

A Guide to Helping Your Clients Select the **ATC Code** for Their Risks

Construction Type Guidelines

To help you provide your clients with catastrophe coverage they can depend on, we use construction classes generated by the Applied Technology Council (ATC).

The ATC codes were produced as part of the National Earthquake Hazards Reduction Program (NEHRP) in 1988 in an attempt to formulate improved seismic building codes. We use these codes to model risks more accurately and provide more precise pricing.

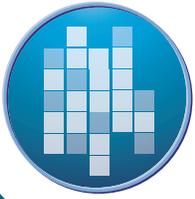
The information in this guide will help you and your clients determine the correct ATC code when submitting a risk. While many applications from your clients classify the construction type using the Insurance Service Office (ISO) Fire Guidelines, the ATC codes provide much clearer classification of risk. There are six major classes in the ISO guidelines that correspond to 15 classes in the ATC guidelines. To view the corresponding ATC code and complete description, simply click the ISO Fire Class below and select the correct ATC code for the particular risk.

Index: ISO Fire Class

- 1 [Frame](#)
- 2 [Joisted Masonry](#)
- 3 [Non-Combustible](#)
- 4 [Masonry Non-Combustible](#)
- 5 [Modified Fire Resistive](#)
- 6 [Fire Resistive](#)

| ISO Fire Class | ATC Code |
|----------------|------------------|
| 1 | 1 |
| 2 | 4, 8, 16 |
| 3 | 2 |
| 4 | 3, 7, 16 |
| 5 | 9, 10, 15 |
| 6 | 5, 6, 12, 13, 14 |

We appreciate your business and are confident that this information will allow us to correctly model, and price, your business!



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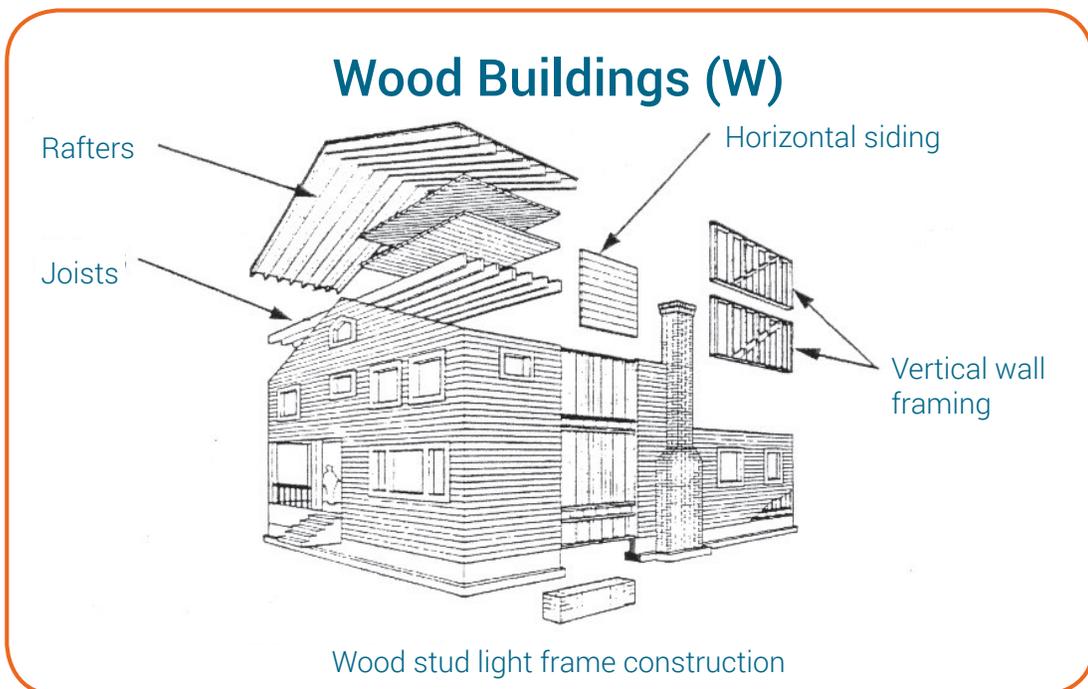
Wood Frame (ATC 1)

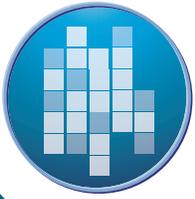
Description

Buildings with walls constructed of 2x4" or 2x6" wood studs spaced at 16" covered on the outside with plywood, lap siding, or stucco and on the inside with gypsum board or lath and plaster. This is a very common form of residential construction. Well-constructed buildings of this type are typically earthquake resistant because of the high lateral force strength that the wood stud walls and plywood provides, and because most buildings are lightweight.

Bolting the frame of the structure to its foundation can reduce the exposure of building damage. Unbolted buildings may slide off their foundations during a strong earthquake, causing significant damage. Anchoring the frame to the foundation has proven to be the best means of protection against earthquake damage in frame structures. Most buildings constructed after 1949 are considered to be bolted to the foundation.

Buildings constructed prior to 1949 may not be bolted to the foundation. Another common deficiency in older wood frame buildings is inadequate strength in the cripple walls, walls enclosing the crawl space between the ground surface and floor beams. A similar situation holds for the aboveground walls of a basement, or the walls below floor level on a sloping site. These lowest level walls are often inadequate because of large openings, have no sheathing, or are sheathed only on one side. Structural failure often occurs with this type of older construction.





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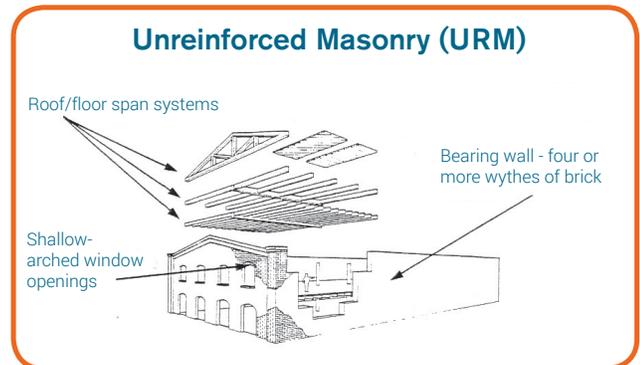
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Unreinforced Masonry (ATC 4)

Description

Unreinforced Masonry buildings (URM) include both unreinforced brick and unreinforced concrete block buildings. There is little or no embedded steel reinforcement in the masonry. The unreinforced masonry structural walls support the building weight and offer limited resistance to earthquake forces.

Many unreinforced masonry buildings in the United States are over 100 years old. Unreinforced masonry buildings are usually four stories or less. The framing for the floors and roof, whether of wood, steel or concrete, is supported by the walls. In California, building codes changed in 1945, no longer allowing unreinforced masonry infill walls.

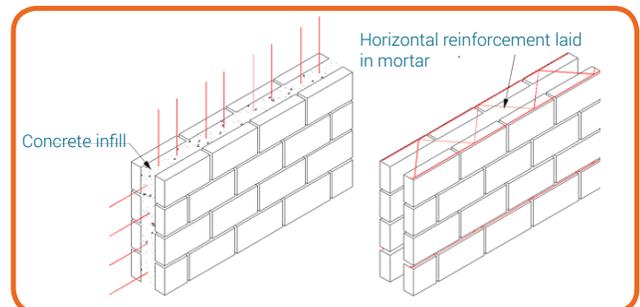


Note: For ATC 4, the building type would contain a structural frame.

Reinforced Masonry (ATC 8)

Description

Reinforced masonry buildings are built of concrete block, brick or other masonry materials with steel reinforcing bars inserted into the cells of the masonry and the cells filled with concrete. This is not reinforced concrete construction, since the reinforcing is not an integral part of the masonry during the original construction; it is inserted and then filled after the walls are already constructed. This creates a monolithic wall, but unless the wall is also tied to the foundation, it will not preclude the building shifting off the foundation during an earthquake.

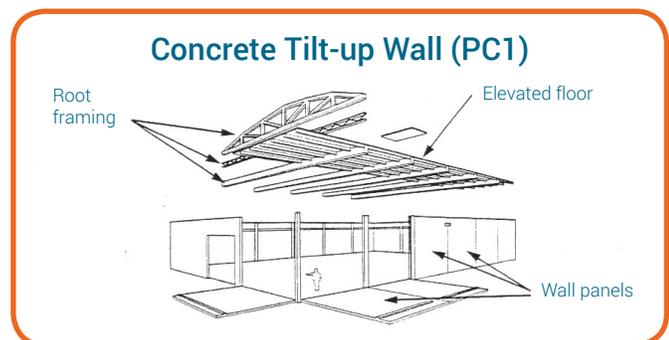


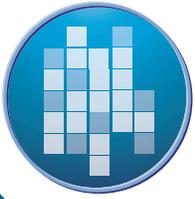
Note: For ATC 8, the building type would contain a structural frame.

Concrete Tilt-up (ATC 16)

Description

The concrete tilt-up wall is often used for large one or two story industrial or warehouse buildings. The concrete walls, which are cast as panels on the building floor and then tilted into place, resist both gravity loads (vertical) and earthquake forces. Additional or elevated floors usually have wood or steel frame. Some buildings may actually be classified as ATC 10 or 12. Buildings built prior to 1976 are most vulnerable to damage. Buildings built after 1976 have stricter building codes, with even better construction after 1997. In addition, buildings with a **wood joist roof would typically be classified as ISO 2**, or a metal roof as ISO 4.





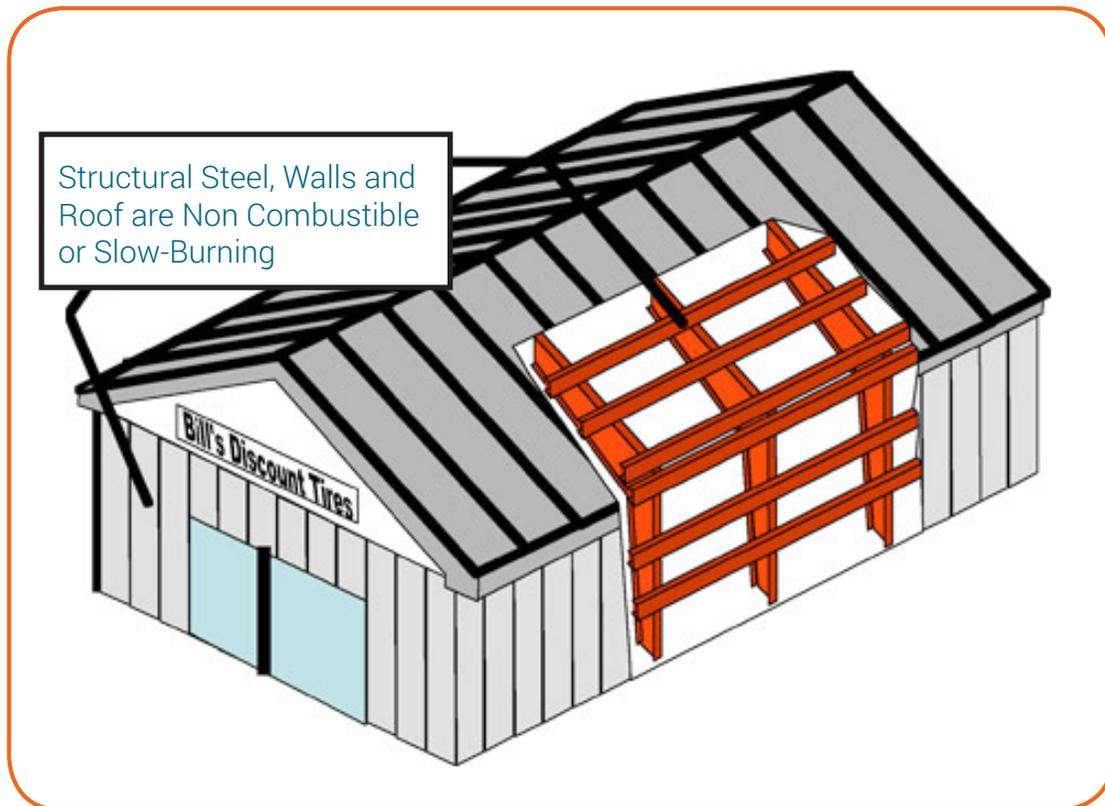
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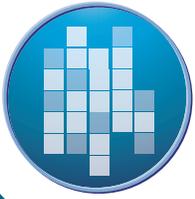
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Light Metal (ATC 2)

Description

Light Metal buildings include buildings with exterior walls, floors, and roofs of non-combustible or slow-burning materials, building supports of non-combustible or slow-burning materials, and non-combustible or slow-burning roof decks on non-combustible or slow-burning supports—regardless of the type of insulation on the roof surface.





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Unreinforced Masonry (ATC 3)

Description

Unreinforced Masonry buildings (URM) include both unreinforced brick and unreinforced concrete block buildings. There is little or no embedded steel reinforcement in the masonry. The unreinforced masonry structural walls support the building weight and offer limited resistance to earthquake forces.

Many unreinforced masonry buildings in the United States are over 100 years old. Unreinforced masonry buildings are usually four stories or less. The framing for the floors and roof, whether of wood, steel or concrete, is supported by the walls. In California, building codes changed in 1945, no longer allowing unreinforced masonry infill walls.

Reinforced Masonry (ATC 7)

Description

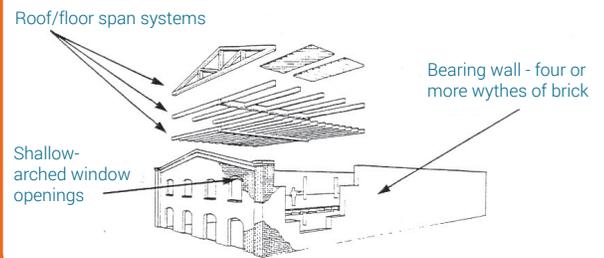
Reinforced masonry buildings are built of concrete block, brick or other masonry materials with steel reinforcing bars inserted into the cells of the masonry and the cells filled with concrete. This is not reinforced concrete construction, since the reinforcing is not an integral part of the masonry during the original construction; it is inserted and then filled after the walls are already constructed. This creates a monolithic wall, but unless the wall is also tied to the foundation, it will not preclude the building shifting off the foundation during an earthquake.

Concrete Tilt-up (ATC 16)

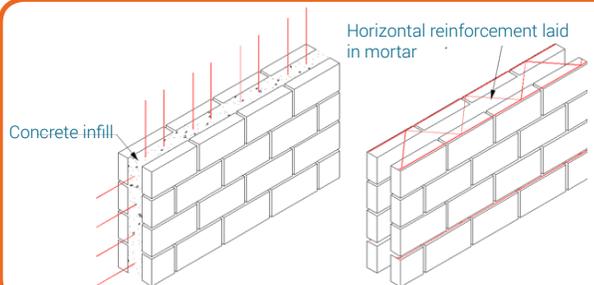
Description

The concrete tilt-up wall is often used for large one or two story industrial or warehouse buildings. The concrete walls, which are cast as panels on the building floor and then tilted into place, resist both gravity loads (vertical) and earthquake forces. Additional or elevated floors usually have wood or steel frame. Some buildings may actually be classified as ATC 10 or 12. Buildings built prior to 1976 are most vulnerable to damage. Buildings built after 1976 have stricter building codes, with even better construction after 1997. In addition, buildings with a wood joist roof would typically be classified as ISO 2, or a **metal roof** as ISO 4.

Unreinforced Masonry (URM)

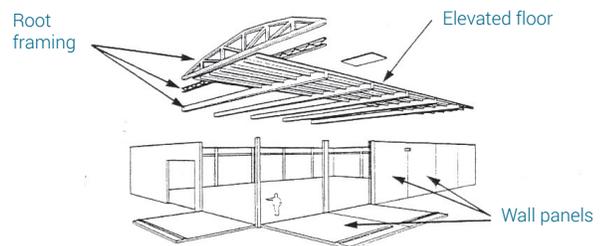


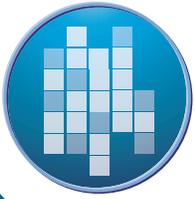
Note: For ATC 3, the building type would not have a structural frame.



Note: For ATC 7, the building type would not have a structural frame.

Concrete Tilt-up Wall (PC1)





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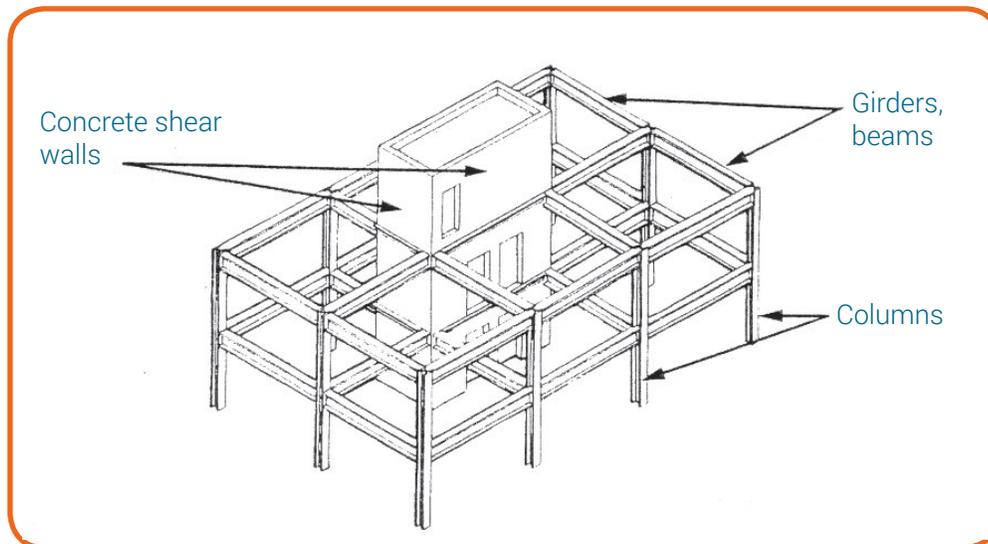
Steel Moment Frame (ATC 9 and 10)

Description

Steel rectangular moment-resisting frame buildings have vertical columns and horizontal girders or beams of steel H sections. The floor delivers the weight of the building to the girders. The columns and girders support the total weight of the building. The columns and girders are rigidly connected together into rectangular frames. Horizontal earthquake forces are resisted by the strength and ductility of the column/girder joints, and the bending strength of the members.

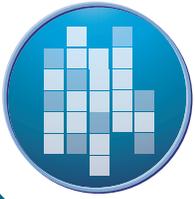
Braced frames (ATC 9) use trussing to resist sideways forces on buildings. Trussing is formed by inserting diagonal structural members into rectangular areas of a structural frame. Braced frames are typically classed as Single Diagonal and Cross Bracing.

There are also Knee Bracing, K Bracing, V Bracing and Inverted V Bracing. Cross Bracing and K Bracing are very rigid. The bracing is often concealed by panels and it is not easy to tell a building has bracing from outside. Buildings with K Bracing are typically classified as ATC 9, whereas ATC 10 does not have K Bracing.



Long Span (ATC 15)

This is generally a code associated with structures with suspended roofing or suspended walkways.

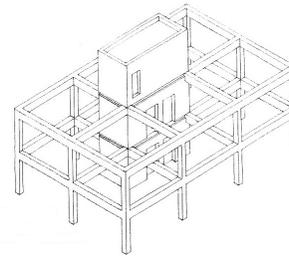


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Reinforced Concrete Shear Wall with moment-resisting frame (ATC 5)

Description

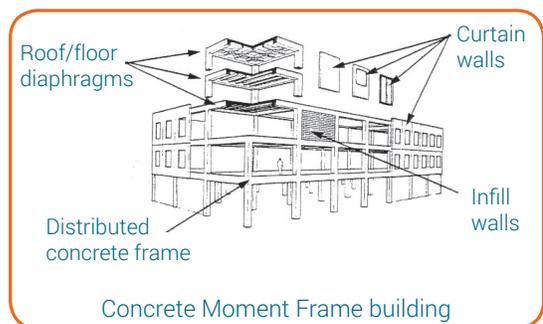
Reinforced Concrete shear walls support vertical loads. Shear wall with moment-resisting frame is a dual system in which a frame and shear wall are interconnected by the floor to act integrally as one system by making use of each forte: flexibility of frame and non-ductility of shear wall.



RC Shear Wall with moment-resisting frame building. Reinforced concrete shear walls around central core, i.e. central elevators and stairs.

RC Shear Wall without frame (ATC 6, 12 and 13)

Cast-in-place reinforced concrete walls support the building weight.



The most spectacular major building collapses in the Northridge Earthquake in 1994 were typically of reinforced concrete frame building designed and built prior to 1975. (It is also noted that some post 1975 parking garages collapsed or were severely damaged.)

Non-ductility results from

1. wide spacing between ties,
2. main bar splices all at the same location,
3. insufficient shear reinforcement,
4. insufficient tie anchorage,
5. lack of continuous beam reinforcement through joints with columns, and
6. inadequate reinforcing of joints.

Reinforced Concrete Frame

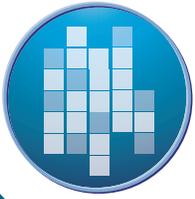
- Ductile (ATC 12)
- Non-ductile (ATC 13)

The concrete moment frame has vertical columns and horizontal girders cast together to form rectangular concrete frames, as shown below. The frames may be exposed or enclosed by curtain walls or a masonry veneer.

Most concrete moment-frame buildings with nonductile frames have a limited capacity to resist large earthquake forces. When deformed, the non-ductile concrete moment frames have been badly damaged and lose their strength.

Ductile Concrete moment-frame buildings are much less likely to collapse in an earthquake. They are built with closely spaced reinforcing and other details that give good ductility to the frame.

These reinforcement details are concealed by the concrete, therefore, it is difficult to tell whether a concrete frame is ductile or non-ductile. In high seismic areas, concrete moment resisting frame buildings built after about 1976-1980 almost always have ductile frames. In low and moderate seismic areas, non-ductile concrete frame buildings are allowed and are still built.



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Precast Concrete (other than Title-up) (ATC 14)

Description

Precast construction is characterized by roof and floor systems consisting of structural concrete T sections, structural double T sections and hollow-core concrete slabs.

The walls consist of load-bearing frame components (typically cross sections) and multi-story load-bearing panels.

Curtain wall systems are characterized by pre-cast concrete panels, metal, glass or stone panels. The structural system of a pre-cast building consists of pre-cast columns and beams.

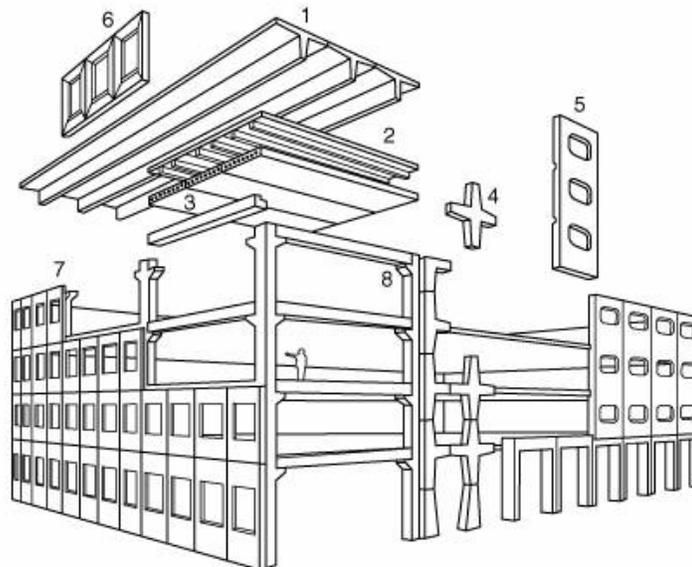
Precaste Concrete

Roof/floor span systems:

1. Structural concrete T sections
2. Structural double T sections
3. Hollow-core concrete slab

Wall systems:

4. Load-bearing frame components (cross)
5. Multistory load-bearing panels



Curtain wall systems:

6. Precast concrete panels
7. Metal, glass, or stone panels

Structural systems:

8. Precast column and beams