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It's all in the details!

Progress report of the product surveillance of burglar resistant building components

Introduction

The steadily increasing number of burglaries, the security requirement of many citizens relating thereto and the just launched support programme of the KfW-Bankengruppe (bank group) "Senior-friendly Conversions" [1] that also supports individual measures regarding burglary protection result in strongly increased demands for burglar-inhibiting measures. Thus, more and more manufacturer of building elements offer such products. However, in contrast to the situation of approx. 15 years ago, manufacturer can very rarely make use of their own test experience as extensive test evidence and reports can be used by the system house. This test experience, where often is recognized which effects, for example, the use of a screw driver can have, is of enormous significance for the understanding of the interaction of individual details for a reliable and burglar resistant building component. It is therefore all the more important, that the assured qualities are guaranteed by appropriate accompanying measures like courses or the certification of manufacturing plants. ift Rosenheim provides a possibility of certification with the certification scheme for burglar resistant components [2]. Some points are shown below, inter alia based on experiences from product monitoring, to which details attention has to be paid in order to secure the reached classes in the test documentation also in the project.

Three Pillars

A serviceable, burglar resistant element stands on three essential pillars:

- Planning
- Assembly
- Installation

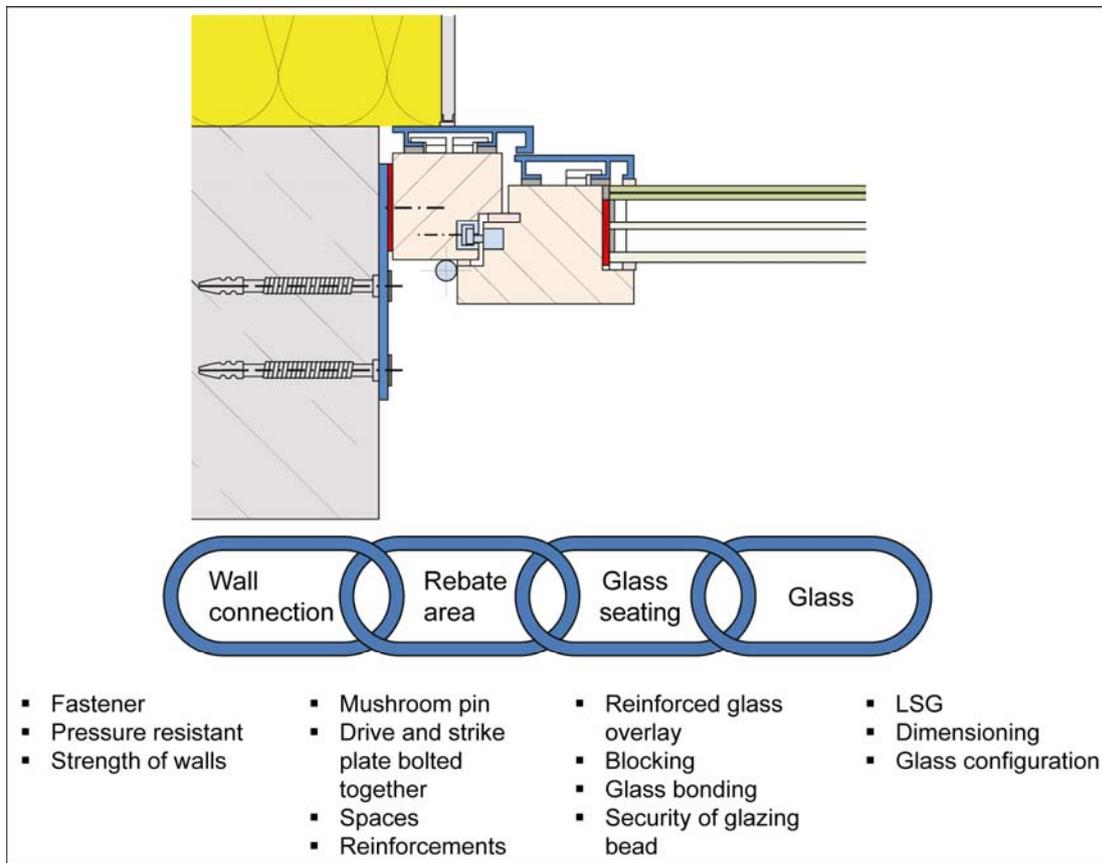


Figure 1 Quality chain burglar intrusion

Planning (order processing/verification)

During this stage, the feasibility is reviewed and specified. The responsible parties need extensive knowledge - of the boundary conditions of the object as well as the system boundaries of the element covered by the according documents.

Assembly situation

DIN EN 1627:2011 [3] makes already statements which surrounding walls depending on the resistance class is basically suitable:

- Masonry according to DIN 1053-1 [4]
- Reinforced concrete according to DIN 1045 [5]
- Aerated concrete walls
- Light weight walls
- Wall types separately proven

The planned assembly situation of the elements in the wall has to be considered in addition to the walls. If a circumferential fixation and a compression resisting packing between element and wall are not possible, usually separate documents regarding this installation situation have to be made. This takes effect, among other things, in the following situations:

- Elements with top-mounted roller shutter box
- Wall structure with external thermal insulation composite systems (position of the window in the insulation zone)
- Fixing method with wall anchors

If it is already known in the planning stage that a standard-compliant assembly is not possible due to the given installation situation, it has to be considered in the consultation and the offer.

System boundaries

Although very extensive records are provided for the use, the overall system regarding the burglar resistant properties can generally not be covered. The planning bodies must know the system boundaries, so that only components or possible variations are used, for which the proof of suitability was made. The following points are mentioned primarily:

- Opening types/direction
- External dimensions
- Used profiles
- Used infillings/glazing units
- Used hardware

The feasibility check is an essential point when implementing projects for burglar resistance. In the product monitoring, it must be sadly noticed that this pillar is given too little attention. This is partly due to the situation that the manufacturer is often not the planning body and the interfaces are not clearly defined.

Manufacturing of Burglar-resistant Elements

Assuming that only such components were selected, which were proven, the manufacture-based criteria are mentioned below.

General

- Compliance of given material quality (e.g. species of wood, density, wall sections)
- Compliance of given tolerances at cutting and profiling
- Exact execution of corner joints (connection type, adhesive, corner strength)



Figure 2 Broken frame corner

Hardware Installation

Hardware is a substantial part of burglar resistant elements. Generally, the hardware is the link between fixed (frame) and moving part (sash).

Fixation of Hardware and Hardware Components

Different details have to be considered depending on the material:

Timber

- Screw type depending on the situation (type, dimension, material)
- Pre-drilling of screw connections
- Use of screws with integrated drill bit
- Slanted and/or offset screw connections

Plastic

- Screw connections only through plastic
 - Screw connections through plastic and steel (length of reinforcement?)
 - Screw connections with special underlayment
- Different screw types and length are necessary depending on the fixing method, which are specified in detail in the test documentation.
- exact pruning of the steel reinforcement from the corner

Metal

- Self-tapping screws
- Special screws

Lock Support

As, for example, locks are inserted in chambers of profiles whose size is already defined, are attached to the material for the lateral support that inhibits the evasion of the lock cases by a possible attack.

Drill Protection

A mostly inconspicuous component that is for example mounted on the casement gearing of windows. This component is part of the burglar resistant hardware and should prevent that an access on the square is possible from the attack side. It has to be guaranteed by suitable measures that this component is mounted. If it is missing, it normally does not stand out to at a later stage.

Various protective goals at doors are often reached by an appropriate and tested security plate. Therefore, the drilling protection for the area of the detainer is integrated on the one hand and, for example, the extraction protection for the profile cylinder can also be fulfilled. In spite of a cylinder cover integrated in the security plate (e.g. ES1-**ZA** according to DIN 18257 [6]), the profile cylinder has to be necessarily done drill protected.



Figure 3 Security plate with cylinder cover

Securing of Accessible Components

In order to increase the resistance time of an element, the screws accessible from the attack side like

- Screw connections of hinges
- Screw connections of pressure plates from facades
- Screw connections of mechanical protections of fixing of the glazing

have to be secured with different measures.

- Drilling of tool holders

- Impact of balls in the hexagon socket
- Filling of the hexagon socket with special products

These measures have to be implemented necessarily despite the fact that the scheduled dismantling work is also hindered and/or prevented.

Fixing of the Glazing/Securing of Infillings

If the sash consists of a continuous frame and infilling, the infilling has to be secured. The securing of the infilling retention system is generally made mechanically, e.g. by instered brackets, or with adhesions. The following parameters are among other things essential for adhesions:

- Selection of approved, tested adhesive
- Correct positioning of glazing (position of LSG pane in insulating glass unit internal – exterior)
- Preparation of the adherent area (cleaning, priming)
- Insertion of the adhesive on the correct position in the correct quantity
- Conditioning of the bonded infill panels (1K or 2K)

The retaining device is also an appropriate tool:

- Use of given securing (e.g. steel bracket)
- Use of given fixing material for securing
- Positioning of the securing as specified (quantity, spacing)

No specifications of the resistance classes of the glazing according to DIN EN 1627 exist for elements of resistance classes RC 1 N and RC 2 N. That means any glazing can be agreed upon with the house owners. The securing of the fixing of the glazing has to be made in the tested version.

Elements with Anti-panic Locks

Besides the mentioned points, further details have to be observed at elements with anti-panic bolts or emergency exit devices. In general, the infillings have to be implemented significantly complexly and the use of standard glazing of class P4A and/or P5A in the resistance classes RC2 and/or RC3 is mostly not sufficient enough. However, the greatest care is required to secure burglar resistant properties:

- Preventing the smallest penetration possibilities on the operation units
- Testing of linked side parts at identical aspects
- Minimizing floor joint, if certified, and adjusting the operating equipment accordingly.



Figure 4 Access on handle

Inspection of Element Ready for Use

An essential part of the quality control is the inspection of the element ready for use. For various controls is this the only possibility for the inspection in the manufacturing establishment:

- Resulting rebate and/or gap dimensions
- Optimal engagement in the locking devices
- Positioning of hinge bolts and air gap restrictors
- Operability of elements

Management with Not Completely Manufactured Elements

For various reasons, the burglar resistant elements are not produced completely in the production site:

- The glazing of the fixed panels can only be made after mounting.
- The glazing is made on-site due to the high glass weight.
- Frames and sashes are delivered on-site from different production sites.
- Hardware (e.g. security plates or profile cylinders) are provided on site.

In these cases, it is mandatory to provide the executing personnel the necessary tools for completion of the elements on-site (e.g. documents and materials) and have the compliant construction confirmed in writing. The standard-compliant construction of elements can only be made upon receipt and examination of these documents.

Marking of Elements

Burglar resistant elements according to DIN 1627 can be marked. ift-certified elements have to be marked. As a result, the elements commissioned as certified elements have to be necessarily marked with the ift-certified mark.

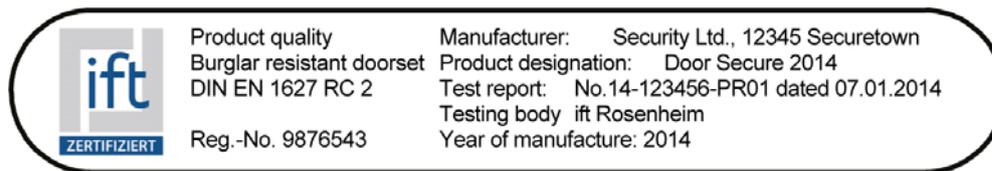


Figure 5 Sample identification plate "ift-certified"

Assembly

Basis for the assembly of elements is the assembly instruction of the underlying test documents and the documents of the planning stage.

- Selection and quantity of fastener
- Positioning of elements in the wall
- Load transfer and compression resisting packing
- Plumbed and accurately aligned installation
- Fastening of the elements

After appropriate assembly of the elements according to the assembly instruction, an attestation of installation according to DIN EN 1627 has to be issued and handed over to the client. Ideally, a copy is sent to the manufacturer of the elements, who is often connected with his name to the element, for the completion of the factory production control.

Conclusion

Good test documents ideally contain all necessary details to produce burglar resistant building components. If the manufacturer uses appropriate tools like work and test instructions to gather and check all parameters, the basis for a functional, burglar resistant building component is given. However, the key for this success is certainly in a competent, expert treatment of the project, from initial contact to final acceptance of construction work. In practice, the need for additional security measures is strongly present. In the construction are mostly elements that have burglar resistant properties, but forego essential elements like anti-vandal or anti-bandit glazing.

Literature

- [1] Support programme of KfW-Bankengruppe "Senior-friendly Conversions"
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