Thermal Integrity Profiling (TIP) Checklist for Foundations

Thermal Integrity Profiling (TIP) checklist for deep foundations. Install wires, capture heat signatures, flag anomalies, and acceptance. Interactive checklist, commentable, export as PDF/Excel.

Project:	
Date:	
Filled by:	

Pre-Test Planning

1	Confirm TIP as the sole integrity method for this scope; explicitly exclude CSL in the test plan. Evidence: approved plan referencing TIP only, with pile IDs and schedule.
2	Review drawings and cage lengths; calculate required sensor cable length ($\geq$ cage length + 0.5 m). Evidence: takeoff sheet and material list signed by supervisor.
3	Verify data loggers and thermal cables have current calibration certificates ($\leq$ 12 months). Acceptance: certificates match serial numbers. Evidence: photos/PDFs stored with pile ID.
4	Prepare tools: multimeter, calibrated thermometer (±0.5 °C), cable ties, heat-shrink, protective sleeves, labels, tablet. Evidence: prestart checklist photo.
5	Brief crew on cable handling during cage lifting/placement and tremie operation. Acceptance: roles assigned; hazards identified. Evidence: toolbox talk record with signatures.

TIP Wire Installation

6	Mark four wire positions at 90° around the cage. Acceptance: spacing within ±10°. Evidence: marked cage photos with compass reference.
7	Secure wires to the cage using non-metallic ties every 1.0 m; maintain 10–20 mm stand-off to avoid pinching. Evidence: close-up photos at top, mid, bottom.
8	Protect cable ends and connectors with heat-shrink and sleeves; label each channel (A–D) and pile ID. Evidence: label photos; label list saved.
9	Provide 300 mm slack loop at the top of each wire to accommodate lifting and trimming. Evidence: photo showing loop dimension on ruler.
10	Perform continuity and resistance check end-to-end with a multimeter. Acceptance: within manufacturer resistance ±10%. Evidence: recorded ohms for each channel.

Data Acquisition and Logging

11	Program loggers with synchronized time (UTC), sampling interval 1–2 min, correct pile ID and channel map. Evidence: configuration screenshot stored.
12	Mount logger above cut-off elevation by $\geq$0.5 m in a splash-proof enclosure; secure cables away from vibrator paths. Evidence: installation photos.
13	Record ambient and delivered concrete temperatures using a calibrated thermometer (±0.5 °C). Evidence: readings in pour log with time stamps.
14	Start logging $\leq$10 minutes before concrete placement start; record start/stop times, truck IDs, tremie events. Evidence: pour log and logger time alignment check.
15	Continue logging until peak temperature passes and declines $\geq$20% from peak (typically 24–72 h). Evidence: time–temperature plot demonstrating decay.

Data Analysis and Interpretation

16	Align data to depth; generate temperature vs time and temperature vs depth plots for each channel. Evidence: exported plots (PNG/PDF) per pile.
17	Compute mean temperature by depth across channels; flag segments with any channel deviating >20% from mean over ≥0.5 m. Evidence: variance table.
18	Identify asymmetric gradients suggesting cage offset; criterion: cross-channel difference >3 °C sustained ≥1.0 m. Evidence: annotated plots with notes.
19	Evaluate toe and top responses; investigate low toe peak or delayed rise indicating soft bottom or debris. Acceptance: toe within ±10% of adjacent segment mean. Evidence: toe zoom plot.

Acceptance and Reporting

20	Correlate anomalies with pour events (interruptions, tremie lifts, obstructions). Document any mitigating evidence (video, photos). Evidence: timeline overlay.
21	Issue acceptance when no significant anomalies per criteria and consistent cross-channel behavior. State acceptance per approved project specifications and authority requirements. Evidence: signed acceptance form.
22	Compile report: raw CSV, calibration certificates, plots, photos, logger/pile IDs, and conclusions. Export PDF/Excel with QR link to data archive. Evidence: distributed report receipt list.

Comments:

Filled by:

Signature:

Introduction	How to use this checklist
Thermal Integrity Profiling (TIP) provides a reliable, non-destructive method to assess drilled shafts and bored piles by using the concrete's heat of hydration. This checklist covers thermal profiling from wire installation through heat signature recording, anomaly identification, and acceptance. It focuses solely on TIP and explicitly excludes CSL, ensuring a single clear procedure for deep foundation quality assurance. By placing temperature sensors along the reinforcing cage and logging at tight intervals, TIP reveals necking, inclusions, soft bottoms, and cage misalignment as characteristic temperature deviations. The process improves early detection, reduces costly rework, and documents foundation integrity in SI units suitable for design and authority records. Users will plan the test, install and verify wires, configure calibrated data loggers, capture pour timestamps, analyse traces by depth, and issue an acceptance decision per approved project specifications and authority requirements. Start interactive mode to tick tasks, add comments and photos, and export consolidated reports to PDF or Excel with a secure QR code.	1. Preparation: Load project, pile IDs, and logger serials. Confirm TIP-only scope, tools, calibrated thermometer, cables, ties, sleeves, and enclosures are available. 2. Site setup: Verify access, safe lifting plan for cages, and protected area for logger installation above cut-off elevation with power/battery checks. 3. Activate interactive mode: Tick items as completed, attach photos, and add comments for anomalies, decisions, and calibration evidence. 4. During works: Use the checklist on a tablet to guide installation, logging, and documentation, ensuring time stamps align with pour logs. 5. Export: Generate consolidated PDF/Excel with data plots, logs, and photos; embed QR code linking to the source archive for verification. 6. Sign-off: Capture digital signatures from contractor, tester, and reviewer; distribute and archive per approved project specifications and authority requirements.