CBTCBOOK.COM
V1.0 · SEPTEMBER 2026
CHUNJUN (FRANCISCO) WANG

CBTC Testing & Commissioning Checklist

Six test phases from factory acceptance to revenue service demonstration, with who performs each, where, how long it really takes, and what has to be signed before the next one starts.

PHASE	PURPOSE	PERFORMED BY	ENVIRONMENT	DURATION
FAT	Verify the vendor baseline meets specification.	Vendor test team, PMC witnessing	Vendor integration lab	6–12 weeks
SIT	Verify CBTC integrates with site infrastructure.	Vendor + owner signal team	On site, non-revenue hours	12–20 weekends
Dynamic testing	Verify safe train movement through scenario progressions.	Owner + vendor	Live track, non-revenue hours	4–8 weeks
Shadow running	CBTC monitors live traffic without controlling it.	Vendor + owner + operator	Revenue-service hours	6–12 months
Parallel operations	CBTC and legacy trains share track during transition.	Operator + owner	Live track, revenue hours	2–8 weeks
Revenue service demo	Final pre-cutover test carrying passengers.	Operator + owner	Full line, limited service	2–4 weeks

Phase sign-off checklist

1 · FACTORY ACCEPTANCE — 6–12 WEEKS

- [ ] Acceptance criteria agreed **in writing before FAT begins** — the single best defense against disputes over marginal results.
- [ ] Generic functional tests: ATP algorithms, speed-restriction enforcement, SPAD prevention, dwell enforcement.
- [ ] Communication protocol tests including radio-link dropout and recovery.
- [ ] Degraded-mode scenarios: loss of zone controller, radio interference.
- [ ] Critical-event data logging demonstrated and retrievable.
- [ ] Functional coverage recorded (60–90 % of the final system is typical).
- [ ] Owner's signal engineer and PMC sign-off captured.

2 · SITE INTEGRATION — 12–20 WEEKENDS

- [ ] Track-access windows confirmed against the real possession calendar, not an idealized one.
- [ ] Static tests: equipment power-up, communication links established, site data loaded.
- [ ] Low-speed dynamic tests with non-revenue trains at 5–10 mph.
- [ ] Legacy interlocking, power supply, TIU and ATS integration verified against the ICD.
- [ ] Real radio propagation measured along the whole alignment — lab simulators retired.
- [ ] Record-and-playback of critical events working end to end.

3 · DYNAMIC TESTING — 4–8 WEEKS

- [ ] Scenario progression executed in order: static, low-speed linear, multi-zone, high-speed, multi-train, emergency, degraded mode.
- [ ] Every scenario has a written procedure and a recorded result: Pass, Fail or Deferred.
- [ ] Deferred items carry an owner, a date and a closure route — not a blank.
- [ ] Simulator coverage documented, with the residual on-track scope justified.

4 · SHADOW RUNNING — 6–12 MONTHS

- [ ] CBTC logs every movement while the legacy system stays in command.
- [ ] Nightly log analysis by owner signal engineering and vendor.
- [ ] Every unexpected ATP activation classified: system bug, environmental factor, or benign variation.
- [ ] Evidence accumulated across weather, loading and real operator behavior — not just fair-weather weeks.
- [ ] Divergences between CBTC's would-be decisions and the legacy system's actual ones investigated, not counted.

5 · PARALLEL OPERATIONS — 2–8 WEEKS

- [ ] Safety case covers **every** train-type combination on shared track.
- [ ] Written rules for which yards allow mixing and which segments require segregation.
- [ ] Handoff protocol defined for a CBTC train forced back onto legacy signals.
- [ ] Capacity expectation set with stakeholders: the least-capable train governs headway.

6 · COMMISSIONING & HANDOVER — 2–4 WEEKS

- [ ] Operators trained: 20–40 classroom hours plus 30–60 hours on the job.
- [ ] Controllers and dispatchers: 30–50 classroom hours plus 20–40 simulator hours.
- [ ] Maintenance technicians: 40–80 hours classroom and hands-on.
- [ ] Management and emergency response: 4–8 hours awareness training.
- [ ] Punch list closed; system documentation handed over.
- [ ] Spares procured and inventoried; vendor support transition agreed.
- [ ] For CIG-funded projects: FTA PMOC **System Integration Review** passed — a genuine go/no-go, and a PMOC can defer cutover on insufficient evidence.

The three failures that recur. Acceptance criteria written after testing starts; track access planned against a calendar the operating railway never agreed to; and a shadow-running period cut short because the schedule slipped upstream. The first two are avoidable on paper. The third is the one that reaches the newspapers.

Phase structure and durations from *Communications-Based Train Control*, Volume 1, Chapter 12.5 (Table 12.6), by Chunjun (Francisco) Wang. Durations reflect US brownfield practice on mid-size lines; greenfield projects compress SIT and parallel operations substantially.

FREE TO USE AND SHARE WITH ATTRIBUTION.