

	CONSTGLASS 	
	Data-sheet Klausen	

Object: Parish Church in Klausen (Eifel)	Date: 15. 12. 2008
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OBJECT IDENTIFICATION	
Site	Klausen (Germany)
Building	Parish and Pilgrimage Church
Location and orientation of the window	Axial window in the choir, faced to the east 



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Description of the window opening (dimensions, number of lights, test panel marked)



3 lancet window with tracery
total height: circa 11 m
total width: circa 3 m
height per lancet: circa 8,50 m
width per lancet: circa 90 cm

Date

1878

Short description of the window (identification of subject, artist, workshop)

Themes of the choir glazing are the Seven Pains of St. Mary. The axial window depicts the Flight to Egypt (lower part) and the Crucifixion (upper part).
The windows were made in 1878. The executing workshop is unknown.

Owner

Pfarr- und Wallfahrtskirche Klausen
(Pfarrer Karl-Joseph Meyer)

Person(s) in charge

Diözesankonservatorin Dr. Barbara Daentler
Amt für kirchliche Denkmalpflege
Hinter dem Dom 6
54290 Trier

Investigated panel (inventory number CVMA number, size)

I, 1b
Size: 81 cm x 80,8 cm






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Manufacturing technique	unpainted glazing		<input type="checkbox"/>
	painted glazing		<input checked="" type="checkbox"/>
		oxide paint / grisaille paint inside	<input checked="" type="checkbox"/>
		oxide paint / grisaille paint outside	<input type="checkbox"/>
		silver stain inside	<input type="checkbox"/>
		silver stain outside	<input type="checkbox"/>
		transparent enamel inside	<input type="checkbox"/>
		transparent enamel outside	<input type="checkbox"/>
		<input type="checkbox"/>
		<input type="checkbox"/>
<p>Further information:</p> <ul style="list-style-type: none"> - oxide paint for the outlines - In course of a restoration around 1900 the six ornamental panels at the bottom of the axial window got a cold (unfired) pigment coating with lacquer. Obviously the original paint layer – although recently made – was in a bad condition and loss of paint had occurred. The lacquer was to conceal the light patches where the paint was lost and to secure generally the unstable paint. <p>Condition of the paint layer: The paint is insufficiently fired. It appears matt and open porous. There is a lot of paint loss</p> <p>On some segments the contour lines of oxide paint were coated either with Ormocer® or SZA in comparison to Paraloid® B72 during a conservation project in 1991.</p>			

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ENVIRONMENT IN SITU / IN STORAGE				
Protective glazing	no protective glazing		<input type="checkbox"/>	
	protective glazing		<input checked="" type="checkbox"/>	
		installed in the original position of the ancient panels		<input checked="" type="checkbox"/>
		mounted to the outside (ancient panels stay in their original position)		<input type="checkbox"/>
		no ventilation		<input type="checkbox"/>
		internal ventilation		<input checked="" type="checkbox"/>
		external ventilation		<input type="checkbox"/>
		size of interspace between ancient panel and protective glazing		~ 2 cm
		ventilation slot at the top (size)		~ 2 cm (?)
		ventilation slot at the bottom (size)		~ 2 cm
		date of installation		1991



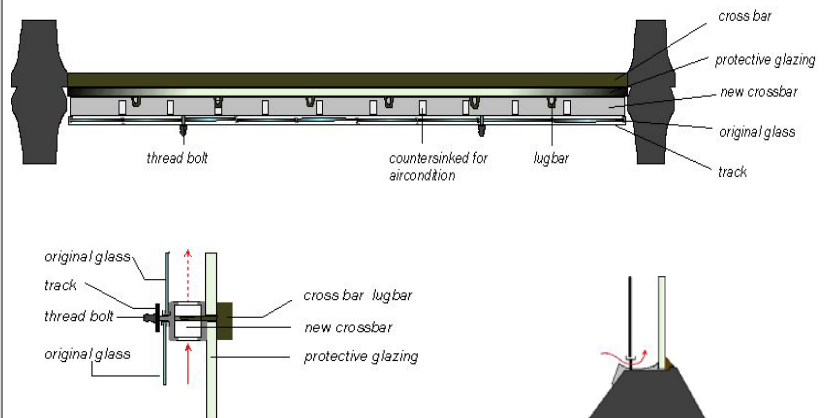
Further information:

The ventilation in the interspace is obviously not sufficient. During the actual removal we saw water drops on the surface of the protective glazing and on the external side of the original panel.






Outer protective glazing with water drops on the inside surface.

Construction of the outer protective system:



Material protective glazing	Plain glass
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Surround materials and construction related materials	Before the protective glazing system was installed, the window was surrounded by red sandstone. The panels were inserted in the grooves and fixed in mortar. After the installation of the outer protective system in 1991 the window panels were internally mounted on a new steel construction. Each panel is now framed with U-profiles of brass.
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Museal exposition / Storage		<input type="checkbox"/>
	Cabinet	<input type="checkbox"/>
	Store	<input type="checkbox"/>
	<i>Further information:</i>	

Objects exposed to	partial sunlight (east side)	<input checked="" type="checkbox"/>
	daylight, but no direct sunlight	<input type="checkbox"/>
	artificial warm light	<input type="checkbox"/>
	artificial cold light	<input type="checkbox"/>
	mixed warm-/cold light	<input type="checkbox"/>
	<i>Further information:</i>	



Climate of the building

The church is heated.
Climate measurements have been started the December 2nd, 2008 by exposing a data-logger in lancet c of the window (lowest register)



Data-logger exposed on panel 1c

The climatic data are: air temperature (T [C°]) and relative humidity (RH [%])

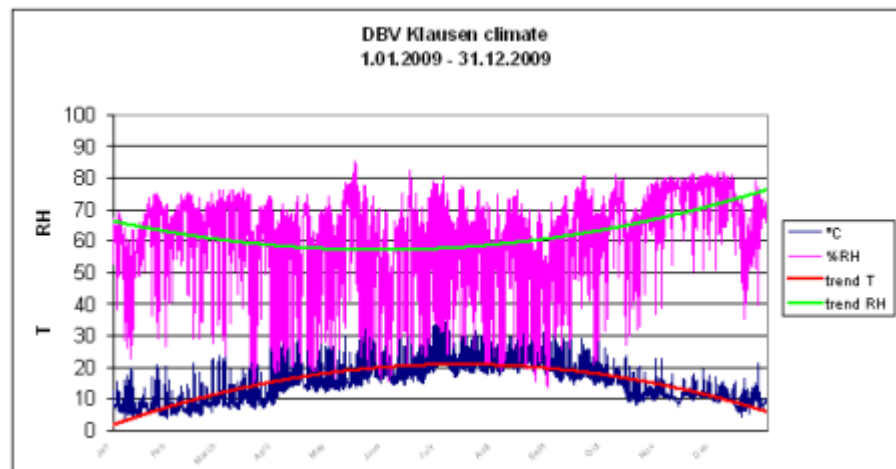


fig.1 Klausen climate

The plot shows that RH tendencies depend on season of the year: in warmer, summer period of the year, the RH averages drop down with rise of air temperature. This may suggest, that there is no additional input of water vapors from more humid outer climate.

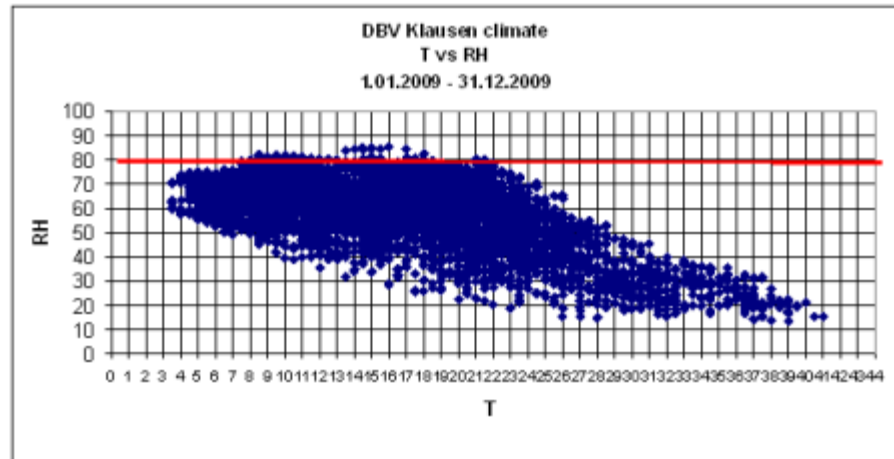


fig 2. Klausenr climate: T vs RH

The graph depicted on fig. 2 visualizes the possibility of wetness of the glass occurring when $T > 0\text{ }^{\circ}\text{C}$ and $\text{RH} > 80\%$. The graph shows, that wetness may occur within the 8 to 22 $^{\circ}\text{C}$ range. It seems that this phenomenon may occur quite often.

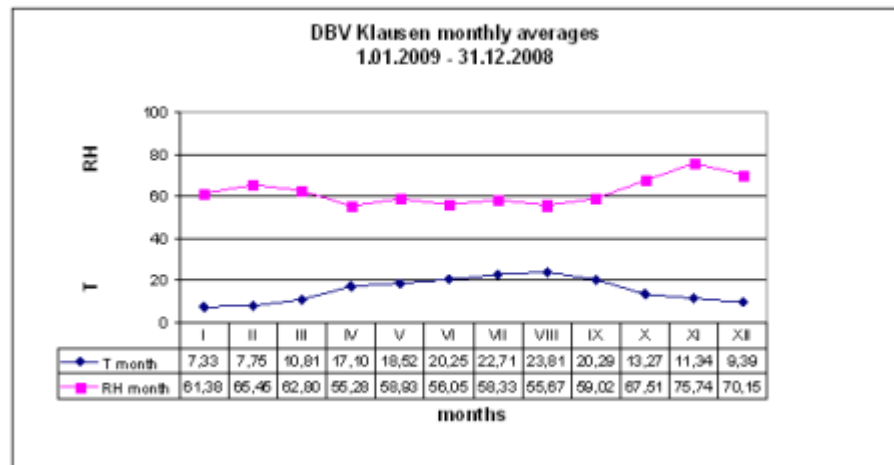


fig. 3. Klausen climate: monthly averages

The mean monthly values of climate data follow the trend lines of plot 1 and also show, that probability of wetness occurrence is higher in the colder seasons of the year, particularly in late Autumn and winter period .



The light parameters are: illuminance of visible light (VIS [lux]) and irradiance of UV radiation [mW/m²]

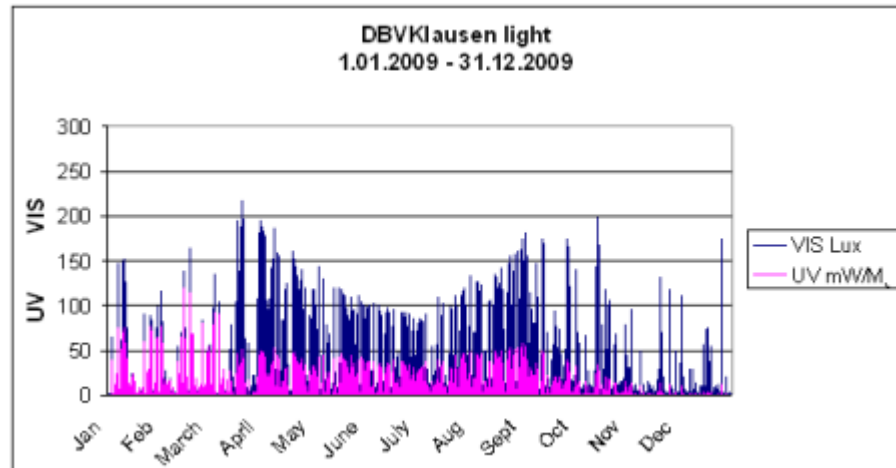


fig. 4. Klausen visible and UV light levels

The lowest level of light occurs in summer. This phenomenon, rather astonishing for the first glance may be caused by high sun path in summer, leading to shading the area where logger was situated. The UV level is very low throughout the year. There is also low VIS illuminance during cold season of the year.

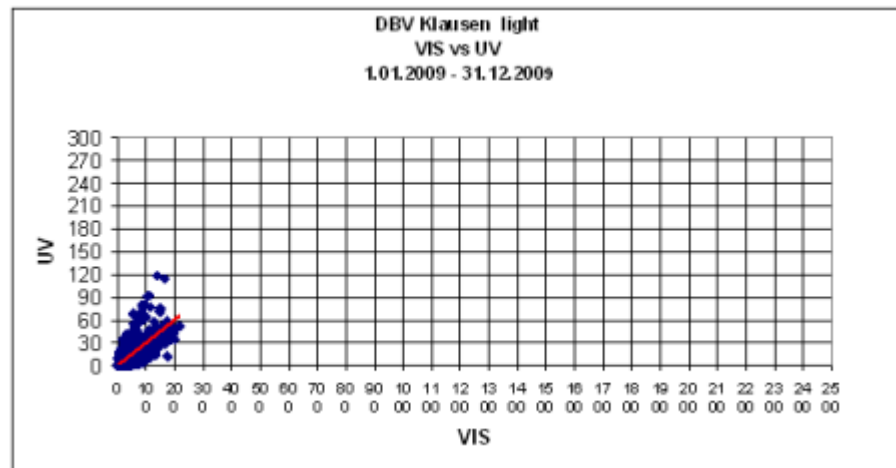


fig 5. Klausen light: VIS vs. UV

The graph shows, that the both, illuminance and irradiance are low and the range of them is narrow.

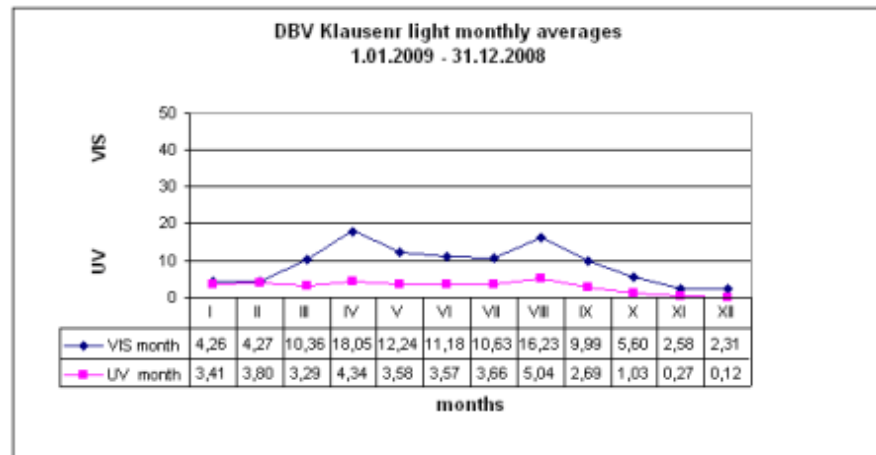









fig. 6. Klausen light: monthly averages

The UV radiation is low, the VIS light shows two peaks in April and August and low level of light in winter.




The climatic conditions of the Klausen Church window show a climate typical for naturally ventilated interior, where the interior climate follows the exterior one, although thanks to buffering of structure's envelope the variations of it are smaller. The scatter plot (fig. 2) suggests, that a little possibility of wetness may occur. The visual radiation (fig. 4) shows the drop of VIS radiation during summer, while UV radiation does not change so much and, moreover, does not follow the visual radiation pattern. An explanation of this phenomenon is, without knowing the situation of the window, impossible.

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INSPECTION OF THE SITE BEFORE REMOVAL (WITH PICTURES)	
Requirements for a safe removal in respect of minimal intervention	
Environmental causes for damage	
Short report of removal	<p>The internal mounted panel was easy to remove. It required a scaffold and a 17'' wrench.</p> 
Short report of transport	<p>The panel was transported by car in a wooden transport box. In view of the damaged paint the box was transported in an almost vertical position.</p>

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CONSERVATION MATERIAL	
Conservation material (producer, product name, characterization, data, etc.)	<p>SZA (developed by ISC-Fraunhofer Institute, Würzburg, D) is an inorganic material based on silicium-zirkon-alkoxide.</p> <p>Ormocer® (developed by ISC-Fraunhofer Institute, Würzburg, D) is an inorganic-organic hybridpolymer, a heteropolysiloxane mixed with an acrylic resin (Paraloid B 72)</p> <p>Paraloid® B72 is a copolymer of methyl acrylate and ethyl methacrylate in solution with Toluene (MA/ EMA 30/70; 1% Toluene).</p>
Purpose of use	consolidation of paint layer / paint pigments <input checked="" type="checkbox"/>
	coating / lamination <input type="checkbox"/>
	edge bonding <input type="checkbox"/>
	stabilization of cracked glass <input type="checkbox"/>
	<input type="checkbox"/>
	<input type="checkbox"/>
Application technique	application with brush <input checked="" type="checkbox"/>
	application with spray <input type="checkbox"/>
	single application <input type="checkbox"/>
	repeated application (Ormocer®, SZA) several times
	Concentration
	mixing ration of the SZA Si/Zr (9/1) 14% solution in iso-butyl alcohol
	mixing ratio of Ormocer® Ormocer/Paraloid/Plexigum PM 381 (80/10/10) 6% solution in ethyl acetate
	mixing ratio of Paraloid® B72 10% in Toluene

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	<p>Further information:</p> <p>The treatment of the panel was a test, carried out in 1991 by the stained glass conservation studio of Cologne Cathedral. This was done in comparison to Paraloid® B72.</p> <p><u>Description of the treatment:</u></p> <p>SZA was used for the stabilization of damaged paint. The application was partial. During the application process SZA needed a relative humidity of more than 60%.</p> <p>Ormocer® was also used for stabilization of damaged paint, but under normal room conditions.</p>	
Date of application	1991	
Documentation of this treatment	photographs (colour transparent and black & white, prints, digital images)	<input checked="" type="checkbox"/>
	written records	<input checked="" type="checkbox"/>
	diagrams	<input type="checkbox"/>
	data-files	<input type="checkbox"/>
		<input type="checkbox"/>
		<input type="checkbox"/>
	<p>Further information:</p> <p>The written record is available in Cologne Cathedral's stained glass studio</p>	
Do you think the information is	exact	<input checked="" type="checkbox"/>
	more or less reliable	<input type="checkbox"/>
Previous restorations (data, treatments, material)	exact	<input type="checkbox"/>
	more or less reliable	<input checked="" type="checkbox"/>
	hearsay	<input type="checkbox"/>



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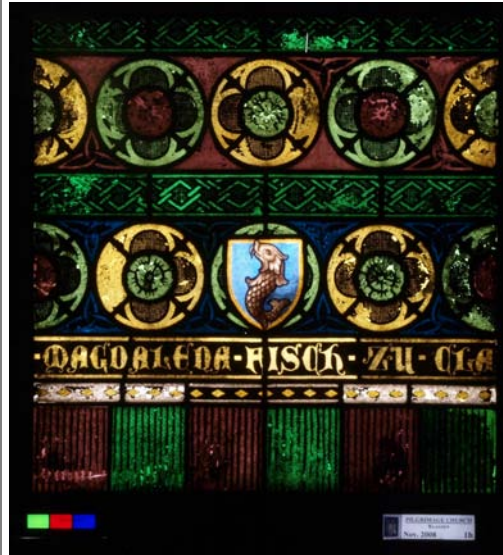


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CONDITION REPORT / DOCUMENTATION IN THE WORKSHOP

Pictures of panel / glass in transmitted light



Lighting: photoflash "Multiblitz"

[All digital photos in this data sheet were recorded with an Olympus E3 reflex camera; object lens: Vario 12–60 mm]

Pictures of panel / glass in reflecting and raking light, internal and external surface



internal face



external face

Lighting condition: artificial light

Examination of the object (if possible with microscope)

The internally coated glass is obviously in a good condition compared to 1991. Only some small particles of the paint became loose. Unfortunately, in 1991, the company which carried out the general conservation treatment (Firma Binsfeld, Trier, D) did not pay much regard for the SZA/Ormocer®-treated test panel, especially for the endangered paint. They applied several cello-tapes on the internal face, maybe for securing cracks (we do not know why). Two of the cello-tapes were detached by somebody; here the SZA/Ormocer®-treated contours were badly damaged.



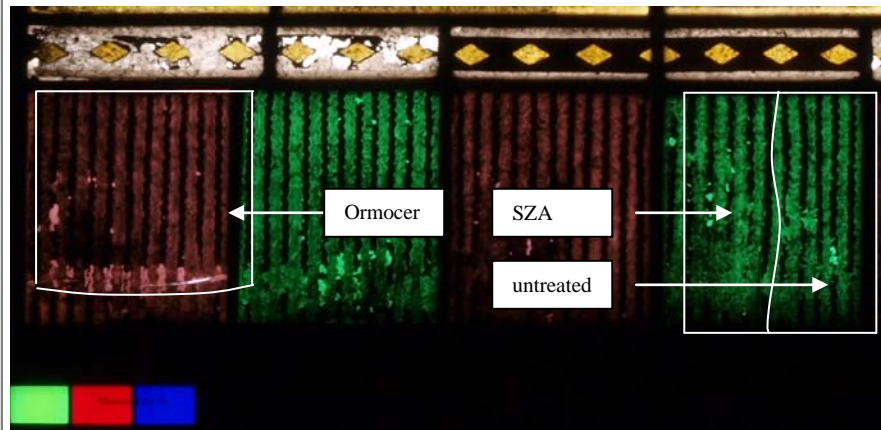
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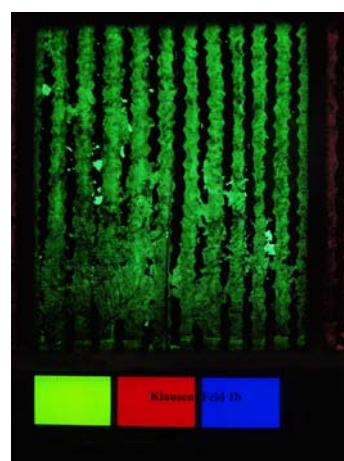
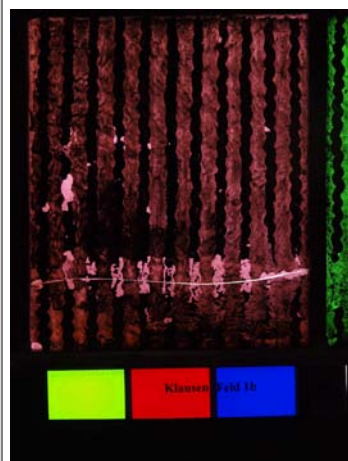


Selected damages

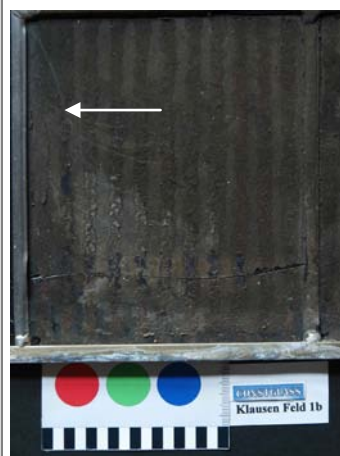


Selection and documentation of samples to be analysed




Conservators questions



internal face, transmitted light



internal face, reflected light

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	<p>sample no. 1: KLA_Ormocer_1</p> <p>sample no. 2: KLA_SZA_1</p> <p>sample no. 3: KLA_Untreated_1</p> <p><u>Conservators Questions:</u></p> <ul style="list-style-type: none"> - What about the today's condition of the conservation materials? - How is the adhesion between glass and the materials? - Is there any reaction between the paint and the coating materials? - Can you detect and differentiate the various materials (glass / Ormocer®/ SZA)? - Is there any penetration of Ormocer® respectively SZA into the paint layer? - Is there any chance to remove the materials without damaging the paint underneath?
Selection and documentation of areas for reversibility tests or reactivation tests	<p>All 3 glass samples can be used for tests.</p> <p>If necessary the pieces can be cut smaller, but the procedure <u>must</u> be executed exclusively by Kathrin Wittstadt!</p> <p>Sample KLA_SZA_1 was separated in July 2009 for the investigations in 3 samples:</p> <p>KLA_SZA_separtated_1 KLA_SZA_separtated_2 KLA_SZA_separtated_3.</p>

RESPONSIBLE CONSERVATORS (name, phone, e-mail)	
Person 1	Dr. Ulrike Brinkmann phone: ++49/221/17940-365 e-mail: ulrike.brinkmann@dombau-koeln.de
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