PWHT Check

Analysis Report

Demo Refinery Line A | Joint / Weld ID: W-1042

Procedure reference: DEMO-PWHT-001

Recorder / file: Sample project · Line A.csv

Application 1.1.0 | Publisher: HAAVIK APP DEVELOPMENT

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Analysis timestamp: 2026-10-14T10:32:06.716Z | Engine 1.3.0-review

Analysis summary: FLAGS DETECTED

Procedure limits supplied by user

Profile ID: demo | Profile: DEMO-PWHT-001. Illustrative user-entered limits. Replace with your approved procedure.

Soak lower bound: 610 °C

Soak upper bound: 620 °C

Minimum common soak: 90 min

Maximum heating rate: 200 °C/h

Maximum cooling rate: 200 °C/h

Maximum TC spread: 20 °C

Minimum required active TCs: 8 TC

Allowed signal dropout: 60 s

Rate calculation window: 5 min

Display: computed temperature, rate and spread results round to 3 decimals, midpoint ties away from zero. An explicit ABOVE LIMIT / BELOW LIMIT comparison distinguishes unequal near-limit values. Display precision is not sensor accuracy. Decisions use unrounded values; full evidence is in Audit JSON.

Data summary & calculation scope

1021 input rows; 1021 analyzed samples; 8 channels. Synthetic recorder wall clock; UTC representation.

Synthetic/source reference (not SHA-256): Built-in deterministic synthetic data

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Source unit: °C | Procedure Profile unit: °C | Analysis unit: °C. Fahrenheit absolute conversion: (F - 32) * 5/9; differences and rates: * 5/9.

Numerical comparison: exact rational arithmetic with propagated input-rounding bounds; no fixed absolute tolerance. Cooling reversal review tolerance: 0 °C (user setting, not an acceptance limit).

Phase boundaries and change history

Manual override currently active: NO. Manual changes ever made: NO.

analysisStart: 2026-10-07 08:00:00.000 | Source: AUTO | Original detected value: 2026-10-07 08:00:00.000 | Current automatic: 2026-10-07 08:00:00.000

soakStart: 2026-10-07 11:18:30.000 | Source: AUTO | Original detected value: 2026-10-07 11:18:30.000 | Current automatic: 2026-10-07 11:18:30.000

soakEnd: 2026-10-07 13:11:30.000 | Source: AUTO | Original detected value: 2026-10-07 13:11:30.000 | Current automatic: 2026-10-07 13:11:30.000

analysisEnd: 2026-10-07 16:30:00.000 | Source: AUTO | Original detected value: 2026-10-07 16:30:00.000 | Current automatic: 2026-10-07 16:30:00.000

Analysis: 2026-10-07 08:00:00.000 to 2026-10-07 16:30:00.000

Soak search: 2026-10-07 11:18:30.000 to 2026-10-07 13:11:30.000

Quality settings: maximum sampling gap 120s; suspicious exact flat line 30min.

Rates: equal-observation OLS over actual timestamps in a trailing window. The first point at or before its start is included. Missing, out-of-scope readings and long gaps reset the window. A window-average slope can smooth shorter excursions; this is not an instantaneous-rate test.

Heating scope: Observed points only; temperature [unbounded, unbounded] °C; recorder time [phase start, phase end]. No interpolation at scope boundaries.

Cooling scope: Observed points only; temperature [unbounded, unbounded] °C; recorder time [phase start, phase end]. No interpolation at scope boundaries.

Required-channel spread scope: cycle (legacy default); 2026-10-07 08:00:00.000 to 2026-10-07 16:30:00.000.

PASS applies only to the configured calculation performed; it is not code compliance or weld acceptance. Blank limits are NOT CONFIGURED. Insufficient evidence requires REVIEW.

Channel list

TC1 | source TC1 | enabled | required

TC2 | source TC2 | enabled | required

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TC3 | source TC3 | enabled | required

TC4 | source TC4 | enabled | required

TC5 | source TC5 | enabled | required

TC6 | source TC6 | enabled | required

TC7 | source TC7 | enabled | required

TC8 | source TC8 | enabled | required

Temperature record



Chart: full source extent; channel visibility is restored for report capture. Colored regions show selected phases and detected flags. Refer to event timestamps for exact evidence.

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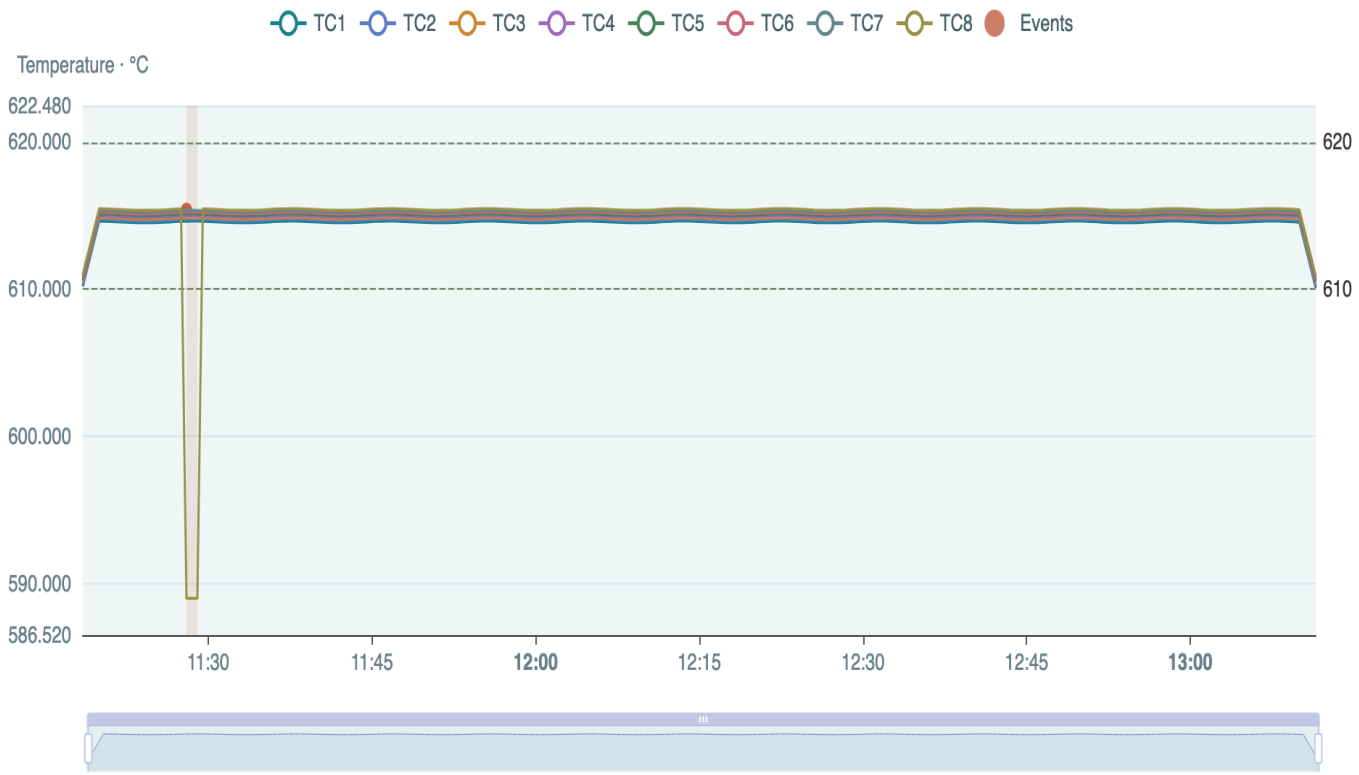
Selected soak interval - detailed temperature record



All enabled channels; actual measurements only. Selected interval: 2026-10-07 11:18:30.000 to 2026-10-07 13:11:30.000. Missing readings remain breaks. Display scale includes measured extrema and entered soak limits.

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Calculated results / PASS - FLAG - REVIEW

Status	Check	Required	Measured
FLAG	Temperature spread	20.000 °C	26.359 °C
FLAG	Required active channels	8	7
REVIEW	Signal dropout	60 s	60 s
PASS	Common soak	90 min	102 min
REVIEW	Heating rate	200.000 °C/h	178.714 °C/h
PASS	Cooling rate	200.000 °C/h	178.714 °C/h
REVIEW	Data quality	Review anomalies	1

Calculation methods & source evidence

FLAG | Temperature spread

Required: 20.000 °C | Measured: 26.359 °C

Computed value (display rounded): 26.359 °C | Entered limit: 20.000 °C

Comparison evidence: exact rational arithmetic with propagated input bounds; relation above. Original decimal tokens, exact rational numerator/denominator and propagated bounds are retained in the companion Audit JSON.

Maximum observed spread across required enabled channels over the selected cycle phase/time scope [1791360000000, 1791390600000]. Missing values make coverage incomplete. Hottest: TC7 = 615.359 °C; coldest: TC8 = 589.000 °C.

Method: 615.3594616573938 - 589 = 26.359 °C (display rounded); compare with 20.000 °C limit.

Interval: 2026-10-07 11:28:30.000 to 2026-10-07 11:28:30.000. Channels: TC1, TC2, TC3, TC4, TC5, TC6, TC7, TC8.

Evidence: 1 source point. First / last shown; complete points and original mapped data are in the companion audit JSON.

Row 419 | 2026-10-07 11:28:30.000 | TC1=614.639; TC2=614.759; TC3=614.879; TC4=614.999; TC5=615.119; TC6=615.239; TC7=615.359; TC8=589.000

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FLAG | Required active channels

Required: 8 | Measured: 7

Computed value (display rounded): 7 | Entered limit: 8

Minimum number of required channels with finite readings.

Method: min over samples(count of finite required TC values)

Interval: 2026-10-07 08:50:00.000 to 2026-10-07 08:50:00.000. Channels: TC1, TC2, TC3, TC4, TC5, TC6, TC7, TC8.

Evidence: 1 source point. First / last shown; complete points and original mapped data are in the companion audit JSON.

Row 102 | 2026-10-07 08:50:00.000 | TC1=172.054; TC2=172.174; TC3=172.294; TC4=172.414; TC5=172.534; TC6=missing; TC7=172.774; TC8=172.894

REVIEW | Signal dropout

Required: 60 s | Measured: 60 s

Computed value (display rounded): 60 s | Entered limit: 60 s

1 missing-data runs. Short gaps remain visible. Longest required-channel span: 60s; longest optional-channel span: 0s. The entered dropout limit applies only to required channels; optional losses require review and do not establish a required-channel violation.

Method: recovery timestamp - last valid timestamp; edges clipped

Interval: 2026-10-07 08:49:30.000 to 2026-10-07 08:50:30.000. Channels: TC6.

Evidence: 3 source points. First / last shown; complete points and original mapped data are in the companion audit JSON.

Row 101 | 2026-10-07 08:49:30.000 | TC1=170.599; TC2=170.719; TC3=170.839; TC4=170.959; TC5=171.079; TC6=171.199; TC7=171.319; TC8=171.439

Row 103 | 2026-10-07 08:50:30.000 | TC1=173.512; TC2=173.632; TC3=173.752; TC4=173.872; TC5=173.992; TC6=174.112; TC7=174.232; TC8=174.352

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PASS | Common soak

Required: 90 min | Measured: 102 min

Computed value (display rounded): 102 min | Entered limit: 90 min

Comparison evidence: exact rational arithmetic with propagated input bounds; relation above. Original decimal tokens, exact rational numerator/denominator and propagated bounds are retained in the companion Audit JSON.

Longest uninterrupted common interval. Total observed common soak: 111 min. Only adjacent in-band samples establish continuity; no interpolation.

Method: max(end - start) / 60000; all required TC values within inclusive band

Interval: 2026-10-07 11:29:30.000 to 2026-10-07 13:11:30.000. Channels: TC1, TC2, TC3, TC4, TC5, TC6, TC7, TC8.

Evidence: 2 source points. First / last shown; complete points and original mapped data are in the companion audit JSON.

Row 421 | 2026-10-07 11:29:30.000 | TC1=614.631; TC2=614.751; TC3=614.871; TC4=614.991; TC5=615.111; TC6=615.231; TC7=615.351; TC8=615.471

Row 625 | 2026-10-07 13:11:30.000 | TC1=610.098; TC2=610.218; TC3=610.338; TC4=610.458; TC5=610.578; TC6=610.698; TC7=610.818; TC8=610.938

REVIEW | Heating rate

Required: 200.000 °C/h | Measured: 178.714 °C/h

Computed value (display rounded): 178.714 °C/h | Entered limit: 200.000 °C/h

Comparison evidence: exact rational arithmetic with propagated input bounds; relation below. Original decimal tokens, exact rational numerator/denominator and propagated bounds are retained in the companion Audit JSON.

Trailing least-squares regression; at least 5 minutes; earliest point brackets the window. No regression bridges missing values or long gaps. Observed points only; temperature [unbounded, unbounded] °C; recorder time [phase start, phase end]. No interpolation at scope boundaries. 3093 windows evaluated. OLS is a window-average slope, not an instantaneous maximum; short excursions can be smoothed. Exact rational OLS comparison; propagated source rounding bounds. No fixed absolute rate allowance. Review reasons: missing readings or recorder gaps.

Method: slope = SUM((t-mean(t))(T-mean(T))) / SUM((t-mean(t))^2), t in hours; cooling = max(0, -slope)

Interval: 2026-10-07 11:06:00.000 to 2026-10-07 11:11:00.000. Channels: TC8.

Evidence: 11 source points. First / last shown; complete points and original mapped data are in the companion audit JSON.

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Row 374 | 2026-10-07 11:06:00.000 | TC1=573.221; TC2=573.341; TC3=573.461; TC4=573.581; TC5=573.701; TC6=573.821; TC7=573.941; TC8=574.061

Row 384 | 2026-10-07 11:11:00.000 | TC1=588.089; TC2=588.209; TC3=588.329; TC4=588.449; TC5=588.569; TC6=588.689; TC7=588.809; TC8=588.929

PASS | Cooling rate

Required: 200.000 °C/h | Measured: 178.714 °C/h

Computed value (display rounded): 178.714 °C/h | Entered limit: 200.000 °C/h

Comparison evidence: exact rational arithmetic with propagated input bounds; relation below. Original decimal tokens, exact rational numerator/denominator and propagated bounds are retained in the companion Audit JSON.

Trailing least-squares regression; at least 5 minutes; earliest point brackets the window. No regression bridges missing values or long gaps. Observed points only; temperature [unbounded, unbounded] °C; recorder time [phase start, phase end]. No interpolation at scope boundaries. 3104 windows evaluated. OLS is a window-average slope, not an instantaneous maximum; short excursions can be smoothed. Exact rational OLS comparison; propagated source rounding bounds. No fixed absolute rate allowance.

Method: slope = SUM((t-mean(t))(T-mean(T))) / SUM((t-mean(t))^2), t in hours; cooling = max(0, -slope)

Interval: 2026-10-07 14:10:00.000 to 2026-10-07 14:15:00.000. Channels: TC8.

Evidence: 11 source points. First / last shown; complete points and original mapped data are in the companion audit JSON.

Row 742 | 2026-10-07 14:10:00.000 | TC1=437.639; TC2=437.759; TC3=437.879; TC4=437.999; TC5=438.119; TC6=438.239; TC7=438.359; TC8=438.479

Row 752 | 2026-10-07 14:15:00.000 | TC1=422.771; TC2=422.891; TC3=423.011; TC4=423.131; TC5=423.251; TC6=423.371; TC7=423.491; TC8=423.611

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REVIEW | Data quality

Required: Review all anomalies | Measured: 1

Computed value (display rounded): 1 | Entered limit: Review all anomalies

Missing values, long sampling gaps and suspicious flat lines need human review. Flat lines are not classified as sensor failure.

Method: Gap > configured quality threshold; exact unchanged run >= configured flat-line interval

Interval: No evidence interval available. Channels: TC1, TC2, TC3, TC4, TC5, TC6, TC7, TC8.

Common soak intervals

Longest: 102 min. Total: 111 min.

2026-10-07 11:18:30.000 - 2026-10-07 11:27:30.000: 9 min

2026-10-07 11:29:30.000 - 2026-10-07 13:11:30.000: 102 min

Flagged events and review items

REVIEW | 2026-10-07 08:49:30.000 - 2026-10-07 08:50:30.000 | TC6: 60s unobserved span (last valid to recovery; clipped at recording edges). | Channels TC6

FLAG | 2026-10-07 08:50:00.000 - 2026-10-07 08:50:00.000 | Required active channel count below limit. | Channels TC1, TC2, TC3, TC4, TC5, TC6, TC7, TC8

FLAG | 2026-10-07 11:28:00.000 - 2026-10-07 11:29:00.000 | Required-channel spread 26.353 °C exceeds 20.000 °C. | Channels TC1, TC2, TC3, TC4, TC5, TC6, TC7, TC8

REVIEW | 2026-10-07 11:28:00.000 - 2026-10-07 11:29:30.000 | Not all required channels are inside the soak band. | Channels TC8

Import warnings

0 warnings retained in audit data.

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Engineer review - manually entered

Reviewed by: _____

Company: _____

Role: _____

Date: _____

Decision (human-entered): Not entered

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