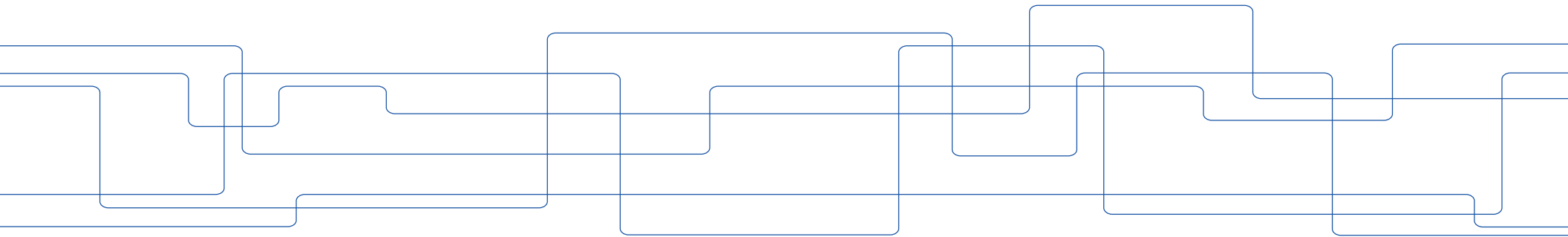




Vattenskador i Sverige - omfattning och orsaker

- ett uppdrag från Boverket

Folke Björk, Rolf Kling, Karl-Eric Larsson och Hans Lind





Om författarna

- Folke Björk är professor i Byggnadsteknik på KTH i Stockholm
- Rolf Kling har erfarenhet från Säker vatten, Vattenskadecentrum och Nordiska Vattenskaderådet
- Karl-Eric Larsson har erfarenhet som byggskadechef på Folksam
- Hans Lind är nationalekonom och professor i Fastighetsekonomi,





Quest from Boverket

Mapping faults, defects and damages in the construction sector

The entire study is available on:

<https://www.boverket.se/sv/om-boverket/publicerat-av-boverket/publikationer/2018/kartlaggning-av-fel-brister-och-skador-inom-byggsektorn/> Hämtad 2019-08-18.

The part about water damages:

<http://urn.kb.se/resolve?urn=urn:nbn:se:kth:diva-256458>



Collection of information

- Questionnaire for owners of apartment buildings 88 companies - 417,000 apartments
 - Statistics from "Svensk försäkring" and MEPS -90% of the Swedish insurance market
 - Interviews with builders of detached houses and apartment buildings, 2 of each
 - Data collection from insurance companies' claims officials about 15,000 water damages from 2017.
-

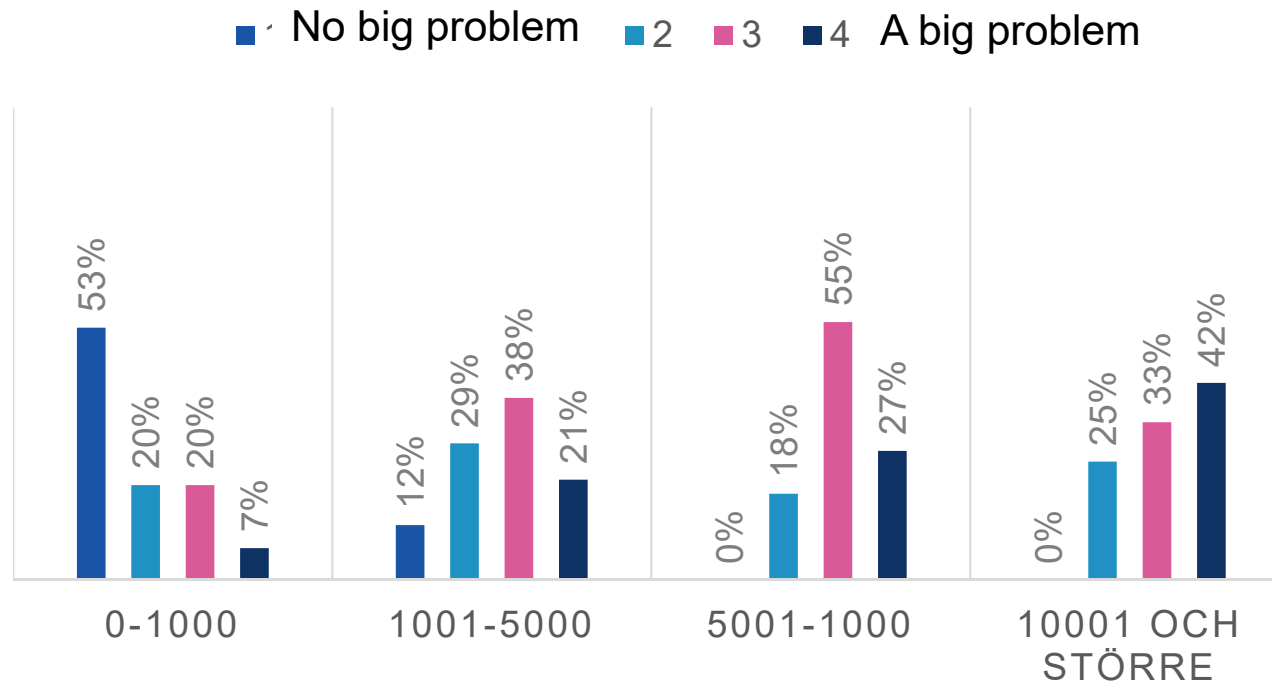


Damages – frequency and cost

- Frequency of damages in apartment buildings
 - One damage per 59 apartments every year
- Mean cost for damages
 - Mean value for the cost of a damage: around 60 000 SEK
- Average cost for the entire stock of apartments
 - 1 025 SEK per apartment and each year
- Frequency of damages in detached houses
 - 1 damage per 50 houses every year
- Insurance companies refunding in average
 - 44 000 SEK per damage
- Total cost per damage
 - Perhaps 80 000 SEK
- Average cost for the stock of detached houses:
 - About 1600 SEK per house each year och år

This can really vary a lot

Are water damage a big problem for a property owner?



Number of apartments in the stock



These are not water damages:

Condence problems:

- Processes in which water vapor in the air condenses in various sensitive areas in a construction with consequent damage are not considered here.

Leakages in the building envelope:

- Damage related to leakage of water from rainfall or groundwater into roofs, walls or foundations, or other processes of this kind are not included here. Neither is water from extinguishing of fires.
-



Quick and slow damage processes

Quick damage process:

- When large amounts of water run out, like from a broken pipe connection - a situation that obviously requires action.

• **Slow damage process:**

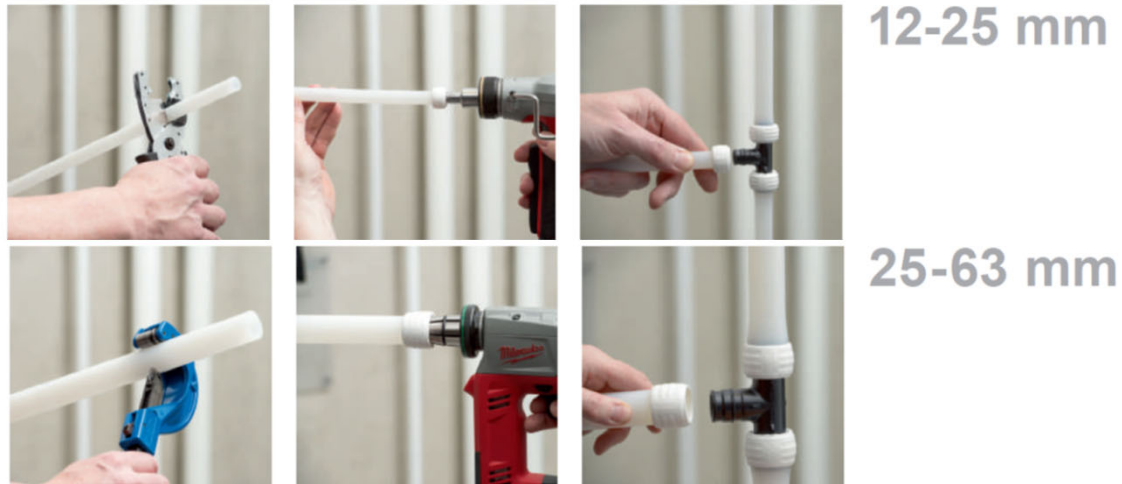
- For example, a leaking membrane under a tile floor in a shower, a small leak in a joint between pipes or in the event of a corrosion damage. The amount of leaking water is rather small and the process can take a long time. Finally, the damage (which may be severe) is noticed.
-



Connections in tap water pipes have frequent problems

- The tap water pipes might not stand enough pressure
 - Clamp couplings require
 - the right combination of products
 - the right tools and good knowledge.
 - it is never possible to mix different suppliers' systems
 - Moreover; Risk that nails may hit hidden pipes.
 - The damages are often related to work done by subcontractors
-

Connection of tap water pipes



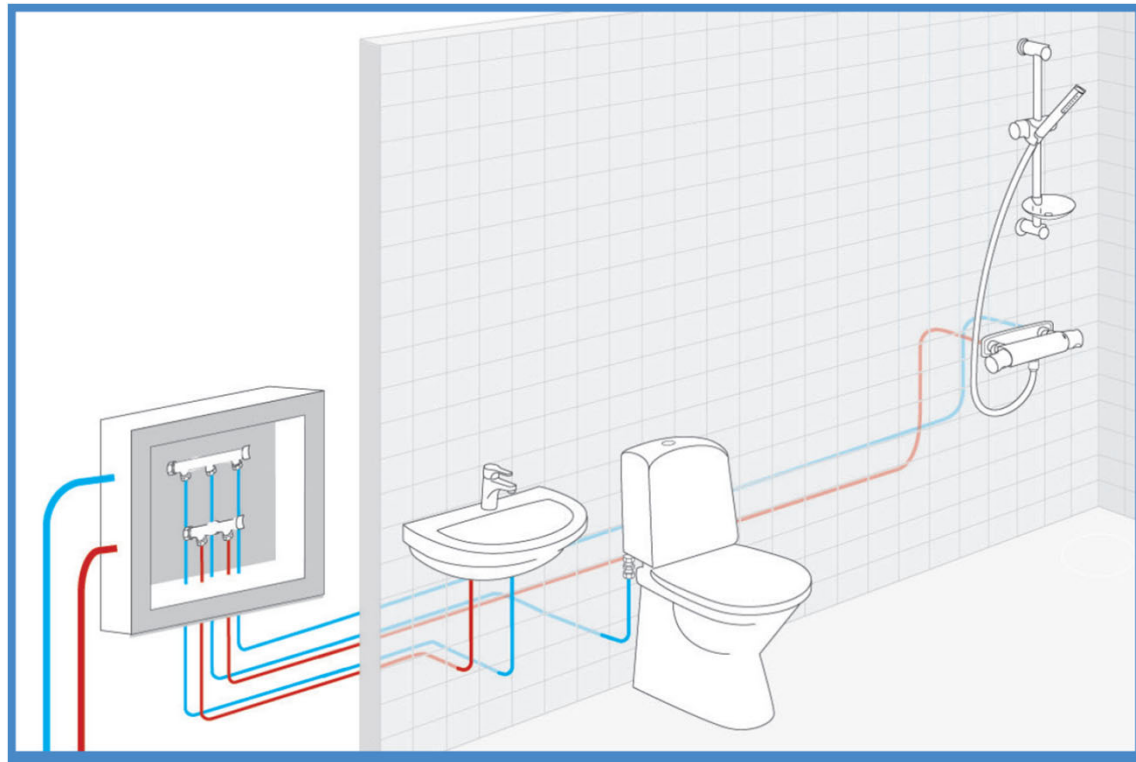
1 Kapa röret vinkelrätt.

2 Q&E-ringen sätts på röret.
Expandera. Återkrampningen
startar direkt.

3 Skjut omedelbart på den expan-
derade röränden på nippeln.
Kopplingen är självåtdragande
tack vare PEX-materialets ter-
miska minne. Färdigt!

Ur: Bygg på Uponor med rörsystem i världsklass, 2019

Hidden pipes in a bathroom



Ur: Bauhaus – Rör i rörsystem för tappvatten 2019



Consequences of damage from water leakage

When pressurized pipes are leaky, the amount of water can be large. If the leak is small, it can last for a long time without being detected.

Maybe 1 in 1000 connections will fail, but the consequences will be great for such a failure.

A typical cost for a water damage is SEK 150000.

Built-in pipes are a special risk factor. Such pipes are often a strong desire from a customer.

Citation: Builder of apartments



Damage processes

Outflowing water under pressure:

Damage to a pressureised system for water. Examples are dishwasher and washing machine and also heating system.

Outflowing water from gravity systems:

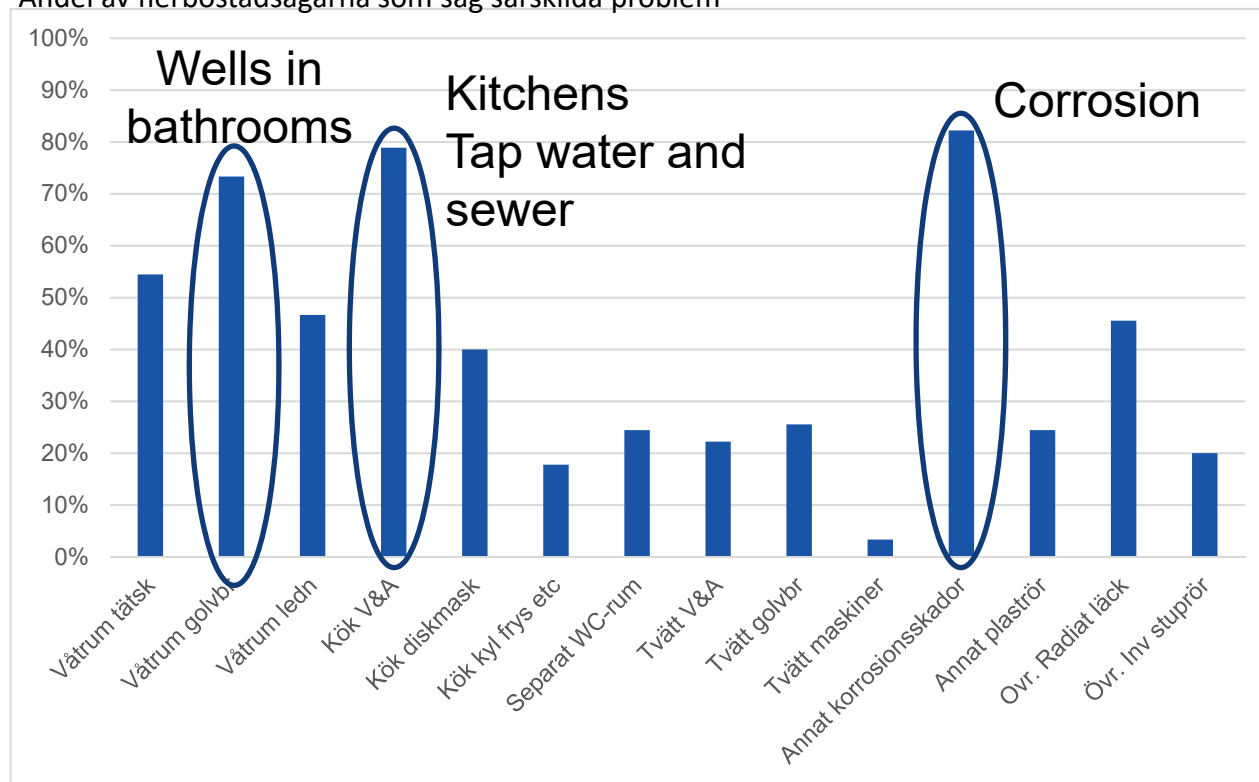
Liquid water flows into the building or building structure. Examples are drainage pipes leaking or being clogged or water flowing from a larger vessel, such as an aquarium.

Leaking waterproofing:

Joints in membranes in bathrooms, waterproofing membranes under tiles and membrane connections to wells. Examples are wet areas for baths or showers and laundry rooms in apartment buildings and combined laundry rooms and technology rooms in detached houses.

The most severe types of damage in apartment buildings

Andel av flerbostadsägarna som såg särskilda problem



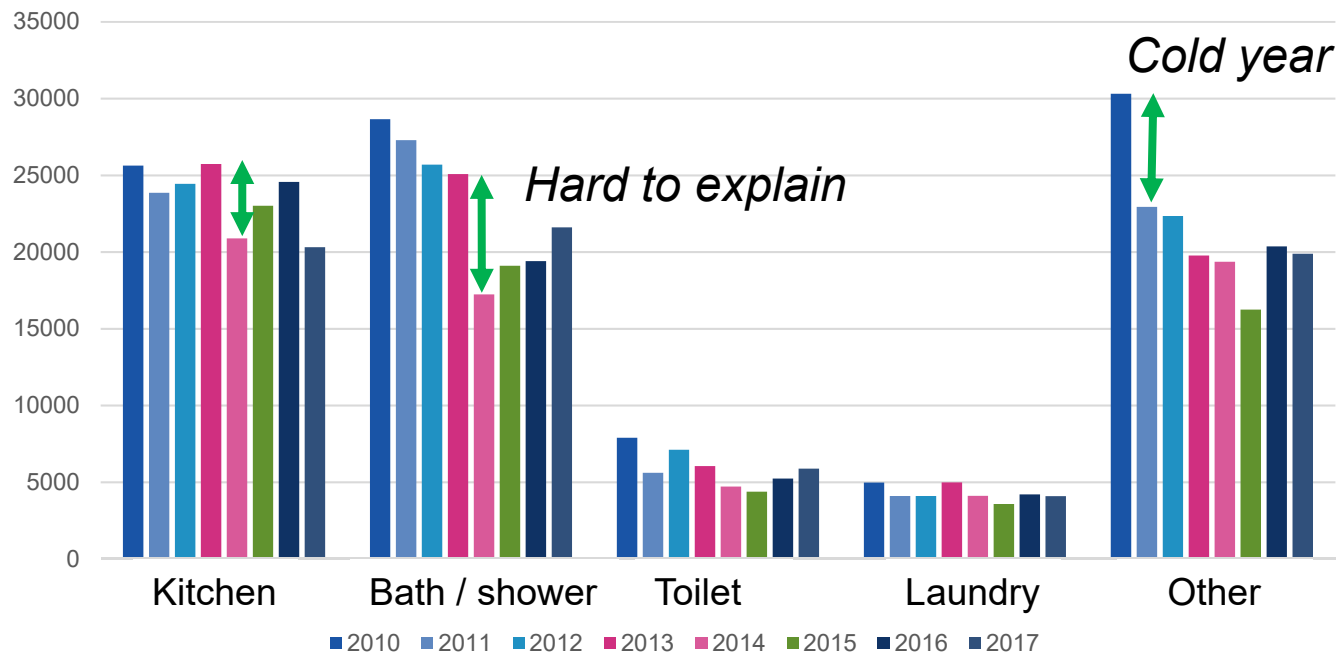


Sewers – especially in apartment buildings

- Joints in sewers
 - Back fall on pipes in floor slabs
 - The water locks are emptied.
 - Sewer pipes under a base plate can be affected due to settlements and the ground sinking.
 - The greatest care is required when placing and anchoring pipes in and under the base plate before casting.
-

Damage in different parts of detached houses

Number of damages



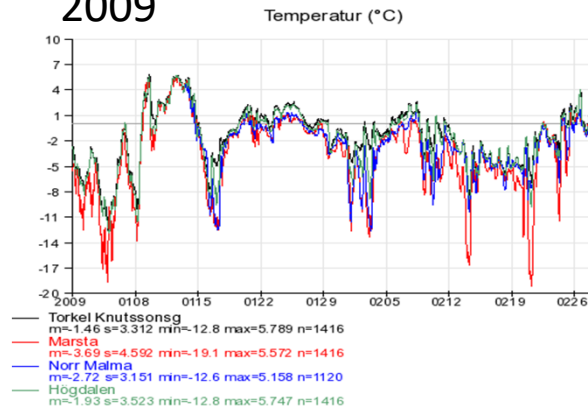
Figur 4

Antalet skador i olika delar av byggnader under åren 2010 till 2017 enligt statistik från "Svensk försäkring"

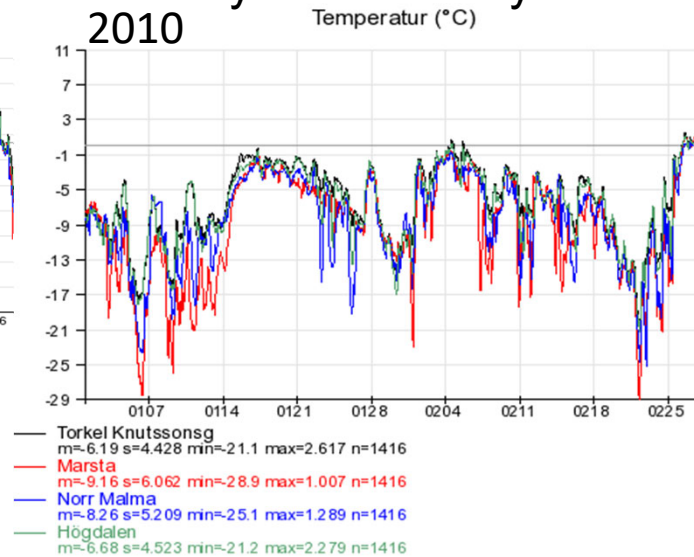


Some years colder than others

January och february
2009



January och february
2010





Bathrooms – especially in detached houses

- Leakage at threshold when water flows on bathroom floor. Water can proceed under the floor throughout the home.
- The threshold must also be low for availability reasons
- Floor wells near walls are difficult to install
- Uncertainty about elongated floor wells



Threshold



Well close to a wall



Limitation of damage

Producers of detached houses

- Some check tightness of their installations with compressed air at the factory.
 - An ambition to collect all kitchen pipe fittings in in a waterproof cabinet
 - The installer should check all risk points when the installation is complete ???
 - Always waterproof underlays for dishwasher, fridge and freezer
 - Water alarms with water fault switches placed in kitchens is discussed. However, this is not something that is used today.
-



Limitation of damage

Producers of apartment buildings

- Membranes in bathrooms etc. are installed in accordance with the industry rules for GVK or BKR. Authorization is particularly important for pipe installations. A subcontractor must be authorized for "Säker vatten".
 - Coupling cabinets for tap water connections are a novelty that allows you to avoid leakage through shafts.
-



Contexts that may result in damages

- *A: Equipment does not last as long as expected*
 - *B: The maintenance plan is not good enough*
 - *C: Craftsmen who made installations did not have the necessary skills.*
 - *D: Craftsmen who did the installation had the necessary skills but did not do their best.*
 - *E: The owner has contributed to substandard work*
 - *Q: Construction goods or materials of inferior quality or incorrect type have been used.*
 - *G: Risky technical solutions*
 - *H: Poorly done maintenance*
 - *I: Problems related to the construction documents*
 - *J: Construction checks or follow-up of control plans are not done well enough*
 - *K: The user of the building handles it in a clumsy or careless way*
 - *L: The user of the building is not aware that a damage process is in progress*
 - *M: The user of the building happens to be in unfortunate circumstances beyond his own control*
-



Who is responsible?

- *A: Equipment does not last as long as expected*
- *B: The maintenance plan is not good enough*
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- *E: The owner has contributed to substandard work*
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- *G: Risky technical solutions*

Property owners
responsibility

The inhabitants or users
responsibility

- *H: Poorly done maintenance*
- *I: Problems related to the construction documents*
- *J: Construction checks or follow-up of control plans are not done well enough*
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Responsibility from Manufacturers of detached houses: Two Concepts:

1: Avoiding responsibility - everything is referred to the contractor who assembles

The company's design department is responsible for how the house looks and works when it is built. Electrical and plumbing constructions are supplied by sub-consultants

Other faults are the contractor's responsibility. Since the customer buys the house as a kit and has his own contract with the contractor. The house manufacturer is only responsible for faults in the building material delivery.

2: The house manufacturer offers a guarantee

The manufacturer offers an insurance with recourse to the assembling contractor for the first five years. After 10 years there is no guarantee protection. It is believed that efforts to improve protection against water damage are a cost that results in poorer competitiveness.



Some notations

- The likelihood of a home being affected by water damage has not changed during the 2000s. The situation has not improved.
 - The cost of damages in fixed monetary value has increased over the past 25-year period.
 - Depreciation due to the age of the building will have a major impact on the homeowner's costs of repairing a water damage.
 - The property owner and the users of the property can do much to reduce the water damage
-



Conclusions

- Membranes in bathrooms- work for safer solutions
 - Kitchens - work for water damage safety
 - Work execution - important cause of damages. Improved skills are required!
 - Freeze damage - better design and workmanship are needed
 - Corrosion is a major cause of damage. Maintenance planning must be better!
-

En hälsning från Stockholm

