

## Scope for Subgroup 4: As-built Installation Evaluation and Commissioning Test

Validation standard is recommended practices: not “shall” but “should”.

A clause in P2800.2 will be dedicated to “As-built installation evaluation and commissioning testing. The subgroup will use Table 20 of IEEE 2800 std as a reference and write a procedure for each commissioning testing process and as-built model evaluation. Each relevant section/topic of the IEEE 2800 std requirement that has R (required) or D (depends) entry in the respective cells of the table will be addressed accordingly. Where it’s stated “depends” this clause should specify on what does it “depend”; this may or may not need defined testing procedures.

The sub-group will focus on the following processes:

- As-built installation evaluation
- Commissioning tests (coordination with NERC MOD validation?).

For as-built installation evaluation and commission test processes the group will define:

- Commissioning tests to be conducted on site
  - Includes type of test, Synthetic signals required (if any)-specifications, measurement sensor needs, measurement data accuracy, validity of the test, post processing
- Question: Should “As built installation evaluation” verification be limited to only the controls that have changed from the proposed design? For example, if nothing has changed let’s say in ride through settings-do we need to do an as-built installation evaluation? How do we verify? My understanding is that such WTG/HVDC internal settings are not accessible and sometimes driven by hardware limitations. So is it fair to say we verify only on the plant level settable/tunable settings for as-built installation evaluation? Section 7 of the IEEE 2800 std and Section 6.2 FFR will be very difficult to verify

**Excerpt from IEEE 2800:**

12    **12.2.4 As-Built Installation Evaluation**

13    *The IBR plant as-built installation evaluation (on-site) is an evaluation at the time of commissioning to verify*  
14    *that IBR units, the collector system, supplemental IBR device(s), and protective functions forming an IBR*  
15    *plant as delivered and installed meets or exceeds the design as defined in the IBR plant design evaluation.*

**Excerpt from IEEE 2800 Table 20. R = required, D = depends, NR = not required:**

Requirement	RPA at which requirement applies	IBR unit-level tests (at the POC)	IBR plant-level		
			Design evaluation (including modeling for most requirements)	As-built installation evaluation	Commissioning tests
		Type tests <sup>152</sup>			
			Responsible Ent		
		IBR unit or supplemental IBR device manufacturer	IBR developer / TS owner / TS operator	IBR developer / TS owner / TS operator	IBR developer / TS owner / TS operator
4.2 Reference points of applicability (RPA)	POM (Default)	NR	R	NR	NR
4.4 Measurement performance and accuracy	POC & POM	R	R	R	R
4.5 Operational measurement and communication capability	POM	NR	R	R	R
4.6 Control capability requirements	POM	NR	R	R	R
4.6.1 Execution of mode or parameter changes	POM	NR	R	R	R
4.6.2 Ramping for control parameter change	POM	NR	R	R	R
4.7 Prioritization of IBR Responses	POM	R	R	R	D
4.8 Isolation device	POM	NR	R	R	R
4.9 Inadvertent energization of the TS	POM & POC	D	R	R	NR
4.10 Enter service	POM	D	R	R	R
4.11 Interconnection integrity	POM	R	R	R	NR

Requirement	RPA at which requirement applies	IBR unit-level tests (at the POC)		IBR plant-level	
		Type tests <sup>152</sup>	Design evaluation (including modeling for most requirements)	As-built installation evaluation	Commissioning tests
		IBR unit or supplemental IBR device manufacturer	IBR developer / TS owner / TS operator	IBR developer / TS owner / TS operator	IBR developer / TS owner / TS operator
4.12 Integration with TS grounding	POM	NR	R	R	NR
<b>Clause 5 Reactive Power—Voltage Control Requirements within the Continuous (</b>					
5.1 Reactive power capability	POM	R	R	R	R
5.2 Voltage and reactive power control modes	POM	D	R	R	R
<b>Clause 6 Active-Power – Frequency Response Requirements</b>					
6.1 Primary Frequency Response (PFR)	POC & POM	NR <sup>153</sup>	R	R	R
6.2 Fast Frequency Response (FFR)	POC & POM	R <sup>154</sup>	R	R	R
<b>Clause 7 Response to TS abnormal conditions</b>					
7.2.2 Voltage disturbance ride-through requirements	POC <sup>155</sup> & POM <sup>156</sup>	R	R	R	NR

Requirement	RPA at which requirement applies	IBR unit-level tests (at the POC)		IBR plant-level v	
		Type tests <sup>152</sup>	Design evaluation (including modeling for most requirements)	As-built installation evaluation	Commissioning tests
		<b>Responsible Enti</b>			
		IBR unit or supplemental IBR device manufacturer	IBR developer / TS owner / TS operator	IBR developer / TS owner / TS operator	IBR developer / TS owner / TS operator
7.2.3 Transient overvoltage ride-through requirements	POM	R	R	R	NR
7.3.2 Frequency disturbance ride-through requirements	POM	R	R	R	NR
7.4 Return to service after IBR plant trip	POM	refer to line entries for 4.10 (			
<b>Clause 8 Power quality</b>					
8.2.2 Rapid voltage changes (RVC)	POM	NR	R	R	R
8.2.3 Flicker	POM	NR	NR	NR	R
8.3.1 Harmonic current distortion	POM	R <sup>157</sup>	R	R	R
8.3.2 Harmonic voltage distortion	POM	D	D	D	D
8.4.1 Limitation of cumulative instantaneous over-voltage	POM	R	R	R	NR

Requirement	Requirement applies	(at the POC)		IBR plant-level		
		Type tests <sup>152</sup>	Design evaluation (including modeling for most requirements)	As-built installation evaluation	Commissioning tests	CO
Responsible Entity						
		IBR unit or supplemental IBR device manufacturer	IBR developer / TS owner / TS operator	IBR developer / TS owner / TS operator	IBR developer / TS owner / TS operator	IB / I / 1
8.4.2 Limitation of over-voltage over one fundamental frequency period	POM	D	R	R	NR	
Clause 9 Protection						
9.1 Frequency Protection	POC and POM	D	R	R	R	
9.2 Rate of Change of Frequency (ROCOF) Protection	POC and POM	D	R	R	D	
9.3 Voltage Protection	POC and POM	D	R	R	R	
9.4 AC Overcurrent Protection	POC and POM	D	R	R	R	
9.5 Unintentional Islanding Protection	POC and POM	D	D	R	R	
9.6 Interconnection System Protection	POM	NR	R	R	R	
Clause 10 Modeling Data						
10 Modeling Data	POC and POM	NR	R	R	NR	
Clause 11 Measurement data for performance monitoring and validation						
Requirement	RPA at which requirement applies	IBR unit-level tests (at the POC)		IBR plant-level		
		Type tests <sup>152</sup>	Design evaluation (including modeling for most requirements)	As-built installation evaluation	Commissioning tests	
Responsible Entity						
		IBR unit or supplemental IBR device manufacturer	IBR developer / TS owner / TS operator	IBR developer / TS owner / TS operator	IBR developer / TS owner / TS operator	
11 Measurement data for performance monitoring and validation	POC and POM	D	R	R	R	