NASH NEWS

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NATIONAL ASSOCIATION OF STEEL-FRAMED HOUSING INC.

WWW.NASH.ASN.AU

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NASH SUBMISSION TO BUSHFIRE ROYAL COMMISSION

The Bushfire Royal Commission commenced formal hearings on 11 May 2009. Most of the evidence to date has involved the timeline and behaviour of the fires, the roles and actions of the various emergency authorities, the issue of warnings and other public information and the actions taken by individuals affected by the fires.

The hearings and submissions made are public and may be viewed via the Royal Commission website at www.royalcommission.vic.gov.au

With a longstanding interest – and considerable credibility - in bushfire resistant construction, NASH elected to make a submission to the Royal Commission. The NASH position on major natural hazards such as bushfires, cyclones and termite infestations is to support the findings of research into the effects of these hazards on low-rise buildings, and to make recommendations on appropriate product applications.

The NASH submission focussed on Term 8 of the Commission's Terms of Reference - *The fireproofing of housing and other buildings, including the materials used in construction – and made the following points:*

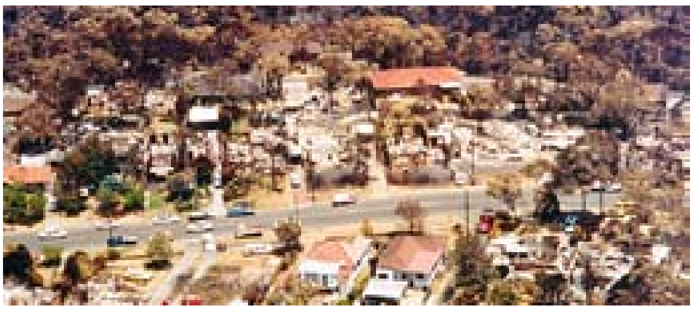
- CSIRO research has consistently shown that ember attack accounts for over 90% of house loss in Australian bushfires. Houses are not consumed by bushfires, but by house fires started by the bushfire.
- The design and construction of buildings in accordance with AS 3959-2009 is a "lowest common denominator" approach and may not achieve the level of protection that building owners and the community expect.
- The Canberra homes lost in the 2003 bushfires were destroyed by ember attack or by the spread of fire between houses. All were more than 100 metres from the bushfire, none were destroyed by radiation from it and none would have required special bushfire construction measures under AS 3959-2009.
- Even in the most severe fire events, buildings may provide limited temporary protection to occupants until radiant heat levels outside the building have returned to safer levels. Use of materials that delay the rate of destruction of the building should be an important design consideration.
- Critical components such as bushfire shutters should be made only from materials with proven non-combustibility, dimensional stability and durability. Non-combustible materials should be used more extensively on and within the building envelope to mitigate ignition and fire spread.
- Regulatory measures are needed to deal with the maintenance and durability of those building materials that are critical to the bushfire resistance of the building.

NASH also made the following observations on particular matters that the Royal Commission is likely to consider in its deliberations:

- *Fuel management:* Once building sites are assessed, effective regulatory measures are needed to ensure fuel load management by communities and owners around houses and settlements to maintain the vegetation conditions as they were when the bushfire attack assessments were originally made.
- *Construction costs:* Many homes in Victoria and other states are already subject to the special construction measures required by the BCA. AS 3959-2009 does not extend these measures in lower bushfire risk areas, nor does it in general make construction more complex or costly than current regulations. In areas of highest bushfire risk, where flame zone conditions may be experienced, costs are currently uncertain as few systems have been tested.
- *Stay or go:* Whether a stay or evacuate policy is adopted, buildings in bushfire areas need to be designed to a minimum standard. The path of a bushfire is not always very predictable and a sudden change in conditions may require the occupants to seek shelter in a house, even if they have decided to "leave early".

NASH continues to strongly advocate the following principles in the construction of bushfire resistant buildings:

- Keep embers out of the building and its structure by blocking, screening or shielding openings, voids and build-up points with proven non-combustible materials.
- Use non-combustible materials for any permanent part of the building where embers could come into sustained contact;
- Use high-quality, durable structural and exterior materials to ensure long term strength and fire resistance with minimum maintenance.
- Minimise or avoid the use of combustible elements within roof, wall and subfloor regions of the structure.
- Install landscape features such as non-combustible fencing that can intercept and trap embers and fine fuels away from the building, and also provide some shielding from radiant heat especially from an adjoining building fire.



TRUECORE® WARRANTY UPDATE

BlueScope Steel released an update on 1 June 2009, to the TRUECORE® steel 50 year corrosion warranty for residential buildings.

The update clarifies the warranty eligibility and coverage when non-TRUECORE® steel is utilised in various building components. The warranty has also been amended to bring it into line with other BlueScope Steel warranties. For a sample copy of the new warranty visit www.truecore.com.au

BlueScope Steel has also made available a new warranty for framing made from TRUECORE® steel used in the construction of buildings funded by the Federal Government's economic stimulus package.

The warranty has a number of differing conditions from the residential warranty, including duration and proximity to marine locations. A sample warranty showing the terms and conditions is available through BlueScope Steel State Offices. Applications for the warranty will be managed via the new Online Warranty Tool. For further information please contact your local BlueScope Steel office or TRUECORE® steel distributor.

BRICK TIE TESTING FOR EARTHQUAKES

New Zealand has regions of high seismicity and they are naturally concerned that their buildings perform satisfactorily when subjected to a major earthquake.

Associate Professor Emad Gad of the University of Melbourne undertook a simulation of a major earthquake on a steel-framed brick veneer in 1996. The frame was composed of 75mm deep G300 C section studs with clip of brick ties. The steel frame performed extremely well. Since that time the industry has moved to thinner sections, G550 high tensile steel and attaching the brick ties with screws to the face of the stud. In addition, New Zealand has some different building practices to Australia including the use of:

- 70mm wide bricks (typically 110mm in Australia)
- A thermal break with brick veneer construction (thermal breaks only required with lightweight claddings in Australia)

Therefore NASH NZ decided to carry out a series of tests on the University of Melbourne shaker table tests to simulate the behaviour of a steel frame under seismic loading.

In collaboration between Melbourne University, Auckland University, Building Research Association of New Zealand (BRANZ), NASH-NZ, NASH-Australia and with feedback at all stages of loadings selection and performance requirements from the New Zealand Department of Building and Housing (DBH), a typical test structure known as the Test House was designed.

The Test House measured approximately 2.6m x 2.8m in plan and was 2.4m in height. It comprised a steel frame with brick veneer exterior cladding and plasterboard interior lining. All building components were typical, full size and sourced from either New Zealand or identical suppliers in Australia. Specifically, the steel frame was made of 0.75mm thick G550 lipped C sections, the bricks were standard 70 Series and the brick ties were Type B Eagle ties. The brick ties were screwed to the flanges of the studs with the presence of 40mmx10mm thick standard thermal break.

The Test House was designed to encompass a range of typical geometric features in the veneer walls in different directions. It had two brick veneer walls without openings in one direction and in the orthogonal direction it had one wall with a window opening and the other wall with a door opening. Given the bi-directional capabilities of the shaking table, the Test House was subjected to earthquake excitations in the north-south and east-west directions.

A roof slab weighing 1500kg was placed on the top of the Test House and supported by the frame to simulate the equivalent mass from a house roof. With this roof mass combined with the designed frame wall bracing the Test House exhibited the same dynamic characteristics as those of a typical full scale single

storey brick veneer house. The Test House had a fundamental natural frequency prior to earthquake shaking of approximately 6Hz.

The Test House was subjected to various levels of the 1940 El Centro North South earthquake strong motion record. This record is compliant with the New Zealand Earthquake Standard NZS 1170.5 and the selection and scaling process was in accordance with NZS 1170.5 Clause 5.5, with expert judgment applied for the determination of the period range of interest and k2 factor. Agreement between all parties was obtained on the value of these factors prior to commencement of testing. The specific levels of excitation that were targeted and their significance are listed in Table 1.

While the main direction of interest was excitation in the North-South (NS) direction, the Test House was subjected to excitations in each direction up to MCE level and greater. The series of tests performed on the Test House and associated observations are summarised in Table 2.

As can be seen from the results in Table 2, the Test House performed extremely well. Earthquakes with MCE level of shaking caused only minor cracking to the plasterboard and brick veneer walls even though at this level of loading, major loss of the veneer walls would be considered acceptable. Given the exceptional level of performance of the Test House up to MCE earthquakes, it was further subjected to even more severe shaking. The Test House did not suffer serious damage up to and including 2.6 times El-Centro (approximately 1.51 MCE or magnitude 9 on the Richter scale), although damage to the internal lining at 1.34 MCE caused more load to shed to the bracing system in that and subsequent tests. This in turn led to partial failure of the bracing system commencing at 1.51 MCE, as shown in Table 2. Up to 2.6 El-Centro no bricks were lost from the out-of-plane walls. This is extremely good performance given the fact that the Test House had already been subjected to 7 high level earthquakes prior 2.6 El-Centro. In reality it is impossible for a single house to experience this number and severity of earthquakes during its design life.

Given that the Test House was designed using conventional methods, constructed from typical components and built using professional trades people, it would be considered to be representative of brick veneer steel-framed construction in New Zealand. With its excellent performance under an extremely onerous earthquake testing program, it can be concluded that this form of construction would be expected to exhibit performance considerably better than the performance limits from Table 1 under the most demanding design seismic conditions in New Zealand.

Relevance to Australia

The steel frame was representative of frames used in Australia. In the latest Australian Standard for earthquakes actions AS 1170.4-2007, there are no specific design requirements for houses less than 8.5 m high where the hazard factor Z≤0.11 and the horizontal racking forces need to be checked if Z>0.11. Generally the hazard factor in Australia is less than 0.11. There are a few local hot spots with higher values ie Meckering WA (Z=0.22).

Therefore the serviceability limit state (SLS) test at 0.89 El-Centro is slightly less than ultimate design case for a house located at Meckering and generally at least twice the ultimate design case for the rest of Australia. The tests confirmed again the very good performance of steel framing when subject to earthquakes. Due to the low seismicity in Australia, AS 2699.1 Type A brick ties are specified in Australia whereas in New Zealand Type B brick ties are specified.

Table 1: Earthquake levels adopted for testing corresponding regions in New Zealand and target performance limits

Earthquake design level	Scale relative to El-Centro	Approximate level on Richter Scale (Ms)	Regions covered in New Zealand	Performance limits
Serviceability Limit State (SLS)	0.89	6.1 to 6.3	Regions with ZR = 0.20 which corresponds to greater value than the Ultimate Limit State (ULS) conditions for Auckland and Hamilton and is approximately equal to ULS conditions for Dunedin.	Localised hairline cracking of veneer and lining at most vulnerable locations. No post earthquake remedial work required.
Ultimate Limit State (ULS)	1.28	7.3 to 7.5	Regions with ZR = 0.42 which corresponds to ULS for Masterton and greater value than ULS for Wellington.	Noticeable cracking of veneer and linings, brick loss limited to < 5% of bricks or the top two rows above the top row of ties. Visible damage to frame expected but not to be significant and not to reduce ability of frame to support house.
Maximum Considered Earthquake (MCE)	1.72	8.3 to 8.5	Regions with ZR = 0.76 which corresponds to the MCE level for Wellington and Masterton and greater than the ULS for highest seismic location in NZ.	Significant linings and framing damage but not collapse of framing. Significant brick loss.

Future Work

The University of Melbourne is planning to develop a theoretical model for the interaction between the brick veneer and the steel wall stud. In New Zealand they're looking at developing a new simple static test for brick ties fixed to steel studs.

Table 2: Summary of tests performed and observations made

Test No	Earthquake level and direction		Observations
	N-S1	E-W2	
1	SLS		No damage whatsoever.
2	ULS		Minimal hairline cracks in the plasterboard lining at window top corners. Very limited hairline cracks at locations in brick veneer adjacent to opening. No damage to any brick ties or the screws or the thermal break.
3		SLS	No increase in damage from test 2.
4	MCE		Minvor increase in cracking of internal plasterboard at window corners. No increase in cracking in brick veneer. No visible damage to any ties.
5		MCE	No increase in damage from test 4.
6	1.16MCE (2.0 El-Centro)		Noticeable rocking of wall brick piers at base of window. Hairline cracks post test extending right across pier base. No bricks lost. No visible damage to any ties. No visible damage to steel framing. Plasterboard cracks in window top corners now remaining open approx 1mm after test.
7	1.34MCE (2.3 El-Centro)		Increased rocking and cracking during test. No new cracks. No bricks lost. No visible damage to brick ties but in plane twisting for the East and West walls. No evidence of pullout of any ties. No visible damage to steel frame.
8	1.51MCE (2.6El-Centro)3		Partial failure of connection between the top of diagonal brace and top plate for East and West walls. No bricks lost. No tie pullout from frame or veneer.
9	1.57MCE (2.7El-Centro)4		Failure of connection of diagonal brace to top plate in East and West walls. Top 2 rows of bricks lost in East and West walls. No bricks lost for the North and South walls. Minimal to no damage to ties in the North and South walls. No tie pullout from studs in any location.

1. *For shaking in the North-South direction, the North and South veneer walls were subjected to out-of plane loading.*
2. *For shaking in the East-West direction, the East and West veneer walls were subjected to out-of plane loading.*
3. *El-Centro corresponds to a Richter magnitude (Ms) greater than 9.0.*
4. *El-Centro is the upper limit of the shaking table capacity for this test setup.*


SAFE WORK IN AUSTRALIA - NEW!

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The inaugural Council meeting of Safe Work Australia was held in June. Safe Work Australia takes over the occupational and safety aspects from the former Australian Safety and Compensation Council.

The new Council is composed of an independent chair and representatives from the Commonwealth, each state and territory, employees (2) and Unions (2).

The role of the Safe Work Australia Council is the national policy development on OHS and workers' compensation matters and specifically to:

- achieve significant and continual reductions in the incidence of death, injury and disease in the workplace;
- achieve national uniformity of the OHS legislative framework complemented by a nationally consistent approach to compliance policy and enforcement policy; and
- improve national workers' compensation arrangements.

As previously, the implementation of the proposals is in the hands of the state and territory governments.

Safe Work Australia is currently working on national model legislation for OHS, which all jurisdictions have committed to implementing by December 2011. Concurrently with the development of the new model legislation, the existing state and territory regulations will be reviewed.

Safe Work Australia is now responsible for the development of Codes of Practice such as the code for Prevention of Falls in Housing Construction.

BCA 2010 TO INTRODUCE 6 STAR ENERGY RATING

The public review draft of the Building Code of Australia has introduced new provisions for 6 star energy performance of all residential buildings and a significant improvement in energy for all other classes of buildings.

This has been developed in response to a decision by the Council of Australian Governments (COAG). The provisions cover:

- Performance requirements for hot water units.
- Performance requirements for electrical lighting.
- Additional thermal insulation in walls, floors and roofs.

This may require:

- increasing the depth of studs in the external walls for some systems to fit the bulk insulation, or
- the use of insulating board on external face of studs, or
- the use of denser insulation board, or
- the use of energy rating software to offset higher insulation in other areas.

The use of double glazed widows will also increase. Lightweight sub floors will require insulation in most areas. The exact requirements will depend on the climate zone in which the building is being built. Members are encouraged to review the draft which can be downloaded from the Australian Building Codes Board website. www.abcb.gov.au Comments close on 3 August.

It is anticipated that more people will use the energy rating software rather than the deemed-to-satisfy solutions given in the BCA as it allows for excess insulation in one element to be offset by under insulation in other areas.

BCA2009 came into effect on 1 May and included the following significant revisions:

- The introduction of 5 star energy requirements including thermal breaks for Queensland.
- Tasmania to move towards 5 star energy rating in 2010. It is now proposed that they move to 6 star in 2010 in line with the rest of Australia.
- Definition for 'breaking surf' introduced.
- Reference to the old loading codes (AS 1170 series 1989-1994) removed.
- Reference to AS 4055-1192 removed following transition period.
- A termite action has been added to the list of actions that must be deigned for in the performance section of the BCA.
- New earthquake code referenced.
- The introduction of the Lo-Hi-Lo testing regime for metal roof sheeting, battens and their connections.

An amendment to the NASH Standard Residential and Low-rise Steel framing Part 1 Design Criteria to bring it into line with BCA2009 is currently at public review. The amendment also clarifies the use of flared services holes. A copy of the amendment was emailed to all members and can be downloaded from the NASH website www.nash.asn.au

NASH MEMBER

JOHN KING OAM

Congratulations to John King who was awarded the Order of Australia Medal in the Queen's Birthday Honours for services to the community and to people with disabilities.

John King is probably better known to NASH Members as the Managing Director of the steel home builder JG King, based in Ballarat Victoria.

Since 2000, John has been a board member and governor of McCallum Disability Services. Through his company, JG King, he has built charity houses across Victoria to raise money for organisations such as Ballarat Health, Karkana Support Services in Horsham, Lodden Mallee Housing Services in Bendigo, Ozchild in Melbourne and McCallum Disability Services.

On this work, John said, *"We try to do a couple of charity houses in the communities we work in mainly for adult disability services. I see a huge need for people with disabilities, particularly if they are still living at home and they've got ageing parents who worry about who's going to look after them".*

Congratulations John on this recognition for your service to the community.

MEMBERS

NASH welcomes the following new members:

Company	Chapter	Activity	Contact
McDonald Jones	NSW	Builder	Bill McDonald
Ageless Design	WA	Building designer	Robin Eattell
Rainbow Building Solutions	TAS	Steel frame fabricator	Mattt Smith
Steel House Frames NSW	NSW	Steel frame fabricator	Byran Kilgour

Ken Watson

Executive Director