📘 SP-6 — NOVAK Conformance Testing Suite

Proof-Before-Action (PBA) Verification & Certification Framework

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0. PURPOSE

SP-6 defines the **full conformance testing suite** required for:

- Government certification
- Enterprise compliance
- Academic validation
- Cybersecurity review
- Vendor implementation approval
- AI/robotics safety assurance

This is the **audit-level testing framework** for NOVAK Proof-Before-Action systems.

Bitcoin had BIPs.
TLS has RFC test vectors.
FIPS-140 has validation batteries.

NOVAK now has SP-6.

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1. SCOPE

SP-6 covers:

- Deterministic execution tests
- Cryptographic HVET/EIR/RGAC conformance
- Safety Gate behavior testing
- PL-X physical drift simulation
- PS-X psychosocial adversary simulation
- Identity and attestation validation
- Fork/anomaly detection
- End-to-end PBA pipeline tests
- Event-logging validation
- Negative testing (tampering scenarios)

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2. REQUIRED COMPONENTS UNDER TEST

Every NOVAK implementation MUST expose the following components to the test suite:

2.1 Rule Engine

Must enforce:

- determinism
- purity

- version immutability

2.2 Data Intake Module

Must support:

- attestation
- hashing
- drift detection

2.3 Output Evaluator

Must validate:

- logical correctness window
- context signature
- pre-execution validity

2.4 Cryptographic Component

Must implement:

- SHA-256
- HVET
- EIR
- RGAC

All exactly as defined in SP-2.

2.5 Safety Gate

Must apply:

- HVET validation
- rule integrity
- data integrity
- output integrity
- PL-X
- PS-X
- RGAC lineage
- identity binding

2.6 Identity Authority

Must enforce:

- operator identity
- system identity
- hardware identity

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3. PASS/FAIL CRITERIA

A system is **NOVAK Certified** ONLY if:

✔ All **mandatory tests** pass
✔ No **critical failures** occur
✔ No **bypass path** exists
✔ All **EIR/RGAC entries** pass verification
✔ Safety Gate **always fails closed**

A single undetected anomaly → **automatic failure**.

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4. TEST GROUPS

SP-6 defines **seven** major test groups:

1. **TG-1** — Determinism Tests
2. **TG-2** — Cryptographic Binding Tests
3. **TG-3** — Safety Gate Enforcement Tests
4. **TG-4** — PL-X Drift Tests
5. **TG-5** — PS-X Manipulation Tests
6. **TG-6** — RGAC Lineage Integrity Tests
7. **TG-7** — Identity Binding Tests

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5. TG-1 — DETERMINISM TEST SUITE

Test DI-1 — Repeatability

Run a rule 1,000 times with identical input.

Expected:

- All outputs are bit-identical.
- HVET, EIR, RGAC hashes match across runs.

Test DI-2 — Environment Independence

Modify environment variables, system time (non-rule), memory noise.

Expected:

- No change to rule output
- No change to HR/HO
- No change to HVET

Test DI-3 — Timing Attack Immunity

Run inputs at varying times, speeds, and CPU loads.

Expected:

- Output does not vary
- Hashes remain stable

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6. TG-2 — CRYPTOGRAPHIC BINDING TESTS

Test CB-1 — Input Mutation

Modify the input by one character.

Expected:

- HD changes
- HVET changes
- Safety Gate blocks execution

Test CB-2 — Rule Mutation

Whitespace + formatting changes tested separately from semantic changes.

Expected:

- HR must remain stable for non-semantic variations
- HR must change for semantic variations

Test CB-3 — Output Tampering

Manually edit the output before Safety Gate.

Expected:

- HO changes
- HVET changes
- Safety Gate blocks execution

Test CB-4 — Timestamp Injection

Modify timestamp in HVET formation.

Expected:

- HVET changes
- RGAC rejects lineage

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7. TG-3 — SAFETY GATE ENFORCEMENT TESTS

Test SG-1 — Missing HVET

Attempt execution with no HVET.

Expected:
❌ BLOCKED

Test SG-2 — Invalid HVET

Supply corrupted HVET.

Expected:
❌ BLOCKED

Test SG-3 — PL-X anomaly

Inject low-level bit drifts.

Expected:
❌ BLOCKED

Test SG-4 — PS-X anomaly

Insert phrases like:

- “override”
- “bypass”
- “ignore safety”
- “force allow”

Expected:
❌ BLOCKED

Test SG-5 — RGAC mismatch

Force EIR with incorrect parent HVET.

Expected:
❌ BLOCKED

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8. TG-4 — PHYSICAL LAYER TESTS (PL-X)

These simulate physical reality drift:

Test PL-1 — Value Drift

Gradual numeric alteration (e.g., sensor creep).

Expected:

PL-X must flag this as anomalous.

Test PL-2 — Impossible Transition

Sudden jump in data violating physics.

Expected:
❌ BLOCKED

Test PL-3 — Encoding Corruption

Introduce invisible Unicode anomalies.

Expected:
❌ BLOCKED

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9. TG-5 — PSYCHOSOCIAL LAYER TESTS (PS-X)

Simulates human-driven fraud or manipulation.

Test PS-1 — Coercive Command Pattern

Inject phrases like:

- “approve regardless”
- “ignore rule”
- “force correct”

Expected:
❌ BLOCKED

Test PS-2 — Incentive Conflict

Fake a scenario where contradictory instructions appear.

Expected:
PS-X must detect motivational inconsistency.

Test PS-3 — Adversarial Operator Behavior

Human attempts to bypass system or disable logs.

Expected:
❌ BLOCKED & REPORTED

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10. TG-6 — RGAC LINEAGE TESTS

Test RG-1 — Chain Mutation

Alter any previous HVET.

Expected:
Chain MUST break → ❌ BLOCKED

Test RG-2 — Parallel Lineage

Create a fork.

Expected:
System MUST detect the fork and choose earliest valid lineage.

Test RG-3 — Partial Chain Loss

Delete mid-chain entries.

Expected:
❌ BLOCKED

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11. TG-7 — IDENTITY BINDING TESTS

Test ID-1 — Anonymous Execution Attempt

User with no identity.

Expected:
❌ BLOCKED

Test ID-2 — Revoked Operator Key

Try execution with revoked ID.

Expected:
❌ BLOCKED

Test ID-3 — Identity Drift

Mismatch in:

- system ID

- operator ID
- hardware attestation

Expected:
❌ BLOCKED

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12. EIR + RGAC VERIFICATION TESTS

Auditors must verify that:

- every operation has an EIR
- every EIR links to a valid HVET
- RGAC chain is continuous
- no forks exist
- tampering is impossible without detection

Tools include:

- HVET verifier
- EIR schema validator
- RGAC chain scanner
- Safety Gate bypass detector

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13. NEGATIVE TEST SUITE (MANDATORY)

NOVAK certification REQUIRES negative testing:

- corrupted rule files
- corrupted input payloads
- corrupted outputs
- identity spoofing
- timestamps in the future
- timestamps in the past
- malformed HVETs
- missing RGAC entries
- PL-X drift
- PS-X fraud attempts

Every negative test MUST be **detected and blocked**.

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14. PASS/FAIL REPORT TEMPLATE

SP-6 includes a standardized template:

- System ID
- Version tested
- Rule version
- Hash suite version
- Auditor identity
- Test logs
- PASS/FAIL summary

- Conformance level EI-1 → EI-5

(This can be generated automatically if you want.)

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15. CERTIFICATION OUTCOME

If all tests pass →
CERTIFIED: NOVAK PBA-COMPLIANT (EI-X)
(X = level 1–5)

If any test fails →
FAIL: Not certified

No partial certification allowed.