IEEE P344 Project Status Report

James Parello, Chairman IEEE 344 (SC-2.5)
IEEE SC-2 Meeting
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IEEE P344 Project
Status Summary

- Significant Items/Progress to Date
- Balloting Status
- Recirculation Ballot 3 Technical Issues
- Action Plan

IEEE P344 Project
Significant Items/Progress to Date

- IEEE P344 Ballot Review Committee (BRC) was formed to resolve balloting comments. The BRC consisted of the entire IEEE 344 Working Group.
- Balloting of IEEE P344/D23 produced 29 technical and 100 editorial comments. Resolution of comments to the original draft (IEEE P344/D23) through three (3) Working Group meetings.
- Three Recirculation Ballots of the IEEE P344 Draft have been issued since July 2004 to resolve negative balloter comments.
- Resolution of recirculation ballot comments was reached by simple consensus voting by E-Mail communication with BRC members.
- IEEE P344/D27 issued to negative balloters for consideration.
- PAR P344 is active until December 2004.

IEEE P344 Project
Ballot Status

Summary of IEEE SA Ballot Results for IEEE P344				
Voting Results	Original Ballot (P344/D23)	Recirculation Ballot 1 (P344/D25)	Recirculation Ballot 2 (P344/D26)	Recirculation Ballot 3 (P344/D26)
	No. of Votes	**No. of Votes**	**No. of Votes**	**No. of Votes**
Eligible Balloters	45	44	44	44
Votes Received	39 (86%)	39 (88%)	39 (88%)	39 (88%)
Affirmative	34 (89%)	34 (89%)	34 (89%)	30 (78%)
Negative	4	4	4	8
Abstention	1	1	1	1
New Negatives	N/A	0	2	4
Comments Received				
New Technical	29	7	4	5
New Editorial	100	4	0	0

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Recirculation Ballot 3 Technical Issues

Issue #1: 9.3.3.2 (P344/D26)

9.3.3 Equipment similarity

9.3.3.2 Physical systems (P344/D26)

"Equipment similarity must be established by direct comparison ***and*** by dynamic similarity. Similarity by direct comparison may be demonstrated through comparison of make, model, vintage, and detail design features with due consideration of equipment construction and any design differences. Similarity of dynamic response characteristics can be established by comparing the physical parameters of the equipment. This can be done by comparing the predominant resonant frequencies and mode shapes….."

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Issue #1 Balloter Comments to (P344/D26)

- In subclause 9.3.3.2, the change in D26 to "**and**" verses the "**and/or**" in D25 is an unjustified conservatism.
- The change of "and/or" to "and" essentially removes an option we are currently using to qualify identical equipment through SQUG methods. This would cause difficulty in future applications.
- The "and/or" in the original clause makes the comparison requirement not restrictive enough. The "and" in the current clause makes the comparison requirement too restrictive requiring detailed dynamic comparisons.
- Both direct comparison of equipment physical features and dynamic properties are necessary for demonstrating equipment similarity. The equipment physical features will establish the physical characteristics and design features that will distinguish it from other equipment. These distinctive physical features act as constraints and are the foundation for establishing equipment similarity. For seismic response considerations, you need also to establish dynamic similarity using the dynamic properties of equipment. The dynamic properties/constraints will establish the dynamic behavior characteristics for demonstrating the candidate equipment is dynamically similar to the reference equipment.

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Issue #1 Balloter Comments to P344/D26 (Continued)

- By changing the “and/or” to “and” in the first sentence of this paragraph, the computation of natural frequencies and mode shapes will be required for any qualification using similarity (primarily analysis and test-based but perhaps even experience-based). This is completely unnecessary and a dramatic change in the way qualification by similarity has been successfully practiced for many years.
- Changing the text to read "and" rather than "and/or" places unnecessary requirements on the operator. There have been many cases over the years where the demonstration of similarity by direct comparison is sufficient, and additional dynamic analyses were unnecessary. The text of D26 adds unjustified conservatism to the process.
- Requiring both direct comparison and dynamic similarity means that it is always necessary to compare the mode shapes and frequencies when extrapolating seismic qualification for similar equipment. This requirement is unnecessary and, in some cases, may not be practical to meet. It is unnecessary since the remainder of the first paragraph of this clause requires that similarity by direct comparison include comparison of the relevant features and any differences of the two items of equipment.

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Issue #1 BRC Resolution to P344/D26

- The wording in subclause 9.3.3.2 will be reinstated to the wording of subclause 9.3.2 of IEEE Std 344-1987 with minor consolidation and editorial changes for consistency. This resolution is incorporated into P344/D27 and submitted to negative balloters.

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Issue #2: 10.3.3 (P344/D26)

10.3 Test experience data

10.3.3 Characterization of reference equipment class

" A reference equipment class is a group of similar equipment that shares a narrow range of physical, functional, and dynamic characteristics and whose performance in tests has been demonstrated. The similarity of the reference equipment that defines an equipment class should be based upon an extension of the principle of similarity of 9.3.3.2 and 9.3.3.3. The reference equipment class may include more than one manufacturer or product series when all of the items are constructed in the same general manner, contain the same basic subcomponents and respond dynamically in the same manner. ***For example, significant natural frequencies of the reference equipment would lie within approximately 1/3 octave***. The attributes of the equipment class, the number of independent items in the equipment class, and functionality of the equipment during the test are defined in 10.3.3.1 through 10.3.3.3."

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Issue #2 Balloter Comments to P344/D26

- The subject sentence narrowly restricts the range of one of the dynamic characteristics to 1/3 octave. Such a restriction is unnecessary and inappropriate since subclause 10.3.3.1.a) already requires that the relevant physical characteristics, design details, dynamic characteristics, and functions of the reference equipment class must be defined. Artificially restricting the range of significant natural frequencies to 1/3 octave presupposes natural frequencies are one of the critical seismic characteristics for all equipment classes for all ranges of frequencies.
- Candidate equipment is not usually known when the reference equipment is being assembled so the requirement is impossible to meet. The real strength of the experience-based method is the diversity of the reference equipment.
- Subject sentence in not realistic in that experience with testing of the same item of equipment on a shake table (e.g., electrical cabinets constructed with bolted assemblies) often shows significant variations in the frequency response due to “loosening up” of the connections from repeated tests (5 OBE + 1 SSE).

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Issue #2 BRC Resolution to P344/D26

- Maintain wording as-is. "***For example, significant natural frequencies of the reference equipment would lie within approximately 1/3 octave***."
- This criterion provides a quantitative requirement to demonstrate the fundamental natural frequencies of the test reference equipment are within an acceptable range of the of the candidate equipment. This is necessary since the test experience spectra which defining the SSE capacity of a test reference equipment class uses the frequency-by-frequency mean value of successful test response spectra.

IEEE P344 Project
Action Plan

- Request response from negative balloters to Recirculation Ballot 3 for consideration of IEEE P344/D27. (October 3, 2004)
- Submittal of P344 Draft for 10-Day Recirculation Ballot 4. (October 2004)
- Consider requesting time extension to P344. (Before October 19, 2004)
- Submittal of P344 Draft to IEEE SA for approval. (November 2004)