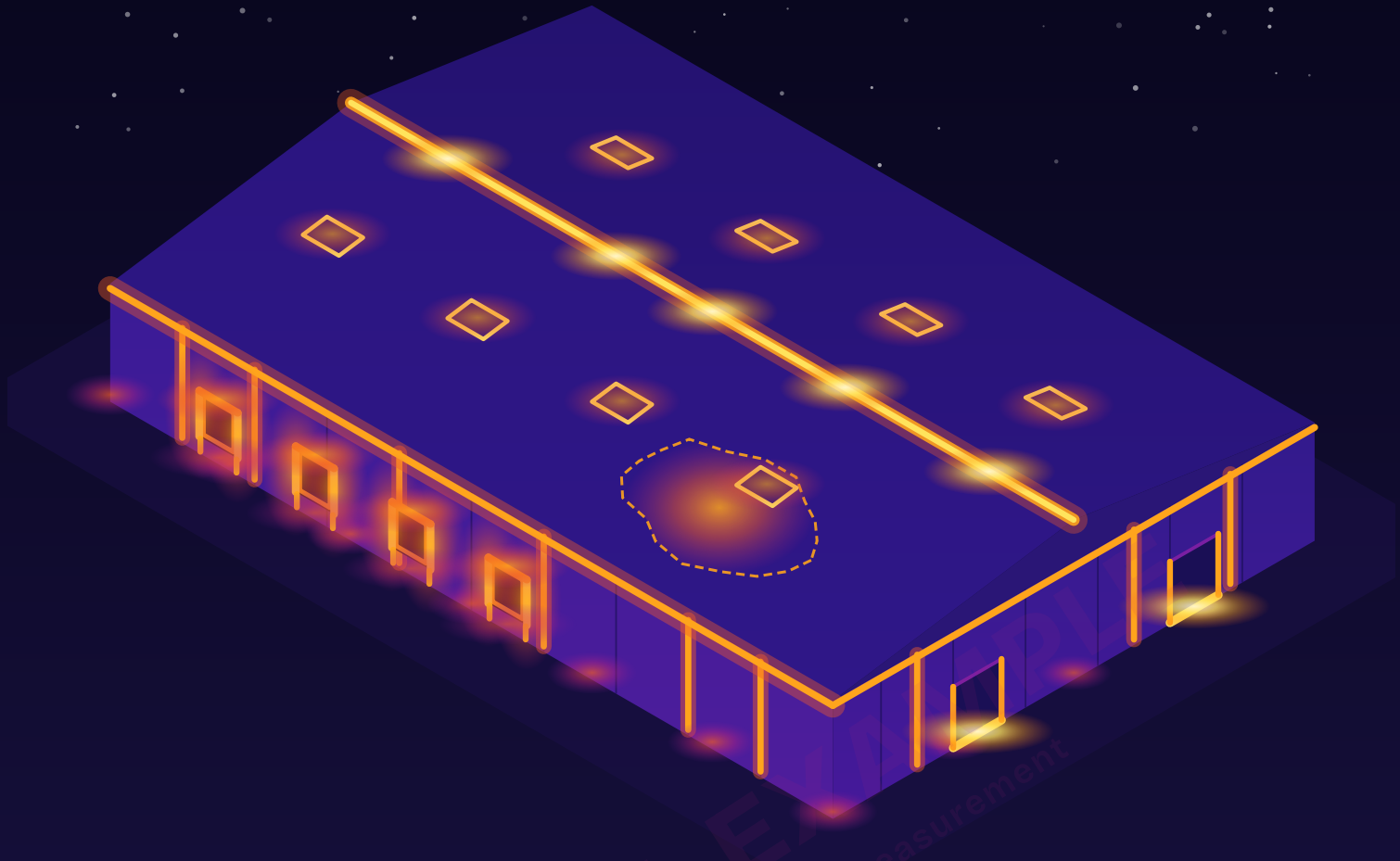




Simulated thermal view with findings 1-13 · not a real measurement

3D PACKAGE - 3D HEAT MAP + ENGINEERING ANALYSIS · SAMPLE

Sample analysis report

Mintaraktár Logisztikai Kft. (fictional)

A 2,400 m² warehouse near Nyíregyháza: where heat escapes, what it costs per season, and what to fix first.

REPORT ID	MINTA-RPT-001 · v1.0	CLIENT	Mintaraktár Logisztikai Kft. (fictional)
FACILITY	60 × 40 m hall, 2,400 m ² , 9 m clear height, sandwich panels; gas radiant-tube heating, 16 °C	SITE	Nyíregyháza area (fictional address)
SURVEY (EXAMPLE VALUE)	18 Nov 2026 20:30 – 19 Nov 2026 01:10	DELIVERED (EXAMPLE VALUE)	2 Dec 2026
PRICES	at 9 October 2026 gas prices, net	PREPARED BY	HőKép3D engineering team

What this is and is not: Engineering thermal-imaging survey – not an accredited or certified inspection. It does not replace an energy performance certificate, a statutory energy audit, mandatory electrical-safety or fire-safety inspections; those are carried out by professionals authorised under Hungarian law. Savings and payback figures are estimates, not commitments.

This document is an illustrative sample. The company, facility, survey conditions and images are invented or simulated; the figures come from the HőKép3D worked example (“Warehouse, large level”).

1

Executive summary

The night-time thermal survey of the hall produced **13 findings**. We estimate that together they carry **2,700,000 (2,200,000–3,900,000) HUF** worth of gas out of the building per heating season – **≈ 27%** of the heating bill. **Three items (priority A)** account for 61% of this and pay back in about 12 months.

2,700,000 HUF/season

estimated loss (central)

range: 2,200,000–3,900,000

1,600,000 HUF

quick package (A) fix cost

range: 860,000–3,200,000

1,700,000 HUF/season

quick package saving

range: 1,300,000–2,300,000

12 months

simple payback

incl. the survey: 15 mo. · range: 4–29 mo.

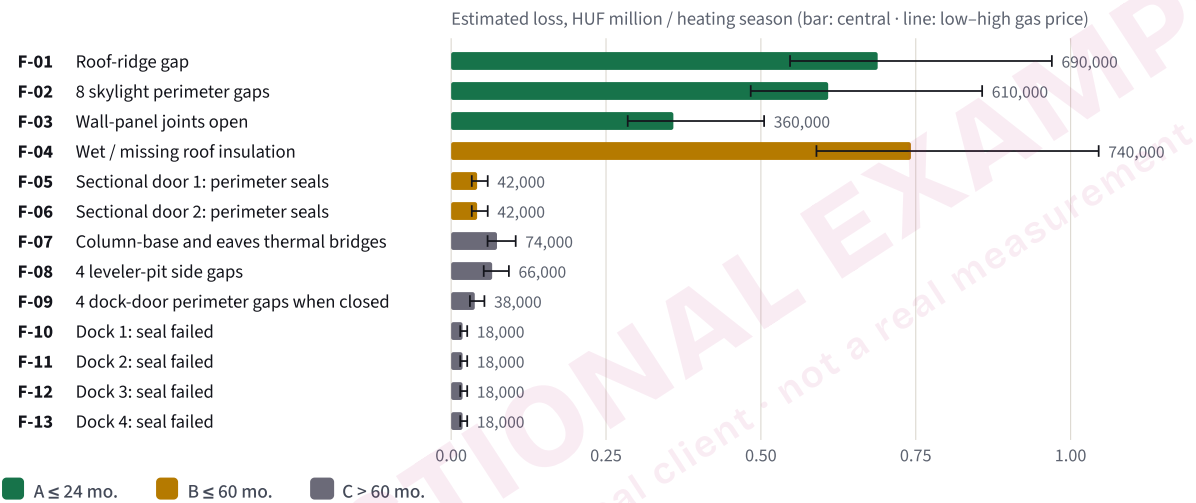
What to fix first

Item	Fix	Loss/season	Payback
1. F-01 Roof-ridge gap	270,000 HUF	690,000 HUF	5 mo.
2. F-03 Open wall-panel joints	410,000 HUF	360,000 HUF	14 mo.
3. F-02 Skylight perimeter gaps	960,000 HUF	610,000 HUF	19 mo.
Package total	1,600,000 HUF	1,700,000 HUF	12 mo.

Payback of an item = fix ÷ seasonal loss × 12 (flat, today’s central gas price). Order by payback as in the action plan (page 11).

What to do

1. Ask for 2–3 quotes for the three A items (1,600,000 HUF, range 860,000–3,200,000 HUF). The cost bands are indicative.
2. Plan the B items into the next maintenance window: seals on two sectional doors; the wet roof area needs a moisture reading and belongs with a roof refurbishment.
3. Do the C items (docks, thermal bridges) only together with other refurbishment; their long payback does not justify them on their own.
4. Re-scan after the fix (HUF 70,000): shows whether the defect is gone.



Prices: net gas price at 9 October 2026, 40.4 HUF per invoice-kWh (range 32.1–56.9). The uncertainty of one item is typically ±30–50%. Savings materialise only if the fixes are carried out; the survey itself saves no energy. About 12 t CO₂ per season (NCV basis, 0.202 kg/kWh).

2

Survey conditions

Example data. The facility, client, survey date, conditions and images are invented or simulated; the loss and cost figures come from the HőKép3D worked example (“Warehouse, large level”).

An exterior heat-loss survey is reliable only under valid conditions. The table shows what our method requires and the (invented) values of the example night. If the conditions fail, we reschedule free of charge (up to 2 times **[confirm]**).

Condition	Our requirement	Example night (invented value)	
Indoor-outdoor temperature difference	$\Delta T \geq 10\text{ K}$, preferably $\geq 15\text{ K}$	inside 16.0 °C, outside −1.4 °C: $\Delta T\ 17.4\text{ K}$	✓
Sun on the facade	at least 4 h after sunset or before sunrise	sunset $\approx 15:50$, survey 20:30–01:10: starting 4 h 40 min after sunset	✓
Wind	$< 5\text{ m/s}$	mean 1.6 m/s, maximum gust 3.1 m/s	✓
Precipitation, surfaces	no rain, dry surfaces	no precipitation in the previous 24 h; surfaces dry	✓
Heating	stable for at least 24 h	16 °C set-point unchanged for 40 h; doors closed except the docks	✓
Sky	recorded (the roof cools towards the sky)	clear, 0/8 cloud – the cooling was taken into account for roof images	✓

Survey scope (example)

Exterior facades	all 4 facades, full length
Roof	oblique views from a lift + interior roof soffit; no drone add-on
Interior walk-through	2 full rounds: doors, docks, walls, roof soffit
Docks	the client docked an empty trailer at each of the 4 docks
Image set (example)	236 thermal images + 236 visual photos, 41 interior images
3D model	images registered on the hall’s 3D model; findings measured in m / lm / mm

Instrument and settings

Thermal camera	[camera model, resolution]
Thermal sensitivity	[NETD]
Emissivity	$\epsilon = 0.90$ (painted steel sheet) – checked with a reference tape
Reflected temperature	recorded for every image
Distance	5–25 m
Method basis	MSZ EN ISO 6781-1:2023 – we follow its principles; we claim no conformity certification

The instrument type and resolution are filled in on a real report; they are left blank in this sample on purpose. We claim no calibration certificate or personnel certification.

3

Method in brief and limits

A thermal camera measures **surface temperature**. It shows *where* a fault is but does not read the watts lost. A loss in forints is therefore a **model-based estimate**: computed from the thermograms and on-site dimensions (m², m, gap width in mm) with standard physics and sourced parameters.

- 1

Night-time survey
thermal + visual image of the same view, inside and out; field log.
- 2

Registration on the 3D model
location, length, area and gap width of each finding can be measured.
- 3

Finding and alternative explanation
two views; reflection, solar and process heat excluded.
- 4

Loss estimate
defect → H [W/K] → kWh → m³ gas → HUF (low / central / high gas price).
- 5

Fix cost band, payback
indicative cost band; priority: A ≤ 24 months, B ≤ 60, C otherwise.
- 6

Engineering approval
the approving engineer checks the report before release (page 15).

$$Q \text{ [kWh]} = H \text{ [W/K]} \cdot HDD \text{ [K}\cdot\text{day]} \cdot 24 \cdot f / 1000 \rightarrow \text{invoice-kWh} = Q / \eta \cdot 1.1076 \rightarrow m^3 = \text{invoice-kWh} / 10.52 \rightarrow \text{HUF} = \text{invoice-kWh} \cdot \text{gas price}$$

What a thermogram gives us well

- ✓ location and extent of a defect (m², lm)
- ✓ its relative severity
- ✓ approximate gap width

What we cannot know precisely

- the real air flow (wind and stack effect vary hour by hour)
- the real conductivity of wet insulation
- the true price of the fix (quotes needed)
- hidden defects: not every defect shows on a thermogram

Why ±30–50% for one item?

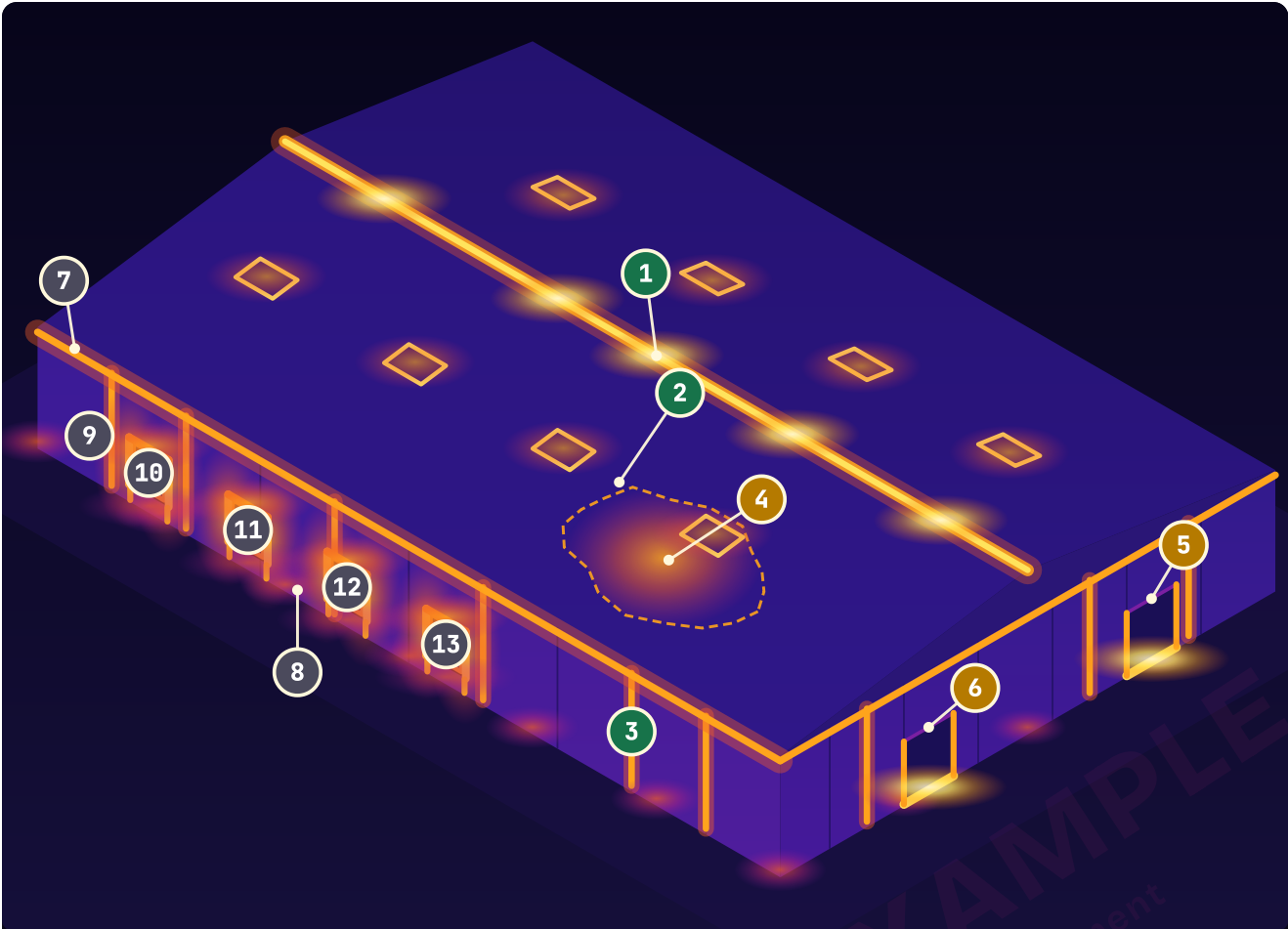
Factor	Band
Gas price	–20 % / +41 %
Weather (mild–cold season)	–17 % / +18 %
Efficiency (0.72–0.88)	+11 % / –9 %
U-value of wet insulation	≈ ±50 %
Gap size, discharge coefficient, pressure	±30–50 %

We give a range for every item. The central value is roughly the median.

Limits. The survey describes the moment and the weather and operating conditions of the measurement. A thermogram does not see what is behind a cover. The simulated images in this sample only illustrate. The engineering report is informative: it certifies no compliance.

4

3D overview and list of findings



Simulated thermal view on a simplified 3D model of the hall (isometric). Numbers are the finding numbers; green = priority A, amber = B, grey = C. The interactive 3D heat map is part of the delivered data package (page 14).

ID	Finding	W/K	W (mean)	kWh heat	m ³ gas	HUF/season	Fix HUF	Payb. mo.	Pr.
F-01	Roof-ridge gap	280	3,200	12,000	1,600	690,000	270,000	5	A
F-02	8 skylight perimeter gaps	250	2,900	11,000	1,400	610,000	960,000	19	A
F-03	Wall-panel joints open	150	1,700	6,400	840	360,000	410,000	14	A
F-04	Wet / missing roof insulation	300	3,500	13,000	1,700	740,000	3,100,000	50	B
F-05	Sectional door 1: perimeter seals	17	200	750	99	42,000	90,000	26	B
F-06	Sectional door 2: perimeter seals	17	200	750	99	42,000	90,000	26	B
F-07	Column-base and eaves thermal bridges	30	350	1,300	170	74,000	1,800,000	292	C
F-08	4 leveler-pit side gaps	27	310	1,200	160	66,000	600,000	109	C
F-09	4 dock-door perimeter gaps when closed	15	180	680	90	38,000	360,000	113	C
F-10	Dock 1: seal failed	7	87	330	43	18,000	300,000	196	C
F-11	Dock 2: seal failed	7	87	330	43	18,000	300,000	196	C
F-12	Dock 3: seal failed	7	87	330	43	18,000	300,000	196	C
F-13	Dock 4: seal failed	7	87	330	43	18,000	300,000	196	C
Total (joint effect, not a plain sum)		1,100	13,000	49,000	6,400	2,700,000	8,900,000	39	

Values rounded to 2 significant digits; low–high ranges are on the finding cards. “W (mean)” is the power at the mean outdoor temperature of the heating season. Finding cards on pages 6–10.

5

Finding cards

F-01

Roof-ridge gap

ROOF - RIDGE LINE

A

Confidence: High

SIMULATED THERMAL IMAGE

+9 °C

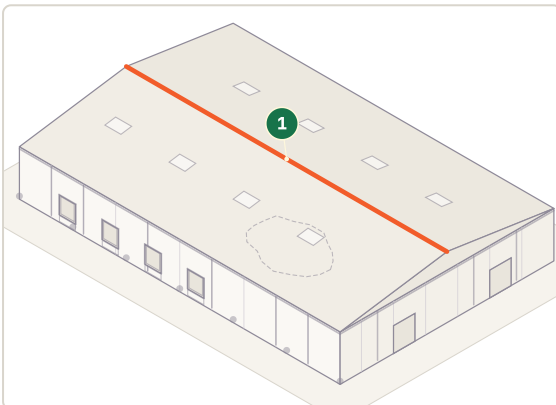
Sp1 6.8 °C

Ref -0.9 °C

-3 °C

Simulated thermal image of the finding (example)

1



LOCATION · IMAGE PAIR

Ridge line along the full hall length (x 0–60 m, y 20 m, z 11.5 m)
IR-0311...0326 (exterior, from a lift), IR-0502...0509 (interior, roof soffit)

WHAT THE IMAGE SHOWS

A continuous band 6–9 K warmer along the ridge, with a warm plume at the strongest stretches. Both roof planes behave alike; the panel fields are cold.

LIKELY CAUSE

The joint seal under the ridge cap has aged and detached. Warm air leaves at the highest point of the hall because of the stack effect.

3,200

W (season mean)

12,000

kWh heat/season

1,600

m³ gas/season

690,000 HUF

per season (550,000–970,000)

FIX SUGGESTION

Replace the ridge seal profile and foam seal over the full length (with a lift); check the cap fixings.

COST BAND

60 × 4,500 HUF/lm = **270,000 HUF** (150,000–480,000) · payback **5 months**

VERIFICATION

Targeted re-scan under similar conditions after the fix: ΔT along the ridge ≤ 1 K against the panel field.

CONFIDENCE BASIS

two independent views (outside and inside), valid conditions

F-02

Skylight perimeter gaps

ROOF - 8 SKYLIGHTS

A

Confidence: High

SIMULATED THERMAL IMAGE

+9 °C

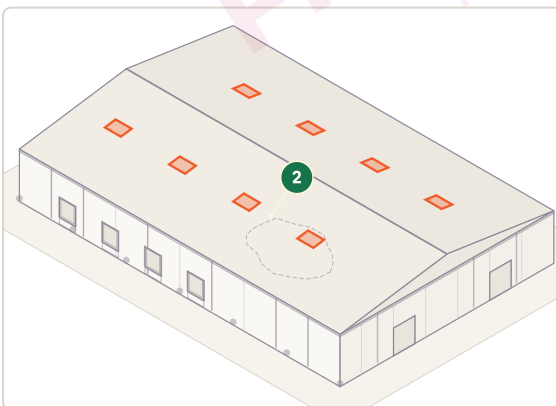
Sp1 5.9 °C

Ref -0.9 °C

-3 °C

Simulated thermal image of the finding (example)

2



LOCATION · IMAGE PAIR

8 skylights, 4 on each roof plane (marked in the 3D model)
IR-0327...0346 (exterior), IR-0510...0521 (interior)

WHAT THE IMAGE SHOWS

All eight skylights show a continuous 5–7 K warm frame; it is stronger in the corners, where a small plume is visible.

LIKELY CAUSE

The frame seal has hardened and the frame has separated from the sheet through thermal movement.

2,900

W (season mean)

11,000

kWh heat/season

1,400

m³ gas/season

610,000 HUF

per season (480,000–860,000)

FIX SUGGESTION

New frame seal on each skylight (8), re-tighten the frame fixings.

COST BAND

8 × 120,000 HUF = **960,000 HUF** (480,000–2,000,000) · payback **19 months**

VERIFICATION

Re-scan after the fix; ΔT along the frame ≤ 1 K against the surrounding panel.

CONFIDENCE BASIS

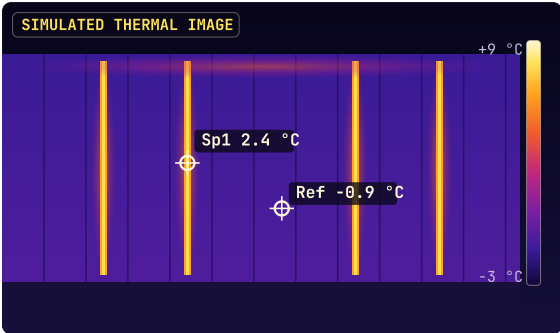
two views, gap also confirmed visually

F-03 Open wall-panel joints

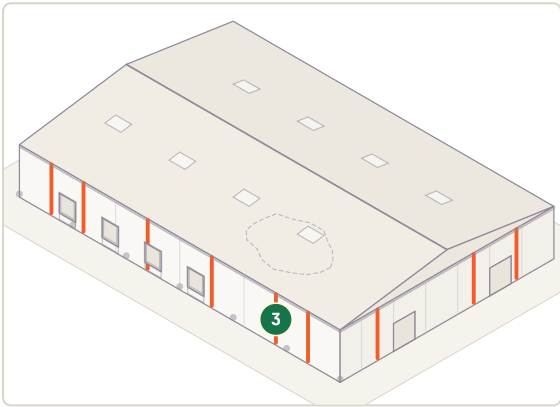
FACADE - VERTICAL JOINTS

A

Confidence: High



Simulated thermal image of the finding (example)



LOCATION · IMAGE PAIR

Long and end wall, 9 vertical joints, ≈ 90 m in total (measured in the 3D model)
IR-0101...0188 (exterior), RGB-0101...0188

WHAT THE IMAGE SHOWS

Vertical warm lines of 2–3 K along the panel joints; the panel field is cold and even.

LIKELY CAUSE

The foam between the panels has shrunk and detached; the gap is about 2 mm.

1,700

W (season mean)

6,400

kWh heat/season

840

m³ gas/season

360,000 HUF

per season (290,000–510,000)

FIX SUGGESTION

Re-seal the panel joints per metre from a lift.

COST BAND

90 × 4,500 HUF/lm = **410,000 HUF** (230,000–720,000) · payback **14 months**

VERIFICATION

Re-scan; joint-line $\Delta T \leq 1$ K against the panel field.

CONFIDENCE BASIS

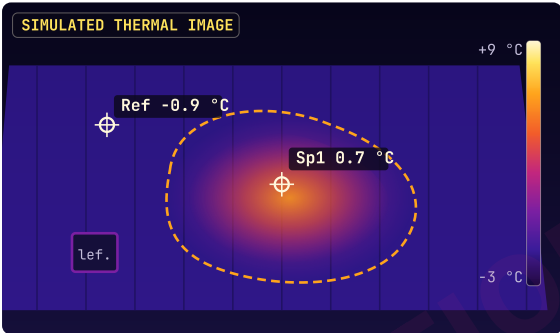
valid conditions, repeating pattern on several facades

F-04 Wet / missing roof insulation

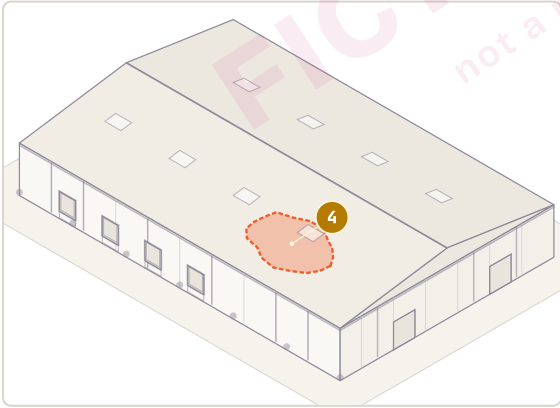
ROOF - INSULATION

B

Confidence: Medium



Simulated thermal image of the finding (example)



LOCATION · IMAGE PAIR

Roof near a drain (x 36–50 m, y 27–37 m); about 14 × 10 m, ≈ 140 m² (~6 % of the roof)
IR-0347...0362 (exterior), IR-0522...0531 (interior)

WHAT THE IMAGE SHOWS

An irregular patch, +1.6 K against the surrounding panel. Contrast is small (clear sky, cooling roof) but the edge is sharp: it points to moisture, not an artefact.

LIKELY CAUSE

A damaged cover sheet or a leaking drain junction wetted the panel core; $U \approx 2.5$ W/m²K instead of the intact 0.35.

3,500

W (season mean)

13,000

kWh heat/season

1,700

m³ gas/season

740,000 HUF

per season (590,000–1,000,000)

FIX SUGGESTION

Remove the cause of the leak, then replace or PU-foam patch the wet panel field (open, dry, fill, close). Moisture reading or a core sample first.

COST BAND

140 × 22,000 HUF = **3,100,000 HUF** (1,700,000–5,600,000) · payback **50 months**

VERIFICATION

Moisture reading / core sample before the fix; re-scan on a dry clear night afterwards.

CONFIDENCE BASIS

low thermal contrast; the inside image shows the extent too, but the moisture must be confirmed by a site reading

F-05-06

Sectional-door perimeter seals

FACADE - 2 SECTIONAL DOORS

B

Confidence: High

SIMULATED THERMAL IMAGE

Simulated thermal image of the finding (example)

LOCATION · IMAGE PAIR

End wall (x = 60 m), y = 10 m and y = 28 m
IR-0189...0204 (exterior), IR-0532...0537 (interior)

WHAT THE IMAGE SHOWS

A 5–6 K warm line along the bottom edge and side profiles of each door; the door leaf itself is cold. Inside, cold “fingers” on the floor in front of the door.

LIKELY CAUSE

The bottom rubber profile is worn and the side brush seal is broken up.

390

W (season mean)

1,500

kWh heat/season

200

m³ gas/season

84,000 HUF

per season (67,000–120,000)

ID	Location	HUF/season	Fix	Payb. mo.
F-05	Sectional door 1	42,000	90,000	26
F-06	Sectional door 2	42,000	90,000	26

FIX SUGGESTION

Replace the seal set (bottom, sides, top) on each door and adjust the door.

COST BAND

2 pcs × 90,000 HUF = **180,000 HUF** (80,000–360,000)

VERIFICATION

Re-scan with the door closed; ΔT around the door ≤ 2 K.

CONFIDENCE BASIS

two views, the door was closed during the survey (field log)

F-07

Column-base and eaves thermal bridges

FACADE - COLUMNS, EAVES

C

Confidence: Medium

SIMULATED THERMAL IMAGE

Simulated thermal image of the finding (example)

LOCATION · IMAGE PAIR

Eaves line of the long and end wall and 13 column bases; about 120 m in total
IR-0101...0188 (exterior), IR-0538...0560 (interior)

WHAT THE IMAGE SHOWS

Repeating warm patches of 2–4 K along the eaves line and at the column bases.

LIKELY CAUSE

The steel columns and the plinth strip bridge the panel insulation; the insulation breaks at the eaves junction.

350

W (season mean)

1,300

kWh heat/season

170

m³ gas/season

74,000 HUF

per season (59,000–100,000)

FIX SUGGESTION

Insulation strip and cladding at the eaves and column bases. High cost, low yield: worth doing only together with a building refurbishment.

COST BAND

120 × 15,000 HUF/lm = **1,800,000 HUF** (960,000–3,600,000) · payback **292 months**

VERIFICATION

Design check; re-scan after the works.

CONFIDENCE BASIS

known bridge geometry, but the psi-value is estimated by analogy

Simulated images, invented data · estimate, not a guarantee

FICTIONAL SAMPLE

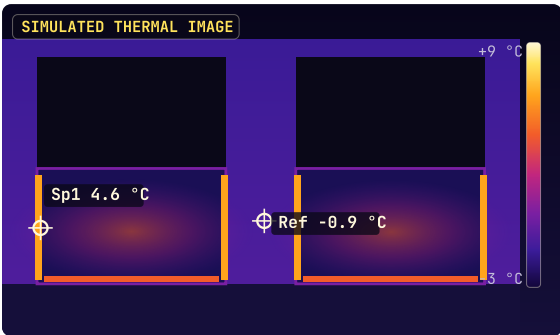
8 / 15

F-08 Dock-leveler pit side gaps

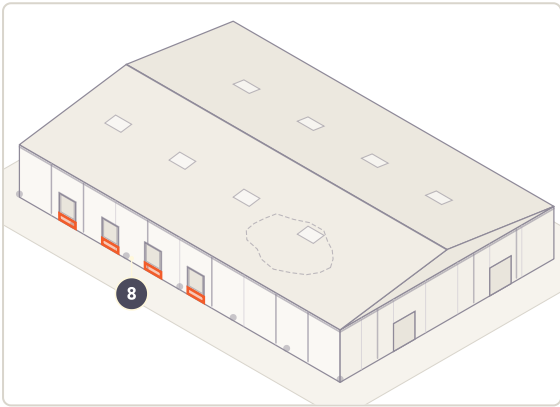
DOCK WALL - 4 LEVELER PITS

C

Confidence: Medium



Simulated thermal image of the finding (example)



LOCATION · IMAGE PAIR

Dock wall, below the dock doors, at all 4 docks (4 × 3.0 m)
IR-0205...0212 (exterior), IR-0561...0568 (interior)

WHAT THE IMAGE SHOWS

A warm line outside along a gap of about 15 mm at the side of each pit, cold inflow at floor level inside.

LIKELY CAUSE

The seal between the leveler and the pit edge is missing or aged.

310

W (season mean)

1,200

kWh heat/season

160

m³ gas/season

66,000 HUF

per season (53,000–93,000)

FIX SUGGESTION

Pit-edge seal at each dock (4).

COST BAND

4 × 150,000 HUF = 600,000 HUF (320,000–1,200,000) · payback 109 months

VERIFICATION

Visual check + smoke test before the fix; re-scan afterwards.

CONFIDENCE BASIS

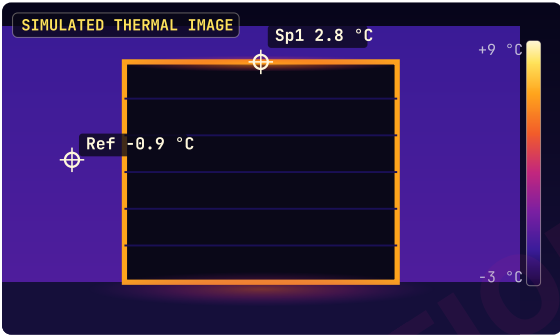
the inside view confirms the gap width; from outside only the warm line shows

F-09 Dock-door perimeter gaps when closed

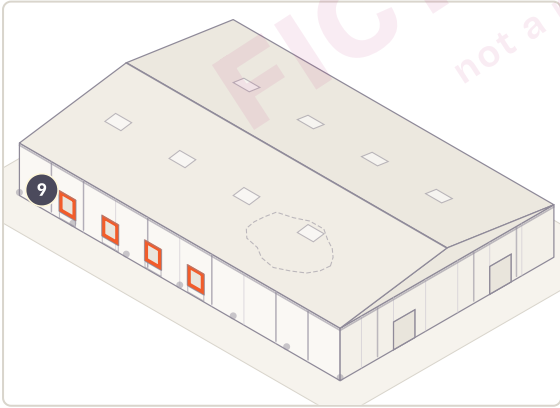
DOCK WALL - 4 DOCK DOORS

C

Confidence: High



Simulated thermal image of the finding (example)



LOCATION · IMAGE PAIR

Perimeter of the 4 dock doors (head + two sides), x=9, 17, 25, 33 m
IR-0213...0236 (exterior), IR-0569...0580 (interior)

WHAT THE IMAGE SHOWS

With the door closed, a thin continuous 2–3 K warm line along the perimeter of the door leaf.

LIKELY CAUSE

The side and head seal profiles have hardened and the door adjustment has drifted (gap of about 5 mm).

180

W (season mean)

680

kWh heat/season

90

m³ gas/season

38,000 HUF

per season (30,000–54,000)

FIX SUGGESTION

Replace the perimeter seal set and adjust each door (4).

COST BAND

4 × 90,000 HUF = 360,000 HUF (160,000–720,000) · payback 113 months

VERIFICATION

Re-scan with the doors closed.

CONFIDENCE BASIS

two views, doors were closed

F-10-13

Failed dock seals (docks 1-4)

DOCK WALL - 4 DOCKS

C

Confidence: High

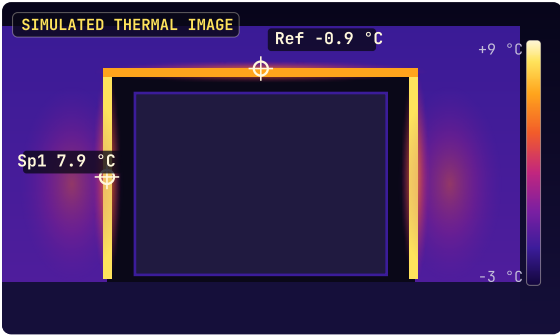
SIMULATED THERMAL IMAGE

Ref -0.9 °C

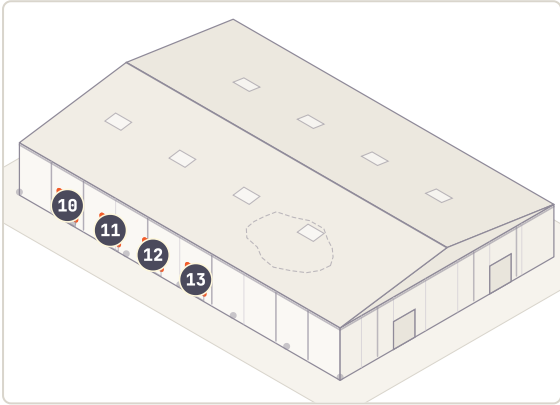
Sp1 7.9 °C

+9 °C

-3 °C



Simulated thermal image of the finding (example)



LOCATION · IMAGE PAIR

Side pads and head curtains of the 4 docks, x= 9, 17, 25, 33 m (measured with a trailer docked)

IR-0237...0276 (exterior), IR-0581...0604 (interior)

WHAT THE IMAGE SHOWS

A warm frame on all three sides (two side pads, head curtain) with a strong plume around the trailer; cold flow across the dock floor inside.

LIKELY CAUSE

The side pads are compressed or torn and the head curtain is incomplete: a gap of about 26 mm remains with a trailer docked.

350

W (season mean)

1,300

kWh heat/season

170

m³ gas/season

74,000 HUF

per season (58,000-100,000)

ID	Location	HUF/season	Fix	Payb. mo.
F-10	Dock 1	18,000	300,000	196
F-11	Dock 2	18,000	300,000	196
F-12	Dock 3	18,000	300,000	196
F-13	Dock 4	18,000	300,000	196

FIX SUGGESTION

Repair the side pads / curtain at each dock. Low yield: the gap is open only with a trailer docked (about 25 % of the hours), so payback is long; do it together with a dock refurbishment.

COST BAND

4 pcs × 300,000 HUF = **1,200,000 HUF** (600,000-2,400,000)

VERIFICATION

How to read a finding card Priority: $A \leq 24$, $B \leq 60$, $C > 60$ months simple payback. **Confidence:** High – at least two independent views and valid conditions; Medium – one view or low thermal contrast; Low – a site check is needed before deciding. **Image pair:** IDs of the thermal and visual image in the delivered data package. The thermal images in this sample are simulated.

Simulated images, invented data · estimate, not a guarantee

FICTIONAL SAMPLE

10 / 15

6 Action plan

The list is sorted by payback (shortest first). Costs are net, indicative, quote-based assumptions; ask for 2–3 quotes. Savings can be added up because the calculation already shares the common air flow between items.

ID	Action	Fix, HUFrange	Loss HUF/season	Payback (mo.)	Pr.	Suggested timing
1.	F-01 Replace ridge seal (60 lm)	270,000 150,000–480,000	690,000	5	A	within 4–8 weeks
2.	F-03 Re-seal panel joints (90 lm)	410,000 230,000–720,000	360,000	14	A	within 4–8 weeks
3.	F-02 Re-seal 8 skylight frames	960,000 480,000–2,000,000	610,000	19	A	within 4–8 weeks
4.	F-05 Door seal set + adjustment – door 1	90,000 40,000–180,000	42,000	26	B	next maintenance window
5.	F-06 Door seal set + adjustment – door 2	90,000 40,000–180,000	42,000	26	B	next maintenance window
6.	F-04 Repair wet panel field (140 m²) – moisture check first	3,100,000 1,700,000–5,600,000	740,000	50	B	next maintenance window
7.	F-08 Pit-edge seals (4)	600,000 320,000–1,200,000	66,000	109	C	tie to a refurbishment
8.	F-09 Dock-door seal sets (4)	360,000 160,000–720,000	38,000	113	C	tie to a refurbishment
9.	F-10 Dock side pad / curtain repair – dock 1	300,000 150,000–600,000	18,000	196	C	tie to a refurbishment
10.	F-11 Dock side pad / curtain repair – dock 2	300,000 150,000–600,000	18,000	196	C	tie to a refurbishment
11.	F-12 Dock side pad / curtain repair – dock 3	300,000 150,000–600,000	18,000	196	C	tie to a refurbishment
12.	F-13 Dock side pad / curtain repair – dock 4	300,000 150,000–600,000	18,000	196	C	tie to a refurbishment
13.	F-07 Insulation strip, cladding (120 lm)	1,800,000 960,000–3,600,000	74,000	292	C	tie to a refurbishment

Comparing packages

Package	Items	Fix, HUF (range below)	Saving, HUF/season (range below)	Payback, mo. (best–worst)	incl. survey	5-year net* (flat; below: forward)
Quick package: A	3	1,600,000 860,000–3,200,000	1,700,000 1,300,000–2,300,000	12 4–29	15	6,200,000 4,300,000
A + B	6	4,900,000 2,600,000–9,200,000	2,500,000 2,000,000–3,500,000	24 9–56	26	7,000,000 4,300,000
All 13 findings	13	8,900,000 4,700,000–17,000,000	2,700,000 2,200,000–3,900,000	39 15–94	41	4,300,000 1,300,000

* Flat price / forward curve; fix and survey (489,000 HUF, list price) deducted. Payback: simple, flat today’s central gas price; the “incl. survey” column adds the 489,000 HUF survey. The best–worst band pairs low fix cost with high gas price and vice versa. All findings: result of the calculation engine’s “large, widespread” level.

7

Five years, two scenarios

The chart shows the cumulative net position after paying the fix and the survey. The solid line holds today’s central gas price flat; the dashed line follows the forward (futures) curve (40.4 → 35.8 → 27.1 HUF/kWh), which is not a forecast but today’s market pricing. The band between the lines is a realistic lower and upper bound.



The numbers

	A items	All 13
Fix (central)	1,600,000	8,900,000
Survey (list price)	489,000	489,000
Saving per year (central)	1,700,000	2,700,000
5 years, flat price	6,200,000	4,300,000
5 years, forward curve	4,300,000	1,300,000
Worst case (5 years, fix + survey)	1,400,000	-9,100,000

HUF, net. The worst case assumes a high fix cost and a low gas price at the same time.

What to read from it

- ✓ The quick package (A) is profitable within five years even in the worst case; the full list is not, so the C items do not pay back on their own.
- ✓ The value of the package rests mainly on three items – ask for quotes on those first.
- ✓ The survey price is the list price of the 3D package (HUF 489,000 + VAT); in the pilot programme HUF 275,000 + VAT for the first 10 facilities (in exchange for written consent to an anonymised case study). The survey itself saves no energy.
- ✓ Savings appear only if the fixes are carried out and operation stays as is.

8

Assumptions and price basis

Energy and weather

Net marginal gas price (low / central / high)	32.1 / 40.4 / 56.9 HUF/invoice-kWh
	≈ 338 / 425 / 599 HUF/m ³ · 9 October 2026
Forward price path, 5 seasons	40.4 / 35.8 / 27.1 / 27.1 / 27.1
Gas: 1 m ³	10.52 invoice-kWh (34.2 MJ/m ³ , to be taken from the invoice)
Heating degree-days (HDD)	2,161 K·day (16/12 °C, Nyíregyháza, ERA5, 11 seasons)
Heated-time fraction	0.85 (night / weekend set-back)
Efficiency (radiant tubes, NCV)	0.80 (0.72–0.88)
CO ₂ factor	0.202 kg/kWh

Defect model

U-value of wet insulation	2.5 (1.5–3.5) W/m ² K, intact panel 0.35
Linear thermal bridge ψ	0.35 (0.10–0.80) W/mK, as designed 0.10
Air gap: orifice equation	$C_d = 0.6$; wind 2.5 m/s × ΔC_p 0.4; stack: 0.8-H
Pressure difference across the building	≈ 3.9 Pa
Dock gap active / door gap (closed)	25 % / 97 %
Baseline leakage q50	6 m ³ /(h·m ²)

Fix unit prices (indicative, net)

Item	Central	Range	
Dock seal pad / curtain repair, per dock	300,000	150,000–600,000	assumption
Dock leveler pit seal	150,000	80,000–300,000	assumption
Sectional door seal set (bottom, sides, top)	90,000	40,000–180,000	assumption
Panel joint resealing per m (incl. lift access)	4,500	2,500–8,000	assumption
Roof skylight seal, each	120,000	60,000–250,000	assumption
Insulation patch / PU foam per m2 (open, dry, fill, close)	22,000	12,000–40,000	assumption
Thermal-bridge remediation (insulation strip + cladding) per m	15,000	8,000–30,000	own assumption

No Hungarian price list was available; the cost bands are quote-based assumptions built from the labour-rate floor and typical material prices. The actual price depends on the contractor.

Survey price (net)

3D package, 2,400 m ²	489,000 HUF (list price)
Pilot programme (first 10 facilities)	275,000 HUF
Travel (zone 1, up to 40 km)	free
ÁFA	27% – reclaimable by a business

Prices follow research/pricing.json; the real quote is fixed on the order form.

The full calculation method, with sources and uncertainty analysis: “Heat-loss worked examples 2026” (heat-loss-worked-examples-2026-en.pdf).

9 What this report is not

What this report is and is not

This report is an engineering assessment based on a thermal-imaging survey with supplementary visual (RGB and, where agreed, drone) data. Its purpose is to locate, rank and estimate the cost impact of heat losses and thermal irregularities. Savings and payback figures are estimates based on stated assumptions and are not commitments.

The survey is **not** an accredited or certified inspection and is **not** an energy performance certificate, a statutory energy audit or energy-specialist (szakreferens) service, an electrical safety inspection, a fire-safety inspection, a building-expert or court-expert opinion, or structural, design or technical-supervision work. It does not replace compliance with any statutory obligation; those tasks are performed by professionals authorised under Hungarian law and serve different purposes.

The method draws on the principles of recognised standards (e.g. ISO 6781); this is a methodological reference, not a declaration of conformity. Results reflect the weather and operating conditions at the time of measurement and do not guarantee that hidden defects will be found.

- Not design, construction or technical supervision: involve design and contractor expertise before any works. We accept no commission from contractors. **[confirm]**
- No guaranteed savings: the HUF values are model estimates with a range.
- Electrical-cabinet screening (if ordered) is an early warning, not a safety inspection.

10 The delivered data package

File / folder	Content
01-elemzo-jelentes.pdf	This document.
02-3d-hotterkep/	Interactive 3D heat map: a browser link and an offline HTML copy; findings numbered on the model.
03-intezkedesi-terv.xlsx / .pdf	The table on page 11 in editable form, with formulas.
04-leletek/	Per finding a PNG (thermal + visual) and a CSV: 3D coordinate, W/K, kWh, m ³ , HUF, fix, priority.
05-nyers-fajlok/	The original image files containing temperature data.
06-latvanyfotok/	The visual (RGB) photographs.
07-meresi-naplo.pdf	Conditions, instrument settings, weather, accompanying notes.
08-szamitasi-alapok.json	Inputs and assumptions of the calculation: reproducible.
MANIFEST.sha256	The SHA-256 hash of every delivered file.

SHA-256 manifest – what for?

The MANIFEST.sha256 lists the name and SHA-256 hash of every delivered file, so you can check at any time that a file has not changed since delivery. The manifest is not a digital signature and not a timestamp.

How to verify

```
shasum -a 256 -c MANIFEST.sha256      # macOS/Linux
certutil -hashfile <file> SHA256      # Windows
```

The hashes are created at delivery; there are no real files in this sample.

11

Approval

Role	What it covers	Name	Signature, date
Field thermographer	The on-site survey, the images and the field log.	[name]	[signature] · [date]
Approving engineer	Engineering check of the findings, calculations and recommendations before release.	[name]	[signature] · [date]

The names are intentionally blank in this sample. The approval is an internal HőKép3D quality-assurance step; it is not an official, accredited or certified approval and does not replace any procedure that requires statutory authorisation.

DOCUMENT

MINTA-RPT-001 · v1.0
Issued: 2 Dec 2026 (example value)
Prices: 9 October 2026

CONTACT

HőKép3D · info@hokep3d.hu · [+36 ...]
[company name] · [seat] · [tax no.]

12

Glossary

ΔT	Temperature difference (inside–outside, or between a finding and its surroundings), in kelvin.
W/K (H)	Heat-loss coefficient: watts lost per kelvin of temperature difference.
HDD	Heating degree-days (K·day): the “coldness” of a season for a given indoor / balance temperature.
Invoice-kWh	The energy unit on the gas invoice (MJ ÷ 3.2504); 10.8% more than NCV-based kWh.
U-value	Thermal transmittance, W/m²K: heat loss of a construction per unit area.
ψ	Linear thermal-bridge coefficient, W/mK.
Thermal bridge	A part of the construction where heat escapes more readily than around it (e.g. steel column, ring beam).
Dock-leveler pit	The pit of the loading bridge (dock leveler) behind a dock door.
Sectional door	An industrial door made of horizontal sections that rolls upwards.
Confidence	How sure we are about a finding: High / Medium / Low (see the note on the finding cards).
Simple payback	Fix cost ÷ annual saving; no interest or price change.
Stack effect	Warm air rises, so it leaves through high gaps and is replaced through low ones.

Engineering thermal-imaging survey – not an accredited or certified inspection. It does not replace an energy performance certificate, a statutory energy audit, mandatory electrical-safety or fire-safety inspections; those are carried out by professionals authorised under Hungarian law.