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## DUBLIN INSTITUTE OF TECHNOLOGY SCHOOL OF ARCHITECTURE

## POST GRADUATE CERTIFICATE IN DIGITAL ANALYSIS AND ENERGY RETROFIT



Percentage Efficiency of Main Heating System

62

Improvement to Heat Loss via Plane Elemen

STANDARD ASSESSMENT PROCEDURE RESULTS	STANDARD ASSESSMENT PROCEDURE RESULTS		
ENERGY EFFICIENCY RATING SAP 76C (131kWh/m2/yr)	ENERGY EFFICIENCY RATING SAP 85B (202kWh/m2/yr)		
ENVIRONMENTAL IMPACT (CO2) RATING SAP 80C (25kg/m2/yr)	ENVIRONMENTAL IMPACT (CO2) RATING SAP 71C (36kg/m2/yr)		
BRE SCOTLAND Outline Refurbishment Spec	BRE SCOTLAND Outline Refurbishment Spec		
Apartment G1	Apartment G2		
Gas Combi Boiler with Gas Flue Saver Technology	Electric Combi Heat Store & Underfloor Heating		
Cavity Fill and External Wall Insulation	Cavity Fill Moisture Buffering Internal Insulation & Lining		
Low Energy Individual Mechanical Extract Fans	Insulated Suspended Timber Floor		
Low Energy Timber Windows and Doors	New Acoustic Ceiling and Seperating Wall Treatments		
6.53 q50 airtightness	Heritage Timber Windows and Doors		
Independent Living Adaptations	Intermittent Room only Heat Recovery		
	6.11 q50 Airtightness		
STANDARD ASSESSMENT PROCEDURE RESULTS	STANDARD ASSESSMENT PROCEDURE RESULTS		
ENERGY EFFICIENCY RATING SAP 82B (91kWh/m2/yr)	ENERGY EFFICIENCY RATING SAP 83B (104kWh/m2/yr)		

ENVIRONMENTAL IMPACT (CO2) RATING SAP 85B (18kg/m2/yr)

ENVIRONMENTAL IMPACT (CO2) RATING SAP 87B (17kg/m2/yr)



Baseline



BRE SCOTLAND Outline Refurbishment Spec	BRE SCOTLAND Outline Refurbishment Spec	2,000	1,000	
Apartment F1	Apartment F2			
SedBUK A Gas System Boiler	Air Source Heat Pump with Radiators	G1 G2 F1 F2	G1 G2 F1 F2 G1 G2 F1 F2	
4m2 Solar Thermal System & 210L Cylinder	2 kW Soalr PV Array	A DEAP analysis of the building as		
Cavity Fill and External Wall Insulation	Cavity Fill and Loft Insulation	refurbished by BRE Scotland was		
Basic additional Loft Insulation	MVHR	carried out and the results along with	Some brief comments on the exercise woud include: Levels of airtightness achieved were poor in the context of an NZEB upgrade. Only one of the units achieved NZEB standard and required a combination of renewables plus mechanical ventilation with heat recovery. The question could be acked as on whether this approach is excessive (expensive) for a 60scm two beforem apartment???	
Positive Input Ventilation From Loft	"Super" Low Energy Windows and Doors	some selected comparisons are shown		
Low Energy Windows and Doors	6.04 q50 Airtightness	above.		
Positive input ventilation (loft)	Feed in Tarrif income			
7.53 q50 Airtightness				



The exercise shown right was carried out using DEAP on the BRE NZEB F2 Apartment to investigate the effect of changing the heating systems employed and the results show that NZEB can still be achieved using a conventional gas boiler.

Floor

0.15 W/m2k







WBP eaves extension

Ψ = 0.0487 W/mk T = 19.2 ° C

Ψ = 0.0196 W/mk T = 19.1 ° C

Ψ = 0.0244 W/mk

T = 18.5 ° C







Interstitial

Surface

PROPOSED U- Values and Condensation Risk Analysis Apartment G1 and F1





Airtightness at ceiling Install "Intello plus" membrane to existing ceiling fixed at 400 ctrs with 50mm x 25mm timber battens. Ensure membrane is properly airtight taped at all laps. Membrane to be airtight taped and sealed to walls at corners.

First Floor Plan



Seperating Floor from above: 2mm selected vinyl floor finish on 6mm wbp ply on Intello plus airtight membrane turned up at corners and sealed with airtight tape at junctions with existing walls, on 18mm t&g OSB flooring sheets on existing timber joists. Gyprock plank fitted between floor joists on gypframe SIF floor channel fitted over joists. 100mm Rockwool Roll batt insulation fitted between joists.

22mm painted square edged mdf window board. 18mm OSB packer airtight taped to window frame and wet plaster finish at wall 185mm x 35mm treated timber cavity closer.

Existing sill to be removed and new 100mm x 100mm quinnlife block laid on existing brickwork. New 50mm x 50mm treated softwood batten fixed to quinnlite with new window to sit on batten and screw fixed to reveals and soffit.

Seperating Floor from above (60m compartment): 2mm selected vinyl floor finish on 6mm wbp ply onn 18mm t&g OSB flooring sheets on existing timber joists OSB to be airtight taped at all joints and airtight taped with wetplaster finish at all

floor wall junctions. Gyprock plank fitted between floor joists on





17.000 0 2.5/m² Forngs Vertical Twist stainless steel No./m . Florings equivalent diameter: 0.0101 m / alpha: 0.800  $R_{r} = R_{s} + \Sigma R_{i} + R_{ss} = 9.51 \text{ m}^{2}\text{K/W}$ Correction to U-value for according to delta l [W/{m=K)] BS EN ISO 6946 Annex D Mechanical fasteners 0.018 BS EN ISO 6946 Annex D Air gaps 0.005 Vapour pressure distribution Calculation according BS EN ISO 13788 Ti [°C] 20.0 Te [\*C] 4.3 phi (-) phi\_e-. Month of balance: January 0.598 0.840 THE REAL PROPERTY AND ADDRESS OF ------S and breds store bras block an anna anna anna anna anna a aligned and a state over a stat ni cinte sono estat initi tini Initi initi initi dana anta i Saturation pressure Partial pressure 2 2,000 1,500 a 1.000 -500 0.0 0.1 0.2 0.4 0.5 0.3 0.2 0.3 0.4 0.5 0.0 0.1 **AIR TIGHTNESS** STRATEGY "Permeability is calculated by dividing the air leakage rate in m3/hr by the envelope area in m2. The



PRO Clima Intello plus membrane installed under plasterboard PRO Clima Intello plus membrane installed under plasterboard At suspended timber ground floor install PRO Clima Intello plus at ground and first floor ceilings and fixed with 25mm x 50mm at ground and first floor ceilings and fixed with 25mm x 50mm membrane to top of existing joists, min 150mm laps sealed with timber battens and sealed at all wall junctions with airtight tape. timber battens and sealed at all wall junctions with airtight tape. Seal with airtight tape at all wall junctions.

permeability at 50 Pascals pressure

change rate at normal conditions."

Specify a Q50/ 20 of 2 or better

The procedure for testing is

From TGD part L 2011

method".



