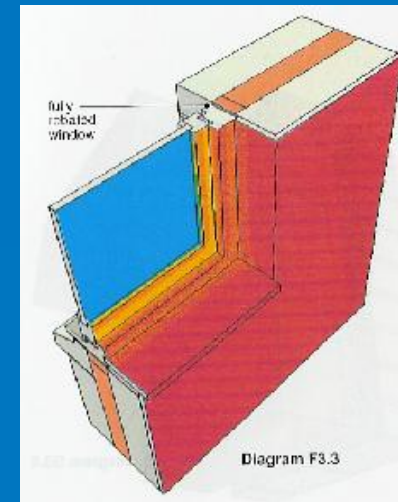
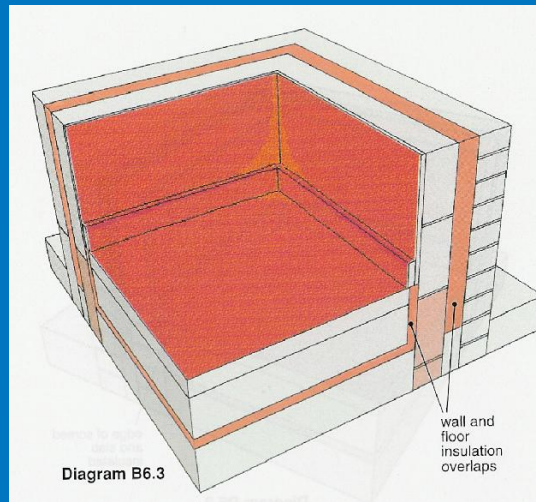
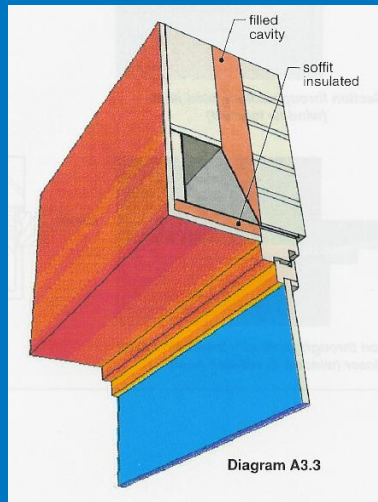


# Best practice design for energy efficiency



Nick Jones BRE

# What does an energy efficient house look like?



BED zed is an extreme view of what an ee house may look like

# What does an energy efficient house look like?



Could this be an energy efficient house?

# Examples of innovation

- Plastic plumbing
- MMC
- Internet ready homes
- Engineered timber joists
- Waste minimisation



# Best Practice standards

- Long history of use with bodies such as Housing Corporation, National Assembly for Wales.
- Carefully developed for simplicity and low technical risk.
- Consultation with energy experts and industry.
- Alignment with Building Regulations.

# Building Regulations A 2006

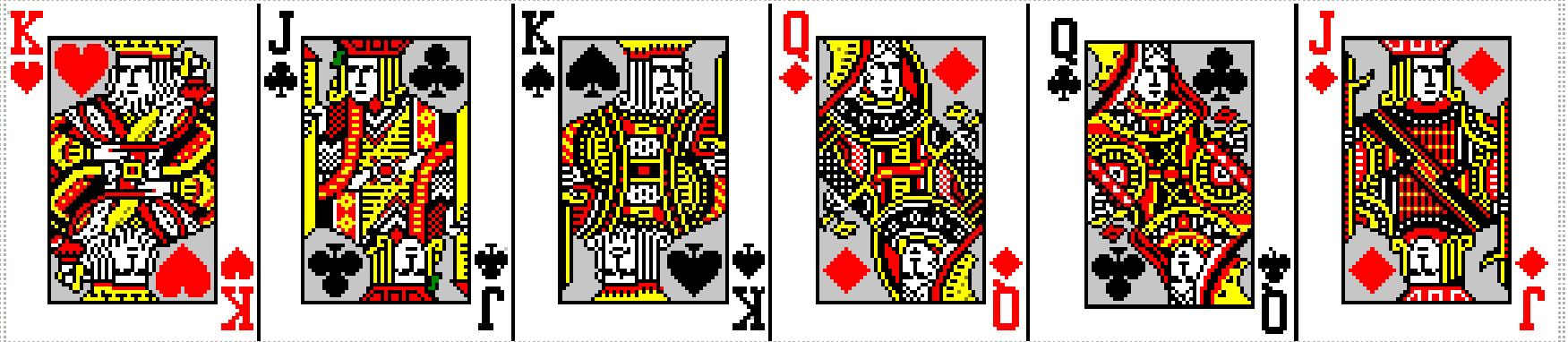
## Means of compliance – New build

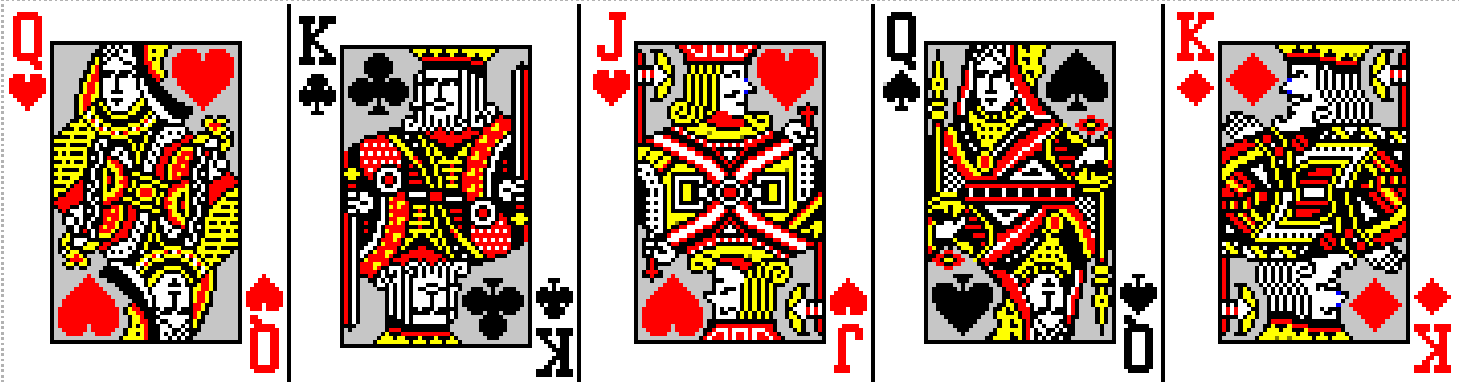
- Elemental Method
  - For new dwellings with efficient heating and extensions
- Target U-value Method
  - Is the average U-value as good as if the elemental U-values had been used?
  - Allowances for boiler efficiency and solar gains
- Carbon Index Method
  - 8.0 is the pass level.

# Building Regulations L1A 2006

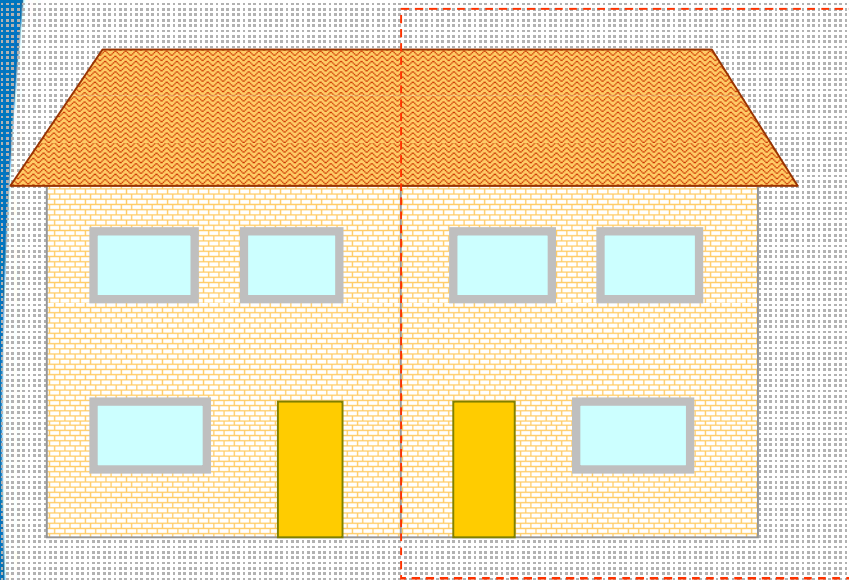
## Means of compliance – New build

- ~~Elemental Method~~
  - ~~For new dwellings with efficient heating and extensions~~
- ~~Target U-value Method~~
  - ~~Is the average U-value as good as if the elemental U-values had been used?~~
  - ~~Allowances for boiler efficiency and solar gains~~
- Target (carbon dioxide) Emissions Rate
  - $\text{KgCO}_2/\text{m}^2$ , varies with shape, floor area and fuel





## Example 2002 house



Semi-detached

Passes under  
Target U-value **4**

### Areas:

Floor area =  $88\text{m}^2$

Openings =  $20.7\text{m}^2$

### U-values:

Walls =  $0.45\text{ W/m}^2\text{K}$

Roof =  $0.16\text{ W/m}^2\text{K}$

Gnd floor =  $0.25\text{ W/m}^2\text{K}$

Windows =  $2.0\text{ W/m}^2\text{K}$

Doors =  $3.0\text{ W/m}^2\text{K}$

### Heating :

Gas, reg, 87%

# Energy rating – what's included

- Insulation
- Ventilation
- Efficiency and control of heating system
- Solar gains
- Fuel choice for space and water heating
- Photo Voltaics
- (Lighting)
- (Overheating)

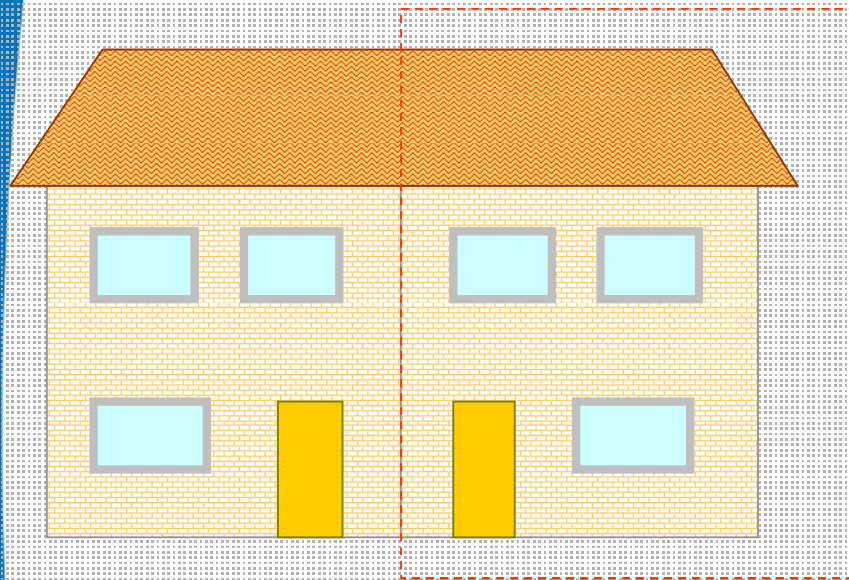
# Energy rating – what's not included

- Household size and composition
- Ownership of appliances
- Heating patterns
- Geographical location

# ADL1A stages

- criterion 1: predicted CO<sub>2</sub> (DER) emissions no worse than target (TER)
- criterion 2: limits on design flexibility
- criterion 3: limiting effects of solar gains in summer
- criterion 4: quality of construction & commissioning
- criterion 5: provision of information - O&M instructions and Energy Performance Certificate

# Example 2006 house



Semi-detached

TER = 23.00

DER = 22.87

4

## Fabric:

Walls =  $0.3 \text{ W/m}^2\text{K}$

Roof =  $0.16 \text{ W/m}^2\text{K}$

Gnd floor =  $0.22 \text{ W/m}^2\text{K}$

W&D =  $1.8 \text{ W/m}^2\text{K}$

Bridging = 'Accredited'

Air leakage =  $8 \text{ m}^3/\text{h}/\text{m}^2$

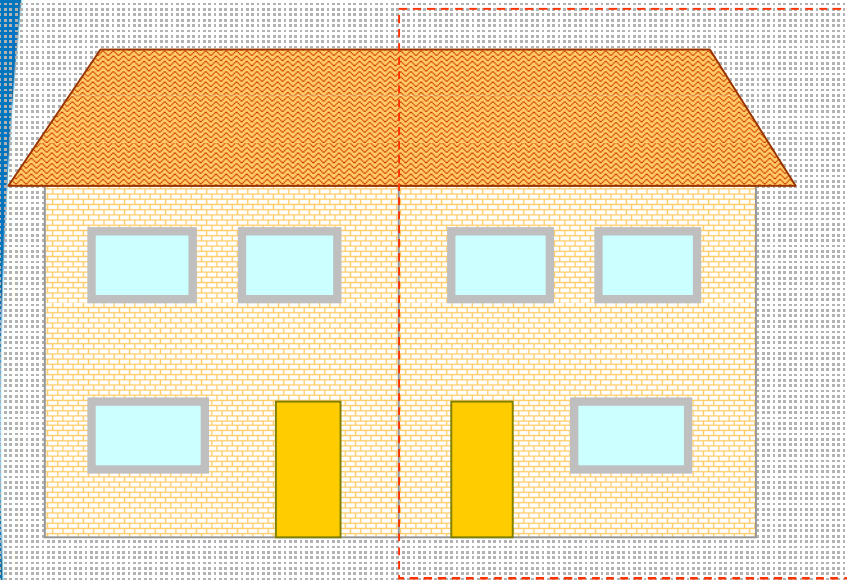
## Heating :

Gas, reg, 90%

# EST Best Practice

- criterion 1: predicted CO<sub>2</sub> (DER) emissions no worse than target (TER) x 0.8
- criterion 2: limits for U-values, boiler efficiency, air leakage etc
- criterion 3: As per ADL1A. No mechanical cooling
- criterion 4: air permeability 3m<sup>3</sup>/h/m<sup>2</sup>
- criterion 5: As per ADL1A

## Example Best Practice 1.



Semi-detached

$$\text{TER} \times 0.8 = 17.25$$
$$\text{DER} = 17.24$$

4

### Fabric:

Walls =  $0.20 \text{ W/m}^2\text{K}$

Roof =  $0.11 \text{ W/m}^2\text{K}$

Gnd floor =  $0.2 \text{ W/m}^2\text{K}$

W&D =  $1.3 \text{ W/m}^2\text{K}$

Bridging = 'Y=0.04'

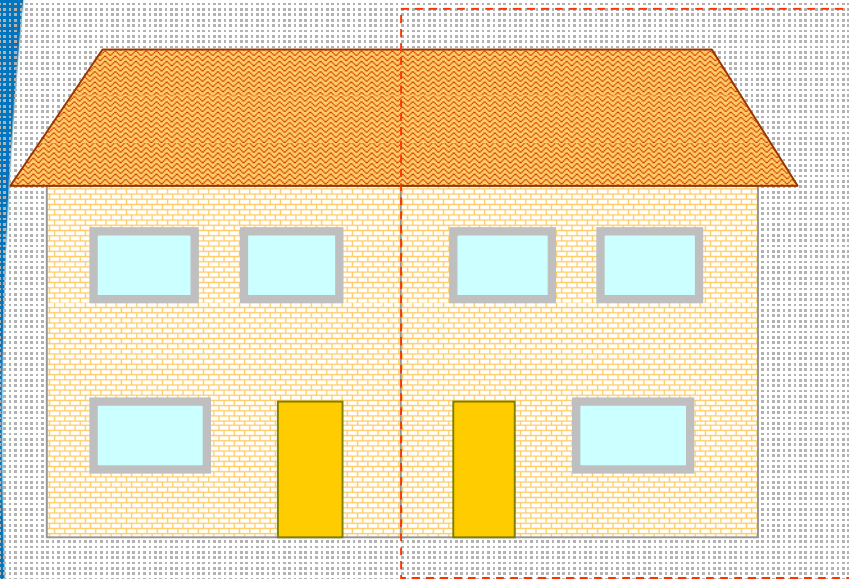
Air leakage =  $3 \text{ m}^3/\text{h}/\text{m}^2$

### Services :

Gas, reg 91%, controls

Heat recovery.

## Example Best Practice 2.



Semi-detached

$$\text{TER} \times 0.8 = 17.25$$

$$\text{DER} = 17.23$$

4

### Fabric:

Walls =  $0.23 \text{ W/m}^2\text{K}$

Roof =  $0.16 \text{ W/m}^2\text{K}$

Gnd floor =  $0.12 \text{ W/m}^2\text{K}$

W / D =  $1.5/0.7 \text{ W/m}^2\text{K}$

Bridging = 'Y=0.06'

Air leakage =  $3 \text{ m}^3/\text{h}/\text{m}^2$

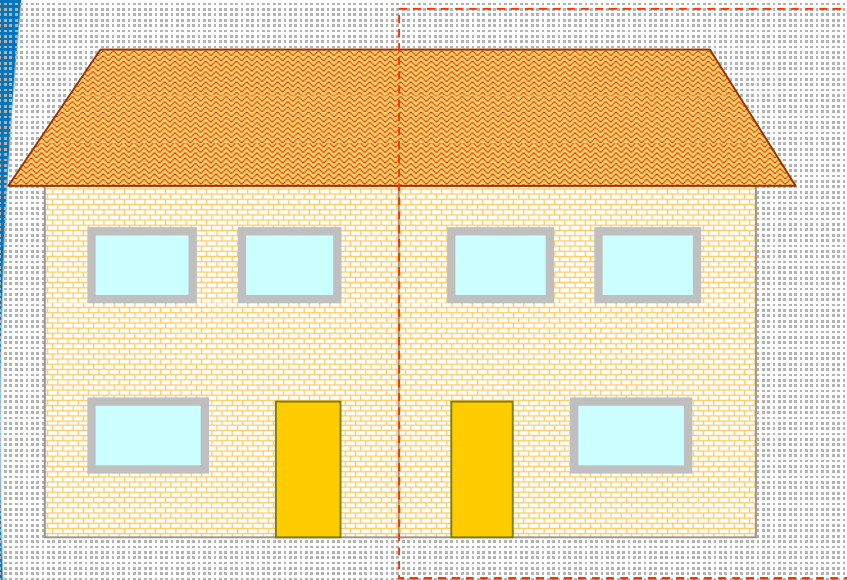
### Services :

Gas, combi 91%

Good gas fire.

Heat recovery.

## Example Best Practice 3.



Semi-detached

$$\text{TER} \times 0.8 = 17.25$$

$$\text{DER} = 17.21$$

4

### Fabric:

Walls =  $0.25 \text{ W/m}^2\text{K}$

Roof =  $0.13 \text{ W/m}^2\text{K}$

Gnd floor =  $0.20 \text{ W/m}^2\text{K}$

W&D =  $1.5 \text{ W/m}^2\text{K}$

Bridging = 'Y=0.07'

Air leakage =  $3 \text{ m}^3/\text{h}/\text{m}^2$

### Services :

Gas, reg, 91%

Solar panels.

Heat recovery.

# What does an energy efficient house look like?



