Joint Details – Scanfibre SFRC Ground Slabs

INTRODUCTION – The drying shrinkage that occurs in freshly placed concrete takes place over time (Fig. 1). If restrained this shrinkage generates tensile stresses in the concrete and if this tensile stress is higher than the tensile strength of the concrete the result is cracking

Reinforcement (fibre, mesh or rod) at the dosage rates typically used does little to prevent this cracking, realistically only working after cracking has occurred to limit the width of any cracks. The incorporation of strategically placed, well detailed, joints can effectively eliminate unplanned cracking when accompanied by good work practices that include correct placing, finishing and curing techniques.

The following details are offered to assist in the preparation of suitable engineering drawings for Scanfibre reinforced slabs on grade, although the information offered is of relevance when detailing any concrete ground slabs. *It should be borne in mind that the details are prepared on the basic assumption that cracking will occur at all provided joints with the resulting individual uncracked slab panels then shrinking back from perimeter joints toward the centre of a panel.* With this concept in mind it makes absolutely no sense to thicken the slab at edges or at joints if shrinkage restraint is to be avoided and where thickenings are essential the joint pattern should incorporate thickenings by assuming they offer full shrinkage restraint to the slab.

Fig. 1 Drying in Laboratory Air from PCA Dev. Dept. Bulletin 103

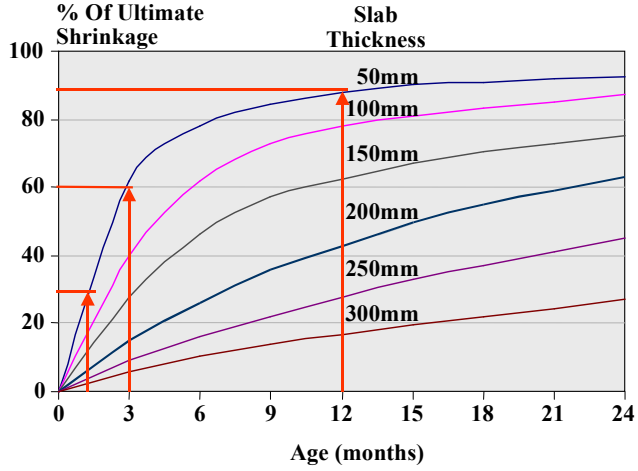
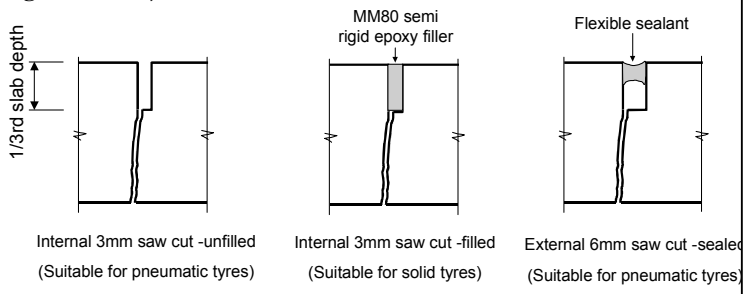


Fig.2 Saw cut joint details

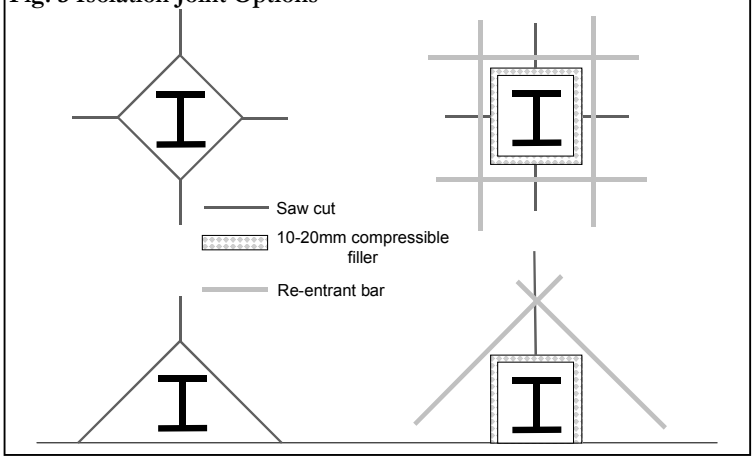


CRACK CONTROL JOINTS

The most common method of slab on ground construction is to place a long strip that is typically 6-10 metres in width. The length is then determined by the building plan or selected by the concretor to give an area that can be placed and finished in one day. The finished strip is then cut into square to rectangular panels (maximum aspect ratio 1.5) using transverse saw cuts, typically of 3mm width, to provide crack control.. The timing of saw cutting is critical. Sawing should occur as late as possible in order to minimise damage to the concrete surface, but must go in prior to cracking taking place. A typical saw cut detail is shown in Fig. 2.

Internal and perimeter columns when tied into the slab offer restraint and hence give rise to cracking if they are not isolated from the main slab. This can be done using sawn or boxed out isolation joints Fig. 3. Where the column needs to be tied to the slab selecting an appropriate joint layout can overcome many problems (Fig. 4).

Fig. 3 Isolation Joint Options



CONSTRUCTION JOINTS

Load transfer between slabs poured at different times can be achieved using either dowels or keys. Both types of joints have plusses and minuses:-

Key Joints Have the advantage of permitting slip along the line of the joint but lose the snug fit as shrinkage takes place (Fig. 5). It is recommended the taper on the top and bottom of the male section be kept to a minimum to minimise the vertical movement and hence potential for joint damage as the slabs shrink apart. Proprietary metal key joint profiles can incorporate dowels also to overcome this problem, but Scancem do not recommend key joints in slabs under 150mm thick. Where a key joint is to be formed in the concrete using removed timber side forms we recommend a minimum slab thickness of 200mm.

Dowel Joints Have the advantage of maintaining the top faces of adjacent slabs level as the slabs move apart. The main problem with dowels is that they must be properly aligned if they are to permit shrinkage to take place. The use of proprietary plastic sheathes that are fixed to the side forms can overcome any alignment problems. Conventional round dowels only permit movement normal to the joint and not parallel to it, giving the potential to cause cracking especially at corners dowelled to both sides (Fig.5). Proprietary square dowels overcome this problem by allowing lateral movement also.

EXPANSION JOINTS

Expansion joints are not normally required inside a building due to the expected expansion usually being less than the drying shrinkage. Where they are provided load transfer is typically provided with dowels and the slabs are separated with a compressible material. Consideration to joint corner protection needs to be given depending on the wheel loadings (Fig. 6).

SPECIAL DETAILS

To prevent drying shrinkage cracking standard details should avoid incorporating thickenings. Some typical special details are shown in Fig. 7.

Fig. 4 Tied Perimeter Columns

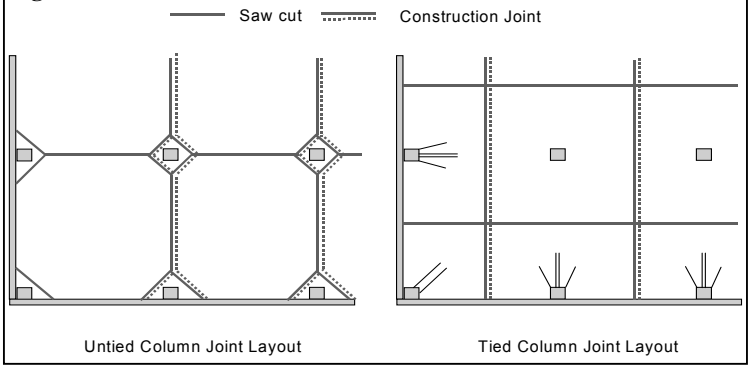


Fig. 5 Construction Joints

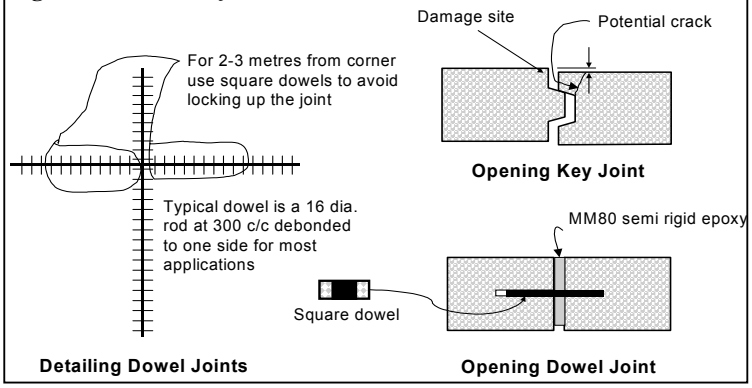


Fig. 6 Expansion Joint details

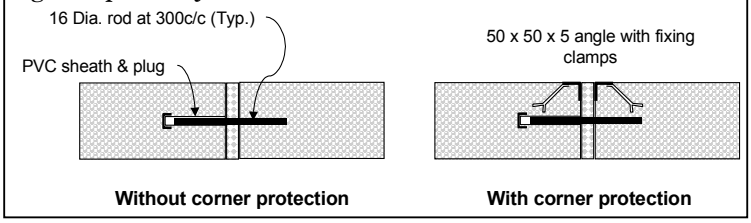
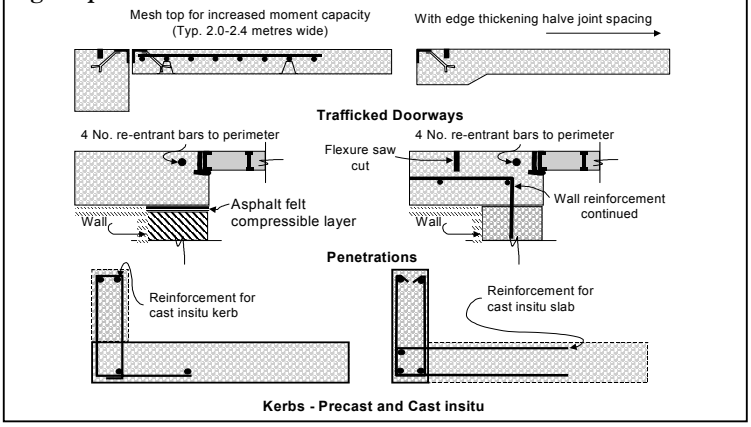


Fig. 7 Special Details



SCANCEM MATERIALS
PRODUCTS FOR ENGINEERED CONCRETE
S'pore : 2 Kallang Pudding Rd, #06-10, Mactech Ind. Bldg, S349307 Tel: +(65) 6255 8737 Fax: +(65) 6255 8713 email info@scancemmaterials.com
M'sia : A-4-9, Plaza Dwi Tasik, Jln Sri Permaisuri, Bandar Sri Permaisuri 56000 Kuala Lumpur, Tel: +(60) 3 9171 2110 Fax: + (60) 3 9171 5110