



# In praise of movement joints

More cocktail hour musings from Dr Pingo Dripstone.

**M**ovement joints are essential. An ancient Hopi Indian maxim observes: 'Movement joints keep the parts apart so that the whole as a whole can stay together, more or less.' Polysulphide, one of the early synthetic rubbers still occasionally used in movement joints, derives its name from Sulph (or Sulf), in the pantheon of ancient Middle Kingdom Egypt, the minor deity responsible for keeping things in their right places despite rumblings and post-tensioning of the underworld. The Greek sage Paracetamol of Athens (circa 1283 to 1220 BC) declared: 'A crack is Nature's way of telling you where to put a movement joint next time.'<sup>(1)</sup>

Movement joints are natural and environmentally friendly. The lodges of beavers, the hives of honey bees and the mounds of magnetic termites all incorporate movement joints, as do the longhouses of headhunting Dayaks of Borneo and Kalimantan, the stone tiers of Yucatán, Machu Picchu and Disneyland (Anaheim) and, until 1991, the remnants of the Hanging Gardens of Babylon. By contrast, the monuments of Angkor Wat fell into decay because movement joints were sacrificed as a cost-cutting measure by Jayavarmans II, III and IV. Antarctica has movement joints; they are called crevasses. Africa has a very large movement joint known as the Great Rift Valley. Iceland is spreading apart along a movement joint that traverses the country and occasionally melts glaciers.

Movement joints are politically correct. For centuries, southern Spain functioned more or less as a movement joint (strictly speaking, an isolation joint) between Christian Europe and the forces of Islamic expansion from the south. [Ed: Dr Dripstone's discourse at this point has been abridged by several pages considered to be of marginal relevance]. The Great Wall of China had gold leaf-inlaid lacquer movement joints at regular centres until they were filled in and concealed as counter-revolutionary, revisionist and divisive during the frenzy of the Cultural Revolution. Fortunately most were later reinstated on the orders of differential movement pragmatist Deng Xiaoping.

Gentle reader, movement joints are not to be disparaged or diminished. Movement joints are our friends! Unfortunately, for a variety of reasons explored below, movement joints are increasingly overlooked, undersized and even omitted entirely in modern ceramic tile and natural stone finishes – with dire consequences, as we shall see.

In 1919 the soon-to-be Nobel Prize-winning Anglo-Irish poet William Butler Yeats, himself an accomplished self-taught terrazzo paviour and tile fixer, surveyed the state of contemporary European architecture and wrote:

Things fall apart; the centre cannot hold;  
Mere anarchy is loosed upon the world,  
The blood-dimmed tide is loosed, and  
everywhere  
The ceremony of innocence is drowned;  
The best lack all conviction, while the worst  
Are full of passionate intensity.

*Why were things falling apart? You may well ask. Why could the centre not hold? What was the subject of this passionate intensity?* The answer is movement joints! Some critics have accused Yeats of being unduly histrionic, but soon-to-be published academic research<sup>(2)</sup> has confirmed a long-held suspicion that by 1919, he had already recognised, *inter alia*, the nascent diminution of movement joints in stone cladding and paving, in ceramic tiling and in construction generally. As storm clouds, distant thunder and other geopolitical clichés started to regather over Europe, Yeats saw the first signs of the potentially catastrophic consequences of ever-larger buildings with ever-larger components separated by ever-harder, narrower, fewer and eventually no joints capable of accommodating reversible and irreversible movement. Ironically, the rise of the Modern Movement in architecture was to see both the rise and seeming decline of the Modern Movement joint and the epidemic of Post-Modern drumminess, recurring themes in Kerouac's trilogy and Ginsberg's free-verse translation of *The Upanishads*. But I digress....

For millennia, pieces of hard natural building material – for instance marble, granite, porphyry, limestone, basalt, ceramic tiles and clay bricks – were separated by inherently soft joints of lime mortar modified by such additives as resin, gum arabic, ammoniac, tufa, linseed oil, flax, cow dung and the crushed bones of religious heretics. Long before anyone but a few quarry masters, some Hopi Indians, the philosopher-architect Paracetamol of Athens and whoever designed the Parthenon in Rome understood that solid rock and dense masonry expand and contract in response to changes in their temperature and moisture content, buildings incorporated unrecognised movement joints that accommodated and harmlessly relieved these inexorable movements.

By the nineteenth and early twentieth centuries, buildings had come to incorporate larger components of these traditional materials, as well as steel, aluminium, concrete and glass, that behaved in different and exciting ways. Concrete was found to expand during early hydration, then contract as it cured and later expand and/or creep, or maybe not, depending on whether you have been engaged as an expert witness for the engineer, the builder or the owner. As it warmed, aluminium was found

to expand three or four times more than stone and ceramics. Stainless steel was found to expand and contract at greater rates than mild steel, a phenomenon more recently exploited in the work of noted Basque architect Franco Gehry, most notably in cladding the art museum on the University of Minnesota campus in Minneapolis, a building likened by the local press to 'a crumpled Coke can', at least until Coca Cola's corporate lawyers arrived from Atlanta bearing writs. But I digress....

To counteract so-called differential movements between materials with different movement characteristics, and the effects of accumulation of expansion and contraction between components in long runs of similar materials, architects, engineers and manufacturers of synthetic rubber conceived, developed and gradually codified movement joints in general and, more specifically, control joints, expansion joints and contraction joints in hard finishes and cladding. By 1961 Egon Tons, a researcher in Trondheim, Norway, had determined that the optimum ratio of width to depth for synthetic rubber seals in joints that need to widen, narrow and recover is very close to 2:1. Thus was born the Modern Movement joint sealed with modified bitumens, butyl rubbers, polysulphides, polyurethanes, neoprene, silicones, flexibilised epoxies, ebonite, EPDM gaskets and so on. Codes of practice and design guidelines for ceramic tiling, stone flooring, stone and brick masonry and curtain walling soon embraced the concept of the deliberately resilient movement joint, installed at regular intervals within materials and between abutting surfaces of different materials.

For decades before the first edition of AS 3958.1-1991: Ceramic Tiles – Guide to the installation of ceramic tiles, practice in Australia relied on local and foreign experience, much brought by European migrants, and then on CP 202 (the first 1972 British code of practice for tile and slab flooring) and the 1976 edition of the British Standard BS 5385 (the code of practice for design and installation of internal ceramic and natural stone tiling). CP 202 advised that:

The need for movement joints around the extreme edges of the floor (perimeter joints) and others dividing the floors into bays (intermediate joints) will depend on the dimensions of the floor, the bedding system and the floor finish material.

Where perimeter joints are to be provided, they should also be placed against all features interrupting the floor surface; these may be structural features such as columns, steps, bases, etc. or machinery and other equipment fixed to the concrete base floor.

Where high internal temperatures are expected, for instance around boilers or over floor heating installations, an assumption of the temperature range and corresponding linear change in the finish should be made to determine where and whether any additional allowance for movement is required.

That was 26 years ago. The 2007 edition of Australian Standard AS 3958.1 still relies heavily on parts of BS 5385, now in print for 18 years; it's not as if the need for movement joints was discovered recently. Clauses 5.4.5.2 (b) and (c) of AS 3958.1-2007 recommend:

(b) *Intermediate movement joints* Intermediate joints type (c), (d) or (e), as shown in Figure 5.1, should be inserted at intermediate positions to accommodate deflections of the base and movements in the flooring.

They should be provided in evenly spaced positions at approximately 4.5 m centres, or at locations where stress might reasonably be expected in—

- (i) internal floors, where any dimension exceeds 9 m or 6 m if subjected to sunlight; and
- (ii) external floors where any dimension exceeds 4.5 m.

On suspended floors, stress-relieving joints type (e), as shown in ➤

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Figure 5.1, should be inserted where flexing is likely to occur (e.g., over supporting walls or beams).

Consideration should be given to the provision of additional movement joints in internal rooms either partly or wholly subjected to strong sunlight.

In very large floors it is advisable to incorporate movement joints forming bays divided by type (c) or (d) joints, as shown in Figure 5.1, at 24 m to 30 m intervals, each bay being subdivided into smaller bays by stress-relieving joints type (e) shown in Figure 5.1, at 8 m to 10 m intervals. Floors that are not so large should be divided into bays by the insertion of type (e) joints as shown in Figure 5.1, at 8 m to 10 m intervals.

(c) *Perimeter joints* Movement joints type (c), as shown in Figure 5.1, should be inserted where the tiling abuts restraining surfaces such as perimeter walls, columns, curbs, steps and plant fixed to the base. In floors of less than approximately 10 m<sup>2</sup>, perimeter joints may be deleted if it is considered that the hygiene, waterproofing or aesthetics of the installation will be adversely affected. If perimeter joints are deleted, floor tiles should finish a minimum of 3 mm from restraining surfaces. Perimeter joints are recommended in all areas where conditions that may generate stresses are likely to be extreme, as in rapid, large temperature changes (e.g., underfloor heating).

These words seem to come as a surprise to many in the tiling industry and to a few self-accredited expert witnesses in tiling disputes, but they have not changed since 1991. Similar recommendations can be found in the tiling standards of the American National Standards Institute and in guidelines of the major tile adhesive manufacturers.

In the latter half of the twentieth century, movement joints became so ubiquitous in walls and their claddings, linings and finishes and in tiled and natural stone flooring and paving that they often passed unnoticed. Where anomalously wide and straight joints were considered visually discordant, designers found ways to conceal them behind downpipes on walls, in recesses between precast concrete panels, within regular tile joints and irregular patterns in stone paving, and by making them (perhaps only briefly) the same colour as the bounding materials they subdivided.

In remote but parallel developments that continue to defy gravity 50 years later, the popular dimensions of ceramic tiles started to grow inexorably.<sup>(3)</sup> In 1948 a survey in Europe revealed that tiles of 200 x 200 mm (400 square centimetres) were at the upper limit of what was available for interior use. By the mid-1980s, tiles of 300 x 300 mm (900 square centimetres) and larger were becoming common. This writer and his colleagues remember slouching awestruck for hours at a local trade show in 1987 as near-naked young women in a turbulent foam-filled clear acrylic spa tub held aloft and fondled samples of zebra skin-striped porcelain floor tiles of 400 x 400 mm (1600 square centimetres); this was later understood to be a regular feature of larger gatherings in Spain and Italy. By 2000 or so, a generation of herniated sales reps were already refusing to deliver samples of 450 x 450 mm (2025 square centimetres) and 600 x 600 mm (3600 square centimetres) tiles to architects' offices unless guaranteed car-parking spaces, lift keys, trolleys and special-event insurance cover. At Cersaie 2001 in Bologna, at least two manufacturers exhibited tiles of 1.2 x 1.8 m, so large that both the tiles and their déshabillé demonstrators had to be secured and displayed standing upright in clear acrylic showers stalls rather than in the traditional effervescent spa tubs.

In an even shorter period, the sizes of stone tiles and slabs affordable and popular for internal floors and wall finishes in residential construction also increased. In the early 1980s, the introduction of saws made from wire coated with industrial diamonds enabled natural stone to be cut more thinly and efficiently. The cost and thickness of stone tiles and slabs declined, the sizes of readily available finished slabs increased, and the market responded by demanding ever-larger

pieces of stone for flooring, paving, wall lining and cladding. Once regarded largely as a luxury material for kitchen benchtops, stone has become ubiquitous and 300 x 300 mm tiles are being supplanted by 450 x 450 mm tiles and 600 x 600 mm slabs. At diametric extremes, the very small (e.g. tumbled mesh-mounted stone mosaics) and the very big are often seen as better; the developer of the most expensive high-rise apartments in Singapore recently insisted on 900 x 900 and 900 x 1200 mm marble slab floors because competitors were offering 600 x 600 mm. Ceramic tile manufacturers are also producing similarly large-format tiles (a term that changes meaning every few years) which successfully mimic the appearance of natural stone.

As tiles became bigger, their edges tended to become straighter ('rectified'), thus making possible narrower grouted joints, a development welcomed by those who regard joints of any sort as an anathema. In a famous but unintended demonstration of plate tectonics by local fashion leaders, grouted joints were completely eliminated between dark grey 300 x 600 mm tiles basking in sunlight at the base of floor-to-ceiling windows in a building facing north towards Sydney Harbour. The innocent grouted joint, so long a silent servant to mankind, became the hapless victim of unskillful discrimination and, dare I say it, a campaign of industry-sanctioned terror. Not unnaturally, it responded by becoming tougher. New grout formulations with higher workability (to get into those ever-narrowing joints), stain resistance and fade resistance tended to be harder and more dense; that, in turn, further diminished the capacity of joints to accommodate and relieve the effects of expansion of ceramic tile and stone finishes.

So, as tiles have become larger and joints narrower and harder, the proportion of material available to deform harmlessly, to absorb expansive strain and to prevent distress and drumminess in conventional tiling systems has declined by a factor of 10 or more in a period of about 50 years. By the mid-to-late 1990s, all of these trends coincided<sup>(3)</sup>; the contribution and capacity of normal grouted joints to accommodate in-plane expansion in floors and walls had almost been eliminated, and intermediate movement joints were increasingly seen as disturbing, visible anomalies in otherwise uninterrupted expanses of stone, tiles and terrazzo. And perhaps they became endangered because, if one were prepared to risk the consequences, installation was considered too time-consuming, troubling and costly. An epidemic of silent – and occasionally percussive – distress and disputation in floor tiling has followed.

There were warnings. *Ceramic Floor and Wall Tile: Performance and Controversies*, a 1989 handbook sponsored by the Italian ceramic tile industry and distributed in Australia by the Italian Trade Commission, emphasises the importance of movement joints and illustrates the consequences of their deletion. An Australian tiling industry task force in 1989 identified omission, mislocation and misconstruction of movement joints as among the most common factors in complaints over distress-related expansion of tiles and tiling. With advice from the CSIRO, in 1994 the Royal Australian Institute of Architects published a *Cautionary Note* alerting its members to the rising incidence of defects in seemingly conventional tiling. The technical literature and installation guidelines of tile adhesive manufacturers became progressively more explicit on the need to provide for differential movement, to prepare concrete substrates by abrasion, to correlate tile bed thicknesses with tile sizes (by spreading tile adhesive using trowels with notches of appropriate shapes and dimensions; see Clause 5.6.2 of AS 3958.1–2007) and to comply with corresponding recommendations of national and regional standards and codes of practice. The Internet allowed manufacturers to make detailed technical bulletins easily available to designers, tile fixers and consumers; for example, Ardex, Mapei, PCI (now part of BASF in Europe) and Laticrete have websites offering comprehensive technical advice. All recommend intermediate and perimeter movement joints in compliance with local and regional codes and standards. *Tile Today* has published several articles on the necessity for movement joints in ceramic tile and stone finishes.



Thanks to successive grants from the Arts Council, I have amassed an unequalled collection of autographed and plastic-sleeved copies of hundreds of articles and papers on the same themes from industry magazines, seminars and conferences in Australia, Britain, Europe and North America, many downloadable from the Internet. At least among these authorities, there seems to be a unanimous consensus that perimeter and intermediate movement joints are necessary, even in floor tiling in single-storey detached dwellings of moderate dimensions. Given that most of the authors have no obvious links to manufacturers of movement joints, backer rods, bond-breaker tapes and sealants, even a professional sceptic and habitual solicitor of *sub rosa* emoluments, such as are necessary to sustain this humble writer, is prepared to accept that this consensus is not the result of a gigantic conspiracy by the Lathams, Miskas, B.A.T. Trims, Schluters, Sikas, Tremcos and Dow Corning of the world.

Nevertheless, complaints of drummy and cracked floor and wall finishes of stone and ceramic tiles, disproportionately due to omission and misconstruction of movement joints, continue unabated in the first decade of the twenty-first century. Disputes over cause and liability have provoked the growth of a boutique discipline of Internet and Yellow Pages consultant stone doctors, tile doctors, paving pathologists, crime-scene ceramicists, Building Code bombasticators, vitreous virologists, notched-trowel trouble-shooters, forensic floor analysts, slip and trip sleuths and all-purpose polymath materials technologists<sup>(4,5)</sup>, one of whom recently offered the following as expert opinion on omission of intermediate movement joints in residential floor tiling: "I disagree that these joints are conventional in tiling work carried out in single-storey residential dwellings [sic]. It is much more common that tilers will lay tiles without these joints, in deference to the wishes of the owners."

This occurs in the context of evidence that omission of intermediate movement joints, throughout floor tiling in runs up to 22 m on slabs mostly with underfloor heating, could not contribute to drummy tiling. The consultant goes on to argue that omission of movement joints, contrary to the recommendations of AS 3958.1-1991 and tile adhesive manufacturers, is so common in floor tiling in contemporary house construction that it has become the industry's *de facto* standard and thereby standard practice. In other words, the recommendations of the Australian Standard, prepared and accepted by unanimous consensus of industry representatives including the Australian Tile Council, lose force if enough naïve or adventurous tilers ignore them long enough. This is a novel proposition, but from it arises a disturbing possibility: Could it be true that the majority of tile fixers and stone fixers working in domestic-scale construction routinely omit conventional movement joints where recommended by AS 3958.1 and tile adhesive manufacturers? We down here on the tiles at Atelier Dripstone Bar & Grill would certainly like to hear from some of the anonymously typical and normal tradesmen on whose practices the expert's generalisations rely.

AS 3958.1 defines a movement joint as 'A joint, usually wider than the usual joint between tiles or slabs, designed to accommodate lateral movement in the base or bedded finish, which is filled with materials having special properties'.

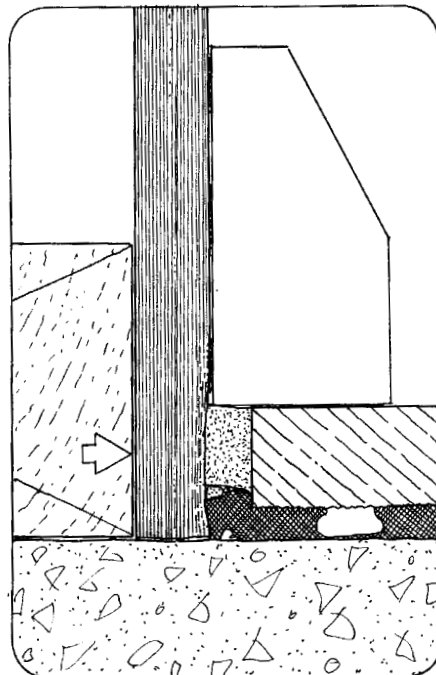
In defending the omission of conventional resilient movement and isolation joints under skirtings and elsewhere

at perimeters of floor tiling in 20 houses, the same consultant has looked down upon dense and fully grouted joints and pronounced: "I do not agree that perimeter isolation joints have not been provided. [...] The tiles are laid up to a gyprock wall lining. The gyprock is an easily compressible material and would easily accommodate any tile movement at the edge."

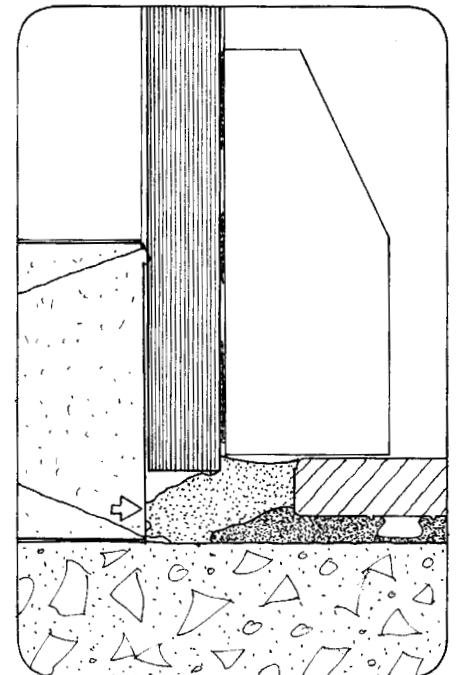
The corresponding material is described in Clause 5.4.5.1 as being 'permanently deformable...such as polystyrene'. Movement joints are also described as sealed with materials that are '...equally deformable as well as resistant to physical and chemical attack'. The notion that 10 mm and thicker sheets of ordinary, fire-resistant, water-resistant and acoustic grades of plasterboard are so deformable and resilient as to be suitable substitutes for bands of polystyrene, rubber foam and elastomeric sealants (silicones, urethanes) at least 6 mm wide, is novel. It is also rejected by manufacturers of plasterboard.

The expert opinion cited above evidently rests on the assumption that plasterboard wall lining extends upward from concrete floor level, such that floor tiles and grouted joints abut and press against but do not penetrate beyond the visible vertical face of the plasterboard sheet. This peculiar assumption is illustrated in **Figure 1**. As any experienced tiler would appreciate, it is nonsense. Plasterboard manufacturers such as CSR and Boral recommend that sheets of plasterboard are fixed with their bottom edges raised at least 10 mm above concrete floor slabs, as shown in **Figures 2, 3 and 4**. AS 3958.1 Clause 4.6.5, Fixing of gypsum-plasterboard sheets, advises that 'Particular attention should be paid to the following: (h)(iii) Gypsum plasterboard sheets adjoining floors at all areas, except shower recesses, to be fixed 10 mm clear of the finished floor.'

If 6 mm thick ceramic floor tiles on 3 mm bedding are fixed and grouted hard against the base of plasterboard-lined walls, there is an appreciable risk that bedding adhesive and grout will flow or be forced into 10 x 10 mm cross-section voids under the plasterboard and against concealed bottom plates of timber or light-gauge steel wall framing (**Figure 2**). The critical sequence of materials will then comprise the bottom plate, hard grout and tile adhesive, and the tile edge. Plasterboard will either not



**Figure 1.** Dramatic hand-drawn monochrome illustration of plasterboard wall lining and hard grouted perimeter joint re-enacting the main scene in *Iceberg versus Titanic*. Plasterboard stationary; edge of tiling drifting to port at 0.000057 knots. Tiling doomed.



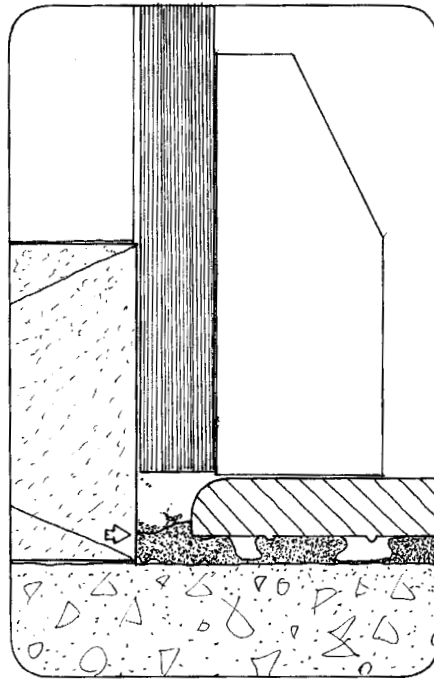
**Figure 2.** How not to allow for movement of floor tiling #17: Allow joint grout to penetrate and solidify within 10 mm high gaps below 10 mm and thicker plasterboard wall lining. (Collect all 25 cards in the series and qualify for a 12 mm notched trowel autographed by Dr Pingo Dripstone.)

extend into the depth of the tiling (Figure 3), or it will penetrate one or two millimetres (Figure 2). In-plane expansion of tiling and stone flooring at perimeters will not be easily accommodated by compression of plasterboard; it will be resisted, with the foreseeable risk of drumminess, arching and cracking in abutting floor tiles. The same principle and practice apply to thicker stone flooring; although stone may finish 15 or more millimetres above surfaces of concrete slabs, the risk remains that bedding mortar, adhesive bedding and joint grout will penetrate under plasterboard, solidify out of sight and resist normal expansion of the floor finish (Figure 4).

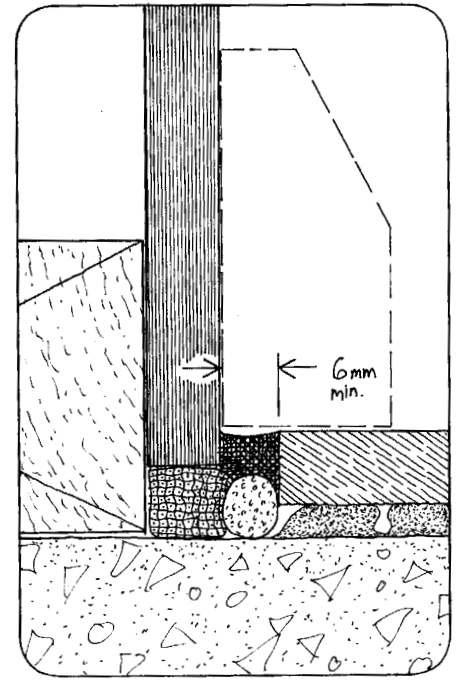
AS 3958.1 recognises that in relatively small rooms of 10 square metres and less, it is tolerable to substitute unsealed gaps at least 3 mm wide for conventional 6 mm wide sealed waterproof isolation joints. Whether to do so is prudent, particularly in such small compartments as bathrooms, toilets and laundries, is necessarily a matter for future argument at lucrative hourly rates in the context of expert evidence in accordance with Schedule 7 of the Uniform Civil Procedures Rules 2005, the Expert Witness Code of Conduct. Meanwhile, some might regard the practice as potentially unhygienic. Also, no matter how small a lavatory, walk-in pantry or wardrobe, *en suite* wine cellar or bondage chamber may be, its floor tiling should not be regarded as small and unworthy of perimeter movement joints unless it is also effectively isolated from the effects of movement of larger adjacent areas of tiling, for instance by providing movement joints across doorways.

AS 3958.1 is not referenced by the Building Code of Australia, so it is not a regulatory document. Its recommendations on tiling in general, and on the provision of movement joints in particular, are not mandatory unless compliance with the Standard is expressly specified in contract documents. Given the Standard's necessary generalisations, its legalistic format and syntax (see, for instance, Clause 9.6.3.4(c)(iv)(A) and the note thereunder) and the period between successive editions, any practiced sophist can argue that AS 3958.1 supports almost any proposition, its opposite and much in between. In low-rise residential construction, householders and builders may simply rely on tilers and stone fixers to employ the individual interpretation of good industry practice without further definition or direction. They may assume, at least until defects and disputes develop, that such nebulous and elastic terms as 'good' and 'normal industry practice' have some consistent meanings that will be understood and realised at the discretion of tradesmen, all without reference to published standards and to manufacturers' guidelines that direct compliance with those standards.

In seeking to define those terms, courts and consumer tribunals are susceptible to reasonable argument that the recommendations of AS 3958.1 adequately establish good practice or at least minimum acceptable practice. The Standard is also cited in the *Guide to Standards and Tolerances*, a document published and relied on by the NSW Office of Fair Trading and its equivalents in Tasmania, Victoria and the ACT. In the seemingly rueful words of the NSW Master Builders Association's March 2008 e-circular on *Floor Tiling Problems*, "Consequently, the Standard is often held up as a *de facto* regulatory document rather than simply a guide."



**Figure 3.** ...or slip the edge of the tile edge and its adhesive discreetly beneath the plasterboard and against the face of a 90 x 35 mm timber bottom plate of a stud wall!



**Figure 4.** The last resort: Fill the concealed gap with inexpensive rubber or plastic foam and install a 6 mm wide bead of elastomeric sealant against a foam backing rod.

In other words, if intermediate and perimeter movement joints at the locations and spacings recommended in AS 3958.1 are expediently or accidentally left out of ceramic tiled and stone floors and, as a result, things fall apart or arch upward, the centre cannot hold and becomes drummy, mere anarchy and writs are loosed upon the world, the best lack all adhesion and the worst are full of passionate intensity, be warned that the standard by which workmanship is ultimately judged may be AS 3958.1. Meanwhile, remember the axioms of Paracetamol of Athens and the wisdom of the Hopi: demand, cherish and defend your movement joints. ☞

*Dr Pingo Dripstone was born on a mountainside in Tennessee where he is reputed to have killed a bear when he was only three, an event he sometimes steadfastly denies. Currently a non-practising barista and Tantric Buddhist in Melbourne, he studied architecture and Marxism (Beijing-line) at universities in France, Uruguay and Australia in the early 1970s and from time to time since graduating in 1982 and/or 1984 has attempted to practice one or the other or both simultaneously. His passions include the alpenhorn, vulcanology, reflexology and architectural stone in all its wonderful and myriad forms other than epoxy-filled travertine and certain varieties of basal pegmatite.*

#### NOTES

1. Paracetamol of Athens, also known as Acetaminophen the Half-Greek, was a homespun logician, architect and early advocate of articulated masonry, movement joints, knee-braced portal frames and staying indoors during lightning storms. His pioneering tract on building, *Tract on Building*, contains many homilies that have become – or should have become – underlying precepts in modern architecture, wet-area waterproofing and subterranean termite control. Little appreciated in his lifetime and for centuries after, Paracetamol is said to have been mortally injured when a marble portal, under which he had been sheltering, was struck by lightning.
2. See *Towards a prolegomenon on the symbolic and symbiotic meanings of metamorphic lithotypes in the verse of W. B. Yeats and the Angry Penguins* by Luz Cannon MA, Department of General Studies & Ethnomusicology, University of the Western Mallee, Horsham, Victoria, to appear in the autumn 2009 issue of *The Journal of Figurative Rock Mechanics* courtesy of the Arts Council of Australia.
3. Long-winded and somewhat turgid conjecture on these trends and their long-term effects can be found in *How not to learn from mistakes: Future and recurring defects in ceramic tiling*, a keynote paper at Qualicer 2000 in Castellón, Spain. It was probably plagiarised and delivered, in a rare moment of lucidity, by the Bangkok-based hack and pundit Peter Hartog.
4. Your correspondent is here obliged to disclose that he has, at times of financial distress and contrary to common sense, offered such opinions on distress in stone and ceramic tile floor and wall finishes. He has, however, lately forsworn this activity and assented to therapeutic intervention, and is currently negotiating with the producers of *A Current Affair* for a series of dramatic on-air confessions.
5. And in their wake come dispute resolution consultants, often the very same people but with different CVs and business cards, and zealous last-ditch litigators.