Project no.: **768576**

Project full title: **Residential Retrofit assessment platform and demonstrations for near zero energy and CO2 emissions with optimum cost, health, comfort and environmental quality**

Project Acronym: **ReCO2ST**

Deliverable no.: **D2.3-Appendix**

Title of the deliverable: **Appendix_Project refurbishment scenarios**

Contractual Date of Delivery to the CEC:	**31.12.2018**
Actual Date of Delivery to the CEC:	
Organisation name of lead contractor for this deliverable:	**AAU**
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Participants(s):	**P1 - Aalborg University** **P2 – Brunel University** **P4 – University of Cadiz** **P5 - Estia**
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Deliverable type:	**Public**
Version:	
Total number of pages:	
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DENMARK

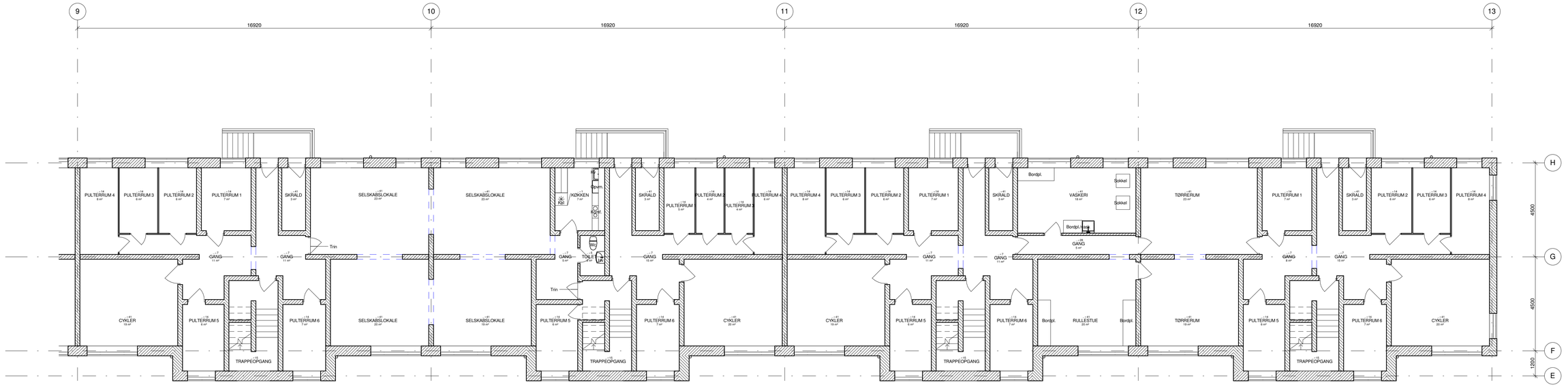
The list of the following documents is provided as supplement to the Deliverable 2.3.

A. ARCHITECTURAL DRAWINGS BEFORE RENOVATION
B. EXISTING BUILDING ELEMENTS AND U-VALUES
C. EPQR REPORT
D. BLOWER DOOR TEST AND THERMAL IMAGING REPORT

A. Architectural drawings before renovation

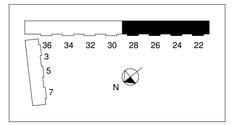
The list of architectural drawings include floor plans, façade and section drawings. The layout is the same for all apartments, therefore only a set of representative drawings is provided.

The included drawings consist of the original drawings from 1945 and a newer version, which was made in 2016, by ARKINORD, when NIRAS A/S was hired to make an analysis of the existing condition of the buildings. The new drawings are taken from a 3-D model, built based on the original architectural drawings.



EKSISTERENDE FORHOLD
KÆLDERPLAN, DEL 1
PETER MØLLERS GADE

E110.1



Ansvarsforbehold ved udsendelse af digitale tegninger :
Videre anvendelse af fremsendte digitale tegninger, herunder også
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PDF-tegninger og sheets i Revit-modellen er ALTID de gældende. DWG tegninger konverteret fra Revit, samt views, objekter og udtræk fra RVT/IFC-model anvendes på modtagers ansvar og risiko.

Arkitektfirmaet ARKINORD A/S forbeholder sig i h.t. ABR 89 ophavsretten til tegningerne.

FORELØBIGT TRYK
06.09.2016

Frederikshavn Boligforening

Vinkelgaarden - Vinkelvej og Peter Møllers Gade

Eksisterende forhold

Kælderplan - del 1

Sag nr.: 16-093	Udarb.: ns
Dato: xx.xx.2016	Kontrol.: fs
Mål: 1 : 100	Godkendt: fs
Tegn. fil.:	Vinkelgaarden
Tegn. nr.:	**E110.1**

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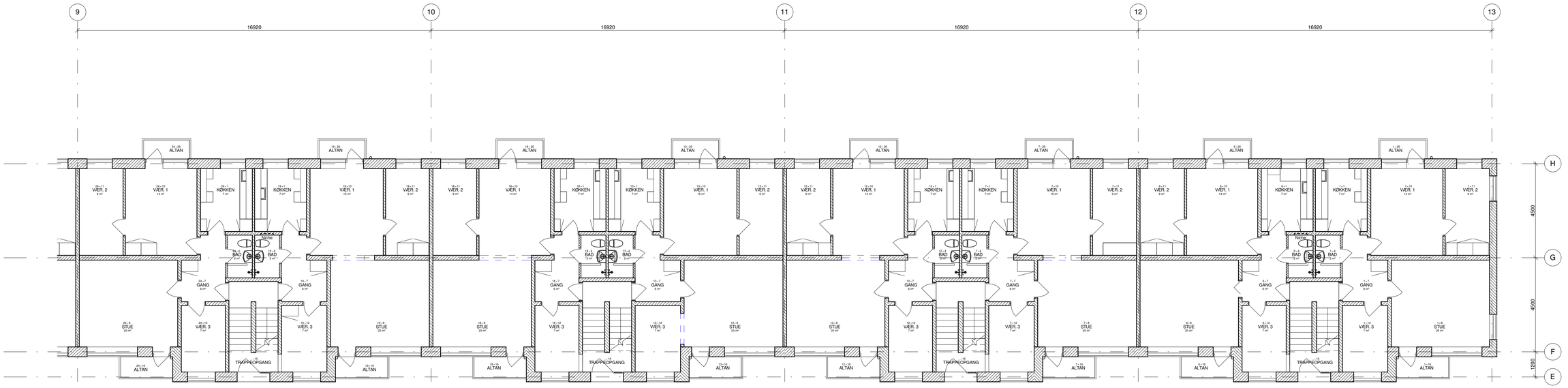
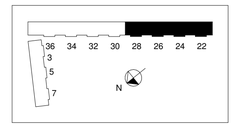


E111.1

EKSISTERENDE FORHOLD
STUEPLAN, DEL 1
PETER MØLLERS GADE



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FORELØBIGT TRYK
12.09.2016

Frederikshavn Boligforening
Vinkelgaarden - Vinkelvej og Peter Møllers Gade

Eksisterende forhold
Stueplan - del 1

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Dato: xx.xx.2016	Kontrol.: fs
Mål: 1 : 100	Godkendt: fs
Tegn. fil.: Vinkelgaarden	
Tegn. nr.: **E111.1**	

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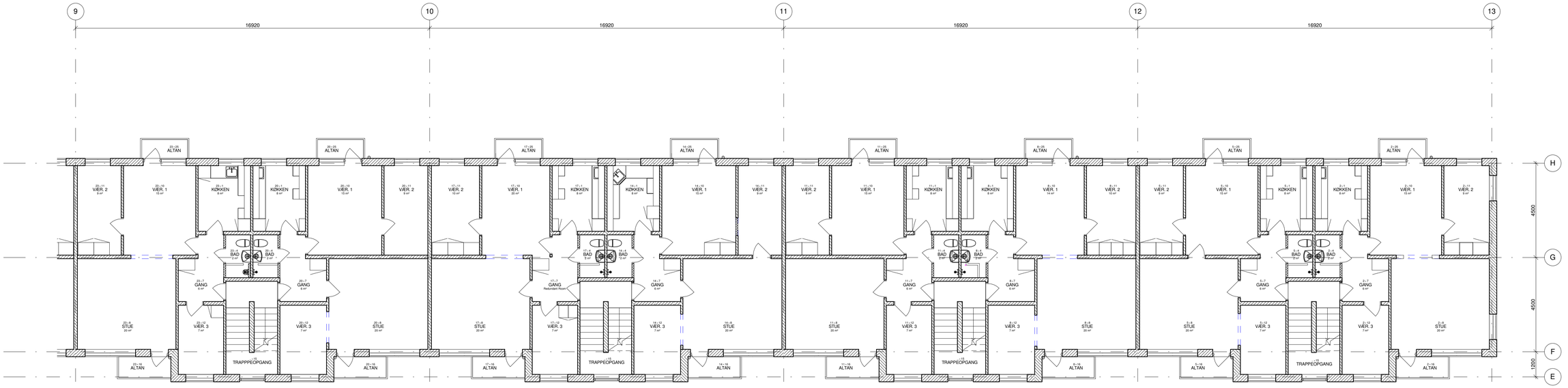
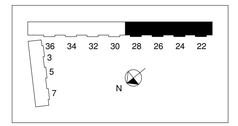


E112.1

EKSISTERENDE FORHOLD
1. SALSPLAN, DEL 1
PETER MØLLERS GADE



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FORELØBIGT TRYK
14.09.2016

Frederikshavn Boligforening
Vinkelgaarden - Vinkelvej og Peter Møllers Gade

Eksisterende forhold
1. salsplan - del 1

Sag nr.: 16-093	Udarb.: ns
Dato: xx.xx.2016	Kontrol: fs
Mål: 1 : 100	Godkendt: fs
Tegn. fil.: Vinkelgaarden	
Tegn. nr.: **E112.1**	

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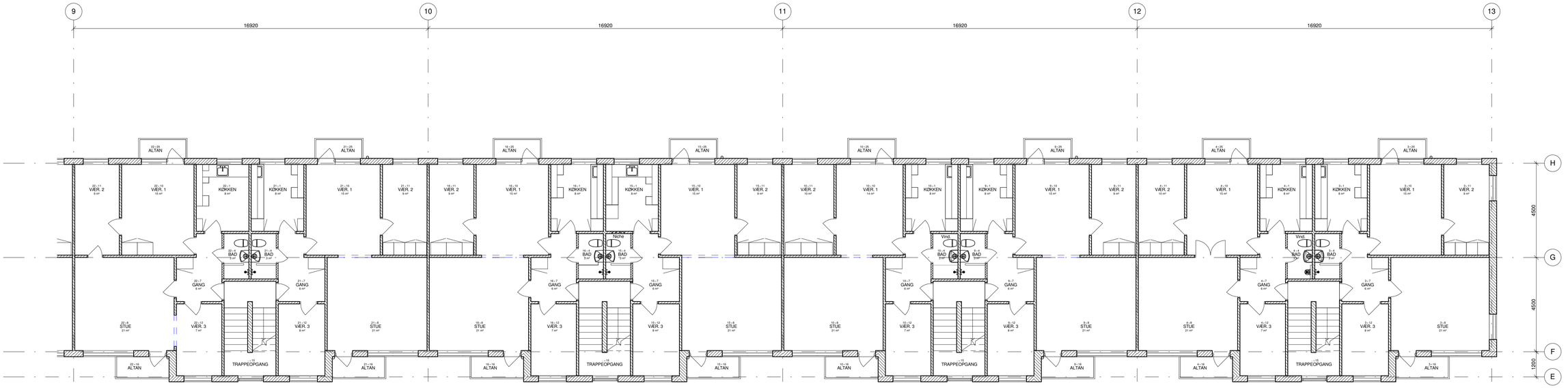

EKSISTERENDE FORHOLD
2. SALSPLAN, DEL 1
PETER MØLLERS GADE

E113.1



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FORELØBIGT TRYK
19.09.2016

Frederikshavn Boligforening
Vinkelgaarden - Vinkelvej og Peter Møllers Gade

Eksisterende forhold
2. salsplan - del 1

Sag nr.: 16-093	Udarb.: ns
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Tegn. fil.: Vinkelgaarden	
Tegn. nr.: **E113.1**	

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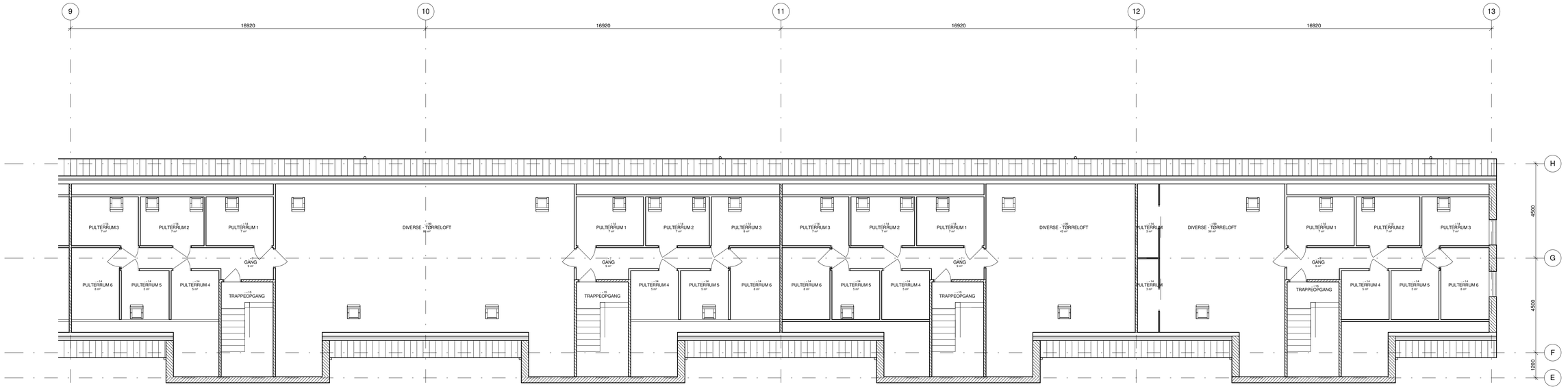
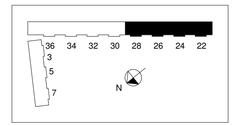


EKSISTERENDE FORHOLD
TAGETAGEPLAN, DEL 1
PETER MØLLERS GADE

E114.1



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FORELØBIGT TRYK
22.09.2016

Frederikshavn Boligforening

Vinkelgaarden - Vinkelvej og Peter Møllers Gade

Eksisterende forhold
Tagetageplan - del 1

Sag nr.: 16-093	Udarb: ns
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Mål: 1 : 100	Godkendt: fs
Tegn. fil.: Vinkelgaarden	
Tegn. nr.: **E114.1**	

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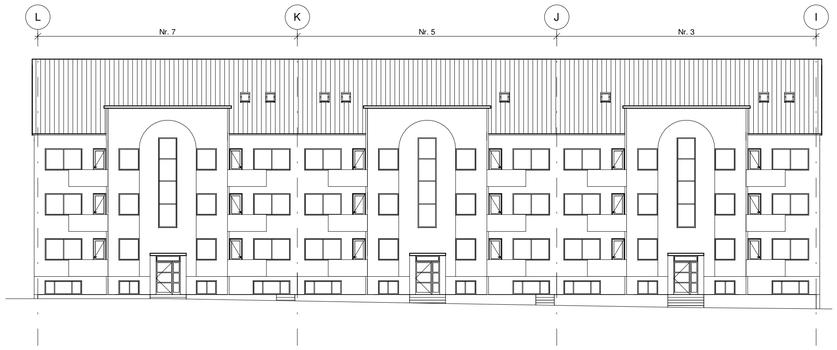
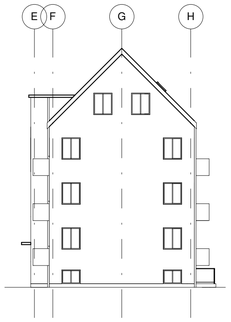
FACADE MOD VEST
PETER MØLLERS GADE



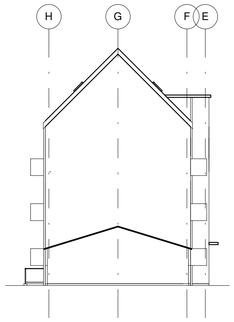
FACADE MOD ØST
PETER MØLLERS GADE



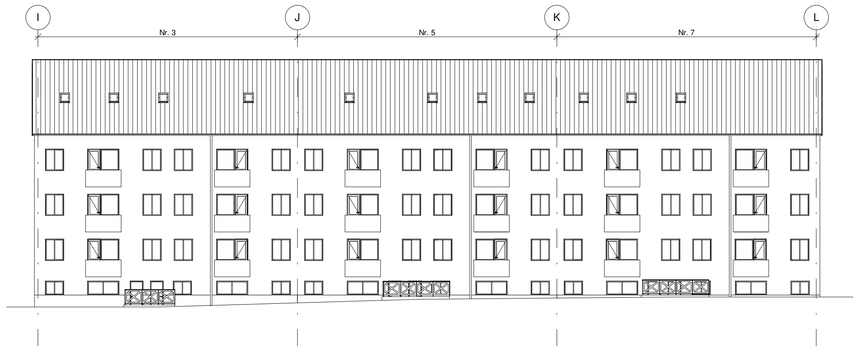
FACADE MOD SYD
VINKELVEJ



GAVL MOD SYD
PETER MØLLERS GADE



GAVL MOD NORD
PETER MØLLERS GADE



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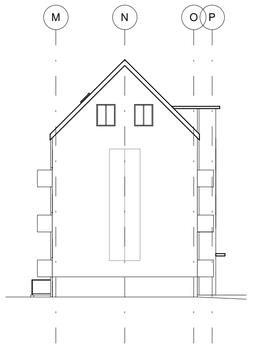

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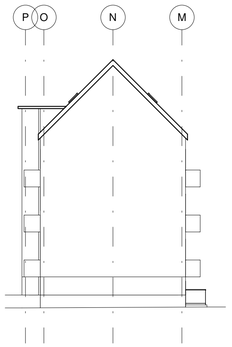

GAVL MOD ØST
VINKELVEJ

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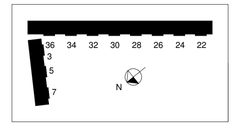

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FORELØBIGT TRYK
16.11.2016

Frederikshavn Boligforening

Vinkelgaarden - Vinkelvej og Peter Møllers Gade

Eksisterende forhold

Facader

Sag nr.: 16-093	Udarb: ns
Dato: xx.xx.2016	Kontrol: fs
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Tegn. fil.: Vinkelgaarden	
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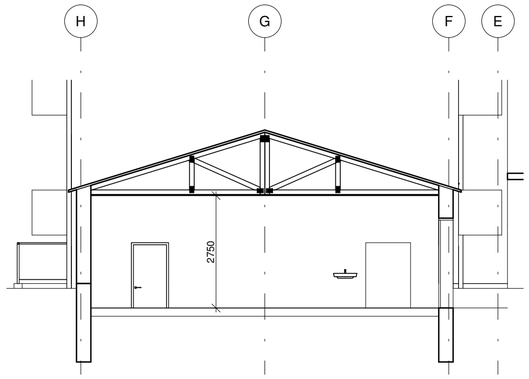
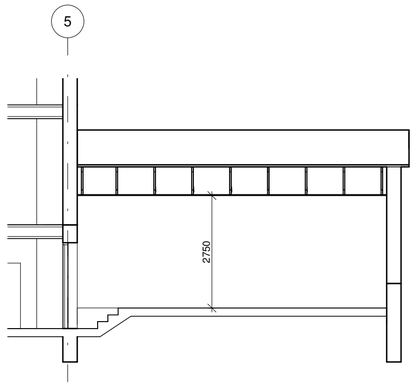
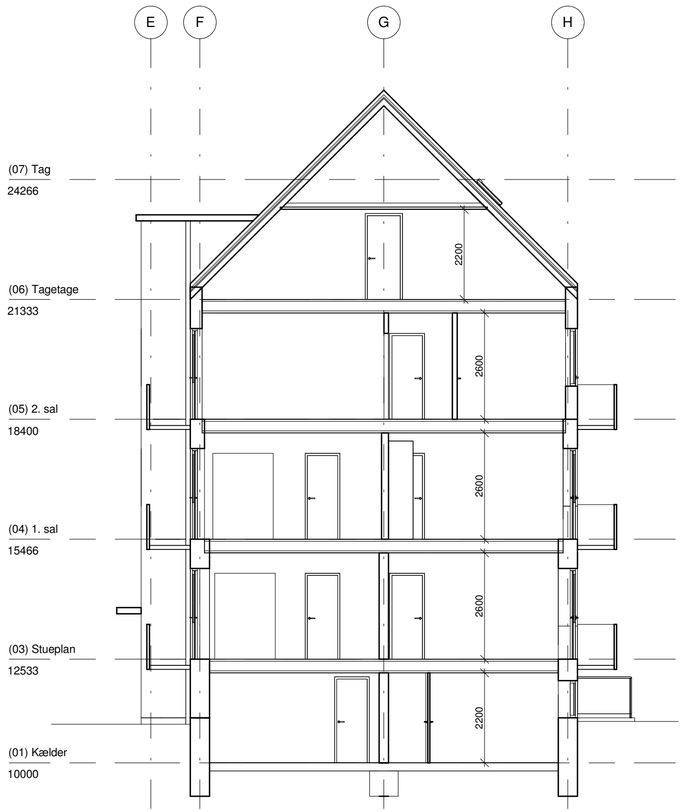


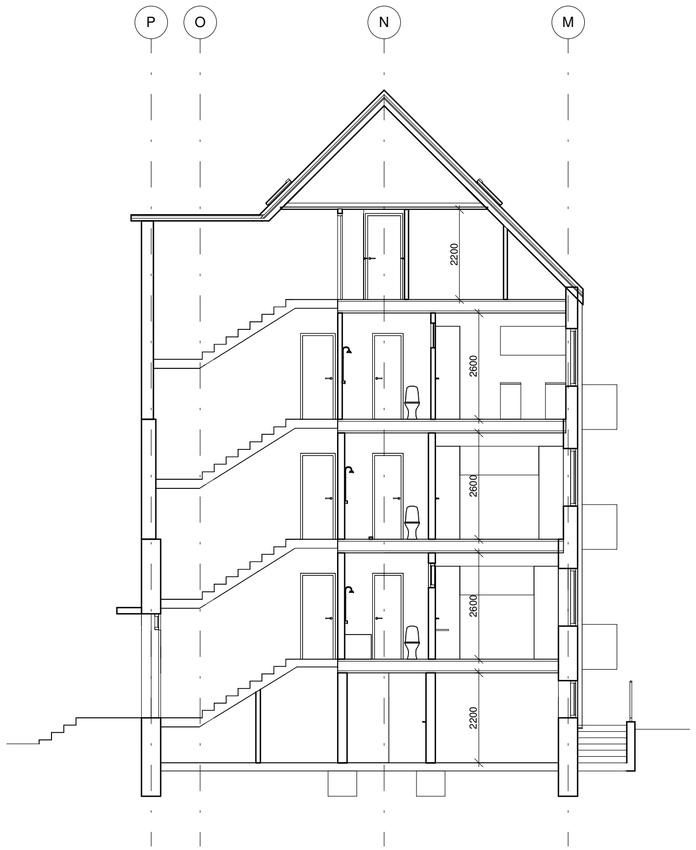
EKSIST. SNIT B-B
PETER MØLLERS GADE



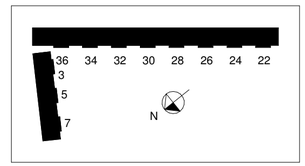
EKSIST. SNIT C-C
PETER MØLLERS GADE



EKSIST. SNIT A-A
PETER MØLLERS GADE



EKSIST. SNIT D-D
VINKELVEJ



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FORELØBIGT TRYK
23.09.2016

Frederikshavn Boligforening

Vinkelgaarden - Vinkelvej og Peter Møllers Gade

Eksisterende forhold
Snit A-A, B-B, C-C OG D-D

Sag nr.: 16-093	Udarb.: ns
Dato: xx.xx.2016	Kontrol: fs
Mål: 1 : 100	Godkendt: fs
Tegn. fil.: Vinkelgaarden	
Tegn. nr.: **E300**	

●	Arkitekt	ARKINORD A|S	Havnepladsen 5B 9900 Frederikshavn www.arkinord.dk	Tlf. 9922 3200 Fax. 9842 0850 Info@arkinord.dk
○	Ingeniør	NIRAS Rådgivende Ingeniører og planlæggere A/S Tilsluttet F.R.I	Silovej 8, 4 Sal 9900 Frederikshavn www.niras.dk	Tlf. 9942 0700 Fax. 9842 5252 fhj@niras.dk
○	Ingeniør	BRIX & KAMP A/S RÅDGIVENDE INGENIØRER Rådgivende Ingeniører og planlæggere A/S Tilsluttet F.R.I	Nørrebro 11 9800 Hjørring www.brixkamp.dk	Tlf. 9892 2888 hj@brixkamp.dk

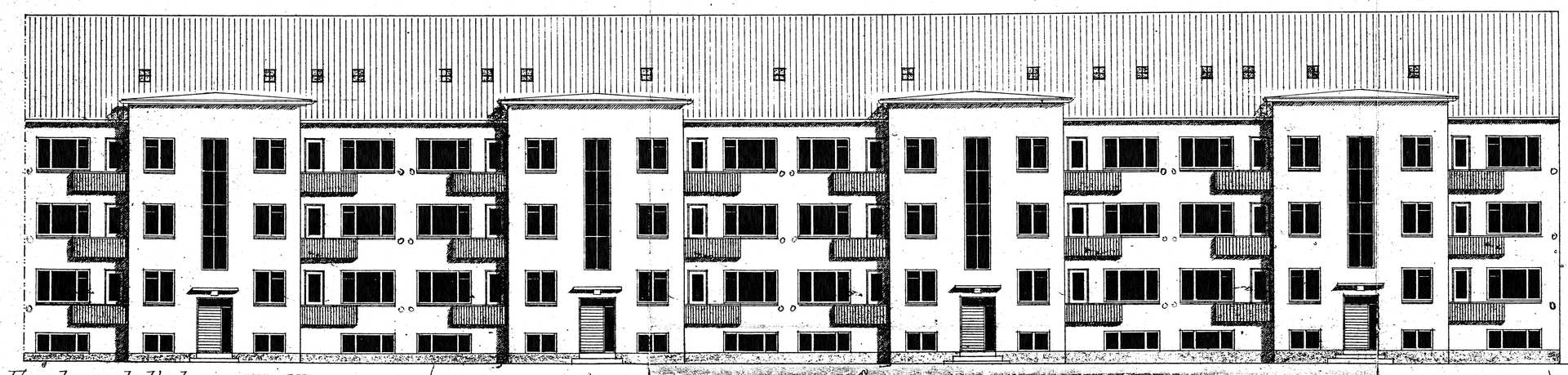
2. „Frederikshavns Boligforening af 1945." 103-1945/46.

2.° 103-1945/46.

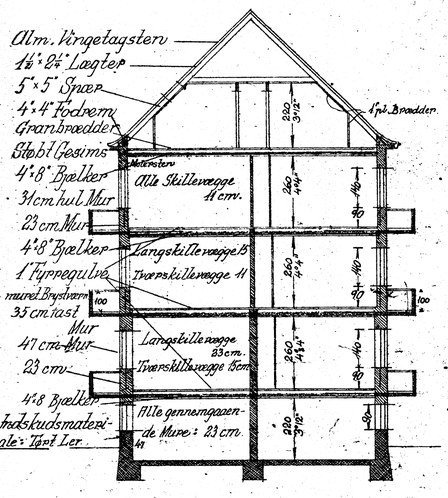
Sydlige Halvdel af Hovedhøjen.

1:100.

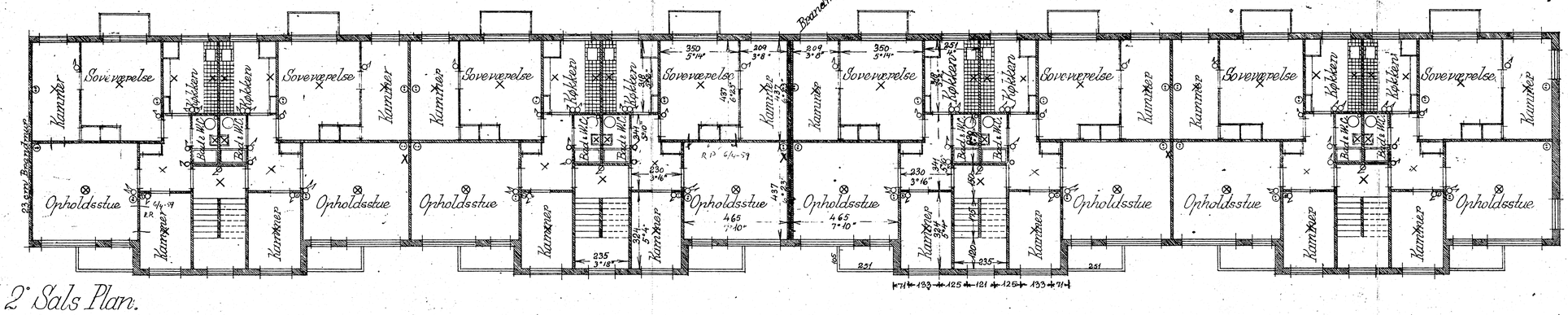
cm 100 0 1 2 3 4 5 6 7 8 9 10 20 30 Meter.



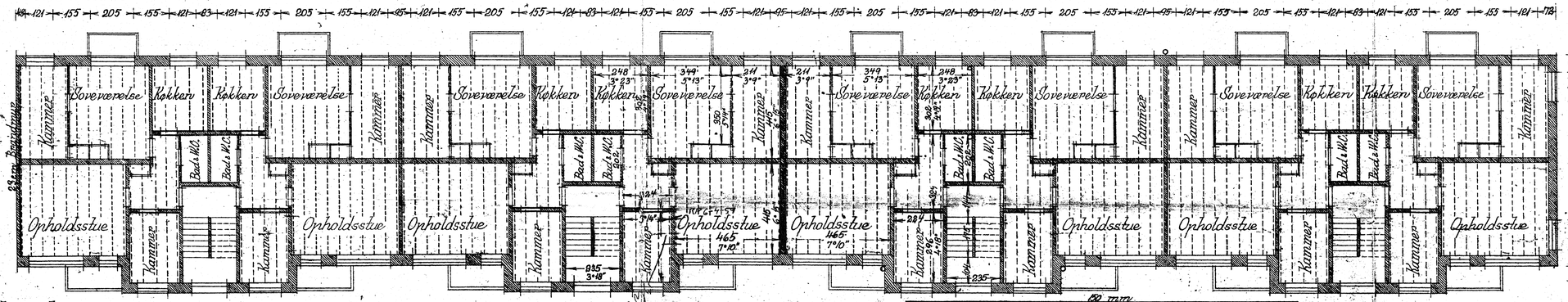
Facade mod Vest.



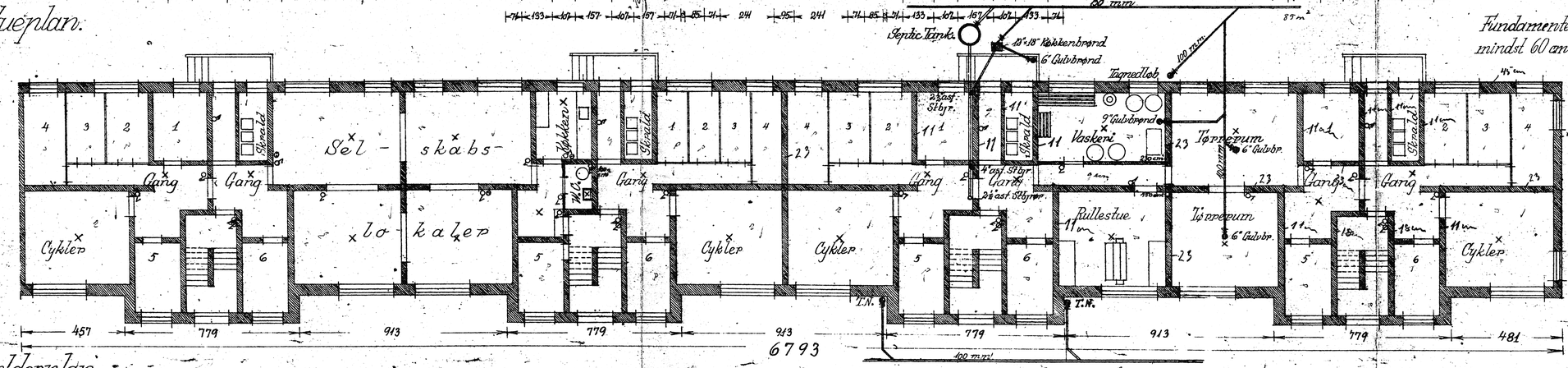
Snit.



2. Sals Plan.

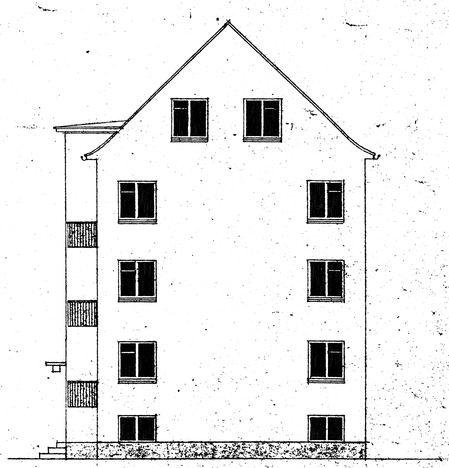


Stueplan.



Kældenplan.

Fundamenter for udv. Kældertrappe og Vanger mindst 60 cm under Kældergulv.



Gavl mod Syd.

9/12-47. Nærværende Attest vil kun have Gyldighed, saafremt Ombygningen i Kælderen er udført som paaskrevet paa Tegningen med Afstand og at Tværskillevæggene for rummene saaledes, der ikke er indtegnet Døre er udført som beyggeanmeldte Plaader. 103-1945/46.

Bygningsinspekteren
Frederikshavn

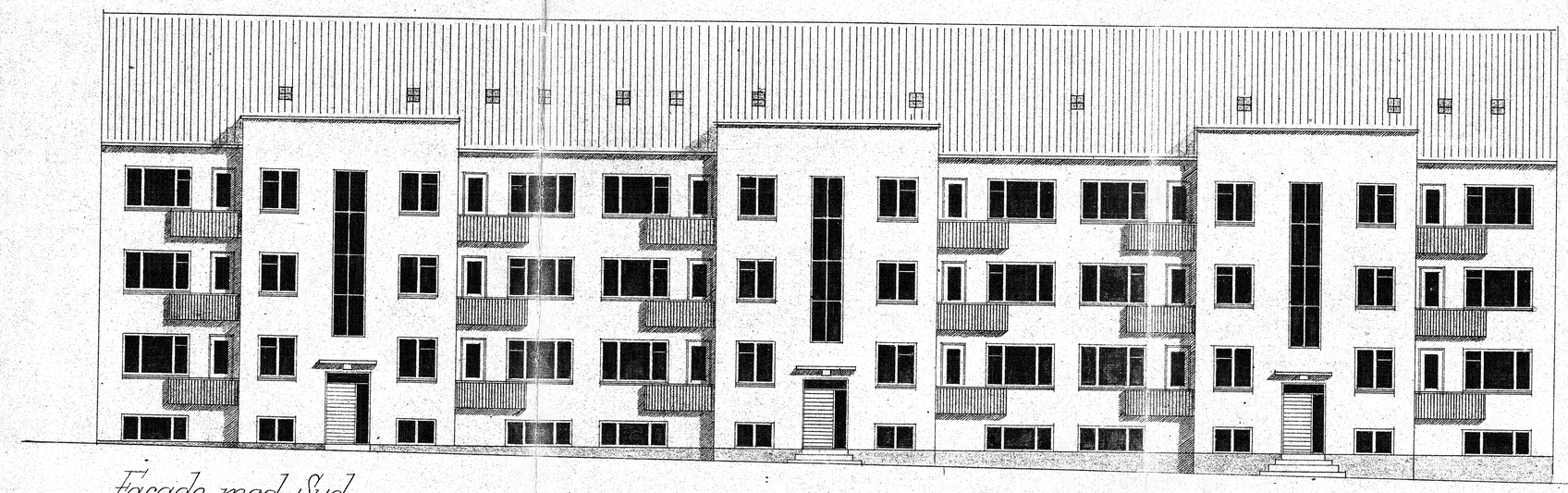
Frederikshavn, i December 1945
Kersen P. Lund

3. „Frederikshavns Boligforening af 1945."

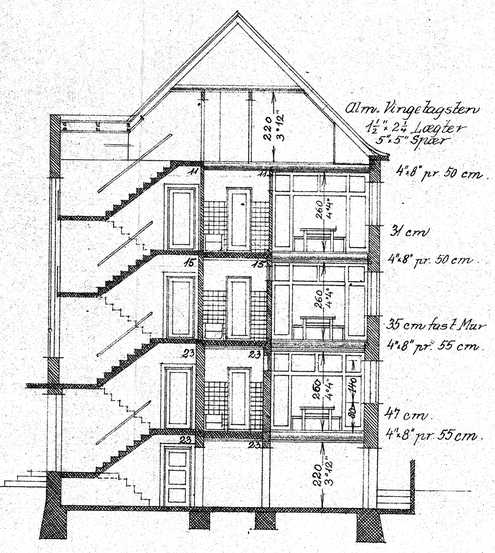
Nordlige Fløj – 18 Lejligheder.

Frederikshavn, i Decbr. 1945.

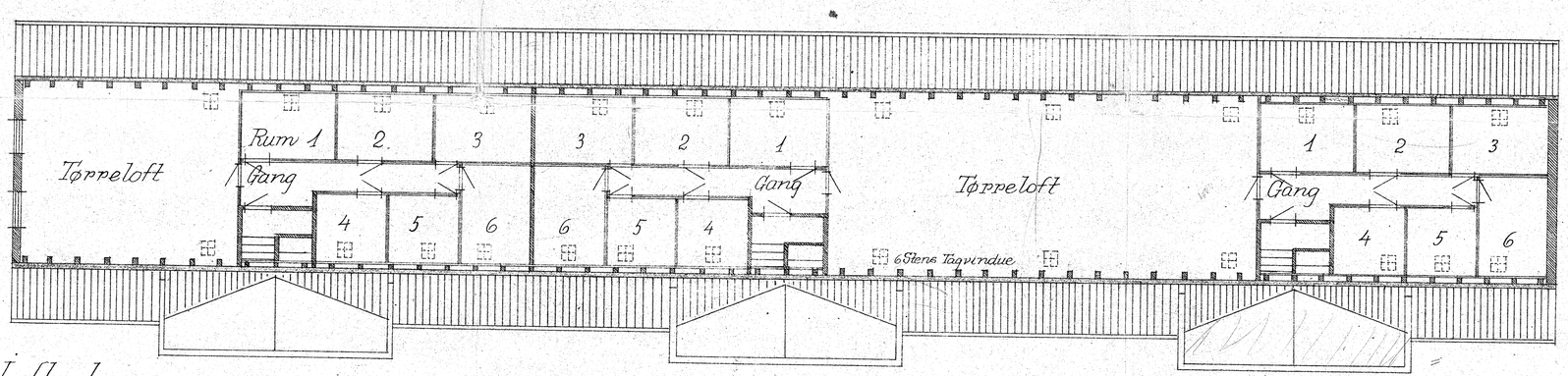
Harald S. Lind



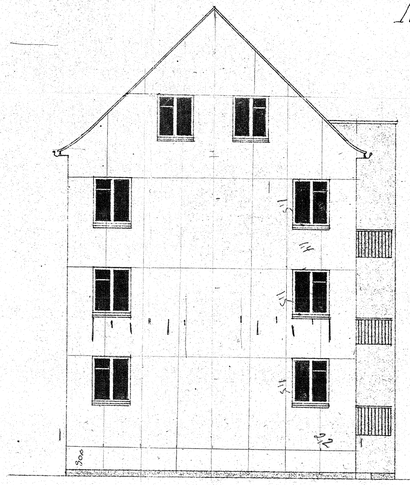
Facade mod Syd.



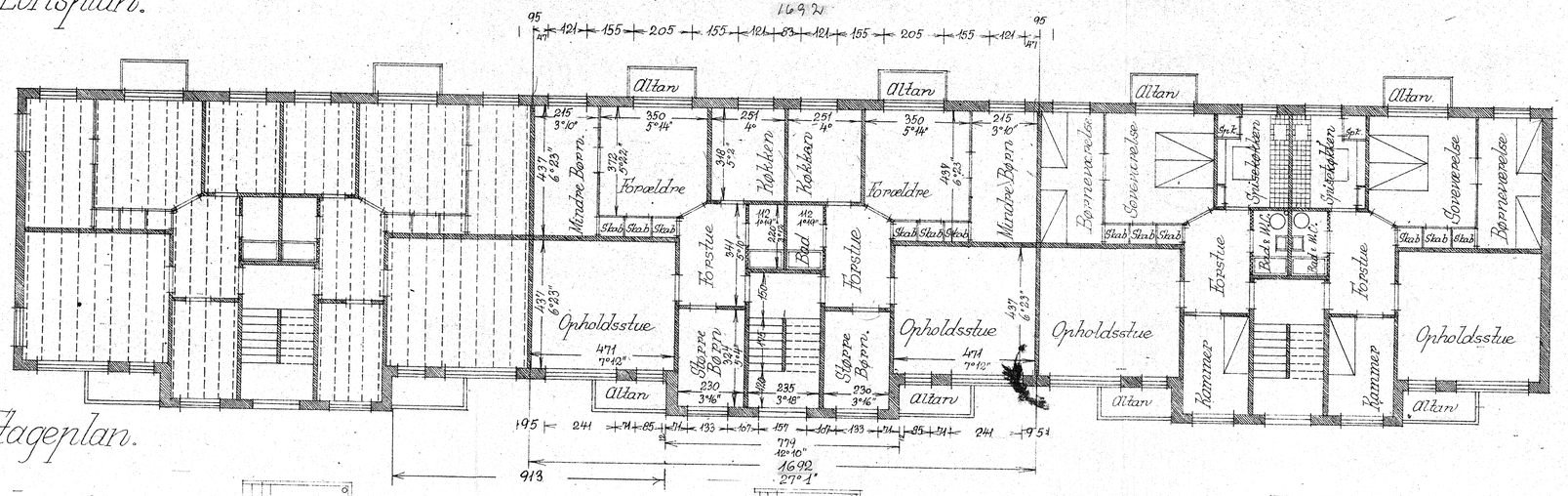
Tværsnit



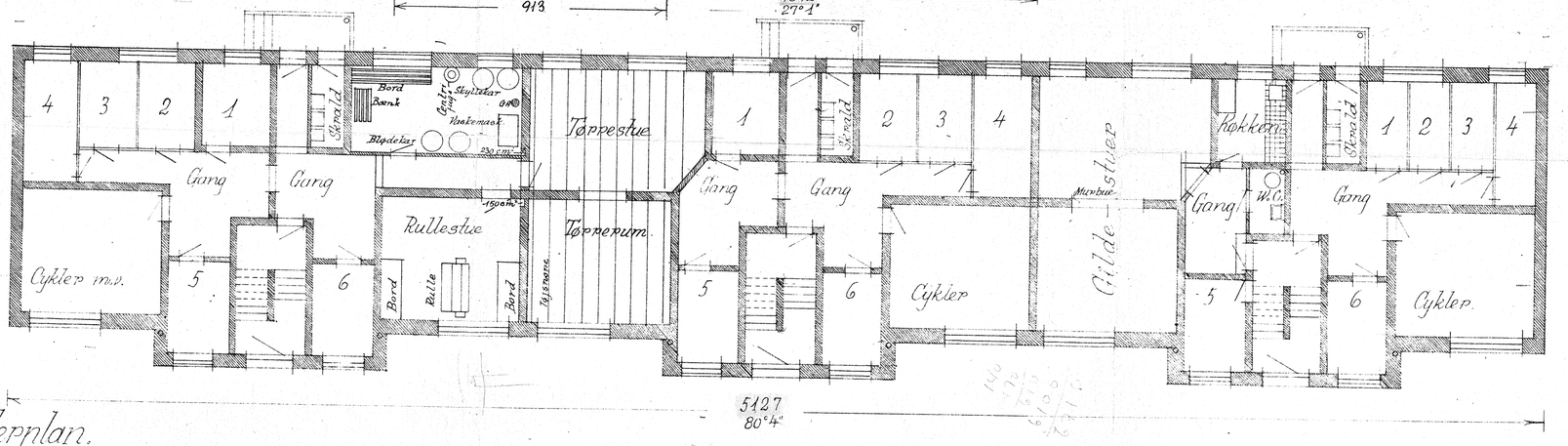
Loftsplan.



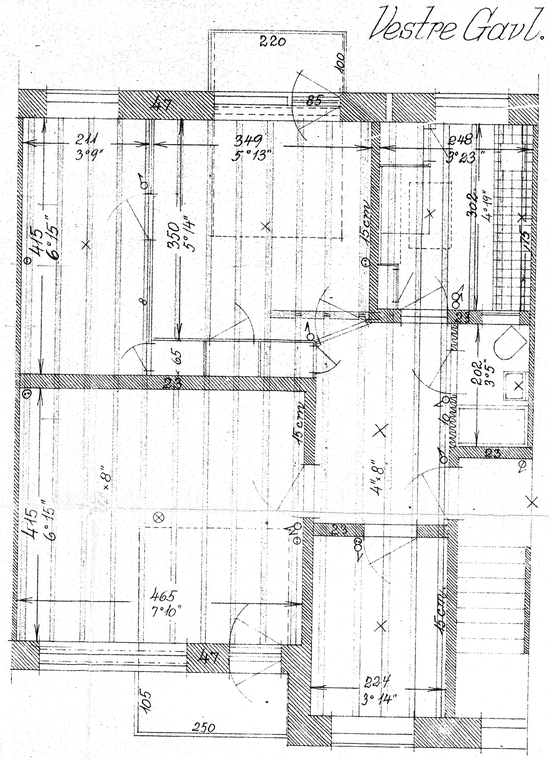
Vestre Gavl.



Etageplan.



Kælderplan.



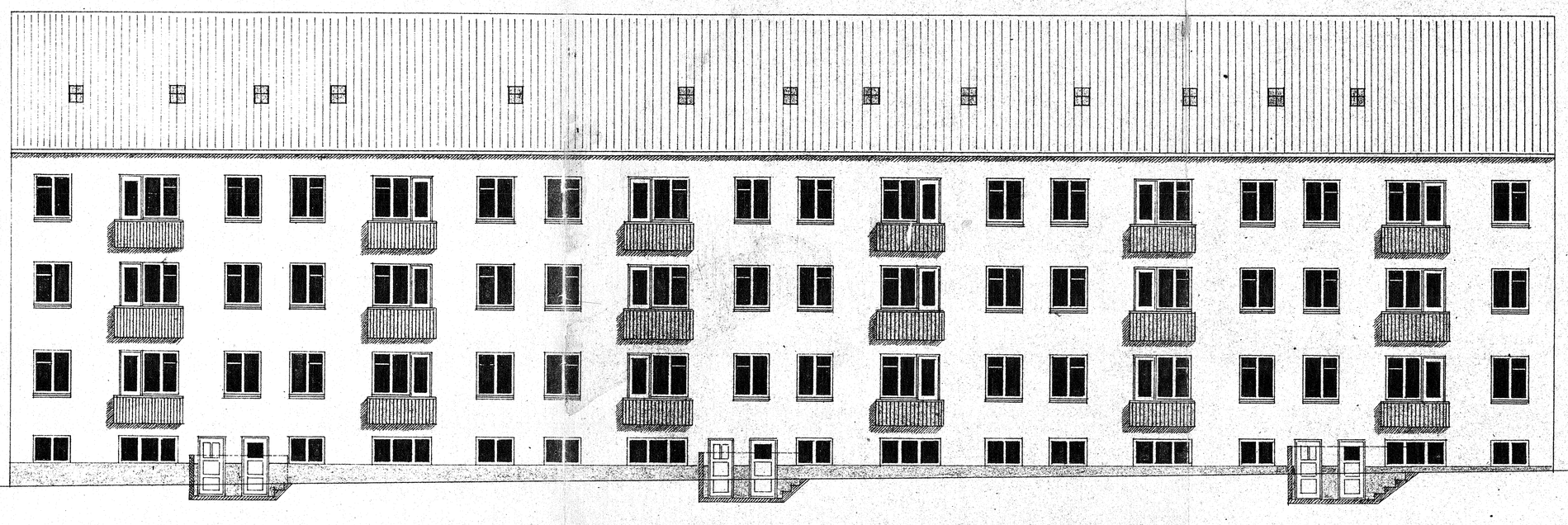
Stueplan 1:50.

1:100

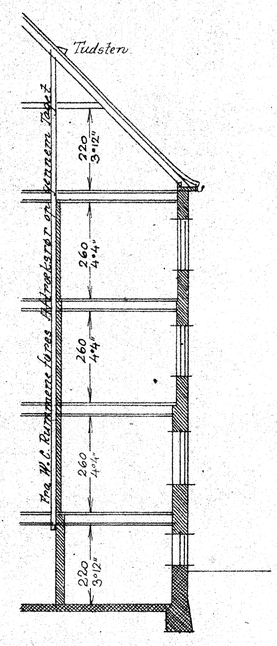
4.

„Frederikshavns Boligforening af 1945".

Bagside og Enkeltheder.

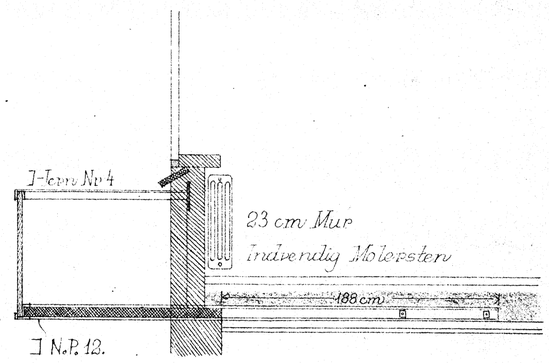


Bagside (mod Nord-Øst.)



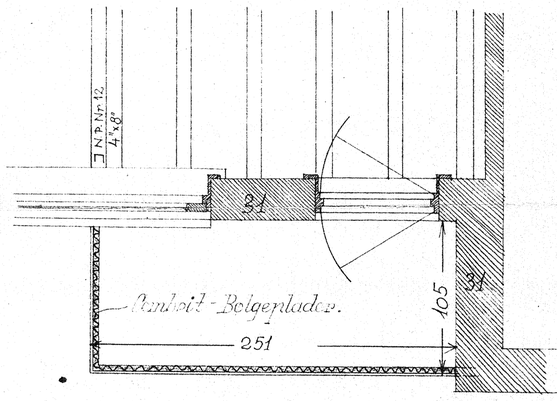
Over alle Muraabninger i Bagsiden: Indvendig Træoverliggere (5"×5" og 7"×7").

Altan, Detail 1:25.

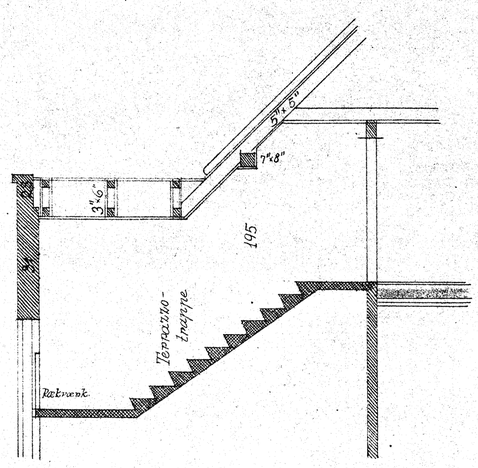


8 mm tyk Betonplade 1:2:4, Rundjern 8 mm.
Underlagsplade 10 × 15 cm.

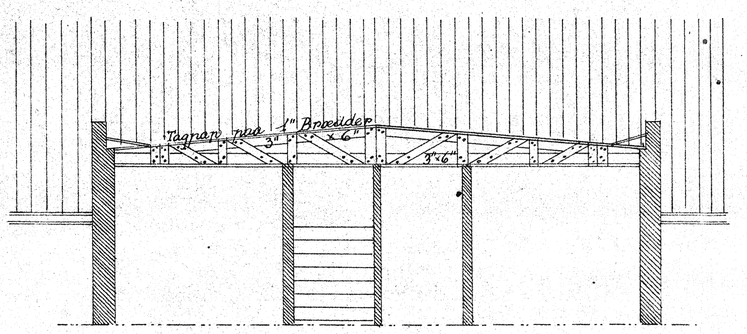
Lodret Snit.



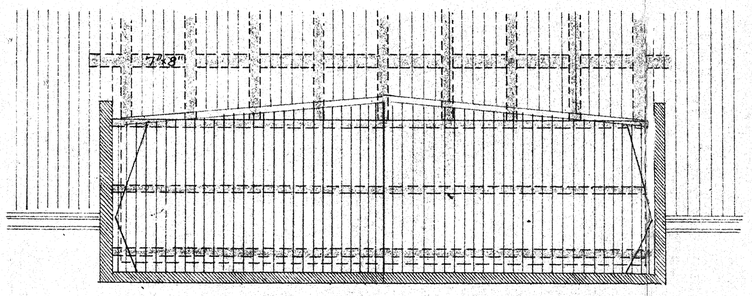
Vandret Snit.



Trappeparti (Loftstrappe) 1:50.



Parallelt Snit.



Inddeling af Tagværk

1:100 cm 100 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 m.

B. Existing building elements and U-values

The U-values of the building elements have been manually calculated based on the element construction taken from provided documents, drawings and on-site observations.

Building characteristic

Building

Address :	Peter Møllers gade 3-7 9900 Frederikshavn
Land register :	
Insurence policy :	
Construction date :	
Owner :	Frederikshvn Boligforening
Caretaker :	
Phone :	

Mandate

Company :	Frederikshavn Boligforeining
Address :	Herald Luns Gade 15 9900 Frederikshavn
Responsable :	Inspektør
Phone 1 :	004596201940
Phone 2 :	
Fax :	

Dimentional Coefficient

Surface of exterior developed areas :	6145	m²
Built area :	1950	m²
Number of internal staircases :	11	U
Floor area :	9344.96	m²
Facade surface area :	4674	m²
Number of exterior doors :	33	U
Number of roof openings :	73	U
Energy reference area :	5250	m²
Number of appartments :	66	U
Floor area of apartments :	85	m²

Complexity Coefficient, Cost Index and Engineering Fees

Size of Building :	100 %	Construction price index :	100 %
Working Conditions :	100 %	Fees :	0 %
Access :	100 %	VAT :	0 %
Complexity Coefficient :	1	Various and unforeseen :	0 %

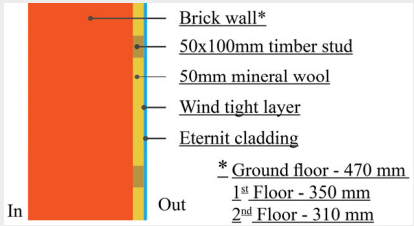
Commentary

ENVELOPE ELEMENTS AND THERMAL CHARACTERISTICS

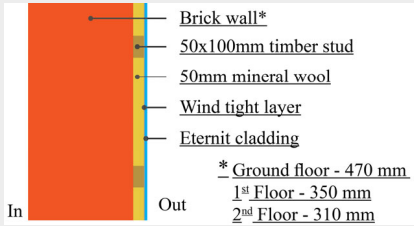
- External wall 1: Basement → U-value (W/m^2K) **0.59**

Description	Details: section's sketch of constructive element	Picture
- Plaster finish - 470mm Brick		

- External wall 2: Ground floor → U-value (W/m^2K) **0.54**

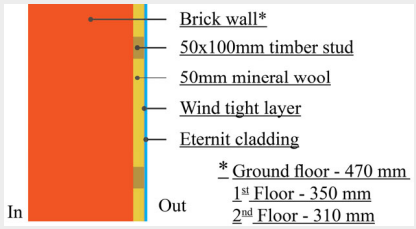
Description	Details: section's sketch of constructive element	Picture
- Plaster finish - 470mm Brick - Insulation/timber battens - Eternit finish		

- External wall 3: First floor → U-value (W/m^2K) **0.59**

Description	Details: section's sketch of constructive element	Picture
- Plaster finish - 350mm Brick - Insulation/timber battens - Eternit finish		

External wall 4: Second floor →

U-value (W/m²K)	0.61

Description	Details: section's sketch of constructive element	Picture
- Plaster finish - 310mm Brick - Insulation/timber battens - Eternit finish		

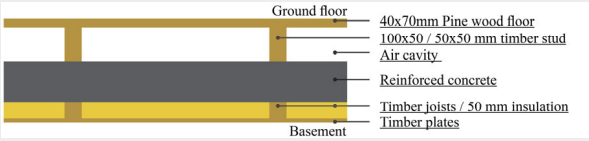
- Basement slab →

U-value (W/m²K)	1.48

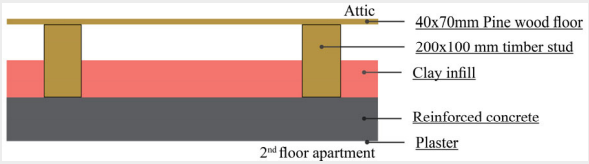
Description	Details: section's sketch of constructive element	Picture
- Reinforced concrete		

- Floor slab (basement/ground slab →

U-value (W/m²K)	1.48

Description	Details: section's sketch of constructive element	Picture
- Wooden floor finish - Timber beams/ Air gap - Reinforced concrete - Insulation/timber battens - Wooden ceiling		 

Roof (2nd floor/attic) → U-value (W/m²K) **0.35**

Description	Details: section's sketch of constructive element	Picture
- timber boards - Timber beams/ Air gap - Timber beams/ Clay infill - Reinforced concrete - Plaster finish		 

- Internal partition → U-value (W/m²K)

Description	Details: section's sketch of constructive element	Picture
- Plaster finish - Brick layer - Plaster finish		

- Window (Type1) → U-value (W/m²K) **2.90** g-value glazing **0.81**

Description	Picture 1	Picture 2
- Double glazed windows - Wooden frame		 Outdoor  Indoor

C. EPQR report

The EPQR report is the energy auditing and evaluation of the building in terms of non-energy related elements, for the buildings' current condition. The analysis is based on site visit. The report was realized using the Swiss tool EPQR.

The grading is done by using 3 type of codes. Codes "a to d" relate to the deterioration stage of each element and the necessary percentage of replacement. Codes "1 to 3" give the priority of replacement, while codes "s, t, u, v" are additional codes related to cost (i.e. necessary amount of insulation higher than building regulations). More specifically:

Codes a to d:	
a	0% replacement
b	>20% replacement
c	>50-60% replacement
d	100% replacement
Codes 1 to 3:	
1	Needs to be changed in the next 5 years
2	Works; should be replaced within the next 10 years
3	It can be replaced, but it is not necessary

Facades

C01-01 External wall

Type 12: Exposed concrete **3 %**

Évaluation de l'état de la surface extérieure de l'enveloppe de façade: décollements, fissures, salissures.

Degradation state ○ a ◉ b ○ c ○ d

Surfaces sales. Joints partiellement dégarnis. Présence localisée de carbonatation.

Necessary Works ◉ 1 ○ 2 ○ 3 ○ 4

Priority I

Poursuite des travaux d'entretien non comptabilisée.





C01-01 External wall

Type 31: Wood or metal frame windows **37 %**

Évaluation du fonctionnement, des surfaces, de la manipulation des fenêtres. Evaluation de l'isolation thermique et phonique, étanchéité à l'air et à l'eau.

Degradation state ○ a ○ b ○ c ◉ d

Toutes les fenêtres sont vétustes et abîmées. Vantaux et cadres dégradés. Fermeture et manipulation difficiles, voire impossibles. Isolation thermique existante insuffisante.

Necessary Works ○ 1 ○ 2 ○ 3 ◉ 4

Priority I

Remplacement complet des fenêtres. Traitement de surface et réfection du joint contre la maçonnerie. Les travaux de remplacement des fenêtres des façades légères doivent être supprimés étant donné qu'ils sont pris en compte dans le type 41 et 42.





Facades

C01-01 External wall



Type 42: Light facade carried between the skeleton **60 %**

Évaluation de l'état des façades légères, isolation thermique et phonique, étanchéité à l'air et à l'eau. Les ouvertures sont comptabilisées à cet élément.

Degradation state ○ a ○ b ◉ c ○ d

Structurally the walls are fine and few of the panel ellements need repait, although the code \c\ is given as the external walls do not comply witrh BR

Necessary Works ○ 1 ○ 2 ◉ 3 ○ 4

Priority I

Remove cladding and the constrution underneath< insulate, make new cladding /external wall.



C01-02 External doors



Type 1: Manual wood or metal doors **100 %**

Évaluation de l'état de surface, du fonctionnement et de la sécurité des portes extérieures.

Degradation state ○ a ○ b ○ c ◉ d

La porte d'entrée ne répond plus aux exigences. Ventail et cadre fortement endommagés. La sécurité à l'effraction n'est plus garantie.

Necessary Works ○ 1 ○ 2 ○ 3 ◉ 4

Priority III



C01-04 Basement windows





Type 1: Basement windows above ground level **100 %**

Évaluation du fonctionnement et de l'état de surface des fenêtres de cave ou du sous-sol.

Degradation state ○ a ○ b ○ c ◉ d

Toutes les fenêtres sont endommagées. Vantaux et cadres dégradés. Manutention difficile et fermeture non assurée.

Necessary Works ○ 1 ○ 2 ○ 3 ◉ 4

Priority III

Remplacement complet des fenêtres de caves et traitement de surface.

C04-02 External wall thermal insulation

Type 1: Absence of thermal insulation **100 %**

Évaluation de l'isolation thermique du composant opaque de la façade, recherche des ponts thermiques, dégâts de condensation, appréciation du confort dans les locaux, etc.

Degradation state ○ a ○ b ○ c ◉ d

La constitution des murs n'est pas satisfaisante du point de vue thermique. La valeur limite SIA (U = 0.25 W/Km2) n'est pas atteinte. Dégâts de condensation et confort insuffisant dans les locaux.

Necessary Works ○ 1 ○ 2 ○ 3 ◉ 4

Priority I

Supplementary Works **Code t**

Isolation thermique compacte d'une épaisseur de 16 cm. Exécution selon les prescriptions minimales (valeur limite SIA: U = 0.25 W/Km2). Il faut supprimer les travaux de finition à l'élément C01-01: Revêtement des murs extérieurs. Contrôler le bilan thermi

Facades

C08-01 Façade scaffoldings



Type 1: Scaffolding and building site **100 %**

Évaluation de la nécessité de la mise en place d'échafaudages et de leur importance.

Degradation state ○ a ○ b ◉ c ○ d

Rénovation ou isolation thermique des façades. Immeuble de grande hauteur. Interventions nécessitant des installations de chantier et des échafaudages.

Necessary Works ○ 1 ○ 2 ◉ 3 ○ 4

Mise en place d'installations de chantier (point d'eau, tableau électrique, roulotte de chantier, etc.) et d'échafaudages (durée du chantier inférieure à 5 mois). Y compris nettoyage des pieds de façade en fin de chantier.

U06-01 Balconies and galleries





Type 1: Concrete / masonry railing **100 %**

Évaluation des salissures, fissures et fixations des balcons et loggias, surface des dalles ainsi que des protections solaires.

Degradation state ○ a ○ b ○ c ◉ d

Nombreuses fissures profondes et éclatements pouvant mettre en péril la sécurité. Décollement complet du revêtement de sol. Évacuation des eaux non assurée. Parties métalliques complètement rouillées et scellements insuffisants. Les protections solaires sont en mauvais état.

Necessary Works ○ 1 ○ 2 ○ 3 ◉ 4

Consultation complémentaire: ingénieur civil. Assainissement de la dalle, remplacement du parapet et des parties métalliques. Nouveau revêtement de sol. Traitement complet de toutes les surfaces. Nouvelle évacuation des eaux. Pose de nouvelles protections

Facades

U13-01 Structure slab-walls

Type 1: Masonry with wooden flooring **100 %**

Évaluation de la structure porteuse: éléments verticaux et horizontaux.

Degradation state ○ a ◉ b ○ c ○ d

Bâtiment avec système porteur en bon état, absence de fissure, de tassement, de fléchissement etc. Conformité antisismique non vérifiée.

Necessary Works ○ 1 ◉ 2 ○ 3 ○ 4

Examen complémentaire: ingénieur civil.
Analyse sommaire de visu sans calculs et rapport sur la suffisance de la structure et sur la conformité antisismique (3 jours de travail). Le montant des travaux de réfection peut être compris dans les éléments concernés.

U13-02 Sourroundings

Type 1: Surroundings - Developed areas **100 %**

Évaluation des abords, surfaces vertes, surfaces en dur, clôtures, installations de boîtes à lettres, des points d'eau et de l'éclairage.

Degradation state ○ a ◉ b ○ c ○ d

Les abords ont besoin d'une remise en état. Les surfaces en dur sont partiellement dégradées.

Necessary Works ○ 1 ◉ 2 ○ 3 ○ 4



Roofs and floors

C02-11 Roof structure





Type 1: Carpentry **100 %**

Évaluation de la solidité des éléments porteurs en bois et des assemblages, de la présence de moisissures ou d'attaques d'insectes.

Degradation state ○ a ◉ b ○ c ○ d

Éléments porteurs en bon état. Bois sain, traces d'attaque d'insectes ou de moisissures localisées.

Necessary Works ○ 1 ◉ 2 ○ 3 ○ 4

Priority I

Traitement de protection de l'ensemble de la charpente.

C03-01 Roof covering

Type 1: Pitched roof **100 %**

Évaluation de l'étanchéité de l'usure de la surface de toiture (y compris avant-toits).

Degradation state ○ a ○ b ◉ c ○ d

Nombreuses tuiles sales et défectueuses. Tuiles faîtières déplacées. L'étanchéité n'est plus garantie localement. Boiseries détériorées. Ferblanterie en partie oxydée.

C: Many dirty and defective tiles. Ridge roof tiles displaced. The sealing is no longer guaranteed locally. Woodwork deteriorated. Ferblanterie partly oxidized.

Necessary Works ○ 1 ○ 2 ◉ 3 ○ 4

Priority I

Remplacement de tuiles (< 30%). Remplacement partiel des raccordements en bois et peinture. Remplacement partiel de la ferblanterie.

Replacement of tiles (<30%). Partial replacement of wood and paint connections. Partial replacement of tinsmithing.

C03-03 Roof openings





Type 11: Skylights **100 %**

Évaluation des dégradations, de la corrosion, de l'étanchéité, des structures vitrées sur la surface de toiture. Les châssis à tabatière sont à évaluer à l'élément C03-02.

Degradation state ○ a ○ b ○ c ◉ d

Vitrage défectueux, ferblanterie non étanche, moisissure des embrasures intérieures. L'élément est à remplacer.

Defective glazing, unsealed tinsmithing, mold of interior embrasures. The item is to be replaced.

Necessary Works ○ 1 ○ 2 ○ 3 ◉ 4

Priority I

Changement complet de l'élément. Repose des garnitures de la ferblanterie et embrasures intérieures.

Complete change of the element. Rest of the fittings of the tinsmithing and interior embrasures.

C03-04 Supperstructures on roof

Type 1: Chimneys and ventilation shafts **100 %**

Évaluation de l'état des constructions en maçonnerie (cheminées, souches, locaux techniques, etc.) sur toiture: fissures, salissures, étanchéité des raccords.

Degradation state ○ a ◉ b ○ c ○ d

Dégradations sur le crépi. Enduit sali et dégradé. Ferblanterie partiellement desserrée (mauvaise dilatation).

Degradation on the plaster. Coating soiled and degraded. Partially loosened plumbing (poor expansion).

Necessary Works ○ 1 ◉ 2 ○ 3 ○ 4

Priority III

Assainissement du crépi, nouveau traitement de surface et remise en état de la ferblanterie.

Renovation of plaster, new surface treatment and refurbishment of tinplate

C03-05 Lightning protection

Type 1: Lightning protection on pitched roof **100 %**

Contrôle et évaluation de l'état et de la conformité des installations de protection contre la foudre.

Degradation state ○ a ○ b ○ c ◉ d

Absence d'installation ou installation vétuste non entretenue n'assurant plus la protection du bâtiment.

No obsolete installation or outdated installation no longer providing protection to the building.

Necessary Works ○ 1 ○ 2 ○ 3 ◉ 4

Création d'une nouvelle installation de protection contre la foudre.

Creation of new lightning protection installation

C04-01 Floor thermal insulation

Type 3: Insulation towards the ground **100 %**

Évaluation de l'isolation thermique de la dalle sur sol. Appréciation du confort dans les locaux situés au-dessus.

Degradation state ○ a ○ b ◉ c ○ d

Néant.

None

Necessary Works ○ 1 ○ 2 ◉ 3 ○ 4

Priority II

Néant.

None

Roofs and floors

C04-03 Roof thermal insulation

Type 2: Sloped roof, attic without amenities **100 %**

Évaluation de l'isolation thermique de la toiture, recherche de ponts thermiques, appréciation du confort des combles, etc.

Degradation state ○ a ○ b ○ c ◉ d

Isolation thermique inexistante, incomplète ou d'épaisseur insuffisante ou totalement détériorée. La valeur limite SIA (U = 0.25 W/Km2) n'est pas atteinte.

Necessary Works ○ 1 ○ 2 ○ 3 ◉ 4

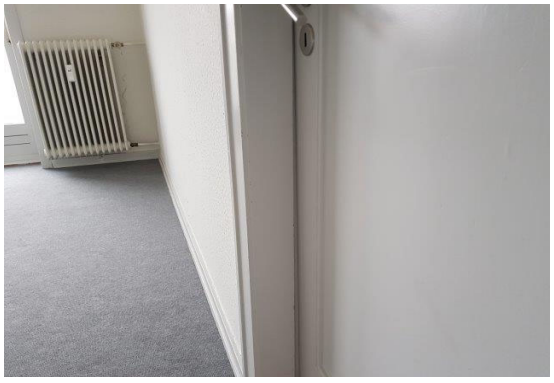
Priority II



Circulation and Commons - Residential building

C05-02 Interior doors





Type 1: Wood interior manual doors **100 %**

Évaluation de l'usure, du fonctionnement et de l'état des surfaces.

Degradation state ○ a ○ b ○ c ◉ d

La totalité des menuiseries est en mauvais état. Surfaces fortement dégradées.

Necessary Works ○ 1 ○ 2 ○ 3 ◉ 4

Priority III

Remplacement de toutes les menuiseries intérieures, traitement complet des surfaces.

I00-05 Lighting wiring and plugs

Type 1: Wiring sockets and fixtures **100 %**

Évaluation de l'état de l'alimentation électrique des prises et des luminaires, du fonctionnement, de la qualité et du niveau de confort des prises de courant fort.

Degradation state ◉ a ○ b ○ c ○ d

L'alimentation des luminaires et des prises électriques est en ordre, elle correspond aux besoins. Nombre de prises et puissance d'alimentation suffisant.

The power supply of the luminaires and electrical outlets is in order, it corresponds to the needs. Number of sockets and sufficient power supply.

Necessary Works ○ 1 ○ 2 ○ 3 ◉ 4

Priority III

Réfection complète des installations d'alimentation électrique des prises et des luminaires. Dépose des installations parasites.

Complete overhaul of electrical power installations for outlets and lights. Removal of parasitic installations. ON the basis that some of the internal walls woudl be demolished and moved the accoompaniyng electrical installations will be replaced.

Circulation and Commons - Residential building

I00-06 Lighting appliances

Type 1: Fictures **100 %**

Évaluation de l'état, du fonctionnement et du niveau d'éclairement des luminaires.

Degradation state ◉ a ○ b ○ c ○ d

Nombre, type et situation des luminaires apparemment suffisants et répondants aux besoins.

Necessary Works ○ 1 ◉ 2 ○ 3 ○ 4

Remplacement complet des ampoules ou tubes fluorescents tout en conservant les supports.

Complete replacement of bulbs or fluorescent tubes while maintaining the supports. NOTE: Only some of the lighting bulbd will be changed as in DK the responsibiulity for light fixtures is with the tenant.

I06-01 Lifts

Type 1: Lift **100 %**

Évaluation du fonctionnement, de l'état d'usure, de la sécurité des ascenseurs ou de de la nécessité et possibilité d'installer un ascenseur.

Degradation state ○ a ○ b ○ c ◉ d

No ellevator of shaft in the building. New installation to be added in the building.

Necessary Works ○ 1 ○ 2 ○ 3 ◉ 4

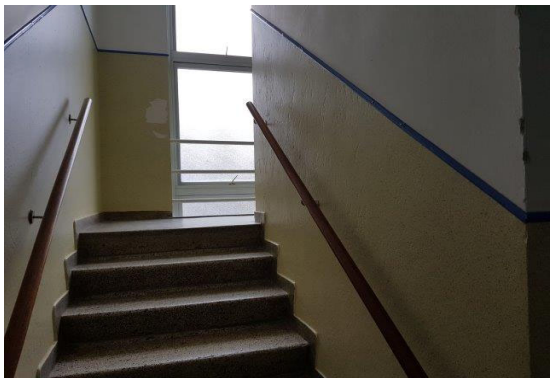
Priority I

Nouvelle installation d'ascenseur. Rénovation du local machinerie. Travaux de peinture dans la cabine et le local machinerie.

New elevator installation. Renovation of the local machinery. Painting work in the cabin and local machinery.

Circulation and Commons - Residential building

U03-01 Staircase



Type 2: Stairwell towards façade **100 %**

Évaluation des surfaces: salissures, décollements, fissures, des parois de la cage d'escalier (y compris les paliers). Évaluation de l'état des vitrages. L'escalier est évalué à l'élément C06-04 ou U03-02.

Degradation state ○ a ○ b ◉ c ○ d

Surfaces sales. Microfissures. Décollements ponctuels du crépi. Fenêtres ou châssis des vitrages en état. Traces de corrosion, profils sales, joints des vitrages secs et cassants. Raccordements en état.

Dirty surfaces. Microcracks. Spot detachment of the plaster. Windows or chassis glazing in condition. Traces of corrosion, dirty profiles, joints of the dry and brittle windows. Connections in state.

Necessary Works ○ 1 ○ 2 ○ 3 ◉ 4

Priority II

Rhabillage du support (>50%). Parois à repeindre. Remplacement complet de l'élément avec vitrage et raccordement.

Dressing of the support (> 50%). Walls to repaint. Complete replacement of the element with glazing and connection. NOTE> Additional works for installation of ellevators

U03-02 Staircase and landings

Type 1: Concrete, stone or artificial stone stairs inside the building **100 %**

Évaluation de l'état des revêtements de sol et des sous-faces de l'escalier, de la balustrade ainsi que de leur sécurité.

Degradation state ○ a ◉ b ○ c ○ d

Limons et balustrades en bon état. Dégâts ponctuels sur les marches et nez de marche. Microfissures et joints dégarnis. Surfaces sales et défraîchies.

Limons et balustrades en bon état. Dégâts ponctuels sur les marches et nez de marche. Microfissures et joints dégarnis. Surfaces sales et défraîchies.

Necessary Works ○ 1 ◉ 2 ○ 3 ○ 4

Priority III

Réfection locale des marches. Contrôle des assemblages, peinture de la balustrade et de la sous-face de l'escalier.

Local repair of the steps. Control of the assemblies, painting of the railing and the underside of the staircase.

Circulation and Commons - Residential building

U04-01 Common premisses



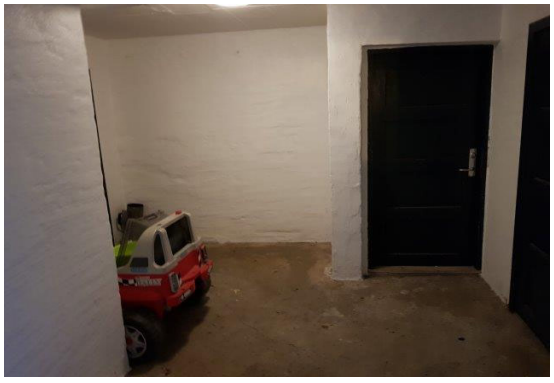
Type 1: Common premises **100 %**

Évaluation des surfaces des locaux communs telles que la buanderie, le local à vélo, etc.: sol, parois, plafonds.

Degradation state ○ a ○ b ◉ c ○ d

Dégâts sur les parois, sols, plafonds. Équipement de buanderie et séchoir insuffisant. Menuiseries et ferrements hors service (< 50%). Surfaces endommagées.

Damage to the walls, floors, ceilings. Laundry equipment and insufficient dryer. Joinery and fittings not in use (<50%). Damaged surfaces.



Necessary Works ○ 1 ○ 2 ◉ 3 ○ 4

Priority II

Reprise des sols, parois et plafonds. Travaux de peinture sur les surfaces réparées. Remplacement ou complément d'équipement dans la buanderie. Réparations des menuiseries et remplacement partiel de portes et de ferrement (<50%). Traitement complet des surfaces.

Resumption of floors, walls and ceilings. Painting work on repaired surfaces. Replacement or additional equipment in the laundry room. Repairs of joinery and partial replacement of doors and fittings (<50%). Complete treatment of surfaces.

U04-02 Private cellars



Type 1: Private cellars **100 %**

Évaluation des caves privées: sols, parois, plafonds et équipement (parois à claire-voie).

Degradation state ○ a ◉ b ○ c ○ d

yyyySalissures et dégâts ponctuels sur les parois, sols, plafonds et portes intérieures. Surfaces dégradées.

Dirt and occasional damage to walls, floors, ceilings and interior doors. Degraded surfaces.



Necessary Works ○ 1 ◉ 2 ○ 3 ○ 4

Priority III

Reprise des parois, sols et plafonds.

Cleaning and repair of wallas floors and ceilings

Circulation and Commons - Residential building

U04-03 Attics (common rooms)

Type 1: Loft (common rooms) **100 %**

Évaluation de la disposition et de l'accessibilité des combles ainsi que des dégradations.

Degradation state ○ a ○ b ○ c ◉ d

Mauvaise disposition des locaux. Les portes et les parois à claire-voie sont fortement abîmées. Installation électrique vétuste. yyyyImpianto elettrico insufficiente.

Bad layout of the premises. Doors and slatted walls are heavily damaged. Old electrical installation. Insufficient electrical installation.

Necessary Works ○ 1 ○ 2 ○ 3 ◉ 4

yyyyDépose et évacuation des aménagements existants. Remplacement des portes de la cage d'escalier, mise en place de nouvelles parois à claire-voie. Réfection des installations électriques.

Removal and evacuation of existing facilities. Replacement of the stairwell doors, installation of new slatted walls. Rehabilitation of electrical installations.
NOTE>Some of the common space in the attic will be remodeled to apartments





U13-02 Sourroundings

Type 1: Surroundings - Developed areas **100 %**

Évaluation des abords, surfaces vertes, surfaces en dur, clôtures, installations de boîtes à lettres, des points d'eau et de l'éclairage.

Degradation state ○ a ◉ b ○ c ○ d

Les abords ont besoin d'une remise en état. Les surfaces en dur sont partiellement dégradées..

The surroundings need a restoration. Hard surfaces are partially degraded.

Necessary Works ○ 1 ◉ 2 ○ 3 ○ 4

Priority III

Réfection des surfaces vertes et en dur.

Rehabilitation of green and hard surfaces.





Premises - Residential buildings

C06-01 Floor finishings





Type 1: Wooden floors **95 %**

Évaluation de l'état d'usure et de salissure des revêtements de sol.

Degradation state ○ a ○ b ◉ c ○ d

Éléments de parquet décollés (< ou = à 25%). Taches et usure importantes. Plinthes endommagées ou inexistantes.

Necessary Works ○ 1 ○ 2 ◉ 3 ○ 4

Réparations locales des parquets(< ou = à 25%). Ponçage et imprégnation de toute la surface. Remplacement ou pose des plinthes.

C06-01 Floor finishings

Type 2: Plastic and textile lining **5 %**

Évaluation de l'état d'usure et de salissure des revêtements de sol.

Degradation state ○ a ○ b ○ c ◉ d

Generalized detachment. Generalized spots and wear. The support is largely deteriorated.

Décollement généralisé. Taches et usure généralisées. Le support est en grande partie détérioré.

Necessary Works ○ 1 ○ 2 ○ 3 ◉ 4

Priority II

Removal and evacuation of old carpets, partial rehabilitation of the subfloor. Installation of new carpets including skirting boards.

Dépose et évacuation des anciennes moquettes, réfection partielle du sous-plancher. Mise en place de nouvelles moquettes y compris plinthes.

Premises - Residential buildings

C06-01 Floor finishings



Type 3: Tile covering **5 %**

Évaluation de l'état d'usure et de salissure des revêtements de sol.

Degradation state ○ a ◉ b ○ c ○ d

Tiles in places peeled or damaged. Partially cleared seals. Localized repairs are possible.

Carreaux par endroits décollés ou endommagés. Joints partiellement dégarnis. Les réparations localisées sont possibles.

Necessary Works ○ 1 ○ 2 ○ 3 ◉ 4

Priority II

Stitching of the tiles and evacuation. Partial repair of the support. Complete replacement of tiles and skirting boards.

Piquage des carreaux et évacuation. Réfection partielle du support. Remplacement complet du carrelage et des plinthes.

C06-02 Interior walls and wall finishings





Type 1: Plaster - paint **95 %**

Évaluation de l'état d'usure, de la fissuration et de l'état de surface des revêtements de mur.

Degradation state ○ a ○ b ○ c ◉ d

Surfaces and funds in bad condition. Many damages.

Surfaces et fonds en mauvais état. Nombreux dégâts.

Necessary Works ○ 1 ○ 2 ◉ 3 ○ 4

Priority I

Fonds à remettre en état (< ou = à 20%). Préparation et réfection complète de la peinture.

Funds to be rehabilitated (<or = 20%). Preparation and complete repair of the painting.

Premises - Residential buildings

C06-02 Interior walls and wall finishings



Type 13: Ceramic tiles **5 %**

Évaluation de l'état d'usure, de la fissuration et de l'état de surface des revêtements de mur.

Degradation state ○ a ○ b ○ c ◉ d

Peeled coating (> 25%). No reserve materials available. Degraded support.

Revêtement décollé (> 25%). Pas de matériaux de réserve disponible. Support dégradé.

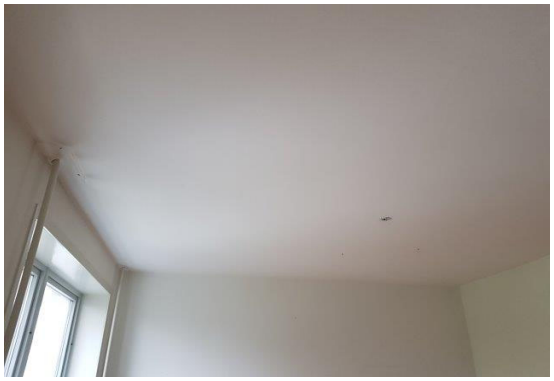
Necessary Works ○ 1 ○ 2 ○ 3 ◉ 4

Priority II

Removal and evacuation of existing earthenware. Laying new earthenware, treatment of joints.

Dépose et évacuation des faïences existantes. Pose de nouvelles faïences, traitement des joints.

C06-03 Ceiling coating





Type 1: Plastered ceiling **100 %**

Évaluation des salissures, des fissures, de la planéité et des décollements des surfaces des plafonds.

Degradation state ○ a ○ b ○ c ◉ d

Dirty and damaged surfaces. Support in poor condition. Bad flatness, detachments, or cracks.

Surfaces sales et endommagées. Support en mauvais état. Mauvaise planéité, décollements, ou fissures.

Necessary Works ○ 1 ○ 2 ○ 3 ◉ 4

Priority I

Repair and wire support. Preparation and painting of all surfaces (possibly suspended ceiling).

Réfection et toilage du support. Préparation et peinture de l'ensemble des surfaces (éventuellement plafond suspendu).

I00-05 Lighting wiring and plugs

Type 2: Wiring sockets and fixtures - dwellings **100 %**

Évaluation de l'état de la surface extérieure de l'enveloppe de façade: décollements, fissures, salissures.

Degradation state ○ a ◉ b ○ c ○ d

Néant.

Necessary Works ○ 1 ◉ 2 ○ 3 ○ 4

Priority III

Néant.

I02-04 Heating and cooling terminal units

Type 1: Radiators **100 %**

Évaluation du fonctionnement, de la puissance et de la corrosion des émetteurs de chaud et de froid dans les locaux (plusieurs types peuvent exister simultanément).

Degradation state ○ a ○ b ◉ c ○ d

Radiators partially in poor condition, dirty, corroded or leaking. Some of the radiators can be preserved.

Radiateurs partiellement en mauvais état, sales, corrodés ou fuites. Une partie des radiateurs peuvent être préservées.

Necessary Works ○ 1 ○ 2 ◉ 3 ○ 4

Priority I

Repair or replace defective parts and seals. Rinse and clean the radiators to preserve. Replace defective radiators (<50%). Rebalance the network. NOTE: Some of the radiator valves need replacement

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Réparer ou changer les pièces défectueuses et les joints. Rincer et nettoyer les radiateurs à préserver. Remplacer les radiateurs défectueux (<50%). Rééquilibrer le réseau.

Premises - Residential buildings

U02-01 Kitchen

Type 1: Equipped kitchen **100 %**

Évaluation de l'usure, de l'âge des installations des appareils, des meubles et des équipements. Évaluation de l'état du local, sol, mur, plafond. La robinetterie, les écoulements et la distribution de gaz ne sont pas à évaluer à cet élément.

Degradation state ○ a ○ b ○ c ◉ d

Bad condition. Damaged pottery, remaining surfaces dirty or damaged. Kitchen fittings and outdated appliances respectively defective. Insufficient electrical installation.

Mauvais état général. Faïences endommagées, surfaces restantes sales ou endommagées. Agencement de cuisine et appareils vétustes respectivement défectueux. Installation électrique insuffisante.

Necessary Works ○ 1 ○ 2 ○ 3 ◉ 4

Priority I

Complete renovation of the room, floor, wall, ceiling. New kitchen layout with new layout. Replacement of the electrical installation.

Rénovation complète du local, sol, mur, plafond. Nouvel agencement de cuisine avec nouvelle disposition. Remplacement de l'installation électrique.





U02-02 Sanitary premisses

Type 2: Bathroom and WC **100 %**

Évaluation de l'usure, de l'âge des installations, des appareils et des équipements. Évaluation de l'état du local, sol, mur, plafond. La robinetterie et les écoulements ne sont pas à évaluer à cet élément.

Degradation state ○ a ○ b ◉ c ○ d

Coatings on walls and ceilings dirty or crumbled. Tiles taken off in places. Hollow or unsealed joints. Maximum of 2 sanitary fixtures damaged or obsolete. Faucet obsolete or not waterproof. Sufficient electrical installation.

Enduits des parois et plafonds sales ou effrités. Carrelages décollés par endroit. Joints évidés ou non étanches. Au maximum 2 appareils sanitaires abîmés ou vétustes. Robinetterie vétuste ou non étanche. Installation électrique suffisante.

Necessary Works ○ 1 ○ 2 ◉ 3 ○ 4

Bad general condition of the premises. Damaged tiles, remaining dirty or defective surfaces. Insufficient equipment. Insufficient electrical installation.

Remplacement de 2 appareils sanitaires au maximum. Réfection des joints. Remplacement de quelques carreaux. Peinture sur parois et plafond.





U12-02 Low current installation

Type 1: Low voltage installations telephone, interphone, TV **100 %**

Évaluation des installations de courant faible: sonnerie, interphone, téléphone, TV/radio, Téléréseau.

Degradation state ○ a ○ b ○ c ◉ d

The entire installation is old and defective. NO Intercom installation

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La totalité de l'installation est vétuste et défectueuse.

Necessary Works ○ 1 ○ 2 ○ 3 ◉ 4

Réfection complète de l'installation.

Complete repair of the installation.

U13-04 Interior carpentry





Type 1: Interior carpentry **100 %**

Evaluation de l'usure, du fonctionnement de l'état des surfaces et des salissures des menuiseries intérieures.

Degradation state ○ a ◉ b ○ c ○ d

Joinery in good condition, traces of shocks or localized wear. Fittings and fittings defective. Faded surfaces.

Menuiseries en bon état, traces de chocs ou d'usures localisées. Garnitures et ferrements défectueux. Surfaces défraîchies.

Necessary Works ○ 1 ○ 2 ○ 3 ◉ 4

Priority III

Replacement of all interior joinery, complete surface treatment.

Remplacement de toutes les menuiseries intérieures, traitement complet des surfaces.

I00-02 Pannels and secondary electrical distribution

Type 1: Low power distribution pannels **100 %**

Evaluation de l'état des tableaux et de leur alimentation électrique, de leur situation et du suivi de leur conformité.

Degradation state ○ a ◉ b ○ c ○ d

Closed secondary distribution boards in a cabinet. Rising and feeding columns with irregularities.

Tableaux de distribution secondaires fermés dans une armoire. Colonnes montantes et alimentation présentant des irrégularités.

Necessary Works ○ 1 ○ 2 ◉ 3 ○ 4

Closing of secondary electrical distribution boards. Compliance of lines or deletions of provisional lines.

Fermeture des tableaux de distribution secondaire électrique. Mise en conformité des lignes ou suppressions des lignes provisoires.

I00-03 Emergency lighting

Type 2: Centralised power supply **100 %**

Évaluation des installations d'éclairage de secours, de leur état, du suivi d'entretien et de leur conformité.

Degradation state ○ a ○ b ○ c ◉ d

The emergency lighting system is not in compliance with the fire safety report.

Le système d'éclairage de secours n'est pas en conformité selon le rapport de sécurité incendie.

Necessary Works ○ 1 ○ 2 ○ 3 ◉ 4

Installation of a new emergency lighting system recommended according to the fire safety concept report.

Installation d'un nouveau système d'éclairage de secours préconisé selon le rapport de concept de sécurité incendie.

I00-05 Lighting wiring and plugs

Type 1: Wiring sockets and fixtures **100 %**

Évaluation de l'état de l'alimentation électrique des prises et des luminaires, du fonctionnement, de la qualité et du niveau de confort des prises de courant fort.

Degradation state ◉ a ○ b ○ c ○ d

L'alimentation des luminaires et des prises électriques est en ordre, elle correspond aux besoins. Nombre de prises et puissance d'alimentation suffisant.

Necessary Works ◉ 1 ○ 2 ○ 3 ○ 4

Priority II

Sans intervention.

I02-01 Heating central production plant





Type 31: Substation without heat production **100 %**

Évaluation du fonctionnement et du rendement de la sous-station (y compris le réseau de distribution primaire).

Degradation state ○ a ◉ b ○ c ○ d

Substation partially defective. Functional security. Clear marks of corrosion or leaks. Insufficient heat insulation. Noise issues, barely maintained installation. Incorrect sizing.

Sous-station ancienne, mais en bon état et correctement isolée. Sécurités fonctionnelles. Marques de corrosion ou de fuites. Peu de problèmes de bruit, installation entretenue.

Necessary Works ○ 1 ○ 2 ◉ 3 ○ 4

Priority I

Adaptation of components to prescriptions, and if necessary change them. Improved insulation Repair corroded or unsealed parts. General control of the installation (distribution pumps, flow rates, temperatures).

Adaptation des composants aux prescriptions, et au besoin les changer. Amélioration de l'isolation. Réparer les pièces corrodées ou non étanches. Contrôle général de l'installation (pompes de distribution, débits, températures).

I02-02 Sanitary hot water production

Type 1: Central boiler with heat exchanger **100 %**

Évaluation du fonctionnement, du rendement et de l'âge de l'installation de production d'ECS

Degradation state ○ a ○ b ○ c ◉ d

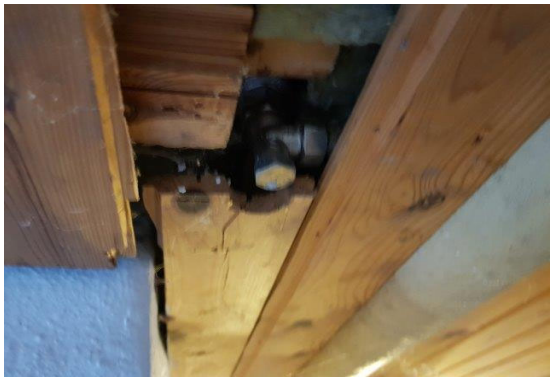
Bouilleur d'eau chaude en mauvais état et obsolète.

Necessary Works ○ 1 ○ 2 ○ 3 ◉ 4

Remplacement total du bouilleur, y compris les installations de sécurité, les conduites, isolations, pompes.

I02-03 Heating distribution network





Type 1: Apparent heat distribution **100 %**

Évaluation du fonctionnement, de la dégradation et de l'isolation des colonnes et conduites de chauffage au sous-sol.

Degradation state ○ a ○ b ◉ c ○ d

Old ducts, but in good condition, signs of corrosion or signs of leaks. Correct sizing, flow rates and pressures assured. No deposits or air in the pipes. Fixings in state. Insulation partially absent

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Conduites anciennes, mais en bon état, signes de corrosion ou indices de fuites. Dimensionnement correct, débits et pressions assurés. Pas de dépôts ou d'air dans les conduites. Fixations en état. Isolation partiellement absente ou endommagée. Prescriptions respectées.

Necessary Works ○ 1 ○ 2 ◉ 3 ○ 4

Priority I

Repair or replace defective parts and seals. Repair or improve insulation. Adapt to the regulations in force. Rinse the network.

Réparer ou changer les pièces défectueuses et les joints. Réparer ou améliorer l'isolation. Adapter aux prescriptions en vigueur. Rincer le réseau.

I02-04 Heating and cooling terminal units





Type 1: Radiators **100 %**

Évaluation du fonctionnement, de la puissance et de la corrosion des émetteurs de chaud et de froid dans les locaux (plusieurs types peuvent exister simultanément).

Degradation state ○ a ○ b ◉ c ○ d

Radiators partially in poor condition, dirty, corroded or leaking. Some of the radiators can be preserved.

Radiateurs partiellement en mauvais état, sales, corrodés ou fuites. Une partie des radiateurs peuvent être préservées.

Necessary Works ○ 1 ○ 2 ◉ 3 ○ 4

Priority II

Repair or replace defective parts and seals. Rinse and clean the radiators to preserve. Replace defective radiators (<50%). Rebalance the network.

Réparer ou changer les pièces défectueuses et les joints. Rincer et nettoyer les radiateurs à préserver. Remplacer les radiateurs défectueux (<50%). Rééquilibrer le réseau.

I04-01 Water connection and metering

Type 1: Connection and water distribution battery **100 %**

Évaluation des conduites depuis l'entrée dans l'immeuble jusqu'aux compteurs.

Degradation state ○ a ○ b ◉ c ○ d

Pipes, fittings and insulation partly defective. Presence of damage, leakage, corrosion or visible deposits. Incorrect sizing. Poorly complied prescriptions, drawings not available.

Conduites, armatures et isolation en partie défectueuses. Présence de dégâts, de fuite, de corrosion ou de dépôts visibles. Dimensionnement incorrect. Prescriptions mal respectées, schémas non disponibles.

Necessary Works ○ 1 ○ 2 ◉ 3 ○ 4

Priority II

Repair or replace defective parts and gaskets, adjusting as necessary. Repair the thermal insulation. The water supplier can give additional information. Adapt to the regulations in force.

Réparer ou remplacer les pièces défectueuses et les joints en adaptant au besoin les dimensions. Réparer l'isolation thermique. Le fournisseur d'eau peut donner des informations supplémentaires. Adapter aux prescriptions en vigueur.

I04-03 Sewage pipes





Type 1: Wastewater pipes **100 %**

Évaluation du fonctionnement, de la corrosion et de l'obstruction des conduites d'eaux usées.

Degradation state ○ a ○ b ◉ c ○ d

Conduites en mauvais état. Dégâts visibles. Refoulements fréquents, fuites localisées. Le bruit dérange souvent. Fixations desserrées et isolation insuffisante.

Conduites en mauvais état. Dégâts visibles. Refoulements fréquents, fuites localisées. Le bruit dérange souvent. Fixations desserrées et isolation insuffisante.

Necessary Works ○ 1 ○ 2 ◉ 3 ○ 4

Priority II

Drainage and rinsing of pipes. Repair if necessary. Insulation at accessible places. Repair the fasteners taking care of the acoustic insulation. Adapt to the regulations in force. Video camera control of horizontal pipes.

I04-08 Sanitary water distribution

Type 1: Cold water and hot water pipes **100 %**

Evaluation du fonctionnement, de la corrosion, et de la distribution des conduites d'eau sanitaire depuis la nourrice avec le compteur jusqu'aux appareils.

Degradation state ○ a ○ b ◉ c ○ d

Conduits partially defective. Reduced flow and pressure, damaged or insufficient insulation. Fixings are defective. Incomplete diagrams, prescriptions met in part. Waters troubled.

Conduites en partie défectueuses. Débit et pression réduits, isolation endommagée ou insuffisante. Les fixations sont défectueuses. Schémas incomplets, prescriptions respectées en partie. Eaux troublées.

Necessary Works ○ 1 ○ 2 ◉ 3 ○ 4

Priority II

Replace or repair lines, joints, fasteners. Repair or change the fasteners. Adapt to the regulations in force. Removal and installation of new thermal insulation (<50%).

Remplacer ou réparer les conduites, les joints, les fixations. Réparer ou changer les fixations. Adapter aux prescriptions en vigueur. Dépose et pose d'une nouvelle isolation thermique(<50%).

U12-01 Ventilation system without air handling

Type 1: Natural ventilation (opening windows) **95 %**

Évaluation de la ventilation des locaux par rapport aux odeurs, à l'humidité, à la présence ou non de moisissures.

Degradation state ○ a ○ b ◉ c ○ d

Néant.

Necessary Works ○ 1 ○ 2 ○ 3 ◉ 4

Priority I

Mise en oeuvre d'un nouveau système de ventilation (type 2 ou type 3). Recours obligatoire à un spécialiste en ventilation. Le coût de cette intervention n'est pas comptabilisé par la méthode.

U12-01 Ventilation system without air handling

Type 2: Passive stack ventilation **5 %**

Évaluation de la ventilation des locaux par rapport aux odeurs, à l'humidité, à la présence ou non de moisissures.

Degradation state ○ a ○ b ○ c ◉ d

Renouvellement d'air insuffisant. Présence d'odeur, de traces d'humidité. Les bouches d'extraction sont partiellement endommagées ou cassées. Le groupe moto-ventilateur d'extraction ne fonctionne pas bien.

Renouvellement d'air insuffisant. Présence d'odeur, de traces d'humidité. Les bouches d'extraction sont partiellement endommagées ou cassées. Le groupe moto-ventilateur d'extraction ne fonctionne pas bien.

Necessary Works ○ 1 ○ 2 ○ 3 ◉ 4

Priority I

Complete replacement of the ventilation system using existing channels or new channels.

Remplacement complet de l'installation de ventilation en utilisant les canaux existants ou de nouveaux canaux.





Sanitation facilities

I04-01 Water connection and metering

Type 2: Connection and water distribution coil with sanitary booster **100 %**

Évaluation des conduites depuis l'entrée dans l'immeuble jusqu'aux compteurs.

Degradation state ○ a ◉ b ○ c ○ d

Conduites, armatures et isolation anciens, mais en bon état et fonctionnels. Old pipes, frames and insulation, but in good condition and functional. Presence of some visible damage, leakage, corrosion or deposit. Acceptable sizing. Prescriptions respected, complete drawings available.

Présence de quelques dégâts, de fuite, de corrosion ou de dépôt visibles. Dimensionnement acceptable. Prescriptions respectées, schémas complets disponibles.

Necessary Works ○ 1 ◉ 2 ○ 3 ○ 4

Priority III

Maintain the frames in good condition. Repair or replace defective parts and seals. Repair the thermal insulation. The water supplier can give additional information.

Entretenir les armatures en bon état. Réparer ou remplacer les pièces défectueuses et les joints. Réparer l'isolation thermique. Le fournisseur d'eau peut donner des informations supplémentaires.

I04-03 Sewage pipes

Type 1: Wastewater pipes **100 %**

Évaluation du fonctionnement, de la corrosion et de l'obstruction des conduites d'eaux usées.

Degradation state ○ a ○ b ◉ c ○ d

Conduites en mauvais état. Dégâts visibles. Refoulements fréquents, fuites localisées. Le bruit dérange souvent. Fixations desserrées et isolation insuffisante.

Necessary Works ○ 1 ○ 2 ◉ 3 ○ 4

Curage et rinçage des conduites. Réparation si nécessaire. Isolation aux endroits accessibles. Réparer les fixations en veillant à l'isolation acoustique. Adapter aux prescriptions en vigueur. Contrôle par caméra vidéo des canalisations horizontales.

Estimation of the work cost, following the standard method of EPIQR+ - Scenario Diagnostic
PMG 3-7, Frederikshavn

Cost index : 100 — **Works costs (without fees and without VAT)**

Summary of cost

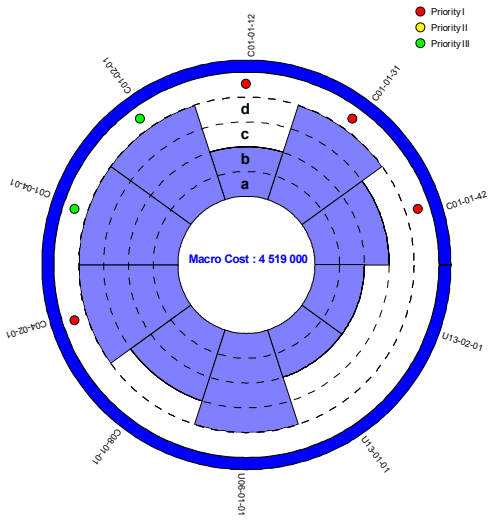
Facades	**4 519 000**
Roofs and floors	**614 000**
Circulation and Commons - Residential building	**1 127 000**
Premises - Residential buildings	**1 066 000**
HVAC - Single Buildings	**552 000**
Sanitation facilities	**23 000**

Works cost (without fees and without VAT)	7 901 000
Architect's fees (without VAT) calculated on the basis of 0 % of the works cost	0
Sub-total of works and fees (without VAT)	7 901 000
VAT on the basis of 0 % of the sub-total	0
Total cost for renovation (with VAT)	7 901 000

Facades

Description

Inventory of state



Summary of the elements

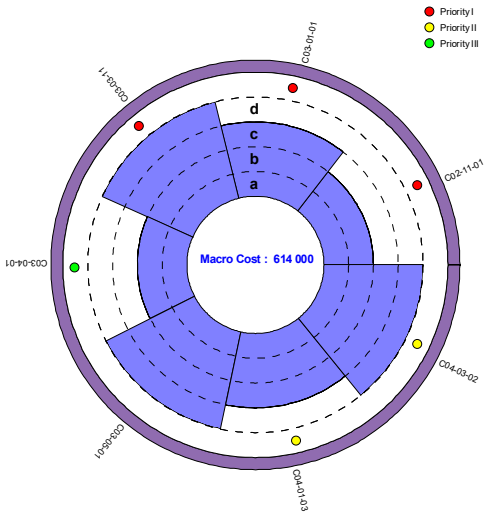
Maco element cost (without fees and without VAT) 4 519 000

Element	Type	1	2	3	4	s	t	u	v	Priority
C01-01 Exposed concrete	12 3 %	●								I
C01-01 Wood or metal frame windows	31 37 %	●	●	●	●					I
C01-01 Light facade carried between the skeleton	42 60 %	●	●	●						I
C01-02 Manual wood or metal doors	01	●	●	●	●					III
C01-04 Basement windows above ground level	01	●	●	●	●					III
C04-02 Absence of thermal insulation	01	●	●	●	●					I
C04-02 Absence of thermal insulation	01						◆			I
C08-01 Scaffolding and building site	01	●	●	●						
U06-01 Concrete / masonry railing	01	●	●	●	●					
U13-01 Masonry with wooden flooring	01	●	●							
U13-02 Surroundings - Developed areas	01	●	●							

Roofs and floors

Description

Inventory of state



Summary of the elements

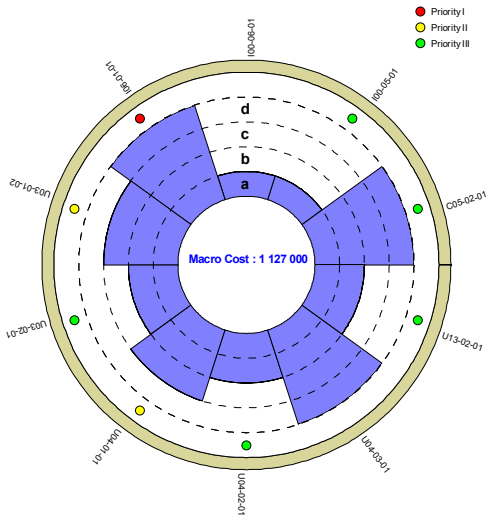
Maco element cost (without fees and without VAT) 614 000

Element	Type	1	2	3	4	s	t	u	v	Priority
C02-11 Carpentry	01	●	●							I
C03-01 Pitched roof	01	●	●	●						I
C03-03 Skylights	11	●	●	●	●					I
C03-04 Chimneys and ventilation shafts	01	●	●							III
C03-05 Lightning protection on pitched roof	01	●	●	●	●					
C04-01 Insulation towards the ground	03	●	●	●						II
C04-03 Sloped roof, attic without amenities	02	●	●	●	●					II

Circulation and Commons - Residential building

Description

Inventory of state



Summary of the elements

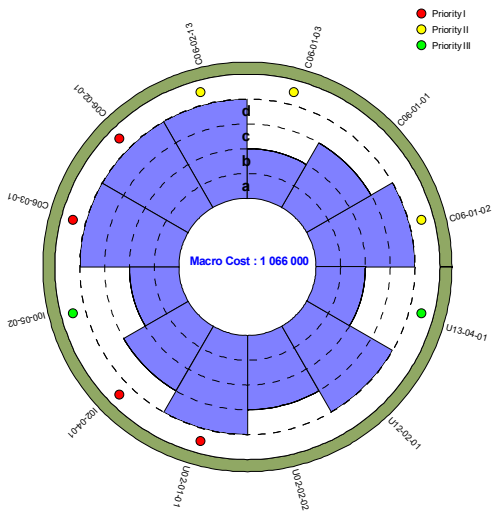
Maco element cost (without fees and without VAT) 1 127 000

Element	Type	1	2	3	4	s	t	u	v	Priority
C05-02 Wood interior manual doors	01	●	●	●	●					III
I00-05 Wiring sockets and fixtures	01	●	●	●	●					III
I00-06 Fictures	01	●	●							
I06-01 Lift	01	●	●	●	●					I
U03-01 Stairwell towards façade	02	●	●	●	●					II
U03-02 Concrete, stone or artificial stone stairs inside the building	01	●	●							III
U04-01 Common premises	01	●	●	●						II
U04-02 Private cellars	01	●	●							III
U04-03 Loft (common rooms)	01	●	●	●	●					
U13-02 Surroundings - Developed areas	01	●	●							III

Premises - Residential buildings

Description

Inventory of state



Summary of the elements

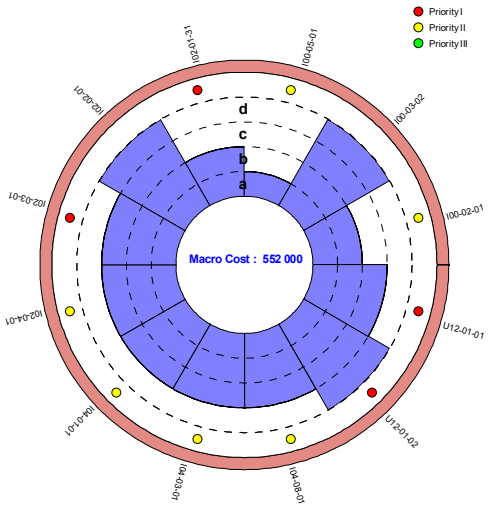
Maco element cost (without fees and without VAT) 1 066 000

Element	Type	1	2	3	4	s	t	u	v	Priority
C06-01 Wooden floors	01 95 %	●	●	●						
C06-01 Plastic and textile lining	02 5 %	●	●	●	●					II
C06-01 Tile covering	03 5 %	●	●	●	●					II
C06-02 Plaster - paint	01 95 %	●	●	●						I
C06-02 Ceramic tiles	13 5 %	●	●	●	●					II
C06-03 Plastered ceiling	01	●	●	●	●					I
I00-05 Wiring sockets and fixtures - dwellings	02	●	●							III
I02-04 Radiators	01	●	●	●						I
U02-01 Equipped kitchen	01	●	●	●	●					I
U02-02 Bathroom and WC	02	●	●	●						
U12-02 Low voltage installations telephone, interphone, TV	01	●	●	●	●					
U13-04 Interior carpentry	01	●	●	●	●					III

HVAC - Single Buildings

Description

Inventory of state



Summary of the elements

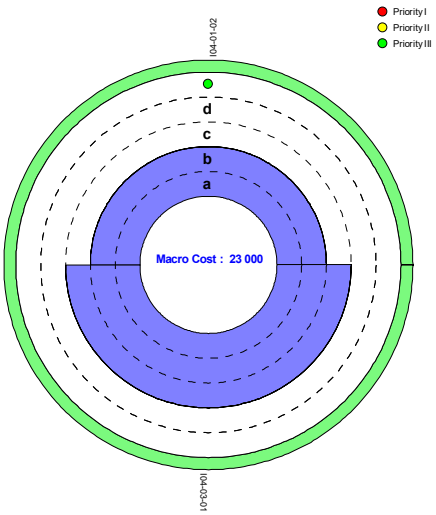
Maco element cost (without fees and without VAT) 552 000

Element		Type		1	2	3	4	s	t	u	v	Priority
I00-02	Low power distribution pannels	01		●	●	●						
I00-03	Centralised power supply	02		●	●	●	●					
I00-05	Wiring sockets and fixtures	01		●								II
I02-01	Substation without heat production	31		●	●	●						I
I02-02	Central boiler with heat exchanger	01		●	●	●	●					
I02-03	Apparent heat distribution	01		●	●	●						I
I02-04	Radiators	01		●	●	●						II
I04-01	Connection and water distribution battery	01		●	●	●						II
I04-03	Wastewater pipes	01		●	●	●						II
I04-08	Cold water and hot water pipes	01		●	●	●						II
U12-01	Natural ventilation (opening windows)	01	95 %	●	●	●	●					I
U12-01	Passive stack ventilation	02	5 %	●	●	●	●					I

Sanitation facilities

Description

Inventory of state



Summary of the elements

Maco element cost (without fees and without VAT) 23 000

Element	Type	1	2	3	4	s	t	u	v	Priority
I04-01 Connection and water distribution coil with sanitary booster	02	●	●							III
I04-03 Wastewater pipes	01	●	●	●						

D. Blower door test and thermal imaging report

The report “Målerapport for luftgennemtrængelighed i bygning, samt termografisk inspektion af bygning.” was realized by Dansk Infrarød Inspektion A/S. The analysis took place in 2009 and it is based on the standards DS/EN 13829.

www.infrared.dk E-mail: info@infrared.dk Nørgårdsvej 11 DK-9440 Aabybro Tlf.: 9824 4460

Målerapport for luftgennemtrængelighed i bygning, samt termografisk inspektion af bygning.

Undersøgelsessted.		
Nadia Mortensen	Driftsansvarlig:	Christian Sørensen
Vinkelvej 3 2 sal, TH 9900 Frederikshavn	Medhjælper:	Poul Sørensen
	Måle operatør:	Bent Bagge Nøhr
98422650	Sagsbehandler:	Karin Broch Nøhr
christian@fbmail.dk	Dato for inspektion:	27. januar 2009

Prøvningsmetode med overtryk og undertryk skabt af ventilator efter:
DS/EN 13829.

Formålet med undersøgelsen er at identificere:
- Bygningens luftgennemtrængelighed
- Bygningens termiske ydeevne
- Luftlækager
- Kuldebroer

Inspektionen er udført af **Dansk Infrarød Inspektion A/S**, er en uvildig virksomhed, som har specialiseret sig i forebyggende vedligeholdelse og dokumentation af bygningers termiske ydeevne.

Termografiudstyr: **ThermaCAM SC – 640.**
Blowerdoor Type: **Minneapolis BlowerDoor Model 4, DG-700.**
Lufthastighedsmåleudstyr: **TSI-8347 A-M-G.**
Datalog: **EasyLog EL-USB-2.**

Bent B Nøhr
Bent Bagge Nøhr

Underskrift.

Termografiansvarlig.

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Beskrivelse af undersøgelse og konklusion.

Ved undersøgelsen med BlowerDoor blev følgende udført:

BlowerDoor blev monteret i døren, i entreen, ud til trappe.

Der blev udført en test af bygningstætheden efter standarten EN 13829.
Først blev der kørt en test med et overtryk på 50 Pascals.
Derefter en test med undertryk, således blev der målt et lækage tal ved 50 Pascals
og dette er målt til ved overtryk: **2,18 l/s m²** og ved undertryk: **1,90 l/s m²** .(Se bilag til rapport).
Lækage arealet i bygningen er målt til ved overtryk: **266,7 cm²**.
Lækage arealet i bygningen er målt til ved undertryk: **253,4 cm²**.

Efter 30 minutters drift, med et undertryk på 50 Pa. påbegyndtes der en inspektion med termografi, og her blev der spottet mange steder med utætheder ved klimaskærmen.

Disse utætheder ved klimaskærmen, medføre træk/kulde i bygning på vindsiden og på bagsiden af bygningen vil der komme et undertryk.

Undertrykket vil trække varm luft ud af bygningen ved eksempelvis huller i og ved klimaskærmen.
I vinterhalvåret vil varm fugtig luft kondensere på sin vej ud igennem utætheder i klimaskærmen, og dermed generere fugt i konstruktionen.

Der er konstateret flere steder ved lejligheden, hvor der er utætheder ved klimaskærmen, såsom:

1. Omkring etage adskillelsen, vinduerne, terrassedøren og ydervægge.
2. Ved ydervæggene for den undersøgte lejlighed ses det tydeligt, at ved disse er der en meget ringe isolering eller ingen isolering.
3. Denne lejlighed er en gavl lejlighed og her ses det tydeligt at gavlvæggene er meget kolde pågrund af ringe isolering eller ingen isolering.
4. Ved nogle af vinduerne skyldes utæthederne at gummilisterne ikke lukker tæt, eller vinduet skal justeres.
5. Ved gulvene i lejligheden trækker der kold luft rundt under disse når der sker en vindpåvirkning af lejligheden.

Når overstående utætheder ved klimaskærmen er udbedret vil det være passende at udføre en ny måling af tætheden ved klimaskærmen, som skal danne basis for om reparationen har minimeret utæthederne ved klimaskærmen.

Bygnings data:	
Etagearealet i undersøgt bygning/lejlighed:	85,0 m^2
Inde temperatur målt i bygning ved opstart:	21,0 °C
Ude temperatur:	2,0 °C
Temperatur differences inde - ude Δt	10,8 °C
Type af bygning:	**Boligblok med stuen og 3 etager.**
Bygge år:	**1946.**
Type af opvarmning:	**Fjernvarme**
Type af ventilation/udsugning:	**Der er en ventile i badeværelse og en i køkken.**

Bemærkninger ved undersøgelsen.
Alle vinduer og døre er lukket på normal vis.
Aftræk i køkken forseglet med tape.
Aftræk i badeværelse er forseglet med tape.

Øvrige bemærkninger ved undersøgelsen.

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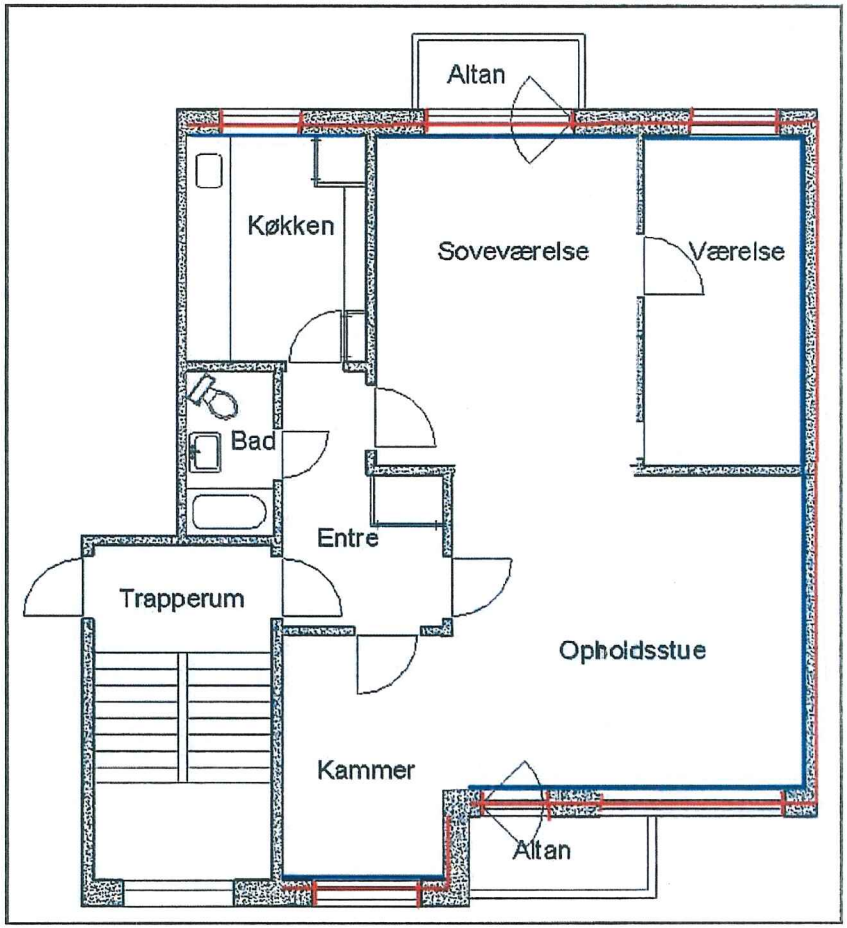
På nedenstående skitse over grundplanen for lejlighed, er de steder indtegnet med blå og røde streger, hvor der er lokaliseret kuldebroer/luftlækager, fejl ved isoleringen osv.

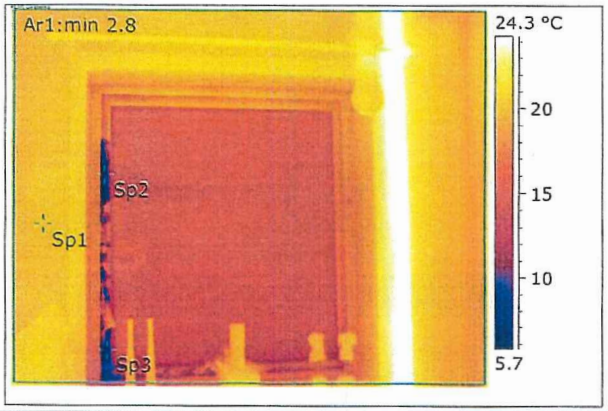
Blå streger indikere fejl ved gulv/væg.

Røde streger indikere fejl ved loft/væg.



Termografirapport.

Termografi nr.: 01 **Lokalitet: Spisestue.**
Nadia Mortensen
Vinkelvej 3 2 sal, TH
9900 Frederikshavn
Dato for undersøgelse: 27. januar 2009

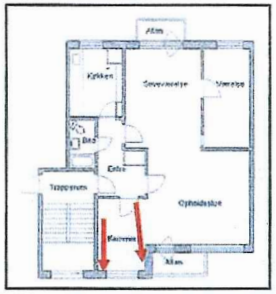


Object Parameter	Value
Emissivity	0.96
Label	Value
Sp1	19.4 °C
Sp2	6.1 °C
Sp3	5.1 °C
Ar1: Max	49.9 °C

IR_0269.JPG

Visuelt foto. **Skitse over grundplan.**





Luftlækage: ja **Målt Lufthastighed ved luftlækage i m/s:** **Kuldebro: ja**

Bemærkninger.

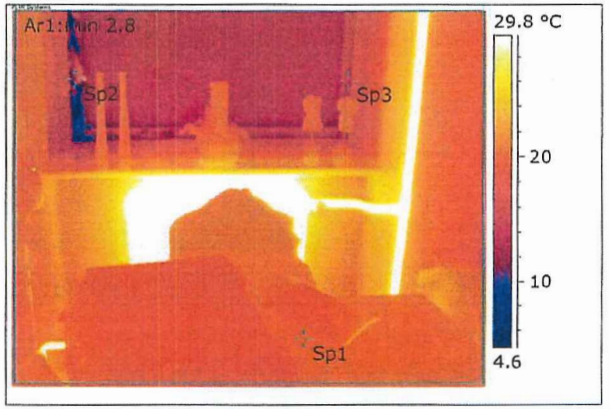
Røde pile på ovenstående skitse markere området hvor termografiet er fra.
Ved vinduet i spisestuen ses der store utætheder ved vinduet. Lejeren har stoppet papir i vinduet for at minimere træk generne ved vinduet.

Dansk infrarød INSPEKTION

www.infrared.dk E-mail: info@infrared.dk Nørgårdsvej 11 DK-9440 Aabybro Tlf.: 9824 4460

Termografirapport.

Termografi nr.: 02 **Lokalitet: Spisestue.**
Nadia Mortensen
Vinkelvej 3 2 sal, TH
9900 Frederikshavn
Dato for undersøgelse: 27. januar 2009



Object Parameter	Value
Emissivity	0.96
Label	Value
Sp1	19.9 °C
Sp2	13.1 °C
Sp3	14.7 °C
Ar1: Max	51.8 °C

IR_0271.JPG

Visuelt foto. **Skitse over grundplan.**





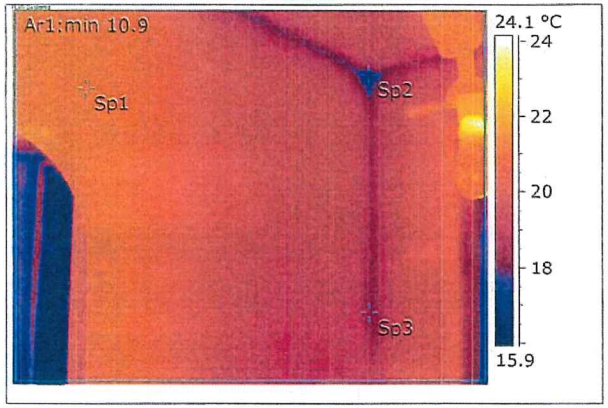
Luftlækage: ja **Målt Lufthastighed ved luftlækage i m/s:** **Kuldebro: ja**

Bemærkninger.

Røde pile på ovenstående skitse markere området hvor termografiet er fra.
Ved vinduet i spisestuen ses der store utætheder ved vinduet. Lejeren har stoppet papir i vinduet for at minimere træk generne ved vinduet.

Termografirapport.

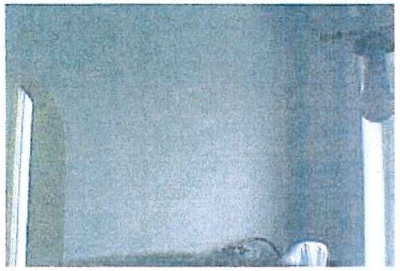
Termografi nr.: 03 Lokalitet: Spisestue.
Nadia Mortensen
Vinkelvej 3 2 sal, TH
9900 Frederikshavn
Dato for undersøgelse: 27. januar 2009

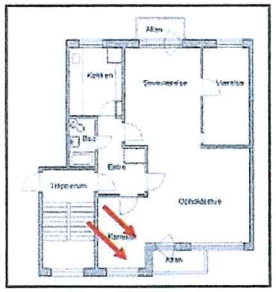


Object Parameter	Value
Emissivity	0.96
Label	Value
Sp1	20.9 °C
Sp2	16.9 °C
Sp3	18.3 °C
Ar1: Max	24.1 °C

IR_0273.JPG

Visuelt foto. Skitse over grundplan.





Luftlækage: ja Målt Lufthastighed ved luftlækage i m/s: Kuldebro: ja

Bemærkninger.

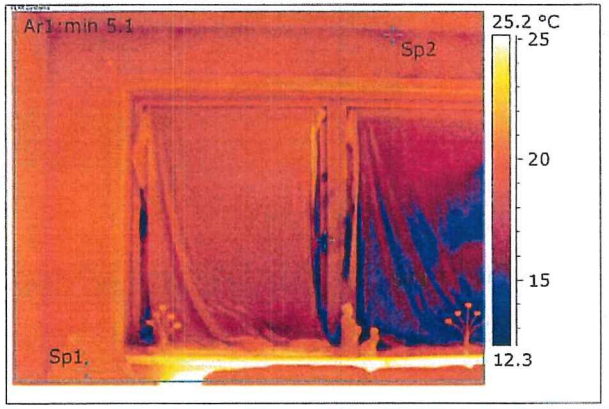
Røde pile på ovenstående skitse markere området hvor termografiet er fra.
Ved skillevæg, og ydervæggen ud mod altanen, ses det tydeligt at er der ingen isolering er.

Dansk infrarød INSPEKTION

www.infrared.dk E-mail: info@infrared.dk Nørgårdsvej 11 DK-9440 Aabybro Tlf.: 9824 4460

Termografirapport.

Termografi nr.: 04 Lokalitet: Stue.
Nadia Mortensen
Vinkelvej 3 2 sal, TH
9900 Frederikshavn
Dato for undersøgelse: 27. januar 2009

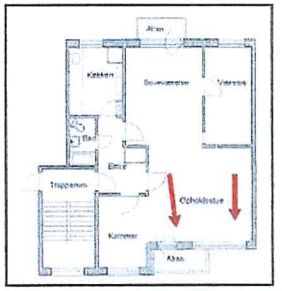


Object Parameter	Value
Emissivity	0.96
Label	Value
Sp1	20.1 °C
Sp2	17.3 °C
Sp3	9.1 °C
Ar1: Max	28.8 °C

IR_0275.JPG

Visuelt foto. Skitse over grundplan.





Luftlækage: ja Målt Lufthastighed ved luftlækage i m/s: Kuldebro: ja

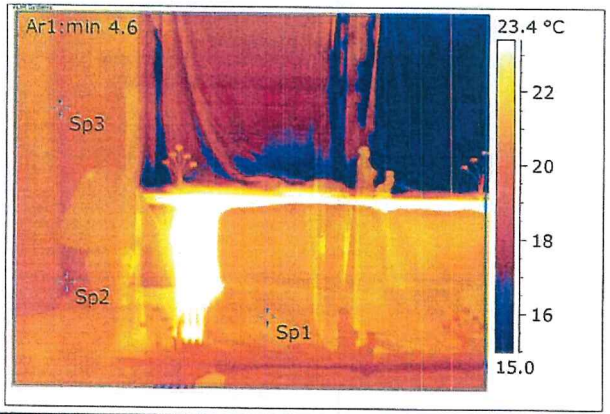
Bemærkninger.

Røde pile på ovenstående skitse markere området hvor termografiet er fra.
Ved termografiet af ydervæggen og vinduet i stuen, ses det tydeligt at der ved overlæggeren over vinduet er mange kuldebroer og ved vinduerne ses der mange kolde områder sandsynligvis på grund af utætheder/luftlækager ved vindue.

Dansk infrarød INSPEKTION
www.infrared.dk E-mail: info@infrared.dk Nørgårdsvej 11 DK-9440 Aabybro Tlf.: 9824 4460

Termografirapport.

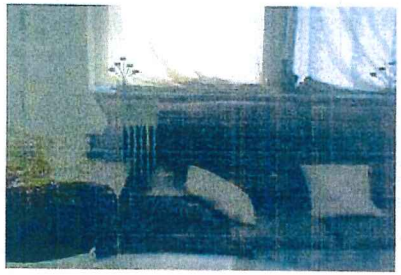
Termografi nr.: 05 Lokalitet: Stue.
Nadia Mortensen
Vinkelvej 3 2 sal, TH
9900 Frederikshavn
Dato for undersøgelse: 27. januar 2009

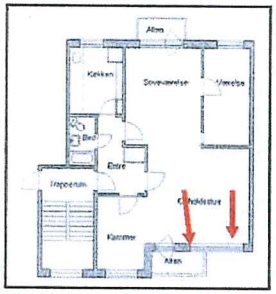


Object Parameter	Value
Emissivity	0.96
Label	Value
Sp1	20.8 °C
Sp2	18.1 °C
Sp3	19.4 °C
Ar1: Max	45.2 °C

IR_0277.JPG

Visuelt foto. Skitse over grundplan.





Luftlækage: ja Målt Lufthastighed ved luftlækage i m/s: Kuldebro: ja

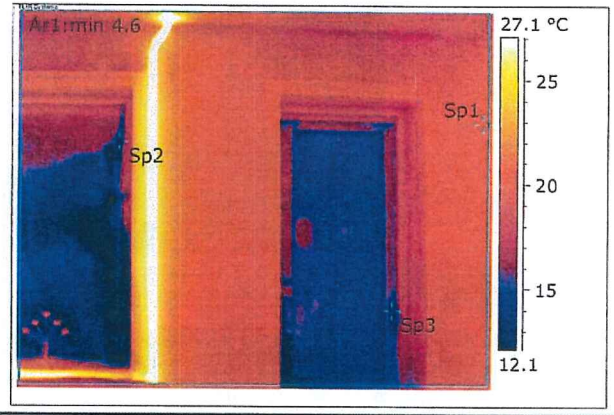
Bemærkninger.

Røde pile på ovenstående skitse markere området hvor termografiet er fra.
Ved termografiet af ydervæggen og vinduet i stuen, ses det tydeligt at der ved overlæggeren over vinduet er mange kuldebroer og ved vinduerne ses der mange kolde områder sandsynligvis på grund af utætheder/luftlækager ved vindue.

Dansk infrarød INSPEKTION
www.infrared.dk E-mail: info@infrared.dk Nørgårdsvej 11 DK-9440 Aabybro Tlf.: 9824 4460

Termografirapport.

Termografi nr.: 06 Lokalitet: Stue.
Nadia Mortensen
Vinkelvej 3 2 sal, TH
9900 Frederikshavn
Dato for undersøgelse: 27. januar 2009



Object Parameter	Value
Emissivity	0.96
Label	Value
Sp1	20.6 °C
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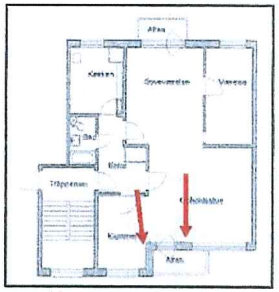
Sp3	12.7 °C
Ar1: Max	51.5 °C

IR_0279.JPG

Visuelt foto. Skitse over grundplan.





Luftlækage: ja Målt Lufthastighed ved luftlækage i m/s: Kuldebro: Ja

Bemærkninger.

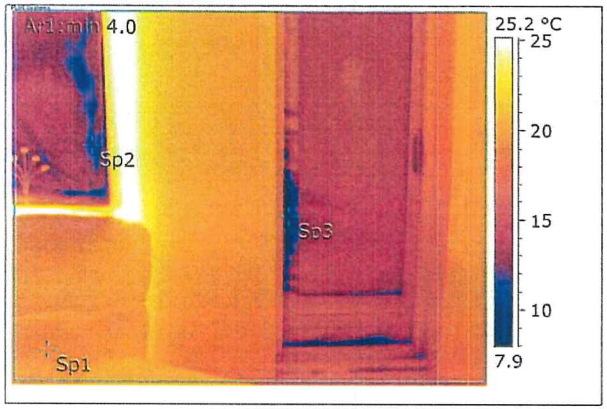
Røde pile på ovenstående skitse markere området hvor termografiet er fra.
Ved termografiet af ydervæggen og terrassedøren i stuen, ses det tydeligt at der ved overlæggeren over vindue og døren er mange kuldebroer. Ved vindue og terassedør ses der mange kolde områder sandsynligvis på grund af utætheder/luftlækager ved døren.

Dansk infrarød INSPEKTION

www.infrared.dk E-mail: info@infrared.dk Nørgårdsvej 11 DK-9440 Aabybro Tlf.: 9824 4460

Termografirapport.

Termografi nr.: 07 **Lokalitet: Stue.**
Nadia Mortensen
Vinkelvej 3 2 sal, TH
9900 Frederikshavn
Dato for undersøgelse: 27. januar 2009

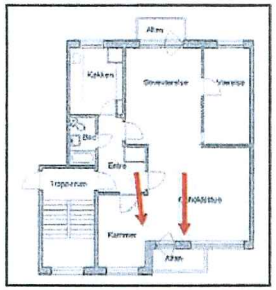


Object Parameter	Value
Emissivity	0.96
Label	Value
Sp1	18.7 °C
Sp2	10.9 °C
Sp3	8.0 °C
Ar1: Max	52.0 °C

IR_0281.jpg

Visuelt foto. **Skitse over grundplan.**





Luftlækage: ja **Målt Lufthastighed ved luftlækage i m/s:** **Kuldebro: ja**

Bemærkninger.

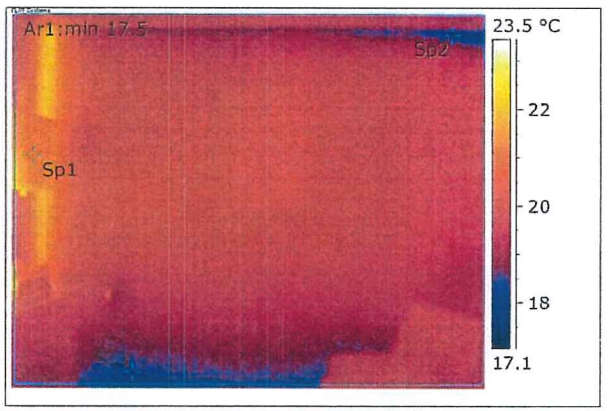
Røde pile på ovenstående skitse markere området hvor termografiet er fra.
Ved termografiet af ydervæggen og terrassedøren i stuen, ses det tydeligt at der ved ydrevægflader på begge sider af døren er der mange kuldebroer ved vindue og terrassedør, ses der mange kolde områder sandsynligvis på grund af utætheder/luftlækager ved døren og vindue.

Dansk infrarød INSPEKTION

www.infrared.dk E-mail: info@infrared.dk Nørgårdsvej 11 DK-9440 Aabybro Tlf.: 9824 4460

Termografirapport.

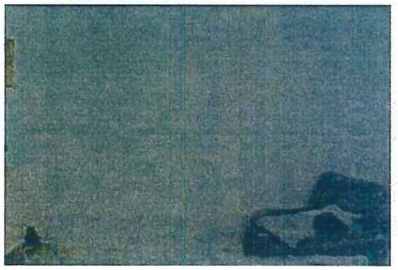
Termografi nr.: 08 **Lokalitet: Stue.**
Nadia Mortensen
Vinkelvej 3 2 sal, TH
9900 Frederikshavn
Dato for undersøgelse: 27. januar 2009

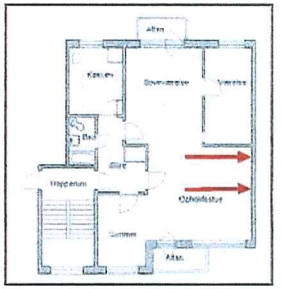


Object Parameter	Value
Emissivity	0.96
Label	Value
Sp1	20.7 °C
Sp2	18.0 °C
Sp3	18.3 °C
Ar1: Max	22.8 °C

IR_0283.JPG

Visuelt foto. **Skitse over grundplan.**





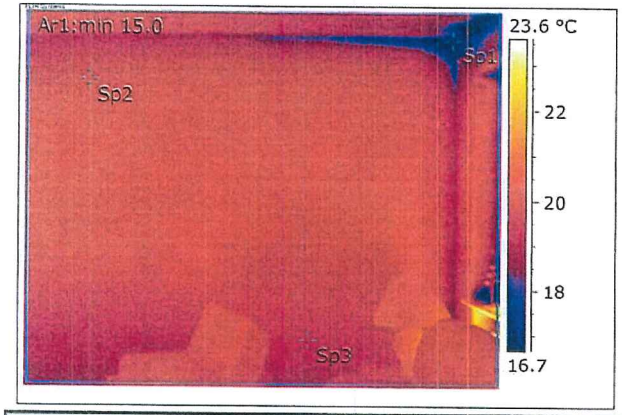
Luftlækage: ja **Målt Lufthastighed ved luftlækage i m/s:** **Kuldebro: ja**

Bemærkninger.

Røde pile på ovenstående skitse markere området hvor termografiet er fra.
Ved gavlvæggen i stuen ses der tydeligt at denne er meget kold i forholc til indervæggene på grund af manglende isolering.

Termografirapport.

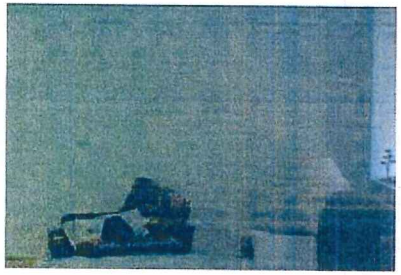
Termografi nr.: 09 **Lokalitet: Stue.**
Nadia Mortensen
Vinkelvej 3 2 sal, TH
9900 Frederikshavn
Dato for undersøgelse: 27. januar 2009

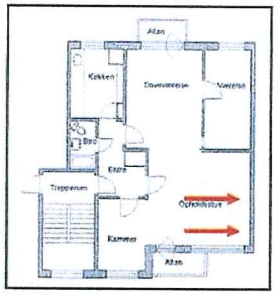


Object Parameter	Value
Emissivity	0.96
Label	Value
Sp1	15.7 °C
Sp2	19.9 °C
Sp3	19.6 °C
Ar1: Max	28.4 °C

IR_0285.JPG

Visuelt foto. **Skitse over grundplan.**





Luftlækage: ja **Målt Lufthastighed ved luftlækage i m/s:** **Kuldebro: ja**

Bemærkninger.

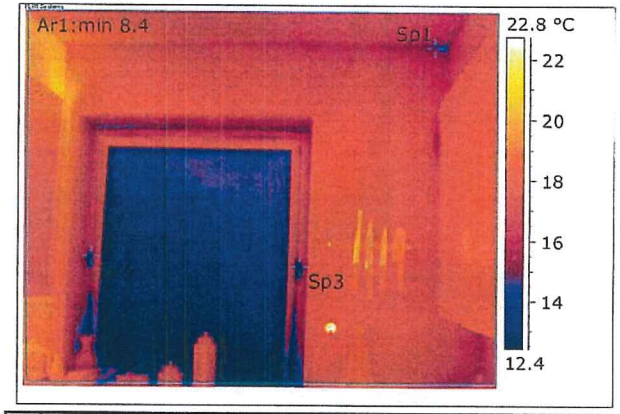
Røde pile på ovenstående skitse markere området hvor termografiet er fra.
Ved gavlvæggen i stuen ses der tydeligt at denne er meget kold i forhold til indervæggene på grund af manglende isolering.

Dansk infrarød INSPEKTION

www.infrared.dk E-mail: info@infrared.dk Nørgårdsvej 11 DK-9440 Aabybro Tlf.: 9824 4460

Termografirapport.

Termografi nr.: 10 **Lokalitet: Køkken.**
Nadia Mortensen
Vinkelvej 3 2 sal, TH
9900 Frederikshavn
Dato for undersøgelse: 27. januar 2009

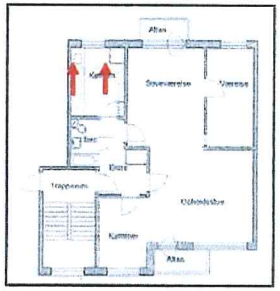


Object Parameter	Value
Emissivity	0.96
Label	Value
Sp1	14.9 °C
Sp2	13.1 °C
Sp3	12.6 °C
Ar1: Max	25.0 °C

IR_0287.JPG

Visuelt foto. **Skitse over grundplan.**





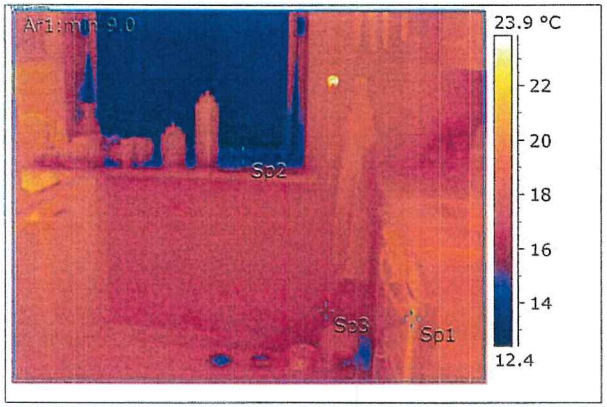
Luftlækage: ja **Målt Lufthastighed ved luftlækage i m/s:** **Kuldebro: ja**

Bemærkninger.

Røde pile på ovenstående skitse markere området hvor termografiet er fra.
Ved termografiet af ydervæggen og vinduet i køkken, ses det tydeligt at der ved overlæggeren over vinduet er mange kuldebroer, og ved vinduerne ses der mange kolde områder sandsynligvis på grund af utætheder/luftlækager ved vindue.

Termografirapport.

Termografi nr.: 11 Lokalitet: Køkken.
Nadia Mortensen
Vinkelvej 3 2 sal, TH
9900 Frederikshavn
Dato for undersøgelse: 27. januar 2009

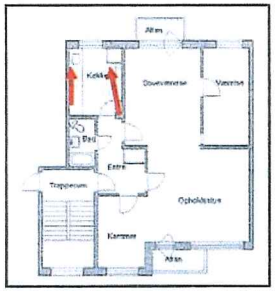


Object Parameter	Value
Emissivity	0.96
Label	Value
Sp1	19.6 °C
Sp2	12.9 °C
Sp3	16.1 °C
Ar1: Max	24.7 °C

IR_0289.JPG

Visuelt foto. Skitse over grundplan.





Luftlækage: ja Målt Lufthastighed ved luftlækage i m/s: Kuldebro: ja

Bemærkninger.

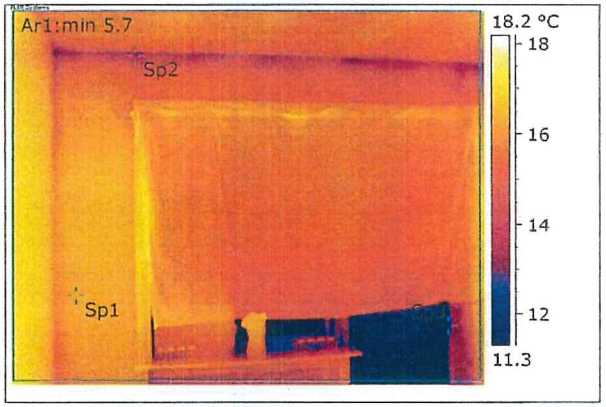
Røde pile på ovenstående skitse markere området hvor termografiet er fra.
Ved termografiet af ydervæggen og vinduet i køkken, ses det tydeligt at der ved murværket under vinduet er mange kuldebroer og ved vinduerne ses der mange kolde områder, sandsynligvis på grund af utætheder/luftlækager ved vindue.

Dansk infrarød INSPEKTION

www.infrared.dk E-mail: info@infrared.dk Nørgårdsvej 11 DK-9440 Aabybro Tlf.: 9824 4460

Termografirapport.

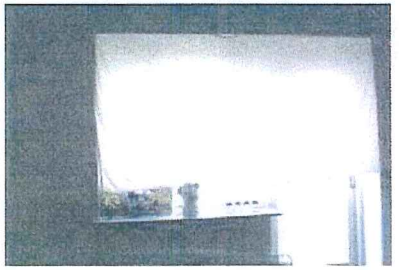
Termografi nr.: 12 Lokalitet: Soveværelse.
Nadia Mortensen
Vinkelvej 3 2 sal, TH
9900 Frederikshavn
Dato for undersøgelse: 27. januar 2009

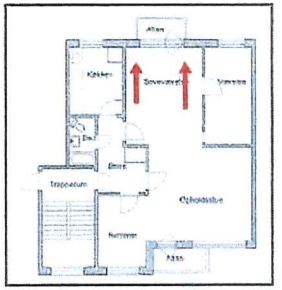


Object Parameter	Value
Emissivity	0.96
Label	Value
Sp1	16.3 °C
Sp2	13.7 °C
Sp3	11.4 °C
Ar1: Max	17.8 °C

IR_0291.JPG

Visuelt foto. Skitse over grundplan.





Luftlækage: ja Målt Lufthastighed ved luftlækage i m/s: Kuldebro: ja

Bemærkninger.

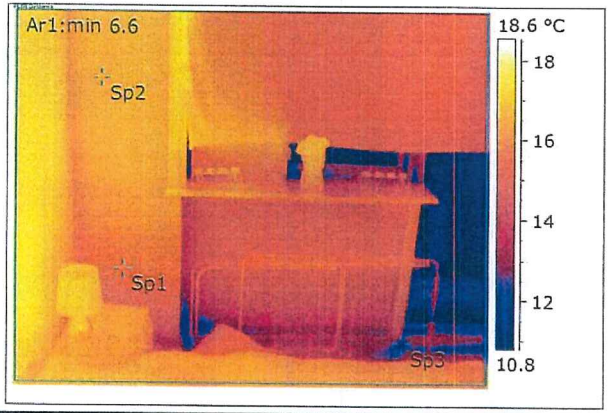
Røde pile på ovenstående skitse markere området hvor termografiet er fra.
Ved termografiet af ydervæggen og vinduet i soveværelse, ses det tydeligt at der ved overlæggeren over vinduet er mange kuldebroer og ved vinduerne ses der mange kolde områder sandsynligvis på grund af utætheder/luftlækager ved vindue.

Dansk infrarød INSPEKTION

www.infrared.dk E-mail: info@infrared.dk Nørgårdsvej 11 DK-9440 Aabybro Tlf.: 9824 4460

Termografirapport.

Termografi nr.: 13 Lokalitet: Soveværelse.
Nadia Mortensen
Vinkelvej 3 2 sal, TH
9900 Frederikshavn
Dato for undersøgelse: 27. januar 2009

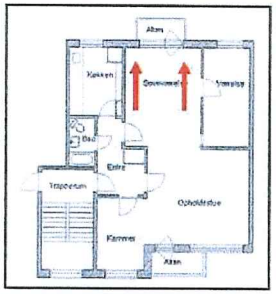


Object Parameter	Value
Emissivity	0.96
Label	Value
Sp1	15.5 °C
Sp2	16.4 °C
Sp3	10.3 °C
Ar1: Max	18.2 °C

IR_0293.JPG

Visuelt foto. Skitse over grundplan.





Luftlækage: ja Målt Lufthastighed ved luftlækage i m/s: Kuldebro: ja

Bemærkninger.

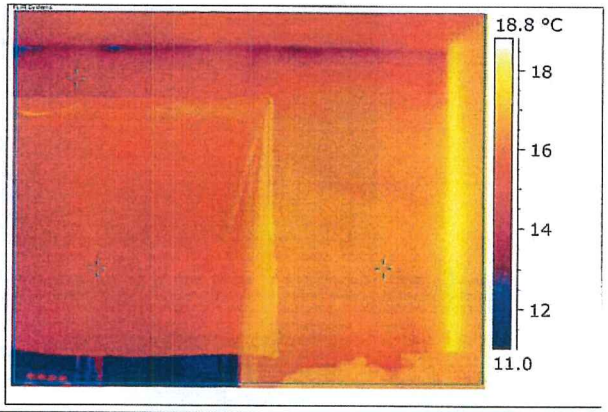
Røde pile på ovenstående skitse markere området hvor termografiet er fra.
Ved termografiet af ydervæggen og vinduet i soveværelse, ses det tydeligt at der ved brystning under vinduet er flere kuldebroer og ved vinduerne ses der mange kolde områder sandsynligvis på grund af utætheder/luftlækager ved vindue.

Dansk infrarød INSPEKTION

www.infrared.dk E-mail: info@infrared.dk Nørgårdsvej 11 DK-9440 Aabybro Tlf.: 9824 4460

Termografirapport.

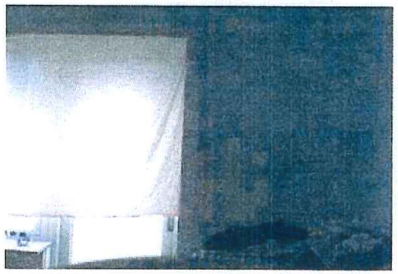
Termografi nr.: 14 Lokalitet: Soveværelse.
Nadia Mortensen
Vinkelvej 3 2 sal, TH
9900 Frederikshavn
Dato for undersøgelse: 27. januar 2009

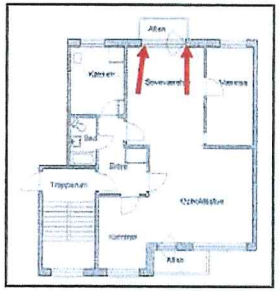


Object Parameter	Value
Emissivity	0.96
Label	Value
Sp1	14.8 °C
Sp2	14.6 °C
Sp3	16.3 °C
Ar1: Max	18.9 °C

IR_0295.JPG

Visuelt foto. Skitse over grundplan.





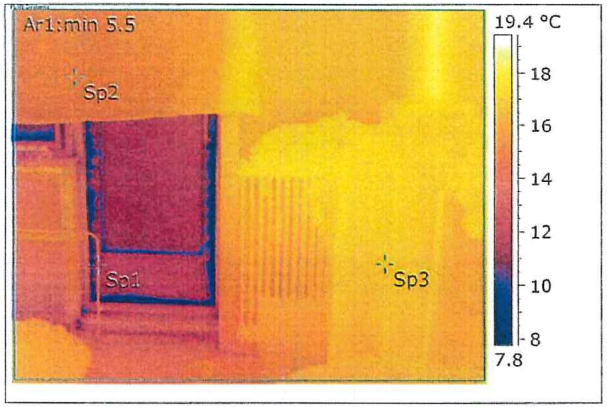
Luftlækage: ja Målt Lufthastighed ved luftlækage i m/s: ikke målt Kuldebro: ja

Bemærkninger.

Røde pile på ovenstående skitse markere området hvor termografiet er fra.
Ved termografiet af ydervæggen og terrassedøren i soveværelse, ses det tydeligt at der ved overlæggeren over vinduet og døren er mange kuldebroer. Ved vinduerne og terrassedøren ses der mange kolde områder sandsynligvis på grund af utætheder/luftlækager ved vindue og terrassedør.

Termografirapport.

Termografi nr.: 15 Lokalitet: Soveværelse.
Nadia Mortensen
Vinkelvej 3 2 sal, TH
9900 Frederikshavn
Dato for undersøgelse: 27. januar 2009

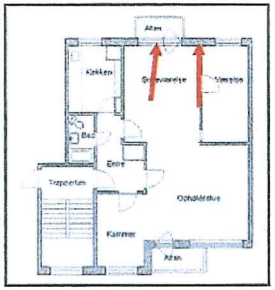


Object Parameter	Value
Emissivity	0.96
Label	Value
Sp1	14.2 °C
Sp2	14.8 °C
Sp3	16.7 °C
Ar1: Max	18.9 °C

IR_0297.JPG

Visuelt foto. Skitse over grundplan.





Luftlækage: ja Målt Lufthastighed ved luftlækage i m/s: ikke målt Kuldebro: ja

Bemærkninger.

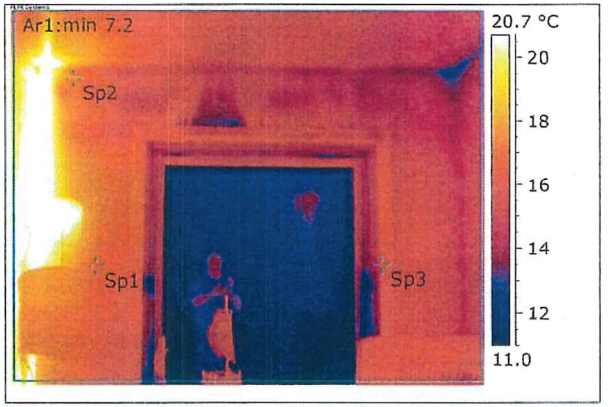
Røde pile på ovenstående skitse markere området hvor termografiet er fra.
Ved termografiet af ydervæggen og terrassedør i soveværelse, ses det tydeligt at denne er meget utæt og ved gulvet ses der mange kolde områder sandsynligvis på grund af utætheder/luftlækager ved etage adskillelsen.

Dansk infrarød INSPEKTION

www.infrared.dk E-mail: info@infrared.dk Nørgårdsvej 11 DK-9440 Aabybro Tlf.: 9824 4460

Termografirapport.

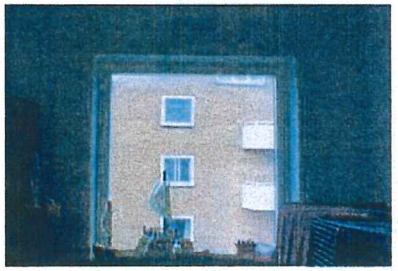
Termografi nr.: 16 Lokalitet: Børne værelse.
Nadia Mortensen
Vinkelvej 3 2 sal, TH
9900 Frederikshavn
Dato for undersøgelse: 27. januar 2009

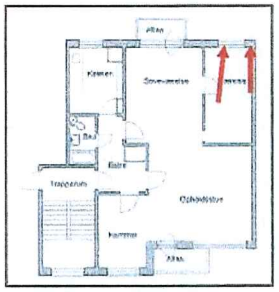


Object Parameter	Value
Emissivity	0.96
Label	Value
Sp1	16.6 °C
Sp2	17.3 °C
Sp3	16.3 °C
Ar1: Max	40.5 °C

IR_0299.JPG

Visuelt foto. Skitse over grundplan.





Luftlækage: ja Målt Lufthastighed ved luftlækage i m/s: ikke målt Kuldebro: ja

Bemærkninger.

Røde pile på ovenstående skitse markere området hvor termografiet er fra.
Ved termografiet af ydervæggen og vinduet i værelse, ses det tydeligt at der ved overlæggeren over vinduet er mange kuldebroer, og ved vinduerne ses der mange kolde områder sandsynligvis på grund af utætheder/luftlækager ved vindue.

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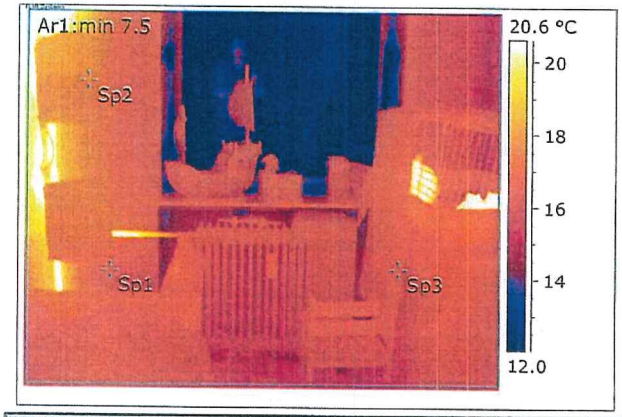
Termografirapport.

Termografi nr.: 17 Lokalitet: Børneværelse.
Nadia Mortensen
Vinkelvej 3 2 sal, TH
9900 Frederikshavn
Dato for undersøgelse: 27. januar 2009

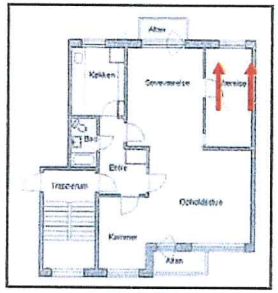


Object Parameter	Value
Emissivity	0.96
Label	**Value**
Sp1	16.0 °C
Sp2	17.4 °C
Sp3	16.4 °C
Ar1: Max	33.4 °C

IR_0301.JPG

Visuelt foto. **Skitse over grundplan.**





Luftlækage: ja **Målt Lufthastighed ved luftlækage i m/s: ikke målt** **Kuldebro: ja**

Bemærkninger.

Røde pile på ovenstående skitse markere området hvor termografiet er fra.
Ved termografiet af ydervæggen og vinduet i værelse, ses det tydeligt at der ved murværket under vinduet er nogle kuldebroer, og ved vinduerne ses der mange kolde områder sandsynligvis på grund af utætheder/luftlækager ved vindue.

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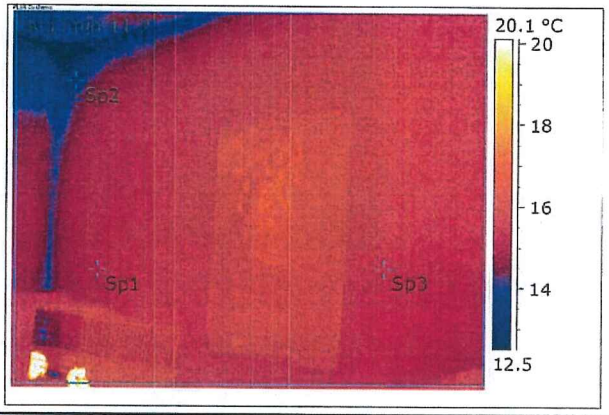
Termografirapport.

Termografi nr.: 18 Lokalitet: Børneværelse.
Nadia Mortensen
Vinkelvej 3 2 sal, TH
9900 Frederikshavn
Dato for undersøgelse: 27. januar 2009

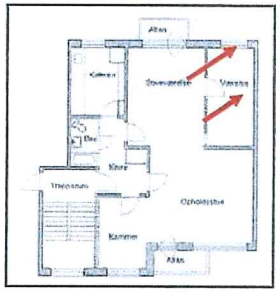


Object Parameter	Value
Emissivity	0.96
Label	**Value**
Sp1	15.0 °C
Sp2	13.6 °C
Sp3	15.5 °C
Ar1: Max	32.3 °C

IR_0303.JPG

Visuelt foto. **Skitse over grundplan.**





Luftlækage: ja **Målt Lufthastighed ved luftlækage i m/s: ikke målt** **Kuldebro: ja**

Bemærkninger.

Røde pile på ovenstående skitse markere området hvor termografiet er fra.
Ved gavlvæggen i værelse ses der tydeligt at denne er meget kold i forhold til indervæggene på grund af manglende isolering.

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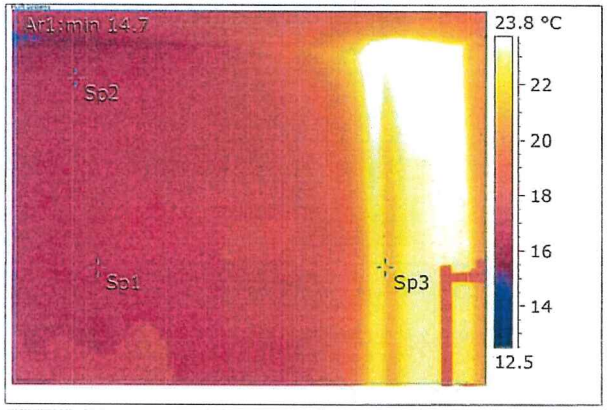
Termografirapport.

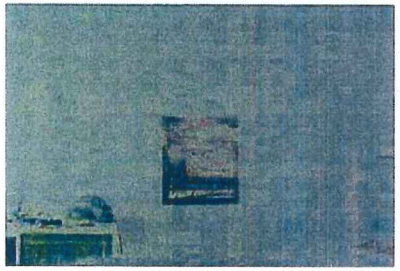
Termografi nr.: 19 Lokalitet: Børneværelse.
Nadia Mortensen
Vinkelvej 3 2 sal, TH
9900 Frederikshavn
Dato for undersøgelse: 27. januar 2009

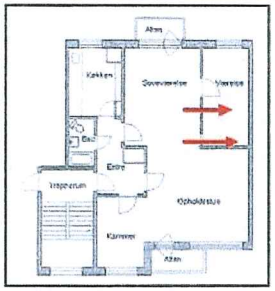


Object Parameter	Value
Emissivity	0.96
Label	Value
Sp1	16.3 °C
Sp2	16.3 °C
Sp3	20.9 °C
Ar1: Max	28.6 °C

IR_0307.JPG

Visuelt foto. Skitse over grundplan.





Luftlækage: ja Målt Lufthastighed ved luftlækage i m/s: ikke målt Kuldebro: ja

Bemærkninger.

Røde pile på ovenstående skitse markere området hvor termografiet er fra.
Ved gavlvæggen i værelse ses der tydeligt at denne er meget kold i forhold til indervæggene på grund af manglende isolering. Ved inddækket kanal med varmerør ses det tydeligt at denne afgiver meget varme til omgivelserne og rørene ikke er særligt godt isoleret inde i kanalen.

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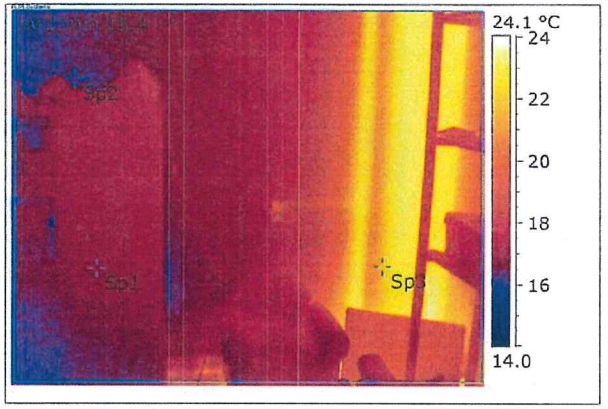
Termografirapport.

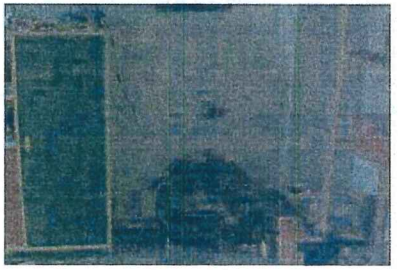
Termografi nr.: 20 Lokalitet: Børneværelse.
Nadia Mortensen
Vinkelvej 3 2 sal, TH
9900 Frederikshavn
Dato for undersøgelse: 27. januar 2009



Object Parameter	Value
Emissivity	0.96
Label	Value
Sp1	16.8 °C
Sp2	16.5 °C
Sp3	21.7 °C
Ar1: Max	24.3 °C

IR_0309.JPG

Visuelt foto. Skitse over grundplan.





Luftlækage: ja Målt Lufthastighed ved luftlækage i m/s: ikke målt Kuldebro: ja

Bemærkninger.

Røde pile på ovenstående skitse markere området hvor termografiet er fra.
Ved gavlvæggen i værelse ses der tydeligt at denne er meget kold i forhold til indervæggene på grund af manglende isolering. Ved inddækket kanal med varmerør ses det tydeligt at denne afgiver meget varme til omgivelserne og rørene ikke er særligt godt isoleret inde i kanalen.

BUILDING LEAKAGE TEST

Undersøgelsen er udført af:
Dansk Infrarød Inspektion A/S
Nørgårdsvej 11, Biersted
Aabybro, 9440
Phone: 98244460

Date of Test: 27-1-2009
Test File: Nadia Mortensen, 23-01-2009

Technician: Bent Bagge Nøhr

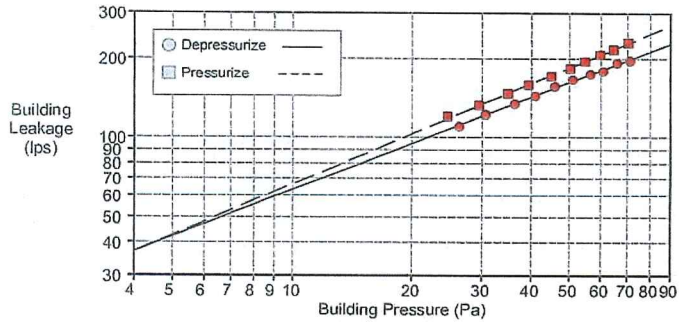
Customer: Frederikshavn Boligforening
Haralds Lundsgade 15
Frederikshavn, 9900
Phone: 96201940
Fax:

Building Address: Nadia Mortensen
Vinkelvej 3 2 sal TH
Frederikshavn, 9900

	Depressurization	Pressurization	Average
Test Results at 50 Pascals:			
V50: Airflow (lps)	162 (+/- 0.4 %)	185 (+/- 0.2 %)	173
n50: Air Changes per Hour (1/h)			
w50: lps/m² Floor Area	1.90	2.17	2.04
q50:			
Leakage Areas:			
Canadian EqLA @ 10 Pa (cm²)	253.4 (+/- 2.3 %)	266.6 (+/- 1.3 %)	260.0
LBL ELA @ 4 Pa (cm²)	143.1 (+/- 3.5 %)	143.5 (+/- 2.1 %)	143.3
Building Leakage Curve:			
Air Flow Coefficient (Cenv)	16.0 (+/- 5.4 %)	15.4 (+/- 3.2 %)	
Air Leakage Coefficient (CL)	16.4 (+/- 5.4 %)	15.3 (+/- 3.2 %)	
Exponent (n)	0.584 (+/- 0.014)	0.637 (+/- 0.008)	
Correlation Coefficient	0.99781	0.99936	

Test Standard: EN 13829
Regulation complied with:
Type of Test Method: B
Equipment: Model 4 (230V) Minneapolis Blower Door

Inside Temperature:	23 °C	Volume:	
Outside Temperature:	2 °C	Surface Area:	
Barometric Pressure:	101325 Pa	Floor Area:	85 m²
Wind Class:	0 Calm	Uncertainty of Building Dimensions:	%
Building Wind Exposure:	Highly Protected Building	Year of Construction:	1946
Type of Heating:	Fjernvarme		
Type of Air Conditioning:	Ingen		
Type of Ventilation:	None		



Date of Test: 27-1-2009 Test File: Nadia Mortensen, 23-01-2009

Comments

Der er udført lukning af aftræk i badeværelse.

Aftræk i køkken er lukket af med tape.

Alle vinduer og døre er lukket på normalvis.

Der er fyldt vand i alle vamdlåse.

Data Points: Depressurization:

Nominal Building Pressure (Pa)	Fan Pressure (Pa)	Nominal Flow (lps)	Temperature Adjusted Flow (lps)	% Error	Fan Configuration
-5.9	n/a				
-76.0	84.1	205	197	-0.9	Ring B
-70.8	80.9	201	193	1.6	Ring B
-65.7	69.6	187	179	-1.1	Ring B
-61.4	66.1	182	175	0.6	Ring B
-55.8	59.8	173	166	1.7	Ring B
-50.7	52.9	163	156	1.7	Ring B
-45.8	44.6	150	144	-0.2	Ring B
-41.2	38.8	140	134	-0.0	Ring B
-35.6	32.1	127	122	0.4	Ring B
-31.2	379.3	115	110	-1.0	Ring C
-3.9	n/a				

Test 1 Baseline (Pa): p01- = -5.9 p01+ = 0.0 p02- = -3.9 p02+ = 0.0

Data Points: Pressurization:

Nominal Building Pressure (Pa)	Fan Pressure (Pa)	Nominal Flow (lps)	Temperature Adjusted Flow (lps)	% Error	Fan Configuration
-3.4	n/a				
67.0	99.5	223	232	0.7	Ring B
61.2	87.5	209	217	-0.1	Ring B
56.3	79.9	200	208	0.3	Ring B
51.3	70.8	188	196	-0.0	Ring B
46.8	62.3	177	184	-1.0	Ring B
41.6	54.3	165	171	-0.8	Ring B
36.0	46.2	152	158	-0.4	Ring B
31.5	39.7	141	147	-0.3	Ring B
26.1	32.3	127	132	0.2	Ring B
21.2	26.4	115	120	1.9	Ring B
-3.4	n/a				

Test 1 Baseline (Pa): p01- = -3.4 p01+ = 0.0 p02- = -3.4 p02+ = 0.0

Dansk Infrarød Inspektion udføre følgende opgaver:

El-termografi :

- termografering af El - tavler og El-anlæg (lav – og højspænding)
- termografering af fjernvarmenet.
- teknisk støvsugning af el-anlæg med L-AUS støvsugeanlæg
- belastningsmålinger, måling af IKmin og IKmax.
- termografi rapport i papir format og CD-rom udgave
- Web-baseret rapport arkiv.
- ved overhængende fare, rapporteres straks.

Bygningstermografi :

- tæthedsprøvning af bygninger i alle størrelser efter BR-08
- ved bygningstermografi arbejdes der med *Blowerdoor/vifte.*
- isoleringstest af bygninger, frysehuse, skibe osv.
- Skimmel svamp test tages og analyseres

Lækagesporinger :

- på rør installationer og varme anlæg (koldt/varmt)
- efter vandlækager.
- Lednings søgninger.
- sporing med isotop. (Br-82). *Halveringstid T½ = 35,3 timer.*
- undersøgelser med spore gas.
- lyttesporing med elektroakustisk lydudstyr..
- billedgengivelser af fejlstedet.
- komplet rapportering af fejlsted.

El-varmekabler:

- fejlsøgning og reparation af el-varmekabler
- optagning af fliser i forbindelse med reparation af el-kabel.
- ønskes det af kunden, kan murearbejde udføres efter endt reparation.

Dansk Infrarød Inspektion tilbyder også at løse special opgaver

Med venlig hilsen

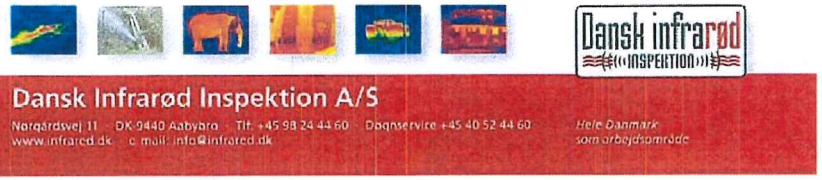
DANSK INFRARØD INSPEKTION A/S



Bent B Nøhr

Bent Bagge Nøhr
Direktør

Mobiltelefon.: 4052 4460.



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Målerapport for luftgennemtrængelighed i bygning, samt termografisk inspektion af bygning.

Undersøgelsessted.		
Tom Lejlighed ADF 1	Driftsansvarlig:	Christian Sørensen
Peter Møllers Gade 30 2, th 9900 Frederikshavn	Medhjælper:	Poul Sørensen
	Måle operatør:	Bent Bagge Nøhr
98989898	Sagsbehandler:	Karin Broch Nøhr
christian@fbmail.dk	Dato for inspektion:	27. januar 2009

Prøvningsmetode med overtryk og undertryk skabt af ventilator efter:
DS/EN 13829.

Formålet med undersøgelsen er at identificere:
- Bygningens luftgennemtrængelighed
- Bygningens termiske ydeevne
- Luftlækager
- Kuldebroer

Inspektionen er udført af **Dansk Infrarød Inspektion A/S**, er en uvildig virksomhed, som har specialiseret sig i forebyggende vedligeholdelse og dokumentation af bygningers termiske ydeevne.

Termografiudstyr: **ThermaCAM SC – 640.**
Blowerdoor Type: **Minneapolis BlowerDoor Model 4, DG-700.**
Lufthastighedsmåleudstyr: **TSI-8347 A-M-G.**
Datalog: **EasyLog EL-USB-2.**

Bent B Nøhr
Bent Bagge Nøhr

Underskrift.

Termografiansvarlig.

www.infrared.dk E-mail: info@infrared.dk Nørgårdsvej 11 DK-9440 Aabybro Tlf.: 9824 4460

Beskrivelse af undersøgelse og konklusion.

Ved undersøgelsen med BlowerDoor blev følgende udført:

BlowerDoor blev monteret i døren, i entreen, ud til trappe.

Der blev udført en test af bygningstætheden efter standarten EN 13829.
Først blev der kørt en test med et overtryk på 50 Pascals.
Derefter en test med undertryk, således blev der målt et lækage tal ved 50 Pascals
og dette er målt til ved overtryk: **1,42 l/s m²** og ved undertryk: **1,28 l/s m²** .(Se bilag til rapport).
Lækage arealet i bygningen er målt til ved overtryk: **150,8 cm²**.
Lækage arealet i bygningen er målt til ved undertryk: **140,0 cm²**.

Efter 30 minutters drift, med et undertryk på 50 Pa. påbegyndtes der en inspektion med termografi, og her blev der spottet mange steder med utætheder ved klimaskærmen.

Disse utætheder ved klimaskærmen, medføre træk/kulde i bygning på vindsiden og på bagsiden af bygningen vil der komme et undertryk.

Undertrykket vil trække varm luft ud af bygningen ved eksempelvis huller i og ved klimaskærmen.
I vinterhalvåret vil varm fugtig luft kondensere på sin vej ud igennem utætheder i klimaskærmen, og dermed generere fugt i konstruktionen.

Der er konstateret flere steder ved lejligheden, hvor der er utætheder ved klimaskærmen, såsom:

1. Omkring etageadskillelsen, vinduerne, terrassedøren og ydervægge, er der utætheder ved lejlighedens klimaskærmen/tæthedsplan.
2. Ved ydervæggene for den undersøgte lejlighed ses det tydeligt, at ved disse er der en meget ringe isolering eller ingen isolering.
3. Ved nogle af vinduerne skyldes utæthederne at gummilisterne ikke lukker tæt, eller vinduet skal justeres.
4. Ved gulvene i lejligheden trækker der kold luft rundt under disse, når der sker en vindpåvirkning af lejligheden.
5. På grund af den meget ringe isolering af ydre væggen, blev der observeret en plet bag ved et møbel hvor der sandsynligvis har været en opfugtning af vægfladen på grund af en kuldebro.
6. Opfugtningen af vægfladen har medført at der er kommet vækst af skimmelsvamp.
7. Se vedhæftet Mycometer test.

Når overstående utætheder ved klimaskærmen er udbedret, vil det være passende at udføre en ny måling af tætheden ved klimaskærmen, som skal danne basis for om reparationen har minimeret utæthederne ved klimaskærmen.

Bygnings data:	
Etagearealet i undersøgt bygning/lejlighed:	85,0 m^2
Inde temperatur målt i bygning ved opstart:	18,00 °C
Ude temperatur:	2,0 °C
Temperatur differences inde - ude Δt	16,0 °C
Type af bygning:	Boligblok med stuen og 3 etager.
Bygge år:	1946.
Type af opvarmning:	Fjernvarme
Type af ventilation/udsugning:	Der er en ventile i badeværelse og en i køkken.

Bemærkninger ved undersøgelsen.
Alle vinduer og døre er lukket på normal vis.
Aftræk i køkken forseglet med tape.
Aftræk i badeværelse er forseglet med tape.

Øvrige bemærkninger ved undersøgelsen.

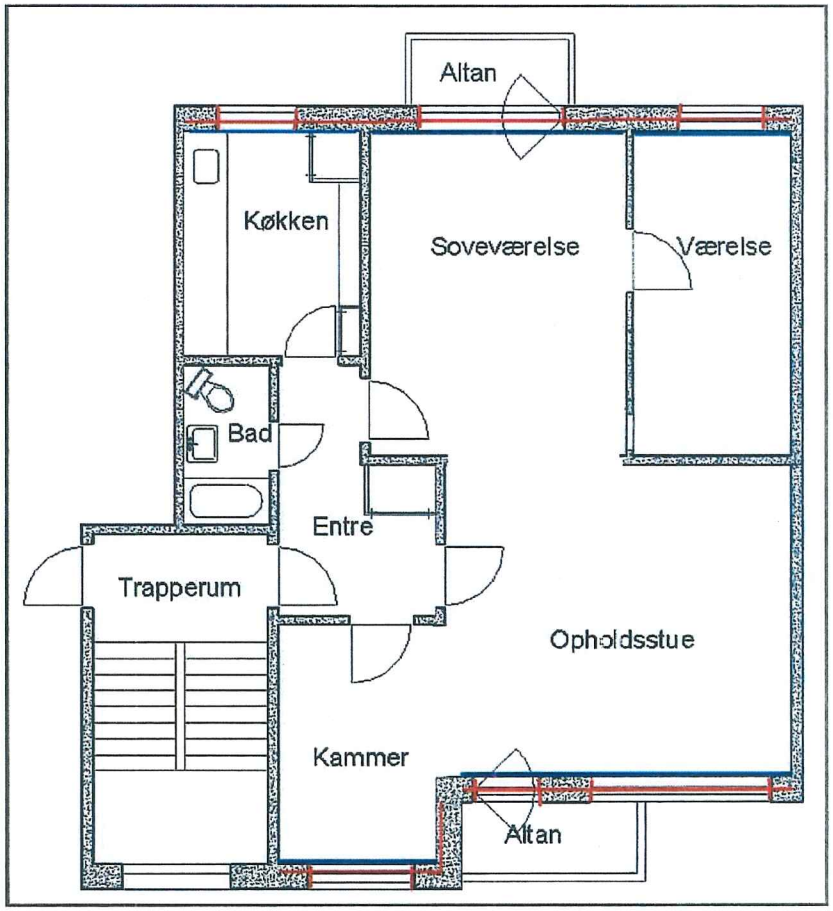
Dansk infrarød INSPEKTION

www.infrared.dk E-mail: info@infrared.dk Nørgårdsvej 11 DK-9440 Aabybro Tlf.: 9824 4460

På nedenstående skitse over grundplanen for lejlighed, er de steder indtegnet med blå og røde streger, hvor der er lokaliseret kuldebroer/luftlækager, fejl ved isoleringen osv.

Blå streger indikere fejl ved gulv/væg.

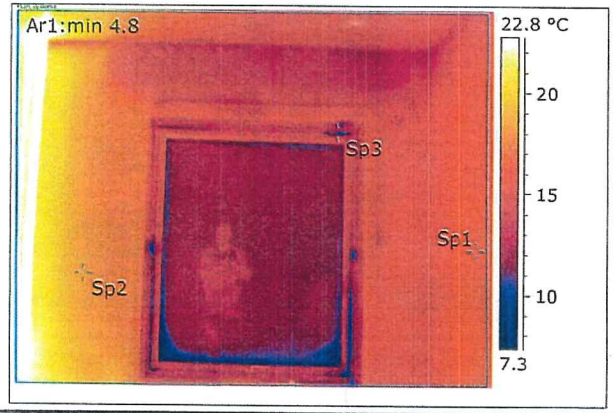
Røde streger indikere fejl ved loft/væg.



www.infrared.dk E-mail: info@infrared.dk Nørgårdsvej 11 DK-9440 Aabybro Tlf.: 9824 4460

Termografirapport.

Termografi nr.: 01 Lokalitet: Værelse.
Tom Lejlighed ADF 1
Peter Møllers Gade 30 2, th
9900 Frederikshavn
Dato for undersøgelse: 27. januar 2009



Object Parameter	Value
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Label	Value
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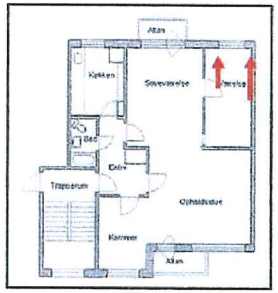
Sp2	17.8 °C
Sp3	9.0 °C
Ar1: Max	54.6 °C

IR_0212.JPG

Visuelt foto. Skitse over grundplan.





Luftlækage: ja Målt Lufthastighed ved luftlækage i m/s: ikke målt Kuldebro: ja

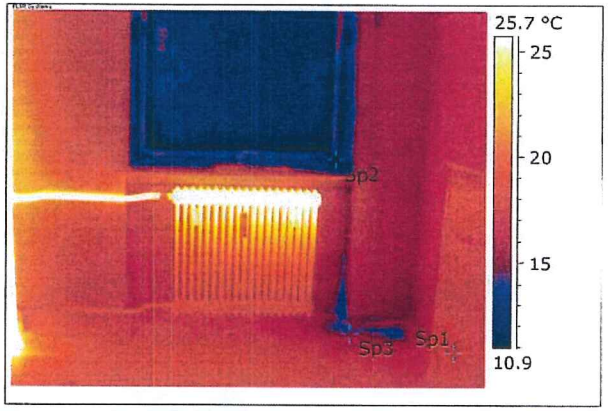
Bemærkninger.

Røde pile på ovenstående skitse markere området hvor termografiet er fra.
Ved vinduet ses der flere utætheder ved den nederste halvdel. Ved lysningen rundt omkring vinduet ses der også nogle små utætheder. Ved murværket til højre for vinduet og over vinduet ses der kuldebroer sandsynligvis på grund af ringe eller ingen isolering ved vægfladen. Ved overgangen mellem ydre væggen og loftet ses der også utætheder.

www.infrared.dk E-mail: info@infrared.dk Nørgårdsvej 11 DK-9440 Aabybro Tlf.: 9824 4460

Termografirapport.

Termografi nr.: 02 Lokalitet: Værelse.
Tom Lejlighed ADF 1
Peter Møllers Gade 30 2, th
9900 Frederikshavn
Dato for undersøgelse: 27. januar 2009



Object Parameter	Value
Emissivity	0.96
Label	Value
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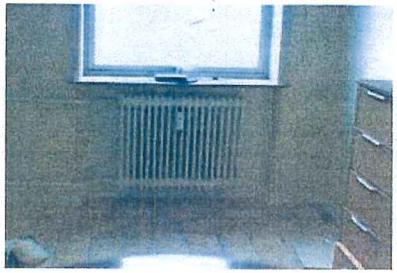
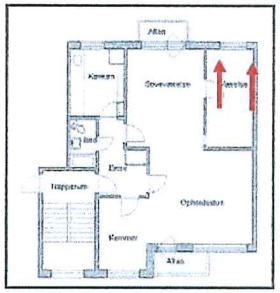
Sp2	6.7 °C
Sp3	15.4 °C

IR_0217.jpg

Visuelt foto. Skitse over grundplan.





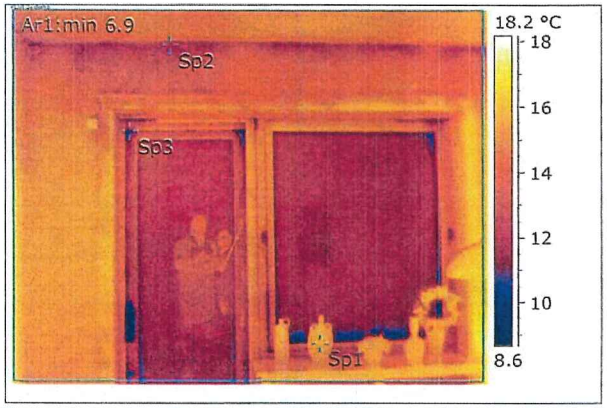
Luftlækage: ja Målt Lufthastighed ved luftlækage i m/s: 3,5 Kuldebro: ja

Bemærkninger.

Røde pile på ovenstående skitse markere området hvor termografiet er fra.
Ved vinduet ses der flere utætheder ved den nederste halvdel. Ved murværket til højre for vinduet og ned mod gulvet ses der kuldebroer sandsynligvis på grund af ringe eller ingen isolering ved vægfladen. Ved overgangen mellem ydrevæggen og gulv ses der også utætheder sandsynligvis omkring etage adskillelsen.

Termografirapport.

Termografi nr.: 03 Lokalitet: Soveværelse.
Tom Lejlighed ADF 1
Peter Møllers Gade 30 2, th
9900 Frederikshavn
Dato for undersøgelse: 27. januar 2009



Object Parameter	Value
Emissivity	0.96
Label	Value
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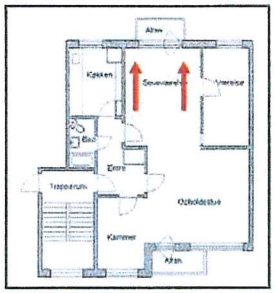
Sp2	11.7 °C
Sp3	10.0 °C
Ar1: Max	17.8 °C

IR_0219.jpg

Visuelt foto. Skitse over grundplan.





Luftlækage: ja Målt Lufthastighed ved luftlækage i m/s: 2,50 Kuldebro: ja

Bemærkninger.

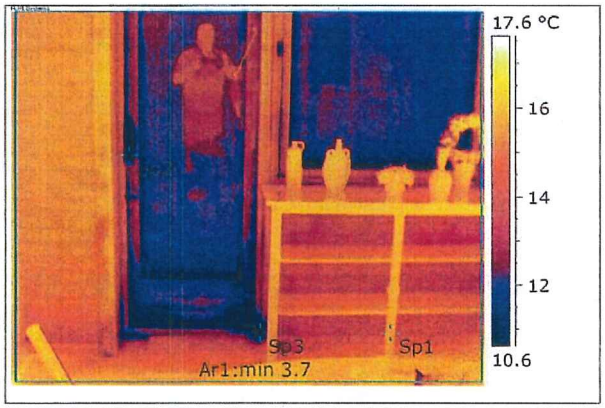
Røde pile på ovenstående skitse markere området hvor termografiet er fra.
Ved vinduet og terrassedør ses der flere utætheder. Ved lysningen rundt omkring vinduet og terrassedør ses der også nogle små utætheder. Ved murværket over vinduet ses der kuldebroer sandsynligvis på grund af ringe eller ingen isolering ved vægfladen. Ved overgangen mellem ydrevæggen og loftet ses der også utætheder.

Dansk infrarød (INSPEKTION)

www.infrared.dk E-mail: info@infrared.dk Nørgårdsvej 11 DK-9440 Aabybro Tlf.: 9824 4460

Termografirapport.

Termografi nr.: 04 Lokalitet: Soveværelse.
Tom Lejlighed ADF 1
Peter Møllers Gade 30 2, th
9900 Frederikshavn
Dato for undersøgelse: 27. januar 2009

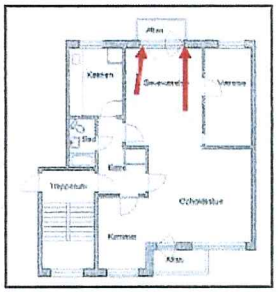


Object Parameter	Value
Emissivity	0.96
Label	Value
Sp1	15.8 °C
Sp2	7.5 °C
Sp3	5.2 °C
Ar1: Max	17.2 °C

IR_0221.JPG

Visuelt foto. Skitse over grundplan.





Luftlækage: ja Målt Lufthastighed ved luftlækage i m/s: 3,75 Kuldebro: ja

Bemærkninger.

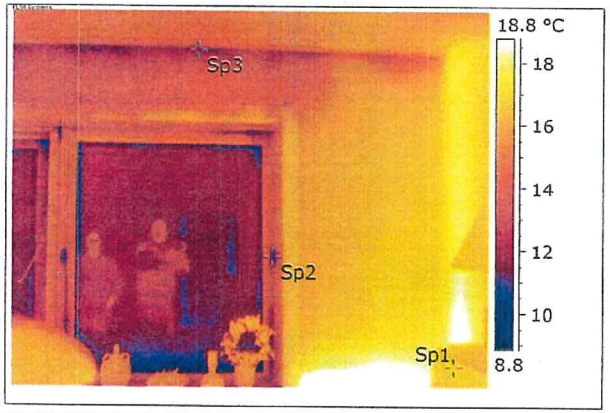
Røde pile på ovenstående skitse markere området hvor termografiet er fra.
Ved vinduet og terrassedør ses der flere utætheder. Ved lysningen rundt omkring vinduet og terrassedør ses der også nogle små utætheder. Ved murværket til venstre for terrassedøren og ned mod gulvet ses der kuldebroer sandsynligvis på grund af ringe eller ingen isolering ved vægfladen.
Ved overgangen mellem ydre væggen og gulv ses der også utætheder sandsynligvis omkring etage adskillelsen.

Dansk infrarød INSPEKTION

www.infrared.dk E-mail: info@infrared.dk Nørgårdsvej 11 DK-9440 Aabybro Tlf.: 9824 4460

Termografirapport.

Termografi nr.: 05 Lokalitet: Soveværelse.
Tom Lejlighed ADF 1
Peter Møllers Gade 30 2, th
9900 Frederikshavn
Dato for undersøgelse: 27. januar 2009



Object Parameter	Value
Emissivity	0.96
Label	Value
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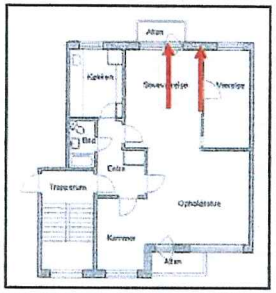
Sp2	10.9 °C
Sp3	11.3 °C

IR_0223.JPG

Visuelt foto. Skitse over grundplan.





Luftlækage: ja Målt Lufthastighed ved luftlækage i m/s: 2,5 Kuldebro: ja

Bemærkninger.

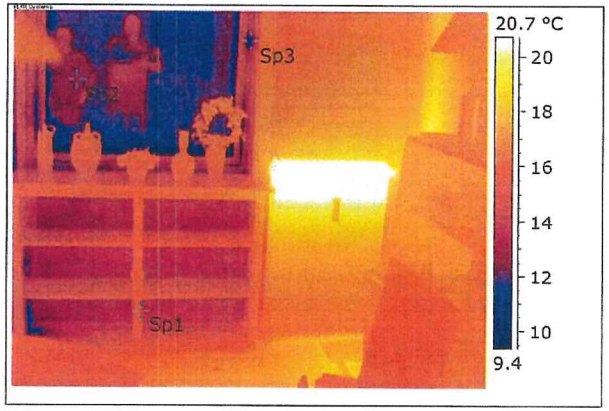
Røde pile på ovenstående skitse markere området hvor termografiet er fra.
Ved vinduet ses der flere utætheder ved det meste af vinduet. Ved lysningen rundt omkring vinduet ses der også nogle små utætheder. Ved murværket over vinduet ses der kuldebroer sandsynligvis på grund af ringe eller ingen isolering ved vægfladen. Ved overgangen mellem ydre væggen og loftet ses der også utætheder.

Dansk infrarød INSPEKTION

www.infrared.dk E-mail: info@infrared.dk Nørgårdsvej 11 DK-9440 Aabybro Tlf.: 9824 4460

Termografirapport.

Termografi nr.: 06 Lokalitet: Soveværelse.
Tom Lejlighed ADF 1
Peter Møllers Gade 30 2, th
9900 Frederikshavn
Dato for undersøgelse: 27. januar 2009



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Label	Value
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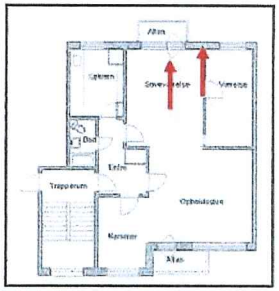
Sp2	12.7 °C
Sp3	11.2 °C

IR_0225.JPG

Visuelt foto. Skitse over grundplan.





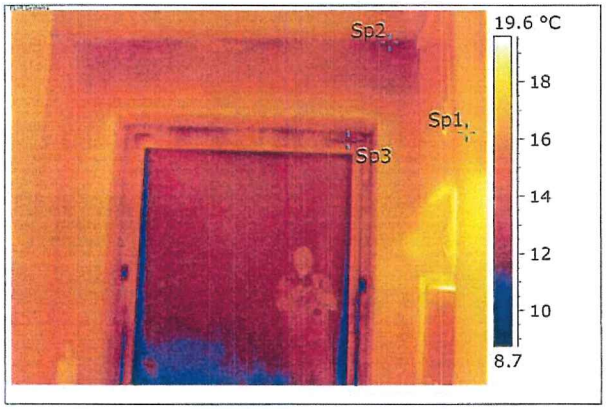
Luftlækage: ja Målt Lufthastighed ved luftlækage i m/s: 1,75 Kuldebro: ja

Bemærkninger.

Røde pile på ovenstående skitse markere området hvor termografiet er fra.
Ved vinduet, ses der flere utætheder. Ved lysningen rundt omkring vinduet og terrassedør ses der også nogle små utætheder. Ved murværket under vindue og ned mod gulvet ses der kuldebroer sandsynligvis på grund af ringe eller ingen isolering ved vægfladen.
Ved overgangen mellem ydre væggen og gulv ses der også utætheder sandsynligvis omkring Etage adskillelse.

Termografirapport.

Termografi nr.: 07 Lokalitet: Køkken.
Tom Lejlighed ADF 1
Peter Møllers Gade 30 2, th
9900 Frederikshavn
Dato for undersøgelse: 27. januar 2009



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Emissivity	0.96
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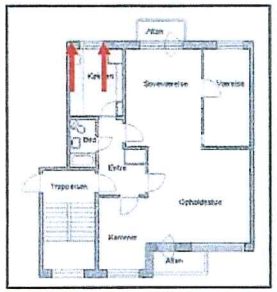
Sp2	11.8 °C
Sp3	11.4 °C

IR_0227.JPG

Visuelt foto. Skitse over grundplan.





Luftlækage: ja Målt Lufthastighed ved luftlækage i m/s: 1,65 Kuldebro: ja

Bemærkninger.

Røde pile på ovenstående skitse markere området hvor termografiet er fra.
Ved vinduet ses der flere utætheder ved den nederste halvdel. Ved lysningen rundt omkring vinduet ses der også nogle små utætheder. Ved murværket til højre for vinduet og over vinduet ses der kuldebroer sandsynligvis på grund af ringe eller ingen isolering ved vægfladen. Ved overgangen mellem ydre væggen og loftet ses der også utætheder.

Dansk infrarød INSPEKTION

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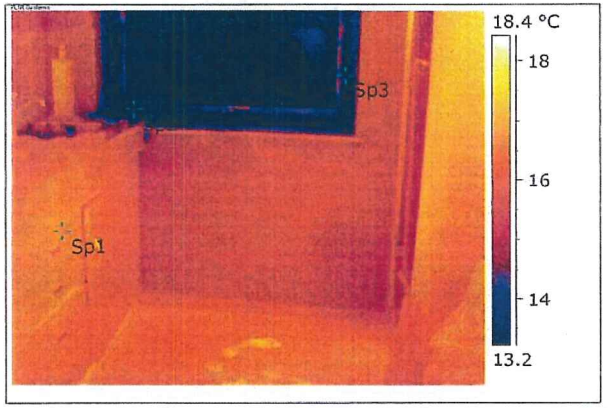
Termografirapport.

Termografi nr.: 08 Lokalitet: Køkken.
Tom Lejlighed ADF 1
Peter Møllers Gade 30 2, th
9900 Frederikshavn
Dato for undersøgelse: 27. januar 2009



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Label	**Value**
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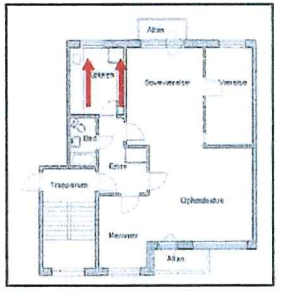
Sp2	11.5 °C
Sp3	10.6 °C

IR_0229.JPG

Visuelt foto. Skitse over grundplan.





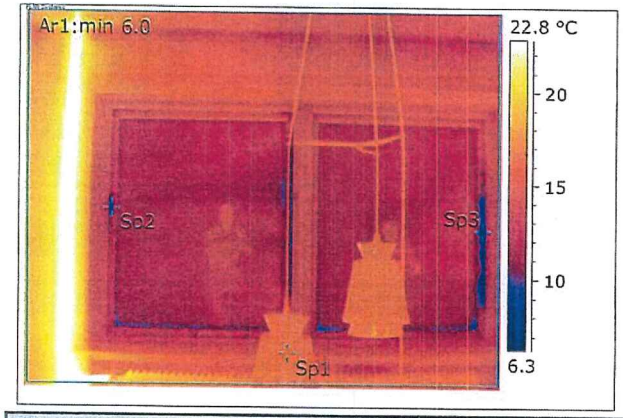
Luftlækage: ja Målt Lufthastighed ved luftlækage i m/s: 3,5 Kuldebro: ja

Bemærkninger.

Røde pile på ovenstående skitse markere området hvor termografiet er fra.
Ved vinduet ses der flere utætheder ved den nederste halvdel. Ved murværket under vinduet og ned mod gulvet ses der kuldebroer sandsynligvis på grund af ringe eller ingen isolering ved vægfladen. Ved overgangen mellem ydre væggen og gulv ses der også utætheder sandsynligvis omkring etage adskillelsen.

Termografirapport.

Termografi nr.: 09 Lokalitet: Stue.
Tom Lejlighed ADF 1
Peter Møllers Gade 30 2. th
9900 Frederikshavn
Dato for undersøgelse: 27. januar 2009



Object Parameter	Value
Emissivity	0.96
Label	Value
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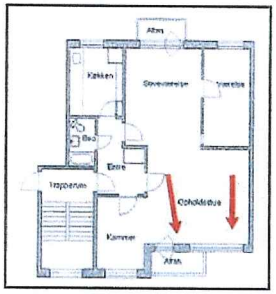
Sp2	9.5 °C
Sp3	6.3 °C
Ar1: Max	49.9 °C

IR_0231.JPG

Visuelt foto. Skitse over grundplan.





Luftlækage: ja Målt Lufthastighed ved luftlækage i m/s: 3,50 Kuldebro: ja

Bemærkninger.

Røde pile på ovenstående skitse markere området hvor termografiet er fra.
Ved vinduet ses der flere utætheder ved dette. Ved lysningen rundt omkring vinduet ses der også nogle små utætheder. Ved murværket over vinduet ses der kuldebroer sandsynligvis på grund af ringe eller ingen isolering ved vægfladen. Ved overgangen mellem ydre væggen og loftet ses der også utætheder.

Dansk infrarød INSPEKTION

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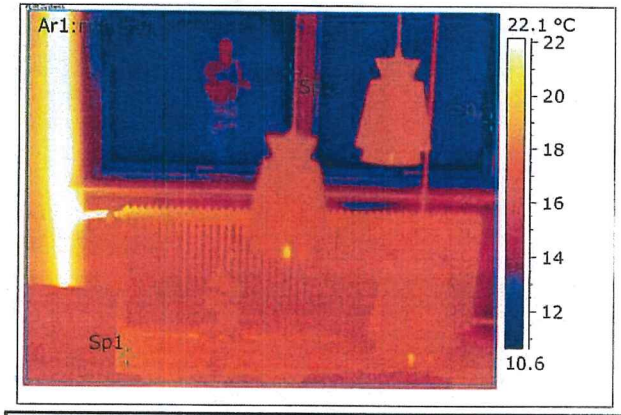
Termografirapport.

Termografi nr.: 10 Lokalitet: Stue.
Tom Lejlighed ADF 1
Peter Møllers Gade 30 2. th
9900 Frederikshavn
Dato for undersøgelse: 27. januar 2009



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Label	Value
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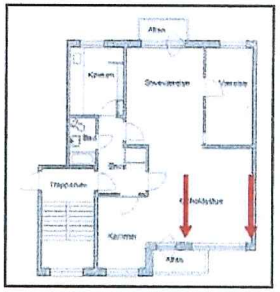
Sp3	6.8 °C
Ar1: Max	49.3 °C

IR_0233.JPG

Visuelt foto. Skitse over grundplan.





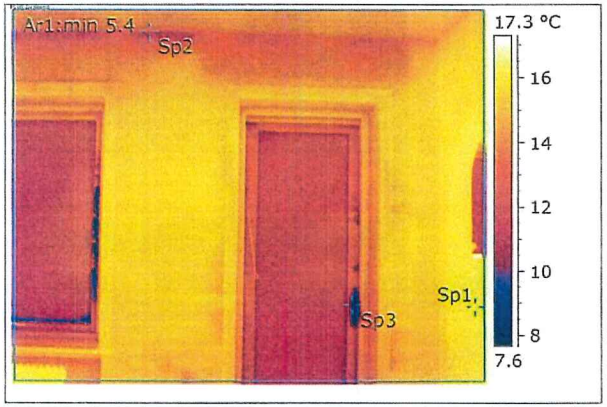
Luftlækage: ja Målt Lufthastighed ved luftlækage i m/s: 2,50 Kuldebro: ja

Bemærkninger.

Røde pile på ovenstående skitse markere området hvor termografiet er fra.
Ved vinduet ses der flere utætheder ved den nederste halvdel. Ved murværket under vinduet og ned mod gulvet ses der kuldebroer sandsynligvis på grund af ringe eller ingen isolering ved vægfladen. Ved overgangen mellem ydre væggen og gulv ses der også utætheder sandsynligvis omkring etage adskillelsen.

Termografirapport.

Termografi nr.: 11 Lokalitet: Stue
Tom Lejlighed ADF 1
Peter Møllers Gade 30 2, th
9900 Frederikshavn
Dato for undersøgelse: 27. januar 2009

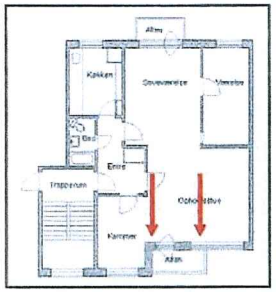


Object Parameter	Value
Emissivity	0.96
Label	Value
Sp1	15.9 °C
Sp2	11.9 °C
Sp3	6.4 °C
Ar1: Max	18.7 °C

IR_0235.JPG

Visuelt foto. **Skitse over grundplan.**





Luftlækage: ja **Målt Lufthastighed ved luftlækage i m/s: 2,25** **Kuldebro: ja**

Bemærkninger.

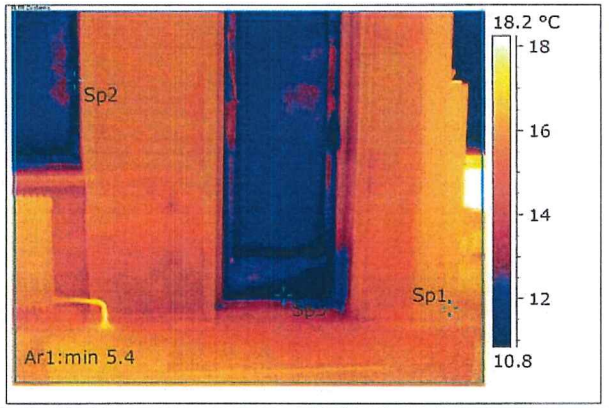
Røde pile på ovenstående skitse markere området hvor termografiet er fra.
Ved vinduet og terrasse døren ses der flere utætheder ved dette. Ved lysningen rundt omkring vinduet og terrasse døren ses der også nogle små utætheder. Ved murværket over vinduet og terrasse døren ses der kuldebroer sandsynligvis på grund af ringe eller ingen isolering ved vægfladen. Ved overgangen mellem ydrevæggen og loftet ses der også utætheder.

Dansk infrarød INSPEKTION

www.infrared.dk E-mail: info@infrared.dk Nørgårdsvej 11 DK-9440 Aabybro Tlf.: 9824 4460

Termografirapport.

Termografi nr.: 12 Lokalitet: Stue.
Tom Lejlighed ADF 1
Peter Møllers Gade 30 2, th
9900 Frederikshavn
Dato for undersøgelse: 27. januar 2009

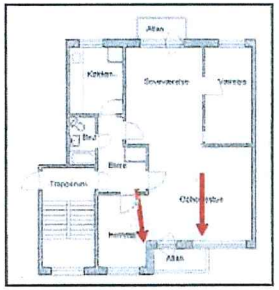


Object Parameter	Value
Emissivity	0.96
Label	Value
Sp1	15.7 °C
Sp2	7.2 °C
Sp3	6.3 °C
Ar1: Max	27.5 °C

IR_0237.jpg

Visuelt foto. **Skitse over grundplan.**





Luftlækage: ja **Målt Lufthastighed ved luftlækage i m/s: 2.25** **Kuldebro: ja**

Bemærkninger.

Røde pile på ovenstående skitse markere området hvor termografier er fra.
Ved vinduet og terrasse døren ses der flere utætheder ved den nederste halvdel. Ved murværket under vinduet og ned mod gulvet ses der kuldebroer sandsynligvis på grund af ringe eller ingen isolering ved vægfladen. Ved overgangen mellem ydre væggen og gulv ses der også utætheder sandsynligvis omkring etage adskillelsen.

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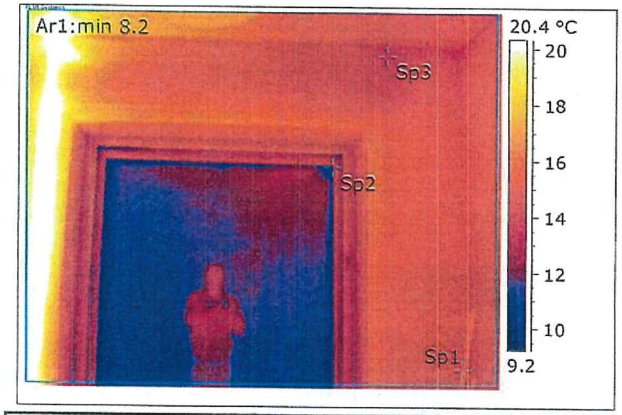
Termografirapport.

Termografi nr.: 13 Lokalitet: Kammer.
Tom Lejlighed ADF 1
Peter Mollers Gade 30 2, th
9900 Frederikshavn
Dato for undersøgelse: 27. januar 2009



Object Parameter	Value
Emissivity	0.96
Label	Value
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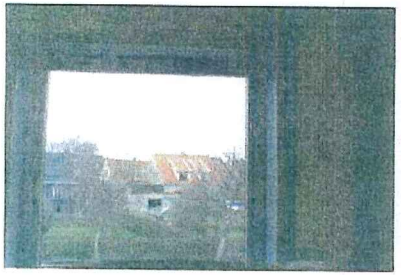
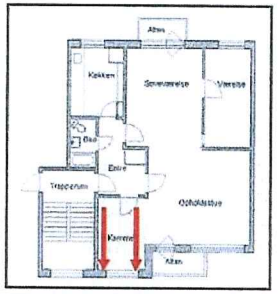
Sp2	10.7 °C
Sp3	13.5 °C
Ar1: Max	52.0 °C

IR_0239.jpg

Visuelt foto. Skitse over grundplan.





Luftlækage: ja Målt Lufthastighed ved luftlækage i m/s: 5,25 Kuldebro: ja

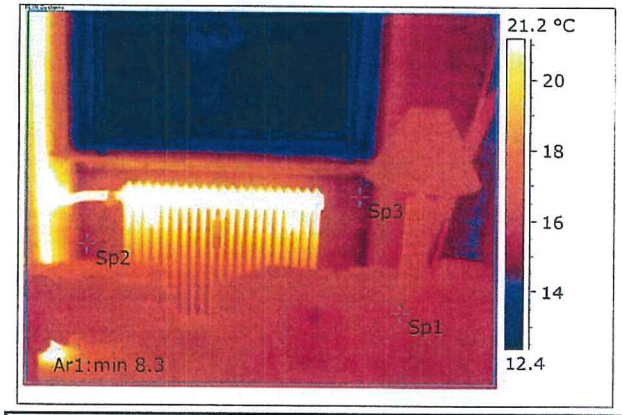
Bemærkninger.

Røde pile på ovenstående skitse markere området hvor termografiet er fra.
Ved vinduet ses der flere utætheder ved den nederste halvdel. Ved lysningen rundt omkring vinduet ses der også nogle små utætheder. Ved murværket til højre for vinduet og over vinduet ses der kuldebroer sandsynligvis på grund af ringe eller ingen isolering ved vægfladen. Ved overgangen mellem ydre væggen og loftet ses der også utætheder.

www.infrared.dk E-mail: info@infrared.dk Nørgårdsvej 11 DK-9440 Aabybro Tlf.: 9824 4460

Termografirapport.

Termografi nr.: 14 Lokalitet: Kammer.
Tom Lejlighed ADF 1
Peter Mollers Gade 30 2, th
9900 Frederikshavn
Dato for undersøgelse: 27. januar 2009

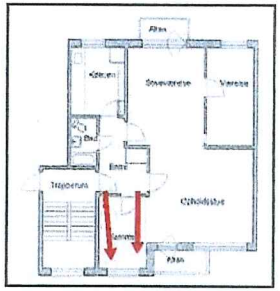


Object Parameter	Value
Emissivity	0.96
Label	Value
Sp1	16.1 °C
Sp2	15.5 °C
Sp3	14.9 °C
Ar1: Max	47.9 °C

IR_0241.jpg

Visuelt foto. Skitse over grundplan.





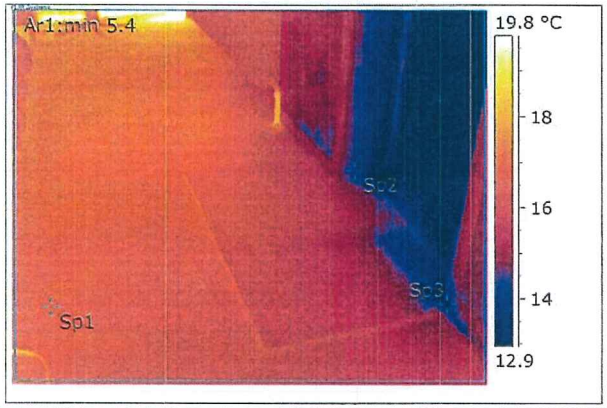
Luftlækage: ja Målt Lufthastighed ved luftlækage i m/s: ikke målt Kuldebro: ja

Bemærkninger.

Røde pile på ovenstående skitse markere området hvor termografiet er fra.
Ved vinduet ses der flere utætheder ved den nederste halvdel. Ved murværket under vinduet og ned mod gulvet ses der kuldebroer sandsynligvis på grund af ringe eller ingen isolering ved vægfladen.

Termografirapport.

Termografi nr.: 15 Lokalitet: Stue.
Tom Lejlighed ADF 1
Peter Møllers Gade 30 2, th
9900 Frederikshavn
Dato for undersøgelse: 27. januar 2009

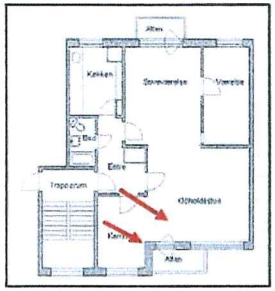


Object Parameter	Value
Emissivity	0.96
Label	Value
Sp1	16.7 °C
Sp2	14.2 °C
Sp3	13.4 °C
Ar1: Max	43.4 °C

IR_0243.jpg

Visuelt foto. **Skitse over grundplan.**





Luftlækage: ja **Målt Lufthastighed ved luftlækage i m/s: 0,37** **Kuldebro: ja**

Bemærkninger.

Røde pile på ovenstående skitse markere området hvor termografiet er fra.
På termografiet ses det tydeligt at utæthederne omkring etage adskillelsen giver en afkøling af gulve omkring terrasse døren.

Dansk infrarød INSPEKTION

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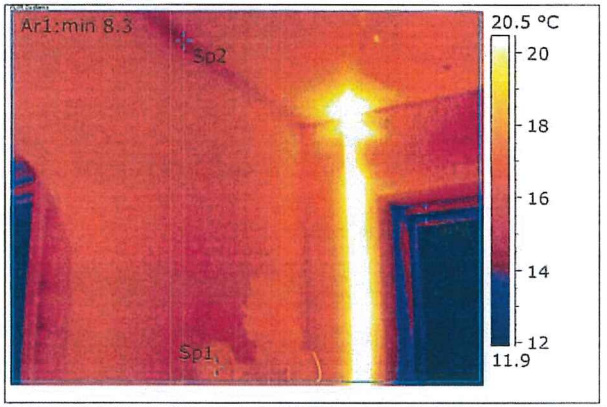
Termografirapport.

Termografi nr.: 16 Lokalitet: Kammer.
Tom Lejlighed ADF 1
Peter Møllers Gade 30 2, th
9900 Frederikshavn
Dato for undersøgelse: 27. januar 2009

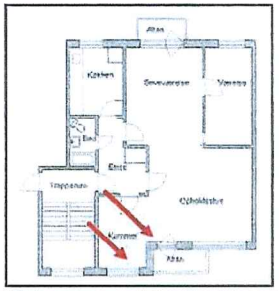


Object Parameter	Value
Emissivity	0.96
Label	Value
Sp1	16.1 °C
Sp2	14.2 °C
Sp3	12.0 °C
Ar1: Max	51.6 °C

IR_0245.JPG

Visuelt foto. **Skitse over grundplan.**





Luftlækage: Ja **Målt Lufthastighed ved luftlækage i m/s: ikke målt** **Kuldebro: ja**

Bemærkninger.

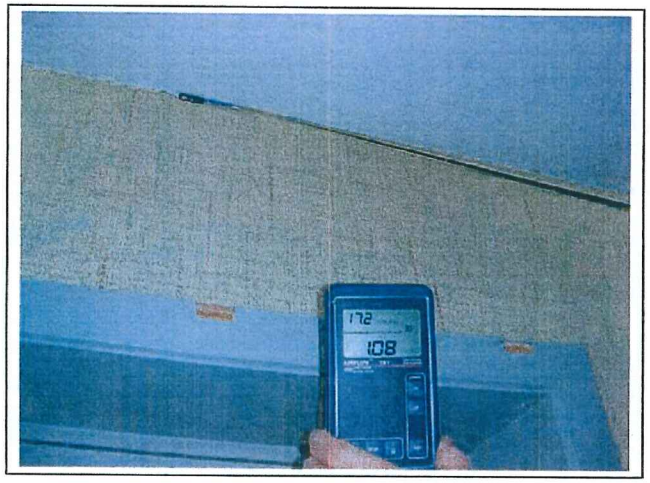
Røde pile på ovenstående skitse markere området hvor termografiet er fra.
Ved ydrevæggen ud til altanen ses det tydeligt at der er en ringe isolering ved denne vægflade

Her er nogle foto´s fra den undersøgte lejlighed, med målt lufthastighed ved utæthederne/luftlækager.

Vindue i værelse.



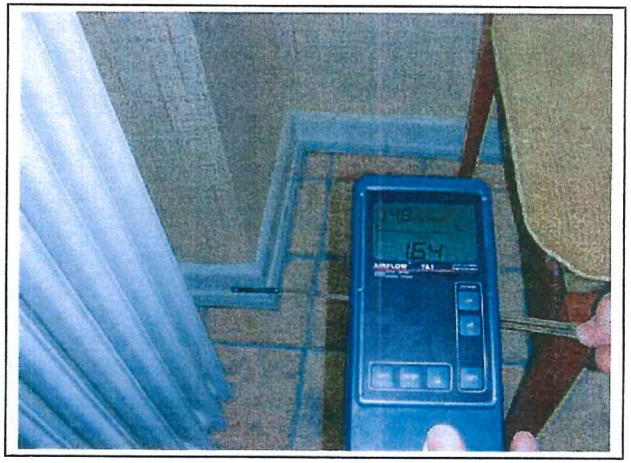
Værelse utæthed ved loft.



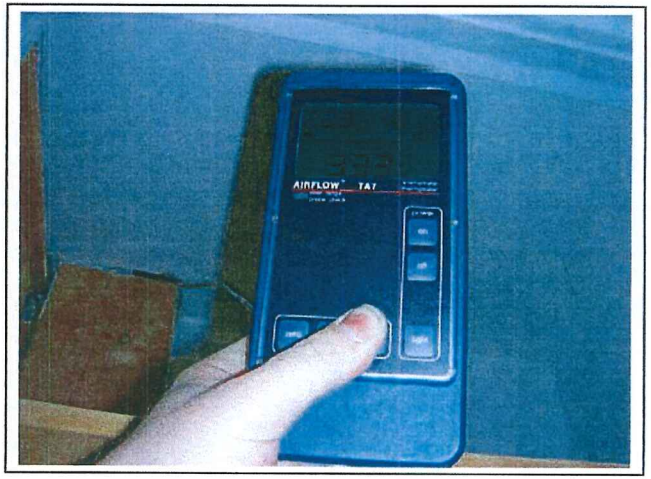
Dansk infrarød INSPEKTION
www.infrared.dk E-mail: info@infrared.dk Nørgårdsvej 11 DK-9440 Aabybro Tlf.: 9824 4460

Her er nogle foto´s fra den undersøgte lejlighed, med målt lufthastighed ved utæthederne/luftlækager.

Værelse lufthastighed ved gulv/etage adskillelse.



Gang lufthastighed ved gulv/etage adskillelse.



BUILDING LEAKAGE TEST

Undersøgelsen er udført af:
Dansk Infrarød Inspektion A/S
Nørgårdsvej 11, Biersted
Aabybro, 9440

Date of Test: 27-1-2009
Test File: Tom Lejlighed ADF 1, 23-01-2009

Technician: Bent Bagge Nøhr

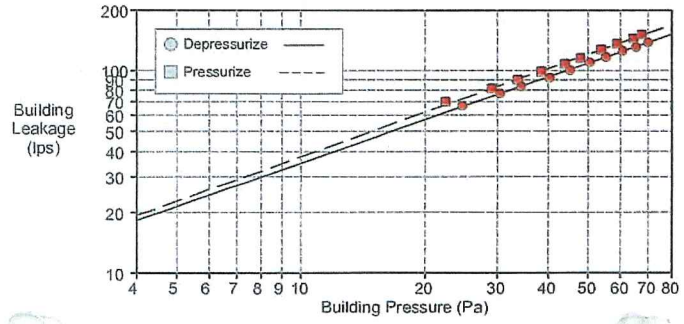
Customer: Frederikshavn Boligforening
Haralds Lundsgade 15
Frederikshavn, 9900
Phone: 96201940
Fax:

Building Address: Tom Lejlighed
Peter Møllers Gade 30 2, th
Frederikshavn, 9900

	Depressurization	Pressurization	Average
Test Results at 50 Pascals:			
V50: Airflow (lps)	109 (+/- 0.2 %)	121 (+/- 0.4 %)	115
n50: Air Changes per Hour (1/h)			
w50: lps/m² Floor Area	1.28	1.42	1.35
q50:			
Leakage Areas:			
Canadian EqLA @ 10 Pa (cm²)	140.0 (+/- 1.3 %)	150.9 (+/- 2.2 %)	145.4
LBL ELA @ 4 Pa (cm²)	70.5 (+/- 2.1 %)	74.7 (+/- 3.4 %)	72.6
Building Leakage Curve:			
Air Flow Coefficient (Cenv)	6.7 (+/- 3.2 %)	7.0 (+/- 5.3 %)	
Air Leakage Coefficient (CL)	6.8 (+/- 3.2 %)	7.0 (+/- 5.3 %)	
Exponent (n)	0.709 (+/- 0.008)	0.727 (+/- 0.013)	
Correlation Coefficient	0.99948	0.99865	

Test Standard: EN 13829
Regulation complied with:
Type of Test Method: B
Equipment: Model 4 (230V) Minneapolis Blower Door

Inside Temperature:	18 °C	Volume:	
Outside Temperature:	2 °C	Surface Area:	
Barometric Pressure:	101640 Pa	Floor Area:	85 m²
Wind Class:	0 Calm	Uncertainty of Building Dimensions:	%
Building Wind Exposure:	Highly Protected Building	Year of Construction:	1946
Type of Heating:	Fjernvarme		
Type of Air Conditioning:	Ingen		
Type of Ventilation:	None		



Date of Test: 27-1-2009 Test File: Tom Lejlighed ADF 1, 23-01-2009

Comments

Udluftning af køkkenskab er lukket af med tape.

Udluftning i badeværelse er lukket af med tape.

Alle vinduer og døre er lukket på normalvis.

Der er fyldt vand i alle vandlåse i lejligheden.

Data Points: Depressurization:

Nominal Building Pressure (Pa)	Fan Pressure (Pa)	Nominal Flow (lps)	Temperature Adjusted Flow (lps)	% Error	Fan Configuration
-2.7	n/a				
-72.6	41.7	145	139	0.1	Ring B
-68.0	37.5	137	132	-0.4	Ring B
-63.2	34.5	132	126	0.8	Ring B
-57.8	30.0	123	118	0.5	Ring B
-53.1	26.5	116	111	0.7	Ring B
-47.8	322.5	105	101	-0.6	Ring C
-42.8	270.7	96	92	-1.4	Ring C
-36.9	224.7	88	84	0.3	Ring C
-33.1	190.9	80	77	0.2	Ring C
-27.3	145.1	70	67	1.1	Ring C
-2.5	n/a				

Test 1 Baseline (Pa): p01- = -2.7 p01+ = 0.0 p02- = -2.5 p02+ = 0.0

Data Points: Pressurization:

Nominal Building Pressure (Pa)	Fan Pressure (Pa)	Nominal Flow (lps)	Temperature Adjusted Flow (lps)	% Error	Fan Configuration
-2.7	n/a				
66.0	43.6	148	152	-0.3	Ring B
62.9	39.7	141	145	-1.6	Ring B
57.4	35.2	133	137	-1.1	Ring B
52.3	30.7	124	128	-1.5	Ring B
46.4	367.8	113	116	-3.0	Ring C
42.4	323.1	106	108	-3.5	Ring C
36.9	271.4	96	99	-3.0	Ring C
32.2	226.4	88	90	-3.2	Ring C
27.6	185.1	79	81	-3.3	Ring C
21.0	139.5	68	70	0.1	Ring C
-0.3	n/a				

Test 1 Baseline (Pa): p01- = -2.7 p01+ = 0.0 p02- = -0.3 p02+ = 0.0

Dansk Infrarød Inspektion A/S

Test rapport for **MycoMeter – Test** ved skimmelsvamp analyse.

Undersøgelsessted:		
Tom Lejlighed ADF 1	Kontaktperson:	**Frederikshavn Boligforening**
	:	
	:	
	:	
Peter Mollers Gade 30 2, th	Forsikringsselskab:	
9900 Frederikshavn	Policenr:	
	Skadenr:	
	Operatør:	**Bent Bagge Nøhr**
Tlf: **98989898**	Dato:	**27. januar 2009**

Analyse efter MycoMetermetoden.	
Prøven er udtaget følgende sted i boligen:	Stue. ydervæg ud til altan.
Prøve er mærket:	1- 30- 2 Sal TH
Analyseværdien:	**1864 MT**

Foto fra prøvetagning.



Det konkluderes, at prøver var inficeret med skimmelsvampebiomasse svarende til kategori C dvs.
Niveauet er højt over det normale baggrundsniveau på grund af vækst af skimmelsvampe.

Det anbefales at området bliver afrenset og der efterfølgende bliver lavet en kontrolmåling til værdien kommer under 25 MT.

Resultat kategorier

Resultaterne er inddelt i tre kategorier svarende til forskellige niveauer af skimmelsvamp.

A	MycoMeter værdi ≤ 25 MT	Niveauet af skimmelsvampe er ikke over det normale baggrundsniveau.
B	MycoMeter værdi ≤ 450 MT	Niveauet af skimmelsvampe er over det normale baggrundsniveau. Dette kan skyldes høje koncentrationer af sporer i støv. eller kan indikere tilstedeværelse af en gammel udtørret svampeskade.
C	MycoMeter værdi > 450 MT	Niveauet er højt over det normale baggrundsniveau på grund af vækst af skimmelsvampe.

Note.
Kategorierne for Mycometer-testen er udviklet i forbindelse med et stort tværfagligt forskningsprogram "Skimmelsvampe i bygninger" med deltagelse af bl.a. Statens Byggeforsknings Institut, Danmarks Tekniske Universitet og Bispebjerg hospital.

Dansk Infrarød Inspektion udføre følgende opgaver

El-termografi :

- termografering af El - tavler og El-anlæg (lav – og højspænding
- termografering af fjernvarmenet.
- teknisk støvsugning af el-anlæg med L-AUS støvsugeanlæg
- belastningsmålinger, måling af IKmin og IKmax.
- termografi rapport i papir format og CD-rom udgave
- Web-baseret rapport arkiv.
- ved overhængende fare, rapporteres straks.

Bygningstermografi :

- tæthedsprøvning af bygninger i alle størrelser efter BR-08
- ved bygningstermografi arbejdes der med *Blowerdoor/vifte.*
- isoleringstest af bygninger, frysehuse, skibe osv.
- Skimmel svamp test tages og analyseres

Lækagesporinger :

- på rør installationer og varme anlæg (koldt/varmt)
- efter vandlækager.
- Lednings søgninger.
- sporing med isotop. (Br-82). *Halveringstid T½ = 35,3 timer.*
- undersøgelser med spore gas.
- lyttesporing med elektroakustisk lydudstyr..
- billedgengivelser af fejlstedet.
- komplet rapportering af fejlsted.

El-varmekabler:

- fejlsøgning og reparation af el-varmekabler
- optagning af fliser i forbindelse med reparation af el-kabel.
- ønskes det af kunden, kan murearbejde udføres efter endt reparation.

Dansk Infrarød Inspektion tilbyder også at løse specielle opgaver

Med venlig hilsen

DANSK INFRARØD INSPEKTION A/S

Bent B Nøhr

Bent Bagge Nøhr
Direktør



Mobiltelefon.: 4052 4460.



Dansk Infrarød Inspektion A/S
Nørgårdsvej 11 | DK-9440 Aabybro | Tlf. +45 98 24 44 60 | Døgnservice +45 40 52 44 60
www.infrared.dk | e-mail: info@infrared.dk
Hele Danmark som arbejdsområde

www.infrared.dk E-mail: info@infrared.dk Nørgårdsvej 11 DK-9440 Aabybro Tlf.: 9824 4460

Målerapport for luftgennemtrængelighed i bygning, samt termografisk inspektion af bygning.

Undersøgelsessted.		
Tom lejlighed AFD 1	Driftsansvarlig:	**Christian Sørensen**
Peter Møllers Gade 34 1,TH 9900 Frederikshavn	Medhjælper:	**Poul Sørensen**
	Måle operatør:	**Bent Bagge Nøhr**
98989898	Sagsbehandler:	**Karin Broch Nøhr**
christian@fbmail.dk	Dato for inspektion:	**27. januar 2009**

Prøvningsmetode med overtryk og undertryk skabt af ventilator efter:
DS/EN 13829.

Formålet med undersøgelsen er at identificere:
- Bygningens luftgennemtrængelighed
- Bygningens termiske ydeevne
- Luftlækager
- Kuldebroer

Inspektionen er udført af **Dansk Infrarød Inspektion A/S**, er en uvildig virksomhed, som har specialiseret sig i forebyggende vedligeholdelse og dokumentation af bygningers termiske ydeevne.

Termografiudstyr: **ThermaCAM SC – 640.**
Blowerdoor Type: **Minneapolis BlowerDoor Model 4, DG-700.**
Lufthastighedsmåleudstyr: **TSI-8347 A-M-G.**
Datalog: **EasyLog EL-USB-2.**

Bent B Nøhr
Bent Bagge Nohr

Underskrift.

Termografiansvarlig.

www.infrared.dk E-mail: info@infrared.dk Nørgårdsvej 11 DK-9440 Aabybro Tlf.: 9824 4460

Beskrivelse af undersøgelse og konklusion.

Ved undersøgelsen med BlowerDoor blev følgende udført:

BlowerDoor blev monteret i døren, i entreen, ud til trappe.

Der blev udført en test af bygningstætheden efter standarten EN 13829
Først blev der kørt en test med et overtryk på 50 Pascals.
Derefter en test med undertryk, således blev der målt et lækage tal ved 50 Pascals
og dette er målt til ved overtryk: **1,46 l/s m²** og ved undertryk: **1,26 l/s m²** .(Se bilag til rapport).
Lækage arealet i bygningen er målt til ved overtryk: **150,1 cm²**.
Lækage arealet i bygningen er målt til ved undertryk: **144,9 cm²**.

Efter 30 minutters drift, med et undertryk på 50 Pa. påbegyndtes der en inspektion med termografi, og her blev der spottet mange steder med utætheder ved klimaskærmen.

Disse utætheder ved klimaskærmen, medføre træk/kulde i bygning på vindsiden og på bagsiden af bygningen vil der komme et undertryk.

Undertrykket vil trække varm luft ud af bygningen ved eksempelvis huller i og ved klimaskærmen.
I vinterhalvåret vil varm fugtig luft kondensere på sin vej ud igennem utætheder i klimaskærmen, og dermed generere fugt i konstruktionen.

Der er konstateret flere steder ved lejligheden, hvor der er utætheder ved klimaskærmen, såsom:

1. Omkring etage adskillelsen, vinduerne, terrassedøren og ydervægge, er der utætheder ved lejlighedens klimaskærmen/tæthedsplan.

2. Ved ydervæggene for den undersøgte lejlighed ses det tydeligt at ved disse er der en meget ringe isolering eller ingen isolering.

3. Ved nogle af vinduerne skyldes utæthederne at gummilisterne ikke lukker tæt, eller vinduet skal justeres.

4. Ved gulvene i lejligheden trækker der kold luft rundt under disse når der sker en vindpåvirkning af lejligheden.

Når overstående utætheder ved klimaskærmen er udbedret vil det være passende at udføre en ny måling af tætheden ved klimaskærmen, som skal danne basis for om reparationen har minimeret utæthederne ved klimaskærmen.

Bygnings data:	
Etagearealet i undersøgt bygning/lejlighed:	**85,0 m²**
Inde temperatur målt i bygning ved opstart:	**20,00 °C**
Ude temperatur:	**2,0 °C**
Temperatur differences inde - ude Δt	**18,0 °C**
Type af bygning:	**Boligblok med stuen og 3 etager.**
Bygge år:	**1946.**
Type af opvarmning:	**Fjernvarme**
Type af ventilation/udsugning:	**Der er en ventil i badeværelse og en i køkken.**

Bemærkninger ved undersøgelsen.
Alle vinduer og døre er lukket på normal vis.
Aftræk i køkken forseglet med tape.
Aftræk i badeværelse er forseglet med tape.

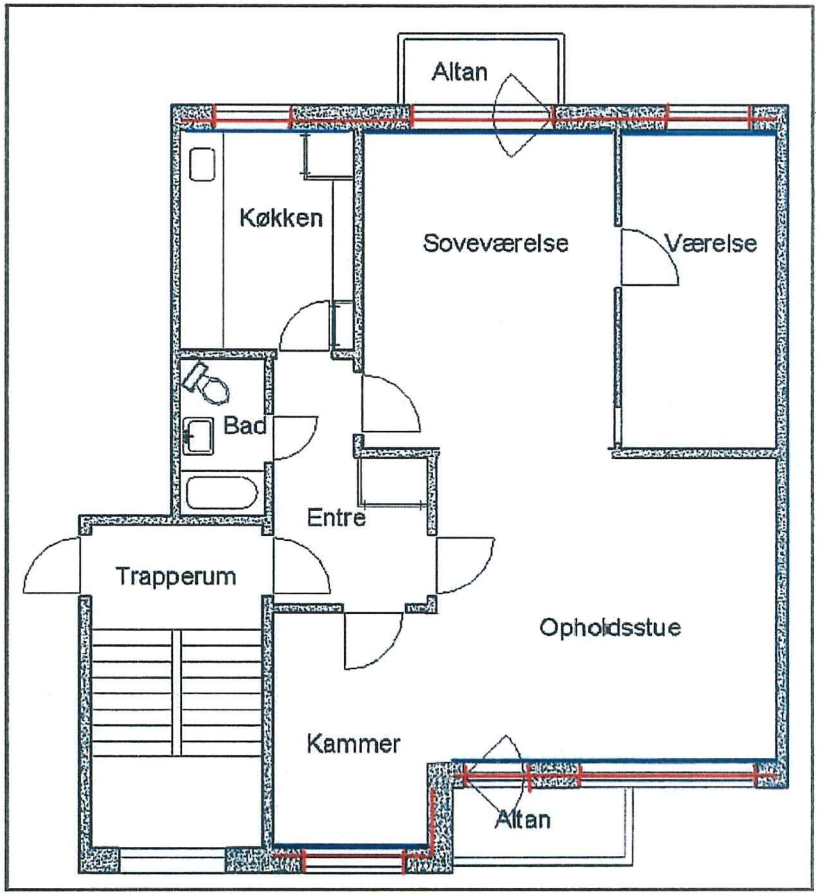
Øvrige bemærkninger ved undersøgelsen.

Dansk infrarød INSPEKTION
www.infrared.dk E-mail: info@infrared.dk Nørgårdsvej 11 DK-9440 Aabybro Tlf.: 9824 4460

På nedenstående skitse over grundplanen for bygning/lejlighed, er de steder indtegnet med blå og røde streger, hvor der er lokaliseret kuldebroer/luftlækager, fejl ved isoleringen osv.

Blå streger indikere fejl ved gulv/væg.

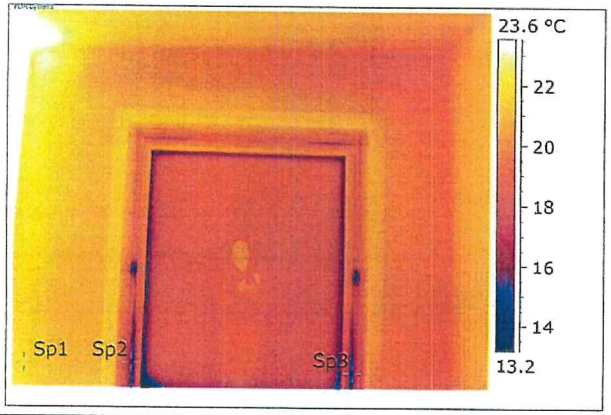
Røde streger indikere fejl ved loft/væg.



www.infrared.dk E-mail: info@infrared.dk Nørgårdsvej 11 DK-9440 Aabybro Tlf.: 9824 4460

Termografirapport.

Termografi nr.: 01 Lokalitet: Værelse.
Tom lejlighed AFD 1
Peter Møllers Gade 34 1,TH
9900 Frederikshavn
Dato for undersøgelse: 27. januar 2009

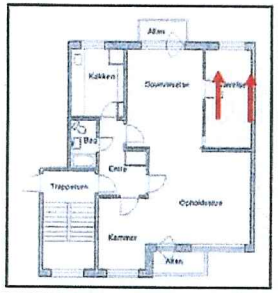


Object Parameter	Value
Emissivity	0.96
Label	Value
Sp1	21.5 °C
Sp2	13.4 °C
Sp3	15.4 °C

IR_0247.JPG

Visuelt foto. Skitse over grundplan.





Luftlækage: ja Målt Lufthastighed ved luftlækage i m/s: Kuldebro: ja

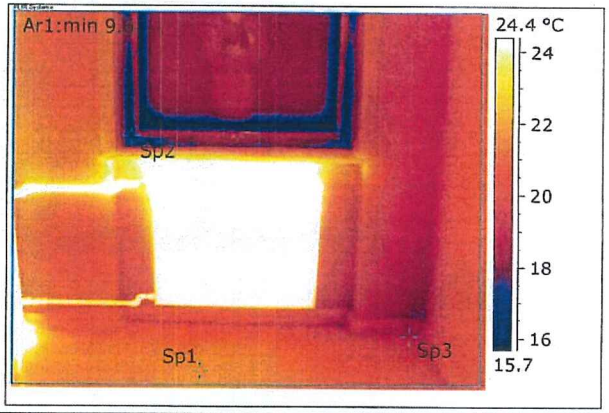
Bemærkninger.

Røde pile på ovenstående skitse markere området hvor termografiet er fra.
Ved termografiet af ydervæg og vindue i værelse, ses der luftlækager ved vinduet og ved ydrevægen op mod loftet ses der nogle kolde områder sandsynligvis på grund af ringe isolering og utætheder ved ydrevæggen.

www.infrared.dk E-mail: info@infrared.dk Nørgårdsvej 11 DK-9440 Aabybro Tlf.: 9824 4460

Termografirapport.

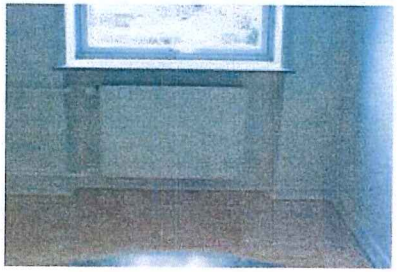
Termografi nr.: 02 Lokalitet: Værelse.
Tom lejlighed AFD 1
Peter Møllers Gade 34 1,TH
9900 Frederikshavn
Dato for undersøgelse: 27. januar 2009

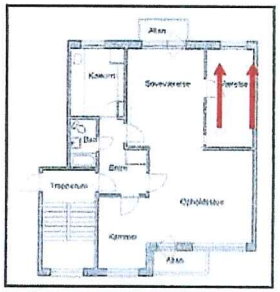


Object Parameter	Value
Emissivity	0.96
Label	Value
Sp1	21.8 °C
Sp2	15.6 °C
Sp3	18.3 °C
Ar1: Max	47.4 °C

IR_0249.JPG

Visuelt foto. Skitse over grundplan.





Luftlækage: ja Målt Lufthastighed ved luftlækage i m/s: Kuldebro: Ja

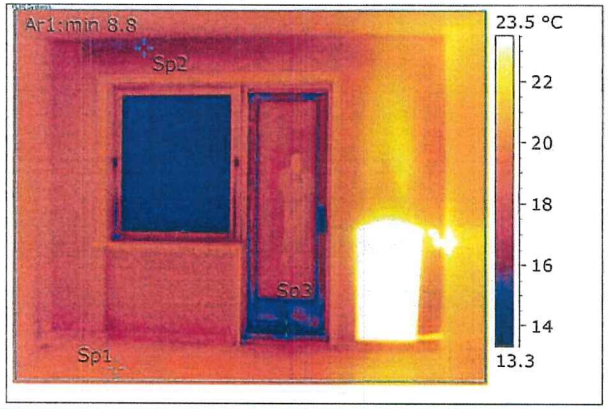
Bemærkninger.

Røde pile på ovenstående skitse markere området hvor termografiet er fra.
Ved termografiet af ydervæg og vindue i værelse, ses der luftlækager ved vinduet og ved ydrevægen ned mod gulvet ses der nogle kolde områder sandsynligvis, på grund af ringe isolering og utætheder omkring etage adskillelsen.

Dansk infrarød INSPEKTION
www.infrared.dk E-mail: info@infrared.dk Nørgårdsvej 11 DK-9440 Aabybro Tlf.: 9824 4460

Termografirapport.

Termografi nr.: 03 Lokalitet: Soveværelse.
Tom lejlighed AFD 1
Peter Møllers Gade 34 1,TH
9900 Frederikshavn
Dato for undersøgelse: 27. januar 2009

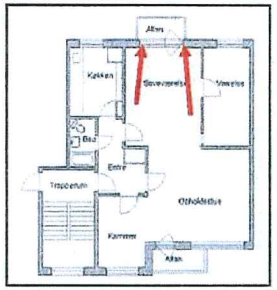


Object Parameter	Value
Emissivity	0.96
Label	**Value**
Sp1	19.1 °C
Sp2	15.9 °C
Sp3	11.0 °C
Ar1: Max	36.2 °C

IR_0251.JPG

Visuelt foto. **Skitse over grundplan.**





Luftlækage: Ja **Målt Lufthastighed ved luftlækage i m/s:** **Kuldebro: Ja**

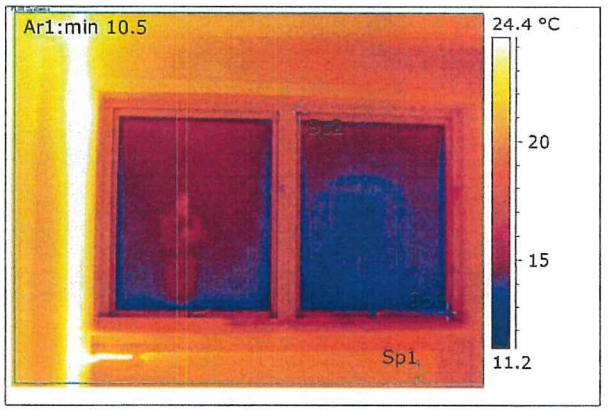
Bemærkninger.

Røde pile på ovenstående skitse markere området hvor termografiet er fra.
Ved termografiet af ydervæg, terrassedør, og vindue i soveværelse, ses der luftlækager ved vinduet, terrassedør og ved brystning under vinduet ned mod gulvet ses der nogle kolde områder.
Sandsynligvis, på grund af ringe isolering og utætheder omkring etage adskillelsen.
Ved murværk, overlægger over vindue og terrassedøren ses der en større kuldebro.

Dansk infrarød INSPEKTION
www.infrared.dk E-mail: info@infrared.dk Nørgårdsvej 11 DK-9440 Aabybro Tlf.: 9824 4460

Termografirapport.

Termografi nr.: 04 Lokalitet: Stue.
Tom lejlighed AFD 1
Peter Møllers Gade 34 1,TH
9900 Frederikshavn
Dato for undersøgelse: 27. januar 2009

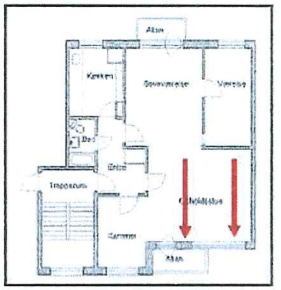


Object Parameter	Value
Emissivity	0.96
Label	**Value**
Sp1	19.2 °C
Sp2	15.3 °C
Sp3	14.5 °C
Ar1: Max	48.0 °C

IR_0253.JPG

Visuelt foto. **Skitse over grundplan.**





Luftlækage: ja **Målt Lufthastighed ved luftlækage i m/s:** **Kuldebro: ja**

Bemærkninger.

Røde pile på ovenstående skitse markere området hvor termografiet er fra.
Ved termografiet af ydervæg og vindue i stue, ses der luftlækager ved vinduet. Og ved ydrevæggen op mod loftet ses der nogle kolde områder, sandsynligvis på grund af ringe isolering og utætheder ved ydervæggen.

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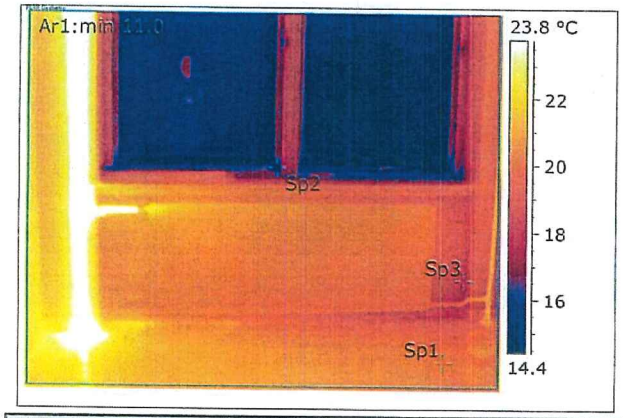
Termografirapport.

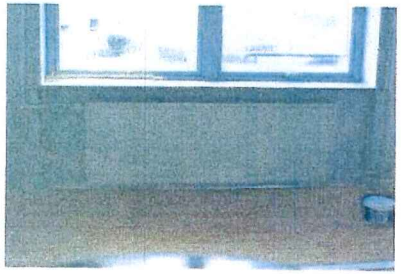
Termografi nr.: 05 Lokalitet: Stue.
Tom lejlighed AFD 1
Peter Møllers Gade 34 1,TH
9900 Frederikshavn
Dato for undersøgelse: 27. januar 2009

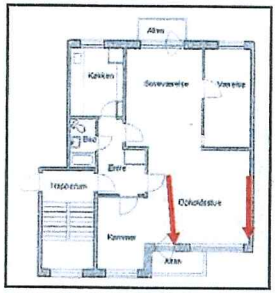


Object Parameter	Value
Emissivity	0.96
Label	Value
Sp1	20.4 °C
Sp2	15.3 °C
Sp3	17.9 °C
Ar1: Max	48.5 °C

IR_0255.JPG

Visuelt foto. **Skitse over grundplan.**





Luftlækage: ja **Målt Lufthastighed ved luftlækage i m/s:** **Kuldebro: Ja**

Bemærkninger.

Røde pile på ovenstående skitse markere området hvor termografiet er fra.
Ved termografiet af ydervæg og vindue i stue, ses der luftlækager ved vinduet og ved ydrevæggen ned mod gulvet ses der nogle kolde områder, sandsynligvis på grund af ringe isolering og utætheder ved ydervæggen.

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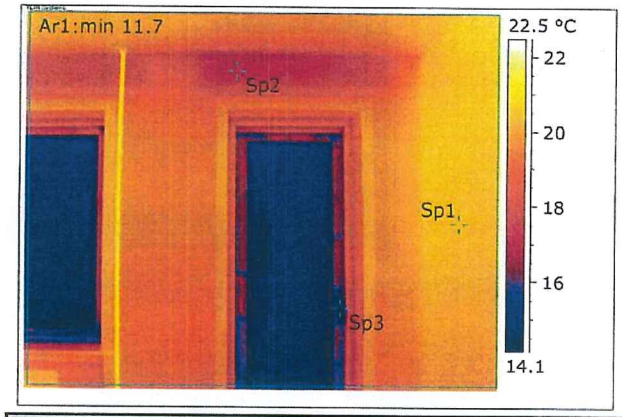
Termografirapport.

Termografi nr.: 06 Lokalitet: Stue.
Tom lejlighed AFD 1
Peter Møllers Gade 34 1,TH
9900 Frederikshavn
Dato for undersøgelse: 27. januar 2009

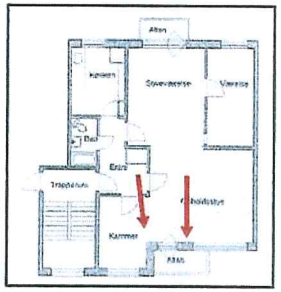


Object Parameter	Value
Emissivity	0.96
Label	Value
Sp1	20.3 °C
Sp2	17.3 °C
Sp3	12.9 °C
Ar1: Max	21.9 °C

IR_0257.jpg

Visuelt foto. **Skitse over grundplan.**





Luftlækage: ja **Målt Lufthastighed ved luftlækage i m/s:** **Kuldebro: ja**

Bemærkninger.

Røde pile på ovenstående skitse markere området hvor termografiet er fra.
Ved termografiet af ydervæg, vindue og terrassedør i stue, ses der luftlækager ved vinduet. Og ved ydrevæggen op mod loftet, ses der nogle kolde områder sandsynligvis på grund af ringe isolering og utætheder ved ydervæggen.

Dansk infrarød INSPEKTION
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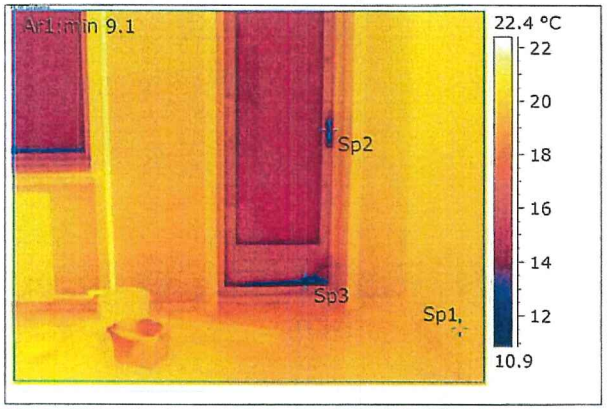
Termografirapport.

Termografi nr.: 07 Lokalitet: Stue.
Tom lejlighed AFD 1
Peter Møllers Gade 34 1,TH
9900 Frederikshavn
Dato for undersøgelse: 27. januar 2009

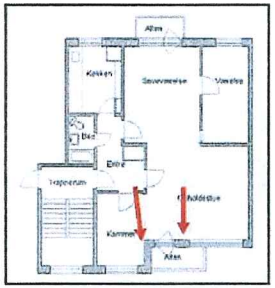


Object Parameter	Value
Emissivity	0.96
Label	Value
Sp1	19.3 °C
Sp2	13.6 °C
Sp3	11.4 °C
Ar1: Max	22.1 °C

IR_0259.jpg

Visuelt foto. **Skitse over grundplan.**





Luftlækage: ja **Målt Lufthastighed ved luftlækage i m/s:** **Kuldebro: ja**

Bemærkninger.

Røde pile på ovenstående skitse markere området hvor termografiet er fra.
Ved termografiet af ydervæg, vindue og terrassedør i stue, ses der store luftlækager ved terassedøren. Ved ydre væggen op mod loftet ses der nogle kolde områder, sandsynligvis på grund af ringe isolering og utætheder ved ydervæggen.

Dansk infrarød INSPEKTION
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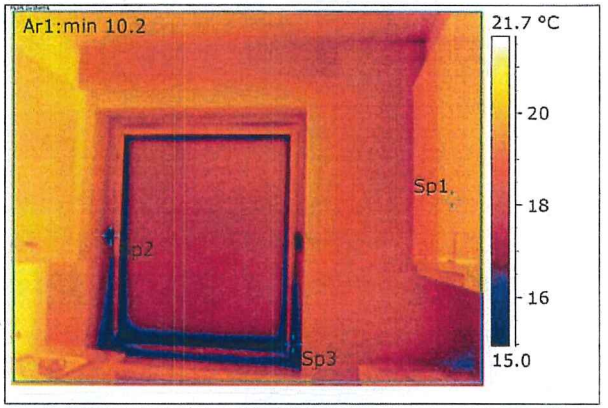
Termografirapport.

Termografi nr.: 08 Lokalitet: Køkken.
Tom lejlighed AFD 1
Peter Møllers Gade 34 1,TH
9900 Frederikshavn
Dato for undersøgelse: 27. januar 2009

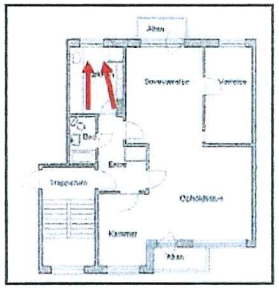


Object Parameter	Value
Emissivity	0.96
Label	Value
Sp1	19.3 °C
Sp2	14.5 °C
Sp3	13.6 °C
Ar1: Max	21.3 °C

IR_0261.JPG

Visuelt foto. **Skitse over grundplan.**





Luftlækage: ja **Målt Lufthastighed ved luftlækage i m/s:** **Kuldebro: ja**

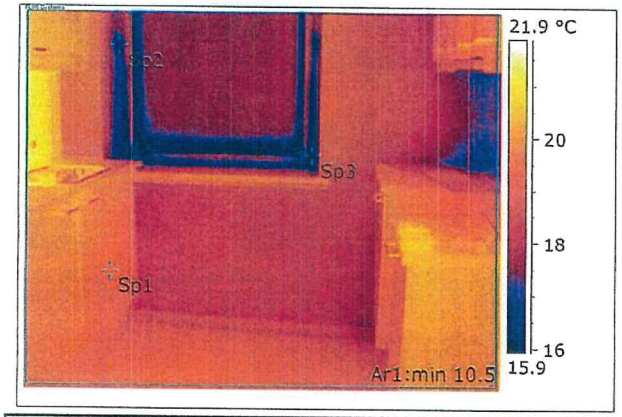
Bemærkninger.

Røde pile på ovenstående skitse markere området hvor termografiet er fra.
Ved termografiet af ydervæg og vindue i køkken, ses der luftlækager ved vinduet. Og ved ydrevæggen op mod loftet ses der nogle kolde områder sandsynligvis på grund af ringe isolering og utætheder ved ydervæggen.

www.infrared.dk E-mail: info@infrared.dk Nørgårdsvej 11 DK-9440 Aabybro Tlf.: 9824 4460

Termografirapport.

Termografi nr.: 09 Lokalitet: Køkken.
Tom lejlighed AFD 1
Peter Møllers Gade 34 1,TH
9900 Frederikshavn
Dato for undersøgelse: 27. januar 2009

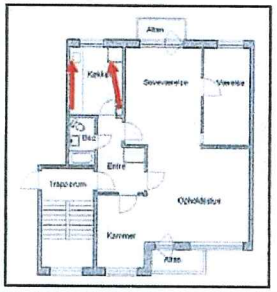


Object Parameter	Value
Emissivity	0.96
Label	Value
Sp1	19.4 °C
Sp2	14.4 °C
Sp3	15.4 °C
Ar1: Max	22.5 °C

IR_0263.JPG

Visuelt foto. Skitse over grundplan.





Luftlækage: ja Målt Lufthastighed ved luftlækage i m/s: Kuldebro: ja

Bemærkninger.

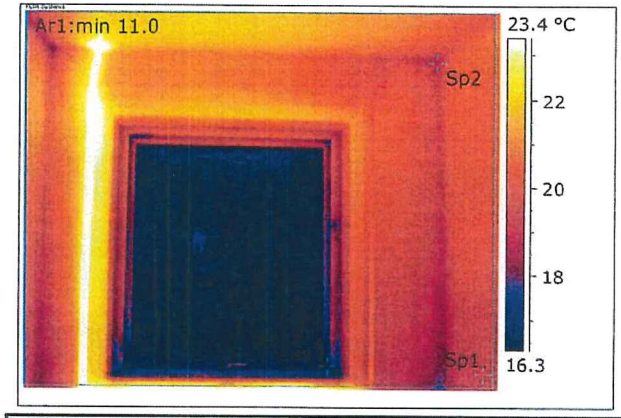
Røde pile på ovenstående skitse markere området hvor termografiet er fra.
Ved termografiet af ydervæg og vindue i køkken, ses der luftlækager ved vinduet og ved ydrevæggen ned mod gulvet ses der nogle kolde områder, sandsynligvis på grund af ringe isolering og utætheder ved ydervæggen.

ASNT. Certificeret i Level I & Level II.

www.infrared.dk E-mail: info@infrared.dk Nørgårdsvej 11 DK-9440 Aabybro Tlf.: 9824 4460

Termografirapport.

Termografi nr.: 10 Lokalitet: Kammer.
Tom lejlighed AFD 1
Peter Møllers Gade 34 1,TH
9900 Frederikshavn
Dato for undersøgelse: 27. januar 2009

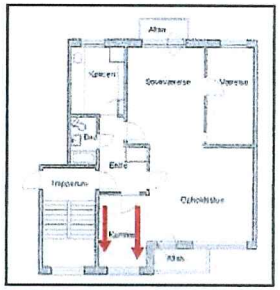


Object Parameter	Value
Emissivity	0.96
Label	Value
Sp1	19.5 °C
Sp2	19.3 °C
Sp3	14.1 °C
Ar1: Max	38.8 °C

IR_0265.JPG

Visuelt foto. Skitse over grundplan.





Luftlækage: ja Målt Lufthastighed ved luftlækage i m/s: Kuldebro: ja

Bemærkninger.

Røde pile på ovenstående skitse markere området hvor termografiet er fra.
Ved termografiet af ydervæg og vindue i kammer, ses der luftlækager ved vinduet. Og ved ydre væggen op mod loftet ses der nogle kolde områder, sandsynligvis på grund af ringe isolering og utætheder ved ydervæggen.

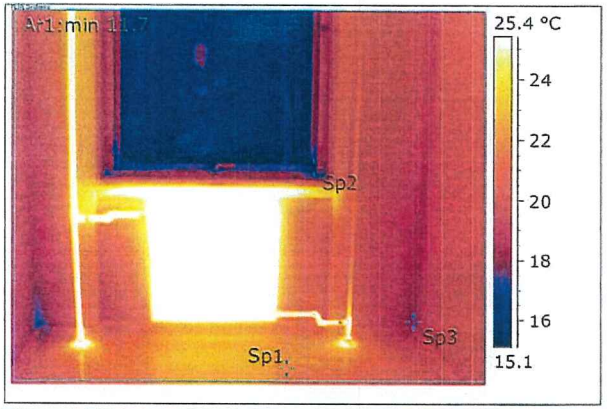
ASNT. Certificeret i Level I & Level II.

Dansk infrarød (INSPEKTION)

www.infrared.dk E-mail: info@infrared.dk Nørgårdsvej 11 DK-9440 Aabybro Tlf.: 9824 4460

Termografirapport.

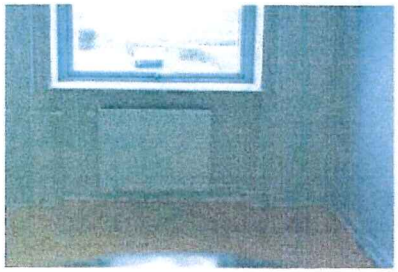
Termografi nr.: 11 Lokalitet: Kammer.
Tom lejlighed AFD 1
Peter Møllers Gade 34 1.TH
9900 Frederikshavn
Dato for undersøgelse: 27. januar 2009

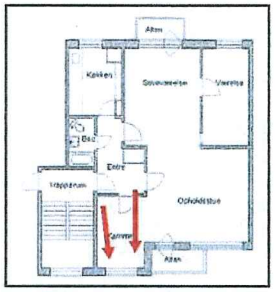


Object Parameter	Value
Emissivity	0.96
Label	Value
Sp1	21.9 °C
Sp2	14.9 °C
Sp3	17.4 °C
Ar1: Max	37.9 °C

IR_0267.JPG

Visuelt foto. **Skitse over grundplan.**





Luftlækage: ja **Målt Lufthastighed ved luftlækage i m/s:** **Kuldebro: ja**

Bemærkninger.

Røde pile på ovenstående skitse markere området hvor termografiet er fra.
Ved termografiet af ydervæg og vindue i kammer, ses der luftlækager ved vinduet. Og ved ydre væggen ned mod gulvet ses der nogle kolde områder, sandsynligvis på grund af ringe isolering og utætheder ved ydervæggen.

Dansk infrarød (INSPEKTION)

BUILDING LEAKAGE TEST

Undersøgelsen er udført af:
Dansk Infrarød Inspektion A/S
Nørgårdsvej 11, Bierstæc
Aabybro, 9440

Date of Test: 27-1-2009 Technician: Bent Bagge Nøhr
Test File: Tom lejlighed AFD 1, 23-01-2009

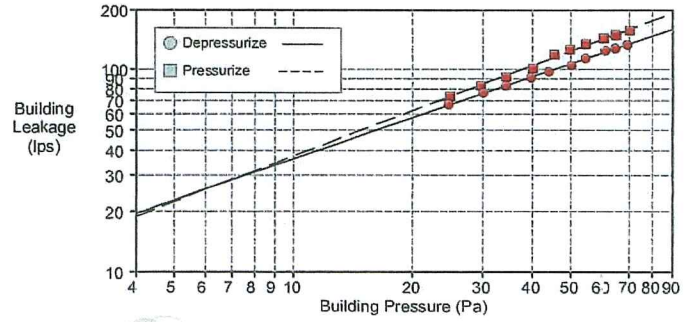
Customer: Frederikshavn Boligforening
Haralds Lundsgade 15
Frederikshavn, 9900
Phone: 96201940
Fax:

Building Address: Tom Lejlighed
Peter Møllers Gade 34 1, th
Frederikshavn, 9900

	Depressurization	Pressurization	Average
Test Results at 50 Pascals:			
V50: Airflow (lps)	107 (+/- 0.4 %)	124 (+/- 0.7 %)	116
n50: Air Changes per Hour (1/h)			
w50: lps/m² Floor Area	1.26	1.46	1.36
q50:			
Leakage Areas:			
Canadian EqLA @ 10 Pa (cm²)	144.9 (+/- 2.0 %)	150.1 (+/- 4.2 %)	147.5
LBL ELA @ 4 Pa (cm²)	75.2 (+/- 3.2 %)	73.0 (+/- 6.5 %)	74.1
Building Leakage Curve:			
Air Flow Coefficient (Cenv)	7.4 (+/- 4.9 %)	6.7 (+/- 9.9 %)	
Air Leakage Coefficient (CL)	7.6 (+/- 4.9 %)	6.7 (+/- 9.9 %)	
Exponent (n)	0.676 (+/- 0.012)	0.747 (+/- 0.025)	
Correlation Coefficient	0.99867	0.99550	

Test Standard: EN 13829 Regulation complied with:
Type of Test Method: B
Equipment: Model 4 (230V) Minneapolis Blower Door

Inside Temperature:	20 °C	Volume:	
Outside Temperature:	2 °C	Surface Area:	
Barometric Pressure:	101325 Pa	Floor Area:	85 m²
Wind Class:	0 Calm	Uncertainty of	
Building Wind Exposure:	Highly Protected Building	Building Dimensions:	%
Type of Heating:	Fjernvarme	Year of Construction:	1946
Type of Air Conditioning:	Ingen		
Type of Ventilation:	None		



BUILDING LEAKAGE TEST Page 2

Date of Test: 27-1-2009 Test File: Tom lejlighed AFD 1, 23-01-2009

Comments

Emhætte er blokeret med tape.

Aftræk er afblændet i badeværelse.

Alle vinduer og døre er lukket på normalvis.

Der er fyldt vand i alle vandlåse i lejligheden.

Data Points: Depressurization:

Nominal Building Pressure (Pa)	Fan Pressure (Pa)	Nominal Flow (lps)	Temperature Adjusted Flow (lps)	% Error	Fan Configuration
-3.9	n/a				
-73.6	38.8	140	134	0.1	Ring B
-68.9	35.7	134	128	0.7	Ring B
-65.3	33.9	131	125	2.0	Ring B
-58.7	28.3	119	114	0.8	Ring B
-54.4	350.3	110	105	-1.8	Ring C
-48.3	305.1	102	98	-0.1	Ring C
-44.0	267.6	96	92	0.0	Ring C
-38.6	222.5	87	83	0.4	Ring C
-34.4	190.0	80	77	1.1	Ring C
-28.9	147.4	70	67	1.6	Ring C
-4.7	n/a				

Test 1 Baseline (Pa): p01- = -3.9 p01+ = 0.0 p02- = -4.7 p02+ = 0.0

Data Points: Pressurization:

Nominal Building Pressure (Pa)	Fan Pressure (Pa)	Nominal Flow (lps)	Temperature Adjusted Flow (lps)	% Error	Fan Configuration
-2.4	n/a				
68.0	46.2	152	157	-1.8	Ring B
62.4	41.6	145	149	-0.9	Ring B
58.3	38.6	139	144	0.3	Ring B
52.3	33.8	130	135	1.4	Ring B
47.5	29.8	122	127	2.0	Ring B
43.1	26.5	116	119	3.2	Ring B
37.9	281.3	98	101	-4.0	Ring C
32.2	232.9	89	92	-2.3	Ring C
27.5	190.7	80	83	-1.7	Ring C
22.6	151.9	71	74	-0.1	Ring C
-2.1	n/a				

Test 1 Baseline (Pa): p01- = -2.4 p01+ = 0.0 p02- = -2.1 p02+ = 0.0

Dansk Infrarød Inspektion udføre følgende opgaver:

El-termografi :

- termografering af El - tavler og El-anlæg (lav – og højspænding)
- termografering af fjernvarmenet.
- teknisk støvsugning af el-anlæg med L-AUS støvsugeanlæg
- belastningsmålinger, måling af IKmin og IKmax.
- termografi rapport i papir format og CD-rom udgave
- Web-baseret rapport arkiv.
- ved overhængende fare, rapporteres straks.

Bygningstermografi :

- tæthedsprøvning af bygninger i alle størrelser efter BR-08
- ved bygningstermografi arbejdes der med *Blowerdoor/vifte.*
- isoleringstest af bygninger, frysehuse, skibe osv.
- Skimmel svamp test tages og analyseres

Lækagesporinger :

- på rør installationer og varme anlæg (koldt/varmt)
- efter vandlækager.
- Lednings søgninger.
- sporing med isotop. (Br-82). *Halveringstid T½ = 35,3 timer.*
- undersøgelser med spore gas.
- lyttesporing med elektroakustisk lydudstyr..
- billedgengivelser af fejlstedet.
- komplet rapportering af fejlsted.

El-varmekabler:

- fejlsøgning og reparation af el-varmekabler
- optagning af fliser i forbindelse med reparation af el-kabel.
- ønskes det af kunden, kan murearbejde udføres efter endt reparation.

Dansk Infrarød Inspektion tilbyder også at løse special opgaver

Med venlig hilsen

DANSK INFRARØD INSPEKTION A/S



Bent B Nøhr

Bent Bagge Nøhr
Direktør

Mobiltelefon.: 4052 4460.



Dansk Infrarød Inspektion A/S

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www.infrared.dk · e-mail: info@infrared.dk

Hele Danmark
som arbejdsområde

FOTOBILAG 1

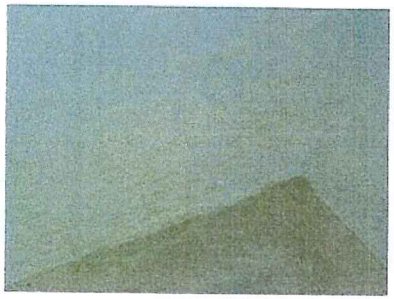


Foto nr. 1.1: Misfarvning og udfældning på kældervæg



Foto nr. 1.2: Afskalninger og udfældning på kældervæg

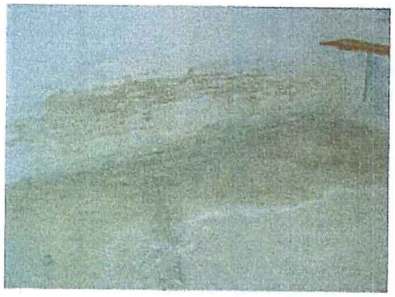


Foto nr. 1.3: Afskalninger og udfældning på kældervæg



Foto nr. 1.4: Gennemsivning ved kælderydervæg



Foto nr. 1.5: Afskalninger på malerbehandlet kældergulv mod jord



Foto nr. 1.6: Revne i kældergulv mod jord



Foto nr. 1.7: Revner i kældergulv mod jord

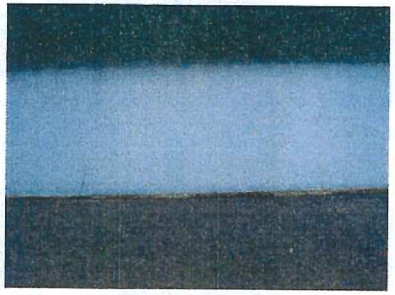


Foto nr. 1.8: Revner i sokkel under østvendt gavl



Foto nr. 1.9: Revner i sokkel under østvendt gavl



Foto nr. 1.10: Tagkonstruktion med aktive borebiller



Foto nr. 1.11: Tagkonstruktion med aktive borebiller



Foto nr. 1.12: Altanbund med forkert fald

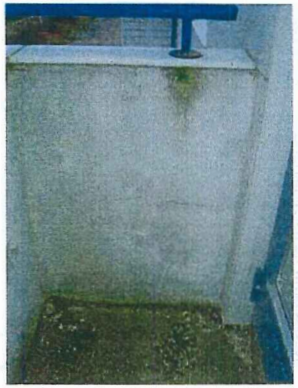


Foto nr. 1.13: Mos- og algebegroning på altan



Foto nr. 1.14: Revne i bagside af altanbrystning



Foto nr. 1.15: Afskalninger på bagside af altanbrystning



Foto nr. 1.16: Misfarvning af altanbrystning



Foto nr. 1.17: Partiel udskiftning af afløbsinstallation



Foto nr. 1.18: Gennemæring på faldstamme

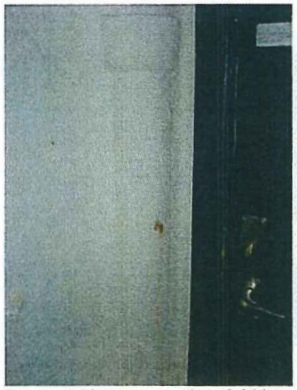


Foto nr. 1.19: Gennemtæring på faldstamme



Foto nr. 1.20: Gennemæring på faldstamme



Foto nr. 1.21: Ældre radiator

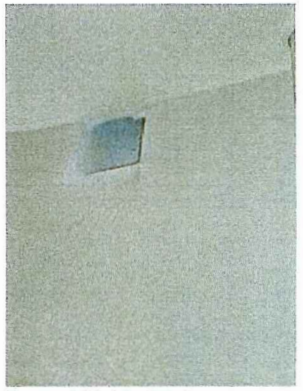


Foto nr. 1.22: Aftræk fra badeværelse

United Kingdom Demo Site

The list of the following documents is provided as supplement to the Deliverable 2.3.

A. Architectural drawings before renovation

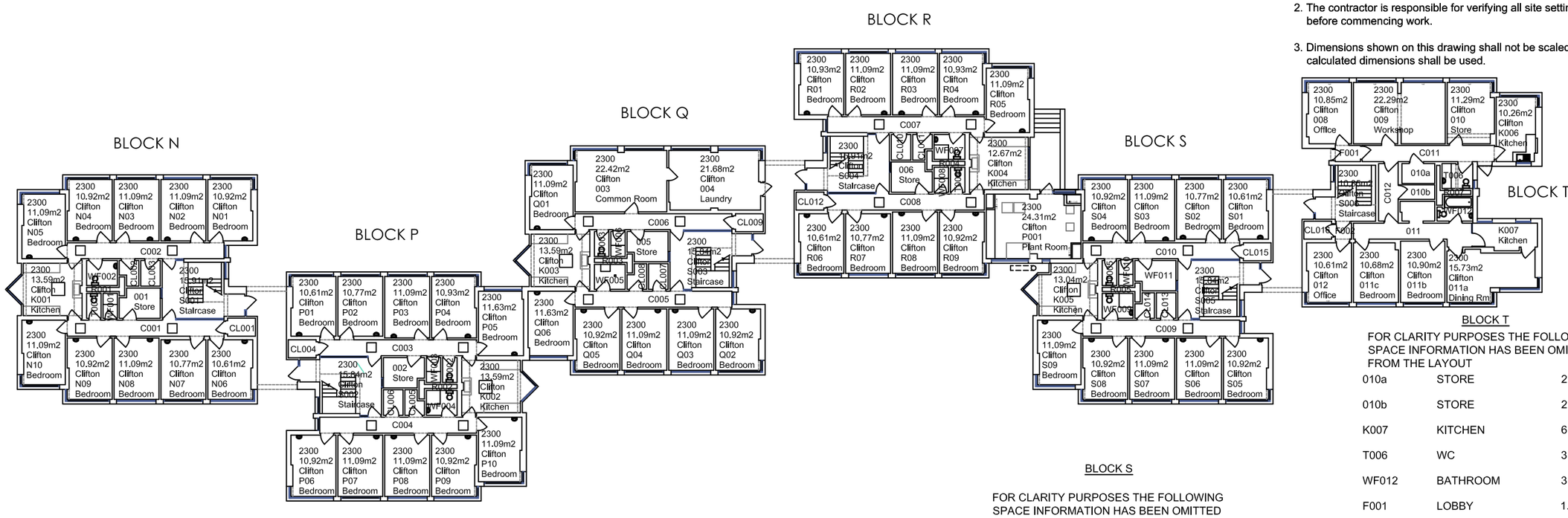
B. EPQR report

C. Blower door test and thermal imaging report

A. Architectural drawings before renovation

The list of architectural drawings include floor plans, and façade drawings. The layout is almost the same for all floors, with slight differences in relation to connection to adjacent blocks.

The included drawings are newer version of the buildings drawings from the year 2009.



Notes:

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BLOCK N

FOR CLARITY PURPOSES THE FOLLOWING SPACE INFORMATION HAS BEEN OMITTED FROM THE LAYOUT

001	STORE	4.71m²
T001	WC	1.45m²
WF001	SHOWER	1.44m²
WF002	BATHROOM	3.08m²
C001	CORRIDOR	10.48m²
C002	CORRIDOR	10.21m²
CL001	CLEANERS STORE	2.13m²
CL002	CLEANERS STORE	1.69m²
CL003	CLEANERS STORE	2.00m²
R001	RISER	0.94m²

BLOCK P

FOR CLARITY PURPOSES THE FOLLOWING SPACE INFORMATION HAS BEEN OMITTED FROM THE LAYOUT

002	STORE	4.71m²
CL004	CLEANERS STORE	2.13m²
CL005	CLEANERS STORE	1.69m²
CL006	CLEANERS STORE	2.00m²
T002	WC	1.45m²
WF003	SHOWER	1.44m²
WF004	BATHROOM	3.08m²
C003	CORRIDOR	10.48m²
C004	CORRIDOR	10.21m²
R002	RISER	0.94m²

BLOCK Q

FOR CLARITY PURPOSES THE FOLLOWING SPACE INFORMATION HAS BEEN OMITTED FROM THE LAYOUT

005	STORE	4.71m²
CL007	CLEANERS STORE	2.00m²
CL008	CLEANERS STORE	1.69m²
CL009	CLEANERS STORE	2.13m²
T003	WC	1.45m²
WF005	BATHROOM	3.08m²
WF006	SHOWER	1.44m²
C005	CORRIDOR	10.21m²
C006	CORRIDOR	10.21m²
R003	RISER	0.94m²

BLOCK R

FOR CLARITY PURPOSES THE FOLLOWING SPACE INFORMATION HAS BEEN OMITTED FROM THE LAYOUT

006	STORE	4.71m²
CL010	CLEANERS STORE	2.00m²
CL011	CLEANERS STORE	1.69m²
CL012	CLEANERS STORE	2.12m²
T004	WC	1.45m²
WF007	BATHROOM	3.08m²
WF008	SHOWER	1.44m²
C007	CORRIDOR	10.21m²
C008	CORRIDOR	10.46m²
R004	RISER	0.94m²

BLOCK S

FOR CLARITY PURPOSES THE FOLLOWING SPACE INFORMATION HAS BEEN OMITTED FROM THE LAYOUT

CL013	CLEANERS STORE	2.00m²
CL014	CLEANERS STORE	1.69m²
CL015	CLEANERS STORE	2.12m²
T005	WC	1.45m²
WF009	BATHROOM	3.08m²
WF010	SHOWER	1.44m²
WF011	SHOWER	4.71m²
C009	CORRIDOR	10.21m²
C010	CORRIDOR	10.46m²
R005	RISER	0.94m²

BLOCK T

FOR CLARITY PURPOSES THE FOLLOWING SPACE INFORMATION HAS BEEN OMITTED FROM THE LAYOUT

010a	STORE	2.64m²
010b	STORE	2.14m²
K007	KITCHEN	6.60m²
T006	WC	3.08m²
WF012	BATHROOM	3.24m²
F001	LOBBY	1.76m²
F002	LOBBY	1.17m²
C011	CORRIDOR	8.84m²
C012	CORRIDOR	4.54m²
011	CORRIDOR	11.15m²
CL016	CLEANERS STORE	2.12m²
R007	RISER	0.94m²

Rev	Date	Purpose of revision	Drawn	Checked	Approved

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Project

BRUNEL UNIVERSITY ESTATE

Drawing title

CLIFTON HALL
GROUND FLOOR LEVEL

Drawing status: FOR INFORMATION

Drawn By:	PAD	Checked By:		Date:	11.11.09
Scale:	1:200 @ A2			Project Ref No:	
Building Name:	CLIFTON HALL				

Drawing number: BUCL-GROUND FLOOR LEVEL — Rev: 0

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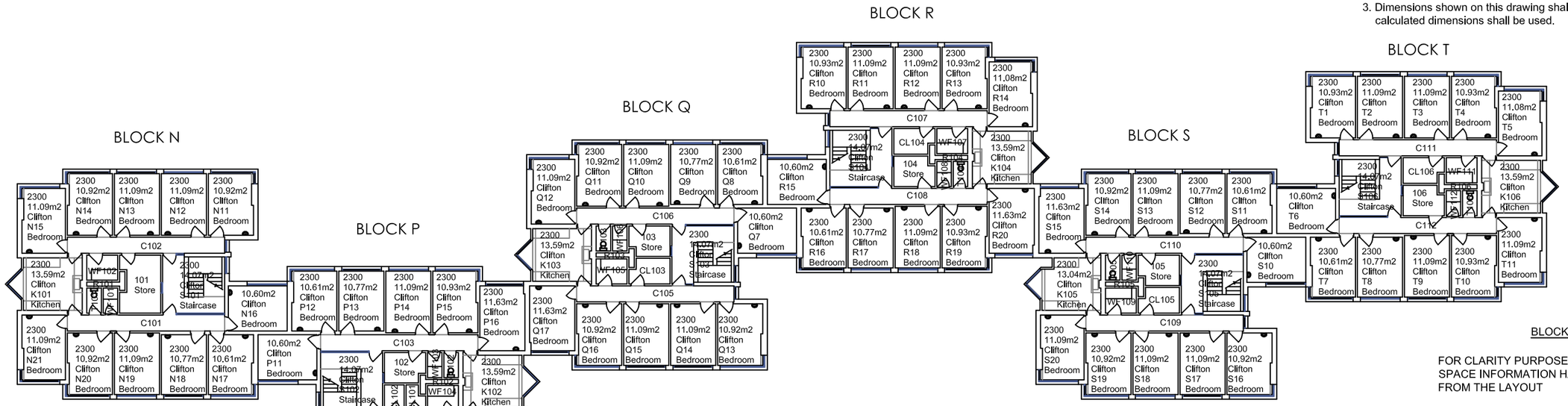

BLOCK S

FOR CLARITY PURPOSES THE FOLLOWING SPACE INFORMATION HAS BEEN OMITTED FROM THE LAYOUT

105	STORE	4.71m²
CL105	CLEANERS STORE	3.89m²
T105	WC	1.45m²
WF109	BATHROOM	3.08m²
WF110	SHOWER	1.44m²
C109	CORRIDOR	10.21m²
C110	CORRIDOR	10.48m²
R105	RISER	0.94m²

BLOCK T

FOR CLARITY PURPOSES THE FOLLOWING SPACE INFORMATION HAS BEEN OMITTED FROM THE LAYOUT

106	STORE	4.71m²
CL106	CLEANERS STORE	2.01m²
T106	WC	1.45m²
WF111	BATHROOM	1.44m²
WF112	SHOWER	1.44m²
C111	CORRIDOR	10.21m²
C112	CORRIDOR	10.53m²
R106	RISER	0.94m²

BLOCK N

FOR CLARITY PURPOSES THE FOLLOWING SPACE INFORMATION HAS BEEN OMITTED FROM THE LAYOUT

101	STORE	4.71m²
T101	WC	1.45m²
WF101	SHOWER	1.44m²
WF102	BATHROOM	3.08m²
C101	CORRIDOR	10.48m²
C102	CORRIDOR	10.19m²
R101	RISER	0.94m²

BLOCK P

FOR CLARITY PURPOSES THE FOLLOWING SPACE INFORMATION HAS BEEN OMITTED FROM THE LAYOUT

102	STORE	4.71m²
CL101	CLEANERS STORE	1.69m²
CL102	CLEANERS STORE	2.00m²
T102	WC	1.45m²
WF103	SHOWER	1.44m²
WF104	BATHROOM	3.08m²
C103	CORRIDOR	10.53m²
C104	CORRIDOR	10.19m²
R102	RISER	0.94m²

BLOCK Q

FOR CLARITY PURPOSES THE FOLLOWING SPACE INFORMATION HAS BEEN OMITTED FROM THE LAYOUT

103	STORE	4.71m²
CL103	CLEANERS STORE	3.89m²
T103	WC	1.45m²
WF105	BATHROOM	3.08m²
WF106	SHOWER	1.44m²
C105	CORRIDOR	10.21m²
C106	CORRIDOR	10.53m²
R103	RISER	0.94m²

BLOCK R

FOR CLARITY PURPOSES THE FOLLOWING SPACE INFORMATION HAS BEEN OMITTED FROM THE LAYOUT

104	STORE	4.71m²
CL104	CLEANERS STORE	3.89m²
T104	WC	1.45m²
WF107	BATHROOM	3.08m²
WF108	SHOWER	1.44m²
C107	CORRIDOR	10.23m²
C108	CORRIDOR	10.53m²
R104	RISER	0.94m²

Rev	Date	Purpose of revision	Drawn	Checked	Approved

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Project

BRUNEL UNIVERSITY ESTATE

Drawing title

CLIFTON HALL
FIRST FLOOR LEVEL

Drawing status: FOR INFORMATION

Drawn By:	PAD	Checked By:		Date:	11.11.09
Scale:	1:200 @ A2			Project Ref No:	
Building Name:	CLIFTON HALL				

Drawing number: BUCL-FIRST FLOOR LEVEL

Rev: 0

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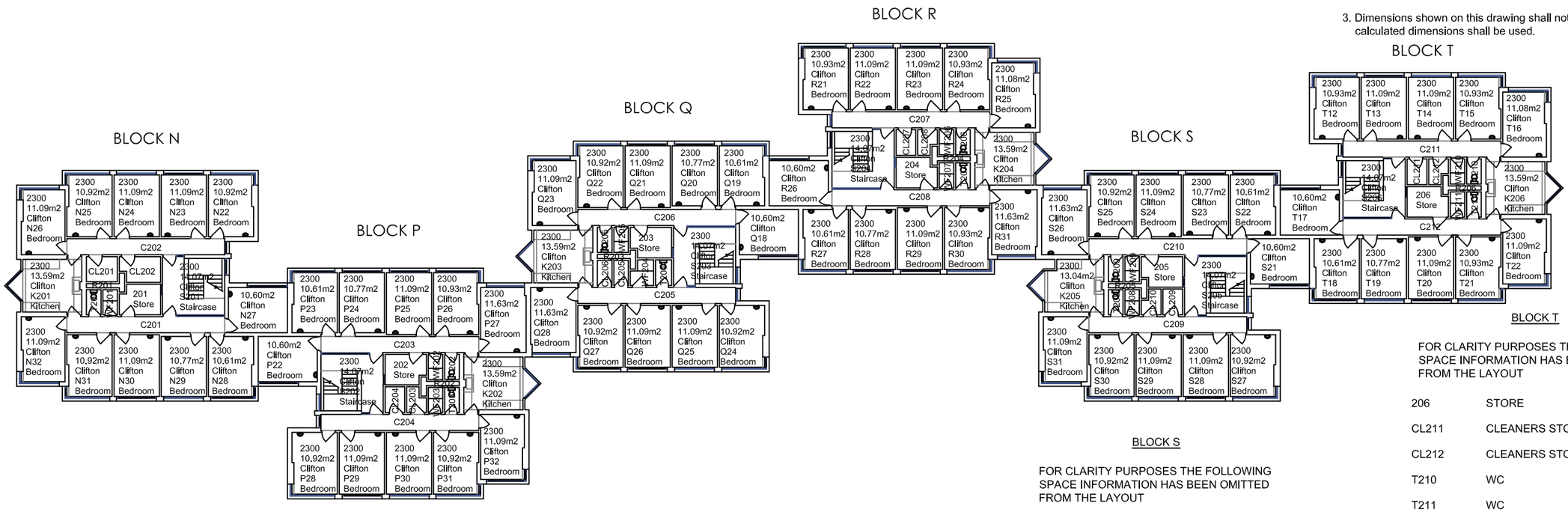

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BLOCK N

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201	STORE	4.71m²
CL201	CLEANERS STORE	3.08m²
CL202	CLEANERS STORE	3.89m²
T201	WC	1.45m²
WF201	SHOWER	1.44m²
C201	CORRIDOR	10.48m²
C202	CORRIDOR	10.19m²
R201	RISER	0.94m²

BLOCK P

FOR CLARITY PURPOSES THE FOLLOWING SPACE INFORMATION HAS BEEN OMITTED FROM THE LAYOUT

202	STORE	4.71m²
CL203	CLEANERS STORE	1.69m²
CL204	CLEANERS STORE	2.00m²
T202	WC	1.45m²
T203	WC	1.45m²
WF202	SHOWER	1.44m²
WF203	SHOWER	1.44m²
C203	CORRIDOR	10.53m²
C204	CORRIDOR	10.19m²
R202	RISER	0.94m²

BLOCK Q

FOR CLARITY PURPOSES THE FOLLOWING SPACE INFORMATION HAS BEEN OMITTED FROM THE LAYOUT

203	STORE	4.71m²
CL205	CLEANERS STORE	1.44m²
CL206	CLEANERS STORE	1.45m²
T204	WC	1.64m²
T205	WC	1.45m²
WF204	SHOWER	2.06m²
WF205	SHOWER	1.44m²
C205	CORRIDOR	10.21m²
C206	CORRIDOR	10.53m²
R203	RISER	0.94m²

BLOCK R

FOR CLARITY PURPOSES THE FOLLOWING SPACE INFORMATION HAS BEEN OMITTED FROM THE LAYOUT

204	STORE	4.71m²
CL207	CLEANERS STORE	2.01m²
CL208	CLEANERS STORE	1.69m²
T206	WC	1.45m²
T207	WC	1.45m²
WF206	SHOWER	1.44m²
WF207	SHOWER	1.44m²
C207	CORRIDOR	10.23m²
C208	CORRIDOR	10.53m²
R204	RISER	0.94m²

BLOCK S

FOR CLARITY PURPOSES THE FOLLOWING SPACE INFORMATION HAS BEEN OMITTED FROM THE LAYOUT

205	STORE	4.71m²
CL209	CLEANERS STORE	2.00m²
CL210	CLEANERS STORE	1.69m²
T208	WC	1.45m²
T209	WC	1.45m²
WF208	SHOWER	1.44m²
WF209	SHOWER	1.44m²
C209	CORRIDOR	10.21m²
C210	CORRIDOR	10.48m²
R205	RISER	0.94m²

BLOCK T

FOR CLARITY PURPOSES THE FOLLOWING SPACE INFORMATION HAS BEEN OMITTED FROM THE LAYOUT

206	STORE	4.71m²
CL211	CLEANERS STORE	2.01m²
CL212	CLEANERS STORE	1.69m²
T210	WC	1.45m²
T211	WC	1.45m²
WF210	SHOWER	1.44m²
WF211	SHOWER	1.44m²
C211	CORRIDOR	10.21m²
C212	CORRIDOR	10.53m²
R206	RISER	0.94m²

Rev	Date	Purpose of revision	Drawn	Checked	Approved

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TEL: 01895 274000

Project

BRUNEL UNIVERSITY ESTATE

Drawing title

CLIFTON HALL
SECOND FLOOR LEVEL

Drawing status: FOR INFORMATION

Drawn By:	PAD	Checked By:		Date:	11.11.09
Scale:	1:200 @ A2			Project Ref No:	
Building Name:	CLIFTON HALL				

Drawing number: BUCL-SECOND FLOOR LEVEL

Rev: 0

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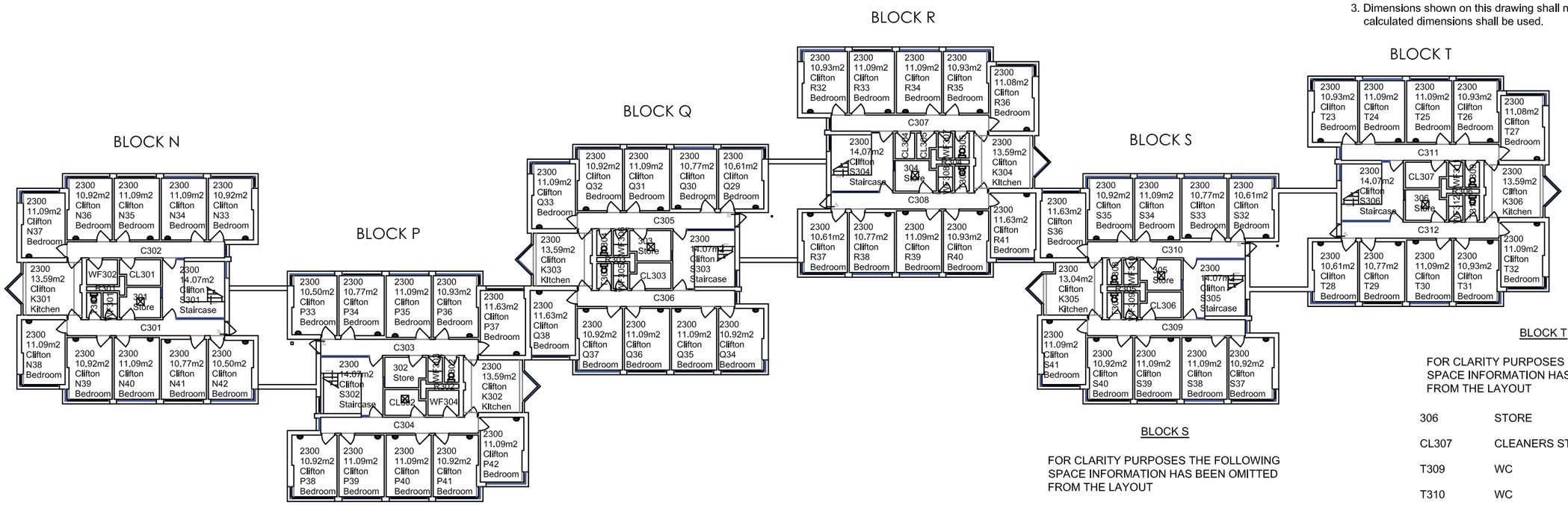

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BLOCK S

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305	STORE	4.71m²
CL306	CLEANERS STORE	3.89m²
T307	WC	1.45m²
T308	WC	1.45m²
WF309	SHOWER	1.44m²
WF310	SHOWER	1.44m²
C309	CORRIDOR	10.23m²
C310	CORRIDOR	10.53m²
R305	RISER	0.94m²

BLOCK T

FOR CLARITY PURPOSES THE FOLLOWING SPACE INFORMATION HAS BEEN OMITTED FROM THE LAYOUT

306	STORE	4.71m²
CL307	CLEANERS STORE	3.89m²
T309	WC	1.45m²
T310	WC	1.45m²
WF311	SHOWER	1.44m²
WF312	SHOWER	1.44m²
C311	CORRIDOR	10.21m²
C312	CORRIDOR	10.53m²
R306	RISER	0.94m²

BLOCK N

FOR CLARITY PURPOSES THE FOLLOWING SPACE INFORMATION HAS BEEN OMITTED FROM THE LAYOUT

301	STORE	4.71m²
CL301	CLEANERS STORE	3.89m²
T301	WC	1.45m²
WF301	SHOWER	1.44m²
WF302	BATHROOM	3.08m²
C301	CORRIDOR	10.38m²
C302	CORRIDOR	10.19m²
R301	RISER	0.94m²

BLOCK P

FOR CLARITY PURPOSES THE FOLLOWING SPACE INFORMATION HAS BEEN OMITTED FROM THE LAYOUT

302	STORE	4.71m²
CL302	CLEANERS STORE	3.89m²
T302	WC	1.45m²
WF303	SHOWER	1.44m²
WF304	BATHROOM	3.08m²
C303	CORRIDOR	10.53m²
C304	CORRIDOR	10.19m²
R302	RISER	0.94m²

BLOCK Q

FOR CLARITY PURPOSES THE FOLLOWING SPACE INFORMATION HAS BEEN OMITTED FROM THE LAYOUT

303	STORE	4.71m²
CL303	CLEANERS STORE	3.89m²
T303	WC	1.45m²
T304	WC	1.45m²
WF305	SHOWER	1.44m²
WF306	SHOWER	1.44m²
C305	CORRIDOR	10.53m²
C306	CORRIDOR	10.21m²
R303	RISER	0.94m²

BLOCK R

FOR CLARITY PURPOSES THE FOLLOWING SPACE INFORMATION HAS BEEN OMITTED FROM THE LAYOUT

304	STORE	4.71m²
CL304	CLEANERS STORE	2.01m²
CL305	CLEANERS STORE	1.69m²
T305	WC	1.45m²
T306	WC	1.45m²
WF307	SHOWER	1.44m²
WF308	SHOWER	1.44m²
C307	CORRIDOR	10.23m²
C308	CORRIDOR	10.53m²
R304	RISER	0.94m²

Rev	Date	Purpose of revision	Drawn	Checked	Approved

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Project

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Drawing title

CLIFTON HALL
THIRD FLOOR LEVEL

Drawing status: FOR INFORMATION

Drawn By:	PAD	Checked By:		Date:	11.11.09
Scale:	1:200 @ A2			Project Ref No:	
Building Name:	CLIFTON HALL				

Drawing number: BUCL-THIRD FLOOR LEVEL

Rev: 0

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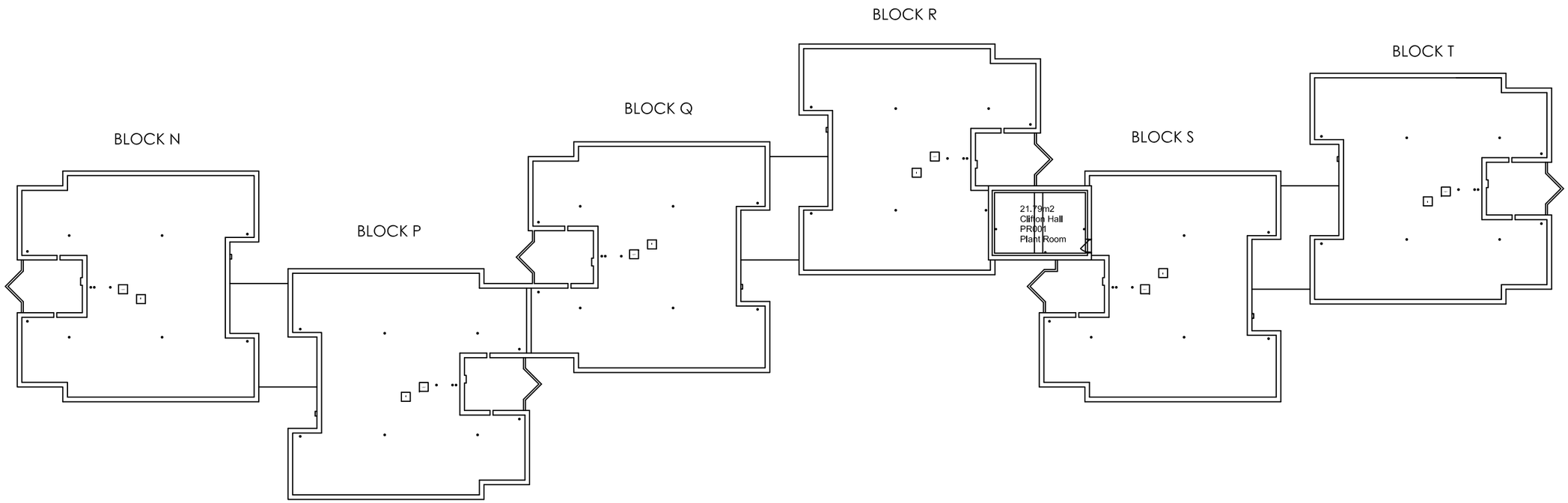
Notes:

1. In addition to these notes reference shall be made to the specification for the works and all relevant Architects and specialist drawings.
2. The contractor is responsible for verifying all site setting out dimensions before commencing work.
3. Dimensions shown on this drawing shall not be scaled. Only written or calculated dimensions shall be used.



Rev	Date	Purpose of revision	Drawn	Checked	Approved

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Project

BRUNEL UNIVERSITY ESTATE

Drawing title

CLIFTON HALL
ROOF LEVEL

Drawing status

FOR INFORMATION

Drawn By:	PAD	Checked By:		Date:	11.11.09
Scale:	1:200 @ A2			Project Ref No:	
Building Name:	CLIFTON HALL				

Drawing number

BUCL-ROOF LEVEL

Rev

0

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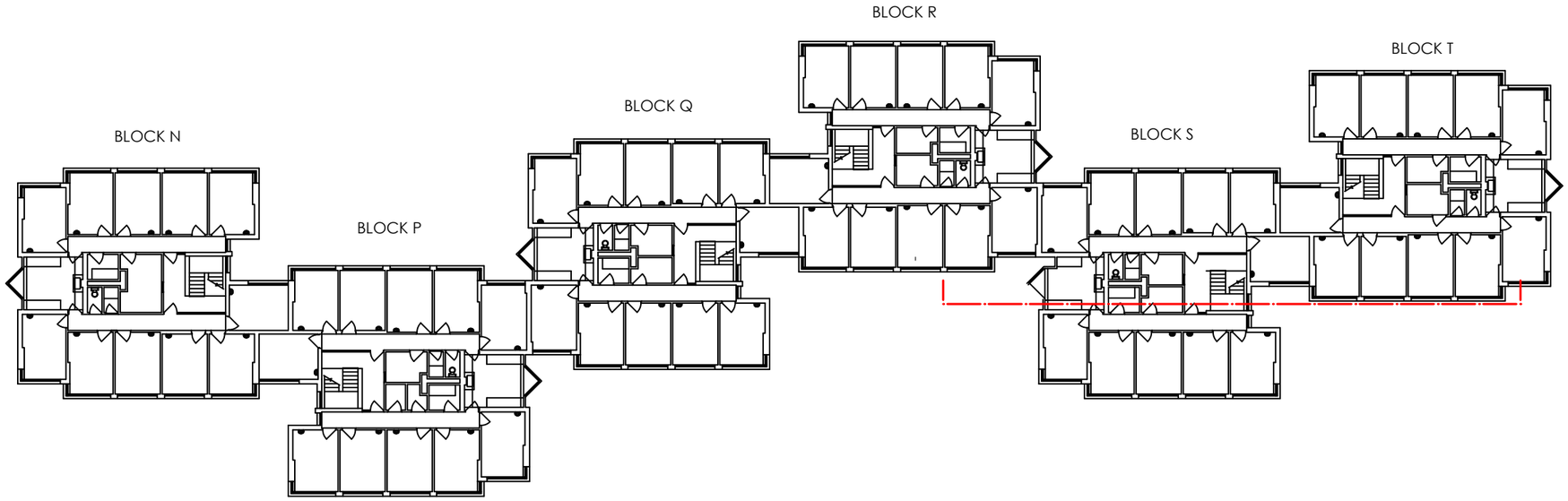
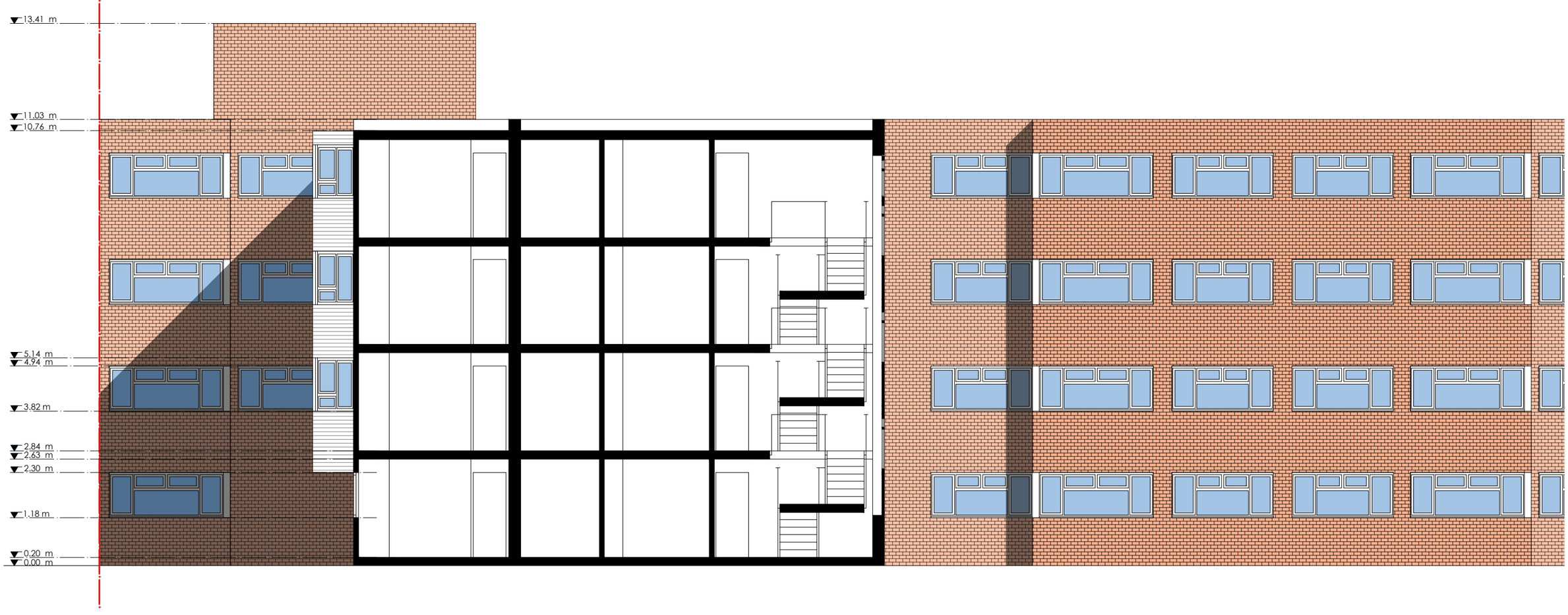
ReCO2St Project

BUL Demo Site - Clifton Hall



Section and elevation - Scale 1:100



B. EPQR report

The EPQR report is the energy auditing and evaluation of the building in terms of non-energy related elements, for the buildings' current condition. The analysis is based on a site visit. The report was realized using the Swiss tool EPQR.

The grading is done by using 3 type of codes. Codes "a to d" relate to the deterioration stage of each element and the necessary percentage of replacement. Codes "1 to 3" give the priority of replacement, while codes "s, t, u, v" are additional codes related to cost (i.e. necessary amount of insulation higher than building regulations). More specifically:

Codes a to d:	
a	0% replacement
b	>20% replacement
c	>50-60% replacement
d	100% replacement
Codes 1 to 3:	
1	Needs to be changed in the next 5 years
2	Works; should be replaced within the next 10 years
3	It can be replaced, but it is not necessary

Facades

C01-01 External wall

Type 11: Exposed masonry (natural stone, brick) **63 %**

Évaluation de l'état de la surface extérieure de l'enveloppe de façade: décollements, fissures, salissures.

Degradation state ○ a ◉ b ○ c ○ d

Salissures et dégâts ponctuels.

Necessary Works ○ 1 ◉ 2 ○ 3 ○ 4

Priority l

Supplementary Works **Code t**

Nettoyage et imprégnation de la façade. Reprise localisée des joints.





C01-01 External wall

Type 32: Aluminium or PVC frame windows **27 %**

Évaluation du fonctionnement, des surfaces, de la manipulation des fenêtres. Evaluation de l'isolation thermique et phonique, étanchéité à l'air et à l'eau.

Degradation state ○ a ◉ b ○ c ○ d

Surfaces extérieures abîmées. Fermeture correcte.

Necessary Works ○ 1 ◉ 2 ○ 3 ○ 4

Supplementary Works **Code s**

Traitement de surface à l'extérieur avec réfection du joint contre la maçonnerie. Contrôle et réglage partiel de ferrements.

Facades

C01-01 External wall

Type 42: Light facade carried between the skeleton **10 %**

Évaluation de l'état des façades légères, isolation thermique et phonique, étanchéité à l'air et à l'eau. Les ouvertures sont comptabilisées à cet élément.

Degradation state ◉ a ○ b ○ c ○ d

Surfaces propres, intactes. La structure est en bon état, absence de corrosion, les vitrages sont en état et de bonne qualité thermique.

Necessary Works ◉ 1 ○ 2 ○ 3 ○ 4

Priority III

Poursuite des travaux d'entretien non comptabilisée.

C01-02 External doors

Type 0: Generic **100 %**

Évaluation de l'état de surface, du fonctionnement et de la sécurité des portes extérieures.

Degradation state ◉ a ○ b ○ c ○ d

Portes d'entrée en bon état répondant aux exigences.

Necessary Works ◉ 1 ○ 2 ○ 3 ○ 4

Poursuite des travaux d'entretien non comptabilisée.





Facades

C04-02 External wall thermal insulation



Type 1: Absence of thermal insulation **100 %**

Évaluation de l'isolation thermique du composant opaque de la façade, recherche des ponts thermiques, dégâts de condensation, appréciation du confort dans les locaux, etc.

Degradation state ○ a ○ b ○ c ◉ d

La constitution des murs n'est pas satisfaisante du point de vue thermique. La valeur limite SIA (U = 0.25 W/Km2) n'est pas atteinte. Dégâts de condensation et confort insuffisant dans les locaux.

Necessary Works ○ 1 ○ 2 ○ 3 ◉ 4

Priority I

Isolation thermique compacte d'une épaisseur de 16 cm. Exécution selon les prescriptions minimales (valeur limite SIA: U = 0.25 W/Km2). Il faut supprimer les travaux de finition à l'élément C01-01: Revêtement des murs extérieurs. Contrôler le bilan thermi

C08-01 Façade scaffoldings

Type 1: Scaffolding and building site **100 %**

Évaluation de la nécessité de la mise en place d'échafaudages et de leur importance.

Degradation state ○ a ◉ b ○ c ○ d

Immeuble de petite hauteur. Bon état des façades et toitures. Interventions nécessitant une simple installation de chantier sans échafaudage.

Necessary Works ○ 1 ◉ 2 ○ 3 ○ 4

Priority II

Mise en place d'une simple installation de chantier (point d'eau, tableau électrique, roulotte de chantier, pont roulant, etc.) sans échafaudage (durée du chantier inférieure à 3 mois).

Facades

U13-01 Structure slab-walls

Type 4: Masonry with concrete floor **100 %**

Évaluation de la structure porteuse: éléments verticaux et horizontaux.

Degradation state ◉ a ○ b ○ c ○ d

Bâtiment avec système porteur en bon état, absence de fissure, de tassement, de fléchissement etc.

Necessary Works ◉ 1 ○ 2 ○ 3 ○ 4

Sans intervention.

U13-02 Sourroundings

Type 1: Surroundings - Developed areas **100 %**

Évaluation des abords, surfaces vertes, surfaces en dur, clôtures, installations de boîtes à lettres, des points d'eau et de l'éclairage.

Degradation state ◉ a ○ b ○ c ○ d

Les abords sont en ordre. Travaux d'entretien réguliers.

Necessary Works ◉ 1 ○ 2 ○ 3 ○ 4

Poursuite des travaux d'entretien non comptabilisée.





Roofs and floors

C02-11 Roof structure

Type 2: Metal structure **100 %**

Évaluation de la solidité et de l'état des éléments porteurs métalliques et des assemblages.

Degradation state ◉ a ○ b ○ c ○ d

Éléments porteurs en bon état. Absence de dégât ou déformation. Assemblages corrects.

Necessary Works ◉ 1 ○ 2 ○ 3 ○ 4

Sans intervention.



C03-01 Roof covering

Type 11: Flat roof with access **100 %**

Évaluation de l'étanchéité de l'usure de la surface de toiture et du confort thermique des locaux au dernier étage.

Degradation state ○ a ○ b ○ c ◉ d

Toit plat non étanche. Recouvrements desserrés ou défectueux. Revêtement de sol inégal et présence importante de mousse dans les joints. Balustrade et garde-corps défectueux. La sécurité n'est plus garantie.

Necessary Works ○ 1 ○ 2 ○ 3 ◉ 4

Priority I

Supplementary Works **Code u**

Réfection complète du toit plat ainsi que tous les recouvrements. Nouveau revêtement de sol. Remise en état des garde-corps et des balustrades.





Roofs and floors

C03-04 Supperstructures on roof



Type 1: Chimneys and ventilation shafts **100 %**

Évaluation de l'état des constructions en maçonnerie (cheminées, souches, locaux techniques, etc.) sur toiture: fissures, salissures, étanchéité des raccords.

Degradation state ◉ a ○ b ○ c ○ d

Massif en bon état et propre. Absence de fissure. Ferblanterie en bon état.

Necessary Works ◉ 1 ○ 2 ○ 3 ○ 4

Poursuite des travaux d'entretien non comptabilisée.

C04-01 Floor thermal insulation

Type 3: Insulation towards the ground **100 %**

Évaluation de l'isolation thermique de la dalle sur sol. Appréciation du confort dans les locaux situés au-dessus.

Degradation state ○ a ○ b ○ c ◉ d

L'isolation du radier est insuffisante, voire inexistante. Le bilan thermique montre que le potentiel de gain énergétique est important. Le confort dans les locaux pourrait être amélioré. Il est possible d'évacuer la dalle et faire un plancher isolé.

Necessary Works ○ 1 ○ 2 ○ 3 ◉ 4

Priority I

Supplementary Works **Code s**

Démolition et évacuation de la dalle actuelle, réfection d'une nouvelle chape avec isolation thermique

Roofs and floors

C04-03 Roof thermal insulation

Type 3: Flat Roof **100 %**

Évaluation de l'isolation thermique de la toiture, recherche de ponts thermiques, appréciation du confort des combles, etc.

Degradation state ○ a ○ b ○ c ◉ d

Isolation thermique abîmée ou humide. Les matériaux sont détériorés notamment par des racines de végétaux.

Necessary Works ○ 1 ○ 2 ○ 3 ◉ 4

Priority I

Supplementary Works **Code s**





Circulation and Commons - Residential building

C05-02 Interior doors

Type 1: Wood interior manual doors **90 %**

Évaluation de l'usure, du fonctionnement et de l'état des surfaces.

Degradation state ◉ a ○ b ○ c ○ d

Menuiseries en bon état. Surfaces propres et soignées. Garnitures et ferrements fonctionnent.

Necessary Works ◉ 1 ○ 2 ○ 3 ○ 4

Poursuite des travaux d'entretien non comptabilisée.





C05-02 Interior doors

Type 3: Glass interior manual doors **10 %**

Évaluation de l'usure, du fonctionnement et de l'état des surfaces.

Degradation state ◉ a ○ b ○ c ○ d

Les portes en verre trempé sont en parfait état, absence de rayures ou d'éclats, les ferrements fonctionnent parfaitement.

Necessary Works ◉ 1 ○ 2 ○ 3 ○ 4

Poursuite des travaux d'entretien non comptabilisée.



Circulation and Commons - Residential building

I00-05 Lighting wiring and plugs

Type 1: Wiring sockets and fixtures **100 %**

Évaluation de l'état de l'alimentation électrique des prises et des luminaires, du fonctionnement, de la qualité et du niveau de confort des prises de courant fort.

Degradation state ◉ a ○ b ○ c ○ d

L'alimentation des luminaires et des prises électriques est en ordre, elle correspond aux besoins. Nombre de prises et puissance d'alimentation suffisant.

Necessary Works ◉ 1 ○ 2 ○ 3 ○ 4

Sans intervention.

I00-06 Lighting appliances

Type 1: Fictures **100 %**

Évaluation de l'état, du fonctionnement et du niveau d'éclairement des luminaires.

Degradation state ○ a ◉ b ○ c ○ d

Nombre, type et situation des luminaires apparemment suffisants. Les ampoules ou tubes fluorescents sont néanmoins obsolètes, leur consommation d'énergie est trop élevée.

Necessary Works ○ 1 ◉ 2 ○ 3 ○ 4

Priority I

Remplacement complet des ampoules ou tubes fluorescents tout en conservant les supports.



Circulation and Commons - Residential building

U03-02 Staircase and landings

Type 1: Concrete, stone or artificial stone stairs inside the building **100 %**

Évaluation de l'état des revêtements de sol et des sous-faces de l'escalier, de la balustrade ainsi que de leur sécurité.

Degradation state ◉ a ○ b ○ c ○ d

Limons, marches et balustrades en bon état. Sans fissure ou trace d'usure. Surfaces propres.

Necessary Works ◉ 1 ○ 2 ○ 3 ○ 4

Poursuite des travaux d'entretien non comptabilisée.





U04-01 Common premisses

Type 1: Common premises **100 %**

Évaluation des surfaces des locaux communs telles que la buanderie, le local à vélo, etc.: sol, parois, plafonds.

Degradation state ◉ a ○ b ○ c ○ d

Les locaux sont en bon état et bien entretenus. Pas de de salissure ni de dégât apparent.

Necessary Works ◉ 1 ○ 2 ○ 3 ○ 4

Poursuite des travaux d'entretien non comptabilisée.



Premises - Residential buildings

C06-01 Floor finishings

Type 2: Plastic and textile lining **100 %**

Évaluation de l'état d'usure et de salissure des revêtements de sol.

Degradation state ○ a ◉ b ○ c ○ d

Surfaces sales et légèrement usées.

Necessary Works ○ 1 ◉ 2 ○ 3 ○ 4

Priority II

Travaux d'entretien, nettoyage du sol.





C06-02 Interior walls and wall finishings

Type 0: Generic **100 %**

Évaluation de l'état d'usure, de la fissuration et de l'état de surface des revêtements de mur.

Degradation state ○ a ◉ b ○ c ○ d

Fonds en bon état. Surfaces sales ou usées.

Necessary Works ○ 1 ◉ 2 ○ 3 ○ 4

Priority II

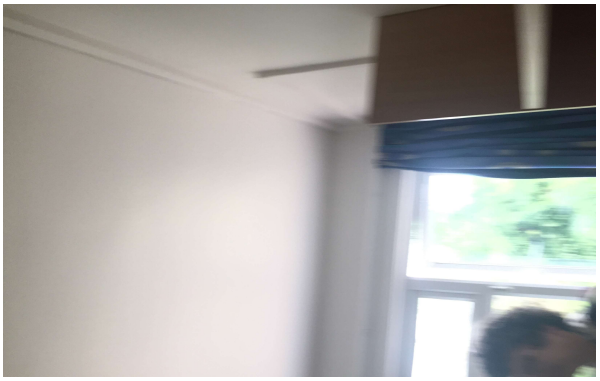
Préparation et peinture des surfaces.





Premises - Residential buildings

C06-03 Ceiling coating



Type 0: Generic **100 %**

Évaluation des salissures, des fissures, de la planéité et des décollements des surfaces des plafonds.

Degradation state ◉ a ○ b ○ c ○ d

Revêtement des plafonds en bon état. Surfaces propres.

Necessary Works ◉ 1 ○ 2 ○ 3 ○ 4

Poursuite des travaux d'entretien non comptabilisée.



I00-05 Lighting wiring and plugs

Type 2: Wiring sockets and fixtures - dwellings **100 %**

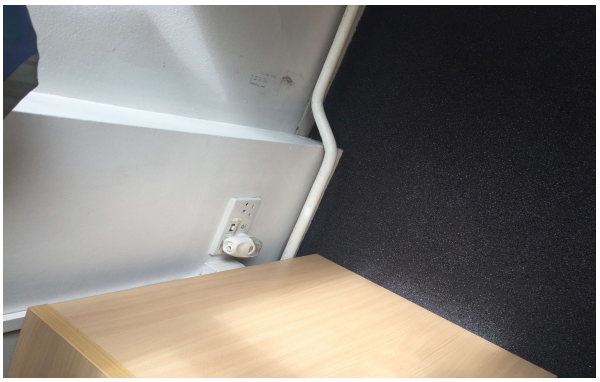
Évaluation de l'état de la surface extérieure de l'enveloppe de façade: décollements, fissures, salissures.

Degradation state ◉ a ○ b ○ c ○ d

L'alimentation des luminaires et des prises électriques est en ordre, elle correspond aux besoins. Nombre de prises et puissance d'alimentation suffisant.

Necessary Works ◉ 1 ○ 2 ○ 3 ○ 4

Sans intervention.



Premises - Residential buildings

I00-06 Lighting appliances

Type 1: Fictures **100 %**

Évaluation de l'état, du fonctionnement et du niveau d'éclairement des luminaires.

Degradation state ○ a ◉ b ○ c ○ d

Nombre, type et situation des luminaires apparemment suffisants. Les ampoules ou tubes fluorescents sont néanmoins obsolètes, leur consommation d'énergie est trop élevée.

Necessary Works ○ 1 ◉ 2 ○ 3 ○ 4

Priority I

Remplacement complet des ampoules ou tubes fluorescents tout en conservant les supports.





I02-04 Heating and cooling terminal units

Type 11: Radiators **100 %**

Évaluation de l'état de la surface extérieure de l'enveloppe de façade: décollements, fissures, salissures.

Degradation state ○ a ◉ b ○ c ○ d

Radiateurs anciens, mais en bon état, un peu sales, corrodés ou traces de fuites. Peu de problèmes de débit, d'air ou de bruit. Peu de dépôts. Dimensionnement et équilibrage corrects. Bonne accessibilité. Vannes manuelles en bon état, mais obsolètes du poi

Necessary Works ○ 1 ◉ 2 ○ 3 ○ 4

Priority II

Réparer ou changer les pièces défectueuses et les joints. Installer des vannes thermostatiques. Rincer et nettoyer les radiateurs. Reéquilibrer le réseau.

Premises - Residential buildings

U02-01 Kitchen





Type 1: Equipped kitchen **100 %**

Évaluation de l'usure, de l'âge des installations des appareils, des meubles et des équipements. Évaluation de l'état du local, sol, mur, plafond. La robinetterie, les écoulements et la distribution de gaz ne sont pas à évaluer à cet élément.

Degradation state ○ a ○ b ○ c ◉ d

Mauvais état général. Faïences endommagées, surfaces restantes sales ou endommagées. Agencement de cuisine et appareils vétustes respectivement défectueux. Installation électrique insuffisante.

Necessary Works ○ 1 ○ 2 ○ 3 ◉ 4

Priority I

Rénovation complète du local, sol, mur, plafond. Nouvel agencement de cuisine avec nouvelle disposition. Remplacement de l'installation électrique.

U02-02 Sanitary premisses

Type 2: Bathroom and WC **100 %**

Évaluation de l'usure, de l'âge des installations, des appareils et des équipements. Évaluation de l'état du local, sol, mur, plafond. La robinetterie et les écoulements ne sont pas à évaluer à cet élément.

Degradation state ○ a ◉ b ○ c ○ d

Enduits des parois et plafond sales ou effrités. Carrelages en bon état. Appareils sanitaires avec légère usure. Joints partiellement dégarnis ou non étanches. Installation électrique suffisante.

Necessary Works ○ 1 ◉ 2 ○ 3 ○ 4

Priority II

Peinture sur plafond et parois. Réfection des joints. Contrôle de la robinetterie et remplacement éventuel de joints.

HVAC - Single Buildings

I00-01 Electrical power supply and main electrical panel



Type 3: Housing buildings: central supply and distribution **100 %**

Evaluation de l'état du tableau principal d'alimentation électrique, de sa situation et du suivi de sa conformité.

Degradation state ○ a ◉ b ○ c ○ d

Raccordement, alimentation et tableau électrique principal en ordre, il n'est pas situé dans un local ou une armoire fermée. Rapport de sécurité de moins de 5 ans.

Necessary Works ○ 1 ◉ 2 ○ 3 ○ 4

Fermeture du tableau principal électrique du bâtiment.

I00-02 Pannels and secondary electrical distribution

Type 1: Low power distribution pannels **100 %**

Evaluation de l'état des tableaux et de leur alimentation électrique, de leur situation et du suivi de leur conformité.

Degradation state ◉ a ○ b ○ c ○ d

Tableaux de distribution secondaires fermés dans une armoire. Colonnes montantes et alimentation en ordre.

Necessary Works ◉ 1 ○ 2 ○ 3 ○ 4

Sans intervention.

HVAC - Single Buildings

I00-03 Emergency lighting

Type 2: Centralised power supply **100 %**

Évaluation des installations d'éclairage de secours, de leur état, du suivi d'entretien et de leur conformité.

Degradation state ◉ a ○ b ○ c ○ d

L'installation est en ordre, contrôle régulier par un spécialiste.

Necessary Works ◉ 1 ○ 2 ○ 3 ○ 4

Sans intervention.





I00-05 Lighting wiring and plugs

Type 2: Wiring sockets and fixtures - dwellings **100 %**

Évaluation de l'état de la surface extérieure de l'enveloppe de façade: décollements, fissures, salissures.

Degradation state ◉ a ○ b ○ c ○ d

L'alimentation des luminaires et des prises électriques est en ordre, elle correspond aux besoins. Nombre de prises et puissance d'alimentation suffisant.

Necessary Works ◉ 1 ○ 2 ○ 3 ○ 4

Sans intervention.

HVAC - Single Buildings

I00-06 Lighting appliances

Type 1: Fictures **100 %**

Évaluation de l'état, du fonctionnement et du niveau d'éclairement des luminaires.

Degradation state ○ a ○ b ◉ c ○ d

Les luminaires sont en état de fonctionnement, mais obsolètes. Une partie des luminaires sont hors d'usage (<30%). Les ampoules ou tubes fluorescents sont obsolètes leur consommation d'énergie est trop élevée.

Necessary Works ○ 1 ○ 2 ◉ 3 ○ 4

Remplacement des luminaires hors d'usage et de l'ensemble des ampoules ou tubes fluorescents tout en conservant les supports.





I02-01 Heating central production plant

Type 1: Oil or gas boiler - up to 1500m2 HRA resp. 100kW **80 %**

Évaluation du fonctionnement et du rendement de l'installation de production de chaleur (y compris le réseau de distribution primaire).

Degradation state ◉ a ○ b ○ c ○ d

Production de chaleur en bon état et correctement dimensionnée. L'installation répond aux prescriptions.

Necessary Works ◉ 1 ○ 2 ○ 3 ○ 4

Priority I

Sans intervention.

I02-01 Heating central production plant

Type 51: Solar collectors **100 %**

Évaluation du fonctionnement et du rendement de l'installation de production de chaleur (y compris le réseau de distribution primaire).

Degradation state ◉ a ○ b ○ c ○ d

Capteurs, armatures, accumulateurs en bon état. L'installation répond aux prescriptions. Les sécurités fonctionnent. Pas de corrosion ou de fuite visible. Peu de bruit. Dimensionnement acceptable.

Necessary Works ◉ 1 ○ 2 ○ 3 ○ 4

Sans intervention.



I02-02 Sanitary hot water production

Type 1: Central boiler with heat exchanger **100 %**

Évaluation du fonctionnement, du rendement et de l'âge de l'installation de production d'ECS

Degradation state ◉ a ○ b ○ c ○ d

Bouilleur d'eau chaude en bon état. Absence de signe de corrosion ou de pertes. Dimensionnement correct et prescriptions respectées.

Necessary Works ◉ 1 ○ 2 ○ 3 ○ 4

Sans intervention.

I02-03 Heating distribution network

Type 1: Apparent heat distribution **100 %**

Évaluation du fonctionnement, de la dégradation et de l'isolation des colonnes et conduites de chauffage au sous-sol.

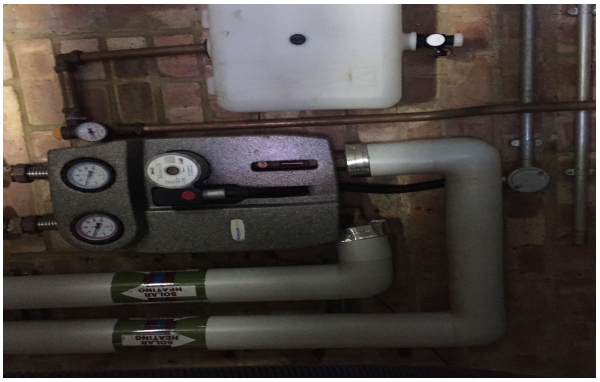
Degradation state ◉ a ○ b ○ c ○ d

Conduites en bon état, non corrodées, étanches et bien isolées. Dimensionnement correct, débits et pressions assurés. Pas de dépôt ou d'air dans les conduites. Fixations en état, prescriptions respectées.

Necessary Works ◉ 1 ○ 2 ○ 3 ○ 4

Sans intervention.





I02-04 Heating and cooling terminal units

Type 1: Radiators **100 %**

Évaluation du fonctionnement, de la puissance et de la corrosion des émetteurs de chaud et de froid dans les locaux (plusieurs types peuvent exister simultanément).

Degradation state ◉ a ○ b ○ c ○ d

Radiateurs en bon état, étanches, propres et sans corrosion. Pas de problème de débit, d'air ou de bruit. Pas de dépôt. Dimensionnement et équilibrage corrects. Bonne accessibilité. Régulation et purgeurs d'air fonctionnent.

Necessary Works ◉ 1 ○ 2 ○ 3 ○ 4

Sans intervention.

I02-06 Energy agent storage

Type 1: Tank in the cellar **100 %**

Évaluation de l'état, de l'étanchéité, de l'accessibilité des citernes, de la présence de systèmes de détection des fuites.

Degradation state ○ a ◉ b ○ c ○ d

Installation de citerne et conduite de raccordement anciennes, mais en bon état. Travaux d'entretien régulièrement exécutés. Peu de dépôts. Conduites d'aération dégagées et fonctionnelles. Bonne accessibilité. Prescriptions respectées.

Necessary Works ○ 1 ◉ 2 ○ 3 ○ 4

Vider la citerne et la réviser. Nettoyer les filtres et les conduites. Prendre toutes les mesures pour respecter les prescriptions en vigueur.

I04-01 Water connection and metering

Type 1: Connection and water distribution battery **100 %**

Évaluation des conduites depuis l'entrée dans l'immeuble jusqu'aux compteurs.

Degradation state ◉ a ○ b ○ c ○ d

Conduites et armatures en bon état, bien entretenues et fonctionnelles. Pas de dégât, de fuite, de corrosion ou de dépôt visibles. Isolation et fixations correctes. Dimensionnement correct. Prescriptions respectées, schémas complets disponibles.

Necessary Works ◉ 1 ○ 2 ○ 3 ○ 4

Sans intervention.



I04-03 Sewage pipes

Type 1: Wastewater pipes **100 %**

Évaluation du fonctionnement, de la corrosion et de l'obstruction des conduites d'eaux usées.

Degradation state ◉ a ○ b ○ c ○ d

Conduites en bon état et fonctionnelles. Pas de refoulement. Pas de bruit. Fixations et isolation intacts. Étiquetage complet. Prescriptions respectées, schémas complets disponibles.

Necessary Works ◉ 1 ○ 2 ○ 3 ○ 4

Sans intervention.

I04-08 Sanitary water distribution



Type 1: Cold water and hot water pipes **100 %**

Evaluation du fonctionnement, de la corrosion, et de la distribution des conduites d'eau sanitaire depuis la nourrice avec le compteur jusqu'aux appareils.

Degradation state ◉ a ○ b ○ c ○ d

Conduites en ordre, pas de dégâts. Bon débit et pression suffisante, isolation correcte. Armatures étanches et réglables. Conduites bien étiquetées et fixées. Schémas disponibles et prescriptions respectées.

Necessary Works ◉ 1 ○ 2 ○ 3 ○ 4

Sans intervention.

I08-01 Gaz connection to the city network

Type 1: Connection to natural gas **100 %**

Évaluation du raccordement au réseau du gaz jusqu'au compteur. Étanchéité, corrosion, armatures, traversée de mur, inscriptions, fixations, schémas, et mode d'emploi, prescriptions légales.

Degradation state ◉ a ○ b ○ c ○ d

Conduites et compteur en bon état. Respect complet des prescriptions. Fixations, armatures et autres pièces en bon état. Bonne signalisation. Pas de corrosion ou de dégâts. Dimensionnement correct. Schémas complets disponibles.

Necessary Works ◉ 1 ○ 2 ○ 3 ○ 4

Sans intervention.

I08-02 Gaz distribution

Type 1: Natural gas distribution **100 %**

Degradation state ◉ a ○ b ○ c ○ d

Conduites en état, sans dégât apparent. Robinetterie étanche et facilement réglable.

Necessary Works ◉ 1 ○ 2 ○ 3 ○ 4

Sans intervention.

U12-01 Ventilation system without air handling

Type 1: Natural ventilation (opening windows) **90 %**

Évaluation de la ventilation des locaux par rapport aux odeurs, à l'humidité, à la présence ou non de moisissures.

Degradation state ○ a ○ b ○ c ◉ d

Renouvellement d'air insuffisant. Présence d'odeurs et humidité. Développement de moisissure.

Necessary Works ○ 1 ○ 2 ○ 3 ◉ 4

Priority I

Supplementary Works **Codes t, u**

Mise en oeuvre d'un nouveau système de ventilation (type 2 ou type 3). Recours obligatoire à un spécialiste en ventilation. Le coût de cette intervention n'est pas comptabilisé par la méthode.



U12-01 Ventilation system without air handling

Type 4: Mechanical ventilation with incividual extraction fans **10 %**

Évaluation de la ventilation des locaux par rapport aux odeurs, à l'humidité, à la présence ou non de moisissures.

Degradation state ○ a ○ b ○ c ◉ d

Les ventilateurs sont vétustes, énergétiquement insuffisants et font du bruit

Necessary Works ○ 1 ○ 2 ○ 3 ◉ 4

Priority I

Supplementary Works **Code u**

Fourniture et pose de nouveaux ventilateurs individuels dans les pièces humides

Estimation of the work cost, following the standard method of EPIQR+ - Scenario Diagnostic
Chepstow Staircase H,

Cost index : 100.98 **Works costs (without fees and without VAT)**

Summary of cost

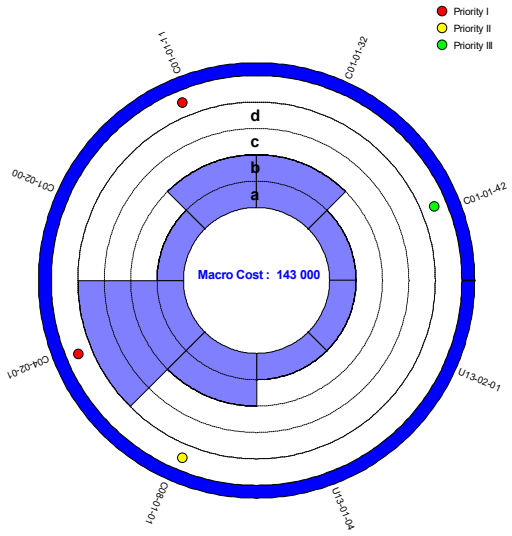
Facades	**143 000**
Roofs and floors	**162 000**
Circulation and Commons - Residential building	**0**
Premises - Residential buildings	**52 000**
HVAC - Single Buildings	**15 000**

Works cost (without fees and without VAT)	372 000
Architect's fees (without VAT) calculated on the basis of 0 % of the works cost	0
Sub-total of works and fees (without VAT)	372 000
Misc. and unexpected's fees (without VAT) calculated on the basis of 5 % of the sub-total	19 000
VAT on the basis of 0 % of the sub-total and misc. and unexpected	0
Total cost for renovation (with VAT)	391 000

Facades

Description

Inventory of state



Summary of the elements

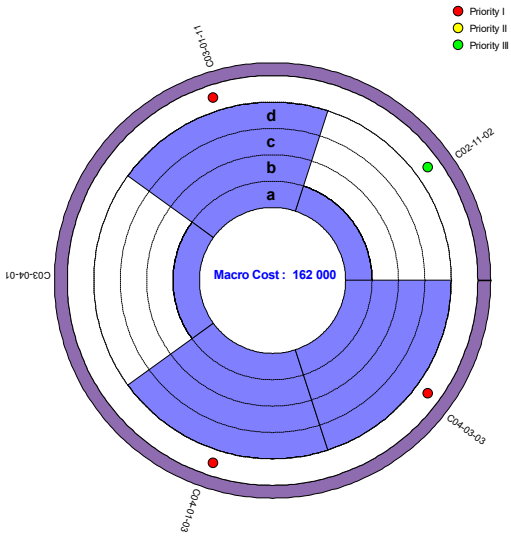
Maco element cost (without fees and without VAT) 143 000

Element	Type	1	2	3	4	s	t	u	v	Priority
C01-01 Exposed masonry (natural stone, brick)	11 63 %	●	●							I
C01-01 Exposed masonry (natural stone, brick)	11 63 %						◆			I
C01-01 Aluminium or PVC frame windows	32 27 %	●	●							
C01-01 Aluminium or PVC frame windows	32 27 %					◆				
C01-01 Light facade carried between the skeleton	42 10 %	●								III
C01-02 Generic	00	●								
C04-02 Absence of thermal insulation	01	●	●	●	●					I
C08-01 Scaffolding and building site	01	●	●							II
U13-01 Masonry with concrete floor	04	●								
U13-02 Surroundings - Developed areas	01	●								

Roofs and floors

Description

Inventory of state



Summary of the elements

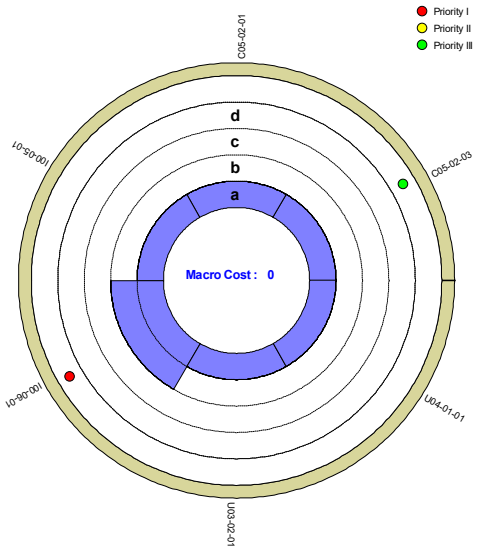
Maco element cost (without fees and without VAT) 162 000

Element	Type	1	2	3	4	s	t	u	v	Priority
C02-11 Metal structure	02	●								
C03-01 Flat roof with access	11	●	●	●	●					I
C03-01 Flat roof with access	11							◆		I
C03-04 Chimneys and ventilation shafts	01	●								
C04-01 Insulation towards the ground	03	●	●	●	●					I
C04-01 Insulation towards the ground	03					◆				I
C04-03 Flat Roof	03	●	●	●	●					I
C04-03 Flat Roof	03					◆				I

Circulation and Commons - Residential building

Description

Inventory of state



Summary of the elements

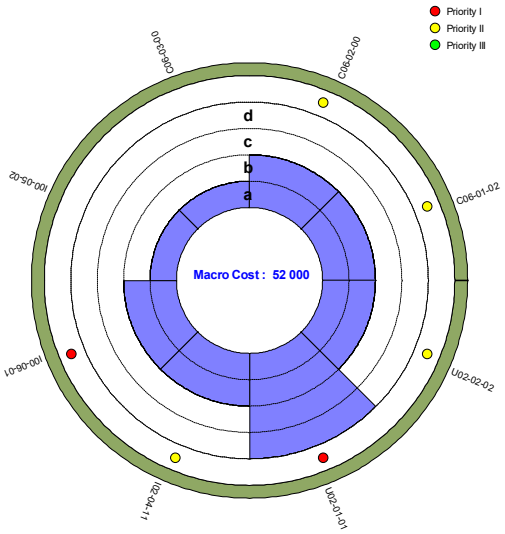
Maco element cost (without fees and without VAT) 0

Element	Type	1	2	3	4	s	t	u	v	Priority
C05-02 Wood interior manual doors	01 90 %	●								
C05-02 Glass interior manual doors	03 10 %	●								
I00-05 Wiring sockets and fixtures	01	●								
I00-06 Fictures	01	●	●							I
U03-02 Concrete, stone or artificial stone stairs inside the building	01	●								
U04-01 Common premises	01	●								

Premises - Residential buildings

Description

Inventory of state



Summary of the elements

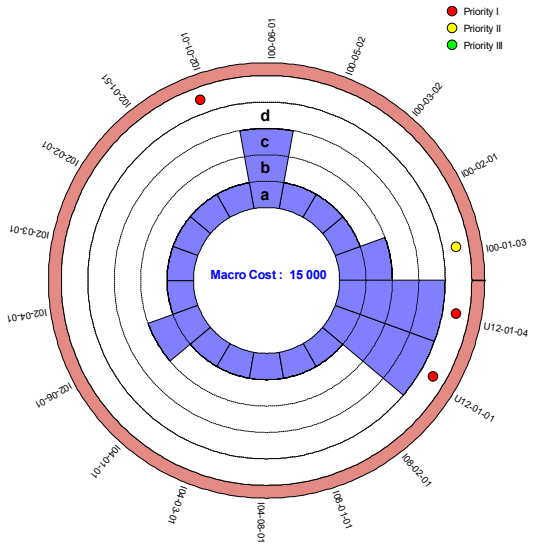
Maco element cost (without fees and without VAT) 52 000

Element	Type	1	2	3	4	s	t	u	v	Priority
C06-01 Plastic and textile lining	02	●	●							II
C06-02 Generic	00	●	●							II
C06-03 Generic	00	●								
I00-05 Wiring sockets and fixtures - dwellings	02	●								
I00-06 Fictures	01	●	●							I
I02-04 Radiators	11	●	●							II
U02-01 Equipped kitchen	01	●	●	●	●					I
U02-02 Bathroom and WC	02	●	●							II

HVAC - Single Buildings

Description

Inventory of state



Summary of the elements

Maco element cost (without fees and without VAT) 15 000

Element		Type		1	2	3	4	s	t	u	v	Priority
I00-01	Housing buildings: central supply and distribution	03		●	●							
I00-02	Low power distribution pannels	01		●								
I00-03	Centralised power supply	02		●								
I00-05	Wiring sockets and fixtures - dwellings	02		●								
I00-06	Fictures	01		●	●	●						
I02-01	Oil or gas boiler - up to 1500m2 HRA resp. 100kW	01	80 %	●								I
I02-01	Solar collectors	51		●								
I02-02	Central boiler with heat exchanger	01		●								
I02-03	Apparent heat distribution	01		●								
I02-04	Radiators	01		●								
I02-06	Tank in the cellar	01		●	●							
I04-01	Connection and water distribution battery	01		●								
I04-03	Wastewater pipes	01		●								

HVAC - Single Buildings

Summary of the elements

Maco element cost (without fees and without VAT) 15 000

Element	Type	1	2	3	4	s	t	u	v	Priority
I04-08 Cold water and hot water pipes	01	●								
I08-01 Connection to natural gas	01	●								
I08-02 Natural gas distribution	01	●								
U12-01 Natural ventilation (opening windows)	01 90 %	●	●	●	●					I
U12-01 Natural ventilation (opening windows)	01 90 %						◆			I
U12-01 Natural ventilation (opening windows)	01 90 %							◆		I
U12-01 Mechanical ventilation with incividual extraction fans	04 10 %	●	●	●	●					I
U12-01 Mechanical ventilation with incividual extraction fans	04 10 %							◆		I

C. Airtightness and thermal imaging report

The Airtightness test was carried out by a local assessor (energy-test Ltd.: www.energy-test.co.uk; 4 St John's Road Tunbridge Wells Kent TN4 9NP).

The enclosed report shows the results from the different tests of floor levels, and staircase; and the used method and test parameters following BS EN 13829.

The thermal imaging was carried out by Brunel researchers during January 2019 for the different facades of the buildings. This preliminary thermography was carried out during daytime (with no sunshine) of the occupied building to figure out main heat losses through the building envelope. Ideally, this method could be more indicative if carried out during night with closed windows and vents on the facades.

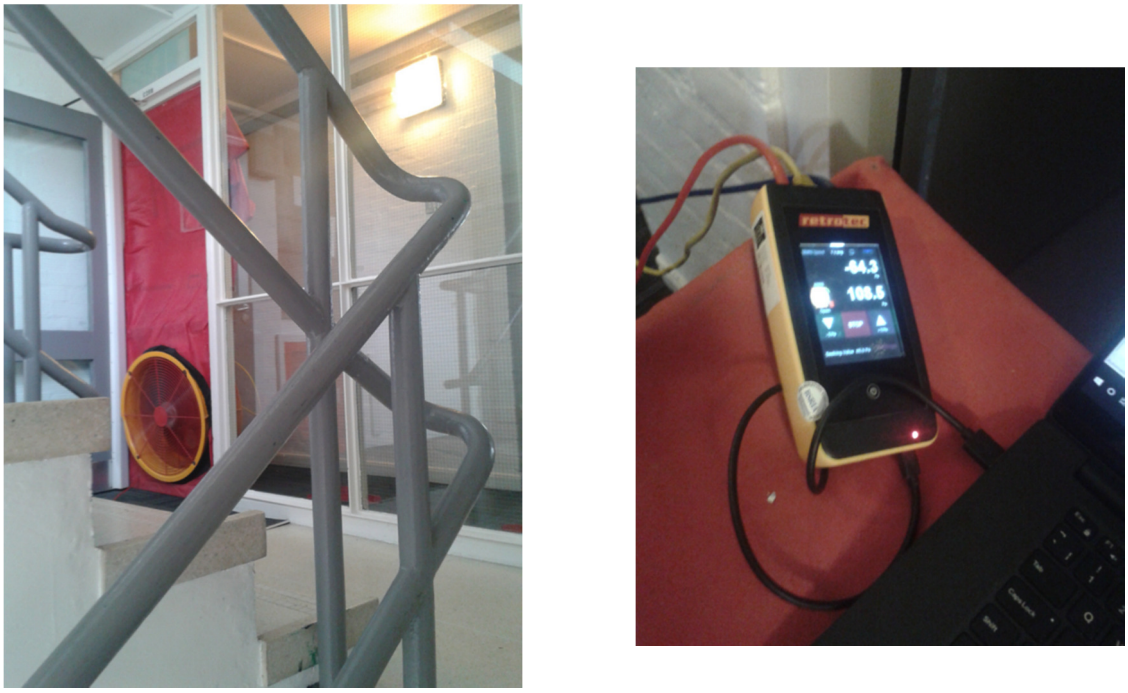


Figure 1 Airtightness test equipment deployed at the entrance of one of the floors

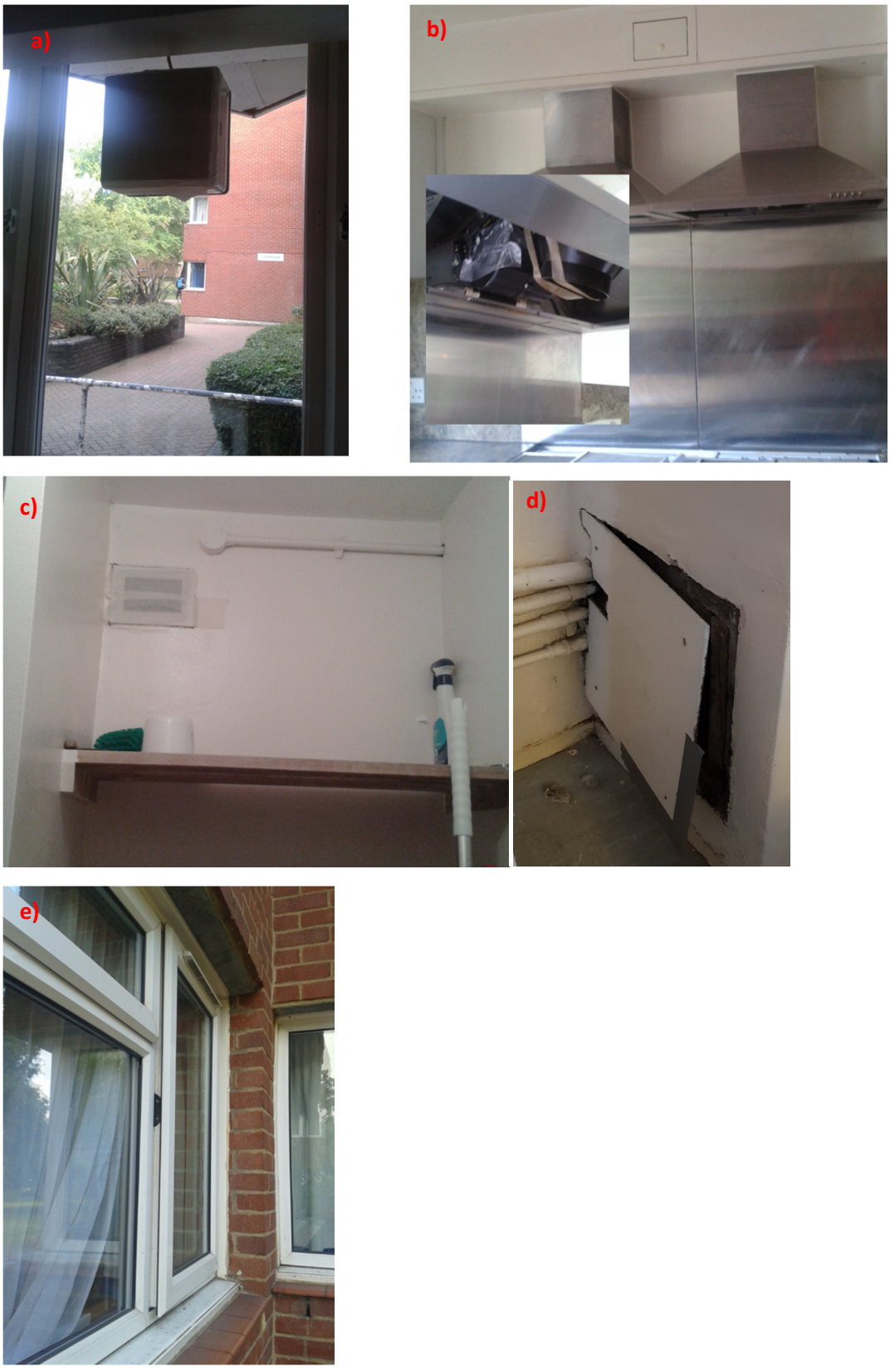


Figure 2 Vents and extractor fans outlets (a, b, c) were sealed using tape, while unintended openings/gaps (d, e) were left as normal

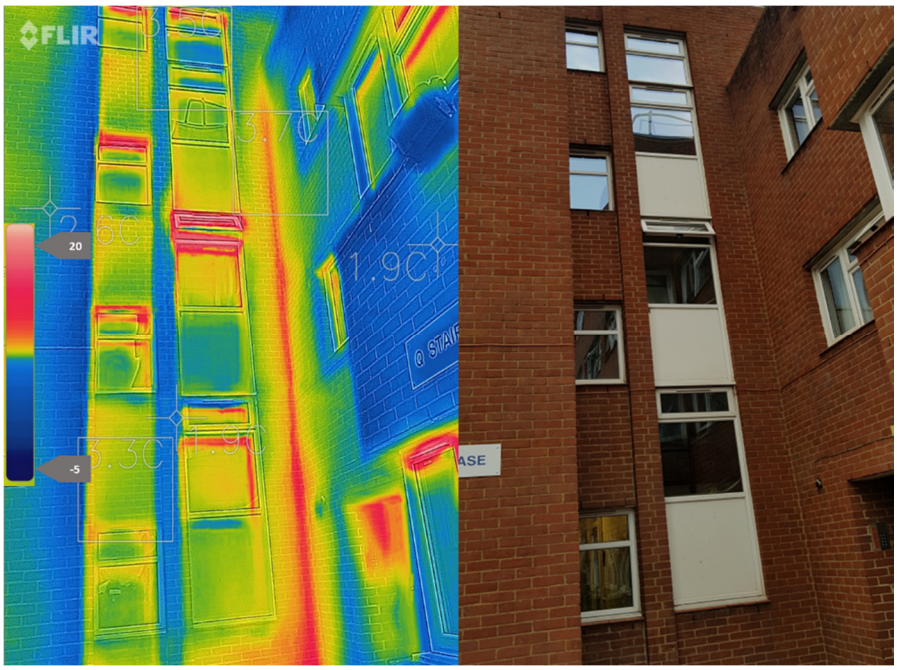


Figure 3 Southern Façade and entrance of block R of Clifton Hall (A clear thermal bridge at the corner wall represents the main heat loss on this façade, while most of other losses are due to window openings, and the construction of the conservatory windows)



Figure 4 Another view of the southern façade shows more losses from the staircase windows (this can be due to thermal reflectivity from different angle), and thermal bridges at top of bedrooms' windows and slab level of third floor

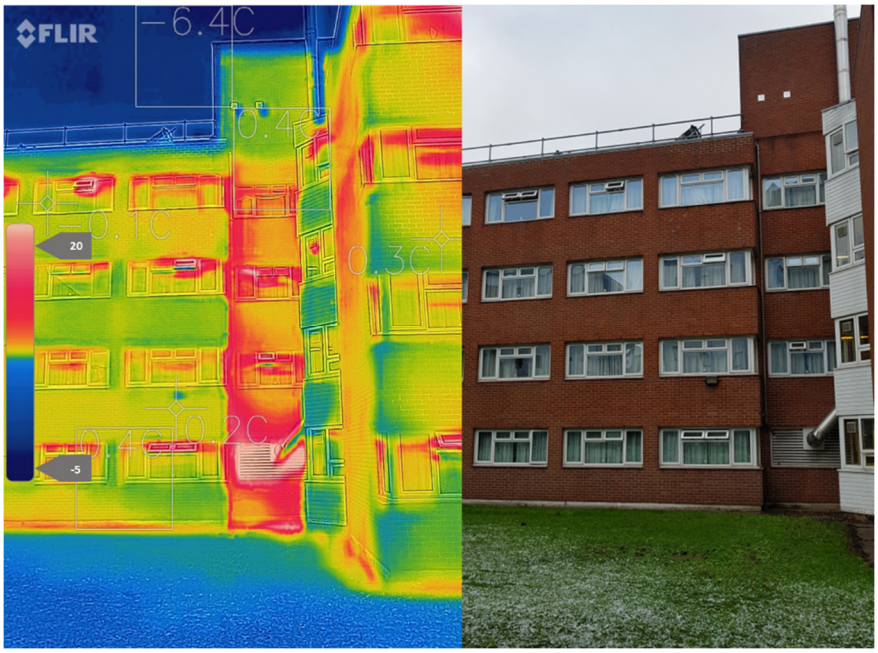


Figure 5 Eastern façade shows main losses from windows' openings and vents



Figure 6 North Façade again with losses from windows' openings and vents, slab/roof levels of third floor, and ground wall to machine room level

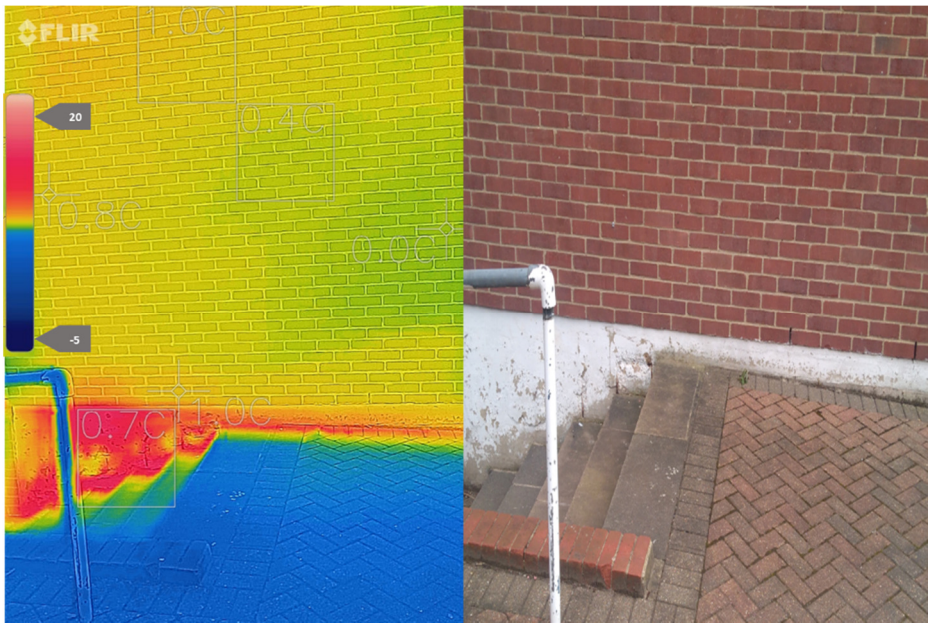


Figure 7 Basement wall to machine room with a visible thermal bridge from ground slab

4 St John's Road
Tunbridge Wells
Kent TN4 9NP

Tel: 01892 315 466
sales@energy-test.co.uk
www.energy-test.co.uk

AIR PERMEABILITY TEST REPORT

APT-ECL-11979

Plot / Address

Top floor flat,
Block R,
Clifton Hall,
Brunel University London,
Uxbridge,
Middlesex,
UB8 3PH

Client

Professor M Kolokotroni
Department of Mechanical and Aerospace Engineering
College of Engineering, Design and Physical Sciences
Brunel University London,
Uxbridge,
Middlesex,
UB8 3PH

Contents

Building details 2
Test details 2
Test results summary 2
Test method 2
Site notes 3
Calibration details 3
Accreditation details 4
Environmental and building conditions 4
Fan test data 4
Air leakage graph 5
Air Permeability Test Certificate 6

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Building details

Building type:	Top floor flat
Year of construction:	1970s
Type of ventilation:	Natural
Type of heating:	Gas central heating
Air conditioning:	No
Envelope area[i] (m^2):	497.3

Test details

Test date:	2018-08-14
Test time:	11:35
Test direction:	Depressurize
Test method:	B
Weather:	Sunny
Area of building tested:	Entire building

Test results summary

Required air permeability rate[ii] at 50 Pa ($m^3/h.m^2$):	10.0000		
Measured air permeability rate at 50 Pa ($m^3/h.m^2$):	11.9285	+/-0.8%	
Correlation, r^2:	0.99920	95% confidence limits	
Intercept, C_{env} ($m^3/h.Pa^n$):	730.89	685.0	779.8
Slope, n:	0.535	0.51755	0.55250
Air flow at 50 Pa, Q_{50} (m^3/h):	5932.1	+/-0.8%	
Equivalent leakage area at 50 Pa (m^2):	2533	+/-0.8%	
Air changes at 50 Pa, n_{50} (/h):	16.52	+/-0.8%	

Air permeability performance criteria: Fail

Test method

The building air permeability test was carried out in accordance with ATTMA Technical Standard L1 - Measuring air permeability in the envelopes of dwellings, September 2016 Issue.

The building was depressurised using a Retrotec Blower Door System.

Pressure differences across the fan and the building were measured using a single digital micro manometer at the start, during and end of the test.

Air temperatures were measured at the start and at the end of the test using a Testo digital thermometer.

Barometric pressure was measured at the start and at the end of the test using a Testo 511.

All equipment used is UKAS calibrated.

[i] The envelope area for air permeability is defined as the area of the external walls plus the area of the roof and the ground floor. Please note this envelope area has been calculated by Energytest Ltd and not the client.

[ii] Building air permeability performance criteria as defined in the Building Regulations 2000 (as amended), Approved Document L1A: Conservation of Fuel & Power.

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Site notes

The following was temporarily sealed for the duration of the test:

i. Mechanical extract fans.

ii. Window trickle vents.

All traps were filled with water.

All external windows and doors were kept closed for the duration of the test.

Windows or doors in adjacent dwellings were kept open for the duration of the test.

With the building under a state of depressurisation significant levels of air leakage were detected via internal inspection, at the following locations:

- Riser cupboards.
- Damaged and defective windows.
- Along kitchen extractor fan duct runs.
- Stairwell door thresholds.
- Cable runs leading from each flat, into the stairwell.
- Gaps in the ceiling around cables and pipes.
- Damaged and defective trickle vents.
- Around rooflight.

Calibration details

	Serial number:	Calibration expiry:	Certificate Number:
Fan:	3PH600399	5 April 2019	603991055
Pressure/flow gauge:	404783	23 July 2019	UK-33247
Barometer	39104025-912	22-Jul-2019	UK-33234
Thermometer:	33959818/411	24-Jul-2019	UK-33258

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Tunbridge Wells
Kent TN4 9NP

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Accreditation details

Air Tightness Testing & Measurement Association (ATTMA)
Airport House,
Purley Way,
Croydon,
CR0 0XZ

Test engineer: Mr J Southworth

ATTMA registration number: 0373

Environmental and building conditions

	Initial	Final	Average
Barometric Pressure (kPa):	101.3	101.3	101.3
Wind speed (m/s):	0	0	0
Internal temperature:	23.2	23.2	23.2
External temperature:	19.4	19.5	19.5

Fan test data

Fan Model: Retrotec 6000		Fan SN: 3PH600399			Gauge Model: DM-32			Gauge SN: 404783		
Baseline, initial [Pa]	-0.10	-0.10	0.0	-0.10	0.0	0.0	-0.10	0.0	0.0	0.0
Baseline, final [Pa]	-0.50	-0.50	-0.50	-0.40	-0.40	-0.40	-0.20	-0.40	-0.10	-0.10
Flow ring:	A	A	A	A	A	A	A	A	A	A
Induced Pressure [Pa]	-65.2	-60.2	-55.6	-50.9	-45.8	-40.5	-35.1	-30.3	-24.9	-20.7
Door Fan pressure, (Pa):	193.0	180.0	160.0	143.0	131.0	115.0	99.6	81.8	67.1	52.6
Total flow, Q_r (m^3/h):	6822.62	6597.30	6233.49	5905.23	5661.15	5316.91	4961.22	4512.41	4101.82	3647.99
Corrected flow, Q_{env} (m^3/h):	6810.49	6585.57	6222.40	5894.73	5651.09	5307.45	4952.40	4504.39	4094.53	3641.50
Error (%):	-0.1%	0.8%	-0.6%	-1.3%	0.2%	0.5%	1.3%	-0.3%	0.7%	-1.0%

Static Pressure Averages: initial [Pa] ΔP_{01} -0.04, ΔP_{01-} -0.10, ΔP_{01+} 0.00
final [Pa] ΔP_{01} -0.35, ΔP_{01-} -0.35, ΔP_{01+} 0.00

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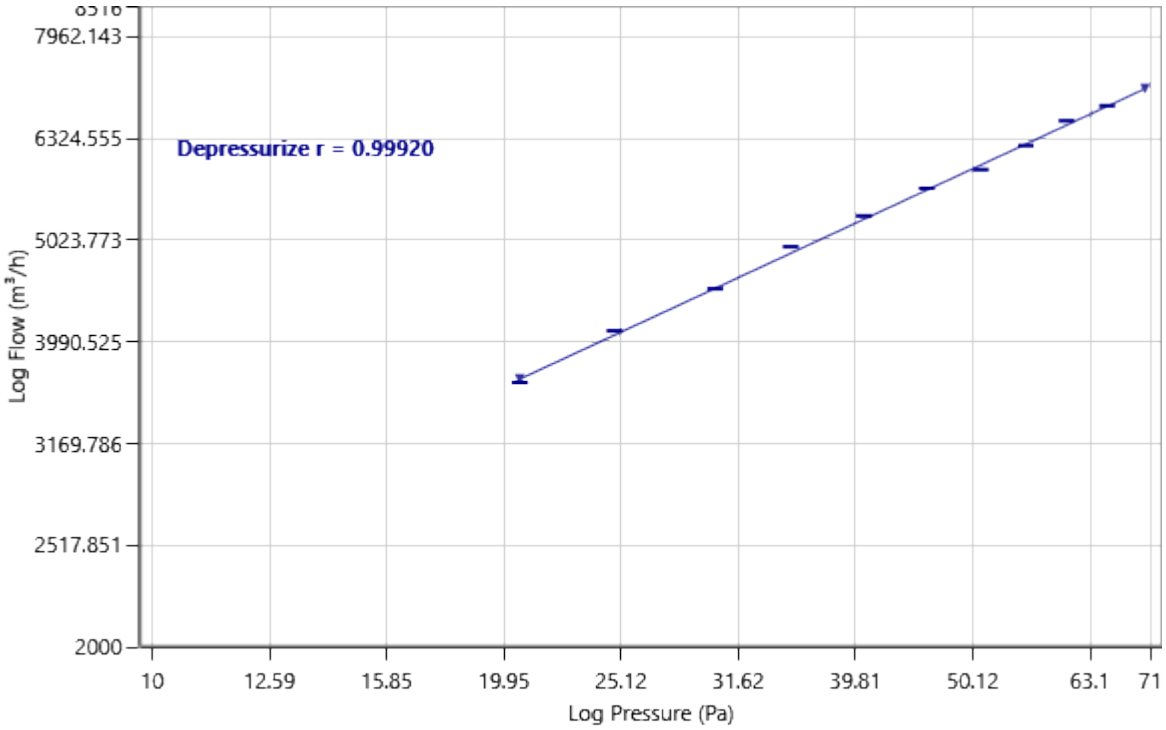
Air leakage graph



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SPAIN

The list of the following documents is provided as supplement to the Deliverable 2.3.

A. EPIQR COST REPORT

Estimation of the work cost, following the standard method of EPIQR+ - Scénario Recost 1
Cadiz, Cadiz

Cost index : 70.16 — **Works costs (without fees and without VAT)**

Summary of cost

Facades	**203 000**
Roofs and floors	**98 000**
Circulation and Commons - Residential building	**30 000**
Premises - Residential buildings	**164 000**
HVAC - Single Buildings	**60 000**

Works cost (without fees and without VAT)	555 000
Architect's fees (without VAT) calculated on the basis of 15 % of the works cost	83 000
Sub-total of works and fees (without VAT)	638 000
VAT on the basis of 7.7 % of the sub-total	49 000
Total cost for renovation (with VAT)	687 000

Estimation of the work cost, following the standard method of EPIQR+ - Scénario Recost 1
Cadiz, Cadiz

Cost index : 70.16 — **Works costs (without fees and without VAT)**

Facades **203 000**

	Element-Type	Priority	1	2	3	4	s	t	u	v	Cost
87%	C01-01-01 Rendering	II	●	●							4 800
13%	C01-01-31 Wood or metal frame windows	II	●	●	●	●					57 800
50%	C01-02-01 Manual wood or metal doors	II	●	●	●	●					1 200
50%	C01-02-02 Manual glazed doors	II	●	●	●	●					2 800
	C01-03-01 XIXth century buildings	II	●	●	●						3 200
	C01-04-01 Basement windows above ground level	II	●	●	●	●					5 100
91%	C01-05-01 Wooden or metal shutters	II	●	●	●	●					24 600
9%	C01-05-11 Roller shutters	II	●	●	●	●					1 000
	C04-02-01 Absence of thermal insulation	II	●	●	●	●					72 100
	C08-01-01 Scaffolding and building site	II	●	●	●	●					18 100
	U06-01-01 Concrete / masonry railing	I	●	●	●						5 900
	U13-01-01 Masonry with wooden flooring	II	●	●							1 400
	U13-02-01 Surroundings - Developed areas	II	●	●	●	●					4 600

Roofs and floors **98 000**

Element-Type	Priority	1	2	3	4	s	t	u	v	Cost
C02-11-01 Carpentry	II	●	●	●	●					20 900
C03-01-01 Pitched roof	II	●	●	●	●					18 500
C03-02-01 Pitched roof	II	●	●	●	●					4 500
C03-03-01 Dormer	II	●	●	●	●					20 300
C03-04-02 Superstructures on roof	II	●	●	●						1 900
C04-01-01 Thermal insulation basement-ground floor	II	●	●	●	●					15 100
C04-03-01 Sloped roof, attic with full amenities	II	●	●	●	●					17 100

Circulation and Commons - Residential building **30 000**

	Element-Type	Priority	1	2	3	4	s	t	u	v	Cost
	C05-02-00 Generic	II	●	●	●	●					7 700
	I06-01-01 Lift		●								0
	U03-01-01 Intenal stairwell	II	●	●	●						2 700
	U03-02-01 Concrete, stone or artificial stone stairs inside the building	II	●	●	●						8 700
	U04-01-01 Common premises	I	●	●	●						7 500
	U04-02-01 Private cellars		●								0
	U04-03-01 Loft (common rooms)	I	●	●	●	●					3 600

Premises - Residential buildings **164 000**

	Element-Type	Priority	1	2	3	4	s	t	u	v	Cost
60%	C06-01-01 Wooden floors	III	●	●							6 500
40%	C06-01-03 Tile covering	III	●	●							2 400
50%	C06-02-00 Generic	III	●	●							6 800
50%	C06-02-01 Plaster - paint	III	●	●							5 800
50%	C06-02-11 Wall paper or textile	III	●	●	●						14 800
	C06-03-01 Plastered ceiling	III	●	●							9 500
	U02-01-01 Equipped kitchen	II	●	●	●	●					77 300
67%	U02-02-01 Toilets in bathroom	II	●	●	●						21 900
33%	U02-02-02 Bathroom and WC	II	●	●	●						11 100
	U13-04-01 Interior carpentry	II	●	●							7 500

HVAC - Single Buildings **60 000**

	Element-Type	Priority	1	2	3	4	s	t	u	v	Cost
	I00-01-02 Without induction current compansation		●								0
	I00-02-01 Low power distribution pannels		●								0
	I00-05-01 Wiring sockets and fixtures	II	●	●	●						1 300
	I00-06-01 Fictures	II	●	●	●						5 600

Estimation of the work cost, following the standard method of EPIQR+ - Scénario Recost 1
Cadiz, Cadiz

Cost index : 70.16 **Works costs (without fees and without VAT)**

HVAC - Single Buildings **60 000**

	Element-Type	Priority	1	2	3	4	s	t	u	v	Cost
	I02-01-01 Oil or gas boiler - up to 1500m2 HRA resp. 100kW		●								0
	I02-02-01 Central boiler with heat exchanger		●								0
	I02-03-01 Apparent heat distribution	II	●	●							1 400
	I02-04-01 Radiators	II	●	●							1 800
	I04-01-01 Connection and water distribution battery		●								0
	I04-03-01 Wastewater pipes	II	●	●	●						5 200
	I04-08-01 Cold water and hot water pipes	II	●	●	●	●					43 800
	I08-01-01 Connection to natural gas		●								0
70%	U12-01-01 Natural ventilation (opening windows)	I	●	●	●	●					800
30%	U12-01-03 Mechanical ventilation	II	●	●							200

Works cost (without fees and without VAT)	555 000
Architect's fees (without VAT) calculated on the basis of 15 % of the works cost	83 000
Sub-total of works and fees (without VAT)	638 000
VAT on the basis of 7.7 % of the sub-total	49 000
Total cost for renovation (with VAT)	687 000

SWITZERLAND

The list of the following documents is provided as supplement to the Deliverable 2.3.

A. INTRODUCTION TO EPIQR+ METHOD
A1. KEYWORDS
A2. METHOD'S CONTEXT AND BOUNDARIES

B. RESULTS OF THE EPIQR+ ANALYSIS
B1. INTRODUCTION
B2. SUMMARY OF COSTS

C. ENERGY CONSUMPTION ANALYSIS
C1. ENERGY CONSUMPTION
C2. COMPOSITION OF THE THERMAL ENVELOPE
C3. ACTUAL CONDITIONS' ENERGY CONSUMPTION ANALYSIS
C4. DISTRIBUTION OF HEAT LOSSES
C5. IMPROVEMENT OF THE THERMAL ENVELOPE
C6. CONCLUSIONS

D. BUILDING CHARACTERISTICS
E. DIAGNOSIS OF THE PYSICAL AND FUNCTIONAL CONDITION
F. COSTS AND INTERVENTIONS RECAP

A. Introduction to the EPIQR+ method

This report was established based on the EPIQR+ diagnosis method which was developed under a project financed by the Technological and Innovation Commission. EPIQR Rénovation and Estia as well as the EPFL participated with other research institutes and private partners on the development of this new decision support tool.

Through a systematic visit, the diagnosis of the functional and physical buildings condition was assessed following four degradation codes (a,b,c and d) as well as one or more improvement codes (s,t and u) attributed to each of the constructive or technical buildings elements. The report established by the EPIQR+ method allows to apprehend the buildings condition scanned by the expert and based on three levels: global level, functional unit level (called macroelement) and element level.

The report was established from the visual buildings visit, without achieving soundings. Based on this diagnosis and the documents delivered by the mandatory, the software helps the expert to define the compliance work required for the refurbishment and by doing so evaluating the buildings level of obsolescence and estimate financially the operations required for its renovation. This does not imply that the whole operations recommended should be implemented. EPIQR cannot be held responsible for the potential costs differences between actual and suggested costs, as these differences may occur from different building work suggested in the report or from potential hidden building degradations which cannot be detected from a visit but may be seen during the effective renovation.
According to the EPIQR+ methods users feed-back, effective investment after refurbishment may vary in a range of ±10% to ±15% in comparison with the initial method's forecast.

A1. Keywords

To ensure a clear comprehension of the report, we define below the main keywords used in the EPIQR+ method.

Element

In order to establish the physical and functional degradation condition's diagnosis as well as the refurbishments estimated costs, the building is divided into elements. These elements correspond to components groups or components strings, ensuring the same function unit.

Types

In order to apply the method to the whole constructed building park, different Types of element were defined to each element.

They define types of execution depending on the buildings age, constructive system, or on the considered element.

For example: the element "C01-01 – Parois extérieures" includes twelve Types:

Crépis (roughcast), *Maçonnerie* (masonry), *Béton apparent* (exposed concrete), *Façade ventilée* (ventilated facade), *Éléments préfabriqués en béton* (precast concrete elements), *Placage pierre et simili* (stone cladding), *Bardage bois ou métal* (wood or metal cladding), *Fenêtres bois* (wooden windows), *Fenêtres aluminium* (aluminium windows), *Façade rideau* (curtain wall facade), *Façade légère portée entre l'ossature* (light inter-structural facade), *Portes halle industrielle* (industrial halls doors).

In some cases, Types can be combined. We then allow to each concerned type a percentage of its proportion in relation to the other element types in the building.

For instance, the types proportion of the element "C01-01 – Parois extérieures" of the diagnosed building correspond to:

Type	Proportion
Roughcast	50 %
Masonry	5 %
Exposed concrete	20 %
Wooden windows	25 %

In some other cases, types can be mutually exclusive. This being the case of the element "U12-01 – Système de ventilation (ventilation system)" which contains three types: *Ventilation par ouverture des fenêtres* (manual ventilation), *Ventilation naturelle* (natural ventilation) and *Ventilation mécanique contrôlée* (controlled mechanical ventilation).

In general, the type percentage sum is equal to 100%. In some cases, several types can be combined, the percentage can therefore exceed 100%

In the case of the "Occultations et protections solaires (solar occultations and protections)", a building can include 50% of windows with wooden flaps, 50% with rolling shutters and 30% of these windows with interior solar protection. These three types will therefore sum a total of 130%.

Macroélément

Macroelement
In order to obtain a global vision of the diagnosis, the elements are gathered into Macroelements. For instance, the "Façades" Macroelement gathers the elements *"Parois extérieures"* (exterior walls), *"Modénature des façades"* (facade's ornament), *"Fenêtres"* (windows), *"Occultations et protections solaires"* (solar screens and protections), *"Portes extérieures"* (exterior doors),

"Fenêtres sous-sol" (basement windows), *"Isolation thermique murs"* (wall thermal insulation), *"Echafaudage de façade"* (facade scaffoldings).

Degradation codes and intervention codes

To assess the degradation level of each element, four codes of degradation were defined: "a" good condition, "b" light degradation, "c" advanced degradation and "d" end of lifetime. These codes represent the average encountered/diagnosed condition, physical or functional, for each element.

Meanwhile, the intervention code is graded "1", "2", "3" or "4". It allows dissociating the degradation condition and the action that will be undertaken on the element. When there is no intervention on the element, the intervention code is "1"; for reconditioning or light rehabilitations, the code is "2"; for significant interventions or for a partial replacement, the code is "3"; for the complete replacement, the code is "4". Defined interventions allow the diagnosed elements to fit the current building standards.

During the realization of the diagnosis, the method establishes the following matches:

degradation code	intervention code
a	1
b	2
c	3
d	4

The method describes the matching degradation codes and the intervention codes for each element of the diagnosis. The expert examines the elements and identifies their closer degradation codes to their physical and functional condition. The match between the real condition of an element and its degradation code depends on the expert's responsibility.

These degradation and intervention codes can be accompanied by a code "s", "t", "u" or "v" indicating the standards of improvement of an element.

Intervention priority

The intervention priority of the elements is assessed following the scale of "I", "II" and "III". Urgent interventions in the short term, within five years, are rated "I". The intervention requested in the medium term, between five or ten years, will have a priority "II". The intervention or the costs that can be postponed to a long term, up to fifteen years, will be rated "III".

The expert is responsible for evaluating this scale of interventions emergency.

A2. Method's context and boundaries

This method allows answering the energetic, interior comfort and the rehabilitation aspects. For other aspects such as fire safety, structural intervention, the building's aspect, the accessibility and the extension of the electricity grid, the waste management of the asbestos materials or any kinds of special materials and the individual equipments, solutions must be discussed with the Lausanne Commune or with specialists from the different fields.

Context and boundaries of the study	into account
1 Energy performance	yes
2 Degradation and building rehabilitation	yes
3 Degradation and technical amenities rehabilitation	yes
4 Intervention on the building's structure	no
5 Fire-safety compliance	no
6 Architectural redefinition or transformations	no
7 Answers to new needs	no
8 Asbestos or special materials sanitation	no
9 Equipment or furniture's renovation	no

Table 1 : Answers of the EPIQR+ method the actual and coming needs.

B1. Introduction

The building Tilleuls 1, located in Vevey, is a residential building built in 1912 on five floors and has a total floor area of 1'222 m^2.

As part of this study, we established three scenarios "Refurbishment", "Basic Upgrading" and "NZEB Upgrading - ReCO2ST". The separation of these three scenarios results from the classification of the works of conservation of the norm SIA 469 as well as the work planned within the framework of the renovation of the building according to the ReCO2ST project.

An inventory of the work is detailed in the different scenarios reports. It indicates for each of the elements of the building its state of deterioration, the work necessary for the restoration as well as their priority of intervention indicated by a note I, II and III. It also recommends possible and relevant adaptation works according to the expert. The diagnosis of each element is illustrated with one to two photos.

Scenario Refurbishment:

The "Refurbishment" scenario refers to all work aimed at maintaining or restoring, for a period of at least ten years, the security and serviceability that the building substance must offer. The detailed interventions thus make it possible to ensure the comfort and the habitability of the building considered necessary or urgent by the expert.

Scenario Basic Upgrading:

Additional interventions in the Refurbishment scenario are intended to enable the facility to respond to new requirements or better performance making the building compliant to minimum legal obligations defined by the Swiss standards and legal framework. This work mainly concerns energy improvements, according to the Energy Act, compliance with the SIA 358 standard for the safety of people, and the requirements for compliance with certain directives of the AEAI fire standard, identified by the auditor without specific detailed analysis.

Scenario Minergie:

The Minergie scenario is a scenario that includes ambitious renovation work to meet the Minergie label. It tends to meet the target values of the SIA 380/1 (Energy Act) for envelope elements, which are very high-performance standards and requires the implementation of efficient ventilation system.

Scenario NZEB Upgrading – ReCO2ST:

This scenario corresponds to the different works that will be carried out in the renovation project of the building. That includes the various options chosen to obtain a high-performance building from the energy point of view while limiting heavy financial investments.

B2. Summary of costs

Scenario NZEB Upgrading – ReCO2ST:

Estimated cost of the works according to the EPIQR+ method, without VAT and fees, in CHF:

Compliance costs	1'354'000
Fees (20%)	203'000
Sub-total compliance and fees	1'557'000
VAT (8%, price 2011)	120'000
Total costs including VAT	**1'677'000**

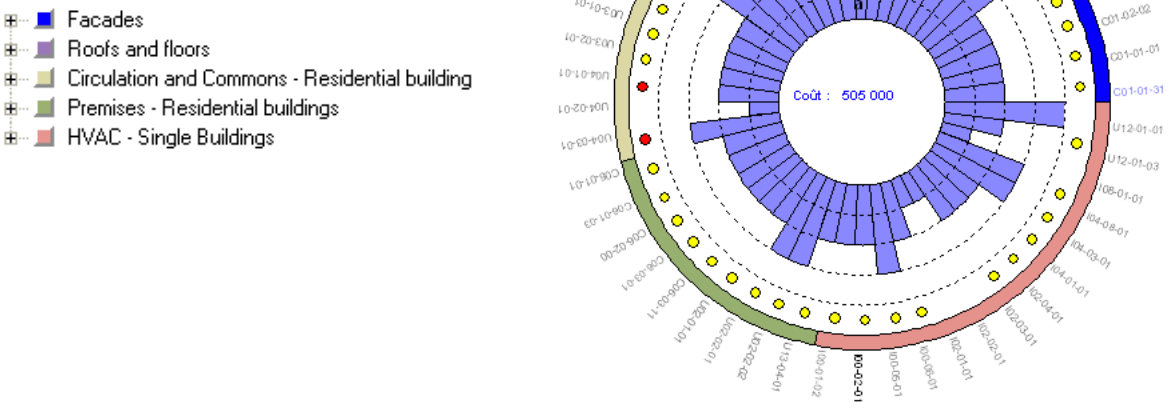


Figure 1: EPIQR+ interface / diagnosis visualisation

C1. Energy consumption

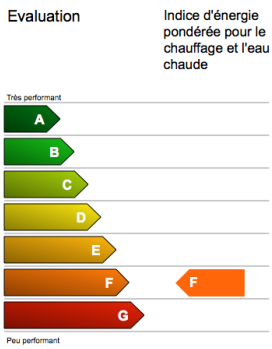
The studied building has an energetic reference surface (A_E) of 1'222 sqm devoted to the assignment « collective habitat » according to the SIA 308/1.

The heating supply is provided by a gas boiler installed in 2014. The average specific final energy needs for heating and hot water is 158 kWh/sqm. To compare, the Swiss real estate one is about 150 kWh/sqm and a similar building would have consumption around 63 kWh/sqm, according to the Swiss regulation.

Based on the visit, the overall performance of the heating production and distribution is estimated 87% of the higher calorific value of the gas due to the recent boilers set up.

Main characteristics are presented in the following table:





Energetic reference surface	1'222 sqm
Assignment SIA 380/1	Collective habitat
Energy carrier	Gas
Boiler	De Dietrich 129 kW 2014
Output production+distribution	η=87%
Production of hot water for sanitary use	Done by the boiler
Consumption (average 2015-2016)	192'360 kWh
Final energy value per year for heating and the supply of hot water	158 kWh/sqm

With average consumption of 192'360 kWh, the building in class F according to technical specifications SIA 2031.

C2. Compositions of the thermal envelope

The following table summarises the thermal properties of the different elements of the building envelope using colour coding. It highlights the less efficient component compared to the actual construction standards (SIA 380/1 :2009).

Envelope component	Supposed composition	U value [W/sqmK]
Windows		
Housing windows	Double non-selective glazing with wooden frames (Uf = 1.9 W / m2K and Ug = 2.9 W / m2K).	≈ 2.8
Entrance windows	Non-selective double glazing with metal frames (Uf = 3.3 W / m2K and Ug = 2.9 W / m2K).	≈ 3.2
Facades		
Exterior walls	Interior finish, 60 cm deep rubble wall (30 cm in window sill), exterior plaster.	≈ 0.9
Walls to unheated premises	Hollow cement brick 15 cm.	≈ 1.6
Roof		
Original inclined roof (stairwell)	Wood rafters without insulation, 1 cm wood panel, 1 cm air gap and earth tiles cooked.	≈ 1.6
Ceilings of housing to attic unheated	Wood floor, 10 cm cement slab.	≈ 1.6
Ceilings from the stairwell to the attic unheated	20 cm concrete slab.	≈ 2.0
Flooring		
Floors to unheated premises subsoil	20 cm concrete slab, 10 cm cement screed.	≈ 1.6

Actual limit value satisfying	Efficient, but below the limit value	Moderately efficient	Inefficient

C3. Actual conditions' energy consumption analysis

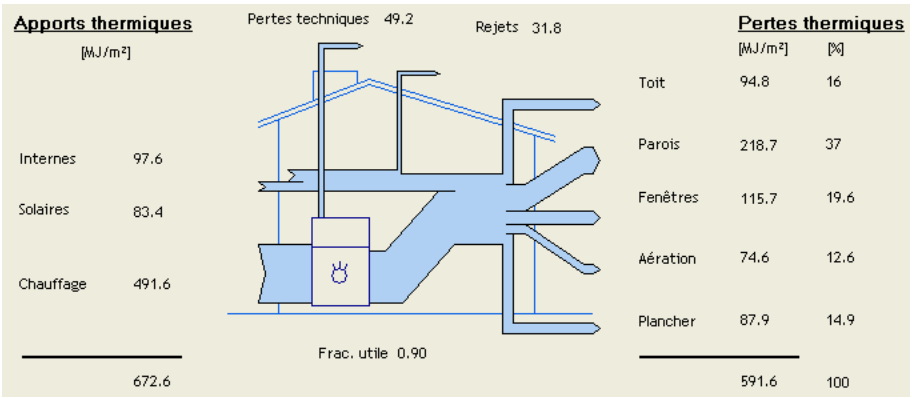
Based on the element's composition hypothesis formulated in the previous section, the surface's summary made on the plan and the hypothesis on the building use's conditions, we realised the building's energy consumption analysis.

The building's heating needs (heat to provide to the building) are of **123 kWh/sqm.y.**

In the absence of the detailed information, the hot water needs to be taken into account in this study refers to the SIA 380/1 standard (75 MJ/sqmy for this building). The same apply to the internal inputs and the thermally active air flows.
Based on the actual energy consumption analysis, the building is rated on class G for its envelope. The heating needs are up to three times higher than an identical building satisfying the current construction's standards. The potential energy savings is therefore evaluated fairly significant.

With standard calculation hypothesis, the theoretical building's IDE is around 160 MJ/sqm.y. This value is close to the consumption measured between 2015 and 2016, that confirm the calcul hypothesis.





Energy consumption analysis of the actual condition. Payerne climatic station. Inner average temperature of 20°C.

C4. Distribution of heat losses

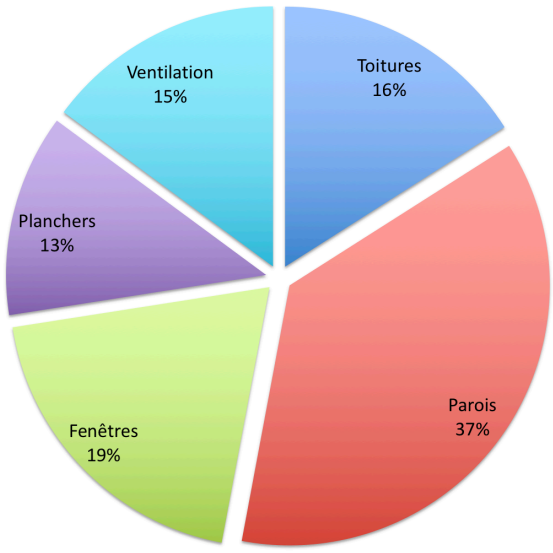
The energy consumption analysis underlines the fact that the outside walls represent more than a third of the building's heating losses. Indeed, they are mostly inefficient. Furthermore, the building's height implies an important facade surface in relation to the other opaque envelop elements.

The windows represent the second item of losses. They are mostly old and composed of double glazed windows with wood frame without thermal break.

The losses through the roof are relatively high because its contact to the attic unheated is not provided with a sufficient thermal insulation.

The floors to unheated premises are not isolated either. Nevertheless, the subsoil acts as a buffer between the ground floor and the ground which limits the thermal losses for this element.

The ventilation losses are related to the mechanical ventilation of the bathrooms groups and also to the manual windows and doors opening as well as the air infiltration in the building. The operating schedule as well as the air flow rates being unknown, the standard value according to the SIA 380/1 were used for this report.



Building heat losses by item.

C5. Improvement of the thermal envelope

Architectural elements

The proposed interventions to reduce the heat requirements of the building as described in the project ReCO2st (Scenario NZEB Upgrading) are summarised in the following table.

Recommandation	New U values [W/m^{2}K]	Heat consumption's reduction	Remarque
Windows			
Replacement of all the original windows by double selective glazing windows with thermal break.	1.3	**11 %**	
Walls			
Implementation of 20 cm of peripheric insulation on the facade-south-east and north-west.	0.15	**27%**	This intervention must be realised simultany to the replacement of the windows. Because of the complexity of the implementation on the facade north-east due to the number of windows, balconies and mouldings, no intervention is advocated on this facade.
Implementation of 16 cm of peripheric insulation on the facade south west.	0.18		
Floor			
Implementation of 12 cm of insulation on the floors against unheated rooms.	0.30	**14 %**	This intervention can be carried out independently of the other works advocated.
Roof			
Installation of 12 cm of insulation on the floor of the unheated attic.	0.28	**16 %**	This intervention can be carried out independently of the other works advocated.

The insulation thicknesses are calculated here on the basis of a thermal conductivity equal to 0.036W/m^{2}K.

Technical installations

The heat production system is a gas boiler which was commissioned in 2014. As part of the project, the building will be connected to a remote heating network with wood production. The boiler currently in place will be deposited. Following the insulation of the building, provide a complete hydraulic balance of the network and heat emitters.

As part of the building's energy renovation, air infiltration will be reduced with the replacement of the windows. Therefore, a humidity-controlled single flow ventilation system must be put in place to ensure sufficient air exchange in the building.

In addition, the building will be equipped with photovoltaic solar collectors on the roof for a total surface of 97 m2. This system will produce approximately 19,000 kWh of electricity per year.

C6. Conclusion

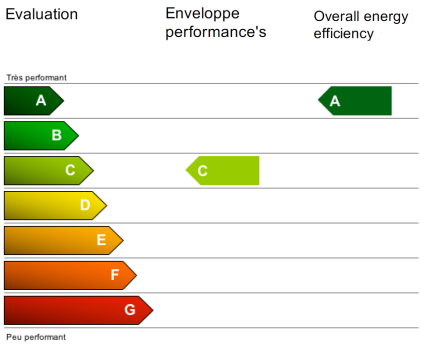
The building Tilleuls 1 was built in the beginning of the XXs century and has been slightly renovated since with the replacement of the windows in the 80's. The thermal envelope is in class G according to the SIA 2031 standard, which means a low performance of all the envelope elements.

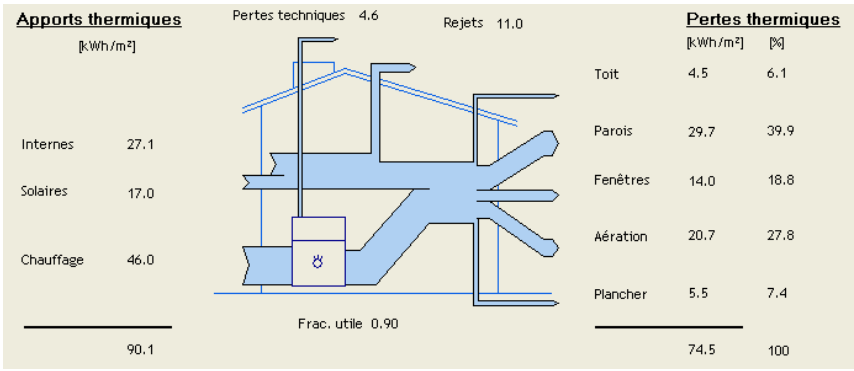
It was found by the thermal balance that the losses are mainly due to the losses by the facade and the windows.

The renovation of the building should therefore concentrate on the peripheral insulation of the façade except the façade noth-east. In addition, all glazing should be replaced by high performance elements. Also provide floor insulation to unheated rooms and the ceiling in contact with the unheated attic.

All of these interventions can reduce the heat requirement for heating by about 66%. The building would then be in energy class C for the performance of the envelope. The building's heating needs (heat to provide to the building) will be of **41 kWh/sqm.y.**

The connection to a remote heat network, as well as the installation of photovoltaic solar panels will significantly improve the overall energy efficiency. With these installations on the technical installations, combined with work on the envelope, the building will be in class A with regard to the





Energy consumption analysis and energetic class reached after the realization of the suggested interventions in the EPIQR diagnosis for scenario ReCO2st.

A2 Limit values according the SIA 380/1

The following spreadsheet fixes the limit performance to respect after the insulation of an opaque shell element or replacement of windows and doors.

	Limit values U_{li} [W/sqmK]		Targeted values U_{ta} [W/sqmK]	
Shell elements Construction elements	outside or laying within 2 meters below ground	non heated rooms or laying over 2 meters below ground	outside or laying within 2meters below ground	non heated rooms or laying over 2meters below ground
Opaque elements roof, ceiling, wall, floor	0.25 0.25	0.28 0.30	0.15 0.15	0.20 0.20
Opaque element with integrated heat system	0.25	0.30	0.15	0.20
Glazing elements : windows, doors and glass doors	1.3	1.6	0.9	1.1
Glazing element with heating system in bracket	1.0	1.3	0.8	1.0
Doors	1.3	1.6	1.1	1.3
Doors above 6sqm	1.7	2.0	1.2	1.4
Blind cases	0.50	0.50	0.30	0.30

Spreadsheet 2: Limit values and targeted values of the thermal transmission's coefficient for the plan elements implied in a transformation of an affectation change for an ambient temperature of 20°C. Extract of the SIA 380/1 SIA standard, 2009 edition.

A3 U Values and subventions

The following spreadsheet sets the U value to reach in order to obtain a subvention from the building's national program (http://www.dasgebaeudeprogramm.ch/index.php/fr).

	U Values [W/sqmK] to respect	Subvention's amount
Windows (with insert in plastic or inox)	$U_{glass} \leq 0.7$ W/sqmK $U_{glass} \leq 1.1$ W/sqmK if protected*	30.- /sqm
Roof Exterior wall (facade) Exterior floor (under face) Wall against ground (laying within 2 meters) Floor against ground (laying over 2 meters)	U ≤ 0.2 W/sqmK U ≤ 0.25 W/sqmK if protected*	30.- /sqm
Wall on non-heated room Ceiling on non-heated room (attic floor) Floor on non-heated room (basement ceiling) Wall against ground (laying over 2 meters) Floor against ground (laying over 2 meters)	U ≤ 0.25 W/sqmK U ≤ 0.28 W/sqmK if protected *	10.- /sqm

Spreadsheet 3: U values to respect in order to obtain subventions for energetic interventions.

More information on the other eventual financial subventions is available on: http://www.infosubventionen.ch

D. Building’s characteristics

Building characteristic

Building

Address :	Tilleuls 1 1800 Vevey
Land register :	303
Insurence policy :	3395
Construction date :	
Owner :	Retraites populaires
Caretaker :	
Phone :	

Mandate

Company :	
Address :	
Responsable :	
Phone 1 :	
Phone 2 :	
Fax :	

Dimentional Coefficient

Surface des abords aménagés :	106 m²	Nombre de portes extérieures :	2 U
Surface bâtie :	238.7 m²	Nombre d'ouvertures en toiture :	8 U
Nombre de cages d'escaliers intérieurs :	1 U	Surface des ouvertures avec occultations et protections solaires :	128.7 m²
Surface de plancher :	1432 m²	Surface de référence énergétique :	1222 m²
Surface de façades vues :	1119 m²	Nombre de logements :	15 U
Nombre de modules d'escaliers intérieurs :	5 U	Surface des locaux d'habitation :	1095 m²

Complexity Coefficient, Cost Index and Engineering Fees

Size of Building :	100 %	Indice de prix de construction OFS :	136.1 %
Working Conditions :	100 %	Honoraires :	15 %
Access :	100 %	TVA :	7.7 %
Complexity Coefficient :	1	Divers et imprévus :	0 %

Commentary

E. Diagnosis of the physical and functional condition

Facades

C01-01 External wall

Type 1: Rendering **87 %**

Évaluation de l'état de la surface extérieure de l'enveloppe de façade: décollements, fissures, salissures.

Degradation state ○ a ◉ b ○ c ○ d

Degraded coating, deterioration of plaster (<20% of the facade surface).

Necessary Works ○ 1 ◉ 2 ○ 3 ○ 4

Priority II

SR : Stitching and new bottom plaster on degraded areas. Cleaning and painting of the whole facade.
SM et SBU : Laying a new plaster during the installation of the peripheral insulation. Cost is included in the item C02-04-01.
SNU : Stitching, new base plaster on degraded areas and painting of the north-east facade only.





C01-01 External wall

Type 31: Wood or metal frame windows **13 %**

Évaluation du fonctionnement, des surfaces, de la manipulation des fenêtres. Evaluation de l'isolation thermique et phonique, étanchéité à l'air et à l'eau.

Typological description

Presence of old windows in double glazing with wooden frame.

Degradation state ○ a ◉ b ○ c ○ d

External surfaces damaged. Correct closures.
Windows of average thermal quality.

Necessary Works ○ 1 ◉ 2 ○ 3 ○ 4

Priority II

SR : Exterior surface treatment with joint repair against masonry. Check and partial adjustment of fittings.
SM : Complete replacement of windows by elements in triple glazing. The S code is retained for this purpose.
SNU et SBU : Complete replacement of windows by double glazed elements.





C01-02 External doors

Type 1: Manual wood or metal doors **50 %**

Évaluation de l'état de surface, du fonctionnement et de la sécurité des portes extérieures.

Typological description

Presence of a wooden door on the basement giving on the outside.

Degradation state ○ a ◉ b ○ c ○ d

Dirty areas. Peeling paint or varnish. Trim and loose fittings.

Necessary Works ○ 1 ◉ 2 ○ 3 ○ 4

Priority II

SR : Painting or varnishing work on both sides.Fittings revision.
SM, SNU et SBU :Replacement of wood door during the facade insulation.





C01-02 External doors

Type 2: Manual glazed doors **50 %**

Évaluation de l'état de surface, du fonctionnement et de la sécurité des portes extérieures.

Typological description

Entrance door in non-selective double glazing with metal frame.

Degradation state ○ a ◉ b ○ c ○ d

Dirty surfaces. Trim and loose fittings.
Low thermal performance.

Necessary Works ○ 1 ◉ 2 ○ 3 ○ 4

Priority II

SR :Fittings revision.
SM, SNU and SBU: Removing the existing door. Establishment of a new entrance door including fittings.





Facades

C01-03 Facade decorations

Type 1: XIXth century buildings **100 %**

Évaluation de l'état des parties saillantes de la façade comme encadrements, cordons, tablettes et décorations de façade. (Les balcons et loggias sont évalués à l'élément U06-01).

Degradation state ○ a ◉ b ○ c ○ d

Some occasional damage on the surface and at the angles. The connections with the masonry are open, but repairable.

Necessary Works ○ 1 ◉ 2 ○ 3 ○ 4

Priority II

SR: Repairs and restorations with resin-based mortars of degraded parts. The nature of these interventions does not require the installation of scaffolding.
SM, SBU: With the installation of a peripheral insulation on the building, the moldings will not have to be taken again. Costs related to facade work are included without the item C01-02-04.
SNU : Rebuilding of the moldings for the north-east facade only.





C01-04 Basement windows

Type 1: Basement windows above ground level **100 %**

Évaluation du fonctionnement et de l'état de surface des fenêtres de cave ou du sous-sol.

Typological description

Presence of cellar windows in single glazing with wooden frame.

Degradation state ○ a ○ b ◉ c ○ d

Closures work. Improper partial seal, damaged exterior and interior surfaces.

Necessary Works ○ 1 ○ 2 ◉ 3 ○ 4

Priority II

SR :Complete treatment of surfaces. Repair of the joint against the masonry.
SM, SNU et SBU : Complete replacement of cellar windows by efficient double-glazed elements and surface treatment.





C01-05 Shutters and solar protection

Type 1: Wooden or metal shutters **91 %**

Évaluation du fonctionnement, du maniement, des surfaces des occultations extérieures.

Typological description

Presence of wooden shutters on all windows of the building, except those on the street side, the stairwell and the basement.

Degradation state ○ a ○ b ◉ c ○ d

Shutters mostly damaged. Surfaces degraded by bad weather.

Necessary Works ○ 1 ○ 2 ◉ 3 ○ 4

Priority II

SR :Preparation and painting of all surfaces.Fittings revision.
SM, SNU et SBU : Replacement of all the shutters. Complete treatment of surfaces.





C01-05 Shutters and solar protection

Type 11: Roller shutters **9 %**

Évaluation du fonctionnement, du maniement, des surfaces des occultations extérieures.

Typological description

Presence of shutters on the ground floor windows side street.

Degradation state ○ a ○ b ◉ c ○ d

Roller shutters are damaged. Partially damaged fittings.

Necessary Works ○ 1 ○ 2 ◉ 3 ○ 4

Priority II

SR: Partial replacement (<30%) of shutters, replacement of fittings.
SM, SNU et SBU : Complete replacement of the shutters.





C04-02 External wall thermal insulation

Type 1: Absence of thermal insulation **100 %**

Évaluation de l'isolation thermique du composant opaque de la façade, recherche des ponts thermiques, dégâts de condensation, appréciation du confort dans les locaux, etc.

Degradation state ○ a ○ b ○ c ◉ d

The constitution of the walls is unsatisfying from the thermal side. The limit value SIA (U = 0.25 W / Km2) is not reached.

Necessary Works ◉ 1 ○ 2 ○ 3 ○ 4

Priority II

SR : No work
SM: Installation of a compact peripheral insulation with a thickness of 20 cm on all external surfaces.
221/5000
SNU: Installation of a 20 cm thick compact perimeter insulation on the southeastern and northwestern gables and 16 cm of insulation on the southwestern facade. The north-east facade is not isolated.
SBU: Implementation of a compact peripheral insulation with a thickness of 16 cm on all external surfaces.

C08-01 Façade scaffoldings

Type 1: Scaffolding and building site **100 %**

Évaluation de la nécessité de la mise en place d'échafaudages et de leur importance.

Degradation state ◉ a ○ b ○ c ○ d

Due to the slight interventions planned on the facade in the refurbishment scenario, site facilities and the installation of scaffolding are not necessary.
In the case of peripheral insulation implementation as described in the other scenarios, a scaffolding will have to be accounted for.

Necessary Works ◉ 1 ○ 2 ○ 3 ○ 4

SR : No installation of construction site.
SM and SBU: Installation of site facilities (water point, electric panel, trailer, etc.) and scaffolding (construction duration less than 5 months). Including cleaning the front feet at the end of the construction site.
SNU: Same SM and SBU with a coefficient of podration because only 70% of surfaces are concerned.

Facades

U06-01 Balconies and galleries

Type 1: Concrete / masonry railing **100 %**

Évaluation des salissures, fissures et fixations des balcons et loggias, surface des dalles ainsi que des protections solaires.

Degradation state ○ a ○ b ◉ c ○ d

Many cracks and breaks without risk to safety. Degraded flooring. Uninsured water evacuation.

Necessary Works ○ 1 ○ 2 ◉ 3 ○ 4

Priority I

SR, SM, SBU and SNU: Remediation of concrete and masonry. Rehabilitation of the floor covering and drainage. Rehabilitation of all surfaces.





U13-01 Structure slab-walls

Type 1: Masonry with wooden flooring **100 %**

Évaluation de la structure porteuse: éléments verticaux et horizontaux.

Degradation state ○ a ◉ b ○ c ○ d

Building with carrying system in good condition, no crack, settlement, sag etc. Unseen anti-seismic compliance.

Necessary Works ○ 1 ◉ 2 ○ 3 ○ 4

Priority II

SR, SM, SNU and SBU: Complementary examination: civil engineer. Summary analysis of visual without calculations and report on the sufficiency of the structure and the antiseismic conformity (3 days of work). The amount of refurbishment work may be included in the items concerned.





U13-02 Sourroundings

Type 1: Surroundings - Developed areas **100 %**

Évaluation des abords, surfaces vertes, surfaces en dur, clôtures, installations de boîtes à lettres, des points d'eau et de l'éclairage.

Typological description

The extern surfaces consist of cement slabs or chippings.

Degradation state ○ a ◉ b ○ c ○ d

The surroundings need a restoration. Hard surfaces are partially degraded.

Necessary Works ○ 1 ◉ 2 ○ 3 ○ 4

Priority II

SR, SM and SBU: Rehabilitation of green and hard surfaces.
SNU: Rehabilitation of green and hard surfaces, evacuation of surface water. Install outdoor lighting.





Roofs and floors

C02-11 Roof structure

Type 1: Carpentry **100 %**

Évaluation de la solidité des éléments porteurs en bois et des assemblages, de la présence de moisissures ou d'attaques d'insectes.

Degradation state ○ a ◉ b ○ c ○ d

Éléments porteurs en bon état. Bois sain, traces d'attaque d'insectes ou de moisissures localisées.

Necessary Works ○ 1 ◉ 2 ○ 3 ○ 4

Priority II

SB, SM, SR et SAN : Traitement de protection de l'ensemble de la charpente.





C03-01 Roof covering

Type 1: Pitched roof **100 %**

Évaluation de l'étanchéité de l'usure de la surface de toiture (y compris avant-toits).

Degradation state ○ a ◉ b ○ c ○ d

Couverture en bon état. Quelques tuiles sont sales et déplacées. Tuiles faîtières partiellement mal fixées. L'étanchéité est garantie.

Necessary Works ○ 1 ◉ 2 ○ 3 ○ 4

Priority II

SB, SM, SR et SAN : Nettoyage et remise en place de tuiles. Remplacement de tuiles (< 5%). Boiseries à refixer et à repeindre.

C03-02 Roof sheet metal work

Type 1: Pitched roof **100 %**

Évaluation de la qualité, de l'étanchéité et de la corrosion de la ferblanterie (garnitures, tabatières, etc.) et des évacuations d'eaux pluviales.

Degradation state ○ a ◉ b ○ c ○ d

Ferblanterie abîmée, traces de corrosion localisées. La fonction est néanmoins assurée. La structure des tabatières ainsi que les vitrages sont en bon état.

Necessary Works ○ 1 ◉ 2 ○ 3 ○ 4

Priority II

SB : Réparations locales et traitement de surface. Réfection des joints de tabatières.
SM, SR et SAN : Remplacement de toute la ferblanterie avec un matériau inoxydable lors de la mise en place de l'isolation périphérique. Remplacement des tabatières (structure, vitrage, raccordements).





C03-03 Roof openings

Type 11: Skylights **100 %**

Évaluation des dégradations, de la corrosion, de l'étanchéité, des structures vitrées sur la surface de toiture. Les châssis à tabatière sont à évaluer à l'élément C03-02.

Typological description

Présence de velux en simple vitrage situés dans les combles.

Degradation state ○ a ◉ b ○ c ○ d

Velux anciens présentant de légères dégradations. Cadres et garnitures de ferblanterie en état.

Necessary Works ○ 1 ◉ 2 ○ 3 ○ 4

Priority II

SB, SM, SR et SAN : Remplacement du verre, réfection des joints préparation et penture des châssis.





C03-04 Supperstructures on roof

Type 2: Superstructures on roof **100 %**

Évaluation de l'état des constructions en maçonnerie (cheminées, souches, locaux techniques, etc.) sur toiture: fissures, salissures, étanchéité des raccords.

Degradation state ○ a ○ b ◉ c ○ d

Dégradations sur le crépi et fissures importantes. Enduit sali et dégradé.

Necessary Works ○ 1 ○ 2 ◉ 3 ○ 4

Priority II

SB, SM, SR et SAN : Assainissement du crépi (< 50%) de la surface. Nouveau traitement de surface.





C04-01 Floor thermal insulation

Type 1: Thermal insulation basement-ground floor **100 %**

Évaluation de l'isolation thermique de la dalle sur les locaux non chauffés. Appréciation du confort des locaux situés au-dessus.

Typological description

Plancher composé d'une de béton hourdi et d'une chape de ciment.

Degradation state ○ a ○ b ○ c ◉ d

Absence d'isolation thermique.

Necessary Works ◉ 1 ○ 2 ○ 3 ○ 4

SB : Sans intervention.
SM : Isolation de la dalle sur sous-sol afin d'obtenir une valeur U = 0.20 W/K.m2.
SR et SAN : Isolation de la dalle sur sous-sol selon les exigences minimales (valeur limite SIA: U = 0.25 W/Km2).





C04-03 Roof thermal insulation

Type 1: Sloped roof, attic with full amenities **100 %**

Évaluation de l'isolation thermique de la toiture, recherche de ponts thermiques, appréciation du confort des combles, etc.

Typological description

Plafonds des logements en contact avec des combles non isolés.

Degradation state ○ a ○ b ○ c ◉ d

Absence d'isolation thermique.

Necessary Works ◉ 1 ○ 2 ○ 3 ○ 4

Priority II

SB : Sans intervention.
SM : Mise en place d'une isolation thermique en surface afin de respecter une valeur U = 0.20 W/K.m2.
SR et SAN : La mise en place d'une isolation respectant les valeurs limite de la SIA a été prise en compte ici, à savoir U = 0.25 W/K.m2.





Circulation and Commons - Residential building

C05-02 Interior doors



Type 0: Generic **100 %**

Évaluation de l'usure, du fonctionnement et de l'état des surfaces.

Degradation state ○ a ◉ b ○ c ○ d

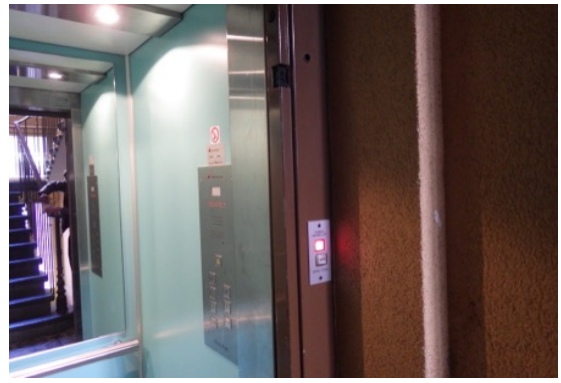
Joinery in good condition, traces of shocks or localized wear. Fittings damaged. Faded surfaces.

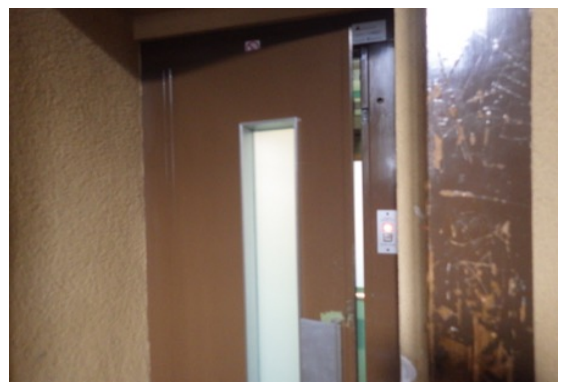
Necessary Works ○ 1 ◉ 2 ○ 3 ○ 4

Priority II

SR and SM: Repair of damaged parts, partial adjustment and replacement of fittings. Doors painting.
SNU and SBU: Replacement of all landing doors.

I06-01 Lifts





Type 1: Lift **100 %**

Évaluation du fonctionnement, de l'état d'usure, de la sécurité des ascenseurs ou de de la nécessité et possibilité d'installer un ascenseur.

Degradation state ○ a ◉ b ○ c ○ d

The facility has been recently renovated and is working properly. The closing of the doors and the controls are enough.
Presence of damage on the outer doors at the level of the bearings.

Necessary Works ○ 1 ◉ 2 ○ 3 ○ 4

Priority II

SR, SM, SNU and SBU: Expected cleaning and painting.

Circulation and Commons - Residential building

U03-01 Staircase





Type 1: Intenal stairwell **100 %**

Évaluation des surfaces: salissures, décollements, fissures, des parois de la cage d'escalier (y compris les paliers). L'escalier est évalué à l'élément C06-04 ou U03-02.

Degradation state ○ a ◉ b ○ c ○ d

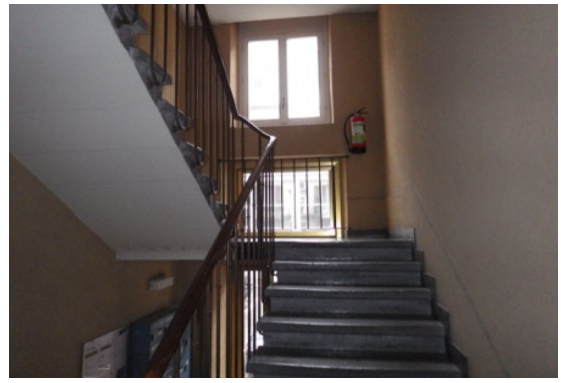
Dirty or faded surfaces. Correct support.

Necessary Works ○ 1 ◉ 2 ○ 3 ○ 4

Priority II

SR, SM and SBU: Preparation and painting of the walls.
SNU: Partial dressings of the support. Preparation and complete painting of the walls.

U03-02 Staircase and landings





Type 1: Concrete, stone or artificial stone stairs inside the building **100 %**

Évaluation de l'état des revêtements de sol et des sous-faces de l'escalier, de la balustrade ainsi que de leur sécurité.

Degradation state ○ a ◉ b ○ c ○ d

Limons and balustrades in good condition. Spot damage on steps and noses. Microfissures and joints cleared. Dirty and faded surfaces.

Necessary Works ○ 1 ◉ 2 ○ 3 ○ 4

Priority II

SR, SM and SBU: Local repair of steps. Control of the assemblies, painting of the railing and the underside of the staircase.
SNU: Rehabilitation of steps and silt. New coatings. Sealing balustrades. Painting all the elements.

Circulation and Commons - Residential building

U04-01 Common premisses

Type 1: Common premises **100 %**

Évaluation des surfaces des locaux communs telles que la buanderie, le local à vélo, etc.: sol, parois, plafonds.

Degradation state ○ a ◉ b ○ c ○ d

Dirt and occasional damage to walls, floors, ceilings and interior doors.

Necessary Works ○ 1 ◉ 2 ○ 3 ○ 4

Priority I

SR, SM, SNU and SBU: Resumption of walls, floors and ceilings. Painting work on repaired surfaces. Light work to repair interior doors.

U04-02 Private cellars

Type 1: Private cellars **100 %**

Évaluation des caves privées: sols, parois, plafonds et équipement (parois à claire-voie).

Degradation state ◉ a ○ b ○ c ○ d

Locals in order. No trace of soiling or deterioration.

Necessary Works ◉ 1 ○ 2 ○ 3 ○ 4

SR, SM, SNU and SBU: Continued unaccounted for maintenance.





Circulation and Commons - Residential building

U04-03 Attics (common rooms)

Type 1: Loft (common rooms) **100 %**

Évaluation de la disposition et de l'accessibilité des combles ainsi que des dégradations.

Degradation state ○ a ○ b ◉ c ○ d

Presence of punctual damage. The floors, ceilings, walls and doors are degraded.

Necessary Works ○ 1 ○ 2 ◉ 3 ○ 4

Priority I

SR, SM, SNU and SBU: Resumption of floors, walls and ceilings. Partial replacement of doors, and slatted walls.





Premises - Residential buildings

C06-01 Floor finishings

Type 1: Wooden floors **70 %**

Évaluation de l'état d'usure et de salissure des revêtements de sol.

Degradation state ○ a ◉ b ○ c ○ d

La surface du parquet est plane et en bon état. Taches et usure partielle. Plinthes endommagées.

Necessary Works ○ 1 ◉ 2 ○ 3 ○ 4

Priority II

SB, SM, SR et SAN : Remplacement de plinthes. Ponçage et imprégnation de l'ensemble des surfaces.





C06-01 Floor finishings

Type 3: Tile covering **30 %**

Évaluation de l'état d'usure et de salissure des revêtements de sol.

Degradation state ○ a ◉ b ○ c ○ d

Carreaux par endroits décollés ou endommagés. Joints partiellement dégarnis. Les réparations localisées sont possibles.

Necessary Works ○ 1 ◉ 2 ○ 3 ○ 4

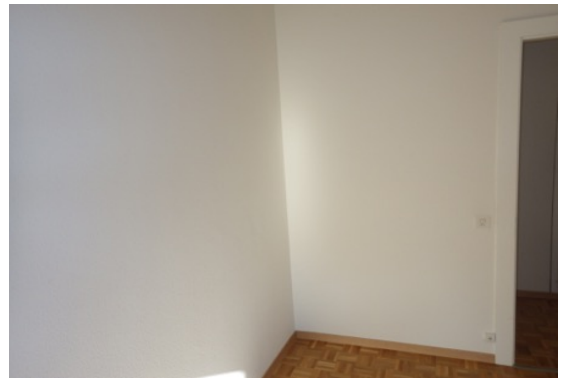
Priority II

SB, SM, SR et SAN : Remplacement de quelques carreaux et plinthes (matériaux de réserve disponibles). Réfection des joints.



Premises - Residential buildings

C06-02 Interior walls and wall finishings



Type 0: Generic **100 %**

Évaluation de l'état d'usure, de la fissuration et de l'état de surface des revêtements de mur.

Degradation state ○ a ◉ b ○ c ○ d

Fonds en bon état. Surfaces sales ou usées.

Necessary Works ○ 1 ◉ 2 ○ 3 ○ 4

Priority II

SB, SM, SR et SAN : Préparation et peinture des surfaces.

C06-03 Ceiling coating



Type 1: Plastered ceiling **50 %**

Évaluation des salissures, des fissures, de la planéité et des décollements des surfaces des plafonds.

Degradation state ○ a ◉ b ○ c ○ d

Surfaces sales. Support en bon état. Microfissures partielles.

Necessary Works ○ 1 ◉ 2 ○ 3 ○ 4

Priority II

SB, SM, SR et SAN : Reprise des fissures et peinture des surfaces.

C06-03 Ceiling coating



Type 11: Plaster suspended ceiling **50 %**

Évaluation des salissures, des fissures, de la planéité et des décollements des surfaces des plafonds.

Degradation state ○ a ◉ b ○ c ○ d

Surfaces défraîchies. Support en bon état.

Necessary Works ○ 1 ◉ 2 ○ 3 ○ 4

Priority II

SB, SM et SR : Nettoyage et traitement de l'ensemble des surfaces. Remplacement partiel (<5%).

U02-01 Kitchen





Type 1: Equipped kitchen **100 %**

Évaluation de l'usure, de l'âge des installations des appareils, des meubles et des équipements. Évaluation de l'état du local, sol, mur, plafond. La robinetterie, les écoulements et la distribution de gaz ne sont pas à évaluer à cet élément.

Degradation state ○ a ◉ b ○ c ○ d

Plafond et murs sales ou défraîchis. Revêtement en faïence ancien, mais en état. Usure des garnitures de meubles de cuisine. Appareils en état. Installation électrique suffisante.

Necessary Works ○ 1 ◉ 2 ○ 3 ○ 4

Priority II

SB, SM et SAN : Peinture sur plafond et murs. Réglage ou remplacement des ferrements des meubles de cuisine et des robinetteries défectueuses.
SR : Remplacement des hottes de charbon actives en plus des travaux d'entretien détaillés précédemment.

U02-02 Sanitary premisses

Type 1: Toilets in bathroom **67 %**

Évaluation de l'usure, de l'âge des installations, des appareils et des équipements. Évaluation de l'état du local, sol, mur, plafond. La robinetterie et les écoulements ne sont pas à évaluer à cet élément.

Degradation state ○ a ○ b ◉ c ○ d

Enduits des parois et plafond sales ou effrités. Carrelages décollés par endroit. Joints dégarnis ou non étanches.

Necessary Works ○ 1 ○ 2 ◉ 3 ○ 4

Priority II

SB, SM, SR et SAN : Remplacement des appareils sanitaires vétustes. Réfection des joints. Remplacement de quelques carreaux. Peinture sur parois et plafonds.

U02-02 Sanitary premisses

Type 2: Bathroom and WC **33 %**

Évaluation de l'usure, de l'âge des installations, des appareils et des équipements. Évaluation de l'état du local, sol, mur, plafond. La robinetterie et les écoulements ne sont pas à évaluer à cet élément.

Degradation state ○ a ○ b ◉ c ○ d

Enduits des parois et plafonds sales ou effrités. Carrelages décollés par endroit. Joints évidés ou non étanches. Robinetterie vétuste ou non étanche.

Necessary Works ○ 1 ○ 2 ◉ 3 ○ 4

Priority II

SB, SM, SR et SAN : Remplacement des appareils sanitaires vétustes. Réfection des joints. Remplacement de quelques carreaux. Peinture sur parois et plafonds.

U13-04 Interior carpentry



Type 1: Interior carpentry **100 %**

Evaluation de l'usure, du fonctionnement de l'état des surfaces et des salissures des menuiseries intérieures.

Degradation state ○ a ◉ b ○ c ○ d

Menuiseries en bon état, traces de chocs ou d'usures localisées. Surfaces défraîchies.

Necessary Works ○ 1 ◉ 2 ○ 3 ○ 4

Priority II

SB, SM, SR et SAN : Réparation des parties endommagées, ajustement et remplacement partiels des ferrements. Peinture des portes.

I00-01 Electrical power supply and main electrical panel

Type 2: Without induction current compansation **100 %**

Evaluation de l'état du tableau principal d'alimentation électrique, de sa situation et du suivi de sa conformité.

Degradation state ○ a ◉ b ○ c ○ d

Connection, power supply and main electrical panel in order located in a closed room. Old, but functional installation. Security report of less than 5 years.

Necessary Works ○ 1 ◉ 2 ○ 3 ○ 4

Priority II

SR and SBU: Verification of the facilities and the amount of the reserve for component replacement.
SM: Installation of photovoltaic solar collectors for a total area of approximately 20 m2 (T code retained for this purpose).
SNU: Installation of photovoltaic solar collectors for a total area of approximately 97 m2 (T code retained for this purpose).

I00-02 Pannels and secondary electrical distribution

Type 1: Low power distribution pannels **100 %**

Evaluation de l'état des tableaux et de leur alimentation électrique, de leur situation et du suivi de leur conformité.

Degradation state ○ a ◉ b ○ c ○ d

Closed secondary distribution boards in cabinets. Old and functional appliances.
These are only equipped with porcelain fuses and do not have a differential protection system.

Necessary Works ○ 1 ◉ 2 ○ 3 ○ 4

Priority II

SR, SM and SBU: Maintenance work and reserve amount for the replacement of defective units.
SNU: No works.





I00-05 Lighting wiring and plugs





Type 1: Wiring sockets and fixtures **100 %**

Évaluation de l'état de l'alimentation électrique des prises et des luminaires, du fonctionnement, de la qualité et du niveau de confort des prises de courant fort.

Degradation state ○ a ○ b ◉ c ○ d

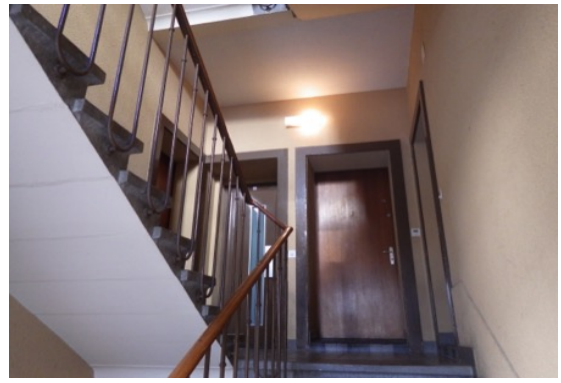
The supply of light points and electrical outlets is insufficient. Replacements have already been made.
Some outlets are outdated and do not meet current standards.

Necessary Works ○ 1 ○ 2 ◉ 3 ○ 4

Priority II

SR, SM and SBU: Specialist consultation, control and replacement of electrical outlets and old switches.
SNU: No works

I00-06 Lighting appliances





Type 1: Fictures **100 %**

Évaluation de l'état, du fonctionnement et du niveau d'éclairement des luminaires.

Typological description

This element only describes the installations present in the commons.

Degradation state ○ a ◉ b ○ c ○ d

Number, type and situation of lights seems sufficient. The bulbs or fluorescent tubes are nevertheless obsolete, their energy consumption is too high.

Necessary Works ○ 1 ◉ 2 ○ 3 ○ 4

Priority II

SR, SM and SBU: Complete replacement of fluorescent bulbs or tubes while retaining supports.
SNU: Complete replacement of fixtures, power distribution is retained.

I02-01 Heating central production plant

Type 1: Oil or gas boiler - up to 1500m2 HRA resp. 100kW **100 %**

Évaluation du fonctionnement et du rendement de l'installation de production de chaleur (y compris le réseau de distribution primaire).

Typological description

Presence of a De Dietrich condensing gas boiler installed in 2014. It has a nominal power of 129 kW.

Degradation state ◉ a ○ b ○ c ○ d

Heat production is in good condition and correctly sized. The installation meets the requirements.

Necessary Works ◉ 1 ○ 2 ○ 3 ○ 4

SR: No works
SM: Installation of a heat pump (code T is retained for this purpose).
SNU: Removal of the boiler and connection to the remote heat network. Provide complete hydraulic balancing of the network and heat emitters.
SBU: Adaptation of the heating curve to be planned after the energetic renovation of the building. Cost not taken into account in the method.





I02-02 Sanitary hot water production

Type 1: Central boiler with heat exchanger **100 %**

Évaluation du fonctionnement, du rendement et de l'âge de l'installation de production d'ECS

Typological description

There is a central boiler of mark Elcalor (type SRI 751) dating from 2014. It has a capacity of 750 liters.

Degradation state ◉ a ○ b ○ c ○ d

Hot water boiler in good condition. No sign of corrosion or loss. Proper sizing and prescriptions respected.

Necessary Works ◉ 1 ○ 2 ○ 3 ○ 4

SR, SM and SBU: No works
SNU: Installation of about 10 m2 of solar thermal collectors (code S is retained for this purpose).





I02-03 Heating distribution network





Type 1: Apparent heat distribution **100 %**

Évaluation du fonctionnement, de la dégradation et de l'isolation des colonnes et conduites de chauffage au sous-sol.

Degradation state ○ a ◉ b ○ c ○ d

Old ducts, but in good condition, some signs of corrosion or signs of leaks. Correct sizing, flow rates and pressures assured. Complete insulation.

Necessary Works ○ 1 ◉ 2 ○ 3 ○ 4

Priority II

SR, SM, SNU and SBU: Repair or replace defective parts and seals. Adapt to the regulations in force. Rinse the network.

I02-04 Heating and cooling terminal units





Type 1: Radiators **100 %**

Évaluation du fonctionnement, de la puissance et de la corrosion des émetteurs de chaud et de froid dans les locaux (plusieurs types peuvent exister simultanément).

Typological description

There are cast iron radiators with thermostatic valves.

Degradation state ○ a ◉ b ○ c ○ d

Old radiators, but in good condition. A little sales or corroded. Few problems with flow, air or noise. Sizing and balancing does not correct.

Necessary Works ○ 1 ◉ 2 ○ 3 ○ 4

Priority II

SR, SM, SNU and SBU: Amount of reserve for the replacement of some obsolete devices.

I04-01 Water connection and metering

Type 1: Connection and water distribution battery **100 %**

Évaluation des conduites depuis l'entrée dans l'immeuble jusqu'aux compteurs.

Degradation state ○ a ◉ b ○ c ○ d

Pipes, frames and insulation old, but in good condition and functional. Little visible damage, leakage, corrosion or deposit. Acceptable sizing.

Necessary Works ○ 1 ◉ 2 ○ 3 ○ 4

Priority II

SR, SM, SNU and SBU: Maintain reinforcement in good condition. Repair or replace defective parts and seals.





I04-03 Sewage pipes

Type 1: Wastewater pipes **100 %**

Évaluation du fonctionnement, de la corrosion et de l'obstruction des conduites d'eaux usées.

Degradation state ○ a ○ b ◉ c ○ d

Conduits in poor condition. Visible damage.

Necessary Works ○ 1 ○ 2 ◉ 3 ○ 4

Priority II

SR, SM, SNU and SBU: Cleaning and rinsing of pipes. Repair if necessary. Repair the fasteners taking care of the acoustic insulation. Keep an amount for sanding pipes and laying a resin.





I04-08 Sanitary water distribution

Type 1: Cold water and hot water pipes **100 %**

Evaluation du fonctionnement, de la corrosion, et de la distribution des conduites d'eau sanitaire depuis la nourrice avec le compteur jusqu'aux appareils.

Degradation state ○ a ○ b ◉ c ○ d

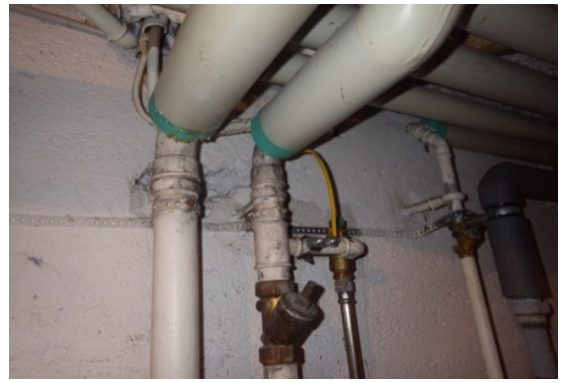
Partially defective pipelines showing signs of corrosion and leakage. Thermal insulation has damage.

Necessary Works ○ 1 ○ 2 ◉ 3 ○ 4

Priority II

SR, SM, SNU and SBU: Replace or repair lines, joints, fasteners. Keep an amount for sanding pipes and laying a protective resin.





I08-01 Gaz connection to the city network

Type 1: Connection to natural gas **100 %**

Évaluation du raccordement au réseau du gaz jusqu'au compteur. Étanchéité, corrosion, armatures, traversée de mur, inscriptions, fixations, schémas, et mode d'emploi, prescriptions légales.

Degradation state ◉ a ○ b ○ c ○ d

Conduits and meter in good condition. Respect of prescriptions.

Necessary Works ◉ 1 ○ 2 ○ 3 ○ 4

SR, SM and SBU: No works.
SNU: Removal of the main gas meter in the case of connection to the remote heat network. Intervention taken into account in the item I02-01-01.



U12-01 Ventilation system without air handling

Type 1: Natural ventilation (opening windows) **70 %**

Évaluation de la ventilation des locaux par rapport aux odeurs, à l'humidité, à la présence ou non de moisissures.

Degradation state ○ a ○ b ○ c ◉ d

Air Renewal not sufficient. presence of smells and humidity. Mold development in some rooms facing north.

Necessary Works ◉ 1 ○ 2 ○ 3 ○ 4

SR: No works
SM: Installation of a dual flow ventilation system with heat recovery (code S is retained for this purpose).
SNU and SBU: Installation of a single flow ventilation system with air extraction in humid rooms only (the T code is retained for this purpose).





U12-01 Ventilation system without air handling

Type 3: Mechanical ventilation **30 %**

Évaluation de la ventilation des locaux par rapport aux odeurs, à l'humidité, à la présence ou non de moisissures.

Typological description

Présence d'un système de ventilation simple flux avec extraction de l'air dans les pièces humides.

Degradation state ○ a ◉ b ○ c ○ d

Renouvellement d'air suffisant. Absence d'odeur. Entrées d'air partiellement endommagées ou en mauvais état (<30%).

Necessary Works ○ 1 ◉ 2 ○ 3 ○ 4

Priority II

SB : Entretien des installations et montant de réserve pour le remplacement de bouches d'entrée d'air.
SM, SR et SAN : Dépose des installations dans le cas de la mise en place de système de ventilation complet.





F. Costs and interventions recap

Estimation of the work cost, following the standard method of EPIQR+ - Scenario Refurbishment
Tilleuls 1, Vevey

Cost index : 136.1 **Works costs (without fees and without VAT)**

Summary of cost

Facades	**147 000**
Roofs and floors	**34 000**
Circulation and Commons - Residential building	**38 000**
Premises - Residential buildings	**225 000**
HVAC - Single Buildings	**62 000**

Works cost (without fees and without VAT)	505 000
Architect's fees (without VAT) calculated on the basis of 15 % of the works cost	76 000
Sub-total of works and fees (without VAT)	581 000
VAT on the basis of 7.7 % of the sub-total	45 000
Total cost for renovation (with VAT)	626 000

Estimation of the work cost, following the standard method of EPIQR+ - Scenario Refurbishment
Tilleuls 1, Vevey

Cost index : 136.1 **Works costs (without fees and without VAT)**

Facades 147 000

	Element-Type	Priority	1	2	3	4	s	t	u	v	Cost
87%	C01-01-01 Rendering	II									46 400
13%	C01-01-31 Wood or metal frame windows	II									24 800
50%	C01-02-01 Manual wood or metal doors	II									600
50%	C01-02-02 Manual glazed doors	II									200
	C01-03-01 XIXth century buildings	II									14 400
	C01-04-01 Basement windows above ground level	II									3 800
91%	C01-05-01 Wooden or metal shutters	II									28 500
9%	C01-05-11 Roller shutters	II									1 000
	C04-02-01 Absence of thermal insulation	II									0
	C08-01-01 Scaffolding and building site										0
	U06-01-01 Concrete / masonry railing	I									21 100
	U13-01-01 Masonry with wooden flooring	II									4 100
	U13-02-01 Surroundings - Developed areas	II									1 800

Roofs and floors 34 000

	Element-Type	Priority	1	2	3	4	s	t	u	v	Cost
	C02-11-01 Carpentry	II									9 100
	C03-01-01 Pitched roof	II									10 800
	C03-02-01 Pitched roof	II									3 600
	C03-03-11 Skylights	II									4 500
	C03-04-02 Superstructures on roof	II									5 600
	C04-01-01 Thermal insulation basement-ground floor										0
	C04-03-01 Sloped roof, attic with full amenities	II									0

Circulation and Commons - Residential building 38 000

	Element-Type	Priority	1	2	3	4	s	t	u	v	Cost
	C05-02-00 Generic	II									5 100
	I06-01-01 Lift	II									3 800
	U03-01-01 Intenal stairwell	II									5 000
	U03-02-01 Concrete, stone or artificial stone stairs inside the building	II									15 600
	U04-01-01 Common premises	I									5 500
	U04-02-01 Private cellars										0
	U04-03-01 Loft (common rooms)	I									2 800

Premises - Residential buildings 225 000

	Element-Type	Priority	1	2	3	4	s	t	u	v	Cost
70%	C06-01-01 Wooden floors	II									22 400
30%	C06-01-03 Tile covering	II									5 300
	C06-02-00 Generic	II									40 900
50%	C06-03-01 Plastered ceiling	II									13 500
50%	C06-03-11 Plaster suspended ceiling	II									6 700
	U02-01-01 Equipped kitchen	II									18 100
67%	U02-02-01 Toilets in bathroom	II									63 600
33%	U02-02-02 Bathroom and WC	II									32 200
	U13-04-01 Interior carpentry	II									22 000

HVAC - Single Buildings 62 000

	Element-Type	Priority	1	2	3	4	s	t	u	v	Cost
	I00-01-02 Without induction current compansation	II									4 000
	I00-02-01 Low power distribution pannels	II									4 000
	I00-05-01 Wiring sockets and fixtures	II									3 800
	I00-06-01 Fictures	II									1 900
	I02-01-01 Oil or gas boiler - up to 1500m2 HRA resp. 100kW										0

Estimation of the work cost, following the standard method of EPIQR+ - Scenario Refurbishment
Tilleuls 1, Vevey

Cost index : 136.1 **Works costs (without fees and without VAT)**

HVAC - Single Buildings **62 000**

	Element-Type		Priority	1	2	3	4	s	t	u	v	Cost
	I02-02-01	Central boiler with heat exchanger										0
	I02-03-01	Apparent heat distribution	II									4 300
	I02-04-01	Radiators	II									5 200
	I04-01-01	Connection and water distribution battery	II									3 100
	I04-03-01	Wastewater pipes	II									14 900
	I04-08-01	Cold water and hot water pipes	II									19 800
	I08-01-01	Connection to natural gas										0
70%	U12-01-01	Natural ventilation (opening windows)										0
30%	U12-01-03	Mechanical ventilation	II									1 000

Works cost (without fees and without VAT)	505 000
Architect's fees (without VAT) calculated on the basis of 15 % of the works cost	76 000
Sub-total of works and fees (without VAT)	581 000
VAT on the basis of 7.7 % of the sub-total	45 000
Total cost for renovation (with VAT)	626 000

Estimation of the work cost, following the standard method of EPIQR+ - Scenario Basic Upgrading
Tilleuls 1, Vevey

Cost index : 136.1 **Works costs (without fees and without VAT)**

Summary of cost

Facades	**621 000**
Roofs and floors	**137 000**
Circulation and Commons - Residential building	**55 000**
Premises - Residential buildings	**225 000**
HVAC - Single Buildings	**101 000**

Works cost (without fees and without VAT)	1 139 000
Architect's fees (without VAT) calculated on the basis of 15 % of the works cost	171 000
Sub-total of works and fees (without VAT)	1 310 000
VAT on the basis of 7.7 % of the sub-total	101 000
Total cost for renovation (with VAT)	1 411 000

Estimation of the work cost, following the standard method of EPIQR+ - Scenario Basic Upgrading
Tilleuls 1, Vevey

Cost index : 136.1 **Works costs (without fees and without VAT)**

Facades 621 000

	Element-Type	Priority	1	2	3	4	s	t	u	v	Cost
87%	C01-01-01 Rendering	II									0
13%	C01-01-31 Wood or metal frame windows	II									163 600
50%	C01-02-01 Manual wood or metal doors	II									3 400
50%	C01-02-02 Manual glazed doors	II									8 200
	C01-03-01 XIXth century buildings	II									0
	C01-04-01 Basement windows above ground level	II									15 000
91%	C01-05-01 Wooden or metal shutters	II									71 700
9%	C01-05-11 Roller shutters	II									2 900
	C04-02-01 Absence of thermal insulation	II									287 300
	C08-01-01 Scaffolding and building site										42 000
	U06-01-01 Concrete / masonry railing	I									21 100
	U13-01-01 Masonry with wooden flooring	II									4 100
	U13-02-01 Surroundings - Developed areas	II									1 800

Roofs and floors 137 000

	Element-Type	Priority	1	2	3	4	s	t	u	v	Cost
	C02-11-01 Carpentry	II									9 100
	C03-01-01 Pitched roof	II									10 800
	C03-02-01 Pitched roof	II									13 000
	C03-03-11 Skylights	II									4 500
	C03-04-02 Superstructures on roof	II									5 600
	C04-01-01 Thermal insulation basement-ground floor										43 900
	C04-03-01 Sloped roof, attic with full amenities	II									50 000

Circulation and Commons - Residential building 55 000

	Element-Type	Priority	1	2	3	4	s	t	u	v	Cost
	C05-02-00 Generic	II									22 500
	I06-01-01 Lift	II									3 800
	U03-01-01 Intenal stairwell	II									5 000
	U03-02-01 Concrete, stone or artificial stone stairs inside the building	II									15 600
	U04-01-01 Common premises	I									5 500
	U04-02-01 Private cellars										0
	U04-03-01 Loft (common rooms)	I									2 800

Premises - Residential buildings 225 000

	Element-Type	Priority	1	2	3	4	s	t	u	v	Cost
70%	C06-01-01 Wooden floors	II									22 400
30%	C06-01-03 Tile covering	II									5 300
	C06-02-00 Generic	II									40 900
50%	C06-03-01 Plastered ceiling	II									13 500
50%	C06-03-11 Plaster suspended ceiling	II									6 700
	U02-01-01 Equipped kitchen	II									18 100
67%	U02-02-01 Toilets in bathroom	II									63 600
33%	U02-02-02 Bathroom and WC	II									32 200
	U13-04-01 Interior carpentry	II									22 000

HVAC - Single Buildings 101 000

	Element-Type	Priority	1	2	3	4	s	t	u	v	Cost
	I00-01-02 Without induction current compansation	II									4 000
	I00-02-01 Low power distribution pannels	II									4 000
	I00-05-01 Wiring sockets and fixtures	II									3 800
	I00-06-01 Fictures	II									1 900
	I02-01-01 Oil or gas boiler - up to 1500m2 HRA resp. 100kW										0

Estimation of the work cost, following the standard method of EPIQR+ - Scenario Basic Upgrading
Tilleuls 1, Vevey

Cost index : 136.1 **Works costs (without fees and without VAT)**

HVAC - Single Buildings **101 000**

	Element-Type	Priority	1	2	3	4	s	t	u	v	Cost
I02-02-01	Central boiler with heat exchanger										0
I02-03-01	Apparent heat distribution	II									4 300
I02-04-01	Radiators	II									5 200
I04-01-01	Connection and water distribution battery	II									3 100
I04-03-01	Wastewater pipes	II									14 900
I04-08-01	Cold water and hot water pipes	II									19 800
I08-01-01	Connection to natural gas										0
70% U12-01-01	Natural ventilation (opening windows)										0
70% U12-01-01	Natural ventilation (opening windows)										40 200
30% U12-01-03	Mechanical ventilation	II									0

Works cost (without fees and without VAT)	1 139 000
Architect's fees (without VAT) calculated on the basis of 15 % of the works cost	171 000
Sub-total of works and fees (without VAT)	1 310 000
VAT on the basis of 7.7 % of the sub-total	101 000
Total cost for renovation (with VAT)	1 411 000

Estimation of the work cost, following the standard method of EPIQR+ - Scenario Minergie
Tilleuls 1, Vevey

Cost index : 136.1 **Works costs (without fees and without VAT)**

Summary of cost

Facades	**670 000**
Roofs and floors	**146 000**
Circulation and Commons - Residential building	**38 000**
Premises - Residential buildings	**218 000**
HVAC - Single Buildings	**292 000**

Works cost (without fees and without VAT)	1 364 000
Architect's fees (without VAT) calculated on the basis of 15 % of the works cost	205 000
Sub-total of works and fees (without VAT)	1 569 000
VAT on the basis of 7.7 % of the sub-total	121 000
Total cost for renovation (with VAT)	1 690 000

Estimation of the work cost, following the standard method of EPIQR+ - Scenario Minergie
Tilleuls 1, Vevey

Cost index : 136.1 **Works costs (without fees and without VAT)**

Facades 670 000

	Element-Type	Priority	1	2	3	4	s	t	u	v	Cost
87%	C01-01-01 Rendering	II									0
13%	C01-01-31 Wood or metal frame windows	II									163 600
13%	C01-01-31 Wood or metal frame windows	II					u				20 400
50%	C01-02-01 Manual wood or metal doors	II									3 400
50%	C01-02-02 Manual glazed doors	II									8 200
	C01-03-01 XIXth century buildings	II									0
	C01-04-01 Basement windows above ground level	II									15 000
91%	C01-05-01 Wooden or metal shutters	II									71 700
9%	C01-05-11 Roller shutters	II									2 900
	C04-02-01 Absence of thermal insulation	II									316 000
	C08-01-01 Scaffolding and building site										42 000
	U06-01-01 Concrete / masonry railing	I									21 100
	U13-01-01 Masonry with wooden flooring	II									4 100
	U13-02-01 Surroundings - Developed areas	II									1 800

Roofs and floors 146 000

	Element-Type	Priority	1	2	3	4	s	t	u	v	Cost
	C02-11-01 Carpentry	II									9 100
	C03-01-01 Pitched roof	II									10 800
	C03-02-01 Pitched roof	II									13 000
	C03-03-11 Skylights	II									4 500
	C03-04-02 Superstructures on roof	II									5 600
	C04-01-01 Thermal insulation basement-ground floor										48 200
	C04-03-01 Sloped roof, attic with full amenities	II									55 000

Circulation and Commons - Residential building 38 000

	Element-Type	Priority	1	2	3	4	s	t	u	v	Cost
	C05-02-00 Generic	II									5 100
	I06-01-01 Lift	II									3 800
	U03-01-01 Intenal stairwell	II									5 000
	U03-02-01 Concrete, stone or artificial stone stairs inside the building	II									15 600
	U04-01-01 Common premises	I									5 500
	U04-02-01 Private cellars										0
	U04-03-01 Loft (common rooms)	I									2 800

Premises - Residential buildings 218 000

	Element-Type	Priority	1	2	3	4	s	t	u	v	Cost
70%	C06-01-01 Wooden floors	II									22 400
30%	C06-01-03 Tile covering	II									5 300
	C06-02-00 Generic	II									40 900
50%	C06-03-01 Plastered ceiling	II									13 500
	U02-01-01 Equipped kitchen	II									18 100
67%	U02-02-01 Toilets in bathroom	II									63 600
33%	U02-02-02 Bathroom and WC	II									32 200
	U13-04-01 Interior carpentry	II									22 000

HVAC - Single Buildings 292 000

	Element-Type	Priority	1	2	3	4	s	t	u	v	Cost
	I00-01-02 Without induction current compansation	II									1 200
	I00-01-02 Without induction current compansation	II						u			11 500
	I00-02-01 Low power distribution pannels	II									4 000
	I00-05-01 Wiring sockets and fixtures	II									3 800
	I00-06-01 Fictures	II									1 900

Estimation of the work cost, following the standard method of EPIQR+ - Scenario Minergie
Tilleuls 1, Vevey

Cost index : 136.1 **Works costs (without fees and without VAT)**

HVAC - Single Buildings **292 000**

	Element-Type	Priority	1	2	3	4	s	t	u	v	Cost
	I02-01-01 Oil or gas boiler - up to 1500m2 HRA resp. 100kW										0
	I02-01-01 Oil or gas boiler - up to 1500m2 HRA resp. 100kW							u			72 700
	I02-02-01 Central boiler with heat exchanger										0
	I02-02-01 Central boiler with heat exchanger						u				27 300
	I02-03-01 Apparent heat distribution	II									4 300
	I02-04-01 Radiators	II									5 200
	I04-01-01 Connection and water distribution battery	II									3 100
	I04-03-01 Wastewater pipes	II									14 900
	I04-08-01 Cold water and hot water pipes	II									19 800
	I08-01-01 Connection to natural gas										0
70%	U12-01-01 Natural ventilation (opening windows)										0
70%	U12-01-01Natural ventilation (opening windows)						u				122 200
30%	U12-01-03 Mechanical ventilation	II									0

Works cost (without fees and without VAT)	1 364 000
Architect's fees (without VAT) calculated on the basis of 15 % of the works cost	205 000
Sub-total of works and fees (without VAT)	1 569 000
VAT on the basis of 7.7 % of the sub-total	121 000
Total cost for renovation (with VAT)	1 690 000

Estimation of the work cost, following the standard method of EPIQR+ - Scenario Nzeb Upgrading (reco2st)
Tilleuls 1, Vevey

Cost index : 136.1 **Works costs (without fees and without VAT)**

Summary of cost

Facades	**549 000**
Roofs and floors	**137 000**
Circulation and Commons - Residential building	**58 000**
Premises - Residential buildings	**223 000**
HVAC - Single Buildings	**182 000**

Works cost (without fees and without VAT)	1 148 000
Architect's fees (without VAT) calculated on the basis of 15 % of the works cost	172 000
Sub-total of works and fees (without VAT)	1 320 000
VAT on the basis of 7.7 % of the sub-total	102 000
Total cost for renovation (with VAT)	1 422 000

Estimation of the work cost, following the standard method of EPIQR+ - Scenario Nzeb Upgrading (reco2st)
Tilleuls 1, Vevey

Cost index : 136.1 **Works costs (without fees and without VAT)**

Facades — 549 000

	Element-Type	Priority	1	2	3	4	s	t	u	v	Cost
87%	C01-01-01 Rendering	II									13 900
13%	C01-01-31 Wood or metal frame windows	II									163 600
50%	C01-02-01 Manual wood or metal doors	II									3 400
50%	C01-02-02 Manual glazed doors	II									8 200
	C01-03-01 XIXth century buildings	II									4 300
	C01-04-01 Basement windows above ground level	II									15 000
91%	C01-05-01 Wooden or metal shutters	II									71 700
9%	C01-05-11 Roller shutters	II									2 900
	C04-02-01 Absence of thermal insulation	II									209 700
	C08-01-01 Scaffolding and building site										29 400
	U06-01-01 Concrete / masonry railing	I									21 100
	U13-01-01 Masonry with wooden flooring	II									4 100
	U13-02-01 Surroundings - Developed areas	II									1 800

Roofs and floors — 137 000

	Element-Type	Priority	1	2	3	4	s	t	u	v	Cost
	C02-11-01 Carpentry	II									9 100
	C03-01-01 Pitched roof	II									10 800
	C03-02-01 Pitched roof	II									13 000
	C03-03-11 Skylights	II									4 500
	C03-04-02 Superstructures on roof	II									5 600
	C04-01-01 Thermal insulation basement-ground floor										43 900
	C04-03-01 Sloped roof, attic with full amenities	II									50 000

Circulation and Commons - Residential building — 58 000

	Element-Type	Priority	1	2	3	4	s	t	u	v	Cost
	C05-02-00 Generic	II									22 500
	I06-01-01 Lift	II									3 800
	U03-01-01 Intenal stairwell	II									7 800
	U03-02-01 Concrete, stone or artificial stone stairs inside the building	II									15 600
	U04-01-01 Common premises	I									5 500
	U04-02-01 Private cellars										0
	U04-03-01 Loft (common rooms)	I									2 800

Premises - Residential buildings — 223 000

	Element-Type	Priority	1	2	3	4	s	t	u	v	Cost
70%	C06-01-01 Wooden floors	II									22 400
30%	C06-01-03 Tile covering	II									5 300
	C06-02-00 Generic	II									40 900
50%	C06-03-01 Plastered ceiling	II									13 500
	U02-01-01 Equipped kitchen	II									22 700
67%	U02-02-01 Toilets in bathroom	II									63 600
33%	U02-02-02 Bathroom and WC	II									32 200
	U13-04-01 Interior carpentry	II									22 000

HVAC - Single Buildings — 182 000

	Element-Type	Priority	1	2	3	4	s	t	u	v	Cost
	I00-01-02 Without induction current compansation	II									0
	I00-01-02 Without induction current compansation	II									38 200
	I00-02-01 Low power distribution pannels	II									0
	I00-05-01 Wiring sockets and fixtures	II									0
	I00-06-01 Fictures	II									5 600
	I02-01-01 Oil or gas boiler - up to 1500m2 HRA resp. 100kW										50 600

Estimation of the work cost, following the standard method of EPIQR+ - Scenario Nzeb Upgrading (reco2st)
Tilleuls 1, Vevey

Cost index : 136.1 **Works costs (without fees and without VAT)**

HVAC - Single Buildings **182 000**

	Element-Type	Priority	1	2	3	4	s	t	u	v	Cost
I02-02-01	Central boiler with heat exchanger										0
I02-03-01	Apparent heat distribution	II									4 300
I02-04-01	Radiators	II									5 200
I04-01-01	Connection and water distribution battery	II									3 100
I04-03-01	Wastewater pipes	II									14 900
I04-08-01	Cold water and hot water pipes	II									19 800
I08-01-01	Connection to natural gas										0
70% U12-01-01	Natural ventilation (opening windows)										0
70% U12-01-01	Natural ventilation (opening windows)										40 200
30% U12-01-03	Mechanical ventilation	II									0

Works cost (without fees and without VAT)	1 148 000
Architect's fees (without VAT) calculated on the basis of 15 % of the works cost	172 000
Sub-total of works and fees (without VAT)	1 320 000
VAT on the basis of 7.7 % of the sub-total	102 000
Total cost for renovation (with VAT)	1 422 000

Summary of the scenarios

	Scenario Refurbishment	Scenario Basic Upgrading	Scenario Minergie	Scenario Nzeb Upgrading (reco2st)
Facades	147'000	621'000	670'000	549'000
Roofs and floors	34'000	137'000	146'000	137'000
Circulation and Commons - Residential building	38'000	55'000	38'000	58'000
Premises - Residential buildings	225'000	225'000	218'000	223'000
HVAC - Single Buildings	62'000	101'000	292'000	182'000
Works cost (without fees and without VAT)	505'000	1'139'000	1'364'000	1'148'000
Architect's fees (without VAT) calculated on the basis of 15 % of the works cost	76'000	171'000	205'000	172'000
Sub-total of works and fees (without VAT)	581'000	1'310'000	1'569'000	1'320'000
VAT on the basis of 7.7 % of the sub-total	45'000	101'000	121'000	102'000
Total cost for renovation (with VAT)	**626'000**	**1'411'000**	**1'690'000**	**1'422'000**

%	EPIQR Code	Element	Priority	Code	Cost	Code	Cost	Code	Cost	Code	Cost
87	C01-01-01	Rendering	II	b	46'400	a	0	a	0	b	13'900
13	C01-01-31	Wood or metal frame windows	II	b	24'800	d	163'600	d	184'000	d	163'600
50	C01-02-01	Manual wood or metal doors	II	b	600	d	3'400	s	3'400	d	3'400
50	C01-02-02	Manual glazed doors	II	b	200	d	8'200	d	8'200	d	8'200
	C01-03-01	XIXth century buildings	II	b	14'400	a	0	a	0	b	4'300
	C01-04-01	Basement windows above ground level	II	c	3'800	d	15'000	d	15'000	d	15'000
91	C01-05-01	Wooden or metal shutters	II	c	28'500	d	71'700	d	71'700	d	71'700
9	C01-05-11	Roller shutters	II	c	1'000	d	2'900	d	2'900	d	2'900
	C04-02-01	Absence of thermal insulation		a	0	d	287'300	d	316'000	d	209'700
	C08-01-01	Scaffolding and building site		a	0	c	42'000	c	42'000	c	29'400
	U06-01-01	Concrete / masonry railing	I	c	21'100	c	21'100	c	21'100	c	21'100
	U13-01-01	Masonry with wooden flooring	II	b	4'100	b	4'100	b	4'100	b	4'100
	U13-02-01	Surroundings - Developed areas	II	b	1'800	b	1'800	b	1'800	b	1'800
	C02-11-01	Carpentry	II	b	9'100	b	9'100	b	9'100	b	9'100
	C03-01-01	Pitched roof	II	b	10'800	b	10'800	b	10'800	b	10'800
	C03-02-01	Pitched roof	II	b	3'600	d	13'000	d	13'000	d	13'000
	C03-03-11	Skylights	II	b	4'500	b	4'500	b	4'500	b	4'500
	C03-04-02	Superstructures on roof	II	c	5'600	c	5'600	c	5'600	c	5'600
	C04-01-01	Thermal insulation basement-ground floor		a	0	d	43'900	d	48'200	d	43'900
	C04-03-01	Sloped roof, attic with full amenities		a	0	d	50'000	d	55'000	d	50'000
	C05-02-00	Generic	II	b	5'100	d	22'500	b	5'100	d	22'500
	I06-01-01	Lift	II	b	3'800	b	3'800	b	3'800	b	3'800
	U03-01-01	Intenal stairwell	II	b	5'000	b	5'000	b	5'000	c	7'800
	U03-02-01	Concrete, stone or artificial stone stairs inside the building	II	b	15'600	b	15'600	b	15'600	b	15'600
	U04-01-01	Common premises	I	b	5'500	b	5'500	b	5'500	b	5'500
	U04-02-01	Private cellars		a	0	a	0	a	0	a	0
	U04-03-01	Loft (common rooms)	I	c	2'800	c	2'800	c	2'800	c	2'800
70	C06-01-01	Wooden floors	II	b	22'400	b	22'400	b	22'400	b	22'400
30	C06-01-03	Tile covering	II	b	5'300	b	5'300	b	5'300	b	5'300
	C06-02-00	Generic	II	b	40'900	b	40'900	b	40'900	b	40'900
50	C06-03-01	Plastered ceiling	II	b	13'500	b	13'500	b	13'500	b	13'500
50	C06-03-11	Plaster suspended ceiling	II	b	6'700	b	6'700	b	6'700	b	6'700
	U02-01-01	Equipped kitchen	II	b	18'100	b	18'100	b	18'100	b	22'700
67	U02-02-01	Toilets in bathroom	II	c	63'600	c	63'600	c	63'600	c	63'600
33	U02-02-02	Bathroom and WC	II	c	32'200	c	32'200	c	32'200	c	32'200
	U13-04-01	Interior carpentry	II	b	22'000	b	22'000	b	22'000	b	22'000
	I00-01-02	Without induction current compansation	II	b	4'000	b	4'000	b	1'200	a	0
	I00-02-01	Low power distribution pannels	II	b	4'000	b	4'000	t	15'500	t	38'200
	I00-05-01	Wiring sockets and fixtures	II	c	3'800	c	3'800	c	3'800	a	0
	I00-06-01	Fictures	II	b	1'900	b	1'900	b	1'900	c	5'600
	I02-01-01	Oil or gas boiler - up to 1500m2 HRA resp. 100kW		a	0	b	0	a	0	d	50'600
	I02-02-01	Central boiler with heat exchanger		a	0	a	0	t	72'700	a	0
	I02-03-01	Apparent heat distribution	II	b	4'300	b	4'300	s	31'600	b	4'300
	I02-04-01	Radiators	II	b	5'200	b	5'200	b	5'200	b	5'200
	I04-01-01	Connection and water distribution battery	II	b	3'100	b	3'100	b	3'100	b	3'100
	I04-03-01	Wastewater pipes	II	c	14'900	c	14'900	c	14'900	c	14'900
	I04-08-01	Cold water and hot water pipes	II	c	19'800	c	19'800	c	19'800	c	19'800
	I08-01-01	Connection to natural gas		a	0	a	0	a	0	a	0
70	U12-01-01	Natural ventilation (opening windows)		a	0	a	0	a	0	a	0
30	U12-01-03	Mechanical ventilation	II	b	1'000	t	40'200	s	122'200	t	40'200
Works cost (without fees and without VAT)					505'000		1'139'000		1'364'000		1'148'000
Architect's fees (without VAT) calculated on the basis of 15 % of the works cost					76'000		171'000		205'000		172'000
Sub-total of works and fees (without VAT)					581'000		1'310'000		1'569'000		1'320'000
VAT on the basis of 7.7 % of the sub-total					45'000		101'000		121'000		102'000
Total cost for renovation (with VAT)					**626'000**		**1'411'000**		**1'690'000**		**1'422'000**

Energy savings action list

(Ventilation DC v0.7/1.0)		Standard conditions (20°C, v0.7m3/m2h, 0%shading)						Standard conditions		
		Heat requirements for heating (kWh/m2.a)	Heat consumption (kWh/m2.a)			Heat Requirements reduction (kWh/m2.a)	Reduction of heat consumption (kWh/a)	Non renewable energy savings (kWhp/a)	Investissement (CHF)	Cost per kWh PNRE (CHF/kWhp)
			Heating	HW	TOTAL					
Envelope intervention	Current consumption	123	137	23	160	0	0	0	0	0.0
	Floor insulation U0.3 (compliance)	105	116	23	139	20	24'807	26'295	44'000	1.7
	Floor Insulation U0.2	103	115	23	138	22	26'640	28'238	50'000	1.8
	Roof Insulation U0.28 (compliance)	102	113	23	136	23	28'473	30'181	50'000	1.7
	Roof Insulation U0.2	101	112	23	135	25	30'183	31'994	56'000	1.8
	Facade insulation Recost U0.9/U0.2/U0.15	91	101	23	124	36	43'503	46'113	210'000	4.6
	Facade insulation U0.15	78	86	23	109	51	61'833	65'543	315'000	4.8
	Facade Insulation U0.18	80	88	23	111	49	59'511	63'082	287'000	4.5
	Windows IIG Uw 1.25-g0.55	110	123	23	146	14	17'108	18'134	163'000	9.0
	Windows IIIG Uw 0.87-g0.45	108	120	23	143	16	19'919	21'114	184'000	8.7
Ventilation and heat production	Ventilation - non adaptive v1.1/1.4	66	73	23	96	64	77'841			
	Ventilation HR v0.4-0.7	43	48	23	71	89	108'391	114'895	120'000	1.0
	Photovoltaic Installation (97 m2)									
	Solar collectors for hot water (covers 60% of heat needs (14 kWh/m2)									
	District Heating with scenario Recost*							90'432	35'000	0.4
	Heat Pump COP 3.0 with scenario recost**									
Global scenarios	Scenario Basic Upgrading	30	34	23	57	103	125'499	133'029	544'000	4.1
	Scenario Minergie	24	27	23	50	110	134'298	142'356	605'000	4.2
	Scenario ReCO2st	41	46	23	69	91	110'835	117'486	467'000	4.0

		Realistic conditions (+1.3°C, v1.0 m3/m2h, 40% shading)							Realistic conditions			
Ventilation and heat production	Ventilation - non adaptive v1.1/1.4											
	Ventilation HR v0.4-0.7								0			
	Photovoltaic Installation (97 m2)						-	21'950				
	Solar collectors for hot water (covers 60% of heat needs (14 kWh/m2)						16'500	-				Scenario recost
	District Heating with scenario Recost*								120'576	35'000	0.3	
	Heat Pump COP 3.0 with scenario recost**								3'570	70'000	19.6	
Global scenarios	Scenario Basic Upgrading	49	54	23	77	83	101'059	-	107'123	544'000	5.1	
	Scenario Minergie	41	45	23	68	91	111'569	-	118'263	605'000	5.1	
	Scenario ReCO2st	62	69	23	92	67	82'241	-	87'175	467'000	5.4	

	Primary non renewable energy factor
gas	1.06
electricity	2.69
wood	0.10