

# Moisture and leakage problems in Icelandic homes – a study using questionnaires

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Björn Marteinson

# Introduction

For some decades we have been aware of that frequency of moisture and leakage problems of different reasons in Icelandic buildings; most often the discussion has been about roofs.

The Icelandic Building Research institute (now building research at Innovation Center of Iceland) did research on roof problems in the 1980's..

In 1992 we decided that it was about time to make a research into the frequency of moisture and leakage problems in general; we made an study by questionnaires' to the home owners.

The average age of the buildings was then about 30 years, but since then much has changed and the average age is now probably nearer to 40 years.



# Building technology

## Building envelope;

The description is valid for the most frequent construction technology of homes in the period year 1920 to year 2000.

## Roof

.. Ventilated wooden roof (often with a thin air gap); roof inclination varies for different age groups of buildings (and the site location also!)

## Outer wall

.. Concrete, insulated on the inside and with rendering (type of insulation and details varies..)

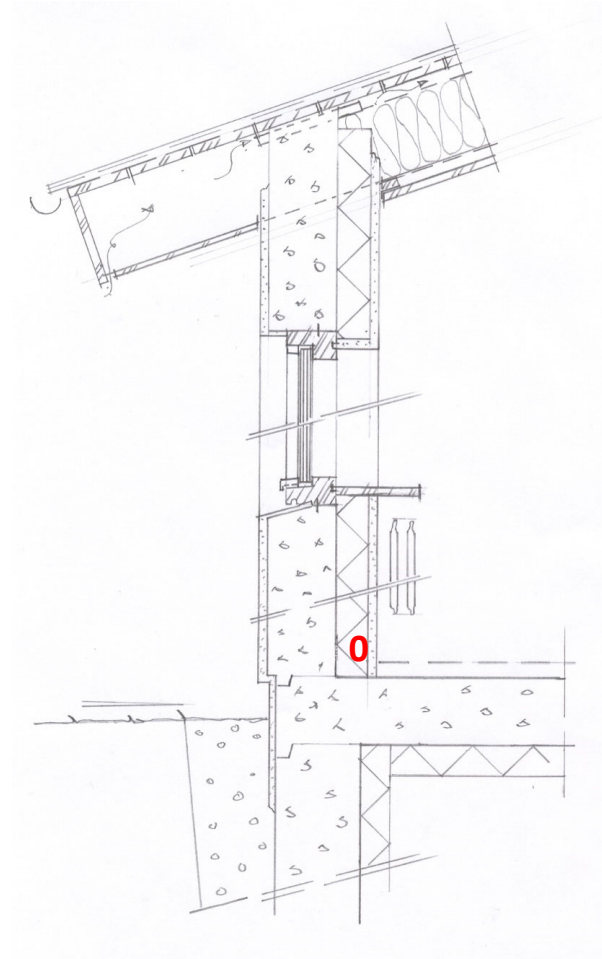
## Ground floor

.. Concrete on insulation and gravel

## Bathroom and pipes

Floor of concrete, walls also or of light-weight concrete blocks (and rendering)

Pipes; inside building components



# Energy price, heating and ventilation

## Energy price;

In biggest part of Iceland heating of buildings is based on geothermal energy.

Energy price is LOW; **0.0245 euro/kWh** and this energy is (in most aspects) sustainable

.. Moisture problems are NOT due to energy price (the price has increased minimally the last decade or so) nor needs to cut down on CO<sub>2</sub> footprint

## Ventilation of homes

Almost entirely natural ventilation through windows;

the moisture added indoors pr. ventilated m<sup>3</sup> of air seems to have (limited research) increased the last 20 years (typically from about 2g/m<sup>3</sup> to 3-4 g/m<sup>3</sup>)..

.. more due to limited information to (young) inhabitants and effect of repeated information about the needs for increased energy efficiency from the outside world, than energy price or CO<sub>2</sub> footprint

## Questionary studies

In general;

- The homes are considered to be relatively similar in construction technique; if a limited time span is considered each time
- The building stock was sorted into age groups of 10 years
- Statistically independent samples chosen, though with at least 10 buildings in each group

Questionary questions;

Is there now, or have there been, moisture or leakage problems in the building?.. And then where:

Roof, outer wall, windows, ground floor or bathroom

Advantages and disadvantages with the (questionaries') methodology;

Advantages	Disadvantages
<ul style="list-style-type: none"><li>• Moisture and leakage problems can be difficult to find, the owners experience of the building is important</li><li>• Time efficient and relatively cheap</li></ul>	<ul style="list-style-type: none"><li>• Not clear if the answerer understands the question in the „right“ way</li><li>• Changes of ownership, short experience of the building?</li><li>• Answering frequency is often low</li><li>• Only those interested answer, distribution is skew?</li></ul>

## Questionary 1; Reykjavík 1992

The table shows frequency of moisture and leakage problems for different components and age groups of buildings .

Moisture and leakage problems in Reykjavík; survey 1992 (Benedikt og Björn, 1997)

	Ans- wers	Frequency (%)									Scope of problems (%)			
		Total	-1925	1925-34	1935-44	1945-54	1955-64	1965-74	1975-84	1985-89	Big	Some	Small	
	112													
Roof		27	43	25	29	18	32	33	20	20	5	7	16	
Walls		21	57	50	21	18	21	22	12	0	4	5	13	
Windows		23	14	25	21	0	21	33	32	20	5	5	13	

Benedikt Jónsson og Björn Marteinnsson (1997) *Ástand mannvirkja og viðhaldspörf*, Rb skýrsla nr. 97-14, Rannsóknastofnun byggingariðnaðarins, (214s+fskj)

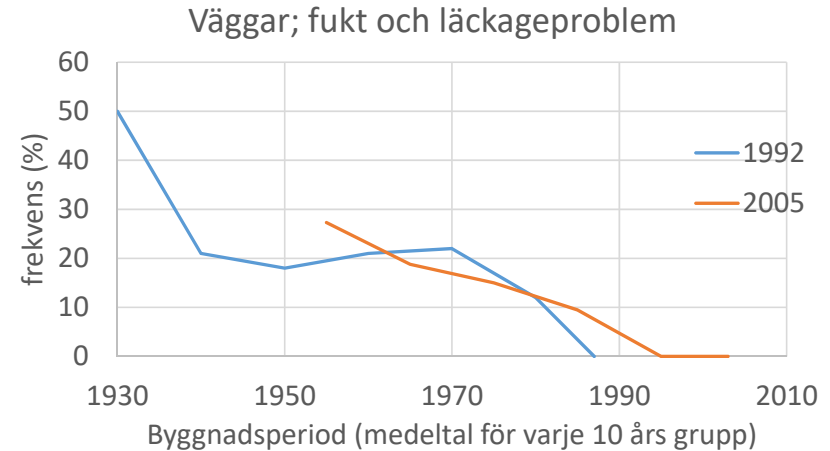
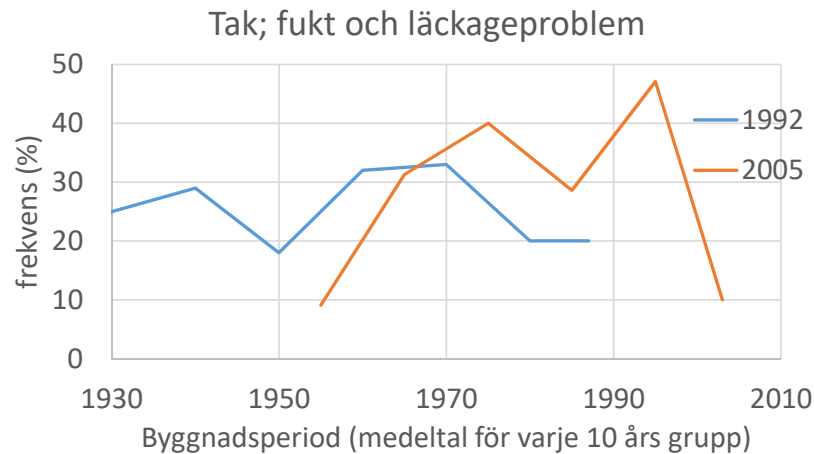
## Questionary 2; Reykjavík (and Akureyri) 2005

The table shows frequency of moisture and leakage problems for different building components and for age groups of buildings

Moisture and leakage problems in homes in Reykjavík; survey 2005 (Björn)												
		Frequency (%)										
	Ans- wers	Total	-1929	1930- 39	1940- 49	1950- 59	1960- 69	1970- 79	1980- 89	1990- 99	2000-	
	111											
Roof		30,6				9,1	31,3	40	28,6	47,1	10	
Outer wall		12,6				27,3	18,8	15	9,5	0	0	
Windows		11,7				9,1	12,5	10	4,8	11,8	30	
Surface												
water/groundwater		3,6				18,2	0	5	4,8	0	0	
Pipes and batheooms		3,6				0	3,1	10	4,8	0	0	
Condensation		1,8				0	3,1	0	4,8	0	0	

Björn Marteinsson ...

## Questionary results..



- .. In 1995 discussion on mould problems had not started, but in 2005 it was getting some interest
- .. Moisture and leakage problems in new buildings are not increasing in general, but they are not diminishing !



## Dangerous lack of interest..

Moisture and leakage problems are seen far too often, and with little known effect on the occupants health

It is astonishing how small interest these problems get with public instances and politicians, the problems are clearly seen as a personal occupational hazard and not a national health risk ..

.. If this goes on, the life quality of many is at change and the cost will be high for the society in the long run

Thank you for listening!