



TEK NOTE

April 2008

Control Joints for Concrete Masonry Crack Control

Cracking in buildings normally results from restrained movement. This movement may originate within a building material due to temperature change or shrinkage; or may result from movement of adjacent building elements. In most cases, movement is inevitable and must be accounted for during design if cracking is to be controlled.

Control joints placed in concrete masonry walls are one method of crack control. Control joints are vertical separations built into a concrete masonry wall to reduce restraint and permit longitudinal movement. They are located where cracking is likely to occur due to excessive tensile stress. Control joints are typically located at:

1. Wall openings
2. Changes in Wall height or thickness
3. Construction joints in foundations, roofs, and floors
4. Wall intersections
5. A distance of not over one-half the allowable joint spacing from all corners
6. A determined spacing for the length of the wall

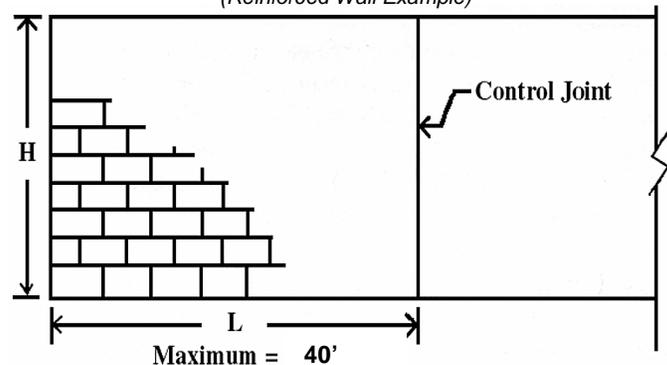
For wall without openings, control joints are used to effectively divide a wall into a series of isolated panels. Table 1 recommends panel length to height (aspect) ratios for spacing of control joints. Figure 1 illustrates the application of this information for a reinforced wall system.

Table 1. Spacing of Control Joints

Recommended Spacing of Control Joints	Masonry Wall System	
	Reinforced CMU ^a	Veneer (joint reinforcing @ 16" o.c.)
Expressed as Ratio of Panel Length to Height, L/H	3	1.5
With Panel Length not to exceed	40 ft.	24 ft.

^aFor solid grouted walls reduce the aspect ratio to 2.5 with panel length not to exceed 32 ft. unless horizontal reinforcement is spaced less than 48" on center.

Figure 1. Control Joint Spacing
(Reinforced Wall Example)



$$\text{Aspect Ratio} = \frac{L}{H} \leq 3$$

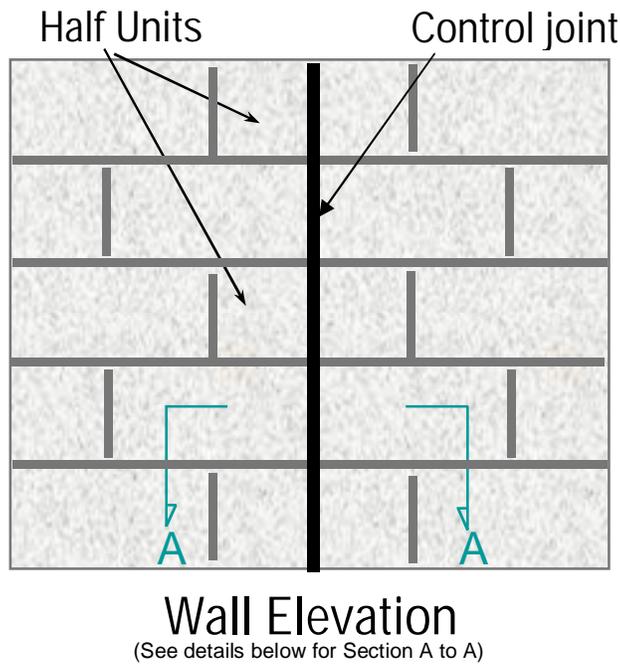
$$\text{Control Joint Spacing (L)} = 3 \times H$$

Common control joints are illustrated in Figure 2. The joints relieve horizontal tensile stresses and permit longitudinal wall movement. They must be weather-tight when located on exterior walls.

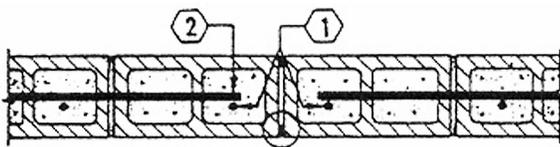
Horizontal reinforcement effectively limits crack width in concrete masonry walls. Horizontal reinforcement should not be continuous across the control joint since this will restrict movement. However, structural reinforcement, such as chord steel at floor and roof diaphragms, is an exception. Lateral loads can be transferred by providing a shear key with a gasket in the typical control joint. If it is necessary to transfer higher shear loads at the joint, the dowelled control joint can be used.

(continued on back)

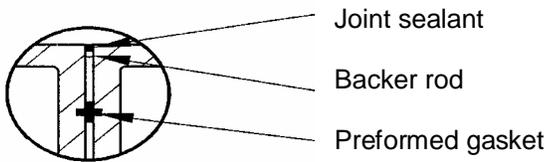
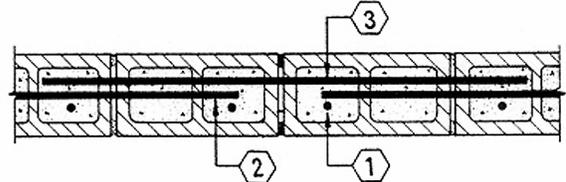
Figure 2. Control Joint Details
(Reinforced Wall Example)



Typical Control Joint



Dowelled Control Joint



1. Additional vertical bars on each side of all control joints
2. Terminate all non-structural reinforcing 2" from control joints
3. Provide 4'-0" long smooth dowel across joint. Prevent bond between bar and grout with a plastic sleeve.

Additional information can be obtained from the National Concrete Masonry Association technical bulletins 10-1A, 10-3 and 10-4.

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