Crosshole sonic logging (CSL) checklist: coupling, analysis

Crosshole sonic logging (CSL) interactive checklist for drilled shafts; commentable workflow covering coupling, pulse analysis, anomaly mapping, and acceptance. Export as PDF/Excel with QR-secured records.

Project:
Date:
Filled by:

Pre-Test Planning and Access Tubes	
1	Confirm CSL is the required method and explicitly exclude PIT from scope; align with the inspection and test plan. Acceptance: scope confirmation signed by contractor and inspector. Evidence: approved ITP, meeting minutes.
2	Review approved drawings for access tube count, spacing, and embedment depth; verify tubes reach near base and extend above cut-off. Acceptance: layout matches design. Evidence: marked drawings, site photos.
3	Verify tube material (steel or PVC), internal diameter, wall thickness, joints, and caps per approved project specifications and authority requirements. Acceptance: materials as specified. Evidence: delivery tickets, material certificates, photos.
4	Confirm tube integrity and continuity by flushing and, where accessible, passing a mandrel or borescope to check for obstructions. Acceptance: no blockage or leakage. Evidence: borescope images, obstruction log.
5	Check tube bottoms are sealed and tops fitted with watertight, ventable caps to prevent grout intrusion and air entrapment. Acceptance: no visible leaks. Evidence: close-up photos, foreman sign-off.
6	Mark tube IDs and angular positions on the head of shaft with a north reference for later anomaly mapping. Acceptance: all tubes uniquely identified. Evidence: paint marks, orientation sketch.
7	Confirm minimum concrete age or compressive strength before CSL per approved project specifications and authority requirements. Acceptance: curing window satisfied. Evidence: cylinder/break reports, strength logs.

Equipment Setup and Calibration	
8	Inspect transmitter, receiver, and cables for damage; verify connectors and strain reliefs. Acceptance: equipment free of defects. Evidence: inspection checklist, photos of serial numbers.
9	Calibrate probes in a clean water bath to establish zero-offset and reference first arrival time (FAT) and amplitude. Acceptance: stable readings within specification limits. Evidence: calibration record, screenshots.
10	Set sampling rate, pulse width, gain, and filters per manufacturer guidance and project requirements. Acceptance: parameters meet specification. Evidence: instrument setup printout or screenshots.
11	Verify depth encoder or graduated cable accuracy against a physical reference. Acceptance: depth error within project tolerance. Evidence: depth check log, photo of reference.

Coupling and Water Management

12	Flush each tube and fill completely with clean, de-aerated water; remove debris and trapped air. Acceptance: water column continuous with no bubbles observed. Evidence: fill log, photos.
13	If permitted, dose an approved wetting agent to improve coupling; record product and concentration. Acceptance: additive use per specification. Evidence: batch record, product data sheet.
14	Measure and record water temperature in each tube and ambient temperature; allow equilibration time if needed. Acceptance: temperatures recorded before testing. Evidence: thermometer readings in log.
15	Perform a static coupling check by holding probes at the same depth; verify stable FAT and amplitude. Acceptance: variation within project thresholds. Evidence: QC screenshots, notes.

CSL Data Acquisition

16	Define tube pair sequence (adjacent and, if specified, diagonal pairs) and logging direction (base-to-top). Acceptance: documented test plan. Evidence: pair matrix, sequence sheet.
17	Set depth increment and pull rate to meet project resolution; confirm encoder counts match increments. Acceptance: parameters per specification. Evidence: parameter log, instrument printout.
18	Log from base to top with transmitter in tube A and receiver in tube B; record FAT, amplitude, and waveform at each increment. Acceptance: continuous coverage. Evidence: raw data files with timestamps.
19	Reverse transmitter/receiver positions and repeat the run for the same pair to cross-validate. Acceptance: differences within project thresholds. Evidence: paired datasets, comparison plot.
20	Monitor real-time signal quality; if low SNR or dropouts occur, pause to re-couple, re-flush, or adjust gain. Acceptance: restored signal quality. Evidence: before/after screenshots, field notes.

Analysis, Anomaly Mapping, and Acceptance

21	Post-process data to compute FAT, relative velocity, amplitude/energy, and waveform QC metrics. Acceptance: 100% depth coverage with valid picks. Evidence: plotted profiles, QC report.
22	Normalize results to a baseline segment and calculate deviations; apply project thresholds for significant changes. Acceptance: values within limits. Evidence: delta FAT and attenuation plots.
23	Identify anomalies where deviations persist across contiguous depths or multiple pairs; classify severity per specification. Acceptance: categorized anomaly register. Evidence: anomaly table with depths.
24	Map anomalies to plan and section using tube geometry and marked angles; issue accept/conditional/reject decision per approved project specifications and authority requirements. Evidence: signed report, data archive, QR-authenticated deliverables.

Comments:

Filled by:

Signature:

Introduction	How to use this checklist
Crosshole sonic logging (CSL) validates drilled shaft or bored pile integrity by transmitting ultrasonic pulses between water-filled access tubes and measuring first arrival time and signal amplitude. This checklist focuses exclusively on CSL and explicitly excludes low-strain pile integrity testing (PIT). It covers tube verification, water coupling, equipment calibration, acquisition parameters, pulse analysis, anomaly mapping, and acceptance decisions. Using related methods such as ultrasonic crosshole testing terminology and sonic pulse velocity interpretation, the workflow minimizes false positives from poor coupling, ensures complete depth coverage, and produces traceable deliverables. You will confirm tube materials and sealing, equalize water temperature, establish scan increments and pull rates, monitor signal-to-noise ratio, normalize data to a baseline, and map anomalies by depth and tube angle. The outcome is a defensible accept/conditional/reject decision per approved project specifications and authority requirements. Use this interactive checklist to tick steps, add comments, attach evidence, and export PDF/Excel; a QR code secures field-to-report traceability.	1. Preparation: Assemble calibrated CSL probes, depth encoder, clean water, approved wetting agent (if allowed), thermometer, borescope/mandrel, PPE, and reporting templates. Confirm access tube layout and curing window per approved project specifications and authority requirements. 2. Start Interactive Mode: Open the checklist on your device, select the shaft ID, and enable tick boxes. For each step, capture photos, screenshots, and readings directly within the corresponding item. 3. Comment and Collaborate: Use the comment field to note anomalies, parameter changes, or coupling fixes. Mention team members to resolve issues in real time and maintain an auditable conversation. 4. Review and Export: Verify all mandatory items are ticked and evidence attached. Generate plots and attach calibration records, then export as PDF/Excel. The system embeds a QR code for authentication. 5. Sign-Off and Archive: Capture digital signatures from contractor, inspector, and owner's representative. Distribute the export to stakeholders and archive the QR-authenticated package in the project records.