



## Advantages and arguments in favour

**Fixit 222 Aerogel high-performance insulating plaster**

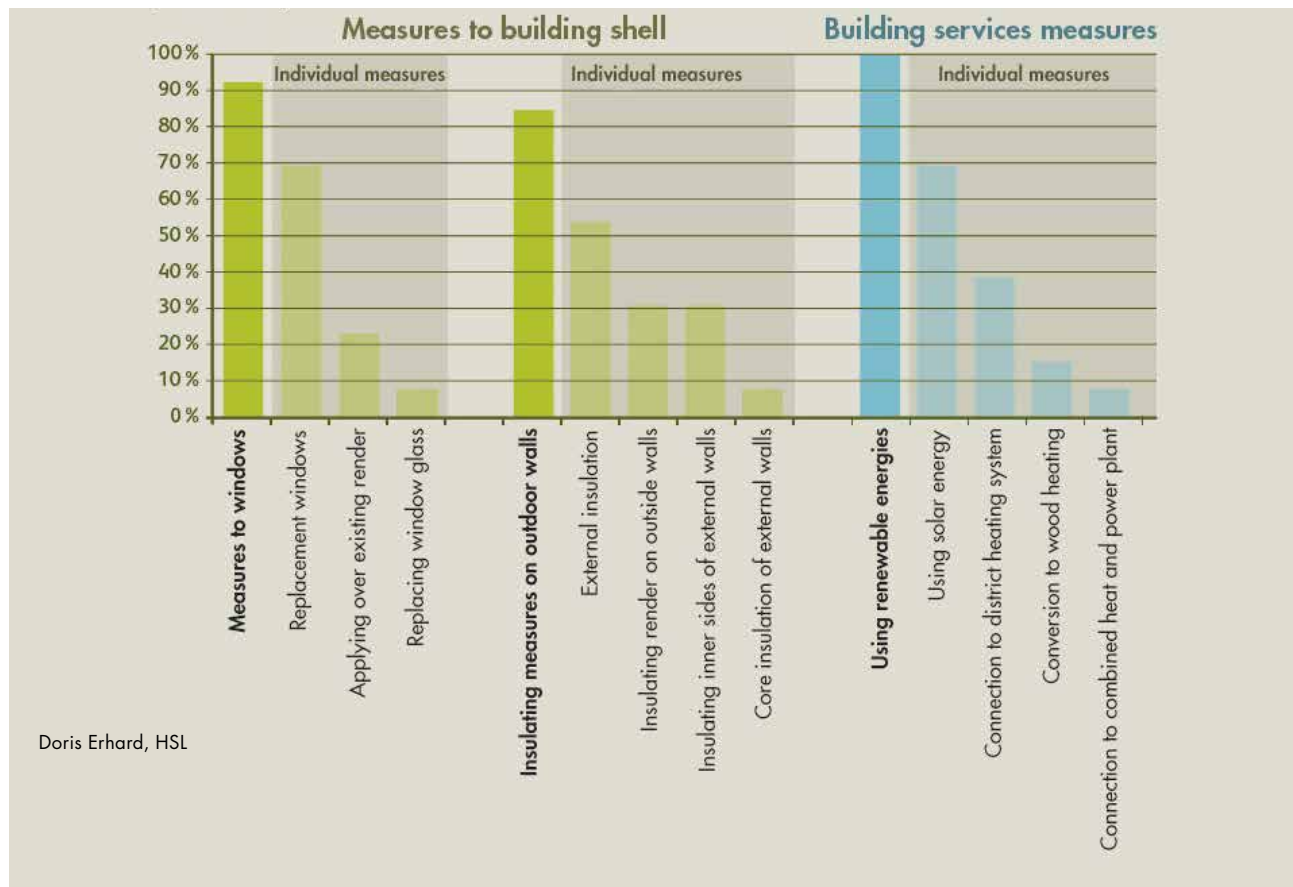
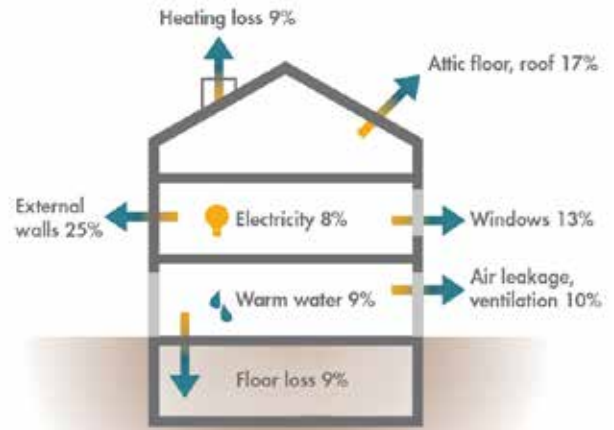
# Energy efficiency

## Large energy loss through external walls

In buildings where the outer walls contribute to over 25 % of the heat loss of the entire structure, improving the facade insulation (both inside and outside surfaces) is the most successful and efficient measure to ameliorate the situation. Naturally, the insulating plaster used plays a critical role in this process. Particularly in the case of old buildings, Fixit 222 offers an excellent combination of natural limestone plaster and a mineral-based insulating material of outstanding thermally insulating properties.



Video: Aerogel reference, France



Doris Erhard, HSL

# Site Heritage Protection

## Facade optics in angled light after renovation



Facade of insulating panels illuminated in angled light. The outline of individual panels is visible under the surface but in accordance with SIA 243 «Rendered exterior thermal insulation» must be accepted as such.



Facade of Aerogel insulating render. The insulation is not visible.

## Facades should tell a tale



The facade of the building on the right has been newly insulated, but in the process the history of the house has been lost.



Here the facade created with Aerogel insulating render is telling a story that is still understandable in its context.

# Improving the U-values

The energy loss through a brick wall is reduced by 2/3 if it is covered with at least 3 cm of Aerogel insulating plaster, instead of conventional plaster. The initial few centimetres thickness are critical in ensuring good insulation of the building shell.

## Quarry stone masonry 50 cm

Single family house, Sissach, Switzerland

Calculated original U-value	Calculated original U-value with 5cm Fixit 222 Insulating Plaster ( $\lambda_D = 0.028\text{W}/(\text{m K})$ )	Calculated improvement in percent
2,00 W/(m <sup>2</sup> K)	0,438	<b>approx. 78 %</b>

Multiple family building, Maschwanden, Switzerland

Calculated original U-value	Calculated original U-value with 5cm Fixit 222 Insulating Plaster ( $\lambda_D = 0.028\text{W}/(\text{m K})$ )	Calculated improvement in percent
2,00 W/(m <sup>2</sup> K)	0,298	<b>approx. 85 %</b>

## Full brickwork 30 cm

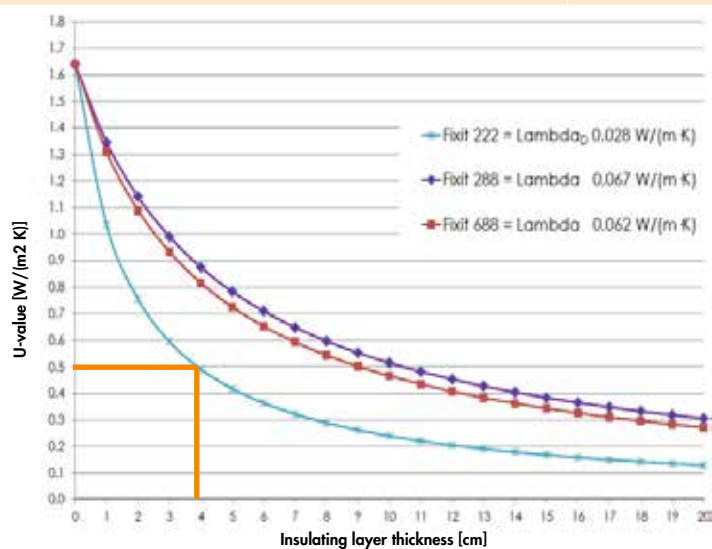
Multiple family building, Zurich, Switzerland

Calculated original U-value	Calculated original U-value with 5cm Fixit 222 Insulating Plaster ( $\lambda_D = 0.028\text{W}/(\text{m K})$ )	Calculated improvement in percent
1,64 W/(m <sup>2</sup> K)	0,595	<b>approx. 64 %</b>

Multiple family building, Rüti, Switzerland

Calculated original U-value	Calculated original U-value with 5cm Fixit 222 Insulating Plaster ( $\lambda_D = 0.028\text{W}/(\text{m K})$ )	Calculated improvement in percent
1,64 W/(m <sup>2</sup> K)	0,417	<b>approx. 75 %</b>

Reduction of energy consumption by two thirds.



# Maintenance and usable lifetime

Conventional insulated facades must usually be repainted or renovated after 15 years of use. This is not the case with Fixit Aerogel. Since its market launch in 2012, experience with the first facades has shown that the maintenance effort required is zero. The reasons for this are on the one hand the reduced layer thickness (with the resulting lower thermal resistance from within) and on the other the capillary effect demonstrated by the mineral-based render. The latter effect ensures that humidity at the render surface is reduced, as a result of which algae/ fungal attack and cobweb infestations are avoided.



10-year-old Aerogel facade given no maintenance



10-year-old facade of thermally insulating render

## Price performance comparison of insulating renders

Indicative price for Fixit 222, approx. 4 cm layer

<b>Fixit 222, Lambda = 0.028 W/mK</b>	<b>4 cm thick</b>	<b>235.00 EUR /m<sup>2</sup></b>
Fixit 288	10,7 cm thick	280.00 EUR /m <sup>2</sup>
Fixit 688	9,3 cm thick	240.00 EUR /m <sup>2</sup>

For the same U-values, Fixit 222 is up to approximately 20 % more economic than conventional insulating renders. The reason for this is the greater material usage and resulting extra manpower required when applying conventional insulating renders.

# Maintenance and usable lifetime

## Comparison of usable lifetimes

### Building shell

Building insulation, windows, roll shutters, slatted blinds, roof

### Compact insulation:

Styropor/polystyrene

25 years

Mineral-wool insulating panels

30 years

### Ventilated facade insulation:

Wood cladding

30 years

Tiles

30 years

Eternit cladding, shingles

40 years

### Render:

Mineral-based facade render on masonry

40 years

Synthetic facade render on masonry

25 years

Silicate paint coat on facade render (purely mineral-based)

25 years

Outdoor dispersion paint coat for use on mineral-based substrate

20 years



Aerogel insulating render has the same usable lifetime as a conventional (non-insulated) render system. The added Aerogel material costs pay for themselves in the long term by the savings in heating costs. Facades which are thermally insulated using conventional insulation materials have a much lower usable lifetime and must undergo repeated maintenance.



## Reasons to use Aerogel insulating render on protected historic buildings

- The thermally insulating plaster replaces a conventional plaster layer of the same thickness without causing any change to the visual appearance of the facade.
- The appearance of the facade is exactly as before – the insulation is not visible at all, even when the surface is illuminated at an angle.
- Indoor walls may also be insulated using thin layers of plaster, so that little living space is lost.
- The insulating render can be applied leaving no cavities. In addition the appearance of the walls can be faithfully reproduced.
- The building is insulated without the need for joints. This ensures that there are no warm or cold bridges, obviating any damage which would be caused by them.
- Water vapour diffusion and capillary moisture transport are guaranteed. Moisture can therefore pass through the masonry to the outside, while the masonry itself remains dry.
- The surface temperature of the inside of the outer walls rises considerably despite the thin layer of insulation. This lends a pleasant atmosphere to the indoor rooms.
- Because of the thinness of the Aerogel insulating layer, inner rooms remain bright. And window rebates are no deeper than with the original plaster.



If for reasons of building physics or because the building is under a historic protection order the requirements of individual building components cannot be maintained, please indicate how the overall requirements can be met by making improvements to those components that are not subject to such limitations.

The relevant authority may reduce the requirements if this results in the better protection of public interest (i.e. on aesthetic grounds).

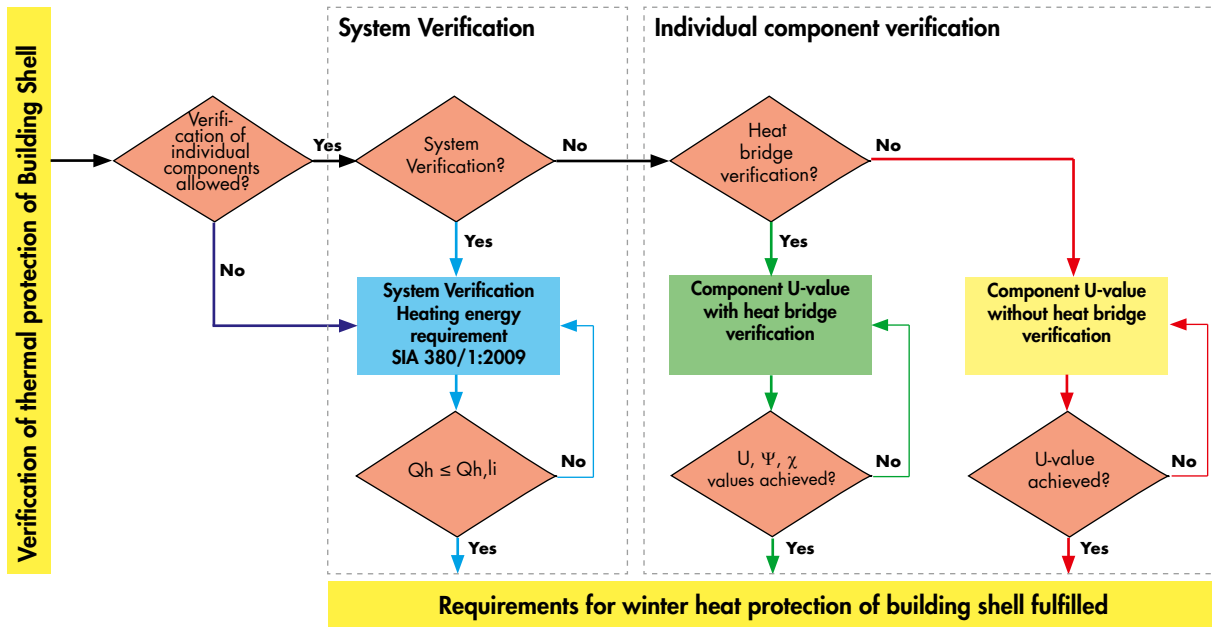


Energy efficient facade renovation



«Conservation and Energy» brochure  
(available in German only)

## Possible choices for energy efficient renovation of non-protected buildings



For non-protected buildings, the regulations allow the building owner to choose between the two verification procedures – individual component verification or system verification. If the building has been placed under a historic protection order the regulations are somewhat more relaxed.

**Individual component verification:** maximum permitted U-value for each individual building component.

Walls: 0,25 W/m<sup>2</sup>K if work is carried out as per SIA  
0,20 W/m<sup>2</sup>K if using building programme

**System verification:** thermal protection/heating requirement as per SIA 380/1. Individual U-values can be freely selected.

### An example of a complete renovation using Aerogel insulating render:





## Example:

### Conversion and thermally efficient renovation, Frongartenstrasse 11, St. Gallen

As part of a complete renovation of the building, a 4 cm thick layer of Aerogel insulating facade render reduced the energy consumption by half without changing the outward appearance of the structure.

Aerogel can be used for total renovations with free choice of U-value. This means that for buildings dating from the 1940s to the 1970s, the installation can be applied in such a manner that the appearance of the facade remains unchanged, thus maintaining local site heritage protection in residential areas. The house need not stand under a historic protection order.



Measurement value  
as PDF download

### Further advantages

- No danger of algae or fungal attack thanks to the capillarity and open diffusion characteristics of Fixit 222. This reduces facade maintenance.
- No cold air downdrafts on external walls and no mildew growth on internal wall surfaces, thereby assuring a pleasant and healthy living atmosphere.
- As a substitute for conventional render, a 3 cm layer of Aerogel render gives a two thirds improvement in energy saving on massive masonry walls.
- Non-flammable, its use is permitted in old town zones and it is completely harmless to humans and animals.
- The insulation is not visible and the local heritage appearance is maintained in residential zones.



Brochure: «Final Report on  
Total Renovation Strategies for  
Residential Buildings»  
(available in German only)



Brochure by the University of  
Applied Sciences, Technology and  
Architecture, Freiburg (Germany)  
(available in German only)

# The advantages of using Aerogel insulating render

## Comparison between insulating panels and aerogel insulating render on indoor surfaces

Aspect	Insulating panels	Insulating render	Explanation
Wall appearance	Flat	Non-flat	Aerogel render reflects original appearance
Detail work	Difficult	Easy	Easy to create with spray-on technique
Hollows, cavities	Possible	Not possible	Spray application fills any potential cavities
Water uptake	Slow	Fast	Render – relatively quickly, large distribution
Dust creation	Yes	No	Render – plaster machine outside Panels – cut and sized indoors
Drying time for 30mm levelling render	30 days	21 days	Insulating render – 3 weeks Levelling render – 1mm / day
Loss of usable room space	9 cm	3 cm	Insulating panels + levelling render or Aerogel insulating render alone
Corner and edge overhead	Yes	None	Greater effort necessary when using insulating panels



In general Fixit Aerogel insulating render is about 20 % more expensive than conventional mineral foam panels. This extra cost is more than compensated by the many advantages of the Aerogel material in the render. The building physics specialist has to hand an easily-applied material which leaves no cavities and reflects all the detail work of the original surface. The owner of the historic old building sees the uneven walls and is happy because even after renovation it still tells its story. Added to this, the project is finished quicker and with less dust than conventional techniques allow. The reduced layer thickness of insulating plaster means that the loss of internal space is significantly less than when compared to conventional insulating panels coated with standard levelling render. Also not to be underestimated are the extra work required for fitting insulating panels to corners and edges, as well as the additional drying time for the levelling coat.

### Conclusion

Viewed in its entirety, Aerogel insulating plaster costs the same as conventional insulating panels. However, the simplicity of the detailed solution leads to a much more secure result.

**After renovation, an old building must still be able to retell its original history.**



To brochure:  
Indoor insulation work using Fixit 222 Aerogel



Indoor insulation using insulating plaster Aerogel (1st prize, Empa Aerogel Award 2021)



Indoor insulation using facing formwork

# Confusion surrounding lambda values

The information below explains how lambda values should be considered.

## Laboratory $\lambda$ values

Some insulating plaster manufacturers refer to a «measured laboratory value» in their technical fact sheets. These values are often extremely good, but unfortunately they have little to do with the real-life properties of the material such as bulk dry density and so on. For energy-related calculations these values should not be used – instead the specifications given in SIA 279 must be followed (insulating plaster 0.08 W/(mK)).

## $\lambda_{10}$ -value

This parameter designation indicates that the thermal conductivity was measured at a mean temperature of 10°C. Such measurements can be made for example in the context of a test report by a testing institute, in accordance with the appropriate standard. Usually this is just a single value and should not be used for calculation purposes since no supplementary factors are taken into account such as for ageing etc. In addition the number of samples taken does not meet the requirements of SIA 279.

## Nominal $\lambda_D$ value

In order to obtain the nominal value of the thermal conductivity, measurements must be carried out by an accredited testing institute (such as Empa) using the prescribed number of samples in accordance with the relevant standard (SIA 279:2011), in a so-called independent monitoring procedure. Ageing effects are also considered in the determination of  $\lambda_D$ .

Fixit 222 Aerogel insulating render has, for example, a nominal  $\lambda_D$  value of 0.028 W/mK and is the only insulating render whose properties are independently monitored and confirmed by the SIA.

The SIA 380/1 standard «Thermal Energy in Buildings» lays down the basic legal framework for heating energy requirement calculations. An extract follows:

«... For the thermal conductivity of insulating materials, the design values in accordance with SIA 279 must be used. For products without proof of monitoring... use the design values given in SIA 279, Table 1, column 'Not monitored'.»

## Conclusion

Only accept confirmed lambda values for independently monitored products. For products which are not independently monitored, a lambda value of 0.08 W/mK must be used defined in SIA 279.

According to the calculations, Fixit 222 Aerogel insulating render thus provides almost three times better insulation performance than the other insulating plasters.

## **1. Why is Aerogel insulating render more expensive than other insulating renders?**

The enormous efforts put into the development and manufacture of the product result in higher production costs. And while the Aerogel render costs more on purchase, this premium is compensated for by the reduction in heating costs and maintenance, as well as the increase in useful lifetime. Considered over the long term, Aerogel insulating render is in fact more economic than conventional rendered facades.

## **2. Does Aerogel contain toxic substances?**

No, our product has been tested by two independent external companies and both state that the render contains no toxic or carcinogenic substances. The render is limestone based and has the same composition (with the exception of the Aerogel) as any other historic lime mortar. The Aerogel material itself is composed of an air filled silicate substance. Unused or old Aerogel render can simply be disposed of in the normal building waste skip.

## **3. As owner of the building, must a particular U-value be reached even though the house is not under a preservation order and only the facade is to be renovated?**

The Swiss MuKE energy legislation permits either a single value or system value to be achieved. For both listed and unlisted buildings, when submitting planning permission to the local authorities you can state that for aesthetic reasons only the render thickness is to be applied. The resulting U-value will then be lower than prescribed, but nevertheless a significant degree of thermal insulation will be achieved.

## **4. Will the decorative elements in the facade disappear under the Aerogel insulating render?**

Many house facades in Switzerland are decorated with cornices, corner pilasters and ornaments which make important contributions to the local heritage landscape and which tell historic tales. These will remain as they were since only the existing render will be replaced. Calculations show that the heat loss through such ornamentation is so small that it can be ignored and, despite this, the house insulation will still be very good.

## **5. Does Fixit AG have experience with Aerogel insulating render?**

After a two-year development phase carried out in cooperation with Empa, Fixit AG launched the Aerogel insulating render onto the market in 2012. The first houses to use the new material were subject to building-physics measurements, and very good values were achieved. After 10 years of monitoring these buildings it can be stated that the product functions properly in every respect and is suitable for use in the renovation of old buildings. This is confirmed by the report of the German Fraunhofer Institute, which has been monitoring Aerogel insulating render over a long period of time.

## **6. Is an energy-efficient renovation not simply too much effort?**

Nowadays the hurdles set by the authorities have become so much smaller than previously that is definitely worth the effort. Even if the building is surrounded by scaffolding for a short time, one can look forward to a very pleasant and healthy living microclimate. Using regionally-based planners, a rapid and efficient building phase is guaranteed.

## 7. As building owner, how can I be sure that the rendering work is done correctly?

Fixit AG only supplies regional contractors who have experience in renovation work involving Aerogel insulating render, and will not deliver to others. In addition our regional advisers will accompany the contractor during the work on every building.

## 8. Does Aerogel insulating render meet fire protection regulations?

Aerogel insulating render does not burn and can be used both in multi-storey buildings and in Old Town quarters where the houses are built close together.



MPA Report on Fire Response

## 9. What is the service lifetime of Aerogel insulating render?

Aerogel insulating render has a calculated service lifetime of 40 years. This is confirmed by experts who calculate and draft environmental declarations (Carbotech AG).

## 10. How does Aerogel insulating render fare in terms of life cycle assessment?

As an individual component it is not possible to evaluate the Aerogel insulating render. To do this to the entire building concept must be analysed, and this must be repeatedly updated and individually calculated before an accurate life-cycle assessment can be performed. However if sensible insulating layer thicknesses are used in construction, no environmental damage occurs, leading to a positive ecological balance sheet.



European technical  
evaluation

**Arguments in favour of using Aerogel, and its advantages when applying over existing render and for single-layer brick walls can be found in the relevant brochures.**

### Aerogel insulating render applied over existing render

- No trace of mounting bolts left on the render surface
- Improvement in thermal insulation
- No visible outline of insulating panels on the render surface
- No subsequent fitting of additional mounting bolts necessary
- Little condensation on the facade surface
- No cavities or hollows between insulating layers



To the brochure

A small extract from our list of current reference buildings



1



2



3



1



4

No.	Reference building
1	Cité Tony Garnier, with painted façade, Lyon, France
2	Mühlestock Madiswil, Switzerland
3	Single family house, St. Gallen, Switzerland
4	Pavillon Thouvenel, Paris, France



**Isokalk AS** ble etablert i 2015 som Fixit AG sin representant i Norge.

Fixit AG er etablert i 1908 da de 8 største kalkgruvene i Sveits slo seg sammen. Fixit AG er morselskapet i The Fixit group, som har 2600 ansatte i 18 land.

Isokalk er superisolerende kalkmørtel med Aerogel – Det originale navnet er Fixit 222. Dette ble det viktigste resultatet av et fireårig forskningsprosjekt i EU som het «Sustainable Renovation of Historical Buildings». Fixit 222 kom på markedet i 2012 og er i ferd med å bli et foretrukket alternativ blant antikvarer og utbyggere som skal bevare, transformere og isolere eksisterende bygningsmasse innen tegl, stein og betong.

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