Ext Ref	11%	10%	13%	13%	8%	15%	12%	12%
SHGC	0.27	0.27	0.18	0.17	0.72	0.65	0.33	0.25
U-Value	1.35	1.10	1.36	1.11	3.62	1.64	3.70	1.66

*Calculations based on Windows 7.2 NFRC 100-2010 conditions

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- ⁵ Anjali Joseph (2006), 'The Impact of Light on Outcomes in Healthcare Settings,' *Director of Research*, The Center for Health Design, issue paper #2
- ⁶ Terrapin Bright Green llc (2012) "The economics of biophilia - Why designing with nature in mind makes financial sense'
- ⁷ Green Building Council of Australia (2016), 'Green Star Daylight and Views Hand Calculation Guide'



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