



Issue Date:	01 May 2014
Code/ Section:	2012 IBC 722.2
Approved:	
Developed by:	David Sandvig, Michael Abegg

Issue: Cover in Fire-resistance rated Concrete Walls/Columns. The code is very clear regarding the minimum wall and column dimensions for fire rated construction as found in Tables 722.2.1.1 and 722.2.4 respectively. What is unclear is the minimum concrete coverage to the main reinforcing steel particularly in concrete walls.

Interpretation:

Walls: The following table is based on findings and guidelines from Factory Mutual for fire resistive construction for normal strength concrete and will be enforced by the City of Phoenix as a minimum standard.

Table 7.2 Minimum Concrete Cover of Steel Reinforcement for Fire Resistance of Concrete Walls

Type of Reinforcement	Fire Resistance (Hours)	Minimum Concrete Cover					
		Normal Weight Aggregate				Lightweight Aggregate	
		Siliceous		Calcerous		(inch)	(mm)
		(inch)	(mm)	(inch)	(mm)		
Rebar	1	3/4	19	1/2	13	1/2	13
	1.5	1	25	3/4	19	3/4	19
	2	1	25	3/4	19	3/4	19
	3	1 1/4	32	1 1/4	32	1 1/4	32
	4	1 3/4	44	1 1/2	38	1 1/4	32
P/S Strand or P/T Tendon	1	1 1/4	32	1	25	1	25
	1.5	1 1/2	38	1 1/2	38	1 1/4	32
	2	2	51	1 3/4	44	1 1/2	38
	3	2 1/2	64	2 1/4	57	2	51
	4	3	76	2 3/4	70	2 1/2	64

Notes:

- (1) Concrete cover is to the main longitudinal reinforcement; not to ties or stirrups.
- (2) Note that concrete cover prescribed by structural concrete codes/standards for normal (non-fire) durability may exceed the values in this table; the greater cover values shall govern.
- (3) Rebar is hot-rolled steel reinforcing bar.
- (4) P/S Strand is high-strength cold-drawn steel prestressing strand.
- (5) P/T Tendon is high-strength cold-drawn steel post-tensioning tendon.

Note that concrete cover is the thickness of concrete measured from the face of the wall to the outer surface of the main longitudinal reinforcing closest to the face of the wall.

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Columns: The following table is also from Factory Mutual and directly correlates with the 2012 IBC SECTION 722.2.4.2: **Minimum cover for R/C columns.** The minimum thickness of concrete cover to the main longitudinal reinforcement in columns, regardless of the type of aggregate used in the concrete and the specified compressive strength of concrete, $f'c$, shall not be less than 1 inch (25 mm) times the number of hours of required *fire resistance* or 2 inches (51 mm), whichever is less.

Table 3. Minimum Concrete Cover for Reinforced Concrete Columns

<i>Fire Endurance (Hours)</i>	<i>Concrete Cover</i>	
	<i>(in.)</i>	<i>(mm)</i>
1	1.0	25
1.5	1.5	38
2	2.0	51
3	2.0	51
4	2.0	51

Notes:

- 1) Concrete cover is the clear cover to the main longitudinal reinforcing.
- 2) Concrete cover shown is for conventional reinforcement (rebar), regardless of aggregate type.
- 3) For prestressed (strand) or post-tensioned (tendon) columns, provide the same concrete cover as is recommended for walls in Table 7.2 for the needed fire endurance, but not less than the concrete cover in this table.