Liquid Crystal Window Technology

PROJECT: MODULAR INNOVATION CENTER MERCK KGAA, DARMSTADT, GERMANY

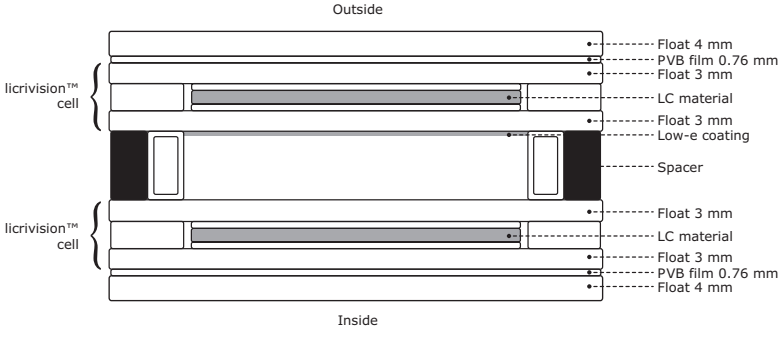
The modular Innovation Center is the precursor to the final Innovation Center which as of 2018 will form the new heart of our global headquarters in Darmstadt.

The building created as the precursor to the final Innovation Center has itself been designed to provide project teams with a creative working environment in which ideas and innovation can be developed and tested. This will enable us to continue to set new standards in the market. The modular Innovation Center stands out not only for its impressive spatial configuration, but also for the new technologies that it houses. Ranging from modern solar technology and novel display and lighting technologies to upgraded smart façade elements using effect pigments – all these are our contributions to modern architecture.

The prime example of these fascinating innovations: the new building itself.

The most prominent aspect of the building is the Liquid Crystal Window technology (LCW), with its smart windows that change light permeability depending on the solar irradiation – and which staff and visitors alike can now experience for themselves in the modular Innovation Center. This data sheet gives you an overview of the key specifications of the Liquid Crystal Window technology used.

DOUBLE CELL BUILD UP



PRODUCT SPECIFICATIONS

Liquid Crystal Window sizes:
629 x 723 mm (tolerance +/– 2 mm)
543 x 1,023 mm (tolerance +/– 2 mm)
629 x 1,066 mm (tolerance +/– 2 mm)
Total glass thickness:
41 mm (tolerance +/– 0.5 mm)
U_g-value (acc. to EN 673):
1.1 W/m²K
Switching speed:
< 1.0 sec.

TECHNICAL DETAILS (ACC. TO EN 410)

			Light transmission		g-Value		Color Rendering Index	
	Dark	Bright	τ_V Dark	τ_V Bright	Dark	Bright	R_a Dark	R_a Bright
Color: gray (continuously dimmable)			11 %	53 %	0.25	0.40	94 %	97 %

licrivision™

ELECTRICAL SPECIFICATIONS

Energy consumption	< 0.4 W/m^2 at 5 V DC
Window controller	Internal window controller connections: 5 V DC power, analog 0 – 10 V BMS grey scale input
Control system	168 individual grey-scale controls from 0 – 100 % switch, fully integrated into BMS The system offers 3 options to control the LCWs: 1) Steering according to light conditions outside (fully automated) 2) Manual override on demand 3) Pre-programmed demonstration sequence with simultaneous room-light control
Connection	Every window will have 30 cm wiring 28 AWG, wiring connection from window to central controller not provided (low power wiring, 20 V AC /by facade manufacturer). All windows have a water-tight low-power plug-and-play connection. Wiring from LCW to central controller integrated in facade and suspended ceiling provided by main contractor.

NORMS

Tests performed according to	EN ISO 12543-4 Laminated glass and laminated safety glass EN 1279-2 Insulating glass units
Visual defects bulletin	According to "Guidelines to assess the visible quality of glass in buildings" and "Guidelines for assessing the visual quality for systems in multiple-sheet insulating glass" issued by Bundesverband Flachglas e.V.
Safety requirements	TRAV Category C Pendulum test passed (acc. to EN 12600)

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