



Prolongation of life-cycle-maintenance & thermal improvements

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Thermal protection of walls using ETICS

- » When speaking about **thermal protection of external walls** we think on one layer masonry, structures with some layers of different materials, or about **additional insulation of existing structures using ETICS**.
- » The assumed intended **working life at least 25 years**, provided that the conditions for the packaging, transport, storage and installation as well as appropriate use, maintenance and repair are met.



Working life

» Working life (of products)

The period of time during which the performances of the product are maintained, under the corresponding service conditions, at a level compatible with the intended use conditions.

» Working life (of works or parts of the works)

The period of time during which the performance will be maintained at a level compatible with the fulfilment of the Essential Requirements.

(source: ETAG 004/2013)



Maintenance

» Maintenance (of works)

A set of preventive and other measures which are applied to the works in order to enable the works to fulfil all their functions during their working life. These measures include cleaning, servicing, repainting, repairing, replacing parts of the works where needed, etc.

» Normal maintenance (of works)

Maintenance, normally including inspections, which occurs at time when the cost of the intervention which has to be made is not disproportionate to the value of the part of the work concerned, consequential costs (e.g. exploitation) being taken into account.

(source: ETAG 004/2013)



Durability

» **Durability** (of products)

Ability of the product to contribute to the working life of the works by maintaining its performances, under the corresponding service conditions, at a level compatible with the fulfilment of the Essential Requirements by the works.

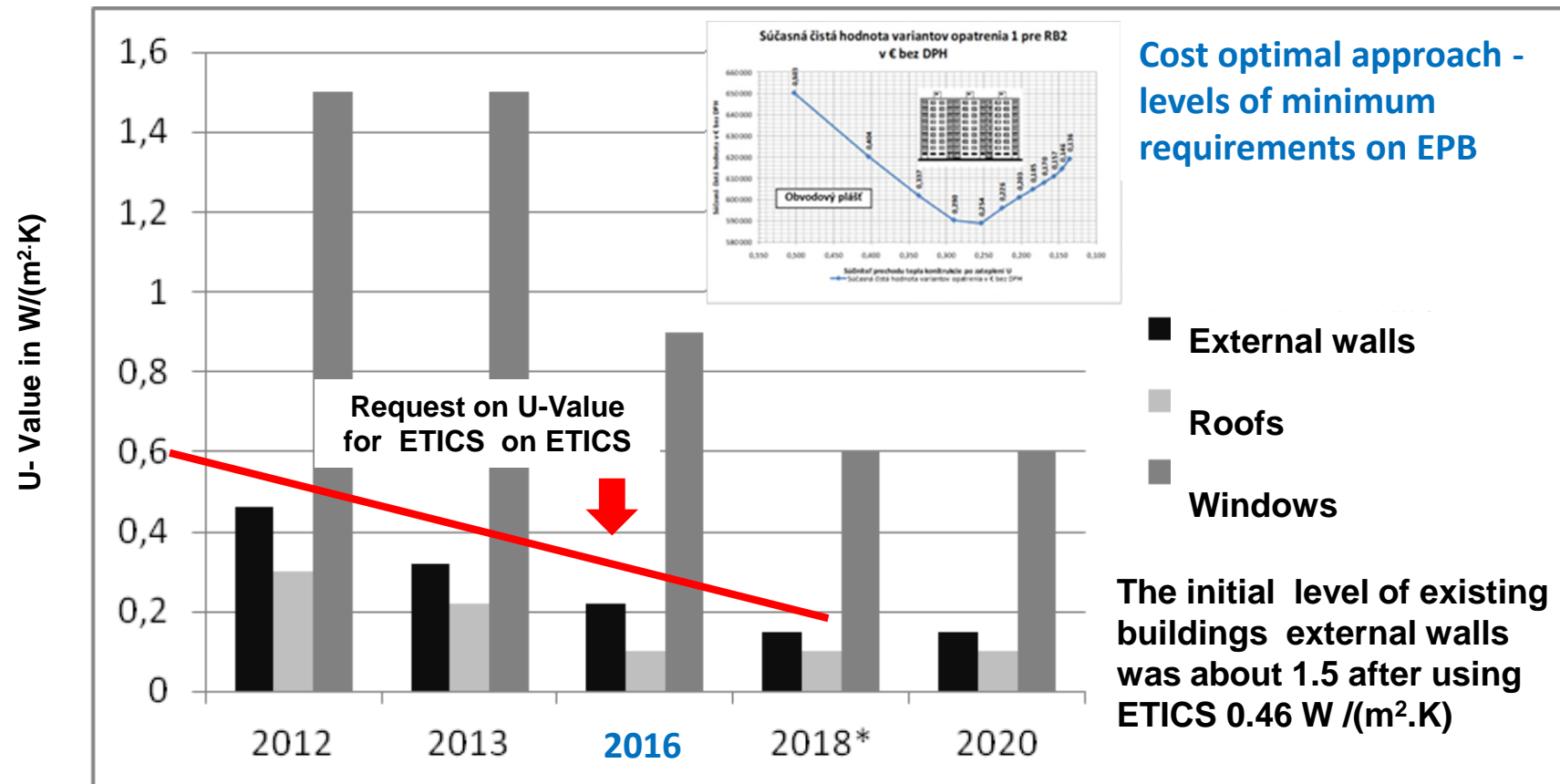
(source: ETAG 004/2013)

- » **Working life of a structure is influenced not only by the real condition, but also by **tighten up the requirements**.**
- » **The external wall should fulfil the 6th essential requirement „**Energy economy and heat retention**“, what is invoking the necessity of insulation already insulated walls, to define the conditions of using **ETICS on ETICS**.**



Tighten of Requirements on thermal protection

Tightening requirements on thermal protection requires rest thickness of the thermal insulation layer ETICS – an example from SR



Apartment building renovated in 1992



Number and types of defects are affected by the level of design and implementation in time of carried out renewal, influenced by used components, and performed details of ETICS.



Apartment building renovated in 2002



Long-acting level of requirements on thermal protection – application thickness of 60 mm thermal insulation



Possibilities and conditions

- » **Increase the thickness** of the thermal insulation of external walls using ETICS **can be performed in the following ways:**
 - new construction of ETICS to the existing ETICS (double ETICS);
 - new construction of ETICS to the existing ETICS after prior removing of external layers (the base layer including the mesh and the surface layer);
 - construction of a new ETICS on the original wall structure after removing the whole existing ETICS.

- » To decide the way of performance an **inspection of existing ETICS** (visible defects, anchoring, mechanical properties, type and quality of thermal insulation, quality of ETICS surface, etc.)



Visible defects



Shrinking and separation of plaster



Shrinking of the plaster



Algae

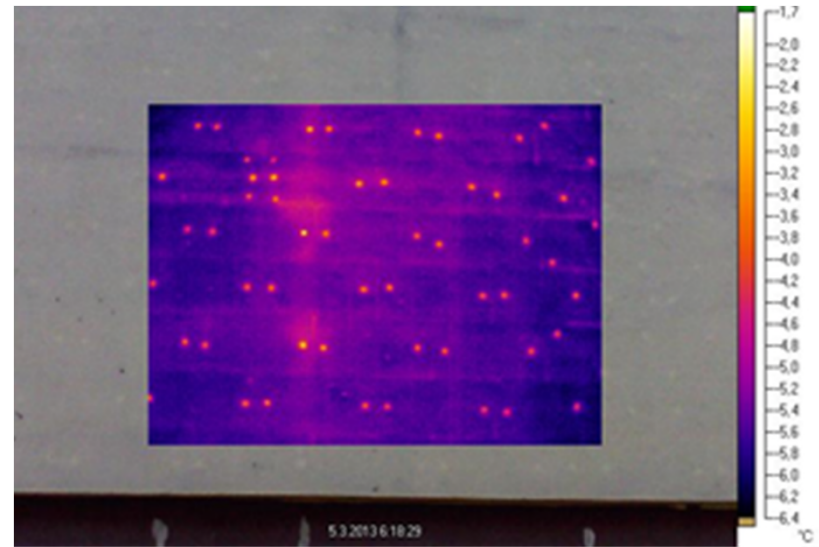


Risks



Checking the anchoring through TICs

The basic condition for detecting the temperature field on the surface of the facade is the existence of heat flow claddings (EN 13187) are for measurement of residential buildings with heavy external cladding required temperature difference between the outside and inside envelope less than $3/U$, where U is the theoretical value of the building envelope heat transfer coefficient, but never less than 5 °C.



Checking the existing ETICS properties



Thickness of all ETICS layers





**Fixing of anchors and checking of
adhesive**



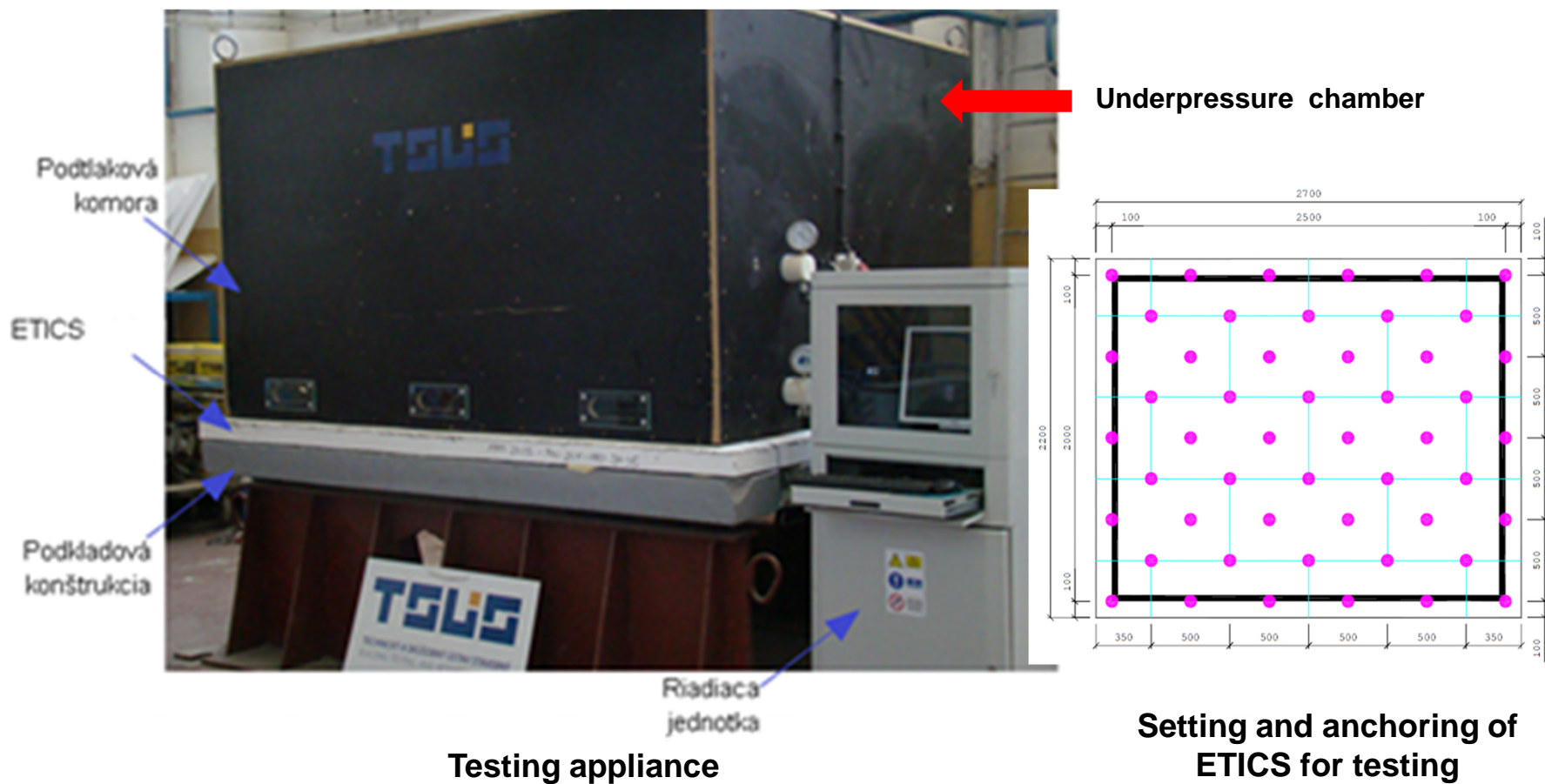
Pull-out test of anchors from the base



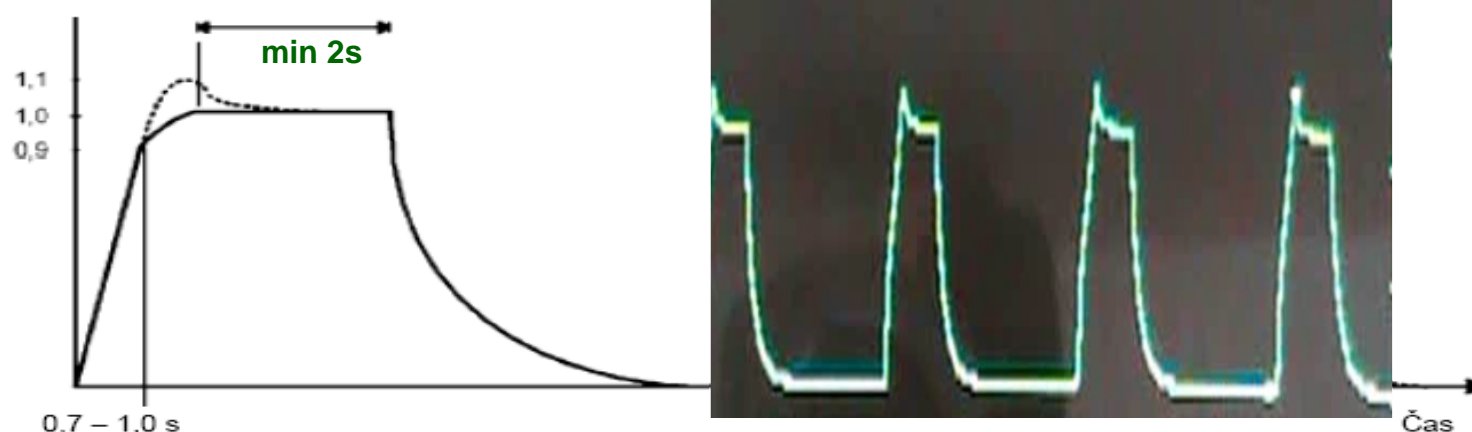
Testing „in situ“
determine of R_{d2} of
existing and proposed
anchors

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Identifikácia budovy/stavby: (popis, adresa)	Bytový dom SMILE 2 Kvetná 683 90201 Pezinok																																		
Identifikácia materiálu nosnej vrstvy podkladu:	Pórobetón P3,3 - 580																																		
Identifikácia skúšaného typu rozpernej kotvy:	Alfaplast A 27																																		
Popis miesta skúšky:	Severná štítová stena																																		
Druh navrhovanej tepelnej izolácie:	Priemer vrtáka (mm) pred vŕtaním po vŕtaní		Teplota vzduchu																																
EPS hr. 100 mm	8,24 8,24		17,3 °C																																
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Použité prístrojové vybavenie:																																			
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<small> Záznam je vypracovaný pomocou kalkulátora pre navrhovanie mechanických spojov (ETICS) na spojenie s podkladom verzia 01 (05/2013). Oprávnený používateľ: Registrčné číslo AO: </small>																																			
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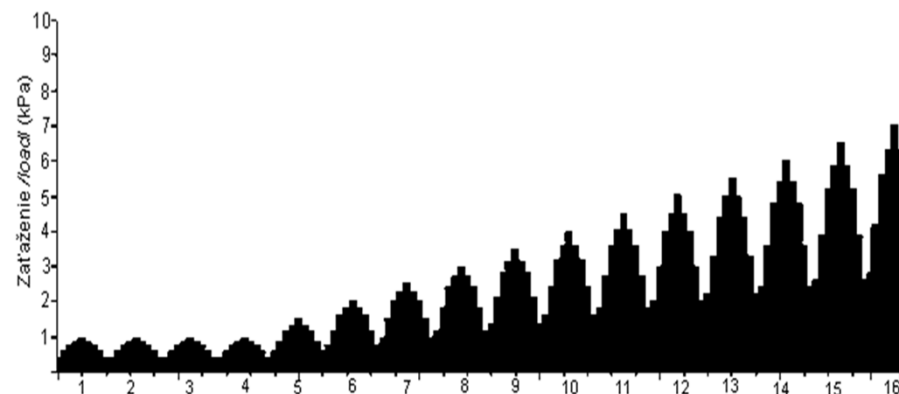
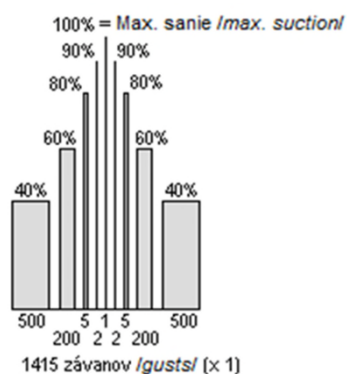
Lift-up test of wind influence on ETICS



Wind load during testing



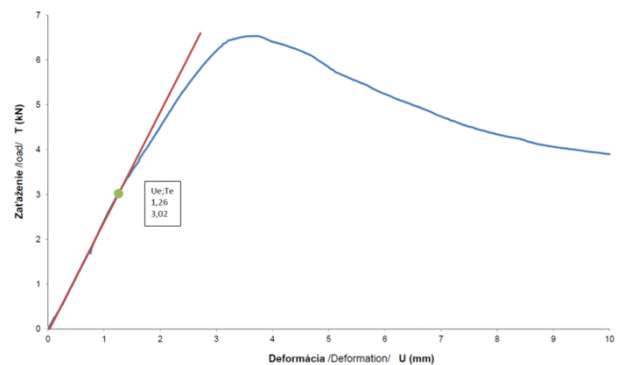
Basic load till the maxim should be achieved during 1,0 s



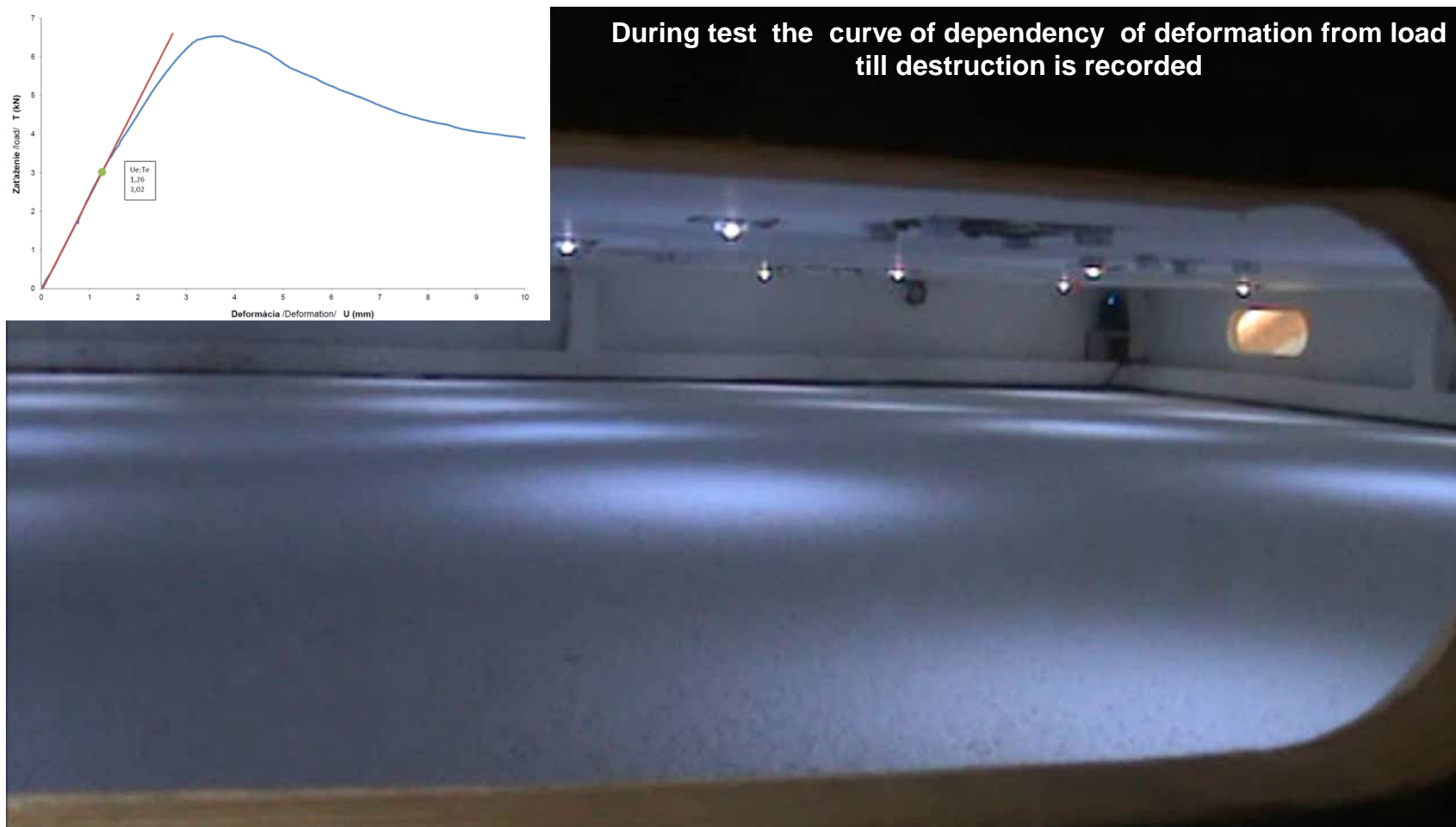
Load cycle consists of basic blast of 1415, and the value changes from 40 to 100%. The maximum load of each cycle after the first four cycles evenly increased until failure of the sample.



Process of testing – Lift-up test



During test the curve of dependency of deformation from load till destruction is recorded



Behaving of ETICS under the influence of wind

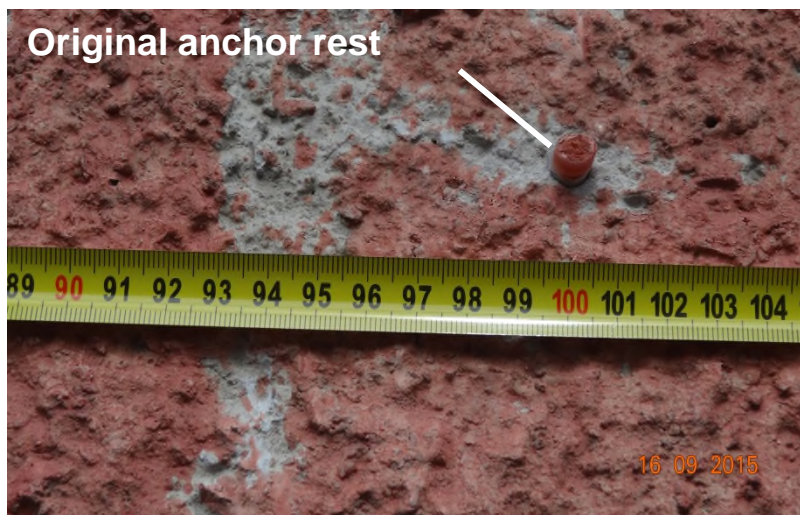
Accelated projection of lift-up test



Failure of ETICS after the test



Checking the base after removal of ETICS



Checking after removal of ETICS - case 2



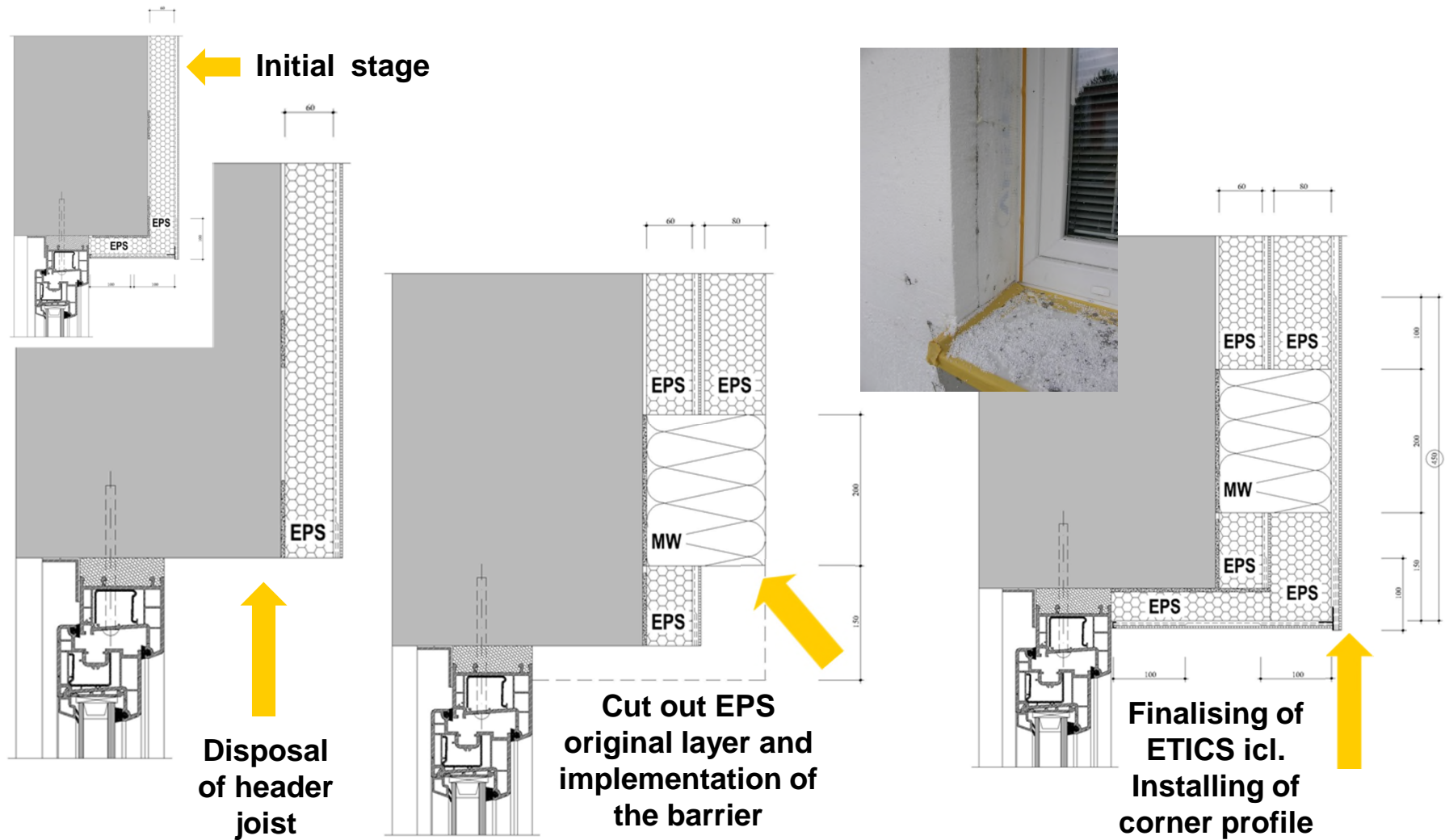
Adhesiveness to the original ETICS



Adhesion without penetration



Schema of ETICS doubling design



Conclusion

- » Starting design of external wall thermal protection improvement a very responsible checking of the original ETICS is needed.
- » To recognize the visible defects is only the start of preparation works.
- » The test of adhesion to the existing ETICS and pull-out test of anchors to the base (initial structure) is an obligation.





**Seat of TSÚS, npo
and OZ ZPZ**

Thank you for Attention

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