



ACI 355 TG6 – European Seismic Provisions

Task Group Report
October 25, 2020

J. Silva – Task Group Chair



Task Group Roster (as of 10/20)

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Voting members

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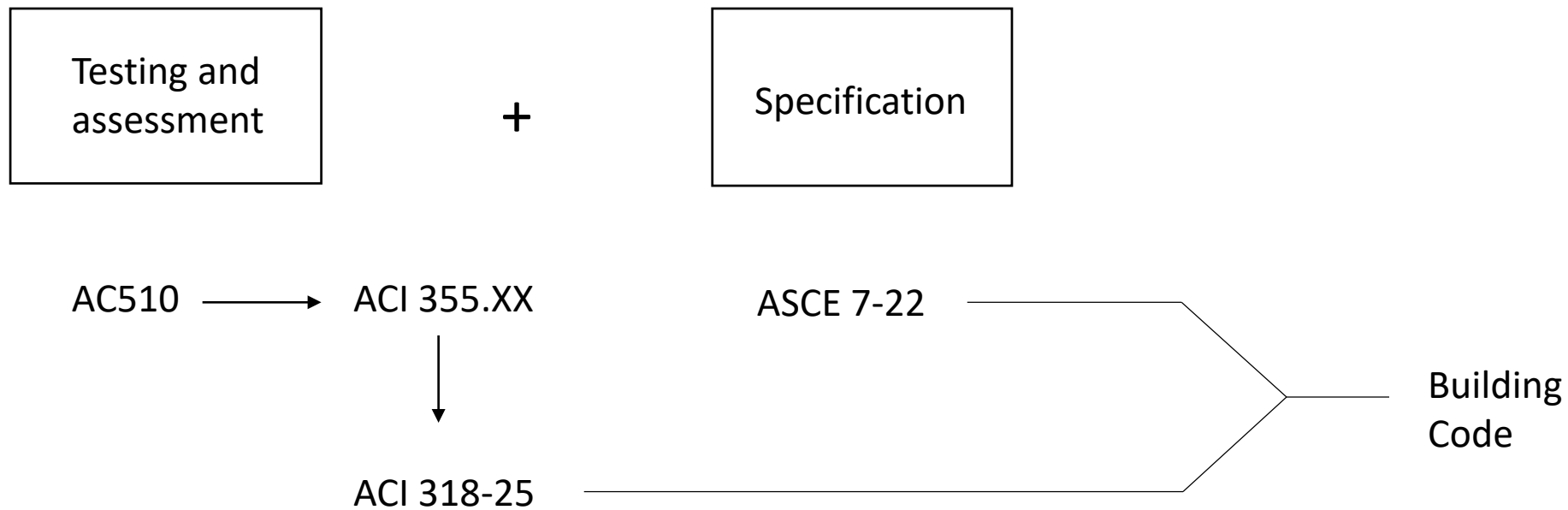
P. Schillinger

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F. Wall

Brief recap

Task Group 6 report of October 13, 2017 recommended implementation of a two-level qualification system similar to the one adopted in Europe.





Why?

The existing seismic qualification procedure, which dates from the mid-1990s, does not have sufficient technical support to ensure the good performance of anchors in earthquakes.

A substantial body of work exists to support the methodology known in Europe as C2.

12.11.3.5 Proprietary Anchors in Concrete. Proprietary expansion, undercut, and adhesive anchors in concrete shall be tested and assessed in accordance with ICC-ES AC510 or equivalent standard and shall show compliance with the required ASPC level as given by Table 12.11-1.

Table 12.11-1 Required Anchor Seismic Performance Category (ASPC)^a

| SDC | Risk Category ^b | Column A SFRS Response Modification Coefficient $R < 5$ ^c | Column B SFRS Response Modification Coefficient $R \geq 5$ ^c |
|------|----------------------------|---|--|
| B | I, II, III, IV | ASPC 0 | ASPC 0 |
| C | I, II, III | ASPC 1 | ASPC 1 |
| C | IV | ASPC 1 | ASPC 2 |
| D, E | I, II, III | ASPC 1 | ASPC 2 |
| D, F | IV | ASPC 2 | ASPC 2 |

^a In accordance with ICC-ES AC510 or equivalent standard.

^b Risk Category as established by the building code or in accordance with Table 1.5-1.

^c For reinforced concrete SFRS classified as Bearing Wall, Building Frame, Moment-Resisting Frame, or Dual Systems incorporating concrete shear walls, the Response Modification Coefficient, R, assigned from Table 12.2-1, Table 15.4-1, or Table 15.4-2 shall be used to determine whether the requirements of Column A or Column B apply. For

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all other SFRS, including composite steel and concrete SFRS, the required ASPC level is given by Column A regardless of the Response Modification Coefficient, R.

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Update

ASCE 7-22 will not include a reference to a two-level seismic qualification system for anchors in concrete.

ACI 355.2 and ACI 355.4 currently reflect seismic qualification testing adopted for inclusion of anchor provisions in **ACI 318-02**.

Option 1: Stay with status quo.

Option 2: Replace current seismic qualification testing with procedure designated in AC510 as ASPC 2 (TR049 C2).



Option 1: Status quo

| Pros | Cons |
|-------|---|
| Easy. | <p>ACI 355 standards would no longer represent state of the art. Increased probability of anchor failures in design level events.</p> <p>Potential confusion with regard to other jurisdictions outside of the US that rely on ACI 318 (e.g., Chile).</p> |



Option 2: Replace current provisions with C2

Pros

ACI 355 standards reflect state of the art with regard to seismic qualification of anchors in concrete.

Anchors qualified under ACI standards are suitable for all applications in US and Europe.

Cons

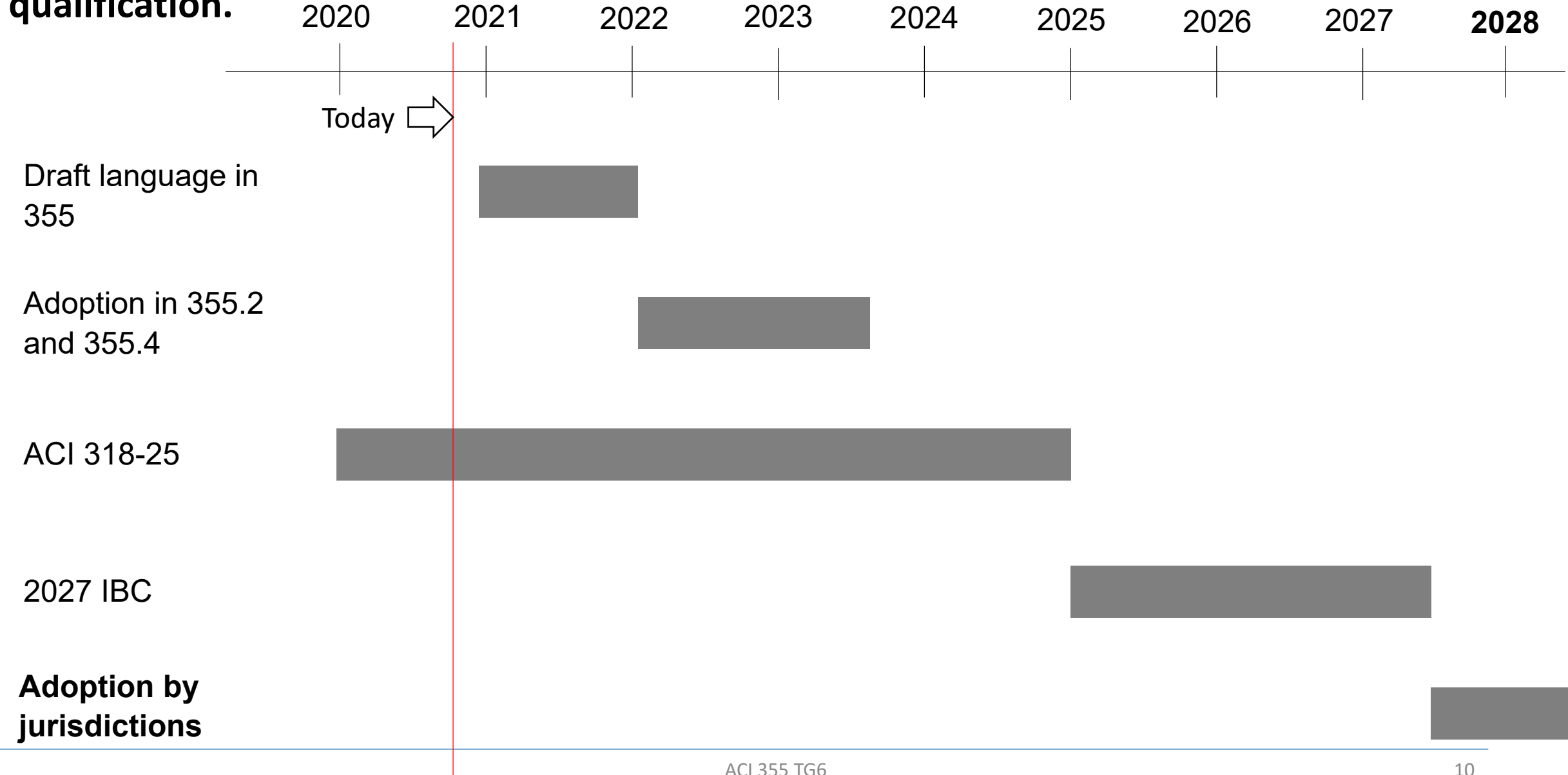
Possible disruptions in design community. 

Probable alignment of
the IBC/IRC with
structural reference
standards

| IBC/IRC edition | Structural reference standards | | | | |
|--------------------|--------------------------------|---------|-------------|-------|------------|
| | ASCE 7 | ACI 318 | AISC 341 | SPWDS | TMS 420 |
| 2018 | 2016 | | 2016 | | 2016 |
| 2021 | | 2019* | | 2020 | |
| 2024 | 2022 | | 2022 | | 2022 |
| 2027 | | 2025 | | | |
| 2030 | 2028 | | 2028 | | |

*possible ACI 318 supplement in 2022

Design and regulatory communities would have 7-8 years to prepare for enhanced seismic qualification.





Summary:

1. There is no path currently to implementation of updated seismic testing and assessment criteria in the two-level manner adopted in Europe (C1/C2).
2. The logical step for the 355 Committee is to begin work on replacing the existing seismic testing and qualification criteria in the two standards with the procedure known as C2.
3. The goal should be completion of the work in time for adoption of the updated documents as reference standards in ACI 318-25.