

1 alignment/sopeec-to-sam.md

1.1 SOPEEC → SAM semantic mapping (topic level)

1.1.1 1.0 Legislation

- **Act and Regulation applicable sections**

- SAM 2.18 Boiler Law and Regulations; 1.2 Licensing Requirements.
- *Semantic match.*

- **CSA B51, ASME Section I/VII, NBIC**

- SAM 2.18 (ASME, NBIC, CSA).
- *Direct match.*

- **CRN, Registration, Certificate of Inspection Permit**

- SAM 2.18 and 2.16 imply jurisdictional compliance but do not explicitly name CRN or "Certificate of Inspection Permit".
- *Partial match; CRN and permit constructs are SOPEEC-only.*

- **Operator Certification, Log Book**

- SAM 1.2 Licensing Requirements; 2.17 Log Books.
 - *Strong semantic match.*
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1.1.2 1.2 Safety

- Low/high water, broken governor belt, braking, broken gauge glass, piping failure, safety valve stuck, leaking hand hole gasket, tightening under pressure, fusible plug activation, driving on grades, putting out fire.
 - SAM 1.3, 1.4, 2.3.2, 2.4.2, 2.8–2.14, 2.13.
 - *Strong semantic match; SAM provides detailed procedures.*
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1.1.3 1.3 Calculations

- **Unit conversions**

- SAM 2.2 and 2.7.2 implicitly require understanding of pressure, BTU, horsepower, but do not explicitly teach Imperial↔Metric conversions.
- *Partial match; conversions are SOPEEC-only.*

- **Engine horsepower**

- SAM 2.7.2 Determining Power Output.
- *Direct match.*

- **Heating surface**

- No explicit SAM topic on heating surface calculation.
 - *SOPEEC-only.*
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1.1.4 1.4 Thermodynamics

- Temperature, BTU/kW, specific/sensible/latent heat, vaporization, expansion, pressure, heat transfer modes, steam states, condensate.
 - SAM 2.2 Properties of Water and Steam; 2.6 Water Treatment (foaming, priming).
 - *Strong semantic match.*
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1.1.5 1.5 Boilers

- Types (firedtube, watertube, locomotive, vertical).
 - SAM 2.3.1 Types of Boilers.
 - Boiler parts and terminology.
 - SAM 2.3.3 Boiler Construction; 2.4.2 Boiler features.
 - Auxiliary components and safety devices.
 - SAM 2.3.2, 2.4.1, 2.4.2.
 - Riveted joints, welding, stays, tube installation, piping, fittings, valves, gaskets, thermal stress.
 - SAM 2.3.3, 2.5.1–2.5.3.
 - *Overall: strong semantic match; SAM is more detailed. "Thermal stress" is implicit in SAM's cautions but not named.*
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1.1.6 1.6 Inspection

- Manufacturer's Data Report, specification sheet, CRN, certificate of inspection permit.
 - SAM 2.15 and 2.18 imply documentation but do not explicitly name all constructs; CRN and permit are SOPEEC-only.
 - Cleaning and preparation, visual internal/external.
 - SAM 1.3(18–19), 2.8.2, 2.10, 2.15.
 - NDE methods (UT, MPI, LPI, RT) and using results to determine MAWP.
 - SAM 2.15 covers MAWP determination but not specific NDE methods by name.
 - Riveted/welded seams, stay and weld inspection.
 - SAM 2.3.3, 2.15.
 - *Overall: strong conceptual match; explicit NDE method naming and CRN are SOPEEC-only.*
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1.1.7 1.7 Operation

- Pressure relief valve purpose, markings, capacity, certification.
 - SAM 2.3.2 Safety Valves; 2.18 (codes).
 - Boiler startup/shutdown, blowoff, safety procedures, layup/storage.
 - SAM 2.8, 2.14, 2.6, 2.15.
 - Water level verification and causes of fluctuation (foaming, priming, incline, tube rupture).
 - SAM 2.2, 2.6, 2.10, 2.11, 2.13.
 - Throttle and governor operation, water hammer, removing condensate, thermal expansion.
 - SAM 2.7.4, 2.11; water hammer and thermal expansion are implicit but not named.
 - Certificate of Inspection Permit, Operator Certification.
 - SAM 1.2, 2.18.
 - Principles of combustion, starting out, driving, hills/grades, stopping, powering stationary load, water level control, priming/knocking, leaking joints.
 - SAM 2.10, 2.11, 2.12, 2.13.
 - *Strong semantic match; SOPEEC names some phenomena (water hammer, thermal expansion) that SAM treats implicitly.*
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1.1.8 1.8 Testing

- Hydro testing, test pressure, water temperature.
 - SAM 2.15 Inspection.
 - *Direct semantic match.*
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1.1.9 1.9 Water Treatment

- Dissolved gases/solids, suspended matter, pH, scale, sludge, foaming, oil, acidic attack, water testing, oxygen scavenger, selecting program, safe handling, purpose of blowoff.

- SAM 2.6 Boiler Water Treatment; 2.10 (blowdown), 2.14 (blowdown and lay-up).
 - *Strong semantic match.*
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1.1.10 1.10 Steam Engines

- Simple/compound engines.
 - SAM 2.7.1.
 - Engine components.
 - SAM 2.7.3.
 - Valve gears (Stephenson & Walshaert), slide valve.
 - SAM 2.7.4 (Stephenson, Woolf, Marsh, Baker; D-valve, Gould).
 - Lubricants, dead center, reversing gear, governor, throttling governor, governor problems, friction clutch.
 - SAM 2.7.3–2.7.4, 2.9, 2.11.
 - Indicator diagrams.
 - No explicit SAM topic.
 - *Strong semantic match except indicator diagrams (SOPEEC-only).*
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1.1.11 1.11 Emergency Procedures

- Boiler explosions, loss of water, tube rupture, governor malfunction, stopping/starting, water hammer, safety valve not opening or sticking, signaling devices.
 - SAM 2.13 Emergency Procedures; 2.11, 2.14.
 - Water hammer and signaling devices are not explicitly named in SAM, but related practices exist (throttle/cylinder drains, whistle codes).
 - *Strong semantic match; a few named concepts are SOPEEC-only.*
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1.1.12 1.12 Repairs

- Standards for repairs (CSA B51, NBIC), code requirements (ASME), jurisdictional requirements, inspection/certification, quality control program.
 - SAM 2.16 Repairs and Modifications; 2.18 Boiler Law and Regulations.
- *Strong semantic match; SAM's "SAM QA program" is a concrete instance of the quality control program concept.*