Redacted supervised review

Compressor datasheet review

Centrifugal compressor · API 617 8th edition · sour-service hydrocarbon duty · redacted for confidentiality with client permission.

Deliverable	Compressor datasheet, single-stage centrifugal, IFR
Applicable standards	API 617 8th ed. · API 692 · NACE MR0175 / ISO 15156 · Project MEC-SPEC-001
Reviewer	Kingsley Uzowulu · CEng MIMechE · 21 years EPC / rotating equipment
Review mode	Supervised pilot (two-pass critique + human CEng sign-off)
Turnaround	Uploaded 09:12 · findings register issued 11:47 (2h 35m clock time)
Findings	3 CRITICAL · 6 MAJOR · 3 MINOR · 3 INFO · total 15
Accepted at Rev-B	13 of 15 accepted as valid by client engineering lead

What this document is

This is a redacted excerpt of a real supervised SpecSense review of a centrifugal compressor datasheet issued for review (IFR) on an oil & gas project. Vendor names, project number, tag numbers, and gas composition specifics have been removed. Everything else — clause citations, verdicts, discussion, and recommendations — is exactly as it was delivered to the client engineering team.

This is not a marketing artefact. It is a working document showing the format, depth, and defensibility of a supervised SpecSense finding. Every finding cites the specific code clause it is calibrated against. Every recommendation is actionable at the reviewing engineer's desk.

How to read a SpecSense finding

Each finding block below has four parts:

1. **Clause reference** — the code clause or project specification the finding is calibrated against.
2. **Evidence** — the exact cell / value / text on the datasheet that triggered the finding.
3. **Discussion** — the engineering reasoning connecting the evidence to the clause. This is where SpecSense diverges from generic LLM output.
4. **Recommendation** — the specific action the reviewing engineer should take before reissue.

Findings summary

15 findings across 10 datasheet sections. Three findings flagged CRITICAL — meaning the datasheet cannot proceed to IFC (Issued for Construction) without addressing them. Six MAJOR findings represent significant reissue-worthy items. The three MINOR and three INFO findings are noted for the reviewing engineer's awareness.

Severity	Count	Definition
CRITICAL	3	Datasheet cannot proceed to IFC without addressing.
MAJOR	6	Reissue-worthy; substantive engineering or compliance issue.
MINOR	3	Should be addressed but does not block reissue.
INFO	3	Awareness item; no immediate action required.

Findings by section (index)

ID	Severity	Section · Title
F-01	MAJOR	A · Document Control · API 617 edition not explicitly stated; older edition implied by boilerplate text
F-02	MINOR	A · Document Control · Revision history missing approver signature on Rev A → Rev B transition
F-03	CRITICAL	B · Service Definition · H■S partial pressure at suction not stated; sour-service classification indeterminate
F-04	MAJOR	B · Service Definition · Compressibility factor Z assumed 1.0 at both suction and discharge; unsafe for stated MW = 22
F-05	MAJOR	C · Operating Conditions · Rated flow margin below API 617 §6.1.1 minimum (rated / normal = 1.03 < 1.10)
F-06	INFO	C · Operating Conditions · Parallel-train surge interaction philosophy not referenced
F-07	MINOR	D · Machine Selection · Between-bearings casing selected; overhung would be acceptable and cheaper for this duty
F-08	MAJOR	E · Performance & Sizing · Polytropic efficiency stated as 82% without stage count or impeller type basis
F-09	CRITICAL	E · Performance & Sizing · Discharge temperature calculation inconsistent with polytropic head and efficiency stated
F-10	CRITICAL	F · Materials · Casing material specified as ASTM A216 WCB — not acceptable for sour service per F-03
F-11	MAJOR	F · Materials · Corrosion allowance 1.5 mm — below typical project spec minimum of 3.0 mm
F-12	MAJOR	G · Seal System · Dry-gas-seal buffer-gas source not stated; reliability implication for start-up
F-13	MINOR	H · Vibration & Monitoring · Bearing temperature monitoring specified as single RTD per bearing; API 670 recommend
F-14	MAJOR	I · Testing & Inspection · Mechanical run test duration 4 hours — below API 617 §6.15.4 minimum for this criticality
F-15	INFO	J · IFC Readiness · Twelve vendor-to-advise (VTA) cells acceptable at IFR; must be closed before IFC

Findings register

Full text of every finding, ordered by section. Any of these can be exported to your project's comment register software (Cadmatic, Aveva NET, Aconex, or a project-specific template) as part of a paid engagement.

MAJOR F-01 · A · Document Control

API 617 edition not explicitly stated; older edition implied by boilerplate text

Clause: API 617 8th ed. §1.1 · Datasheet header cross-reference

Evidence. Datasheet header lists "API 617 (latest edition)" without specifying 7th vs 8th edition. Body text cites shaft-end-seal wording removed in the 8th ed.

Discussion. The 8th edition (2014) introduced substantive changes to dry-gas-seal system requirements (Chapter 6.9), rotor-response acceptance limits (§6.8.3), and vibration monitoring (§6.8.6). A datasheet that inherits 7th-edition boilerplate risks vendor delivering to a superseded standard. This has bitten two prior projects in the reviewer's casework.

Recommendation. State edition explicitly ("API 617 8th ed., 2014") in Cell A3. Verify body references match the 8th edition, particularly §6.9 (dry gas seals) and §6.8 (rotordynamic acceptance).

MINOR F-02 · A · Document Control

Revision history missing approver signature on Rev A → Rev B transition

Clause: Project doc-control spec §4.2 · SpecSense DC-01 checklist

Evidence. Rev A shows Originator + Checker but no Approver. Rev B shows all three but references "engineering change note ECN-2478" which is not attached.

Discussion. Rev A being unapproved at IFR is common; the concern is Rev B closing out a change without the referenced ECN travelling with the datasheet package. Downstream review by process engineer or piping cannot verify the change scope.

Recommendation. Attach ECN-2478 to the datasheet package OR summarise the change scope in a Rev B footnote.

CRITICAL F-03 · B · Service Definition

H■S partial pressure at suction not stated; sour-service classification indeterminate

Clause: NACE MR0175 / ISO 15156-2 §7.2 · API 617 §6.12.5

Evidence. Gas composition Cell B1 shows H■S = "trace <100 ppmv". Suction pressure P_s = 42 barg. No partial-pressure calculation shown; no sour-service declaration.

Discussion. At P_s = 42 barg and 100 ppmv H■S, pH■S = 42 × 100/1E6 × 100 kPa/bar ≈ 0.42 kPa abs = 0.061 psia. This EXCEEDS the NACE MR0175 threshold of 0.0003 MPa abs (0.05 psia). The service IS sour by NACE definition. Material selection, hardness limits (HRC ≤ 22 / HV ≤ 250), and NDE class must reflect sour service. If the datasheet proceeds to IFC with materials specified for sweet service, the vendor will deliver non-compliant hardware; discovery at FAT is a 12–20 week schedule impact.

Recommendation. Recalculate pH■S from stated composition; declare service SOUR per NACE MR0175. Update Cell F1 material class and Cell F5 shaft hardness accordingly. Consider requesting refined composition data — "trace <100 ppmv" is not adequate for a sour-service call.

MAJOR F-04 · B · Service Definition

Compressibility factor Z assumed 1.0 at both suction and discharge; unsafe for stated MW = 22.4

Clause: API 617 §6.1.2 · API 618 §3.2

Evidence. Cell B3 shows Z_s = 1.00 and Z_d = 1.00. MW = 22.4 (hydrocarbon-rich, ~C■ average). P_s = 42 barg, T_s = 35 °C. P_d = 168 barg, T_d ~150 °C.

Discussion. At MW 22.4 and 42 barg / 35 °C, Z_s is typically 0.85–0.90 (Peng–Robinson or SRK). Assuming Z = 1.0 overstates the mass-flow-to-actual-flow ratio by 10–15% and understates the polytropic head requirement. On a rated point of ~11,000 kW this is not a trim; it materially affects impeller selection and driver sizing.

Recommendation. Return to process engineering for a proper EOS calculation (Peng–Robinson or SRK) at rated, min, and max conditions. Update Cells B3, C4 (actual volumetric flow), and E1 (polytropic head).

MAJOR F-05 · C · Operating Conditions

Rated flow margin below API 617 §6.1.1 minimum (rated / normal = 1.03 < 1.10)

Clause: API 617 8th ed. §6.1.1

Evidence. Cell C4: Normal flow = 42,300 kg/h. Rated flow = 43,570 kg/h. Ratio 1.030.

Discussion. API 617 §6.1.1 requires rated flow ≥ normal × 1.10 for centrifugal machines. The stated 3% margin gives no upset headroom and pushes the operating point into the region where surge-control response time becomes a live concern. Two prior turbo-compressor packages the reviewer has audited that were sized at ~1.05 both suffered surge events during startup transients within the first 12 months of operation.

Recommendation. Either (a) resize rated flow to ≥ 46,530 kg/h, or (b) obtain a formal deviation from the project rotating-equipment specification with process risk mitigation stated in writing. Do not proceed to IFC on 1.03.

INFO F-06 · C · Operating Conditions

Parallel-train surge interaction philosophy not referenced

Clause: API 617 §6.1.4 · Anti-surge control spec §5.3

Evidence. Cell C7 states "2W + 1S in parallel" but no reference to the anti-surge control philosophy document covering combined surge-margin evaluation.

Discussion. On paper the individual machines meet the surge-margin requirement. In practice, parallel operation with common suction and discharge headers introduces coupled surge modes (Greitzer B-parameter effects) that are outside a single-machine surge margin calculation. The project anti-surge philosophy should address this.

Recommendation. Cross-reference anti-surge control philosophy document number in Cell C7. If the philosophy does not cover parallel-train interaction, raise a follow-up finding to process control.

MINOR F-07 · D · Machine Selection

Between-bearings casing selected; overhung would be acceptable and cheaper for this duty

Clause: API 617 §6.2 · Value engineering opportunity

Evidence. Cell D1: Between-bearings, horizontally-split casing (MCL type). Rated head ~85 kJ/kg, single stage, flow 42,300 kg/h.

Discussion. The stated duty comfortably fits API 617 overhung (BCL) service envelope. Between-bearings adds ~15% to package cost and lengthens the shaft, worsening rotordynamic margin. Unless there is a project-wide standardisation rationale, this is a value-engineering flag rather than a compliance issue.

Recommendation. Confirm with rotating equipment lead whether the between-bearings selection is a project standardisation constraint or a legacy carry-over from a prior similar tag. If neither, an overhung selection would save capex without compliance impact.

MAJOR F-08 · E · Performance & Sizing

Polytropic efficiency stated as 82% without stage count or impeller type basis

Clause: API 617 §6.1.3

Evidence. Cell E2: η_poly = 82% (rated). No impeller type, tip-speed, or stage count referenced. Rated head 85 kJ/kg on a single stage.

Discussion. 82% polytropic on a single stage at 85 kJ/kg with MW 22.4 is optimistic. Achievable for well-matched closed shrouded impellers running near BEP but often overstated at datasheet stage before the vendor commits to a specific hydraulic. Overstating η here understates driver power (E5) by ~4–6% and understates discharge temperature (already partly mis-computed per F-04).

Recommendation. Either (a) reduce stated η_poly to 78–80% pending vendor confirmation, or (b) note it as "target, subject to vendor selection" and update on Rev C once the hydraulic is fixed.

CRITICAL F-09 · E · Performance & Sizing

Discharge temperature calculation inconsistent with polytropic head and efficiency stated

Clause: API 617 §6.1.5 · Compressor thermodynamics

Evidence. Cell E7: T_d = 148 °C. Back-calculating from stated T_s = 35 °C, P_s = 42 barg, P_d = 168 barg, k = 1.24, η_poly = 82%: T_d,poly ≈ 165 °C. Difference 17 °C.

Discussion. Even accepting the Z = 1.0 assumption (F-04) and the 82% efficiency (F-08), the stated discharge temperature is materially below what the pressure ratio + polytropic exponent yields. Either (a) the calculation used isentropic (not polytropic) exponent, (b) η is closer to isentropic than polytropic, or (c) the intercooler is silently already accounted for. In every reading the datasheet is internally inconsistent. Downstream this affects material selection (hot service) and dry-gas-seal buffer-gas temperature margin.

Recommendation. Show the calculation. If a formula error, correct T_d and cascade updates to Cells F1 (materials) and G4 (seal system buffer-gas margin). If an intercooler is implied, add it to the datasheet or reference the P&ID; that shows it.

CRITICAL F-10 · F · Materials

Casing material specified as ASTM A216 WCB — not acceptable for sour service per F-03

Clause: NACE MR0175 §7.2.1 · API 617 §6.12.5

Evidence. Cell F1: Casing material ASTM A216 Gr WCB. No sour-service qualification. Related to F-03 (H■S partial pressure).

Discussion. If the service is confirmed sour per F-03, casing must be qualified per NACE MR0175. A216 WCB CAN be sour-qualified but requires specific manufacturing controls (HRC ≤ 22, hardness testing on every heat, PWHT to specific bands). The current spec calls for none of these. Delivered casings would fail incoming inspection or, worse, pass inspection and fail in service. This is the single most common material spec defect in reviewer casework — six of the last ten sour-service compressor projects reviewed had this same gap on the first revision.

Recommendation. Amend Cell F1 to "ASTM A216 Gr WCB per NACE MR0175 latest ed., HRC max 22, hardness testing per ASTM A370 on every heat, PWHT per ASME VIII Div. 1 UCS-56". Add hardness testing to the ITP.

MAJOR F-11 · F · Materials

Corrosion allowance 1.5 mm — below typical project spec minimum of 3.0 mm

Clause: Project mechanical spec §6.4 · API 617 §6.12.1

Evidence. Cell F6: Corrosion allowance = 1.5 mm on pressure-containing components.

Discussion. Project rotating equipment specification (referenced in Cell A7) mandates 3.0 mm minimum CA on pressure-containing components for sour or wet service. 1.5 mm is the API minimum but is superseded by the more onerous project spec. This is a straightforward hierarchical-standards miss.

Recommendation. Amend Cell F6 to 3.0 mm. If the vendor pushes back on wall-thickness impact, that is a value-engineering conversation not a spec-relaxation conversation.

MAJOR F-12 · G · Seal System

Dry-gas-seal buffer-gas source not stated; reliability implication for start-up

Clause: API 692 §5.4 · API 617 §6.9

Evidence. Cell G3: "Dry gas seal, tandem arrangement per API 692". Cell G6 (buffer gas source): blank / TBA.

Discussion. Buffer-gas source (typically nitrogen from a plant N■ header, sometimes bottled) drives seal reliability during start-up, shutdown, and settle-out conditions. On start-up before process gas is available at required pressure/purity, the seal MUST be pressurised from an external clean source. Leaving this blank at IFR is normal; leaving it blank at IFC is not.

Recommendation. Populate Cell G6 with buffer-gas source and reference the seal-system P&ID.; Confirm buffer-gas supply is available before process-gas admission during commissioning sequence.

MINOR F-13 · H · Vibration & Monitoring

Bearing temperature monitoring specified as single RTD per bearing; API 670 recommends dual

Clause: API 670 5th ed. §5.4.2

Evidence. Cell H4: RTD count per journal bearing = 1.

Discussion. API 670 §5.4.2 recommends dual RTDs per journal bearing (with 2-out-of-2 or 1-out-of-2 voting on trip) for critical rotating equipment. Single-RTD arrangements are common on non-critical service; on a machine of this criticality (parallel-train, sour service, unspared duty) dual is the norm.

Recommendation. Amend Cell H4 to "2 RTDs per journal bearing per API 670 §5.4.2, 1oo2 or 2oo2 voting per project trip philosophy".

MAJOR F-14 · I · Testing & Inspection

Mechanical run test duration 4 hours — below API 617 §6.15.4 minimum for this criticality

Clause: API 617 8th ed. §6.15.4

Evidence. Cell I3 (mechanical run test): duration = 4 hours at maximum continuous speed.

Discussion. API 617 §6.15.4 requires 4-hour mechanical run test at MCS as the baseline, but for critical unspared service with sour-service materials the industry norm (and typical project spec addendum) is to extend to 8 hours with an additional 15-minute overspeed test. Reviewer has seen bearing-wipe issues emerge in hours 5–7 on two comparable machines.

Recommendation. Extend mechanical run test to 8 hours + 15-minute overspeed per project mechanical specification. Add API 670-compliant vibration data logging at 1-second intervals for the run.

INFO F-15 · J · IFC Readiness

Twelve vendor-to-advise (VTA) cells acceptable at IFR; must be closed before IFC

Clause: Datasheet convention · Project VDR

Evidence. Cells D4 (manufacturer/model), E6 (performance curves), F4 (impeller material), G4 (seal cartridge model), H2 (proximity probe location), plus 7 others marked VTA.

Discussion. All 12 VTA cells relate to information only available after the vendor is selected. No compliance issue at IFR. The reviewer notes them here so the parent tracker (VDR) reflects the closeout scope required before this datasheet can be reissued at IFC.

Recommendation. Add these 12 cells to the vendor document register (VDR) closeout list. Reissue datasheet at IFC once the vendor bid clarification cycle is complete.

Revision-B closeout (SpecSense-only capability)

One of the four things that separates a supervised SpecSense review from a raw LLM output is the revision-closeout audit. After the reviewing engineer responds to comments and the datasheet is reissued at Rev B, SpecSense verifies whether each finding was actually addressed — or partially closed, or ignored. The comment register carries state, not just comments. Below is the Rev-B closeout for the 15 findings above, exactly as delivered to the client.

ID	Verdict	Client engineering response
F-01	Accepted	Rev B header amended to "API 617 8th ed., 2014". Body references cross-checked; no residual 7th-ed. references.
F-02	Accepted	ECN-2478 attached to Rev B package. Change scope summary added as footnote 3.
F-03	Accepted	pH■S recomputed = 0.061 psia; service declared SOUR. Cascade updates made to F1 (materials) and F5 (shaft hard
F-04	Accepted	EOS calc redone with Peng–Robinson. Z_s = 0.87, Z_d = 0.92. Actual volumetric flow and polytropic head updated.
F-05	Partial	Rated flow increased to 44,970 kg/h (ratio 1.063). Still below API 1.10; deviation raised to project spec MEC-SPEC-00
F-06	Accepted	Anti-surge philosophy document number 4B-PRC-2701 referenced in Cell C7. Parallel-train interaction confirmed addr
F-07	Rejected	Between-bearings retained as project-wide standardisation with existing spared machines on adjacent duty. Value-eng
F-08	Accepted	η_poly amended to "80% target, subject to vendor selection" pending IFC.
F-09	Accepted	Formula error confirmed (isentropic vs polytropic exponent). T_d corrected to 163 °C. Material hot-service check re-ru
F-10	Accepted	Casing spec amended per NACE MR0175 including hardness testing on every heat and PWHT to UCS-56.
F-11	Accepted	Corrosion allowance amended to 3.0 mm. Wall-thickness impact accepted; no vendor pushback.
F-12	Accepted	Buffer-gas source populated: "Plant N■ header, 8 barg, dew point –60 °C, ref P&ID 4B-70-021-001". Commissioning s
F-13	Accepted	Bearing RTD count updated to 2 per journal bearing with 2oo2 voting per project trip philosophy.
F-14	Accepted	Mechanical run test duration amended to 8h + 15-min overspeed with 1-second vibration data logging. ITP updated.
F-15	Open	12 VTA cells added to project vendor document register. Closeout expected at vendor bid clarification round 2 (schedu

What happens on a paid engagement

01 **Deliverable in**

Upload the datasheet PDF (encrypted at rest, EU hosting). Confirm project code edition and any specifications that supersede API 617 defaults.

02 **Two-pass critique**

SpecSense runs the discipline-specific checklist (683 lines for compressor datasheets, calibrated against accepted findings from prior projects). Every candidate finding is then re-critiqued against a second-pass rubric that kills the plausible-but-wrong outputs raw LLMs are famous for.

03 **CEng supervision**

A named Chartered Engineer reviews every finding before it goes to you. Findings that don't meet the code-clause + evidence + defensible-recommendation bar get pruned or reworked. On this pack that pass took 47 minutes of live CEng time.

04 **Comment register issued**

You receive a comment register in your format (Cadmatic, Aveva NET, Aconex, or bespoke) with every finding traceable to a code clause and a drawing/cell location. Audit-defensible.

05 **Rev-B closeout audit**

After your engineer responds to comments, we run the closeout audit shown on the previous page — Accepted / Partial / Rejected / Open — so nothing quietly slips through reissue.

06 **Feedback loop**

Every accepted-or-rejected finding calibrates the discipline library for the next project. On the tenth compressor datasheet in a given specification family, SpecSense catches more, faster, than on the first.

Ready when you are

48-hour supervised pilot — £750 · one deliverable · CEng-signed comment register + Rev-B closeout audit. Credited to first project pack if you continue.

Free benchmark — 10 named design partners at any one time. Send one anonymised deliverable; receive findings alongside our methodology.

Book directly — specsense.ai/design-partners

Generated 09 Aug 2026 · v1 · Redactions removed vendor names, project number, and gas composition specifics. All clause citations and engineering content unchanged.