TEAM XIGEN

THE XIGEN PROTOCOL SERIES

Competition • Validation • Records

XCS-1.0-RC3 | 2026-09-10 | FOUNDING RELEASE CANDIDATE 3

Governing doctrine	The XIGEN Protocol
Competition program	The XIGEN Protocol Series
Status	Desk-validated Release Candidate 3; physical and external-professional gates remain open.
Control rule	XCS-1.0 controls conflicts unless it expressly delegates a choice. Appendix C may impose stricter safety requirements. Other appendices and Technical Bulletins implement delegated detail but may not contradict the Standard. Event bulletins may select only published options and may not weaken safety, fairness, evidence, or record-comparability requirements.



RULEBOOK MAP

A faster way to find the rule that controls your build, run, or record.

RC3 / PILOT AUTHORITY — Desk-validated for controlled pilot work. Physical validation and independent-professional gates remain open. This document is not XCS-1.0 Final.

CORE STANDARD — ARTICLES 1-32

Governing doctrine, competition formats, architecture divisions, technical inspection, safety authority, measurement, result status, officials, protests, event levels, records, points, data rights, change control, anti-cheating and due process.

APPENDIX A — MEASUREMENT & METER PLACEMENT

XRP sensor position, cabin state, XR-1A scoring, run timing, source/frequency control, reference checks, reruns, uncertainty, evidence and record confirmation.

APPENDIX B — VEHICLE CLASSIFICATION

TRUNK, COUPLED, NO-WALL, WALL, EXTREME and DEVELOPMENT decision rules; modification metadata; resource tags; acoustic and energy boundaries.

APPENDIX C — SAFETY & ELECTRICAL TECHNICAL INSPECTION

Stored energy, conductors, overcurrent protection, emergency isolation, structural retention, fire/thermal planning, hearing protection, lane states and pre-tech.

APPENDIX D — PROOF TELEMETRY & DATA INTEGRITY

PROOF P0-P3 completeness, synchronization, sampling, voltage/current/power claims, thermal channels, file integrity, retention and chain of custody.

APPENDIX E — RECORDS, CERTIFICATION & OFFICIAL FORMS

Vehicle Passport, pre-tech, run sheet, post-tech, protests, incident reporting, evidence manifest, configuration changes, consent, record confirmation and energy-boundary forms.

APPENDIX F — EVENT OPERATIONS, ELIGIBILITY, GOVERNANCE & RISK

Promoter minimums, lane control, exposure management, eligibility, attempts, points, protest/appeal windows, conflicts, software control and record-session flow.

APPENDIX G — CLASSIFICATION ATLAS & EDGE-CASE GUIDE

Judge-facing classification logic, wall presumption, representative architectures, pathological examples and ambiguity-ruling prompts.

QUICK FIND

Competition formats: Article 5
Architecture divisions: Article 6 + Appendices B/G
Vehicle Passport / resources: Article 7 + Appendix E
Technical inspection: Article 9 + Appendix C
Safety authority: Article 10 + Appendix C
Measurement / XR-1A: Article 11 + Appendix A
Certified results / records: Article 15 + Appendix E
Sanctioned event levels: Article 19 + Appendix F
PROOF telemetry: Appendix D

FOUNDING PREAMBLE

The XIGEN Protocol Series exists to create a competitive environment in which acoustic performance is measured, repeated, documented, and verified. It is designed to complement—not imitate or replace—existing car-audio sanctioning bodies by recognizing verified engineering performance as its own competitive dimension.

> **ANYBODY CAN MAKE A CLAIM. AT XIGEN, YOU PROVE IT.**

ARTICLE 1 — GOVERNING DOCTRINE

1.1 Prime Directive

> **Extract the highest practical measurable acoustic performance from the least hardware, weight, volume, copper, cost, heat, and complexity necessary to achieve it.**

1.2 Primary Maxim

> **ENGINEER FIRST. ADD POWER LAST.**

1.3 Proof Standard

- Can we measure it?
- Can we repeat it?
- Can we explain it?

> **MEASURE IT. REPEAT IT. EXPLAIN IT.**

1.4 Competition Promise

> **MAXIMUM RESULT. MINIMUM BURDEN. PROVE EVERYTHING.**

ARTICLE 2 — PURPOSE AND SCOPE

1. Provide fair, technically controlled competition for high-performance mobile-audio systems.
2. Establish repeatable acoustic measurement and evidence procedures.
3. Recognize peak output, endurance, repeatability, efficiency, and engineering proof as separate achievements.
4. Preserve a traceable configuration behind every verified or certified result.
5. Make safety a condition of eligibility rather than an afterthought.
6. Create a credible technical record that can be useful to competitors, officials, engineers, and consenting technical partners.
7. Maintain open compatibility with co-sanctioned events while preserving XIGEN measurement and certification authority.

ARTICLE 3 — AUTHORITY AND DOCUMENT HIERARCHY

Priority	Authority
1	Applicable law, venue rules, emergency authority, and local fire/building requirements.
2	XCS-1.0 Competition Standard, including explicit definitions and prohibitions.
3	Appendix C when it imposes stricter safety controls; safety may override competitive procedure.
4	Format-specific requirements and Appendices A/B/D/E/F/G within authority delegated by XCS-1.0.
5	Published Rules & Standards precedents and Technical Bulletins that clarify, but do not silently rewrite, higher authority.
6	Event bulletins selecting published options such as attempt count, approved cabin state, or record capability.
7	Head Judge event interpretations, subject to fair-notice limits and appeal.

Silence in the rulebook is not permission to defeat the documented purpose of a rule, but genuine ambiguity is not grounds for a surprise retroactive disqualification. Novel or ambiguous configurations must be disclosed before the first scored run whenever reasonably possible. The Head Judge issues a written provisional ruling. A result may be retroactively invalidated for safety, fraud, concealed material facts, or a configuration that could not reasonably have been legal under the published rule; otherwise the interpretation applies prospectively and may be appealed.

ARTICLE 4 — GOVERNING STRUCTURE

Body	Primary authority
Rules & Standards Committee	Rulebook, definitions, precedents, annual revisions, approved measurement standards.
Competition Operations	Event sanctioning, promoters, schedules, registration, points, championship administration.
Technical Commission	Classification, inspection procedures, telemetry requirements, technical investigations.
Officials Program	Training, examinations, certification levels, ethics, renewal and discipline.
Records Authority	Provisional/Verified/Certified records, evidence review, registry, revocation and archival status.

ARTICLE 5 — COMPETITION FORMATS

Format	What it proves
XIGEN // PEAK	Highest valid XR-1A fundamental-selective SPL during the official window. World-record leadership requires two-run Record Confirmation.
XIGEN // ENDURANCE	Sustained fundamental-selective output across 10, 30, 60, or 90 seconds. Primary score is the lowest rolling 1.0-second fundamental RMS SPL (Sustained Floor); full-interval energy average is the first tie-break.
XIGEN // REPEATABILITY	Three controlled runs under a locked configuration and XR-1A 120-second end-to-next-start recovery for record comparison. Primary result is the lowest of the three runs (“Guaranteed Performance”).
XIGEN // EFFICIENCY	Transparent resource-limited challenges. Count tags alone (one amplifier, one battery, one alternator) are descriptive architecture records and are not proof of efficiency. Competitive efficiency claims require a published challenge specification with measurable resource caps.
XIGEN // PROOF	A certification discipline that overlays PEAK, ENDURANCE, or REPEATABILITY with synchronized engineering evidence. The acoustic mode is declared before the run; the run must also satisfy a PROOF completeness level.

PROOF may be offered as a stand-alone event class or as an overlay on another format. A PROOF result that fails telemetry requirements may retain its underlying acoustic result if that result remains independently valid, but it loses PROOF status.

ARTICLE 6 — VEHICLE ARCHITECTURE DIVISIONS

Division	Definition
TRUNK	Primary low-frequency source/enclosure remains in a separated trunk or luggage compartment and couples through OEM-style openings or seat pass-throughs without converting the passenger compartment into the primary enclosure volume.
NO-WALL	Primary system is within the passenger/cargo volume with no full pressure wall separating the front occupant zone.
COUPLED	Primary enclosure or acoustic source is remote from the main cabin—such as pickup bed, external cargo module, midgate or blow-through—and couples directly through a purposeful opening or transformer section.
WALL	A substantial pressure wall or enclosure boundary forms the primary acoustic separation behind the forward occupant/reference-sensor area.
EXTREME	Purpose-built or materially altered architecture that cannot be classified fairly in the preceding divisions.
DEVELOPMENT / EXHIBITION	Experimental or not-yet-classifiable systems. Results may be published but do not automatically receive championship points or division records.

Detailed decision rules are in Appendix B. System resources are recorded as metadata so that meaningful records can be filtered without multiplying trophy classes.

ARTICLE 7 — RESOURCE METADATA AND VEHICLE PASSPORT

- Drivers: manufacturer, model, size, quantity, coil configuration.
- Amplification: manufacturer, model, quantity, declared nominal load.

- Energy storage: chemistry, quantity, nominal voltage, nominal capacity when known.
- Charging: alternator quantity and declared configuration.
- Enclosure: architecture, primary coupling method, wall/no-wall/coupled status.
- Major conductors and protection architecture for Certified Records and PROOF.
- Configuration revision and dated technical photographs.

A Verified or Certified result belongs to a specific Vehicle Passport revision. Material changes create a new revision; prior results remain historical rather than being silently rewritten.

ARTICLE 8 — CONFIGURATION CONTROL

Material changes include driver model/quantity, amplifier model/quantity, nominal impedance architecture, energy-storage quantity/voltage category, charging architecture, enclosure geometry that can materially change output, wall/coupling architecture, or major cabin/structural modification. Appendix E Form E8 records the change. A configuration may return to a prior revision only if the actual configuration is restored and re-inspected.

ARTICLE 9 — TECHNICAL INSPECTION

9.1 Pre-Tech

- Vehicle Passport review.
- Architecture division confirmation.
- System/resource declaration verification.
- Safety inspection under Appendix C.
- Measurement access and sensor-placement feasibility.
- Technical photos and seal/marking where required.

9.2 Run Control

- Approved meter/DAQ active and zero/reference checks complete.
- Cabin state, source, engine/RPM state, and scoring mode declared.
- Vehicle placed in SAFE, then ARMED only on official command.
- No person remains inside the vehicle during scored high-output XIGEN runs unless a separately published low-output format expressly permits it.

9.3 Post-Tech

- Mandatory for any Certified Record.
- May be random for any competitor.
- May verify driver count, amplifier identity, impedance wiring, energy storage, charging, cabin state, and hidden equipment.
- Refusal invalidates the affected result and may trigger disciplinary review.

ARTICLE 10 — SAFETY AUTHORITY

SAFETY IS ARCHITECTURE.

Appendix C is binding. A Head Judge or Safety Official may stop a run immediately for an unsafe condition. No score, record, schedule pressure, or commercial interest overrides a safety stop. Intentional bypass of a required safety device is a major violation.

ARTICLE 11 — MEASUREMENT AUTHORITY

Official scoring uses a Rules & Standards approved acoustic measurement chain. Standard XIGEN record comparison requires the same approved Record Protocol family. XCS-1.0 RC3 defines XR-1A as the founding pilot reference protocol: XRP placement, a declared single-frequency source from 10.0 through 100.0 Hz, raw calibrated pressure capture, and fundamental-selective scoring under Appendix A. Alternate chains or co-sanctioned positions may produce Verified results inside their own protocol families, but they do not displace XR-1A records until the Technical Commission publishes an equivalence decision. Competition instrumentation determines the official score; engineering telemetry explains behavior and may invalidate a score only when it proves a measurement-integrity defect.

Competition instrumentation and engineering telemetry are distinct roles. A competition meter may determine the official score while synchronized telemetry explains system behavior. Telemetry cannot silently alter the official score after the run.

ARTICLE 12 — OFFICIAL CABIN STATES

Code	State
S	Sealed: all normal closures shut; only approved measurement-cable pass-throughs permitted.
O1	One controlled opening: one declared door/window/opening in the published position.
O2	Two controlled openings: two declared openings in the published position.
OPEN	Format-defined open configuration; all openings must be documented before the run.
CUSTOM	Research/PROOF configuration specifically described in the run sheet; not comparable to standard-state records unless separately categorized.

ARTICLE 13 — SIGNAL SOURCE

- Standard XR-1A PEAK and PEAK-based REPEATABILITY Certified results use one official continuous sine frequency from 10.0 through 100.0 Hz inclusive. XR-1A scores only the calibrated acoustic fundamental at the declared frequency, so deliberate harmonic content, clipping products, unrelated broadband noise, and other frequencies do not increase the official low-frequency score. Sweeps may be used only during a declared tuning/search period. ENDURANCE Certified tone results use the same fundamental-selective method. Music/full-range challenges require a separately named protocol family and are not directly comparable to XR-1A tone records.
- ENDURANCE may use a continuous approved tone or approved music depending on the event format; the source must remain unchanged through the scoring interval.
- REPEATABILITY uses the same source, frequency, declared control state, and configuration for all three runs. For XR-1A records, the next run START trigger occurs exactly 120 seconds after the prior END trigger, tolerance ±2 seconds. Recovery manipulation remains prohibited under Appendix A.
- PROOF records the exact source file/identifier and playback chain.
- Digital engineering test files used for Certified Records should be lossless and checksum-identified when practical.

ARTICLE 14 — RUN VALIDITY

- Measurement-chain failure: run void; competitor receives a rerun after the official determines the system is restored. Deliberate electromagnetic, pneumatic, mechanical, or non-audio excitation of the scoring sensor is prohibited; the score must originate acoustically from the declared audio system.
- Competitor equipment failure: score stands only for the completed valid portion required by the format; incomplete ENDURANCE intervals are invalid.
- Unauthorized cabin/configuration change: run invalid.
- Safety stop: run invalid unless the stop resulted solely from an official/venue error not attributable to the vehicle or competitor.
- Instrumentation interference, falsified configuration, or data tampering: run invalid and disciplinary review required.

ARTICLE 15 — RESULT AUTHORITY

Status	Meaning
PROVISIONAL	Valid supervised result from a sanctioned event; complete certification has not been performed.
VERIFIED	Configuration, instrumentation, required inspection, and evidence are sufficient for official XIGEN result status; no unresolved protest.
XIGEN CERTIFIED RESULT	Highest result-authentication status: complete pre-tech, valid measurement, required repeatability where applicable, post-tech, calibration/reference status, evidence manifest, and Records Authority approval. “XIGEN RECORD” is a separate distinction awarded only when a Certified Result leads an officially recognized record category.

A XIGEN Certified Result receives a unique certification ID. If it also leads a recognized category, the Records Authority may designate it an XIGEN Record. For XR-1A PEAK world records, record leadership requires Record Confirmation: two valid runs in the same event, protocol, Vehicle Passport revision, and configuration. Both runs must clear the standing record by more than the XR-1A tie band; the new record value is the lower of the two qualifying scores. An inaugural category requires two valid runs within 0.50 dB; the lower score becomes the inaugural record. A single exceptional run may remain a Certified Result but is not, by itself, an XR-1A world record.

ARTICLE 16 — OFFICIALS

Level	Authority
TECH OFFICIAL	Basic Passport verification, safety screening, equipment/resource check.
SENIOR TECH	Advanced electrical/enclosure classification, post-tech, resource verification.
MEASUREMENT OFFICIAL	Meter/DAQ setup, reference checks, sensor placement, run data integrity.
HEAD JUDGE	Event authority, safety stop, interpretation, initial protest decision.
RECORD CERTIFIER	Final evidence review and Certified Record approval; may not certify a result in which the official has an undisclosed material conflict.

ARTICLE 17 — PROTESTS, APPEALS, AND PRECEDENT

1. Level 1 — Head Judge event ruling.
2. Level 2 — Technical Commission review.
3. Level 3 — Rules & Standards Committee final interpretation.

Technical disagreement is not misconduct.

ARTICLE 18 — PENALTIES AND INTEGRITY

Category	Examples	Possible response
Good-faith procedural error	Incomplete form, nonmaterial declaration error	Correction, warning, rerun where fair.
Competitive violation	Unauthorized configuration/opening, out-of-rule source	Score correction, invalidation, DQ.
Major integrity violation	Intentional hidden equipment, falsified configuration, calibration/data tampering	DQ, record revocation, points forfeiture, suspension review.
Safety misconduct	Bypassing required isolation, ignoring stop command	Immediate stop, DQ, suspension review.

ARTICLE 19 — SANCTIONED EVENT LEVELS

Level	Minimum intent
L1 LOCAL	Accessible sanctioned competition; points-capable Verified results; Head Judge, Tech Official, Measurement Official, and designated Safety authority (roles may be dual-certified where permitted).
L2 REGIONAL	Higher staffing; Senior Tech available; regional standings; record attempts only when XR-1A equipment, safety, and evidence requirements are met.
L3 MAJOR	National-scale event; advanced inspection, complete XR-1A record capability, and Record Certifier available or formally remote-assigned.
L4 CHAMPIONSHIP	Highest level; championship titles; full evidence retention; mandatory post-tech for podium and records; independent certification required for Team XIGEN/founding-party vehicles.

ARTICLE 20 — CO-SANCTIONED EVENTS

XIGEN may operate beside another sanctioning body. A result under another body does not automatically become a XIGEN result. The same physical run may be recognized only when XIGEN inspection, cabin state, evidence, and measurement requirements are simultaneously satisfied. A co-sanctioned alternate sensor position or scoring chain receives its own protocol code and is not directly ranked against XR-1A world records unless equivalence has been formally approved.

ARTICLE 21 — SEASON POINTS

Place	Base points
1	100
2	80
3	65
4	55

Place	Base points
5	50
6	45
7	40
8	35
9	30
10	25
Qualified finish	15

Event multipliers: L1 ×1.0, L2 ×1.25, L3 ×1.5, L4 ×2.0. Season points attach to a Competitor ID + Vehicle ID + format + division pairing. Changing to a different Vehicle ID starts a new points entry unless Competition Operations approves a documented replacement after loss/damage. Only VERIFIED or CERTIFIED results count after the event's results-finalization deadline. A competitor's best six event results per format/division count unless the season bulletin specifies another number before the first points event. Record bonuses may not substitute for ordinary season participation.

ARTICLE 22 — CHAMPIONSHIP QUALIFICATION

A season bulletin published before points competition begins defines qualification. It may use standings, minimum sanctioned starts, regional placement, Major-event qualification, or published performance thresholds. Mid-season qualification changes are prohibited except for force majeure or integrity/safety emergencies.

ARTICLE 23 — RECORD CATEGORIES

- Absolute acoustic performance.
- Vehicle architecture division.
- Duration (10/30/60/90 s) for ENDURANCE.
- Resource architecture filters such as single amplifier, single energy-storage unit, single alternator, or declared driver-count may be maintained as descriptive records. They shall not be labeled "efficiency" unless the challenge also controls measurable resource magnitude such as mass, energy capacity, charging output, cone/radiating area, or another published cap.
- REPEATABILITY records by Guaranteed Performance and documented spread.
- EFFICIENCY resource-limited achievements.
- PROOF completeness level.

A record category must represent a meaningful engineering distinction and a realistically contestable field. XIGEN will retire or merge low-value categories rather than manufacture world records by excessive fragmentation.

ARTICLE 24 — DATA RIGHTS AND PUBLICATION

Competitors retain proprietary rights in private system details. XIGEN may publish the information necessary to substantiate an official result. Raw engineering telemetry beyond that minimum is public only under the competitor's selected consent level, except that XIGEN officials may retain and review confidential data for certification, safety, protest, fraud investigation, and rule development. Aggregate/anonymized research use must follow the published consent terms in Appendix E.

ARTICLE 25 — MANUFACTURER AND ACCORD PARTICIPATION

Manufacturers and XIGEN Accord partners may support events, instrumentation, research, contingency programs, product validation, or engineering publication. Commercial support never purchases a favorable ruling. Unfavorable valid results may not be falsified or suppressed to protect a partner.

ARTICLE 26 — PERFORMANCE LANGUAGE

Term	Required meaning
MODELED	Result generated from an analytical model.
PREDICTED	Expected physical outcome before validation.
SIMULATED	Result generated inside a simulation environment.
MEASURED	Observed by instrumentation.
REPEATED	Reproduced under comparable declared conditions.
COMPETITION-ACHIEVED	Obtained during an official sanctioned competition run.

Term	Required meaning
XIGEN VERIFIED	Passed the applicable verification requirements.
XIGEN CERTIFIED	Passed the highest applicable certification requirements.

ARTICLE 27 — MEASUREMENT UNCERTAINTY AND TIES

Displayed decimal precision does not automatically establish meaningful separation. Every Record Protocol family has a published tie band derived from its validated repeatability/reference procedure. Cross-chain results are not compared as world-record replacements until equivalence is established. If two results fall inside the applicable tie band, use the format tie procedure; if still tied, recognize a tie rather than inventing significance.

ARTICLE 28 — ETHICS

- Honest measurement.
- Honest reporting.
- Consistent enforcement.
- Traceable decisions.
- Disclosure of official conflicts of interest.
- No competitor, official, promoter, manufacturer, partner, or Team XIGEN vehicle is above the rules.

ARTICLE 29 — RULE CHANGES AND VERSION CONTROL

Major competition rules normally take effect at a new season boundary. Emergency bulletins may take immediate effect only for safety, integrity, legal, or unavoidable technical reasons and expire after 60 days unless formally ratified into a numbered rule revision or extended with a published justification. Each rulebook and bulletin must have an identifier, publication date, effective date, and archived superseded version.

> **DOCUMENT IT → TEST IT → COMPARE IT → DECIDE IT → REVISE THE RECORD**

ARTICLE 30 — INCORPORATED APPENDICES

Appendix	Title
A	Measurement & Meter Placement
B	Vehicle Classification
C	Safety & Electrical Technical Inspection
D	PROOF Telemetry & Data Integrity
E	Records, Certification & Official Forms
F	Event Operations, Eligibility, Governance & Risk
G	Classification Atlas & Edge-Case Guide

The appendices are part of XCS-1.0. Event bulletins may narrow options but may not reduce safety requirements or weaken result-integrity requirements without a published Rules & Standards authorization.

FOUNDING DECLARATION

The XIGEN Protocol Series does not exist to make competition easier. It exists to make results more meaningful. Maximum SPL, endurance, consistency, efficiency, and disciplined engineering are different achievements; each can be recognized without diminishing the others. The purpose is to prove what each architecture actually achieved under known conditions.

> **ENGINEER FIRST. ADD POWER LAST.**
>
> **MEASURE IT. REPEAT IT. EXPLAIN IT.**
>
> **AT XIGEN, YOU PROVE IT.**

ARTICLE 31 — STANDARD RECORD PROTOCOL AND ANTI-GAMING

- Standard world records are comparable only inside a published Record Protocol family identifying measurement chain, algorithm, placement, cabin state, frequency/source rules, and scoring method.

- Physical acoustic geometry, closures, movable panels, ports, seats used as pressure devices, and mechanically variable tuning structures must remain locked from final pre-run inspection through scoring unless a separately sanctioned ACTIVE-GEOMETRY format permits movement.
- No compressed gas, vacuum, pneumatic pulse, explosive device, horn/siren, engine/exhaust pulse, shaker, or other non-audio mechanism may intentionally contribute to the scoring sensor reading.
- No configuration may intentionally concentrate pressure only at the scoring sensor by a local tube, horn, cup, cavity, nozzle, or sensor-specific waveguide.
- Electronic configuration switching that can change impedance, amplifier bank, or energy source during a run must be declared, logged, and capable of post-tech verification.

ARTICLE 32 — FAIR NOTICE AND DUE PROCESS

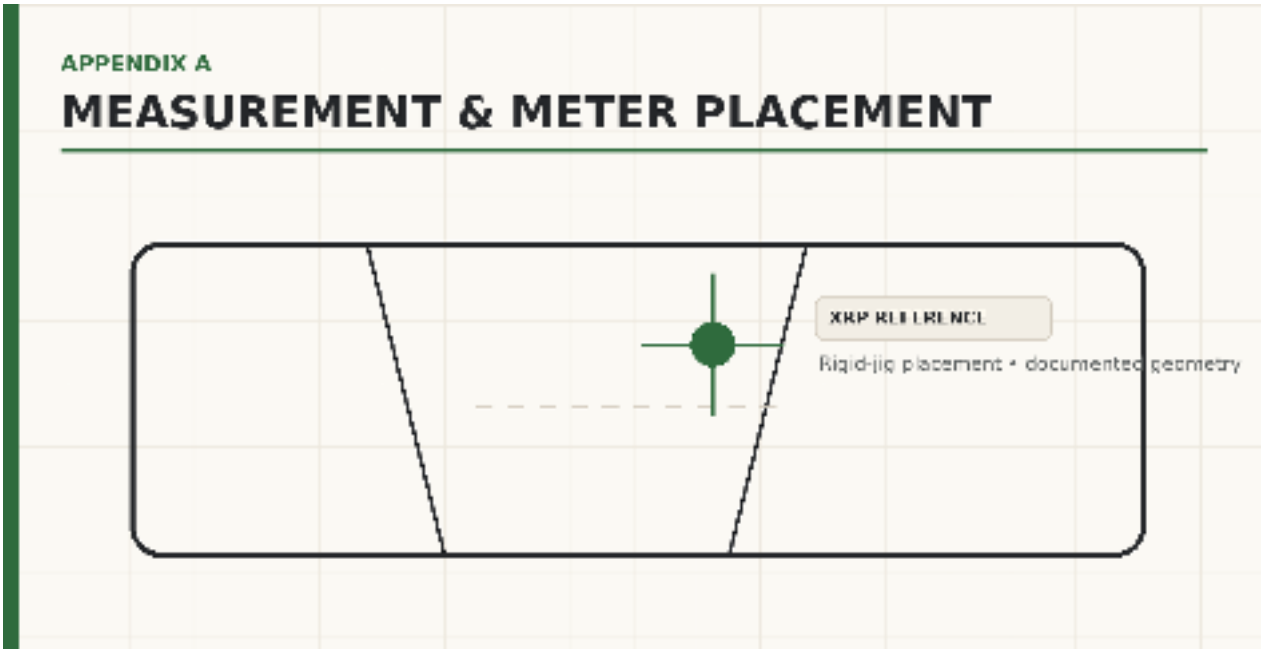
Competitive integrity requires aggressive anti-cheating enforcement and predictable rules. Safety stops are immediate, but non-emergency disciplinary action requires documented facts, notice of the alleged violation, an opportunity to respond, a written ruling, and the applicable appeal route. Deliberate concealment or falsification receives no fair-notice protection.

APPENDIX A — MEASUREMENT & METER PLACEMENT

Acoustic scoring, reference position, timing, cabin state, calibration, and rerun control

XCS-1.0-A-RC3 | 2026-09-10 | FOUNDING RELEASE CANDIDATE 3

Governing doctrine	**The XIGEN Protocol**
Competition program	The XIGEN Protocol Series
Status	Desk-validated Release Candidate 3; physical and external-professional gates remain open.
Control rule	XCS-1.0 controls conflicts unless it expressly delegates a choice. Appendix C may impose stricter safety requirements. Other appendices and Technical Bulletins implement delegated detail but may not contradict the Standard. Event bulletins may select only published options and may not weaken safety, fairness, evidence, or record-comparability requirements.



A1 — PURPOSE

This appendix defines the minimum acoustic measurement procedure for comparable XIGEN results. Its purpose is to remove avoidable placement, timing, algorithm, and operator variation from competition.

A2 — MEASUREMENT CHAIN CLASSES

Class	Use	Minimum requirement
M1 Competition	Official event scoring	Committee-approved SPL system with declared resolution and valid event reference check.
M2 Certified	Verified/Certified records	M1 plus approved Record Protocol chain family, current calibration/traceability status, mandatory pre/post reference check, instrument/firmware/software identification, and retained run file/result log.
M3 Engineering	PROOF raw acoustic channel	Calibrated pressure transducer/DAQ suitable for the target pressure, with raw time data and documented sensitivity/gain.

A3 — XIGEN REFERENCE POSITION (XRP)

For standalone XIGEN competition, the primary scoring sensor is placed on the passenger side of the front cabin using an approved rigid XIGEN placement jig. Hand measurement alone is not sufficient for Certified XR-1A records unless the Technical Commission has approved the equivalent fixture procedure.

- Horizontal reference: sensor acoustic center 300 mm (11.81 in) inboard from the inside reference surface of the passenger-side A-pillar at the windshield plane.
- Vertical reference: sensor acoustic center 100 mm (3.94 in) above the higher of the top dashboard reference plane or the base of the windshield opening at that horizontal station.
- Orientation: sensor orientation must match the approved instrument specification and remain consistent for all vehicles in the event.
- Nothing may touch, shield, clamp, cup, horn-load, tube-load, nozzle-load, or deliberately form a local acoustic cavity/waveguide around the scoring sensor. Sensor-specific acoustic concentration is prohibited even if the device is permanently installed.
- The sensor and jig must be observable by an official during placement; after competitor acknowledgment, only an official may move it.

This XRP intentionally uses simple metric dimensions and is close enough to common passenger-windshield competition positions to support practical co-sanctioning. A co-sanctioned event may publish an alternate approved position if one physical run must satisfy another organization's mandatory placement. The event bulletin must name that position before competition begins; records are tagged with the placement code.

A3.1 Placement Codes

Code	Meaning
XRP-300/100	Standalone XIGEN position defined above.
CO-X	Predeclared co-sanctioned position approved for that event.
LAB-X	Research/PROOF-only position; not directly comparable to standard records unless separately listed.

A4 — PLACEMENT EXCLUSIONS

- No non-OEM object or added acoustic structure may be placed within 600 mm (23.6 in) of the sensor when its purpose or material effect is to alter the local pressure field at the sensor. Ordinary controls, trim, and approved safety/measurement hardware are allowed.
- Permanently installed components are not automatically exempt. If a component creates a sensor-local cavity, pressure guide, or obstruction inconsistent with a representative cabin measurement, the run is invalid or the vehicle moves to a separately approved EXTREME/Research protocol.
- Wall/enclosure surfaces closer than 600 mm to the sensor force review under Appendix B and may move the vehicle to EXTREME.
- Measurement cable routing must not create a significant vent. A sealed pass-through, compliant door gasket route, or approved wireless sensor is permitted.

A5 — CABIN STATE CONTROL

State	Control
S — Sealed	Doors, windows, hatch/tailgate/sunroof closed. Normal HVAC vents may remain in the vehicle's fixed test condition but cannot be changed after the run begins.
O1	Exactly one declared opening in a measured/published position.
O2	Exactly two declared openings in measured/published positions.
OPEN	Format bulletin defines permitted openings. The same configuration is required for all competitors in that class.
CUSTOM	Research only unless a separate record category exists.

For Certified records, S is the default standard state. O1/O2 records require fully open closures or a published physical stop/jig; partial openings are CUSTOM/Research unless a specific event protocol defines a repeatable two-point or angle-based fixture. Any opening or movable closure that changes beyond the published tolerance during scoring invalidates the run.

A6 — SCORING ALGORITHMS

A6.1 PEAK

XR-1A low-frequency scoring is fundamental-selective rather than broadband. The approved chain captures calibrated acoustic pressure at XRP and computes the RMS pressure of the declared sine-wave fundamental under A19. PEAK score is the highest valid 1.000-second fundamental RMS SPL frame within the official window. Harmonics, unrelated frequencies, broadband noise, and deliberate source clipping products do not add to the official XR-1A score.

A6.2 ENDURANCE

ENDURANCE publishes two values derived from XR-1A fundamental-selective frames: Sustained Floor and Full-Interval Level. Sustained Floor is the lowest valid 1.000-second fundamental RMS SPL frame fully contained in the declared interval and is the primary score. Full-Interval Level is the acoustic-energy average of all valid analysis frames and is the first tie-break. A confirmed playback interruption or missing scoring interval invalidates the attempt; natural system sag remains part of the score.

A6.3 REPEATABILITY

Each of three runs produces one valid format score. Primary result = minimum of the three scores ("Guaranteed Performance"). Tie-break 1 = higher arithmetic mean of the three displayed dB scores (a ranking statistic, not an acoustic-energy average). Tie-break 2 = smaller max–min spread. Tie-break 3 = fourth controlled run; if still tied within the Record Protocol tie band, declare a tie.

A6.4 PROOF

PROOF inherits the acoustic scoring method of its declared base mode (PEAK, ENDURANCE, or REPEATABILITY) and adds Appendix D telemetry requirements. Telemetry does not retroactively change the acoustic score unless a measurement-integrity defect is discovered.

A7 — OFFICIAL RUN CLOCK

Mode	Scoring window
PEAK	Up to 30 seconds unless event bulletin specifies a shorter window. Only one continuous official window per attempt.
ENDURANCE	Exactly 10, 30, 60, or 90 seconds after the start trigger.
REPEATABILITY	Each run uses the same scoring window as the selected base mode. XR-1A record comparison uses exactly 120 seconds from prior END trigger to next START trigger, tolerance ±2 seconds. Non-record local formats may publish a different fixed recovery, but receive a different protocol code.
PROOF	Same as base mode; pre-trigger and post-trigger data retention follows Appendix D.

A8 — SOURCE AND FREQUENCY CONTROL

- Standard XR-1A PEAK, ENDURANCE-tone, and PEAK-based REPEATABILITY use one declared sine frequency from 10.0 through 100.0 Hz inclusive, recorded to 0.1 Hz. Certified XR-1A uses an official checksum-identified lossless file or approved digital signal generator. Added tones, sweeps during scoring, intentional modulation, air horns, sirens, or non-audio pressure sources are prohibited. DSP/EQ/gain processing is permitted, but the official score remains only the declared acoustic fundamental.
- A competitor may search/tune before the official attempt only during the declared preparation period.
- For REPEATABILITY, frequency/source selection locks at the start of Run 1.
- For Certified Records, the actual scoring frequency or music track identifier is recorded.
- Certified digital test files must use an official identifier/checksum or an approved signal generator profile. The playback device, application/version when material, sample rate, and signal identifier are recorded.

A9 — PRE-RUN REFERENCE CHECK

1. Measurement Official verifies instrument identity and valid calibration/reference status.
2. Sensor/cable inspected for damage.
3. System performs approved zero/reference/self-test.
4. Placement jig and cabin state are verified.
5. Competitor is shown the placement and may request one correction before the run clock starts.
6. Official locks the sensor, records the configuration-lock state, and starts the run record. From this point through scoring, no mechanical acoustic geometry, closure, impedance-selection hardware, energy-storage selection, or undeclared tuning control may change.

A10 — POST-RUN CHECK

- Record score, timestamp, frequency/source, cabin state, placement code, and instrument ID.
- For Certified/record attempts, the post-run reference check is mandatory before the scoring sensor is moved unless an emergency makes it impossible. If omitted for non-emergency reasons, the attempt cannot receive Certified status.
- If the measurement chain shows saturation, dropout, impossible discontinuity, or failed reference check, the run is measurement-invalid and rerun policy applies.

A11 — RERUN POLICY

Cause	Rerun
Official measurement failure	Yes, without penalty after instrument restoration.
Venue interruption caused by officials	Yes, Head Judge determines recovery time.
Competitor playback/operator mistake	No automatic rerun; event may offer a second scored attempt if format normally allows it.
Competitor equipment failure	No automatic rerun beyond normal attempt allowance.
Safety stop caused by vehicle condition	No automatic rerun; vehicle must re-pass safety inspection first.

A12 — MEASUREMENT UNCERTAINTY

Every approved scoring chain must have a published display resolution and a documented repeatability/reference-check procedure. XIGEN does not claim a statistically meaningful difference smaller than the demonstrated measurement capability. If two results fall within the declared tie band, the format tie procedure applies.

A13 — EVENT MEASUREMENT BULLETIN

Before registration closes, every sanctioned event publishes: approved meter; placement code; cabin state(s); source/frequency rules; scoring algorithm; scoring window; attempt count; recovery time; tie band; record capability; and whether PROOF telemetry is available.

A14 — RECORD EVIDENCE

- Photograph of final sensor placement before the attempt.
- Run data or official meter log.
- Pre/post reference status.
- Completed Run Sheet (E3).
- For Certified Records, post-tech and evidence manifest (E4/E7).

A15 — REPEATABILITY RECOVERY LOCK

- From Run 1 START until Run 3 END, no external charger, booster, shore supply, battery/module swap, added energy source, external cooling device, ice/coolant addition, manual retune, impedance change, software/gain change, physical service, closure change, or undeclared control change is allowed. The only permitted recovery actions are automatic/remote controls and cooling systems physically installed, declared in the Vehicle Passport, and operating under the same policy after every run.
- The declared engine/charging state during recovery must be identical after each run. If engine-on recovery is allowed, RPM policy is fixed for the category and recorded.
- Only cooling and controls physically installed in the Vehicle Passport and declared before Run 1 may operate during recovery.
- If a safety or official equipment issue requires service, the REPEATABILITY set is abandoned and restarted from Run 1 after re-tech.

A16 — SENSOR INTEGRITY / ANTI-SPOOFING

- The measured score must originate acoustically from the declared audio transducers.
- Deliberate electromagnetic/RF interference, direct mechanical excitation of the sensor/jig, pneumatic jets, vacuum/pressure injection, explosive/pyrotechnic impulses, horns/sirens, or other non-audio excitation invalidates the run and triggers integrity review.
- An official may require a control run, sensor substitution, RF check, or secondary engineering sensor when a reading is physically implausible.

A17 — CERTIFIED RECORD PROTOCOL

A Certified world-record comparison requires a published protocol code identifying chain family, scoring software/profile, algorithm, placement code, cabin state, source rule, frequency band, and tie band. XR-1A is the founding standard protocol. CO-X and LAB-X results remain valid within their own protocol families but do not replace XR-1A records without an approved equivalence decision.

A18 — ENVIRONMENTAL RECORD

Certified attempts record cabin air temperature, ambient temperature, barometric pressure, and relative humidity when instrumentation is available; P2/P3 PROOF requires these channels/metadata. Intentional cabin pressurization or evacuation beyond ordinary atmospheric operation is prohibited. Environmental data is not presently used to normalize the SPL score but is preserved for transparency and future correlation.

A19 — XR-1A FUNDAMENTAL-SELECTIVE SCORING ALGORITHM

XR-1A is the founding XIGEN pilot Record Protocol. Its purpose is to score the declared low-frequency acoustic fundamental itself rather than reward harmonics, unrelated noise, or meter-specific broadband behavior.

1. Acquire calibrated acoustic pressure p(t) from the official XRP sensor at a raw sample rate sufficient for the approved chain; raw time history is retained for Certified results.
2. Competitor declares f0 between 10.0 and 100.0 Hz before the attempt. The official source must maintain f0 within the tolerance published by the approved source profile.
3. For each 1.000-second analysis frame, software fits $p(t) = a \cdot \sin(2\pi f0t) + b \cdot \cos(2\pi f0t) + c$ by least squares. Fundamental RMS pressure is $\mathrm{sqrt}(a^2+b^2)/\mathrm{sqrt}(2)$.
4. Frame SPL is $Lf0 = 20 \cdot \log10(p_fund,RMS / 20\ \mu Pa)$. The constant c and energy at all other frequencies are excluded from the score.
5. Frames update at least every 0.050 second. Only complete frames fully inside the official scoring interval are valid.
6. PEAK = maximum valid frame Lf0. ENDURANCE Sustained Floor = minimum valid frame Lf0; Full-Interval Level = $10 \cdot \log10(\mathrm{mean}(10\text{^}(Lf0/10)))$ across all valid frames. REPEATABILITY uses the PEAK result from each of three runs unless another base mode is expressly published.
7. Approved scoring software/version and analysis settings are part of the Record Protocol code. Reprocessing raw data with a different algorithm cannot silently replace the official result.
8. XR-1A pilot tie band is 0.10 dB until physical correlation and placement testing publishes a superseding value. This is a competition comparison band, not a claim of laboratory uncertainty.

A20 — XR-1A RECORD CONFIRMATION

An XR-1A world record is a repeated result, not a hero screenshot.

- Standing record: two valid runs, same event/session, Vehicle Passport revision, configuration, cabin state, placement code, source frequency, and protocol. Both must exceed the standing record by more than the applicable tie band. The lower qualifying score becomes the new record.
- Inaugural category: two valid runs within 0.50 dB of each other. The lower score becomes the inaugural record.
- One exceptional run may be published as a Certified Result even when it does not satisfy Record Confirmation.
- A score inside the standing record tie band may be designated MATCHED RECORD but does not silently displace the existing record chronology.

A21 — SCORE-PRODUCING BOUNDARY

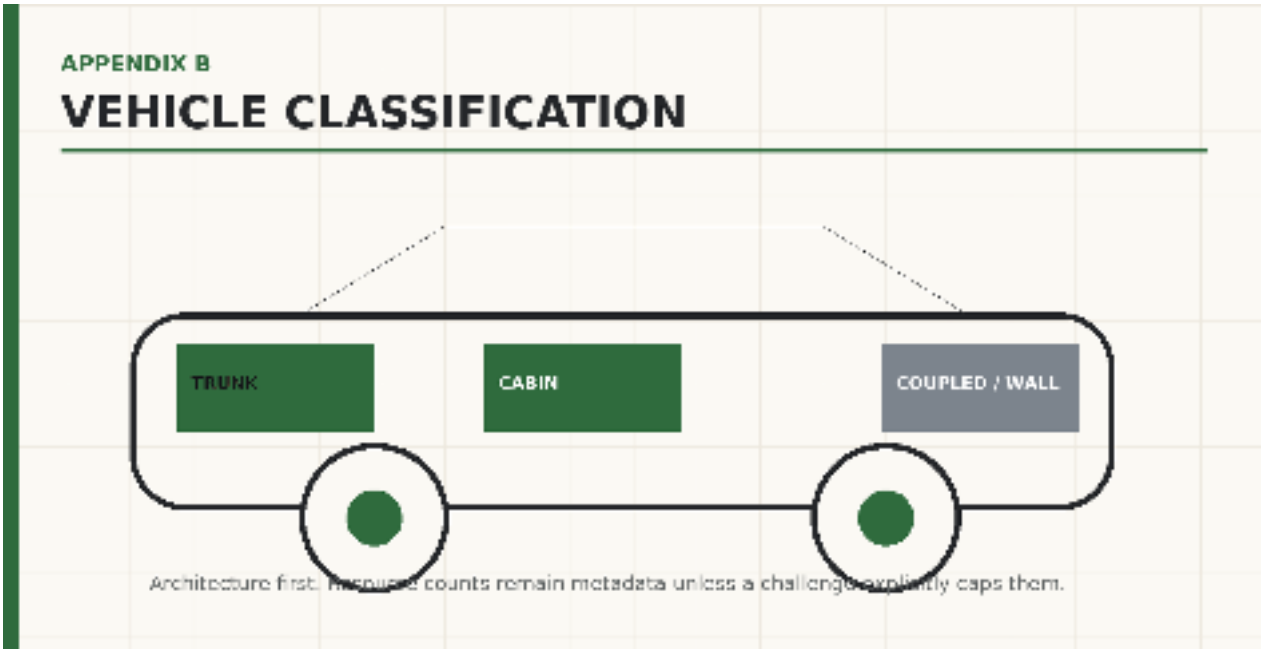
Only declared audio transducers and the vehicle/enclosure/cabin acoustic system may produce the official score. No undeclared loudspeaker, hidden near-sensor emitter, external loudspeaker, shaker, blower, compressed-air device, exhaust pulse, impactor, or temporary acoustic radiator may contribute. All score-producing transducers are declared before tech; none may be placed within the Appendix A sensor-exclusion zone unless specifically approved as part of an EXTREME research protocol.

APPENDIX B — VEHICLE CLASSIFICATION

Architecture divisions, boundaries, modification metadata, and reclassification procedure

XCS-1.0-B-RC3 | 2026-09-10 | FOUNDING RELEASE CANDIDATE 3

Governing doctrine	**The XIGEN Protocol**
Competition program	The XIGEN Protocol Series
Status	Desk-validated Release Candidate 3; physical and external-professional gates remain open.
Control rule	XCS-1.0 controls conflicts unless it expressly delegates a choice. Appendix C may impose stricter safety requirements. Other appendices and Technical Bulletins implement delegated detail but may not contradict the Standard. Event bulletins may select only published options and may not weaken safety, fairness, evidence, or record-comparability requirements.



B1 — PRINCIPLE

XIGEN classifies primarily by acoustic architecture, not by a long list of equipment-count combinations. Resource information is recorded as metadata and may support record filters. The goal is a small number of classes with meaningful technical distinctions.

B2 — CLASSIFICATION ORDER

1. Determine whether the vehicle qualifies for TRUNK.
2. If not, determine whether it qualifies for COUPLED.
3. If not, determine whether it qualifies for NO-WALL.
4. If a substantial pressure wall separates the reference-sensor/forward occupant zone from the system, classify WALL.
5. If none fits fairly or the vehicle is purpose-built beyond these boundaries, classify EXTREME.
6. Unresolved new architecture enters DEVELOPMENT / EXHIBITION pending review.

B3 — TRUNK

- Primary low-frequency enclosure and subwoofer motors/cones are located in a trunk/luggage volume separate from the front passenger volume.
- Coupling through folding-seat openings, ski-pass, rear-deck apertures, vents, or OEM-style penetrations is permitted if the trunk remains the primary enclosure location.
- No rigid full pressure wall may be added forward of the trunk boundary.
- A temporary rear-seat deletion does not automatically change TRUNK if the system remains physically trunk-contained and the opening is the coupling path.
- If the enclosure substantially occupies or is permanently extended into the passenger cabin, classification moves to NO-WALL or WALL.

B4 — COUPLED

- Primary enclosure/source is in a pickup bed, external cargo module, rear compartment, midgate region, or other remote volume not equivalent to a conventional trunk.
- A purposeful blow-through, midgate, pressure spine, transformer duct, or direct-coupling opening connects the remote source to the passenger/cabin measurement volume.
- The coupling opening may be larger than an OEM pass-through and may be structurally reinforced.
- The forward cabin remains substantially usable and is not separated from the sensor by a full competition wall.
- If the coupling structure itself becomes a full wall that defines the forward cabin boundary, classify WALL.

B5 — NO-WALL

- Primary acoustic system shares the passenger/cargo volume.
- Enclosures may extend forward but may not create a rigid full-width/full-height pressure wall that isolates the scoring sensor/forward occupant zone.
- Pillars, seats, trim, consoles, and partial structures may be modified within safety limits.
- A large enclosure behind the B-pillar can still be NO-WALL if normal cabin volume remains continuous around/over/beside it and it does not function as a sealed pressure wall.

B6 — WALL

- A substantial rigid boundary spans enough of the cabin cross-section to function as the primary pressure wall between the forward reference-sensor zone and the acoustic source/enclosure.
- The wall may contain drivers, ports, loading chambers, or transparent panels.
- The wall may not violate Appendix A sensor-clearance or Appendix C safety requirements.
- If the forward cabin itself is radically shortened/rebuilt or sensor geometry becomes nonrepresentative, classify EXTREME.

B7 — EXTREME

- Purpose-built pressure cabin or materially altered vehicle geometry.
- Major roof/floor/body relocation or cabin dimensional changes made primarily for acoustic advantage.

- Sensor is forced into a nonstandard geometry or primary pressure boundary is within the prohibited sensor clearance.
- Vehicle cannot reasonably meet ordinary entry/inspection assumptions.
- Novel propulsion/electrical architecture requiring special safety authorization.

B8 — DEVELOPMENT / EXHIBITION

Development is not a punishment. It allows XIGEN to measure and learn from novel vehicles without forcing an arbitrary competitive ruling. Development vehicles may receive documented results and PROOF datasets but no standing division record until the Technical Commission publishes a classification decision.

B9 — MODIFICATION METADATA

Code	Description
M0 Street	OEM body/cabin geometry substantially intact; ordinary trim/enclosure work.
M1 Reinforced	Structural damping, bracing, reinforced panels/doors/roof, custom trim or service modifications without changing fundamental cabin dimensions.
M2 Acoustic-Modified	Material cabin/coupling modifications for acoustic performance, including large pass-throughs, reinforced pressure interfaces, replacement panels.
M3 Purpose-Built	Major geometry/body/pressure-cabin modification; usually EXTREME.

Modification metadata does not automatically create trophy classes, but Certified record entries always publish the modification code. The Records Authority may maintain separate M0/M1 versus M2/M3 leaderboards when combining them would materially reward body/cabin alteration rather than system engineering.

B10 — RESOURCE TAGS

Tag	Definition
A1 / A2 / A#	Amplifier count.
S1 / S2 / S#	Energy-storage unit count.
ALT1 / ALT#	Alternator count.
D1 / D2 / D#	Subwoofer driver count.
LV-A	Maximum operating bus voltage ≤16.0 V.
LV-X	Maximum operating bus voltage >16.0 V and ≤20.0 V.
HV	Audio energy system >20.0 V DC; Appendix C special requirements apply.
RMT	Remote/coupled enclosure architecture.
WALL	Wall architecture.
PROOF-P1/P2/P3	Telemetry completeness level under Appendix D.
ARAD	Active radiating area metadata.
PRAD	Passive-radiator area metadata.
ES-kWh	Declared nominal energy-storage capacity metadata.
ES-kg	Installed energy-storage mass metadata when verified.
ALT-A	Declared alternator output rating/test basis metadata.
ACTIVE-GEO	Mechanically variable acoustic geometry; not eligible for standard passive-geometry records unless the format expressly allows it.
TRAC	Traction-battery / hybrid-EV energy contribution; Development until a dedicated electrical standard is published.

B11 — SUBWOOFER / DRIVER DEFINITION

Passive radiators do not count as powered-driver quantity, but their radiating area is declared separately for Certified resource/efficiency records. Multiple motors mechanically driving one diaphragm, rotary/novel low-frequency transducers, or acoustically coupled arrays require Technical Commission classification.

B12 — AMPLIFIER COUNT

An amplifier count tag begins with independently packaged commercial power-amplification chassis, but count alone is descriptive—not an efficiency metric. Custom or re-housed systems are counted by independently powered output modules when packaging would otherwise conceal multiple amplifiers. The Technical Commission may assign both a chassis count and module count.

B13 — ENERGY-STORAGE UNIT COUNT

A storage-unit count tag uses one manufacturer-defined battery/module/supercapacitor pack with its own enclosure or service identity. Count alone is descriptive—not an efficiency metric. Certified resource-limited challenges must also record relevant capacity/energy and, when required, verified mass. Competitor-built assemblies are documented by constituent serviceable modules and total declared energy rather than gaining an advantage from a common outer case.

B14 — ALTERNATOR COUNT

Each mechanically driven alternator/generator contributing energy to the competition bus counts as one, but count alone is descriptive. Resource-limited efficiency challenges must publish the applicable charging-output cap/test basis. Integrated hybrid/EV traction or DC-DC contribution receives TRAC status and remains Development for standard records until a dedicated rule is published.

B15 — SEATS AND OCCUPANT SPACE

XIGEN does not require street usability in WALL or EXTREME, but any seat or restraint represented as functional must be securely installed and safe. TRUNK, COUPLED, and NO-WALL vehicles must retain a safe driver control position for moving the vehicle unless transported/pushed under an approved venue exception.

B16 — CLASSIFICATION INSPECTION

1. Competitor declares proposed division on Form E1.
2. Tech Official inspects physical architecture and photographs relevant boundaries.
3. Senior Tech decides ambiguous classification at L2–L4 events.
4. Competitor may protest before the first official run.
5. If a concealed or changed configuration is discovered later, results may be reclassified or invalidated.

B17 — MID-EVENT CHANGES

A competitor may not materially change architecture division after beginning scored runs and continue combining results. A changed architecture creates a new configuration revision and requires new tech; prior scores remain with the prior revision.

B18 — EXAMPLES

Example	Likely division	Reason
Sedan with subs in trunk venting through fold-down seat	TRUNK	Primary system remains in trunk.
Pickup bed enclosure firing through reinforced cab blow-through	COUPLED	Remote source directly coupled to cabin.
SUV cargo-area enclosure behind second row, open cabin	NO-WALL	Shared continuous cabin volume.
Rigid driver/port wall behind B-pillar	WALL	Primary pressure wall separates forward cabin.
Shortened custom pressure cabin with relocated windshield/sensor geometry	EXTREME	Purpose-built geometry materially changes reference environment.

B19 — CLASSIFICATION PHILOSOPHY

CLASSIFY THE ARCHITECTURE. RECORD THE RESOURCES. DO NOT MANUFACTURE CLASSES.

B20 — OBJECTIVE WALL PRESUMPTION

A rigid structure is presumed to be a WALL when, at its principal cabin boundary plane, it occupies at least 80% of the projected cabin cross-sectional area after excluding intentional acoustic apertures and leaves no ordinary continuous occupant/cargo air path around it. A structure below that threshold may still be WALL if it functionally seals the forward measurement volume; a structure above it may be rebutted only by Senior Tech with written reasons. The threshold is a classification presumption, not a construction target.

B21 — DYNAMIC / ACTIVE GEOMETRY

Standard XCS-1.0 records require physical acoustic geometry to remain fixed from final pre-run inspection through scoring. Motorized ports, moving baffles, telescoping chambers, active pressure doors, variable wall position, or other mechanical tuning that moves during scoring is tagged ACTIVE-GEO and competes only in a published active-geometry challenge or DEVELOPMENT until such a format exists. Electronic signal processing and volume control are not mechanical geometry.

B22 — RESOURCE RECORD INTEGRITY

A count tag such as A1, S1, ALT1, or D1 describes architecture only. It must never be advertised as proof of superior efficiency without controlling the magnitude of the resource. Any XIGEN EFFICIENCY challenge must state the measurable cap(s) before registration closes and identify the measurement/verification method.

B23 — COMPETITION ACOUSTIC BOUNDARY

The standard competitive acoustic system consists of the declared vehicle, its installed audio transducers, enclosure/coupling architecture, and ordinary vehicle boundaries. Temporary external horns, ducts, panels, people used as blockers, auxiliary loudspeakers outside the declared architecture, or structures positioned primarily to concentrate pressure at the scoring sensor are not part of a standard record system. A primary horn/transformer that substantially extends beyond the OEM vehicle envelope or creates a purpose-built test chamber is presumptively EXTREME.

B24 — ACOUSTIC BALLAST / CABIN-VOLUME DISPLACEMENT

An object added primarily to reduce, partition, reshape, or load cabin volume is acoustic architecture even if it contains no speaker. Dedicated bladders, blocks, temporary filler, sandbags, removable volume reducers, or similar acoustic ballast must be declared and are not treated as ordinary cargo. If the device materially defines the forward pressure volume or sensor geometry, classify by functional effect and normally M3/EXTREME. Ordinary seats, OEM trim, secured tools required by event operation, and installed system equipment retain their normal treatment. Ballast used solely for vehicle stability must be secured, declared, and positioned so it does not become a sensor-local baffle or pressure guide.

B25 — COMPETITION ENERGY BOUNDARY (CEB)

For resource reporting and EFFICIENCY challenges, the Competition Energy Boundary includes every installed electrical source or storage device capable of delivering energy to the declared audio power bus from READY through END: starter/auxiliary batteries when electrically connected, lithium/sodium/lead packs, supercapacitor banks, serviceable capacitor modules, alternators/generators, traction-battery DC-DC paths, and other converters. Ordinary non-serviceable capacitance internal to a commercial amplifier is part of that amplifier unless a challenge specification expressly measures it separately. CEB diagrams identify every power path crossing into the audio load boundary.

B26 — ENVIRONMENT / ATMOSPHERE CLASSIFICATION

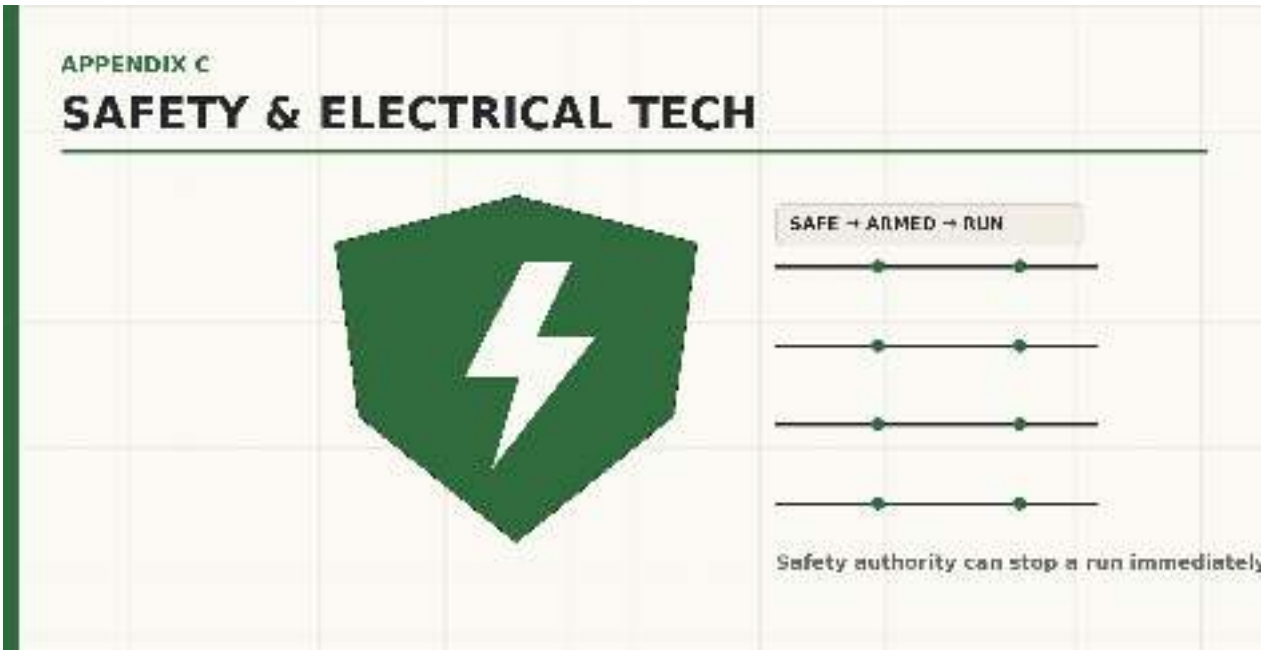
Normal ambient air and installed vehicle HVAC/climate control are permitted unless a format states otherwise. Intentional substitution of helium, CO_2, nitrogen, refrigerant, or another gas in the scoring cabin; intentional cabin pressurization/evacuation; cryogenic conditioning; or temporary external environmental systems used for acoustic advantage move the attempt to DEVELOPMENT/Research and may be prohibited by Appendix C. Standard records preserve environmental metadata rather than normalizing the score.

APPENDIX C — SAFETY & ELECTRICAL TECHNICAL INSPECTION

Vehicle, electrical, stored-energy, emergency-control, hearing, fire, and lane-safety requirements

XCS-1.0-C-RC3 | 2026-09-10 | FOUNDING RELEASE CANDIDATE 3

Governing doctrine	**The XIGEN Protocol**
Competition program	The XIGEN Protocol Series
Status	Desk-validated Release Candidate 3; physical and external-professional gates remain open.
Control rule	XCS-1.0 controls conflicts unless it expressly delegates a choice. Appendix C may impose stricter safety requirements. Other appendices and Technical Bulletins implement delegated detail but may not contradict the Standard. Event bulletins may select only published options and may not weaken safety, fairness, evidence, or record-comparability requirements.



C1 — SAFETY AUTHORITY

PERFORMANCE NEVER OUTRANKS PROTECTION OF PEOPLE.

A safety decision is not a scoring judgment. The Head Judge/Safety Official may stop, isolate, quarantine, or remove a vehicle when a credible hazard exists. Local law, venue emergency procedures, fire authority instructions, and battery/manufacturer safety data supersede this appendix where more restrictive.

C2 — SAFETY STATUS

Status	Meaning
PASS	Eligible for applicable competition.
CONDITIONAL	Minor deficiency corrected before arming; official documents correction.
FAIL	Not eligible until repaired and re-inspected.
QUARANTINE	Suspected active energy-storage, fire, electrical, structural, or fluid hazard. Do not move/charge/operate except under emergency authority.

C3 — OCCUPANT EXCLUSION

All normal XIGEN PEAK, ENDURANCE, REPEATABILITY, and PROOF scoring runs are remote-operated with no person inside the vehicle. A separately published low-output demonstration format may create an exception only with explicit SPL exposure limits and hearing-protection procedures. No official may require a person to remain in a high-output vehicle for scoring.

C4 — HOT ZONE

- The listed Hot Zone distances are absolute minimum barriers, not proof of safe exposure. Minimum sealed-run Hot Zone: 3 m (10 ft) around the vehicle. For open-door/open-cabin scoring, minimum Hot Zone extends 6 m (20 ft) outward from open doors, windows, ports, or dominant radiation direction. The promoter must expand the boundary when exterior monitoring, venue geometry, local law, or cumulative staff exposure requires it. Officials should not remain in the dominant radiation path during scoring when remote observation is practical.
- Officials working inside the Hot Zone during armed operation wear appropriate hearing protection.
- Spectators remain behind a physical boundary controlled by event staff.
- Head Judge expands the zone based on exterior level, venue reflections, debris risk, structural movement, or crowd conditions.

C5 — VEHICLE MOVEMENT

- Vehicle must have functional steering and service braking when moved under its own power.
- If engine/drive system remains active during a run: parking brake set AND at least one axle chocked unless the venue uses an approved dyno/restraint system.
- Transmission in Park for automatic vehicles or Neutral for manual vehicles unless a format expressly tests drive load; any exception requires special approval.
- No person may stand directly in front of or behind a running vehicle inside the lane.

C6 — ENGINE / RPM CONTROL

General XIGEN lane limit is 2,500 engine rpm unless a lower event limit is published. Because normal scored runs are occupant-free, engine speed above idle may be held only by an OEM stationary-speed feature or an approved remote/fail-safe control that returns to idle/off on loss of command. Wedges, sticks, tied pedals, or other unattended improvised throttle devices are prohibited. Actual RPM/engine state is recorded for Verified/Certified records. “Idle Record” requires ≤1,200 rpm for the complete scoring interval.

C7 — EXTERNAL POWER

During scoring, the audio system must be powered only by declared hardware physically installed in the vehicle and shown on the Competition Energy Boundary declaration. External chargers, shore power, booster packs, portable generators, temporary supercapacitors, temporary DC supplies, supply cables, external chillers, compressed-gas cooling supplies, or other temporary energy systems must be disconnected before READY unless a DEVELOPMENT research test expressly permits them. Installed vehicle charging/cooling may operate if declared.

C8 — ELECTRICAL VOLTAGE CATEGORIES

Category	Bus condition	Requirements
LV-A	≤16.0 V DC maximum normal operating voltage	Standard inspection.

Category	Bus condition	Requirements
LV-X	>16.0 to 20.0 V DC	Voltage declared; components/conductors must be rated for actual maximum voltage.
HV-AUDIO	>20.0 to 60.0 V DC	Guarded energized parts, hazard labeling, service disconnect, external emergency isolation, Senior Tech approval.
SPECIAL HV	>60.0 V DC	Not accepted at ordinary XCS-1.0 events. Requires pre-event Technical Commission authorization, venue emergency plan, and qualified inspection.

C9 — ENERGY STORAGE

- All batteries/modules/capacitors securely restrained against vehicle acceleration and crash-like movement expected in event transport.
- No visibly swollen, leaking, cracked, overheated, mechanically damaged, or actively faulting storage unit may compete.
- Terminals and bus bars protected from accidental conductive contact.
- Pack ventilation, orientation, compression, temperature limits, and charge limits follow manufacturer requirements where specified.
- A required BMS or protective control may not be intentionally bypassed for a scored run.
- Competitor declares chemistry and nominal/max voltage. Unknown or prototype chemistry may require DEVELOPMENT classification and manufacturer/SDS information.

C10 — CONDUCTORS AND OVERCURRENT PROTECTION

- Conductors must be mechanically protected from sharp edges, abrasion, moving parts, exhaust heat, and pinch points.
- Positive conductors leaving an energy source must receive overcurrent protection as close to the source as practical, and multi-source/parallel architectures must be protected against credible backfeed from either end of a conductor. The normal target is within 450 mm (18 in) of unprotected conductor length; longer sections require rigid/protected routing or an approved engineered equivalent.
- Protection devices must have DC voltage and interrupt ratings appropriate to the source and conductor architecture.
- Where conventional fusing is technically impractical at extreme current, a documented engineered protection scheme may combine fuse, breaker, pyro device, contactor, protected bus, BMS/current limit, and mechanical containment; approval is required for Certified Records.
- The chassis is not assumed to be a sufficient audio-current return path merely because it is OEM metal. Ground/return architecture must be declared and mechanically secure.

C11 — CONNECTIONS

- No loose battery lugs, temporary twisted-wire connections, exposed set-screw strands, or unsupported high-current joints.
- Studs/bus bars must be covered or positioned to prevent accidental tool contact.
- Conductive jewelry and loose metal objects are prohibited during live electrical service in the lane.
- Live service on exposed high-current buswork is prohibited while the vehicle is ARMED.

C12 — MASTER ISOLATION AND EMERGENCY STOP

Every vehicle seeking XIGEN Certified Result status must have a clearly identified outside-accessible emergency method that stops audio energy delivery without requiring an official to enter the cabin. The preferred sequence is signal/remote-disable first, then source isolation where the switching hardware is rated to interrupt the expected DC voltage/current/fault condition. A contactor or disconnect must never be treated as a safe emergency interrupter beyond its verified rating. WALL, EXTREME, elevated-voltage, and any vehicle ordered by the Head Judge require external emergency control for ordinary competition.

- Emergency control must be reachable without crossing an open acoustic port or primary hazard zone.
- Control labeled “AUDIO EMERGENCY OFF” or approved equivalent.
- Commanded isolation and overcurrent protection are separate functions; one does not automatically substitute for the other.
- Ground/negative may remain permanently connected unless the engineered architecture requires otherwise.
- After emergency activation, re-arming requires competitor and official acknowledgment.

C13 — PRECHARGE / LARGE CAPACITIVE LOADS

Systems using large capacitor banks or amplifier input capacitance that creates significant inrush must use a controlled precharge or equivalent manufacturer-approved method when direct connection can create damaging arcing or contactor welding. Bypassing a required precharge in the lane is a safety failure.

C14 — STRUCTURAL RETENTION

- Enclosures, amplifiers, batteries, tanks, cooling hardware, and removable pressure modules must be positively retained.
- Hook-and-loop alone is not acceptable for heavy equipment.
- Fasteners must engage structural material appropriate to equipment mass and expected load.
- A component that visibly shifts during a run triggers an immediate stop and FAIL until corrected.
- Pressure panels/windows must be inspected for cracks, loose fasteners, delamination, or signs of imminent failure.

C15 — FIRE / THERMAL PLAN

Event promoters must maintain a written fire/thermal incident plan identifying emergency contacts, evacuation path, battery/chemistry information access, initial fire equipment, and a safe quarantine location or authority-directed alternative. Battery response varies by chemistry; XCS-1.0 therefore does not prescribe one universal extinguishing agent. Officials follow fire authority, manufacturer SDS/emergency guidance, and venue policy. An actively venting/overheating storage system is QUARANTINE, not a competition repair.

C16 — COOLING SYSTEMS

- Fans, ducts, A/C purge, liquid cooling, and heat exchangers are permitted if mechanically secure and declared.
- Flammable refrigerant or unusual coolant used outside OEM systems must comply with law/venue requirements and may require documentation.
- Condensate must not drip onto energized buswork or create a slip hazard.
- Compressed-gas cooling or pressure vessels require pre-approval; gas may not be discharged in a manner that creates asphyxiation, projectile, or unfair acoustic-pressure effects.

C17 — HEARING PROTECTION

All officials entering the Hot Zone during armed operation use event-approved hearing protection. Dual protection is strongly recommended for personnel exposed to repeated high-output runs. Competitors are responsible for team-member protection outside the controlled official zone. Exposure management must consider cumulative event time, not only the peak meter score.

C18 — DEBRIS / PRESSURE HAZARDS

- Loose interior/exterior objects must be removed or secured before arming.
- Windows/panels known to be damaged may not be used as pressure boundaries.
- No person may lean into an open door/window/port while the system is ARMED.
- Officials may require protective barriers around glass or panels exhibiting severe movement.

C19 — SAFETY STATES

State	Definition
SAFE	Amplifier high-energy path disabled or system otherwise incapable of scored output; vehicle may be serviced.
READY	Vehicle prepared; measurement active; competitor waiting for official arming command.
ARMED	Audio high-energy system enabled; Hot Zone controlled; no service permitted.
FAULT	Protection event, abnormal condition, or official stop. Output ceases; re-arm requires inspection/acknowledgment.
QUARANTINE	Potential ongoing fire/chemical/electrical/structural hazard; emergency plan controls.

C20 — PRE-TECH CHECKLIST

Item	Pass criteria
Battery/storage restraint	No movement; enclosure/hold-down intact; no visible damage.
Terminal protection	No unintended contact path.
Main positive protection	Source protection or approved engineered equivalent.
Cable routing	No sharp/pinch/heat/moving-part hazard.
Ground/return	Secure and declared.
Amplifier/enclosure mounting	Positive mechanical retention.
Emergency isolation	Required systems functional and labeled.
Vehicle movement controls	Steering/brakes adequate; parking brake/chocks available.
Cooling/fluids	No hazardous leaks/condensate exposure.
Pressure structure	No visible imminent failure.
Hot-zone plan	Barrier and hearing protection ready.

C21 — INCIDENT REPORTING

Any fire, smoke event, storage venting, conductor failure, structural release, injury, or emergency isolation during a sanctioned run requires Form E6. The vehicle cannot resume until the Head Judge and appropriate technical official document disposition.

C22 — AMPLIFIER OUTPUT / SPEAKER-CONDUCTOR HAZARD

- Low DC bus voltage does not mean low hazard at amplifier outputs. High-power audio amplifiers can produce hazardous AC/RMS/peak voltage and substantial fault energy on speaker conductors.
- Exposed high-power output studs, bus bars, or conductors accessible during ARMED operation must be guarded, covered, or physically inaccessible. No live service is permitted on amplifier output wiring while ARMED.
- Where output voltage can reasonably exceed 50 V RMS or 70 V peak under operation, the system receives a HIGH OUTPUT VOLTAGE warning at service access points and is treated as an electrical-contact hazard during tech/service.

C23 — INDOOR ENGINE / CARBON-MONOXIDE CONTROL

- Internal-combustion engines may run indoors only when the venue permits it and an effective exhaust-extraction/ventilation plan is active.
- For indoor engine-on lanes, the promoter must use venue-required CO monitoring or an equivalent documented control. A Head Judge may require engine-off operation if ventilation or monitoring is inadequate.
- Engine exhaust may not be intentionally routed or used as an acoustic scoring source.

C24 — ACOUSTIC / PRESSURE ENERGY PROHIBITIONS

- No compressed gas, vacuum pump, pyrotechnic/explosive device, air horn, siren, undeclared loudspeaker, mechanical shaker, blower used as a pressure source, impact mechanism, engine/exhaust pulse, external acoustic emitter, or other non-declared pressure source may intentionally contribute to the score.
- Intentional cabin pressurization/depressurization beyond ordinary atmospheric operation before or during scoring is prohibited.
- Cooling gas discharge must not enter the scoring cabin/enclosure in a way that materially raises measured acoustic pressure independent of the audio transducers.

C25 — EMERGENCY-ISOLATION FUNCTION TEST

Emergency controls are function-tested during tech at low/no audio load. XIGEN does not require a full-current interruption test in the lane. The official verifies command path, labeling, reset behavior, and the declared isolation sequence; switching-device ratings remain the competitor's engineering responsibility subject to inspection.

C26 — ATMOSPHERE / PRECONDITIONING SAFETY

Standard scoring cabins use ordinary breathable ambient air. Installed OEM or declared HVAC may precondition temperature. Temporary gas substitution, oxygen displacement, intentional pressure manipulation, dry-ice/cryogenic cabin treatment, or external refrigeration connected at READY is prohibited in standard competition because it can create both acoustic and life-safety hazards. Any research exception requires written Technical Commission and venue/fire-safety approval and may not expose personnel to an altered atmosphere.

C27 — DECLARED ENERGY PATH / STORED-ENERGY VISIBILITY

Tech officials must be able to identify every source capable of feeding the audio bus during scoring. Hidden or inaccessible storage is not automatically illegal, but it must be declared, safely installed, and inspectable by an approved method. A capacitor bank or module intentionally

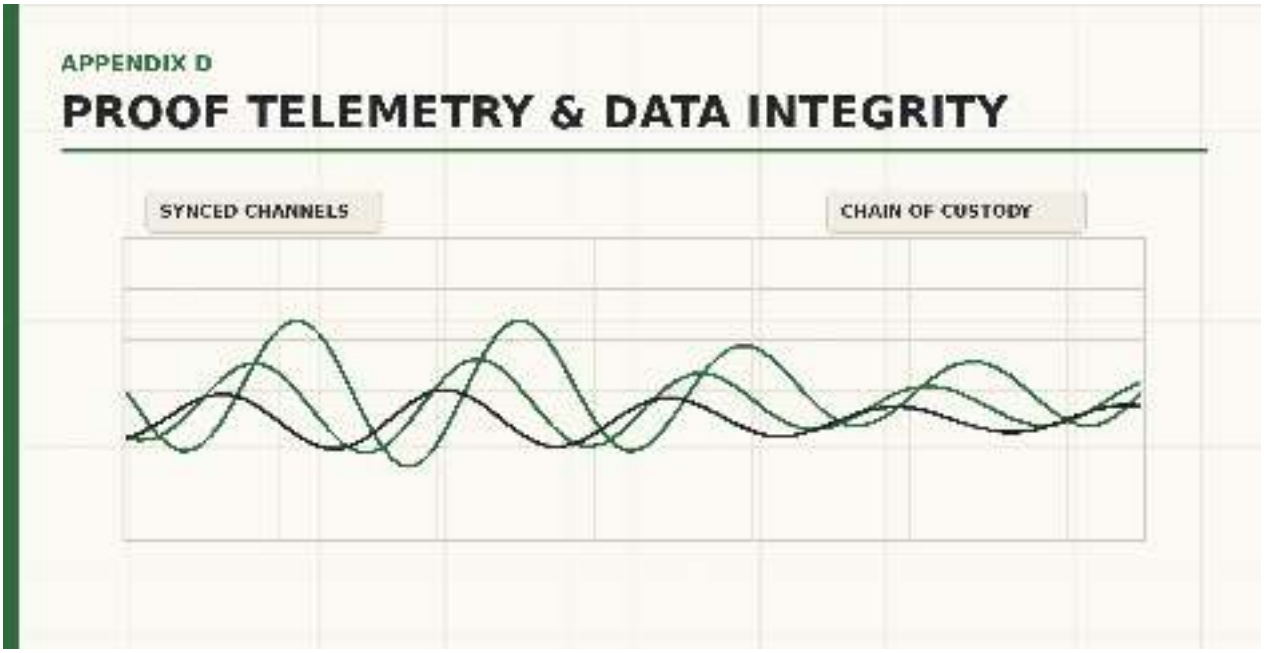
concealed inside another enclosure to evade resource accounting is an integrity violation. Safety inspection remains based on actual voltage, fault energy, chemistry, conductor protection, and isolation—not marketing names or package count.

APPENDIX D — PROOF TELEMETRY & DATA INTEGRITY

Synchronized channels, completeness levels, sampling, derived quantities, retention, and verification

XCS-1.0-D-RC3 | 2026-09-10 | FOUNDING RELEASE CANDIDATE 3

Governing doctrine	**The XIGEN Protocol**
Competition program	The XIGEN Protocol Series
Status	Desk-validated Release Candidate 3; physical and external-professional gates remain open.
Control rule	XCS-1.0 controls conflicts unless it expressly delegates a choice. Appendix C may impose stricter safety requirements. Other appendices and Technical Bulletins implement delegated detail but may not contradict the Standard. Event bulletins may select only published options and may not weaken safety, fairness, evidence, or record-comparability requirements.



D1 — PURPOSE

NOT ONLY WHAT HAPPENED — BUT WHY.

PROOF turns a competition result into an engineering record by synchronizing acoustic, electrical, thermal, mechanical, and vehicle-state evidence. The requirements scale by completeness level so local events can participate without pretending to have research-lab instrumentation.

D2 — PROOF COMPLETENESS LEVELS

Level	Required channels	Intended use
P0 — Acoustic	Official SPL/time + source/frequency + cabin state + configuration/run metadata.	Baseline XIGEN competition record; not a PROOF-certified engineering dataset.
P1 — Core Proof	P0 + amplifier-bus voltage + system DC current + engine/RPM or charging state.	Practical field engineering and Certified PROOF entry level.
P2 — Engineering	P1 + battery/storage voltage (if distinct) + cabin/ambient temperature + barometric pressure + relative humidity metadata/channel where available + at least battery/storage temperature + amplifier temperature + synchronized event markers.	Endurance, electrical/thermal validation, partner-quality field data.
P3 — Research	P2 + at least one advanced channel family: audio-frequency voltage/current for true power/impedance, cabin/enclosure pressure, structural acceleration, or additional thermal/charging channels.	Deep R&D and causality analysis.

P3 does not mean “better score.” It means a richer evidence set. The acoustic score remains governed by the base competition format.

D3 — TIME SYNCHRONIZATION

Level	Maximum alignment error target
P1	≤20 ms between official acoustic timeline and DC electrical timeline.
P2	≤5 ms for electrical/event channels; thermal channels share the same absolute timeline but may update more slowly.
P3	Waveform V/I used for phase, impedance, or true-power claims must be simultaneous on a common clock; interchannel skew must meet the instrument specification and be small enough to produce ≤1° phase error at the highest analyzed frequency. Secondary cross-instrument transient channels target ≤100 µs unless a looser limit is explicitly justified for the claim.

A common DAQ clock is preferred. When independent instruments are used, a visible/electrical synchronization event or timestamp correlation method must be documented.

D4 — MINIMUM SAMPLE / UPDATE RATES

Channel	Minimum	Preferred / notes
Official SPL result	Instrument native	Retain time history when available.
Raw acoustic pressure	48 kS/s	96 kS/s preferred when sensor/instrument supports it.
DC bus voltage	100 S/s trend; ≥1 kS/s for certified power/energy claims	1–10 kS/s preferred for transient analysis; bandwidth documented.
DC system current	100 S/s trend; ≥1 kS/s synchronized for certified power/energy claims	Sensor range/bandwidth documented; no saturation in claimed interval.
RPM / charging state	10 S/s	100 S/s if transient alternator behavior is being studied.
Temperature	1 S/s	10 S/s for amplifier/battery thermal transitions.
Audio V/I waveform	48 kS/s simultaneous	96 kS/s preferred for impedance/phase/true-power analysis.
Acceleration	5 kS/s	10–25 kS/s depending on structural bandwidth.
Pressure secondary channels	10 kS/s	48 kS/s preferred for phase/acoustic transfer work.

D5 — REQUIRED PRE-TRIGGER / POST-TRIGGER

P1–P3 datasets retain at least 2 seconds before the official scoring start and 5 seconds after scoring end where instrument memory permits. ENDURANCE datasets should retain 10 seconds after the interval when studying electrical/thermal recovery. If an instrument cannot retain pre-trigger data, this is declared in the manifest and does not invalidate P1 by itself.

D6 — VOLTAGE MEASUREMENT

- P1 voltage is measured at the amplifier DC input bus or common amplifier distribution feed/return as close to the load boundary as practical. The measurement boundary receives a code (AMP-BUS, STORAGE, CHARGE, or TOTAL-VEHICLE). Power claims require voltage and current from the same electrical boundary.
- If multiple amplifier banks have materially different supply paths, P2/P3 should measure each bank or document the representative point.
- Differential measurement is preferred. Sensor/input common-mode rating must suit the system.
- Published “starting voltage” alone is not a substitute for time-history voltage in PROOF.

D7 — CURRENT MEASUREMENT

- Current sensor must be rated for expected peak current without saturation. P1 current for audio-input power is measured entering the amplifier distribution boundary, not at a location that unknowingly includes unrelated vehicle loads or excludes a source branch. If TOTAL-VEHICLE current is used, the claim must be labeled accordingly and is not interchangeable with amplifier-input current.
- Sensor polarity is recorded so discharge/charge direction is unambiguous.
- If multiple source branches exist, “system current” is either measured at a common point or calculated from synchronized branch sensors; method documented.
- A current trace that clips/saturates cannot support certified power/energy claims, though the acoustic result may remain valid.

D8 — POWER AND ENERGY CLAIMS

DC input power may be computed as instantaneous voltage × simultaneous current only when both channels represent the same defined electrical boundary and are synchronized at sufficient sample rate/bandwidth. Certified peak/average power claims require ≥1 kS/s synchronized DC channels or a validated method with equivalent bandwidth. Battery/energy delivery may be integrated from a STORAGE boundary. Audio output true power requires simultaneous output voltage/current waveforms with phase preserved; Vrms × Irms alone is not real power when phase/non-sinusoidal behavior is material.

> **DO NOT TURN A CLAMP ESTIMATE INTO A TRUE-POWER CLAIM BY CHANGING THE LABEL.**

D9 — TEMPERATURE

- Ambient sensor positioned away from direct hot exhaust/cold A/C discharge unless the local air stream is intentionally being measured.
- Battery/storage temperature sensor location documented (case, terminal, internal telemetry, or cell sensor).
- Amplifier temperature location documented (case, heatsink, internal telemetry).
- Infrared spot readings may supplement but do not replace a synchronized P2 temperature channel for endurance certification.

D10 — IMPEDANCE / PHASE

P3 impedance/phase analysis uses simultaneously sampled acoustic-frequency voltage/current channels on a common DAQ clock (or a formally validated equivalent) with documented probes, bandwidth, scaling, polarity, calibration, and interchannel phase specification. Derived impedance/phase is invalid where either channel clips, aliases, loses common-clock timing, or falls below reliable sensor resolution.

D11 — PRESSURE / STRUCTURAL CHANNELS

- Secondary pressure sensors require their own position codes and calibration/sensitivity records.
- Cabin/enclosure pressure channels are engineering data and do not replace the official scoring sensor unless separately approved.
- Accelerometers must be mechanically attached with a documented axis/orientation.
- Structural data is not used to encourage unsafe panel motion; an official may stop a run despite valuable data if failure appears imminent.

D12 — CALIBRATION / ZERO STATUS

Channel family	Required record
Official SPL	Approved event reference/calibration status under Appendix A.
Voltage	Known meter/DAQ accuracy or calibration status; zero check where applicable.
Current	Sensor model/range; zero before run; calibration factor.
Temperature	Sensor type and reasonable reference check.
Waveform/pressure/acceleration	Calibration/sensitivity or manufacturer traceability sufficient for claimed quantity.

D13 — DATA VALIDITY FLAGS

Flag	Meaning
VALID	Channel supports claimed use.
LIMITED	Usable for trend only; known bandwidth/resolution limitation.
SATURATED	Exceeded range; cannot support magnitude claim in affected interval.
DROPOUT	Missing samples/timeline gap.
UNSYNCED	Timing uncertainty exceeds level requirement.
DERIVED	Computed channel; source channels and method identified.

D14 — FILE INTEGRITY

- For a Certified Result attempt, the Measurement Official controls or witnesses acquisition. Raw files are hashed at first official capture before analysis, then copied to a read-only/controlled archive. The Evidence Manifest records instrument serial number, firmware, scoring/DAQ software version, configuration/profile identifier, file name/size, acquisition time/time zone, and SHA-256. A hash proves post-capture integrity; chain of custody establishes authenticity. Corrections or processing create derived files; raw evidence is never overwritten.
- Evidence manifest stores filename, size, instrument/source, and SHA-256 checksum.
- Corrections/processing create a new derived file; raw data is never overwritten.
- Any manual edit to timestamps or channel scaling must be documented in an analysis note.
- Official result database stores the manifest checksum with the certification ID.

D15 — FILE NAMING

Recommended pattern: XIGEN_<EventID>_<VehicleID>_<ConfigRev>_<Format>_<Run#>_<YYYYMMDD-HHMMSS>.<ext>. Derived files add _DERIVED_v#; public exports add _PUBLIC.

D16 — RETENTION

Artifact	Minimum retention
Certified raw run data	While the result remains a standing record, plus 5 years after supersession/revocation; otherwise 5 years minimum.
Certified evidence manifest	Permanent while record exists; archived permanently after supersession/revocation.
Public result summary	Permanent historical registry.
Ordinary Provisional event data	Season + 1 year minimum unless local law/policy requires longer.
Incident/safety records	At least 5 years, subject to legal/insurance requirements.

D17 — DATA CONSENT

Level	Publication
PRIVATE CERTIFICATION	Officials may retain/review; public sees only minimum record substantiation.
PUBLIC SUMMARY	Public sees summary metrics/plots; raw data remains private.

Level	Publication
PUBLIC DATASET	Competitor authorizes release of specified raw/processed channels under stated terms.
PARTNER R&D	Specified data may be shared with named XIGEN Accord partner(s) under governing agreement; competition result remains independently reportable.

D18 — PROOF PASS / FAIL

A PROOF level passes only if every required channel for that level is present and sufficiently valid for its intended claim. A missing/saturated required channel may downgrade P2→P1 or P1→P0 rather than erase a valid acoustic score. Falsified or intentionally manipulated data triggers integrity review.

D19 — STANDARD PROOF REPORT

1. Result summary and certification status.
2. Configuration / Vehicle Passport revision.
3. Acoustic plot and scoring interval.
4. Voltage/current plot with minimum, maximum, average and recovery notes.
5. RPM/charging-state plot.
6. Thermal plot for P2/P3.
7. Advanced channel analysis for P3.
8. Event markers and anomaly notes.
9. Data-validity table.
10. Evidence-manifest checksum and official signatures.

D20 — ENGINEERING INTERPRETATION

> **MEASURE IT. REPEAT IT. EXPLAIN IT.**

Explanation must distinguish observation from causation. Correlation between two channels is evidence for investigation, not automatic proof of cause. XIGEN technical publications label assumptions, derived quantities, uncertain channels, and alternative explanations.

D21 — EVIDENCE CHAIN OF CUSTODY

- Certified evidence is acquired by, streamed to, or immediately witnessed and captured by a Measurement Official. Competitor-provided files may supplement but cannot be the sole source of a Certified score or power claim unless an approved instrument cryptographically authenticates them.
- The first official hash is recorded before any trimming, resampling, scaling correction, plotting, or manual export that could alter the source file.
- The manifest itself is hashed after completion and signed/approved by the Measurement Official and Record Certifier. Any later addition creates a new manifest version linked to the prior hash.

D22 — CLAIM-SPECIFIC VALIDITY

A dataset may be valid for one claim and invalid for another. For example, a 100 S/s current trace may support trend/recovery discussion but not a certified instantaneous-power claim; an unsynchronized temperature channel may remain valid thermally while being unusable for millisecond causality. Every published PROOF claim must identify the channels that support it and their validity flags.

D18 — XR-1A RAW ACOUSTIC RETENTION

Any Certified XR-1A result retains the raw acoustic time history needed to reproduce the official A19 fundamental-selective calculation, plus scoring frequency, sample rate, calibration/sensitivity metadata, software/profile version, and frame timing. A rendered meter screenshot alone is insufficient evidence for XR-1A Certified status.

D19 — EFFICIENCY POWER-BOUNDARY CHANNELS

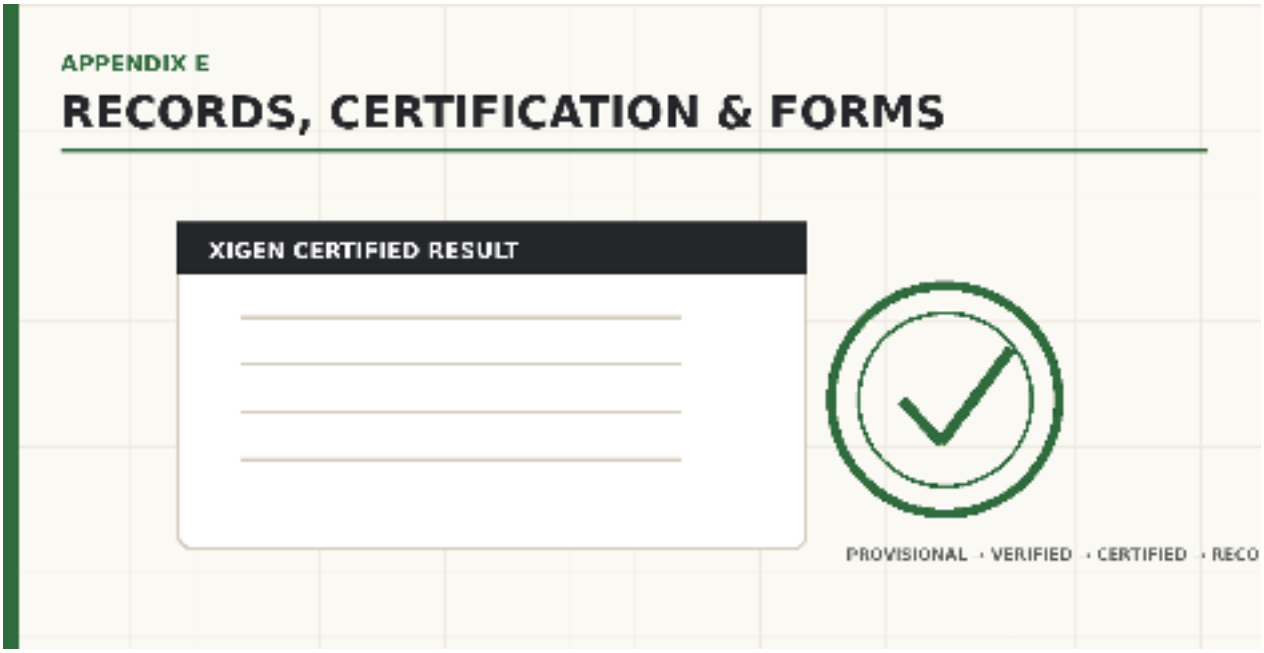
A power-capped EFFICIENCY result requires synchronized bus voltage and total current crossing the declared audio-load boundary. All parallel branches are measured or summed. The voltage and current used for the claim must refer to the same boundary and interval. Average DC input power is the time average of V(t)×I(t) over the official XR-1A scoring frame; current polarity is positive into the audio boundary. Negative samples may reduce net power only when the bidirectional measurement method is expressly validated; otherwise they are clipped to zero for conservative competition accounting.

APPENDIX E — RECORDS, CERTIFICATION & OFFICIAL FORMS

Vehicle Passport, inspection, run control, protests, incidents, evidence, change control, data consent, and certification workflow

XCS-1.0-E-RC3 | 2026-09-10 | FOUNDING RELEASE CANDIDATE 3

Governing doctrine	**The XIGEN Protocol**
Competition program	The XIGEN Protocol Series
Status	Desk-validated Release Candidate 3; physical and external-professional gates remain open.
Control rule	XCS-1.0 controls conflicts unless it expressly delegates a choice. Appendix C may impose stricter safety requirements. Other appendices and Technical Bulletins implement delegated detail but may not contradict the Standard. Event bulletins may select only published options and may not weaken safety, fairness, evidence, or record-comparability requirements.



E1 — RECORD IDENTIFIERS

Recommended IDs: Event = XEV-YYYY-###; Vehicle = XVP-####; Configuration revision = CR##; Result = XRS-YYYY-######; Certified Record = XCR-YYYY-######. The Records Authority may replace numbering format without altering record validity.

E2 — CERTIFICATION WORKFLOW

1. Register competitor and Vehicle Passport.
2. Pre-Tech + Safety PASS.
3. Declare format, cabin state, placement code, source, and configuration revision.
4. Perform official run(s).
5. Lock meter/telemetry evidence.
6. Post-Tech where required.
7. Complete Evidence Manifest.
8. Resolve protests/measurement exceptions.
9. Record Certifier reviews package.
10. Issue Provisional, Verified, or XIGEN Certified Result status. If the Certified Result leads a recognized category under the applicable Record Protocol, separately issue XIGEN Record designation and registry status.

E3 — MINIMUM PUBLIC RECORD FIELDS

- Certification/result ID.
- Competitor/team display name.
- Vehicle year/make/model.
- Architecture division and resource tags.
- Format/mode, score, frequency/source, duration, cabin state, placement code.
- Event, date, location.
- Instrument class and status.
- Configuration revision.
- Certification status and officials.

FORM E1 — XIGEN VEHICLE PASSPORT

Vehicle ID: _____

Competitor / Team: _____

Year / Make / Model: _____

VIN last 8 or organizer identifier: _____

Proposed Division: _____

Modification Code: _____

Configuration Revision: _____

Primary Contact: _____

System Declaration

Category	Manufacturer / Model / Description	Qty / Value
Subwoofer drivers		
Amplifiers		
Energy storage / chemistry		
Alternators / charging		
Primary enclosure		
Coupling / wall architecture		
Major positive conductor		
Major negative/return		
Main protection		
Emergency isolation		

Electrical

Nominal bus voltage: _____

Maximum charging voltage: _____

Declared nominal amplifier load(s): _____

External emergency control location: _____

Competitor Declaration

I declare that the information above materially describes the configuration presented for competition. I will report material changes before further scored runs.

Competitor signature / date: _____

Tech Official / date: _____

FORM E2 — PRE-TECH & SAFETY INSPECTION

Check	PASS	COND	FAIL	Notes
Vehicle Passport matches				
Division/classification				
Battery/storage restraint				
Storage condition / no visible damage				
Terminal/bus protection				
Main positive protection / engineered equivalent				
Cable routing / abrasion / heat				
Ground/return secure				
Amplifier mounting				
Enclosure/pressure structure				
Emergency isolation if required				
Parking brake / chocks				
Cooling / fluids / condensate				
Measurement access / XRP feasible				
Hot-zone controls / hearing PPE				

Final status (PASS / CONDITIONAL / FAIL / QUARANTINE): _____

Required correction: _____

Tech Official / level / date: _____

FORM E3 — OFFICIAL RUN SHEET

Event ID: _____

Result ID: _____

Vehicle ID / Config Rev: _____

Format / Base Mode: _____

Division: _____

Cabin State: _____

Placement Code: _____

Instrument ID: _____

Source / Track / Frequency: _____

Engine / RPM state: _____

Attempt number: _____

Run	Score	Freq / source	Start V	Min V	Peak/Avg I	RPM	Notes
1							
2							
3							
4							

REPEATABILITY Guaranteed Performance: _____

Three-run mean / spread: _____

ENDURANCE duration / Sustained Floor / Full-Interval Level: _____

PROOF level achieved: _____

Measurement Official / date: _____

FORM E4 — POST-TECH / RECORD CERTIFICATION

Verification	PASS	FAIL	N/A	Notes
Driver identity/count				
Amplifier identity/count				
Declared load/wiring architecture				
Energy-storage identity/count				
Charging architecture				
Cabin state / structural configuration				
No hidden/unauthorized equipment				
Emergency isolation functional				
Measurement post-check valid				
Vehicle Passport revision accurate				

Result status requested (Provisional / Verified / Certified Result):

Provisional / Verified / Certified Result decision:

Certification ID: _____

Post-Tech Official: _____

Record Certifier: _____

Open protest / exception: _____

FORM E5 — PROTEST / APPEAL

Protest ID: _____

Event / date: _____

Filing competitor: _____

Affected competitor / result: _____

Rule / classification disputed: _____

Specific facts and evidence:

_____

_____

_____

_____

_____

_____

_____

Requested remedy: _____

Level 1 Head Judge ruling: _____

Level 2 Technical Commission ruling: _____

Level 3 Rules & Standards ruling / precedent ID: _____

FORM E6 — SAFETY INCIDENT / OFFICIAL STOP REPORT

Incident ID: _____

Event / time: _____

Vehicle / competitor: _____

State at incident (SAFE/READY/ARMED/FAULT/QUARANTINE): _____

Official who stopped run: _____

Type	Check
Smoke/fire	
Battery/storage abnormality	
Electrical fault/arcing	
Structural movement/failure	
Fluid/cooling issue	
Injury/exposure	
Vehicle movement	
Other	

Observed facts (do not speculate):

_____

_____

_____

_____

_____

Emergency action: _____

Vehicle disposition: _____

Authority notified: _____

Re-inspection required: _____

Head Judge signature / date: _____

FORM E7 — RECORD EVIDENCE MANIFEST

Certification / Result ID: _____

Vehicle ID / Config Rev: _____

Event ID: _____

PROOF Level: _____

#	File / artifact	Source instrument / official	Size	SHA-256 / identifier	Validity
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					

Raw data write-protected location: _____

Derived analysis version: _____

Manifest prepared by / date: _____

Record Certifier verification: _____

FORM E8 — CONFIGURATION CHANGE NOTICE

Vehicle ID: _____

Old Config Rev: _____

New Config Rev: _____

Effective date: _____

Reason for change: _____

Changed area	Before	After	Material?
Drivers			
Amplifiers			
Impedance/wiring			
Energy storage			
Charging			
Enclosure			
Coupling/wall			
Cabin/structure			
Safety architecture			
Other			

Reclassification required?: _____

Fresh baseline/model restart required?: _____

Tech approval / date: _____

FORM E9 — OFFICIAL CONFLICT-OF-INTEREST DISCLOSURE

Official: _____

Event: _____

Competitor / vehicle potentially affected: _____

Relationship / financial / team / vendor interest: _____

Disposition (check one): ☐ No material conflict ☐ Disclosed; may officiate with oversight ☐ Recused from classification ☐ Recused from record certification ☐ Fully recused

Head Judge / Rules authority decision: _____

FORM E10 — DATA CONSENT & PUBLICATION ELECTION

Competitor selects one or more authorized uses. Minimum public fields required to substantiate official results are not optional.

Selection	Authorization
☐	PRIVATE CERTIFICATION — officials may retain/review detailed data; public receives minimum record summary.
☐	PUBLIC SUMMARY — XIGEN may publish selected plots and summary metrics.
☐	PUBLIC DATASET — XIGEN may publish specified raw/processed channels.
☐	PARTNER R&D — XIGEN may share specified data with named Accord partner(s) under applicable agreement.

Excluded channels / proprietary notes: _____

Named partner(s), if any: _____

Competitor signature / date: _____

FORM E11 — XIGEN CERTIFIED RESULT / RECORD CERTIFICATE DATA

Certification ID: _____

Competitor / Team: _____

Vehicle: _____

Vehicle ID / Config Rev: _____

Division / Resource Tags: _____

Format / Mode: _____

Official score: _____

Frequency / source: _____

Duration: _____

Cabin state: _____

Placement code: _____

Event / location / date: _____

Measurement system: _____

PROOF level: _____

Record category: _____

Head Judge: _____

Measurement Official: _____

Record Certifier: _____

XIGEN CERTIFIED — NUMBER + CONFIGURATION + CONDITIONS + EVIDENCE

E12 — RECORD REVOCATION / CORRECTION POLICY

Corrections preserve history. A clerical correction is versioned. A reclassification preserves the original measurement but changes its competitive category. A revoked record remains visible as REVOKED with the reason/date/authority. Fraud findings may invalidate points and related downstream records according to the disciplinary ruling.

E13 — OFFICIAL REGISTRY STATUS CODES

Code	Meaning
P	Provisional
V	Verified
C	XIGEN Certified
S	Superseded by higher valid record
R	Revoked
X	Reclassified / category changed
A	Archived historical record

E14 — CERTIFIED RESULT VS. RECORD

Certification authenticates a result; record status ranks that Certified Result within a recognized category. A competitor may hold a XIGEN Certified Result without holding an XIGEN Record. Record certificates must identify the category, Record Protocol code, prior record (if any), and effective date.

FORM E12 — EVENT ENTRY / RULES ACKNOWLEDGMENT

Event ID: _____

Competitor ID / Vehicle ID: _____

Competitor age / minor status handled under event policy: _____

Rules version / bulletins acknowledged: _____

Format / Division entered: _____

Emergency contact: _____

I acknowledge the published competition rules, official instructions, safety controls, and protest/appeal procedure. This acknowledgment is not a substitute for any venue/promoter waiver required by applicable law.

Competitor signature / date-time: _____

FORM E13 — RECORD AUTHENTICATION / CHAIN-OF-CUSTODY ADDENDUM

Result / Certification ID: _____

Record Protocol code: _____

Measurement chain family / instrument serial: _____

Firmware / scoring software / profile: _____

Acquisition time + time zone: _____

First official raw-file SHA-256: _____

Manifest SHA-256: _____

Acquired/witnessed by Measurement Official: _____

Record Certifier independent-conflict check: _____

Category leader confirmed? YES / NO Prior record: _____

E14.1 — XR-1A RECORD CONFIRMATION WORKFLOW

1. Confirm both qualifying runs use the same Vehicle Passport/configuration revision, protocol code, XRP placement, cabin state, source frequency, and record category.

2. Verify pre/post reference checks and post-tech requirements for both attempts.

3. Standing record: both scores must exceed the prior record by more than the tie band. Inaugural record: the two scores must be within 0.50 dB.

4. Record value is the lower qualifying score. Preserve both run IDs in the registry.

5. If only one attempt qualifies, certify that result normally but do not assign world-record leadership.

FORM E14 — RECORD CONFIRMATION CERTIFICATE

Event ID: _____ Vehicle ID: _____ Config Rev: _____

Protocol: _____ Category: _____ Prior Record: _____ dB

Run A ID: _____ Score: _____ dB Pre/Post Check: PASS / FAIL

Run B ID: _____ Score: _____ dB Pre/Post Check: PASS / FAIL

Tie band: _____ dB Both clear standing record? YES / NO / INAUGURAL

Confirmed record value (lower qualifying score): _____ dB

Measurement Official: _____ Record Certifier: _____

Disposition: □ CERTIFIED RESULT ONLY □ MATCHED RECORD □ NEW XIGEN RECORD

FORM E15 — COMPETITION ENERGY BOUNDARY DECLARATION

List every electrical source/storage/converter capable of feeding the audio bus from READY through END. Attach a one-line diagram for PROOF/EFFICIENCY Certified attempts.

E16 — FORM VERSIONING

Every completed official form shall carry the applicable XCS revision, event ID, completion date/time, and official identity. Electronic equivalents are permitted if they preserve the same required fields, signatures/approvals, and audit history.

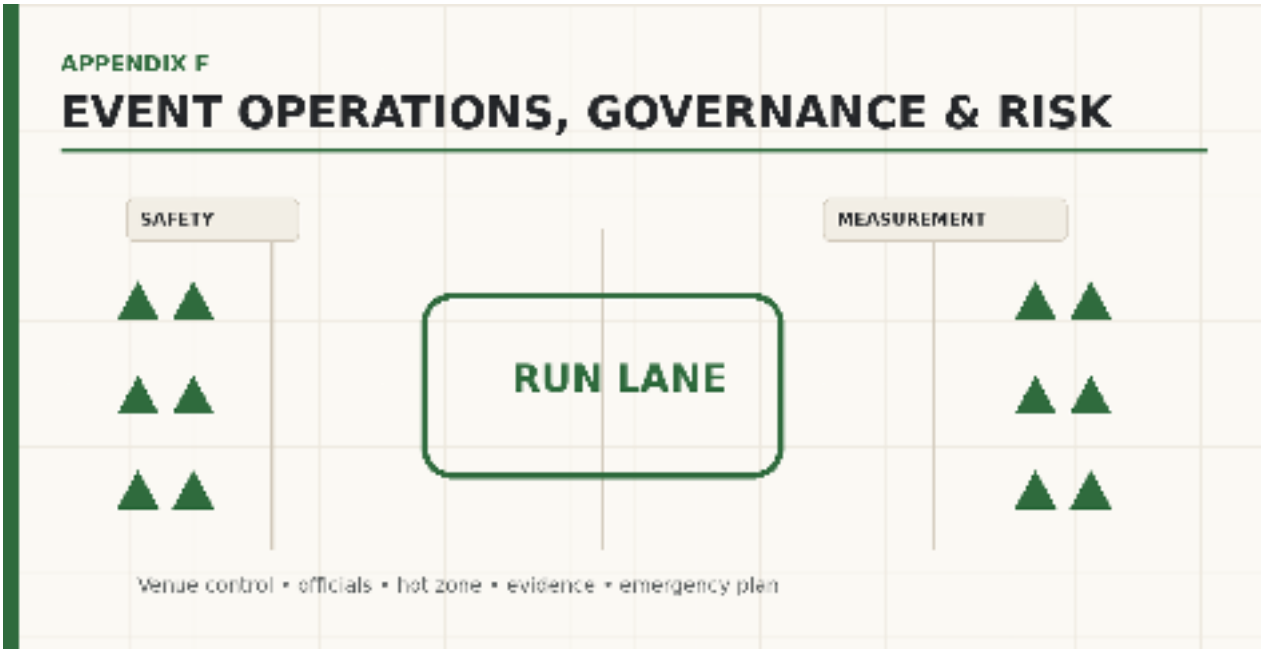
Device / path	Chemistry/type	Nominal/max V	Capacity/output	Connected during scoring?

APPENDIX F — EVENT OPERATIONS, ELIGIBILITY, GOVERNANCE & RISK

Promoter controls, lane operations, eligibility, staff exposure, protests, conflicts, discipline, and fair notice

XCS-1.0-F-RC3 | 2026-09-10 | FOUNDING RELEASE CANDIDATE 3

Governing doctrine	**The XIGEN Protocol**
Competition program	The XIGEN Protocol Series
Status	Desk-validated Release Candidate 3; physical and external-professional gates remain open.
Control rule	XCS-1.0 controls conflicts unless it expressly delegates a choice. Appendix C may impose stricter safety requirements. Other appendices and Technical Bulletins implement delegated detail but may not contradict the Standard. Event bulletins may select only published options and may not weaken safety, fairness, evidence, or record-comparability requirements.



F1 — PURPOSE

This appendix closes the operational gap between a technically valid rulebook and an event that can be run safely, predictably, and fairly. It does not replace local legal advice, venue contracts, insurance requirements, employment rules, or emergency authority.

F2 — SANCTIONING / PROMOTER MINIMUMS

- Written venue permission for the planned sound, engine operation, crowd barriers, and emergency access.
- Insurance and participant/venue documents required by the sanctioning agreement and local law. XIGEN does not provide a universal liability waiver; promoters use jurisdiction-appropriate documents reviewed by their counsel/insurer.
- Published event bulletin before registration closes, including rule revision, formats, protocol/measurement capability, attempt count, cabin states, recovery, schedule, protest windows, and points/record eligibility.
- Named Head Judge, Measurement Official, Tech/Safety authority, and emergency coordinator.
- Emergency plan for fire/thermal events, injury, electrical incident, vehicle movement, severe weather, and evacuation.
- Results/data retention plan and reliable internet-independent local backup.

F3 — MINIMUM STAFFING / ROLE COMBINATION

At L1, one person may hold multiple certifications only when lane workload allows safe separation of duties. The Head Judge may not simultaneously operate the scoring computer during a disputed run while also performing an active safety intervention. L2–L4 events progressively separate Tech, Measurement, Head Judge, and Record Certifier functions. A Record Certifier cannot certify their own vehicle/team/employer-sponsored entry or a household/immediate-family entry.

F4 — LANE CONTROL

- Only authorized competitors/crew and officials may enter the controlled lane.
- Before READY, loose objects are removed, barriers established, hearing/eye protection available as applicable, and the emergency-control path is clear.
- ARMED status is announced visibly/audibly to officials. No service work occurs while ARMED.
- After scoring, vehicle transitions to SAFE before any person enters the cabin or touches high-current/high-output wiring.

F5 — NOISE-EXPOSURE CONTROL

The fixed 3 m / 6 m Hot Zone distances in Appendix C are minimum physical barriers only. Promoters are responsible for worker/official exposure control under applicable law and venue policy. Where repeated high-output runs occur, staff exposure should be monitored with appropriate A-weighted sound-level/dose methods, work positions rotated, remote observation used, and barriers expanded. Hearing protection does not authorize unnecessary close exposure to extreme pressure.

F6 — INDOOR ENGINE / AIR QUALITY

Indoor engine-on competition requires venue approval, effective exhaust extraction/ventilation, and required CO monitoring. The Head Judge may order engine-off competition at any time. Improvised unattended throttle holds are prohibited under Appendix C.

F7 — COMPETITOR ELIGIBILITY

- Each scored entry has a Competitor ID and Vehicle ID. Identity requirements for points/records are published before the season.
- Minors may participate only under a promoter policy compliant with local law, guardian requirements, venue rules, and insurer requirements; minors are never permitted inside normal high-output scored vehicles.
- An entry may be refused or stopped for unsafe conduct, credible threats, active impairment, deliberate fraud, or refusal to follow lane safety instructions, subject to documented review.

F8 — PREPARATION AND ATTEMPT CONTROL

- Standard lane preparation time is 3 minutes after the vehicle is called and measurement setup is available, unless one different time is published for the entire category.
- Standard Certified-record session allows two scored attempts per configuration/category at an event unless a format specifies otherwise. An attempt voided solely by official measurement failure does not consume the allowance.
- Configuration changes between record attempts require declaration and may create a new configuration revision; undeclared changes invalidate the later attempt.

F9 — POINTS OWNERSHIP / EMPTY-FIELD CONTROL

Season points attach to the Competitor ID + Vehicle ID + format + division pairing. A championship title requires the published minimum number of sanctioned starts and qualification criteria, so a one-entry local field alone cannot create a season championship. Team/manufacturer standings, if introduced, use a separate published formula.

F10 — PROTEST FILING WINDOWS

Issue	Normal filing deadline	Notes
Classification / declared legality	Before first scored run	Later filing allowed only for concealed facts or changes.
Run score / procedure	Within 15 minutes of posting or before awards, whichever occurs first	Immediate notice to Head Judge; evidence preserved.
Post-tech / record eligibility	Within 30 minutes of ruling	Vehicle/evidence held where practical.
Fraud / data authenticity	Any time credible new evidence emerges	No limitation while the result remains official; due process still applies.

F11 — APPEAL WINDOWS

- Level 1 event ruling is documented before awards when practical.
- Level 2 appeal is filed within 72 hours of the written Level 1 ruling.
- Level 3 final appeal is filed within 7 calendar days of the written Level 2 ruling.
- Safety-stop authority is not suspended by an appeal. Competitive status may be marked PENDING while evidence is preserved.

F12 — DISCIPLINARY DUE PROCESS

Except for immediate safety removal, an integrity suspension/revocation decision identifies the alleged rule, material facts, evidence relied on, proposed consequence, response deadline, decision-maker/conflicts, written outcome, and appeal route. Emergency temporary suspension may be imposed to protect safety or evidence but must receive prompt review.

F13 — FAIR NOTICE / NOVEL CONFIGURATIONS

NO SURPRISE DISQUALIFICATION FOR A GENUINELY AMBIGUOUS RULE.

A competitor who timely discloses a novel configuration is entitled to a provisional classification/ruling before the run where reasonably possible. The ruling remains valid for that event unless new material facts, safety risk, or deception appears. The Rules & Standards Committee may change future interpretation through published precedent or revision.

F14 — OFFICIAL CONFLICTS

- Officials disclose team, family/household, employer, financial, manufacturer, or other interests that could reasonably affect impartiality.
- No official decides their own protest/appeal.
- Team XIGEN, founders, committee members, sponsors, and Accord partners receive no exemption. Records involving an organizational insider require an independent Record Certifier.

F15 — EVENT RESULTS / AUDIT LOG

- Event results are versioned and include posting time, rule revision, protocol code, and status (P/V/C/PENDING).
- Corrections never silently overwrite the public history; the prior status and correction reason remain auditable.
- Certified-result evidence follows Appendix D/E chain-of-custody controls.

F16 — FORCE MAJEURE / CANCELLATION

Weather, venue orders, emergency response, measurement-system failure, utility loss, or other force majeure may delay or cancel competition. The Head Judge/Promoter documents whether completed rounds stand, whether refunds/credits apply under event policy, and whether points/records remain valid. Safety and evidence integrity control over schedule pressure.

F18 — RECORD SOFTWARE / PROFILE CONTROL

Record-capable events publish the exact XR-1A scoring software/profile identifier before registration closes. The scoring workstation clock, file storage path, operator account, and version are controlled by the Measurement Official. Mid-event software/profile changes suspend record capability until documented reference checks and a Head Judge bulletin are completed. Ordinary local scoring may continue only if the change does not alter the declared scoring method.

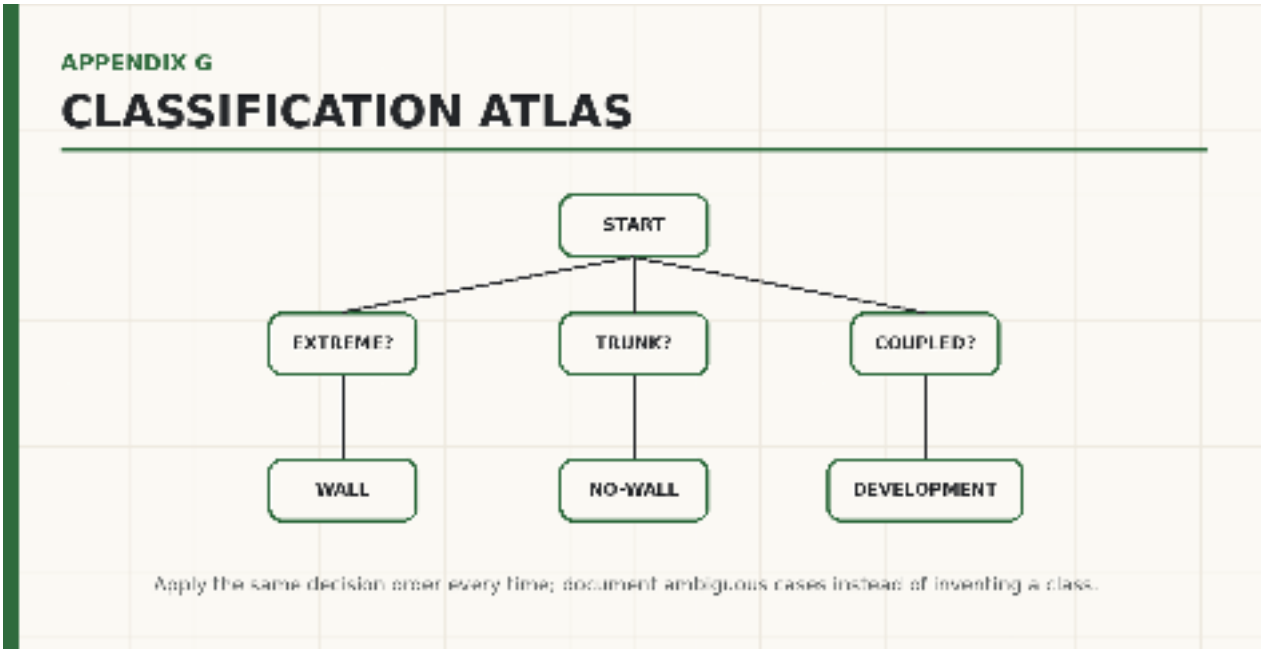
F19 — RECORD SESSION FLOW

A world-record session is treated as evidence acquisition, not an unlimited tuning lane. Standard RC3 permits two scored record attempts per configuration/category, plus reruns caused solely by official measurement failure. The vehicle remains under configuration control between attempts. Where Record Confirmation is sought, both attempts must be completed under the same published protocol and post-tech chain.

APPENDIX G — CLASSIFICATION ATLAS & EDGE-CASE GUIDE

Judge-facing decision logic, representative architectures, and pathological examples

XCS-1.0-G-RC3 | 2026-09-10 | FOUNDING RELEASE CANDIDATE 3



G1 — PURPOSE

This atlas turns Appendix B into a repeatable field decision. It does not replace Appendix B; it provides examples, decision order, and written-ruling prompts. Classification follows functional acoustic architecture, not what a builder calls the enclosure.

G2 — DECISION ORDER

1. EXTREME first: Has the forward cabin, sensor geometry, body structure, or test environment been materially rebuilt into a purpose-built pressure chamber or nonrepresentative geometry?

2. TRUNK: Is the primary low-frequency source conventionally trunk-contained in a separated luggage compartment, using OEM-style pass-throughs/openings without converting the passenger cabin into the enclosure?

3. COUPLED: Is the primary source remote from the ordinary cabin (pickup bed, external cargo module, midgate/rear remote volume) and directly connected by a purposeful blow-through, transformer, duct, or pressure spine without a full forward wall?

4. WALL: Does a rigid boundary functionally define the forward pressure volume and separate it from the primary source? Apply the 80% presumption, then functional review.

5. NO-WALL: If none of the above apply and the primary system shares a continuous passenger/cargo volume, classify NO-WALL.

6. DEVELOPMENT: If a novel system cannot be classified without inventing a new rule, preserve the data and move it to Development pending Technical Commission decision.

G3 — WALL PRESUMPTION FIELD METHOD

Use a cabin cross-section at the principal acoustic boundary. Estimate projected total cross-sectional area and the rigid occupied area, excluding intentional acoustic apertures. ≥80% rigid occupancy with no ordinary continuous air path creates a WALL presumption. The presumption can be rebutted only by Senior Tech with written functional reasons. Below 80% can still be WALL when the structure functionally seals/defines the forward pressure volume.

G4 — REPRESENTATIVE ATLAS CASES

Case	Architecture	Ruling	Reason
G4-01	Sedan; sealed sub enclosure entirely in trunk; rear seat installed	TRUNK	Conventional separated luggage volume.

Case	Architecture	Ruling	Reason
G4-02	Sedan; trunk enclosure; OEM fold-down seat open during run	TRUNK	Opening is coupling path; source remains trunk-contained.
G4-03	Sedan; trunk enclosure feeding OEM rear-deck apertures plus fold-down opening	TRUNK	Multiple OEM-style paths do not by themselves convert cabin architecture.
G4-04	Sedan; enclosure permanently projects through rear-seat opening into passenger space	NO-WALL	Primary acoustic structure now occupies shared cabin volume.
G4-05	Pickup; bed enclosure through reinforced cab blow-through	COUPLED	Remote source deliberately coupled to cabin.
G4-06	Pickup; bed pressure spine/transformer duct to cab	COUPLED	Remote source; purposeful transformer; no full cabin wall.
G4-07	SUV; cargo enclosure behind second row with normal continuous cabin air path	NO-WALL	Shared passenger/cargo volume.
G4-08	SUV; enclosure fills most cargo area but air path remains over/around structure	NO-WALL	Large enclosure is not automatically a wall.
G4-09	Rigid driver/port baffle behind B-pillar occupying ≥80% cross-section	WALL	Wall presumption and functional separation.
G4-10	Rigid structure occupies 72% but sealed trim closes all ordinary bypass paths	WALL	Functional effect overrides percentage.
G4-11	Rigid structure occupies 85% but leaves an ordinary open side corridor continuously joining cargo and forward cabin	NO-WALL rebuttal possible	Senior Tech written ruling required.
G4-12	Forward pressure chamber shortened so XRP cannot be placed normally	EXTREME	Sensor geometry/nonrepresentative cabin.
G4-13	Purpose-built steel/acrylic pressure cell inside stripped vehicle shell	EXTREME	Competition chamber rather than ordinary cabin architecture.
G4-14	Primary horn/transformer substantially protrudes outside OEM vehicle envelope during scoring	EXTREME	External purpose-built acoustic transformer.
G4-15	Motorized port/baffle changes geometry during scoring	DEVELOPMENT / ACTIVE-GEO	Standard records require fixed geometry.
G4-16	Inflatable or rigid filler intentionally reduces cabin volume before run	EXTREME / M3	Dedicated acoustic volume displacement is architecture.
G4-17	Temporary sandbags/blocks placed as pressure baffles near sensor	INVALID standard attempt	Undeclared acoustic ballast/sensor-field manipulation.
G4-18	Hidden small speaker near sensor supplements score	INVALID	Undeclared score-producing transducer; Appendix A anti-spoofing.
G4-19	EV traction battery/DC-DC directly feeds audio bus	DEVELOPMENT + TRAC for standard records	Dedicated propulsion/electrical standard still required.
G4-20	Removable competition wall installed and tech-inspected before run	WALL	Classify the actual scored configuration, not street configuration.
G4-21	External loudspeaker outside vehicle aimed through open window	INVALID standard attempt	External undeclared score source.
G4-22	Natural roof/door flex from acoustic pressure	Class unchanged	Emergent structural response is not active geometry; unsafe movement can still stop run.
G4-23	Mechanically powered roof/panel actuator synchronized to tone	INVALID / DEVELOPMENT	Non-audio mechanical pressure source.
G4-24	Large removable battery case contains many serviceable modules	Class unchanged; resource metadata expands	Outer packaging cannot hide resource magnitude.

G5 — AMBIGUITY RULING TEMPLATE

- What is the primary acoustic source volume?
- What physical boundary defines the forward measurement volume?
- Is there an ordinary continuous air path around the structure?
- Is the source remote and intentionally coupled through a transformer/opening?

- Would removing the questioned structure materially change cabin volume/boundary?
- Can XRP be installed without special geometry?
- Does any temporary/nonfunctional object act as acoustic architecture?
- Which Appendix B rule and atlas case is closest?
- Written ruling and photographs attached before first scored run?

G6 — PILOT STATUS OF 80% WALL PRESUMPTION

The 80% threshold remains a rebuttable RC3 pilot presumption, not a physics constant. Physical classification testing must include representative 60–95% structures, open bypass paths, sealed trim, WALL, NO-WALL, and COUPLED examples before XCS-1.0 Final.