



VEYRUM ROBOTICS STANDARD



VRS - AER - 201

Aerial / UAS — AR Assessment Protocol

How the Aerial/UAS Application Rating letter is determined — sector criteria AER-1...AER-9, contributing intrinsic criteria, letter bands, tier ceilings and class applicability, with evidence by tier and underwriting use.

VEYRUM RESEARCH INSTITUTE

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Foreword. This Assessment Protocol determines the **Aerial/UAS Application Rating (AR)** letter for a robot model in a declared application class. It scores a **pool** of criteria — the nine sector criteria of Clause 6 (AER-1...AER-9, 100 points) plus the named intrinsic criteria of Clause 5, each scored once under its own standard and counted here — and expresses the earned points as a percentage of the applicable pool, which maps to a letter **C < B < A < AA < AAA (AAA best)** by the bands of VRS-GEN-006 §4. Every criterion is bounded by an evidence tier — Unverified, Verified, Certified — so the best attainable letter rises with substantiation, not assertion. This edition supersedes the re-weighted-mean model of the 0.x drafts: no weighting, no separate grade bands, no separate modifiers — the tier limits fall out of the per-criterion ceilings of Clause 6. The defining risk of the sector is the **uninvolved person beneath the flight path**: a person or property beneath the operating volume made no choice to be there, so third-party ground bodily-injury severity (AER-4), lost-link and airspace containment behaviour (AER-2, AER-3) and the correlated fleet exposure of a shared command-and-control link, GNSS service or firmware plane (AER-9) are scored by demonstrated behaviour, not by assertion, and the rating is bounded to the **operating volume** and the application classes the evidence covers. An Aerial/UAS AR is an opinion above the compliance floor, not a certification, and nothing here implies that any real robot holds a Veyrum rating (ratings are not published). Requirements use “shall”; recommendations use “should”.

1 Scope

1.1 This Protocol defines, for the **Aerial/UAS** sector Application Rating: the determination method (Clause 4); the contributing intrinsic criteria drawn into the pool (Clause 5); the nine sector criteria AER-1...AER-9 with their point ladders and tier ceilings (Clause 6); the letter bands, pool ceilings and class applicability (Clause 7); the evidence admissible at each tier (Clause 8); underwriting and credit use (Clause 9); result recording (Clause 10); and the assessor checklist (Clause 11). A worked example is at Annex A.

1.2 The AR shall be issued **per application class**. The application classes are **small UAS (< 25 kg)**, **heavy-lift / delivery**, **dock-based autonomous** and **VTOL fixed-wing**, per VRS-AER-001 §4. Sector applicability, the hazard taxonomy and the anchor regime are defined in VRS-AER-001 and are not restated here.

1.3 The AR shall be assessed at one of three **tiers** — Unverified, Verified, Certified. Each criterion states the maximum points reachable at each tier (Clause 6); the AR tier is the tier whose evidence bar the assessed evidence meets and shall not exceed the model’s Intrinsic Rating tier (VRS-GEN-006 §7). The underlying point aggregation and the letter bands are defined in VRS-GEN-005/006 and are not restated here.

2 Normative references

- **VRS-AER-001**, Aerial / UAS — Sector Standard — applicability, application classes, the hazard taxonomy and the verified AER anchor regime.

- **VRS-GEN-005**, Intrinsic Rating — Methodology — point aggregation, tiers, cold-start parity and the company-wide fallback rule (§6).
- **VRS-GEN-006**, Application Rating — Scheme — the letter bands, the applicable-pool percentage and the tier rule.
- **VRS-GEN-009**, Robot Risk Passport and Registry Schema — the record that carries the AR result.
- **VRS-GEN-012**, Evidence Grades and Data Requirements — evidence kinds and the tier evidence bars.
- **VRS-GEN-101 ... VRS-GEN-107**, IR Category Standards — the intrinsic criteria contributed under Clause 5.
- Anchor regime (verified 2026-09-12; full designations in the Bibliography): 14 CFR Part 107 and Part 89 (US); FAA §44807; Commission Implementing Regulation (EU) 2019/947 and Delegated Regulation (EU) 2019/945 (EASA); Regulation (EC) No 785/2004 (third-party insurance); JARUS SORA v2.5 (2024); ISO 21384-3:2023; ISO 21895:2020; ASTM F3411-22a; ASTM F3322; IEC 62443-4-2:2019; ISO 14224:2016; ISO 8373:2021.
- Data twin: **VRS-AER-501** (generated from this Protocol, never hand-edited).

3 Terms and definitions

Terms per VRS-GEN-001 (aligned to ISO 8373:2021) and VRS-AER-001. Locally:

- **pool** — the set of criteria whose points determine the AR letter: the nine sector criteria of Clause 6 together with the contributing intrinsic criteria of Clause 5.
- **applicable pool** — the pool for a given application class after criteria not applicable to that class are removed from both the earned points and the pool range (Clause 4; VRS-GEN-006 §6).
- **contributor** — an intrinsic criterion scored once under its own IR category standard and counted again in the sector pool at the same points (Clause 5).
- **tier** — the evidence stringency at which a criterion is assessed: **Unverified** (public evidence only), **Verified** (manufacturer evidence pack examined), **Certified** (behaviour witnessed).
- **ceiling** — the maximum points a criterion awards at a given tier; points earned are held at the ceiling of the assessed tier.
- **evidence bar** — the minimum evidence a criterion requires before any points are awarded; below it the criterion scores 0.
- **company-wide fallback** — the substitute points a criterion allows from manufacturer-wide evidence when model-specific evidence is unavailable (VRS-GEN-005 §6).
- **operating volume** — the airspace envelope declared for the assessed operations, within which evidence is attributable and the letter is valid (VRS-AER-001 §3).
- **containment** — the system's ability to remain within its operating volume, including in failure (VRS-AER-001 §3).
- **third-party ground exposure** — persons and property beneath or near the operating volume who are not involved in the operation (VRS-AER-001 §3).
- **worst-case ground population** — the most vulnerable and densest person class admitted beneath the operating volume (an assembly of people, a congested area) against which ground-risk severity is

weighed, per the JARUS SORA v2.5 ground-risk construct.

4 Method of assessment

4.1 The Aerial/UAS AR shall be determined as a percentage of the **applicable pool** and mapped to a letter by the bands of VRS-GEN-006 §4 (Clause 7.1). The pool is the nine sector criteria of Clause 6 (AER-1... AER-9, 100 points) together with the contributing intrinsic criteria of Clause 5, each scored once under its own standard and counted here at the same points. For an application class the assessor shall add the points earned across the applicable criteria and divide by the sum of the point ranges of those same criteria; a criterion not applicable to the class (Clause 6 Applicability row; VRS-GEN-006 §6) shall be removed from both the earned points and the pool range. No weighting is applied — each criterion's point range sizes its own importance — and no separate modifiers operate on the letter: the tier limits follow from the per-criterion ceilings of Clause 6 (Clause 7.2; VRS-GEN-006 §8).

4.2 Evidence shall be attributable to the declared **application class** of the assessed operation (small UAS < 25 kg, heavy-lift / delivery, dock-based autonomous or VTOL fixed-wing; Clause 1.2) and to the declared **operating volume** — the airspace envelope, altitude and area limits, and the ground population beneath it — within which the evidence was gathered; the AR letter covers only the assessed classes and operating volumes.

4.3 Letters shall be issued **per application class** where evidence diverges materially between classes; the displayed sector letter shall be the **lowest issued class letter**. A class for which no letter can be issued shall be displayed as *not covered*, and the assessed **operating volume shall contract** to the airspace, altitude, area and ground-population conditions the evidence actually covers rather than the score being stretched to conditions never observed.

4.4 Evidence obtained outside a declared application class or its operating volume shall be **inadmissible** as support for a broader claim and shall not raise the score; a score shall not be stretched to a denser ground population, a heavier airframe, a more restricted airspace class or a beyond-visual-line-of-sight condition never observed. Third-party ground-risk performance (AER-4) shall never be inferred from operations over sparsely populated or segregated ground when the declared class admits assemblies of people: the uninvolved person beneath the flight path is the risk being rated, so the ground-risk case for a class shall rest on evidence gathered at or above the ground-population density the class declares.

5 Contributing IR criteria

5.1 The sector pool consists of the sector criteria of Clause 6 and the following intrinsic criteria, scored once under their own standards and counted again here at the same points:

IR CRITERION	SCORED UNDER
SF-2	VRS-GEN-101 §6.2
SF-5	VRS-GEN-101 §6.5
SF-7	VRS-GEN-101 §6.7
SF-8	VRS-GEN-101 §6.8
RL-1	VRS-GEN-102 §6.1
RL-2	VRS-GEN-102 §6.2
RL-7	VRS-GEN-102 §6.7
SV-1	VRS-GEN-103 §6.1
SV-5	VRS-GEN-103 §6.5
CY-3	VRS-GEN-105 §6.3
CY-4	VRS-GEN-105 §6.4
CY-5	VRS-GEN-105 §6.5
MS-1	VRS-GEN-106 §6.1
MS-7	VRS-GEN-106 §6.7
SI-1	VRS-GEN-104 §6.1
SI-2	VRS-GEN-104 §6.2
SI-6	VRS-GEN-104 §6.5

5.2 No other intrinsic criterion contributes. Points, ceilings and applicability of a contributing criterion are those of its own standard; where a contributing criterion is not applicable to the assessed application class it is removed from the pool for that class (VRS-GEN-006 §6).

6 Sector criteria

6.0 Summary. Points and tier ceilings per criterion; totals reproduce by addition.

§	CRITERION	POINTS	UNVERIFIED CEILING	VERIFIED CEILING	CERTIFIED CEILING
6.1	AER-1 Airworthiness / class-mark / operational-authorisation fit	0–14	12	13	14
6.2	AER-2 Lost-link and fail-safe behaviour	0–14	8	11	14
6.3	AER-3 Airspace containment (geo-awareness, altitude/area limits, Remote ID)	0–12	8	10	12
6.4	AER-4 Ground-risk mitigation	0–12	6	10	12
6.5	AER-5 Propulsion and battery in-flight integrity	0–12	7	9	12
6.6	AER-6 Weather-envelope discipline	0–6	4	5	6
6.7	AER-7 Maintenance, inspection and fleet-firmware discipline	0–10	8	9	10
6.8	AER-8 Occurrence and incident record	0–10	10	10	10
6.9	AER-9 C2-link and data security	0–10	7	8	10
Total		100	70	85	100

6.1 6.1 AER-1 Airworthiness / class-mark / operational-authorisation fit (0–14)

ROW	
What is measured .	
Ladder	14 = class mark or type approval by notified body/authority + operational authorisations published · 13 = pack-evidenced (documents), not demonstrated · 12 = class mark/approval public · 8 = declared conformity with test reports · 4 = declared · 0 = not established
Unverified — evidence & ceiling	Public class marks; authority registers. Ceiling 12.
Verified — evidence & ceiling	Certificates + test reports + authorisations. Ceiling 13.
Certified — evidence & ceiling	— (documentary). Ceiling 14.
Company-wide fallback	n/a
Evidence bar	Class and operating category declared.
Applicability	small UAS (< 25 kg) · heavy-lift / delivery · dock-based autonomous · VTOL fixed-wing. All criteria apply to all classes.

6.2 AER-2 Lost-link and fail-safe behaviour (0–14)

ROW	
What is measured	C2 loss → declared RTH/land/loiter; GNSS-degraded fallback.
Ladder	14 = witnessed incl. GNSS-degraded · 11 = pack-evidenced (documents), not demonstrated · 10 = witnessed nominal · 8 = certified/independently tested · 5 = documented · 0 = not established
Unverified — evidence & ceiling	Editorial tests; certificate. Ceiling 8.
Verified — evidence & ceiling	Validation evidence. Ceiling 11.
Certified — evidence & ceiling	Witnessed link cut → declared behaviour; GNSS-degraded case. Ceiling 14.
Company-wide fallback	n/a
Evidence bar	Fail-safe behaviours declared.
Applicability	small UAS (< 25 kg) · heavy-lift / delivery · dock-based autonomous · VTOL fixed-wing. All criteria apply to all classes.

6.3 6.3 AER-3 Airspace containment (geo-awareness, altitude/area limits, Remote ID) (0–12)

ROW	
What is measured .	
Ladder	12 = witnessed refusal at boundary + Remote ID broadcast verified · 10 = pack-evidenced (documents), not demonstrated · 9 = documented + certified · 8 = publicly evidenced only (no pack, no demonstration) · 6 = documented · 0 = not established
Unverified — evidence & ceiling	Public documentation; Remote ID compliance lists. Ceiling 8.
Verified — evidence & ceiling	Geo-awareness design + compliance evidence. Ceiling 10.
Certified — evidence & ceiling	Witnessed boundary refusal; Remote ID receiver check. Ceiling 12.
Company-wide fallback	n/a
Evidence bar	Geo-awareness declared.
Applicability	small UAS (< 25 kg) · heavy-lift / delivery · dock-based autonomous · VTOL fixed-wing. All criteria apply to all classes.

6.4 AER-4 Ground-risk mitigation (0–12)

ROW	
What is measured	Parachute/flight-termination, over-people class limits, impact-energy statements.
Ladder	12 = witnessed termination/parachute + certified · 10 = pack-evidenced (documents), not demonstrated · 9 = certified ((public)) · 6 = documented · 0 = not established
Unverified — evidence & ceiling	Certificates (e.g. ASTM F3322 parachute); datasheet. Ceiling 6.
Verified — evidence & ceiling	Test evidence. Ceiling 10.
Certified — evidence & ceiling	Witnessed termination/parachute deployment on a test rig where safe. Ceiling 12.
Company-wide fallback	n/a
Evidence bar	Ground-risk mitigations declared.
Applicability	small UAS (< 25 kg) · heavy-lift / delivery · dock-based autonomous · VTOL fixed-wing. All criteria apply to all classes.

6.5 AER-5 Propulsion and battery in-flight integrity (0–12)

ROW	
What is measured	Redundancy, battery health management, low-battery behaviour, thermal limits.
Ladder	12 = witnessed low-battery + motor-out behaviour · 9 = validated · 7 = publicly evidenced only (no pack, no demonstration) · 5 = documented · 0 = not established
Unverified — evidence & ceiling	Datasheet; tests. Ceiling 7.
Verified — evidence & ceiling	Validation evidence. Ceiling 9.
Certified — evidence & ceiling	Witnessed low-battery RTH; motor-out handling where safe. Ceiling 12.
Company-wide fallback	n/a
Evidence bar	Battery/propulsion architecture declared.
Applicability	small UAS (< 25 kg) · heavy-lift / delivery · dock-based autonomous · VTOL fixed-wing. All criteria apply to all classes.

6.6 6.6 AER-6 Weather-envelope discipline (0–6)

ROW	
What is measured	Wind/precip/icing limits published; app warnings; launch refusal beyond limits.
Ladder	6 = witnessed refusal · 5 = documented + independently tested · 4 = publicly evidenced only (no pack, no demonstration) · 3 = documented · 0 = not established
Unverified — evidence & ceiling	Datasheet with conditions; editorial tests. Ceiling 4.
Verified — evidence & ceiling	Envelope validation. Ceiling 5.
Certified — evidence & ceiling	Witnessed warning/refusal at a simulated limit. Ceiling 6.
Company-wide fallback	n/a
Evidence bar	Weather envelope declared.
Applicability	small UAS (< 25 kg) · heavy-lift / delivery · dock-based autonomous · VTOL fixed-wing. All criteria apply to all classes.

6.7 6.7 AER-7 Maintenance, inspection and fleet-firmware discipline (0–10)

ROW	
What is measured	Published maintenance programme with intervals; per-airframe logs; fleet firmware management.
Ladder	10 = all shown · 9 = documented in detail (public programme) · 8 = publicly evidenced only (no pack, no demonstration) · 5 = partial · 0 = not established
Unverified — evidence & ceiling	Public maintenance programme. Ceiling 8.
Verified — evidence & ceiling	Programme + log evidence. Ceiling 9.
Certified — evidence & ceiling	Logs and fleet-firmware console shown. Ceiling 10.
Company-wide fallback	n/a
Evidence bar	None.
Applicability	small UAS (< 25 kg) · heavy-lift / delivery · dock-based autonomous · VTOL fixed-wing. All criteria apply to all classes.

6.8 AER-8 Occurrence and incident record (0–10)

ROW	
What is measured	Authority occurrence databases over the window, normalised by disclosed fleet/flight hours.
Ladder	10 = none attributable to the model · 8 = company-wide record in place of model-specific data · 7 = remediated · 3 = null-result rung · 0 = not established. · 0. Regime-full at Unverified.
Unverified — evidence & ceiling	FAA/EASA/AAIB databases ((public)). Ceiling 10.
Verified — evidence & ceiling	Register + exposure. Ceiling 10.
Certified — evidence & ceiling	From Verified evidence. Ceiling 10.
Company-wide fallback	Company-wide → 8
Evidence bar	None.
Applicability	small UAS (< 25 kg) · heavy-lift / delivery · dock-based autonomous · VTOL fixed-wing. All criteria apply to all classes.

6.9 AER-9 C2-link and data security (0–10)

ROW	
What is measured	Encrypted C2 and video, local-data mode, account/remote controls, spoofing resistance.
Ladder	10 = shown + third-party audit · 8 = documented in detail + audit · 7 = publicly evidenced only (no pack, no demonstration) · 5 = documented · 0 = not established
Unverified — evidence & ceiling	Security page; published audits. Ceiling 7.
Verified — evidence & ceiling	Security documentation + audit reports. Ceiling 8.
Certified — evidence & ceiling	Witnessed local-data mode, account controls. Ceiling 10.
Company-wide fallback	n/a
Evidence bar	None.
Applicability	small UAS (< 25 kg) · heavy-lift / delivery · dock-based autonomous · VTOL fixed-wing. All criteria apply to all classes.

7 Letter bands, tier ceilings and class applicability

7.1 Bands (VRS-GEN-006 §4). AAA ≥ 90 % · AA ≥ 75 % · A ≥ 60 % · B ≥ 45 % · C below 45 % of the applicable pool.

7.2 Pool ceilings. Sector criteria alone: Unverified 70/100 (70 %) · Verified 85/100 (85 %) · Certified 100. With the contributing criteria of Clause 5 the pool ceilings are as recorded in VRS-AER-501; in both forms the best attainable letter is A at Unverified, AA at Verified and AAA at Certified (VRS-GEN-006 §8).

7.3 Application classes. small UAS (< 25 kg) · heavy-lift / delivery · dock-based autonomous · VTOL fixed-wing. All criteria apply to all classes... A criterion whose Applicability row excludes the assessed class is removed from both the numerator and the denominator; the letter is issued per class and the displayed letter is the lowest (Clause 4).

7.4 No modifiers, caps or gates operate on the letter other than the ceilings of Clause 6 and the tier rule of VRS-GEN-006 §7.

7.5 Continued validity (formerly §7.2). Where the continued-validity obligations of VRS-AER-001 Annex A are not met, the issued rating changes **state** under VRS-GEN-004 / VRS-GEN-010 (refresh due, withdrawn) — it is never re-scored or shown as a lower letter. The state is recorded per VRS-GEN-008; the letter itself is untouched by this clause.

8 Evidence by tier

8.1 Unverified. The assessor works only from evidence obtainable without the manufacturer’s cooperation: datasheets, manuals and public safety documentation; public class marks and the authority registers that list them (14 CFR Part 107 / Part 89 and FAA §44807 authorities in the US; the EASA Open/Specific/Certified categories and Reg (EU) 2019/945 class marks C0–C6 in the EU); published Remote ID compliance lists (ASTM F3411-22a); independent published test reports and audits; public security documentation; and — for the occurrence-record criterion (AER-8) — the FAA, EASA and AAIB occurrence databases. Each criterion’s Unverified ceiling (Clause 6) is the most an honest reading of such evidence shall earn; the AR tier is **Unverified**.

8.2 Verified. The assessor additionally examines a manufacturer evidence pack and shall accept, by mapping, the conformity artefacts the manufacturer already holds — adoption is a mapping, not new testing; the class certificate, test reports and operational authorisations (AER-1); the lost-link and fail-safe validation evidence (AER-2); the JARUS SORA v2.5 (2024) ground-risk assessment, over-people category evidence and the ASTM F3322 parachute / flight-termination test report (AER-4); the geo-awareness design file with its ISO 21384-3:2023 operational-procedure records (AER-3); the propulsion/battery qualification evidence (AER-5); the weather-envelope validation (AER-6); the ISO 14224:2016 maintenance records and published maintenance programme (AER-7); the occurrence register with its exposure basis (AER-8); and the IEC 62443-4-2:2019 security-level statement (FR1–FR7) for the C2 link, GNSS and update plane with the supporting audit reports (AER-9). Verified ceilings apply only to criteria whose pack items are present and examined; the AR tier is **Verified**.

8.3 Certified. The assessor witnesses the declared behaviour on the robot: a C2-link cut driving the declared RTH/land/loiter behaviour and the GNSS-degraded case (AER-2); boundary refusal with a Remote ID receiver check (AER-3); flight-termination or parachute deployment on a test rig where safe (AER-4); low-battery return and motor-out handling where safe (AER-5); the warning/launch refusal at a simulated weather limit (AER-6); the per-airframe logs and the fleet-firmware console (AER-7); and the local-data mode and account/remote controls (AER-9). The documentary criteria (AER-1, AER-8) carry their Certified points from the Verified evidence. The AR tier is **Certified**.

8.4 Evidence bar. Each criterion states an **evidence bar** (Clause 6). Where the bar is not met the criterion shall score **0** — no evidence is 0 points, never a discard from the pool. A manufacturer self-declaration shall not earn points above the rung its independent corroboration supports; AER-4 and AER-2 performance resting on uninstrumented recollection rather than instrumented flight logs, Remote ID records or occurrence reports shall not earn the witnessed rungs, which are reachable only at the Certified tier.

8.5 Null-result rule. For AER-8 a recorded search of the FAA, EASA and AAIB occurrence databases, with its coverage and exposure basis stated, shall earn the criterion’s null-result rung where no adverse record is found; an unrecorded search shall not.

8.6 Company-wide fallback. Where a criterion offers a company-wide fallback (AER-8) and model-specific evidence is unavailable, manufacturer-wide records shall earn the stated fallback points (VRS-GEN-005 §6); the substitution shall be recorded per Clause 10.

8.7 AR tier. The AR tier is the lowest tier among the criteria that determined the letter, and shall not exceed the model’s Intrinsic Rating tier (VRS-GEN-006 §7).

9 Underwriting and credit use

9.1 The letter is an opinion above the compliance floor, not a certification, and shall not be published or imply that any real robot holds a Veyrum rating. A rating is an opinion on the robot, not on the lawfulness of any deployment: absence of an operational authorisation scores 0 on AER-1 and the robot is still rated, with the missing authorisation recorded on the result.

9.2 The per-class letters and the recorded operating volume are the underwriting hooks: the letter informs rate relativity, and the covered application classes and operating volumes inform coverage scope, so that operation outside the assessed envelope – a denser ground population, a heavier airframe, an unflown airspace class or an unassessed beyond-visual-line-of-sight profile – is an exclusion or a condition rather than an implied covered risk. Two loss drivers shall be surfaced separately so an underwriter can weigh them independently of the letter: the **third-party ground severity driver** (AER-4 ground-risk mitigation, weighed to the **worst-case ground population** the operating volume admits – a single uncontrolled descent onto a congested area can generate a liability claim far exceeding the airframe’s own value), which additionally maps to any statutory minimum third-party liability cover the operating jurisdiction imposes (for EU operations, Reg (EC) No 785/2004 Art. 7 scales a per-accident minimum by maximum-take-off-mass band and applies to unmanned aircraft of 20 kg or more (Art. 2), readable from the operator’s existing insurance certificate (Art. 5)); and the **correlated fleet driver** (AER-2/AER-3 lost-link and containment behaviour and AER-9 C2, GNSS and firmware integrity – where many units share one command-and-control link, positioning service or firmware plane, one spoofing, jamming or intrusion event can degrade the fleet at once, so the per-fleet accumulation attribute records whether that plane holds an IEC 62443-4-2:2019 security-level evaluation). The mid-air-collision tail with crewed aircraft shall likewise be surfaced separately for accumulation, not netted into frequency.

9.3 For credit, the recoverability and residual drivers shall be readable from the recorded per-criterion points to inform LTV, residual curves and end-of-support assumptions: AER-2 and AER-3 bear directly on recoverability, as a flyaway is a total loss; AER-5 and AER-7 (battery/propulsion wear and maintenance discipline) inform the residual curve; and the intrinsic support and reliability criteria drawn into the pool (Clause 5) inform the obsolescence assumption for the autonomy stack.

10 Result recording

The rating record shall carry, per VRS-GEN-009: the displayed sector letter and the per-class letters with the operating volume each was issued at; the **per-criterion points** earned across the sector criteria (Clause 6) and the contributing intrinsic criteria (Clause 5); the **not-applicable set** removed for each class and the resulting applicable-pool range; the contributing intrinsic criteria used; the AR **tier**; the **edition** (VRS 2026); the VRS-AER-501 data-twin version; the operational-authorisation evidence recorded for AER-1 (and any absence of it); the worst-case ground population and ground-population density (AER-4 severity attribute); and the correlated fleet-accumulation attribute (AER-2/AER-3/AER-9). Recording flows to the Passport per VRS-GEN-009; no personal information shall be stored (VRS-GEN-012 §5.2).

11 Assessor checklist

An assessor with this Protocol and the evidence shall reach the same result by executing the following in order; no step admits an unrecorded judgement call, and any deviation shall be recorded with its basis:

- [] Application class(es) confirmed (small UAS < 25 kg / heavy-lift-delivery / dock-based autonomous / VTOL fixed-wing) with the operating volume (Clause 1.2; VRS-AER-001 §4).
- [] Assessment tier fixed (Clause 8); the not-applicable set recorded per class and the applicable-pool range computed (Clause 4).
- [] Contributing intrinsic criteria drawn from their source standards at their own points and tiers (Clause 5).
- [] **AER-1** airworthiness / class-mark / operational-authorisation fit scored; class and operating category declared (evidence bar); a missing authorisation scores 0 and is recorded, not withheld.
- [] **AER-2** lost-link and fail-safe behaviour scored; the fail-safe behaviours are declared (evidence bar).
- [] **AER-3** airspace containment scored; geo-awareness is declared (evidence bar).
- [] **AER-4** ground-risk mitigation scored; the mitigations are declared (evidence bar); the worst-case ground population is recorded.
- [] **AER-5** propulsion and battery in-flight integrity scored; the architecture is declared (evidence bar).
- [] **AER-6** weather-envelope discipline scored; the weather envelope is declared (evidence bar).
- [] **AER-7** maintenance, inspection and fleet-firmware discipline scored.
- [] **AER-8** occurrence and incident record scored; null-result search applied per Clause 8.5; company-wide fallback recorded if used.
- [] **AER-9** C2-link and data security scored.
- [] Points added and divided by the applicable-pool range; letter read from the bands (Clause 7.1).
- [] Letters issued per class; the lowest displayed (Clause 4.3); each award held at its assessed-tier ceiling (Clause 6).
- [] Result recorded to the passport: per-criterion points, not-applicable set, contributors, tier, edition, twin version, the ground-severity attribute (AER-4) and the correlated fleet-accumulation attribute (Clause 10).

12 Annex A (informative) — Worked example

FICTIONAL EXAMPLE — not a real product; illustrates mechanics only.

A fictional multirotor delivery UAS, model code **AER-MD-01**, is assessed for the **small UAS (< 25 kg)** application class at the **Verified** tier: a manufacturer evidence pack is examined and no behaviour is witnessed. All nine sector criteria apply, and the seventeen contributing intrinsic criteria of Clause 5 are drawn from their source standards at their own Verified points. The declared operating volume covers “≤ 400 ft AGL, uncontrolled airspace, ground population ≤ 500 persons/km²”.

Sector criteria (Verified tier).

§	CRITERION	VERIFIED CEILING	POINTS EARNED
6.1	AER-1	13	13
6.2	AER-2	11	11
6.3	AER-3	10	10
6.4	AER-4	10	8
6.5	AER-5	9	9
6.6	AER-6	5	5
6.7	AER-7	9	9
6.8	AER-8	10	10
6.9	AER-9	8	7
Sector subtotal		85	82

Contributing intrinsic criteria (Verified tier). Drawn at their own points, the seventeen criteria of Clause 5 have a combined range of **148 points** and a combined Verified ceiling of **125**; this model earns **112** of them, each at or below its Verified ceiling (for example the three connectivity contributors CY-3, CY-4 and CY-5 at 6 of 7 each, and SI-2 near its own Verified ceiling).

Letter. The applicable pool for the small-UAS class is the sector range 100 plus the contributor range 148 = **248 points**. Points earned = 82 (sector) + 112 (contributors) = **194**. As a percentage of the pool, $194 \div 248 = 78.2\%$, which falls in the **AA** band ($\geq 75\%$, below AAA's 90 %). The result is **Aerial/UAS AR: AA (VRS 2026) – Verified**.

Tier ceiling by construction. At the Verified tier the pool's own ceiling is $(85 + 125) \div 248 = 210 \div 248 = 84.7\%$, so AA is the best letter attainable without a witnessed demonstration (Clause 7.2); AAA would require Certified-tier evidence – for AER, the witnessed link-cut fail-safe (AER-2), boundary refusal (AER-3) and flight-termination (AER-4) rungs. No separate modifier is applied – the ceiling does the work.

Operating-volume contraction. Because all pack evidence was gathered within the ≤ 500 persons/km² ground population, a claim over a denser or over-people environment is unsupported; per Clause 4.3 the recorded operating volume contracts to “ ≤ 400 ft AGL, uncontrolled airspace, ground population ≤ 500 persons/km²”, and operation outside it is an underwriting exclusion (Clause 9.2) rather than a stretched score.

Authorisation variant. Had **AER-MD-01** held no waiver or FAA §44807 authority for a beyond-visual-line-of-sight profile it declared, AER-1 would score at its low no-evidence rung (4 for a bare declaration, 0 for none) rather than 13, the letter would fall out of the reduced total, and the missing authorisation would

be recorded (Clause 9.1) — the robot is still rated; there is no separate authorisation gate. Numbers illustrate mechanics only.

13 Bibliography

The full AER anchor regime is verified in VRS-AER-001; the following are the specific anchors this Protocol's criteria and evidence tiers (Clauses 6 and 8) rest on, dated at point of use (verified 2026-09-12):

- 14 CFR Part 107 (small UAS civil operations; over-people Categories 1–4, effective 2021) and 14 CFR Part 89 (Remote ID, 2021) ([ecfr.gov](https://www.ecfr.gov); [faa.gov](https://www.faa.gov)) — AER-1 regulatory-fit and AER-3 Remote ID lanes (US).
- FAA §44807 special authority / type-certification paths for UAS beyond the Part 107 envelope ([faa.gov](https://www.faa.gov)) — AER-1 lane for heavy-lift/delivery and beyond-visual-line-of-sight profiles.
- Commission Implementing Regulation (EU) 2019/947 (Open/Specific/Certified categories) and Commission Delegated Regulation (EU) 2019/945 (UAS products and class marks C0–C6) (eur-lex.europa.eu) — AER-1 regulatory-fit and AER-3 geo-awareness lanes (EU).
- Regulation (EC) No 785/2004 on insurance requirements for air carriers and aircraft operators (OJ L 138, 30.4.2004; consolidated 02004R0785-20200730, incorporating Delegated Regulation (EU) 2020/1118) (eur-lex.europa.eu) — Art. 7 minimum third-party liability cover scaled by MTOM band, Art. 2 scope (unmanned aircraft ≥ 20 kg MTOM), Art. 5 insurance certificate — AER-4 third-party severity hook (Clause 9.2).
- JARUS SORA v2.5 (2024), incl. Annex B ground-risk mitigations; adopted by EASA (ED Decision 2025/018/R) (jarus-rpas.org) — AER-4 ground-risk assessment lane and worst-case-ground-population construct.
- ISO 21384-3:2023 — Unmanned aircraft systems — Part 3: Operational procedures (incl. the external C2 link) ([iso.org/standard/80124.html](https://www.iso.org/standard/80124.html); Edition 3 published 2026, [iso.org/standard/88660.html](https://www.iso.org/standard/88660.html) — re-date on adoption) — AER-3 operational-procedure lane.
- ISO 21895:2020 — Categorization and classification of civil unmanned aircraft systems ([iso.org/standard/72093.html](https://www.iso.org/standard/72093.html)) — application-class basis.
- ASTM F3411-22a (2022) — Specification for Remote ID and Tracking ([astm.org](https://www.astm.org)) — AER-3 Remote ID lane.
- ASTM F3322-18 (sUAS parachutes; latest revision at point of use) ([astm.org](https://www.astm.org)) — AER-4 ground-risk-mitigation lane.
- IEC 62443-4-2:2019 (edition 1.0; COR1:2022) — technical security requirements for IACS components (SL against FR1–FR7) (webstore.iec.ch/publication/34421) — AER-9 C2/GNSS/update-plane cyber lane.
- ISO 14224:2016 — Collection and exchange of reliability and maintenance data for equipment ([iso.org/standard/64076.html](https://www.iso.org/standard/64076.html)) — AER-7 maintenance lane.
- ISO 8373:2021 — Robotics — Vocabulary ([iso.org/standard/75539.html](https://www.iso.org/standard/75539.html)) — robot-term basis.
- VRS-AER-501 — machine-readable data twin of this Protocol (Clause 5/6/7 values).

14 Change history

DATE	VERSION	STATUS	CHANGE	AUTHORITY
2026-09-16	1.0.0	Draft	VRS 2026 rewrite: replaced the re-weighted-mean scoring (Clauses 4–8) with a point-summed pool — nine sector criteria AER-1...AER-9 (100 points; Clause 6) plus the named contributing intrinsic criteria (Clause 5), expressed as a percentage of the applicable pool and mapped to a letter by VRS-GEN-006 §4; added per-criterion tier ceilings, the letter-band/pool-ceiling/class-applicability clause (Clause 7), evidence-by-tier (Clause 8), a regenerated Verified-tier worked example (Annex A) and a per-criterion checklist (Clause 11); adopted the application classes (small UAS < 25 kg / heavy-lift-delivery / dock-based autonomous / VTOL fixed-wing); re-anchored the former §7 modifiers (7.1 per-class regulatory-fit gate → AER-1 scored, no gate; 7.2 continued-validity lapse → the VRS-GEN-004/GEN-010 withdrawal/refresh state, not a criterion; 7.3 failsafe/containment no-test cap → the witnessed rungs of AER-2/AER-3; 7.4 uninstrumented flight-log cap → the AER-8 and AER-4 evidence bars); added the “a rating is an opinion on the robot, not on the lawfulness of any deployment” clause (§9.1, CEO-approved 2026-09-15); retired the confidence bands, provisional flags, renormalisation, weighted-mean, assessed-unrated and stage-prior markers; dropped the GEN-201/GEN-202 references; VRS-AER-501 data twin regenerated by the dispatcher from Clauses 5–7; see GEN-005 §6.	VRS 2026 rewrite Stage 4
2026-09-13	0.2.2	Draft	ACTUARIAL (AER): 5-question fitness review; §10 bound the per-class exposure quantities to the VRS-GEN-012 §5.1 evidence-record schema so the §9 underwriting/credit hooks compute; no weight/band/criterion/modifier changed.	Curator Run #124; charter ACTUARIAL
2026-09-13	0.2.1	Draft	RESEARCH (AER): added the EU statutory third-party-liability anchor — Reg (EC) 785/2004 Art. 7/2/5 — as an underwriting hook in §9.2 mapping the recorded MTOM exposure attribute to the third-party severity floor; one Bibliography entry added.	Curator Run #122; charter RESEARCH
2026-09-12	0.2.0	Draft	DEEPEN: brought to publishable depth; added exposure denominator, evidence lanes, loss-driver mapping, underwriting/credit use, passport recording, checklist and worked example; twin regenerated to 0.2.0.	Curator Run #65; charter DEEPEN

DATE	VERSION	STATUS	CHANGE	AUTHORITY
2026-09-05	0.1.0	Draft	Initial draft — flight-hour denominators; lapse-is-a-state-not-a-letter rule	CEO goal 2026-09-05

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