With increased insulation levels, many in the building industry are overlooking or unaware of the importance in a cool temperate climate of the details dealt with in this pamphlet – cold bridging, reverse brick veneer walls, condensation, sealing construction gaps, edge insulation and “super” insulation.

It’s the construction details that are the building blocks, the stock in trade of anyone designing or building a home. The whole of a building is obviously the sum of its parts – without details a coherent, graceful and functional whole cannot be created. The details in this pamphlet show how some architects have set about solving the particular problems posed by these issues. Rarely is the detail arrived at the ultimate solution. Often it is a starting point for adaptation and development. The art of building is largely an empirical art, which acquires refinement and maturity by a process of successive technical and aesthetic developments. Thanks are due to all the Builders, Architects, Designers and Householders who have given criticism, comment, and sketches for the development of the details in this pamphlet.
Fig. 1 SIX-STAR REVERSE BRICK VENEER
Minimum total system R-values for 6-star "deemed to satisfy" dwelling in Climate Zone 7:
Roof/Ceiling: R4.1/R4.6/R5.1
Walls: R2.8
Floors: R2.75

Fig. 2 SIX-STAR REVERSE BRICK VENEER
The bricks are on the inside where they’re needed to store the heat and the insulation’s on the outside where it’s needed to keep the heat in. Same amount of materials, no extra cost, more comfortable house.

Roof/ceiling insulation
Roof blanket over roof battens – 75 thick foil faced blanket, 75 is max depth when fixing roof through the blanket. Ensure blanket is pressed fully into corrugations to prevent condensation on u/s of iron. Blanket also dampens sound of roof movement. Shiny side to face down to still air space for an extra R0.56 of roof insulation.

Ceiling batts: 90 thick wall batts between joists. Wiring must be on top of batts, or better still, fixed to a "wiring batt" on underside of rafters.

Vapour barrier: Lay foil over top of ceiling battens so that shiny side faces down to the still air space for an additional R-value of R0.4

Total R-value of roof/ceiling system = R7.2

Brick detailing
for solid clay or concrete bricks. Brick on end cornice with recessed joint to ceiling. Reinforced brick lintel – Tongue bar or 3 x 6mm bars with 12g wire stirrups at each perpend for spans to 1.800m.

Concrete slab on rigid insulation Hebel block below framing
Total R-value of floor system = R2.75

Reverse brick veneer wall
External wall: 90 studs with 90 (R2.0) wall batts
Cladding such as fibro or ply finished with cement based paint such as Murobond.
Vapour barrier: Foil on warm side acts as vapour barrier & if shiny side faces a cavity of still air provides an extra R0.6 insulation.

Internal wall: Solid brickwork with flush joints. Solid brickwork weighs 550–630 kg/lin.m. so you need to have bearing checked by a structural engineer.

Total R-value of wall system = R3.1

Thermal mass
Locate in sight of north window; 6:1 ratio between mass surface and north glass area.

Wood framed suspended floor Vapour barrier on underside of floor with shiny side facing down.

Footing details will vary depending on foundation material and whether floor is suspended or on grade.

Total R-value of floor system = R3.1

COLD BRIDGING reduces R-values.
The cold bridge is a bypass in the thermal insulation system along which heat can flow more readily than through the insulation.

Once insulation levels get above R0.8 cold bridging reduces the effectiveness of insulation. Common sources are the structural bridge (Figs 5, 6, 7), the air bridge (Fig 8), the circulation bridge (Fig 9) and the compressed batt – where too large a batt in the space probably reduces its R-value by 25%.

Fig 3 “SUPER-INSULATED” REVERSE BRICK VENEER
With the bricks on the inside the heat they store interacts with the internal environment, not the outside weather. You let the climate do your heating and large heaters become unnecessary.

Fig 4 “SUPER-INSULATED” REVERSE BRICK VENEER
Passive solar design of housing is the key to providing a sustainable lifestyle. A passive solar house has “thermal mass” on the inside. This gives you the marketing edge over standard housing.

Fig 7 Structural Bridge. Projecting balcony floor slab.

Fig 8 Air Bridge. Shrinkage or workmanship creates gaps around parts of the insulation.

Fig 9 Circulation Bridge. Gaps of a few mm. can set up convection currents resulting in a drop to about half the rated value. It probably won’t drop much further.
**Sealing Construction Gaps**

A house contains about half a tonne of air, which is replaced between one and six times an hour, depending how leaky it is. In cool temperate climates the new air must be heated to maintain indoor comfort. Obviously reducing the number of times per hour the air needs to be heated is going to reduce heating costs. By paying careful attention to sealing gaps, fitting sheathing, window & door seals and flue dampers as the house is being built it is possible to reduce this infiltration rate to one or two air changes per hour. A healthy indoor environment is maintained, heat losses are reduced and large heaters become unnecessary.

**Wall Construction**

90 thick stud wall with 70 thick High Performance batts with 20 spacers to wall lining. Foil eg foil backed plasterboard facing 20 air space puts the vapour barrier on the warm side and provides an extra R0.6 insulation. Pack all tolerance and construction gaps with insulation off-cuts or foamed insulation.

**Double Glazing**

A wood framed window or door with a 4/12/4 sealed unit has an approximate R-value of R0.37. If low-e glass is used then it’s R0.53. Frames are usually made of wood, plastic or aluminium. Metal frames act as a heat sink and considerably reduce the R-value of a window unless a thermal break is fitted in the frame.

**Insulative Air Spaces**

For an airspace to insulate it must be sealed to prevent air-flows. Foil surfaces must be free of dust or moisture and must face the airspace. The side is unimportant.

**Further Information**

*Your Home* is Australia’s guide to environmentally sustainable house design and construction (400 pages). The 4th edition may be downloaded from www.yourhome.gov.au or purchased from Sustainable Living Tasmania.

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