
**SCOPE: 1998 California Building Code (Based on 1997 UBC),
Sections 1628, 1630.1.1, 1630.4.2**

PROPOSAL FOR CHANGE:

1 Note that the correct subscript "max_i" is written here as "max i" due to word processing
2 constraints.

3
4 Section 1628:

5 = Redundancy/~~Reliability~~ Factor given by Formula (30-3).

6
7 Section 1630.1.1:

8 ...

9 = ~~Reliability/Redundancy~~ Factor as given by the following formula: taken as the largest of the
10 values of r_i from any story at or below the two-thirds height level of the building. For each story
11 "i" the value of r_i is calculated as:

12
13
$$r_i = 2 - 20 / (r_{max} r_{max i} \sqrt{A_B A_i})$$

14
15 For SI:
$$r_i = 2 - 6.1 / (r_{max} r_{max i} \sqrt{A_B A_i})$$

16
17 **WHERE:**

18 $r_{max} r_{max i}$ = ~~the maximum element story shear ratio. For a given ... two-thirds height level of~~
19 ~~the building. The ratio of the design story shear resisted by the most heavily~~
20 ~~loaded single element in the story to the total story shear in a given direction.~~

21 A_i = The floor area in square feet (m²) of the diaphragm level immediately above the
22 story.

23
24 For braced frames, the value of $r_i r_{max i}$ is equal to ... total story shear.

25
26 For moment frames, $r_i r_{max i}$ shall be taken as ... shear summation.

27
28 For shear walls, $r_i r_{max i}$ shall be taken as ... length of the wall in feet (m).

29
30 For dual systems, $r_i r_{max i}$ shall be taken as the maximum value of $r_i r_{max i}$ as defined above ... the
31 value calculated above.

32
33 shall not be taken less than 1.0 and need not be taken greater than 1.5, ~~and A_B is the ground~~
34 ~~floor area of the structure in square feet (m²). For special moment-resisting frames, except when~~
35 ~~used in dual systems, shall not exceed 1.25. The number of bays of special moment-resisting~~
36 ~~frames shall be increased to reduce r_i , such that is less than or equal to 1.25.~~

37 ~~EXCEPTION: A_B may be ... ground floor.~~

38 EXCEPTION: For a special moment-resisting frame structure having a fundamental
39 period of less than 0.7 seconds, the calculated value of may exceed the 1.25 limit when M does
40 not exceed 0.025/ times the story height for any story at or below the two-thirds height level of
41 the building. For a special moment-resisting frame structure having a fundamental period of 0.7

1 seconds or greater, the calculated value of $r_{max i}$ may exceed the 1.25 limit when M does not exceed
2 0.020/ times the story height for any story at or below the two-thirds height level of the building.

3
4 For a story with a flexible diaphragm immediately above, $r_{max i}$ shall be permitted to be calculated
5 from an analysis that assumes rigid diaphragm behavior. If all diaphragms in the building are
6 flexible, need not be taken greater than 1.25.

7
8 Calculation of $r_{max i}$ need not consider the effects of accidental torsion (due to assumed
9 displacement of the calculated center of mass per Section 1630.6) and need not consider any
10 effects of the amplification factor, A_x , per Section 1630.7.

11
12 When calculating drift, or when the structure is located in Seismic Zone 0, 1 or 2, shall be taken
13 equal to 1.

14
15 The value of shall be permitted to be taken equal to 1.0 in the following circumstances:

- 16 1. For structures located in Seismic Zone 0, 1, or 2.
- 17 2. When calculating displacements for dynamic amplification of torsion in Section 1630.7.
- 18 3. When calculating deflections, drifts, and seismic forces related to Sections 1630.1.3, 1630.9,
19 or 1633.2.4.
- 20 4. When nonlinear time-history analysis is used to justify a structural design per Section
21 1631.6.3.
- 22 5. For design calculations required by Sections 1632 or 1634.
- 23 6. For design calculations required by Section 1633, except that shall be taken as its calculated
24 value for the design of diaphragms and connections of diaphragms that transfer lateral forces
25 between discontinuous vertical elements of the lateral force resisting system in structures
26 having vertical irregularity Type 4 in Table 16-L or plan irregularity Type 4 in Table 16-M.
- 27 7. For evaluation of sliding or overturning at the soil-structure interface per Section 1629.1.
- 28 8. For design of foundation elements, except that shall be taken as its calculated value for the
29 design of connections between the foundation and superstructure elements.

30
31 The ground motion producing ...

32
33 *Section 1630.4.2, paragraph 2.2:*

34 The reactions from the upper portion shall be those determined from the analysis of the upper
35 portion ~~amplified~~ multiplied by the ratio ($R/$) of the upper portion over ($R/$) of the lower
36 portion. This ratio shall not be taken less than 1.0.

REASON FOR PROPOSAL:

37 This is an omnibus proposal that combines seven separate proposals related to the Redundancy
38 Factor.

39
40 In addition, though not presented here, it is recommended that portions of Section 1630.1.1
41 related to the Redundancy Factor should be in their own separate subsection and that the
42 paragraphs at the end of Section 1630.1.1 (regarding the direction of design seismic forces and
43 W) should be moved to more appropriate locations (such as 1630.2.1 or 1633.1).