High Performance Housing using Concrete and Masonry

Dr Andrew Minson

Benefits of concrete and masonry housing

- Energy efficient construction - ability to meet current and future low energy performance standards
- Many high performance exemplar projects
- Development of existing skills and best practice for improved performance
Versatility of Products

Efficient Structural Design
Solid internal upper floors

Benefits include:
• Thermal mass
• Acoustic separation (no squeaky floors)
• No vibration
• Robust/durable
• Fire resistant
• Future adaptability

Masonry construction

• Many uses of masonry in construction
• Includes structural concrete blocks on the inside
Low U-values, low cost, moderate insulation thickness

- U-value = 0.15
  - 150mm cavity, partial fill insulation

- U-value = 0.19
  - 150mm cavity, full-fill insulation

- U-value = 0.18
  - 100 mm extruded polystyrene

New products - high performance insulation products for cavity walls

- 100mm PIR insulation (0.18 U-value)
- 100mm Phenolic insulation (0.18 U-value)

Kingspan Kooltherm K6
Eurowall+
Comprehensive range of high performance masonry construction details

Use of these details ensure:

• Around a 60% cut in heat loss compared to SAP default
• Around a 30% cut in heat loss compared to older accredited details

Solid wall construction: masonry

Wimbish Passiv Haus
Parsons + Whitley Architects/Brimal
In-situ concrete and insulated concrete formwork

ICF with outer leaf of brickwork

Brookwood Farm, Woking

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In-situ concrete: low rise

Outhouse

RIBA Stirling Prize shortlisted 2016

Loyn & Co Architects

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In-situ concrete: high rise

- Efficient modern formwork systems for in-situ concrete
- Speed
- Safety
- Quality
- Minimises waste

One Blackfriars, London

Precast concrete

- Quality control in factory
- Short site programme
- Low waste solution
- Just-in time delivery (less space required on site)
- Optimise use of repeated forms
- Fix designs earlier in process for manufacturing time
Crosswall construction

Motel One, Manchester
330 bed hotel
14 storeys
Concrete crosswall with architectural concrete (recon) cladding panels
Build programme 35 weeks
Actually built in 22 weeks
Architect: Hodder + Partners
Main Contractor: Russells
Construction Completed 2015

Precast cladding

Athletes’ Village, London
White concrete precast in glass fibre backed rubber moulds
Masonry cladding

St Johns Hill, London
Hawkins/Brown Architects for Peabody Estate

Concrete and Masonry

- Delivers high performance housing solutions
- Provides a wide and versatile range of construction methods and products
- UK manufactured sustainable products using responsibly sourced constituent materials.
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Concrete and masonry industry is committed to reducing carbon

CO₂ per tonne of concrete has reduced by 22% since 1990 to 79.7kg/tonne
Concrete and masonry is a net user of waste

107 times more waste & recovered materials were used than were sent to landfill

Concrete and masonry is locally and responsibly sourced

89% is certified to BES 6001
Concrete and masonry is locally produced

Biodiversity

You might not associate concrete and masonry with biodiversity...but....

- MPA National Nature Park with 70 locations created by industry
- 5200ha of priority habitats created
- 6700ha in pipeline
Performance Benefits

To which aspect of sustainability does each performance benefit contribute?

Environmental

- Fire
- Acoustics
- Flood Resilience

Social

Thermal Performance

Economic

Robustness

Durability

Fire Resistance

Concrete and masonry structures have excellent fire resistance, which means the ability to:

- Carry the loads on the structure
- Act as insulation against the heat from a fire
- Prevent fire spread through the structure
Sustainability through fire resistance

Environmental
- Reduced pollution from a fire
- Reduced waste of materials

Social
- Limits potential loss of livelihood or homes through fire

Economic
- Damage limitation - reduced costs to insurance industry
- 30% or more of businesses impacted by fire, go out of business

Performance Benefits

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….structural performance taken as read

Full text version of this table provided in: www.concretecentre.com “Concrete Credentials”
Resilient Housing Conference

Delivering low-risk, long-life housing using concrete and masonry