Problem-Zone „Window“

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Kunsthistorisches Museum Wien

Microclimate Symposium
Kopenhagen 2007

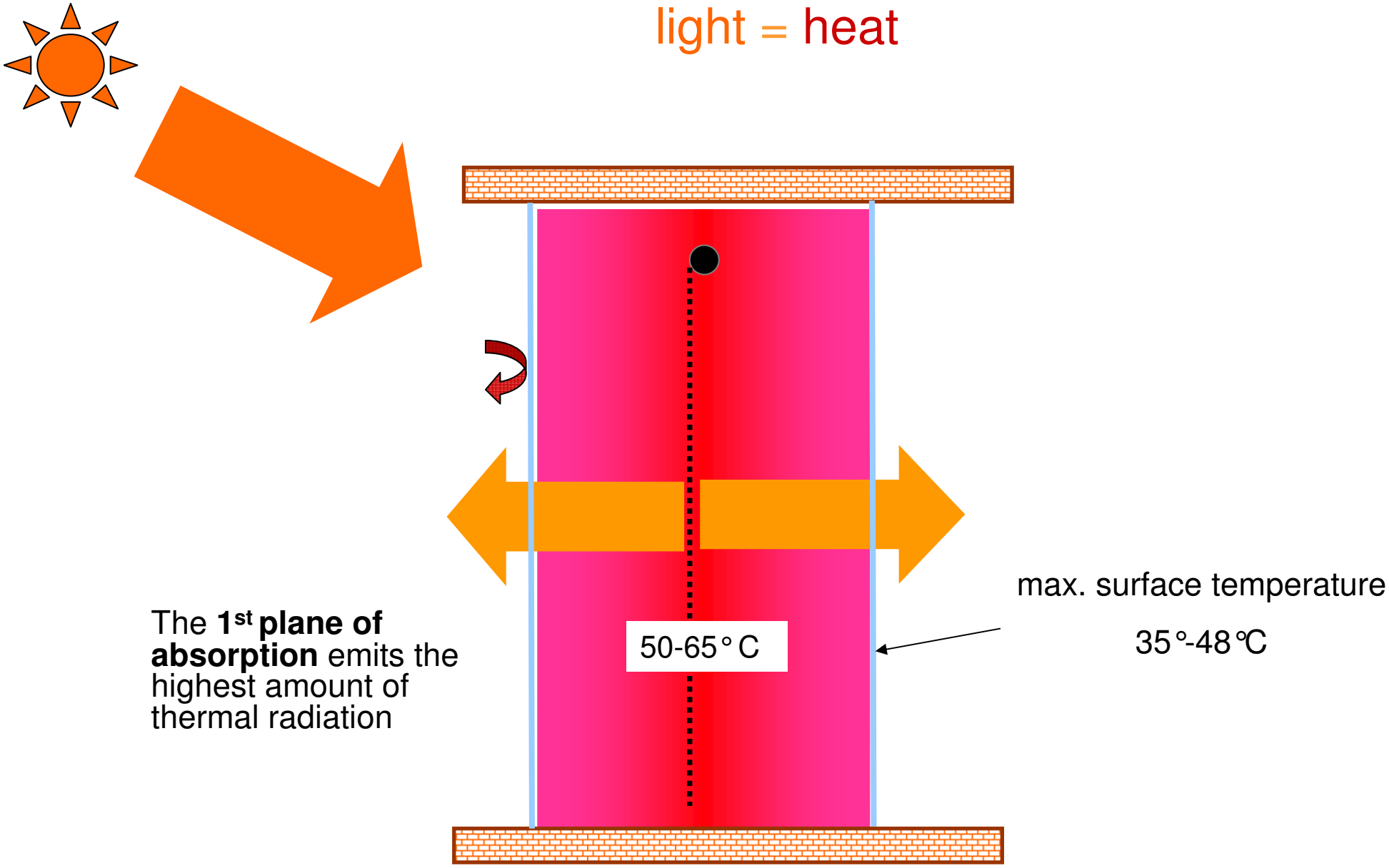
The „Marble Hall“ of the Collection of Antique Musical Instruments Vienna

Location of the
Collection of Antique Musical Instruments (SAM)

Physical Mechanisms and „normal“ Shading Systems

What happens in a „normally“ shaded chest-window?

light = heat

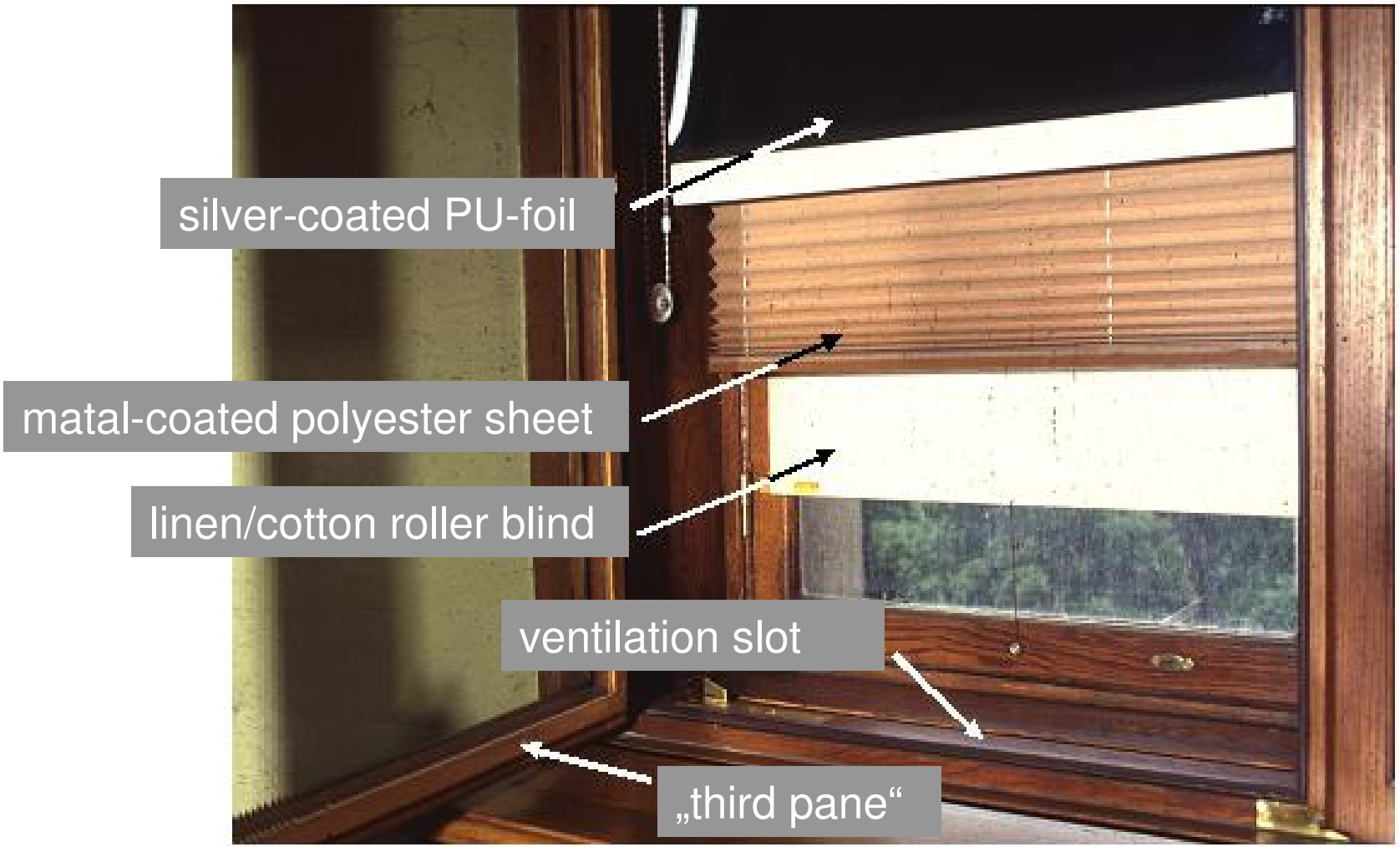


The **1st plane of absorption** emits the highest amount of thermal radiation

max. surface temperature

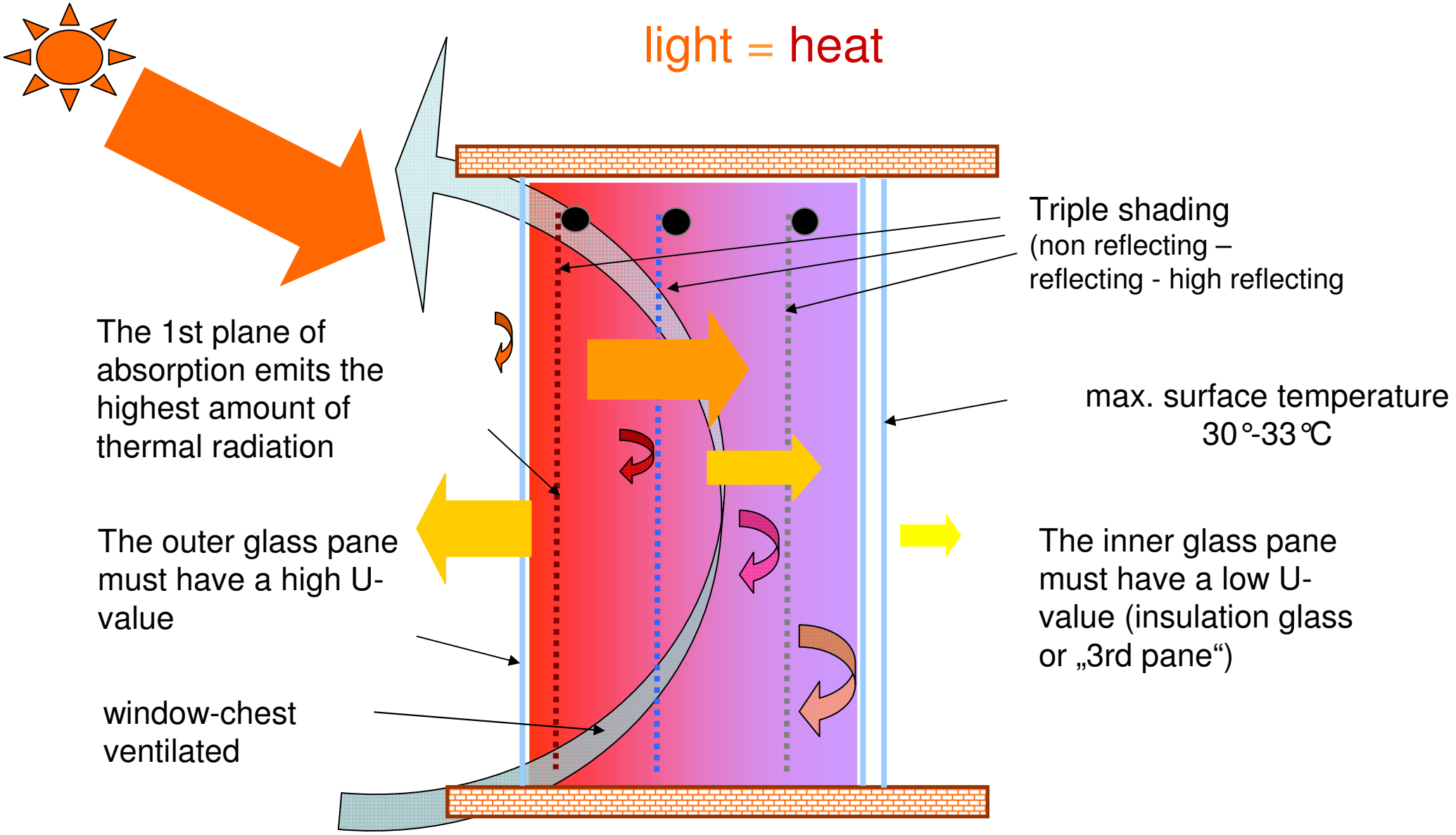
35°-48°C

Sun protection measures in the SAM since 1991

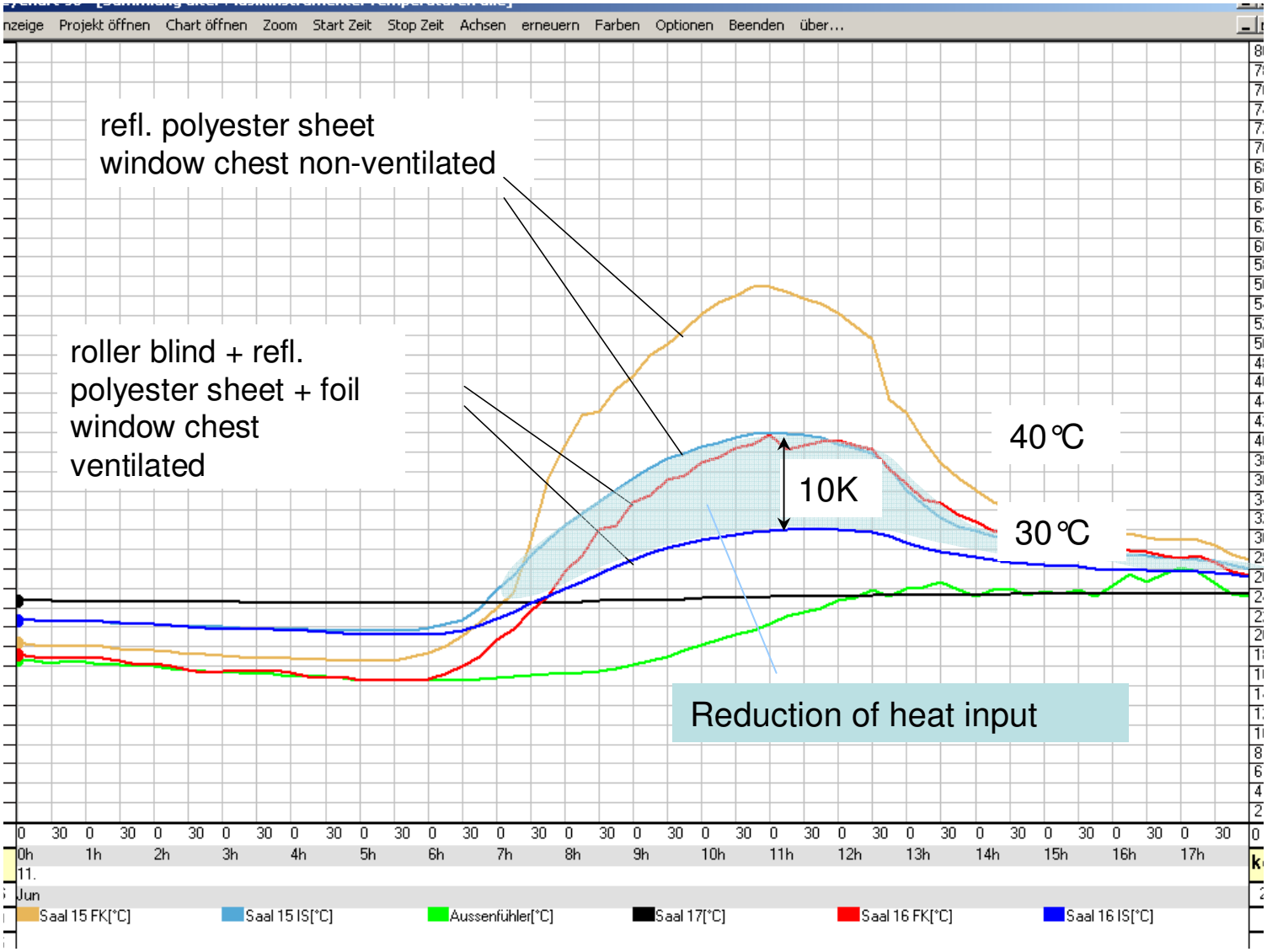


Ventilation of the window chest

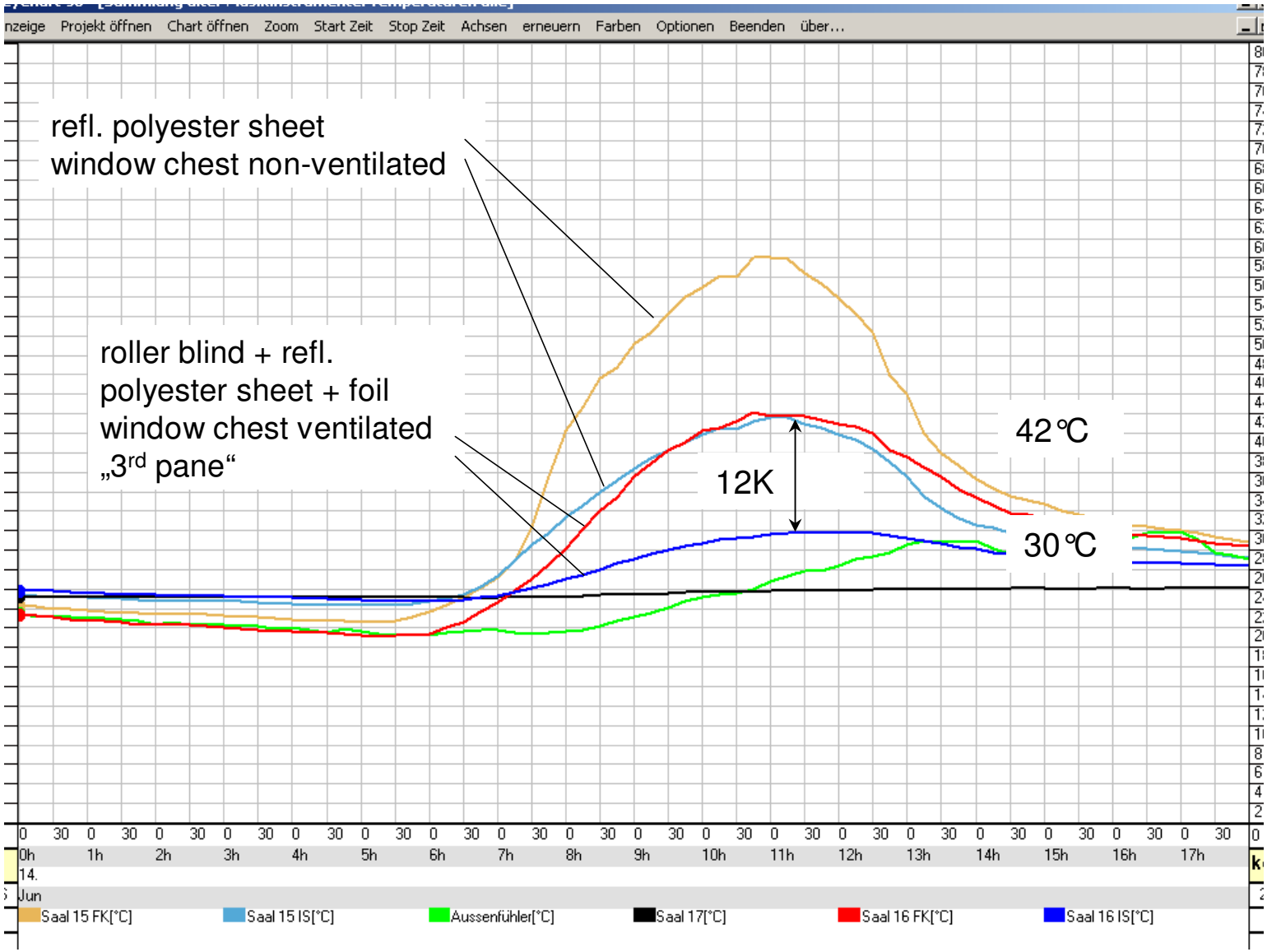
What happens in a window-chest with improved shading?



Standard shading system in a chest window in comparison with triple shading and ventilated window-chest

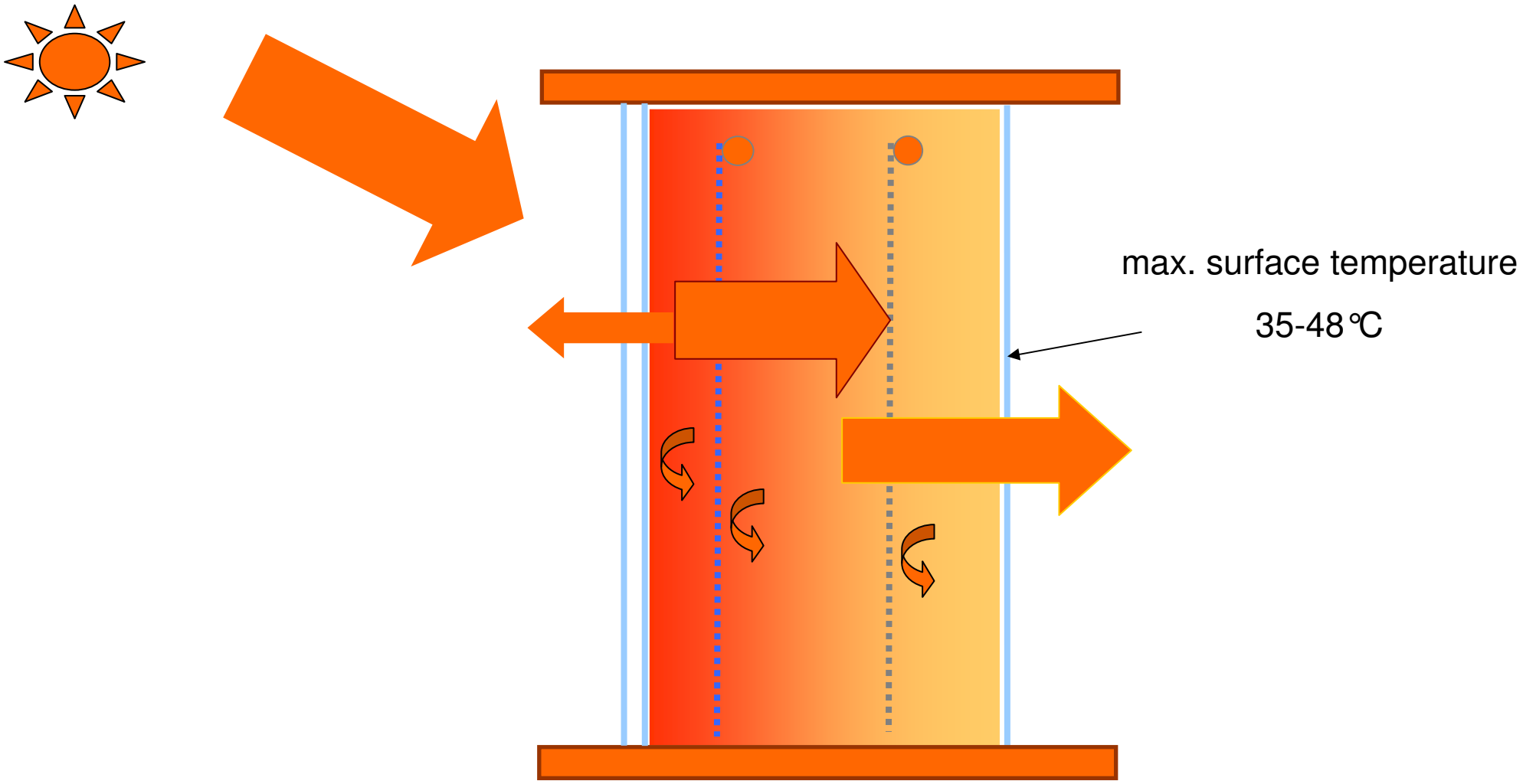


Standard shading in a chest window in comparison with triple shading, ventilated window-chest, and „3rd pane“ (inside insulation glass)

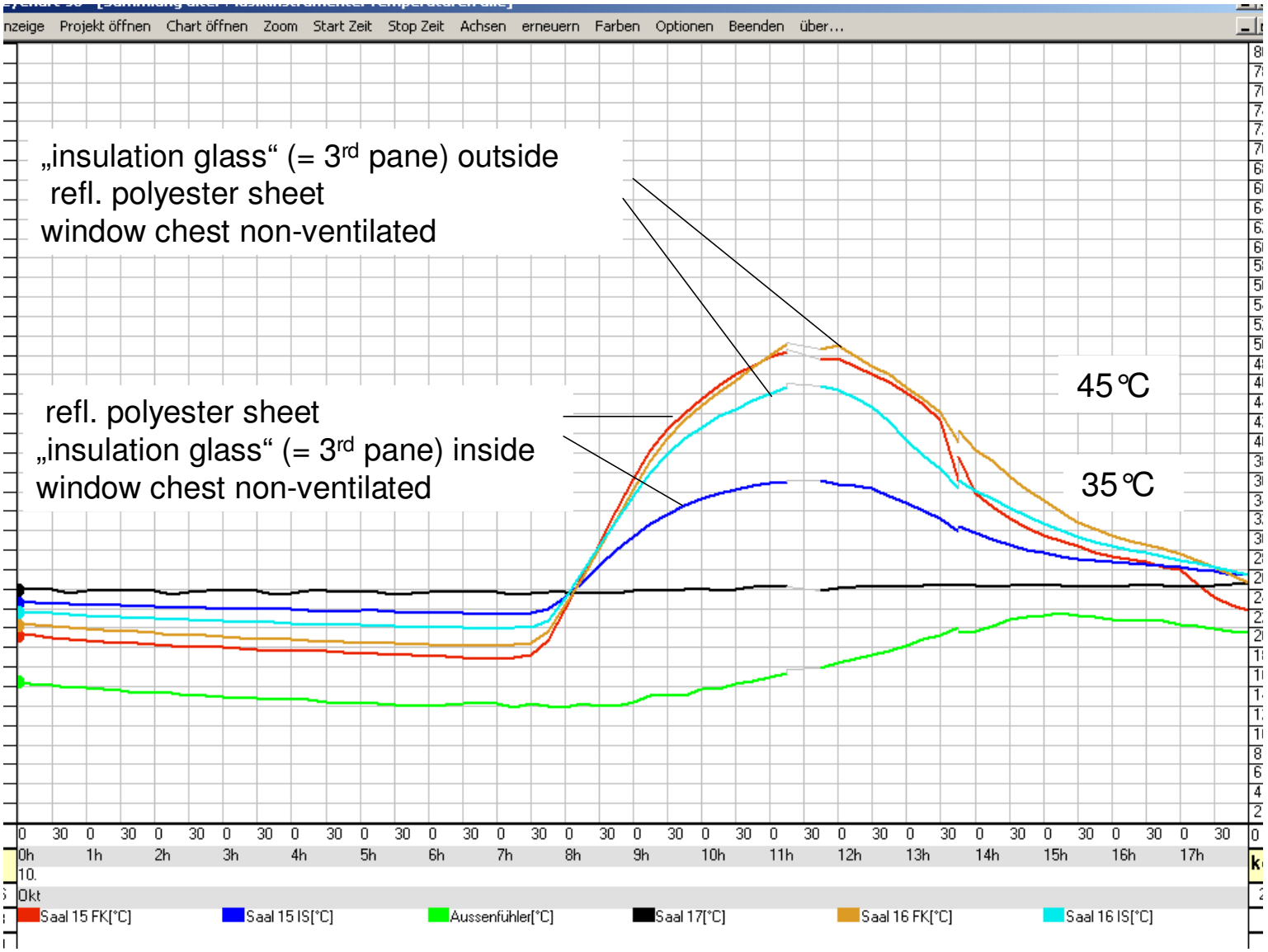


light = heat

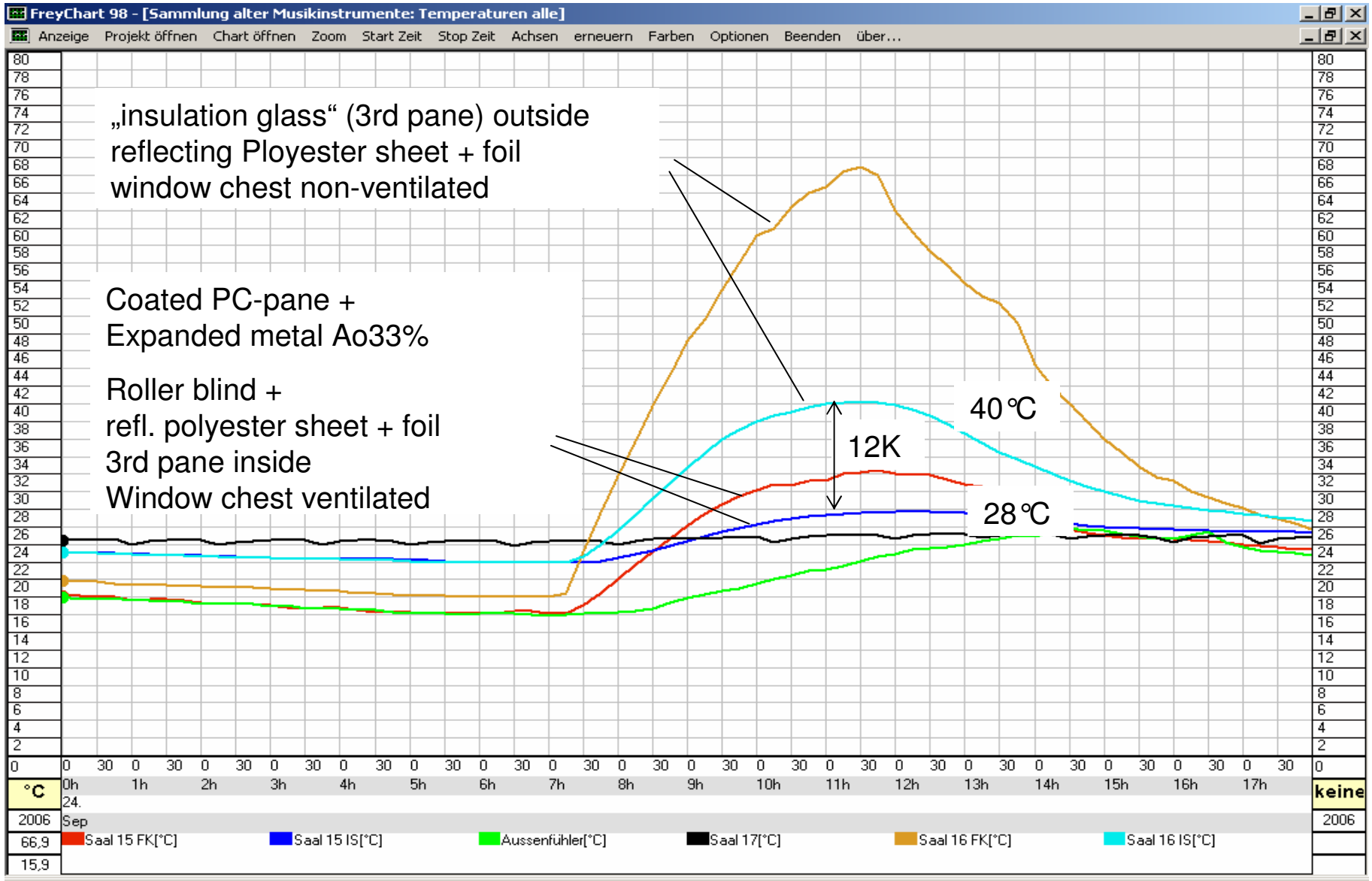
What happens in a chest-window with outside translucent insulation glass?



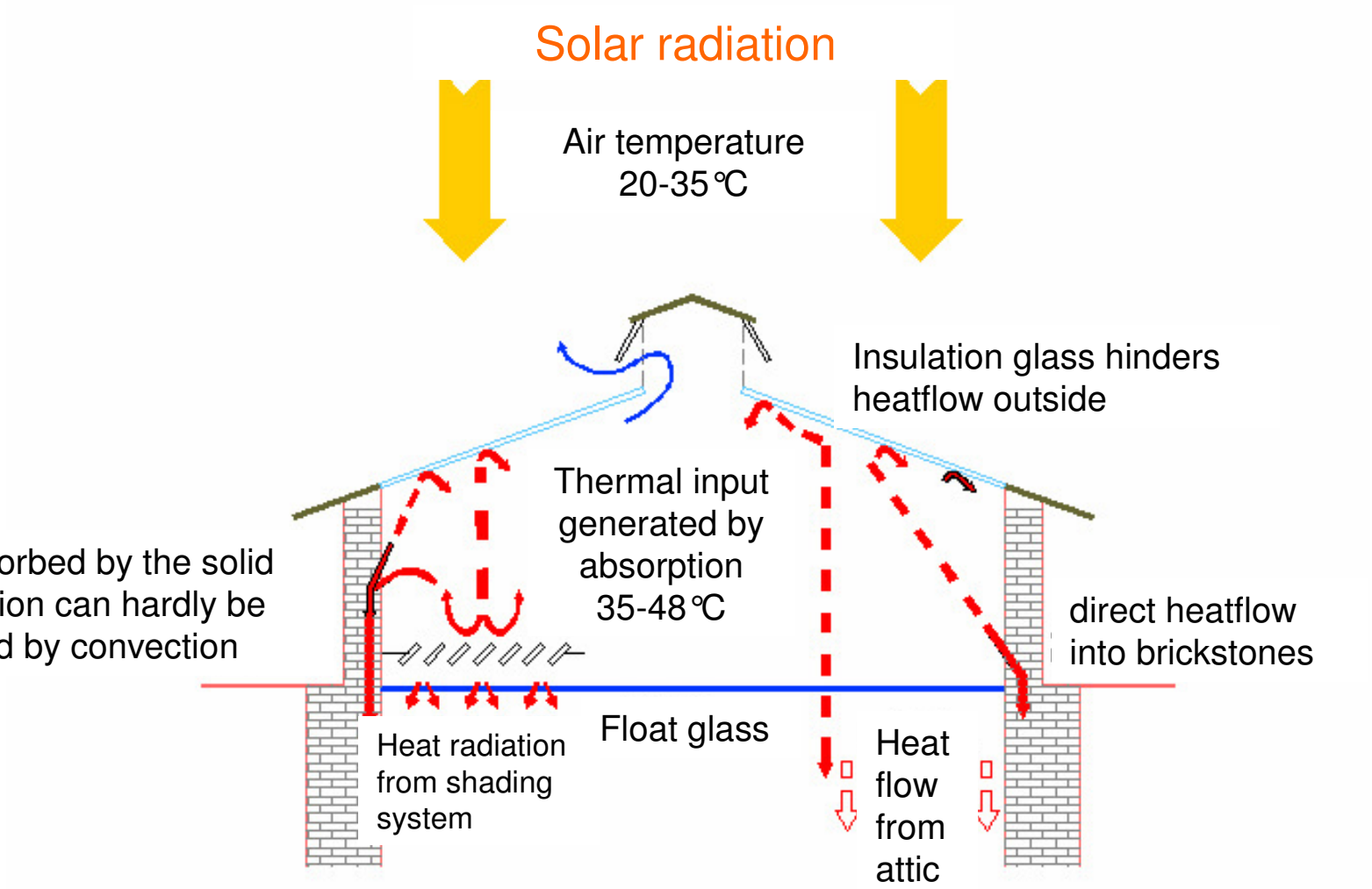
Translucent insulation glass as outer pane *increases* the surface temperature of the inner single glass pane



Simualtion of the windows of the Picture Gallery in comparison with the SAM

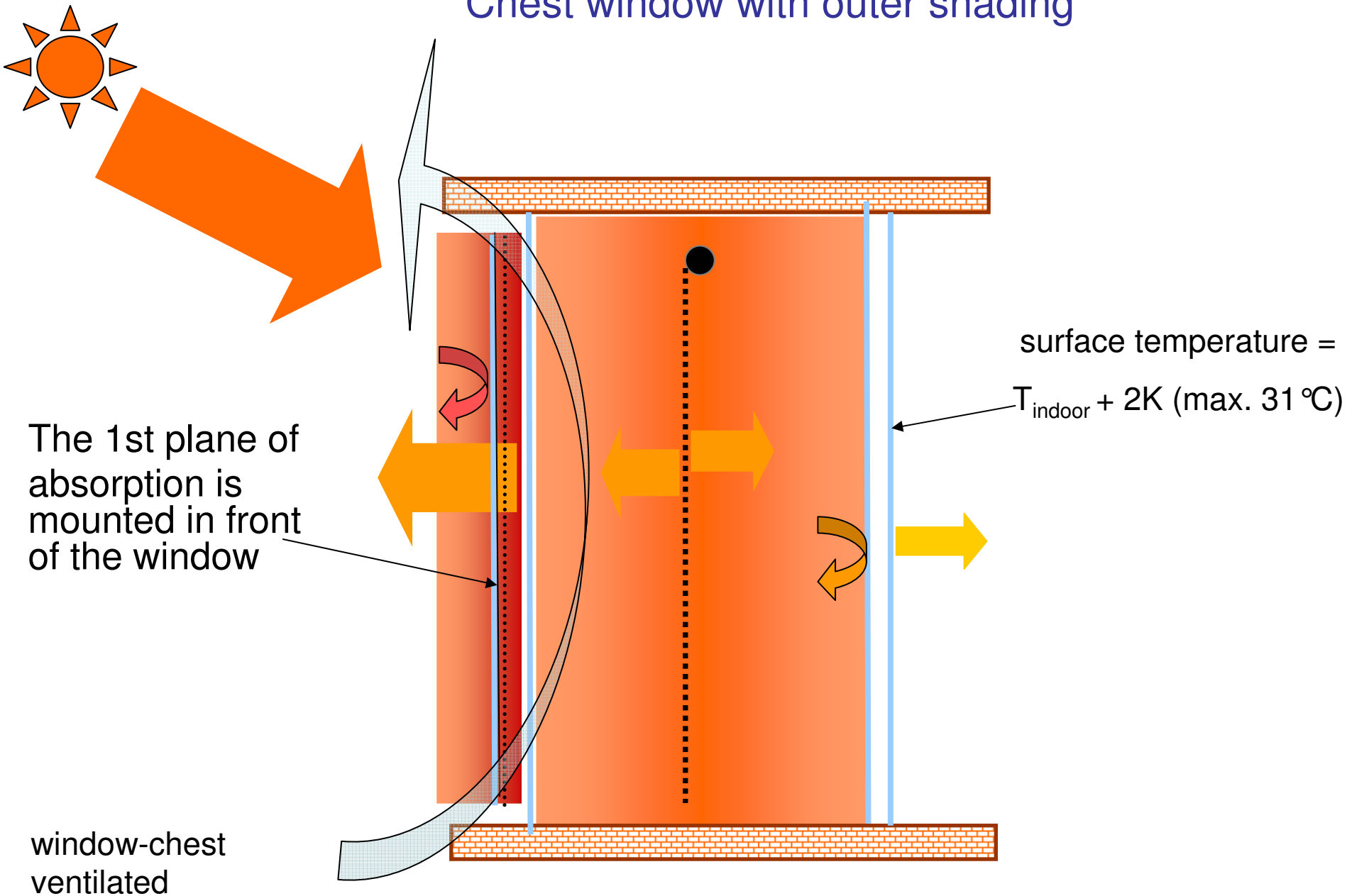


Light roofs are big chest windows
Translucent insulation glasses without outer shading turn light roofs into sun-collectors



Outer Shading

Chest window with outer shading

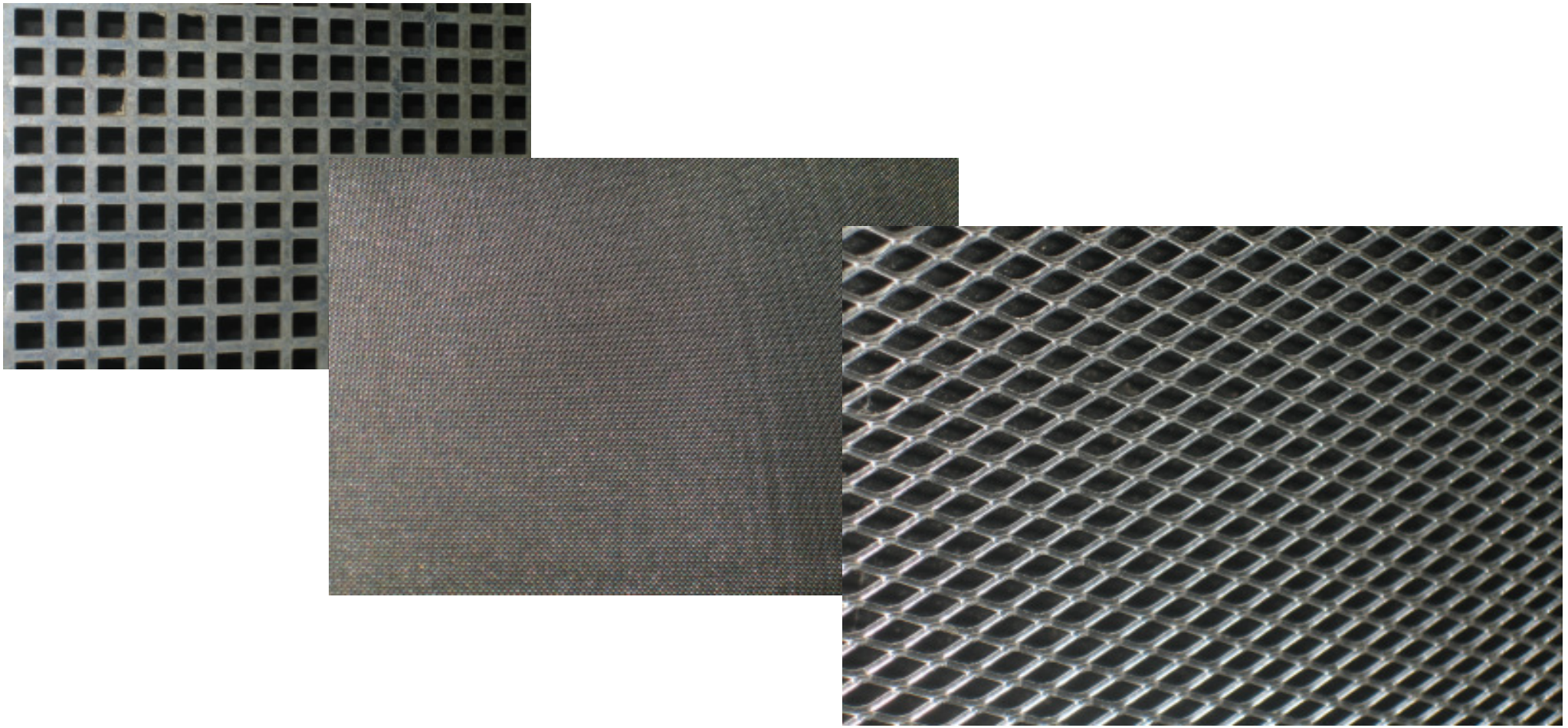


Outer shading materials

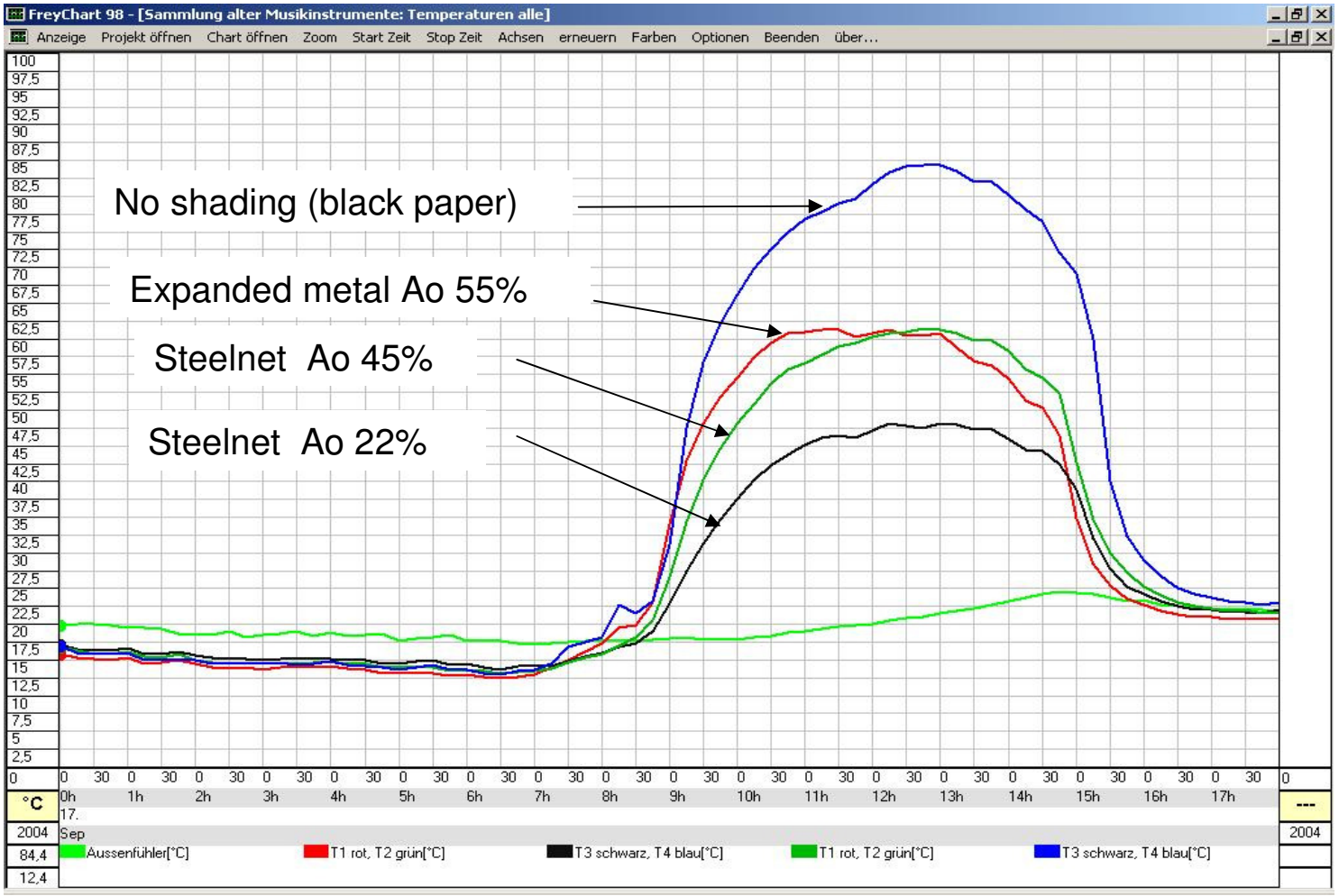
grill Ao40%

micro-net Ao22%

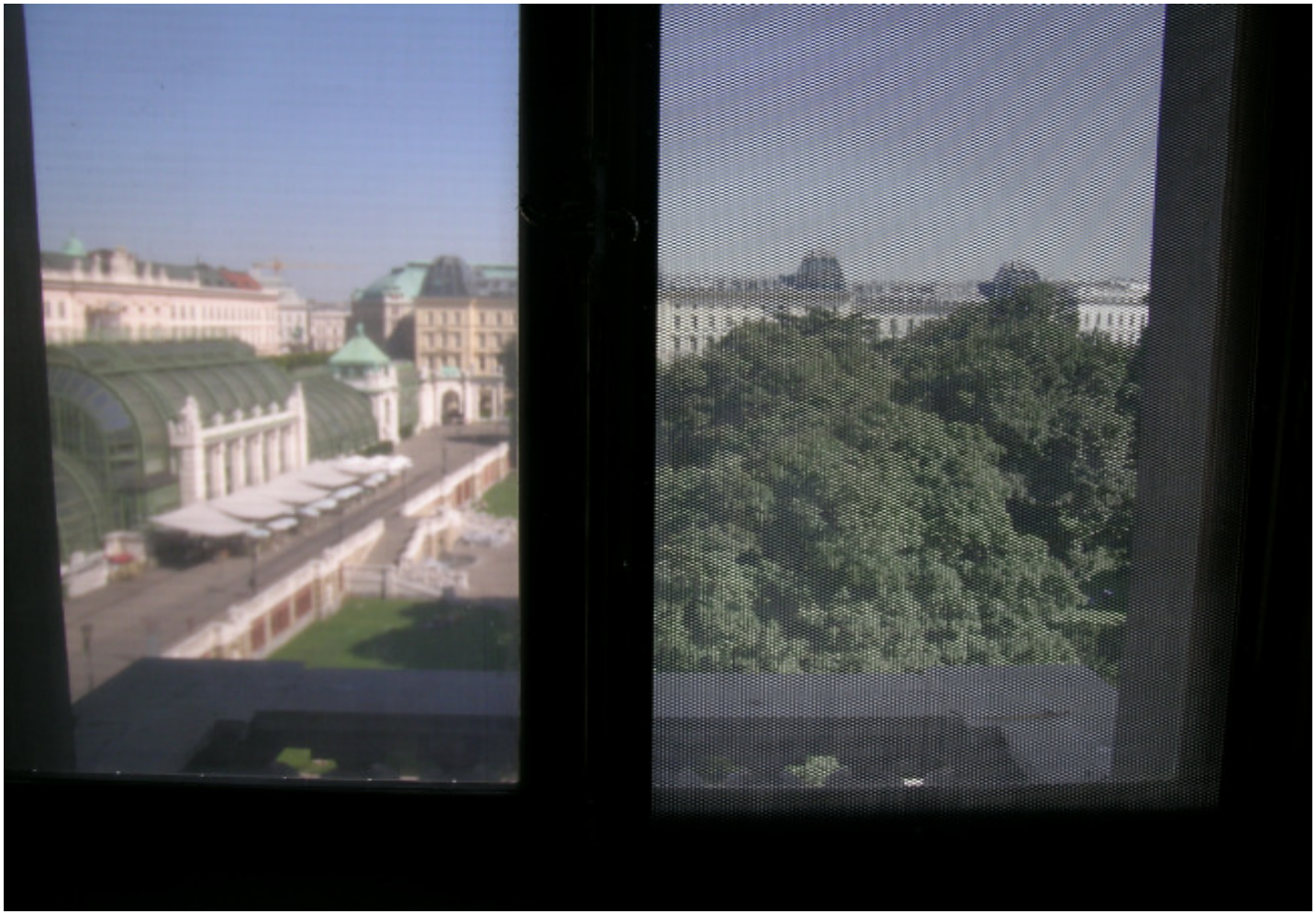
expanded metal Ao33%



In search of the best outer shading material

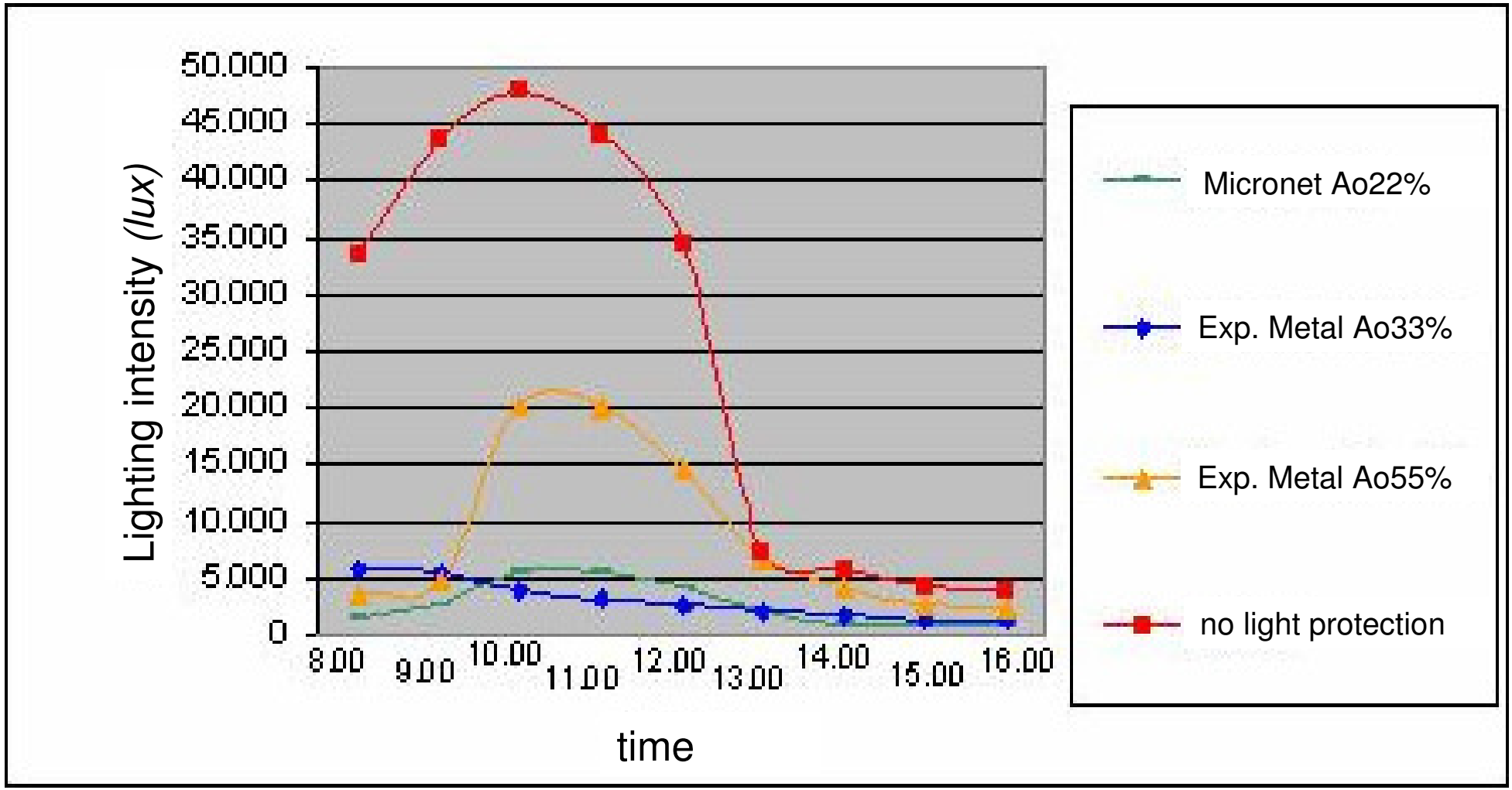


Micronet Ao22% in comparison with expanded metal Ao33%

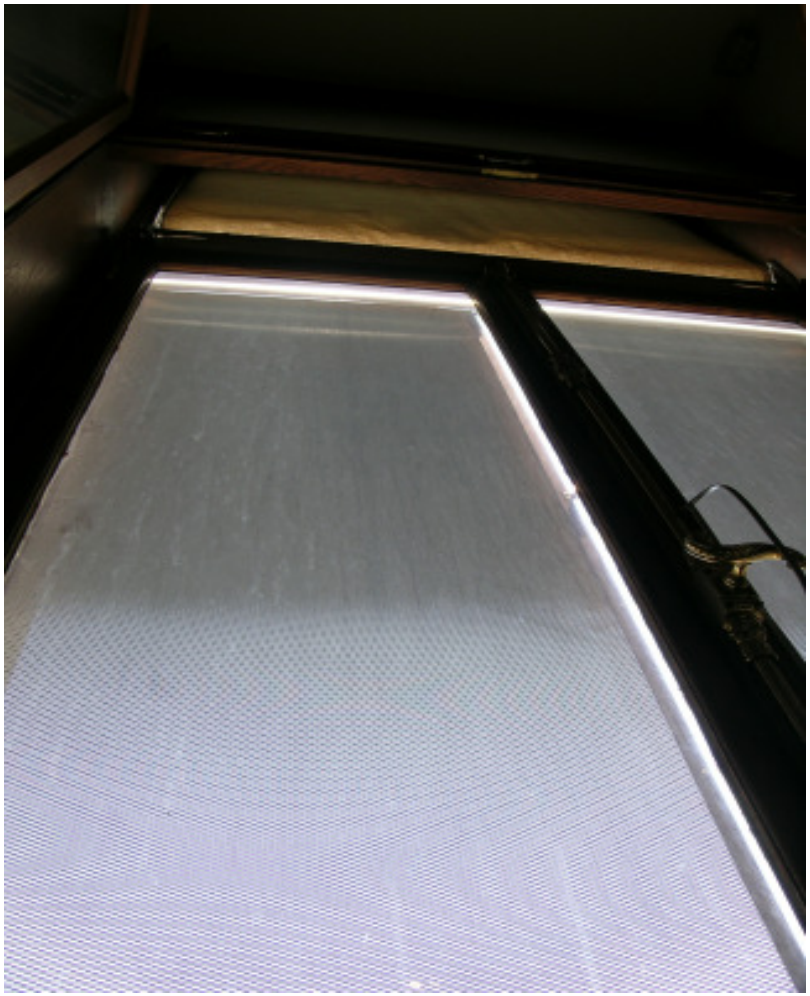


Outer shading with micronet (Ao22%):
The input of sunlight *increases* with increased angle of incidence

Efficiency of shading expressed as lighting intensity *(lux)*



Outer shading with expanded metal (Ao33%):
The light transmittance *decreases* with increased angle of incidence

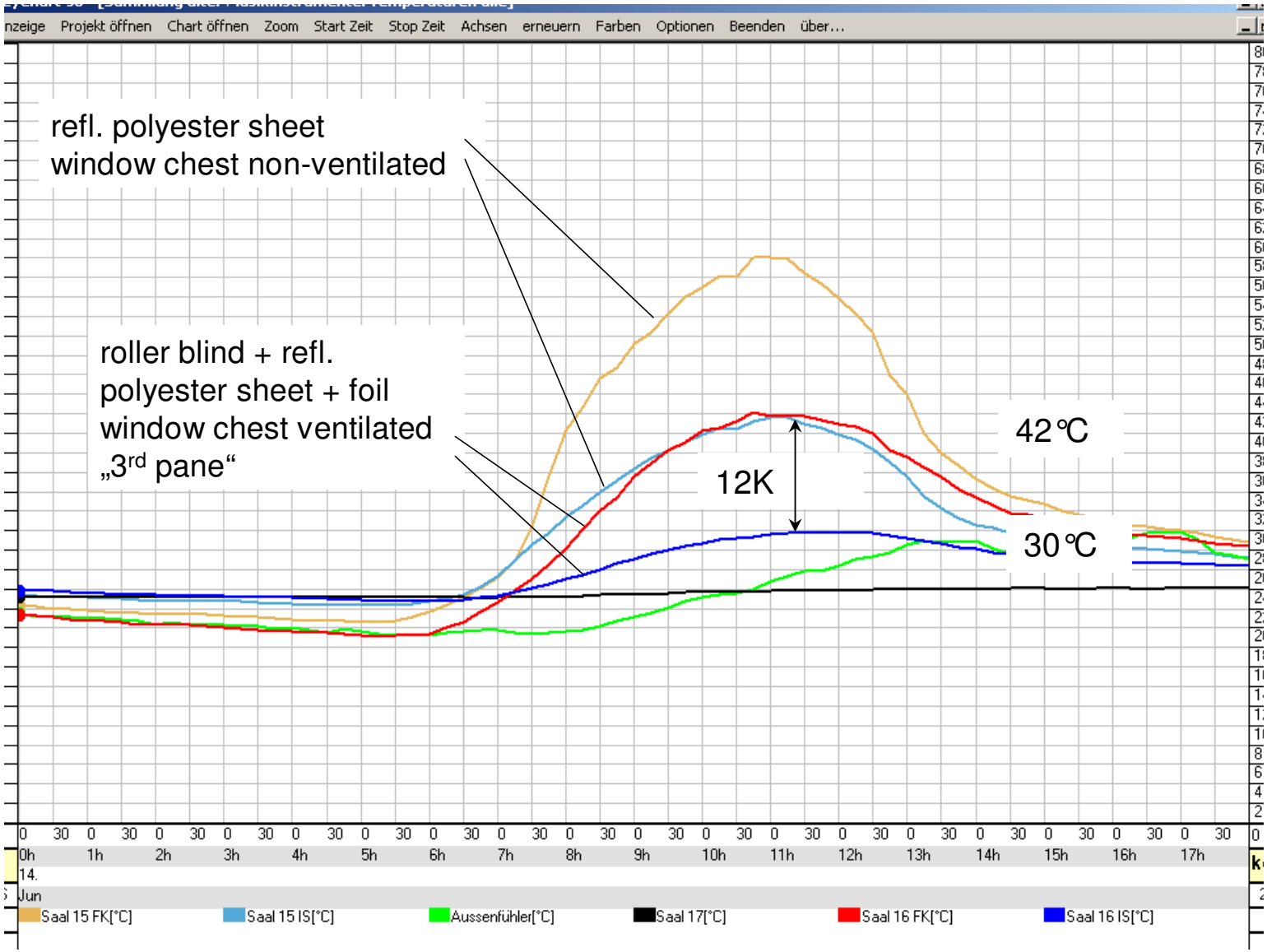


The shading frame is hinged to the outer window frame with a 15mm ventilation spacing

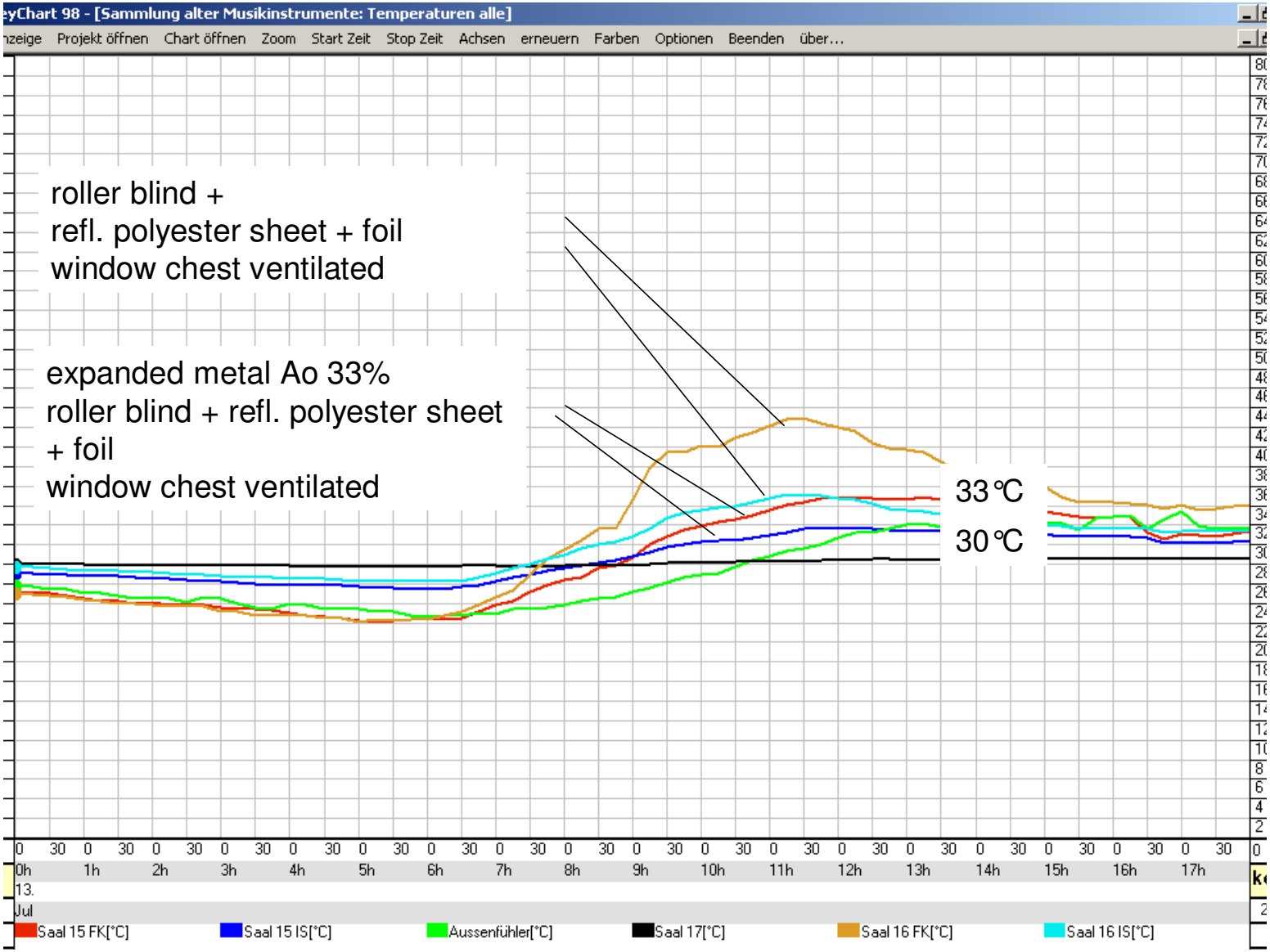
Attention:

Because of the Expansion Coefficient of PC (0.07mm/m/K) the PC must be mounted „swimming“ in the frame

Standard shading in a chest window in comparison with triple shading, ventilated window-chest, and „3rd pane“ (inside insulation glass)

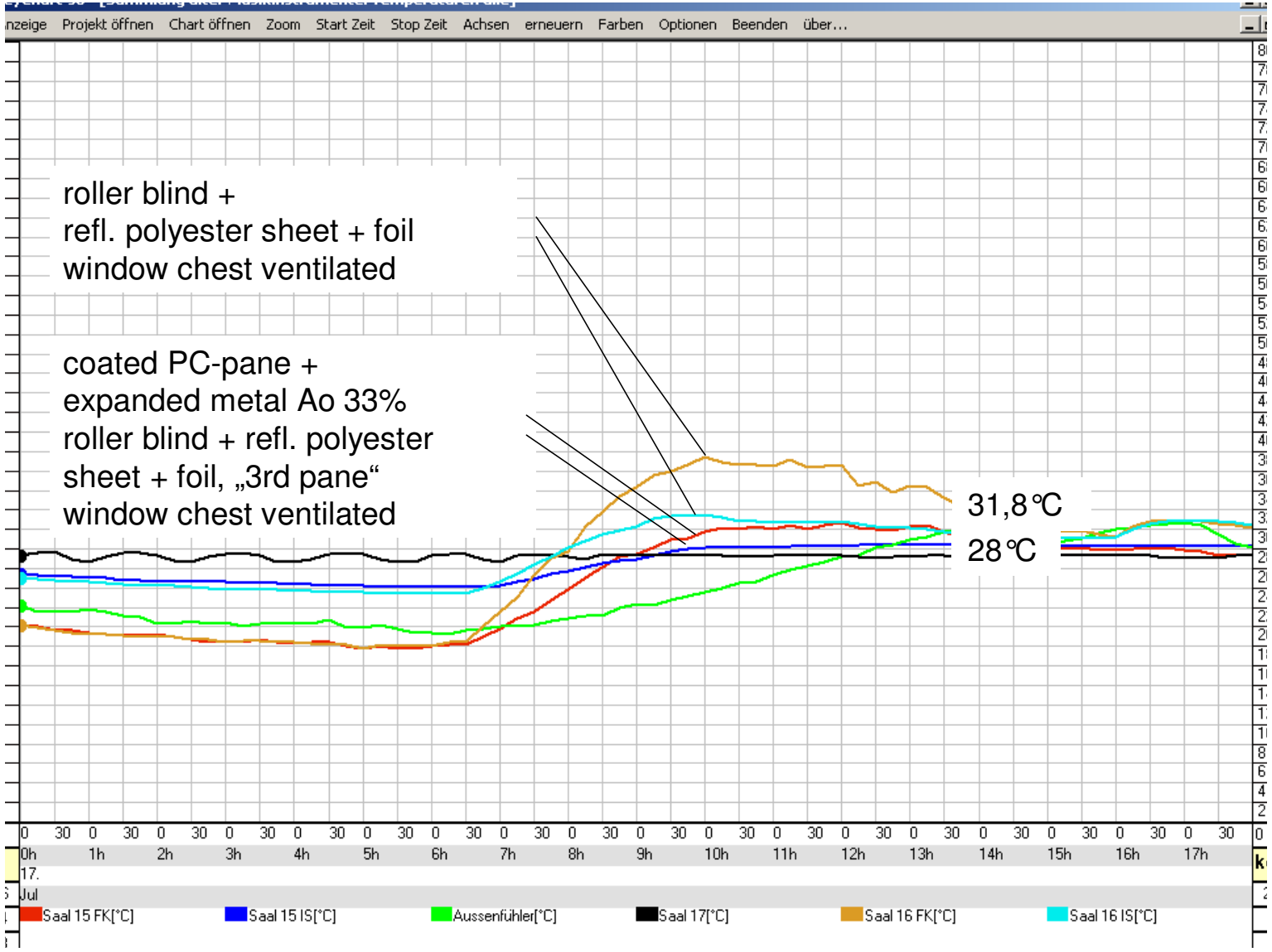


Triple shading in a ventilated chest window in comparison with the same system + additional outer shading (expanded metal Ao33%)



Expanded metal attached to the outer frame

Triple shading in a ventilated chest window in comparison with the same system + optimized outer shading (metal-coated polycarbonate pane + expanded metal Ao33%)



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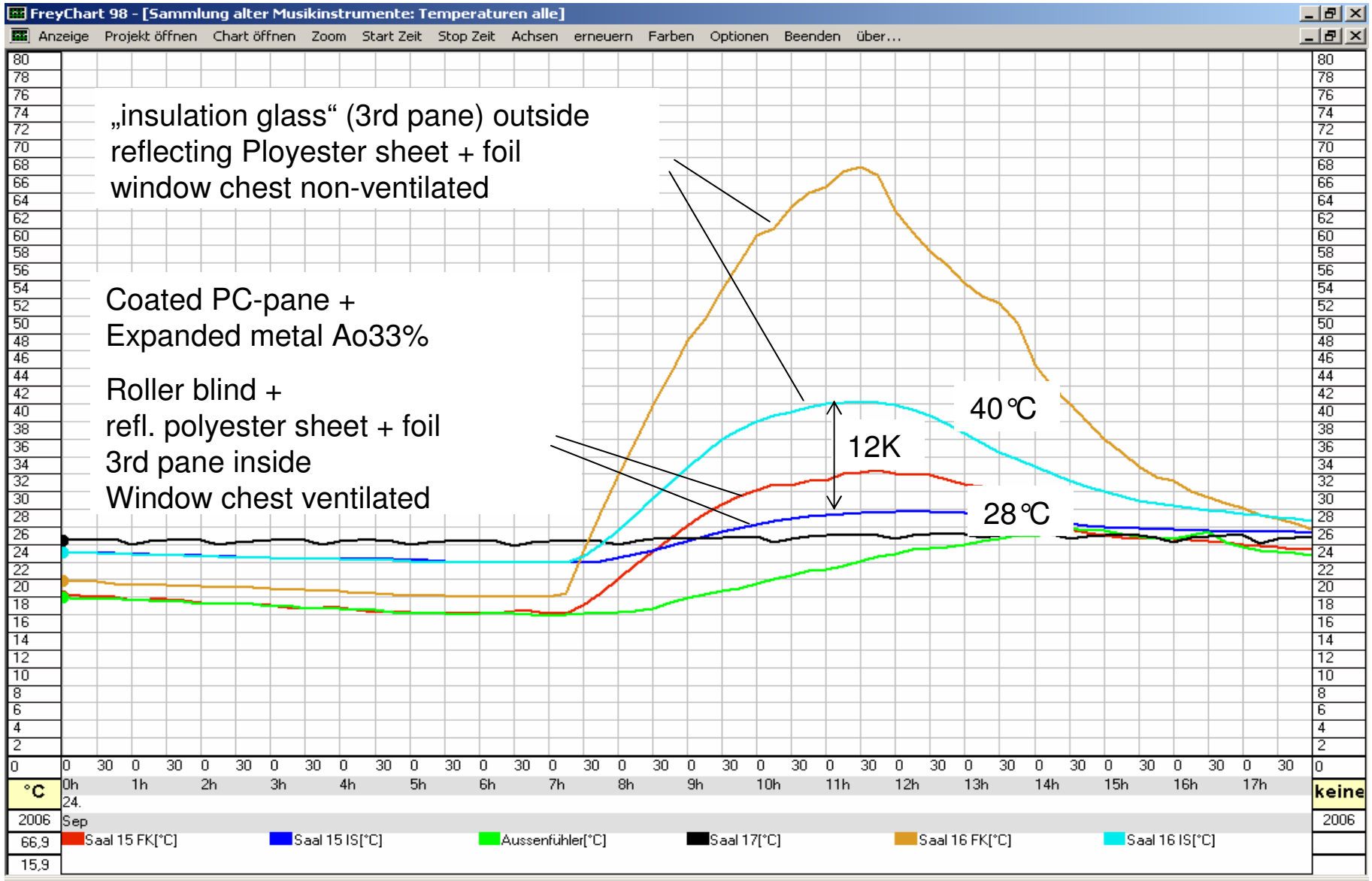
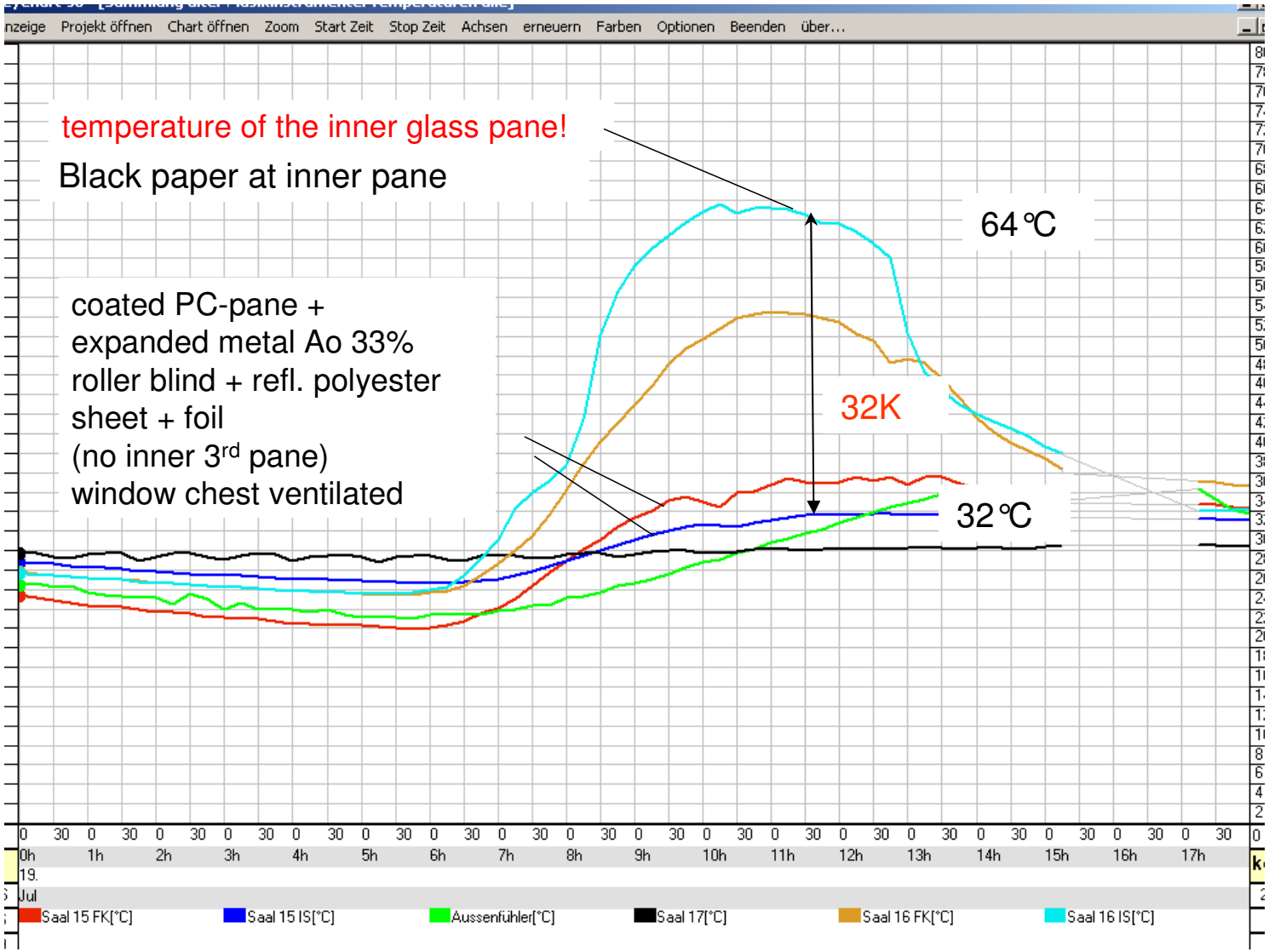


Worst case („Bassano-Saal“) – Best case (SAM) - Scenario in Kunsthistorisches Museum



Aesthetic aspects and „Cultural heritage“ status of historical buildings

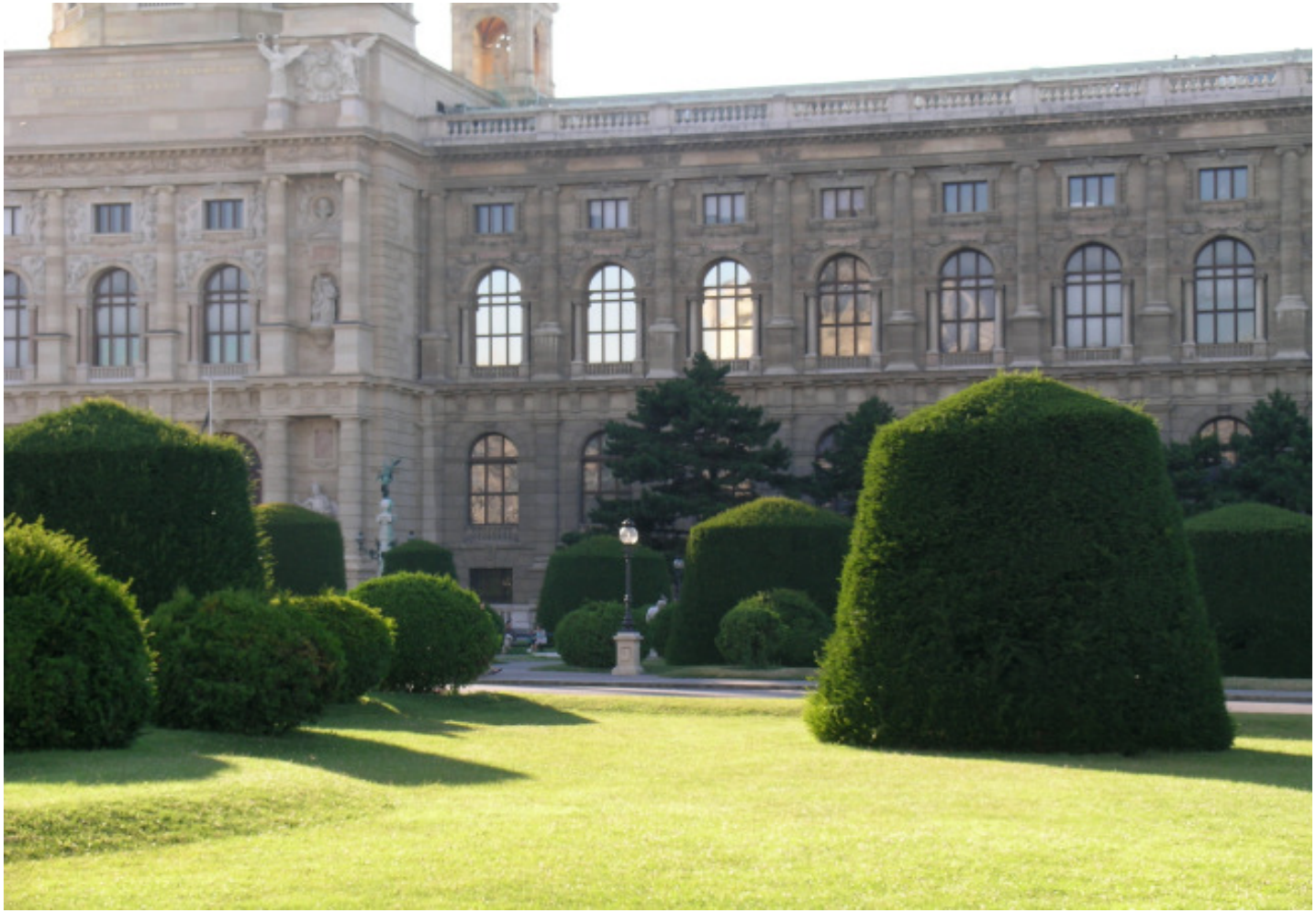
During winter, the arches of the loggia of the Wiener Staatsoper are closed by a moveable glass construction

Eight windows of the main facade of the Wiener Burgtheater are covered up with big photographs of actors

Main entrance to the Museumsquartier

Main intake port and ventilation for the airconditioning above the main entrance of the Int. Conference Center in the Wiener Hofburg

Shaded windows for the „Microtheater“ in the Naturhistorisches Museum



26 Plastic roller jalousies in front of the windows of the Parliament

The SAM shading frames are almost unnoticeable from outside

no outer shading

1st model of outer shading:

Frame of oakwood
expanded metal behind glas pane

The facade of the Neue Burg with outer shading prototype ...

... and final design of the windows of Hall IX

Unintrusive appearance of the outer shading system

Final report of the project EU-1383 ”Prevent”

Michael Kotterer, Henning Großeschmidt,

Frederick P. Boody, Wolfgang Kippes (ed.),

Klima in Museen und historischen Gebäuden: Die Temperierung.
Wissenschaftliche Reihe Schönbrunn, vol. 9, Wien 2004.

see also: www.kog-regensburg.de