



VEYRUM ROBOTICS STANDARD



VRS-FLD-201

Field & Outdoor — AR Assessment Protocol

How the Field & Outdoor Application Rating letter is determined — sector criteria FLD-1...FLD-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 **Field & Outdoor Application Rating (AR)** letter for a robot model in a declared field class. It scores a **pool** of criteria — the nine sector criteria of Clause 6 (FLD-1...FLD-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 condition of the sector is the **unstructured outdoor environment**: terrain, weather, visibility and worksite boundaries replace the walls and traffic rules of a fixed site, so a rating is bounded to a declared **environmental envelope** and to the field classes the evidence covers. Persons entering a multi-tonne machine’s operating zone (FLD-2), zone-boundary excursion (FLD-3) and the correlated fleet exposure of a shared positioning or tele-operation link (FLD-8) are scored by demonstrated behaviour, not by assertion. A Field & Outdoor 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 **Field & Outdoor** sector Application Rating: the determination method (Clause 4); the contributing intrinsic criteria drawn into the pool (Clause 5); the nine sector criteria FLD-1...FLD-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 field classes are **agricultural, construction/earthmoving, mining** and **inspection/survey**, each assessable for a legged, wheeled or tracked model form, per VRS-FLD-001 §4. FLD-6 (implement and stored-energy hazards) applies only where an implement or hydraulic system exists. Sector applicability, the environmental-envelope hazard taxonomy (H1–H6) and the anchor regime are defined in VRS-FLD-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-FLD-001**, Field & Outdoor — Sector Standard — applicability, field classes, environmental-envelope hazard groups H1–H6 and the field 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.
- **ISO 18497-1/-2/-3/-4:2024** — Agricultural machinery and tractors — safety of partially automated, semi-autonomous and autonomous machinery (obstacle protection, operating zones, verification and validation); the series replacing ISO 18497:2018 — agricultural obstacle-protection and zone-boundary anchor.
- **ISO 17757:2024 (Ed. 2)** — Earth-moving machinery and mining — autonomous and semi-autonomous machine system safety (ASAMS) — earth-moving/mining anchor.
- **ISO 25119 series** (agriculture, AgPL) and **ISO 19014 series** (earth-moving, MPL) — functional safety of the safety-related parts of the control system that implement the detection and boundary functions.
- **ISO 3691-4:2023 (Ed. 2)** — Industrial trucks — driverless industrial trucks and their systems — anchor for wheeled/tracked autonomous ground inspection/survey platforms.
- **ISO 12100:2010** — Safety of machinery — general principles for design, risk assessment and risk reduction — generic anchor for a legged/other model with no recognised sector-specific anchor.
- **ISO 14224:2016** — Collection and exchange of reliability and maintenance data for equipment.
- **IEC 62443-3-3:2013** — System security requirements and security levels (SL 1–4).
- **Regulation (EU) 2023/1230** (EU Machinery Regulation, applicable 20 January 2027) — EU market floor; the CE technical file is the corresponding evidence artefact.
- Data twin: **VRS-FLD-501** (generated from this Protocol, never hand-edited).

3 Terms and definitions

Terms per VRS-GEN-001 (aligned to ISO 8373:2021) and VRS-FLD-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 field 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).
- **environmental envelope** — the declared terrain, weather and visibility limits within which evidence is attributable and the letter is valid.
- **field class** — a declared category of assessed field operation (agricultural, construction/earthmoving, mining, inspection/survey), recorded as a protocol applicability field.

4 Method of assessment

4.1 The Field & Outdoor 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 (FLD-1...FLD-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 a field 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 **field class** of the assessed envelope (agricultural, construction/earthmoving, mining or inspection/survey; Clause 1.2) and to the **environmental envelope** — the terrain, weather and visibility limits within which the evidence was gathered; the AR letter covers only the assessed classes and envelopes.

4.3 Letters shall be issued **per field 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 **environmental envelope shall contract** to the terrain, weather and visibility conditions the evidence actually covers rather than the score being stretched to conditions never observed.

4.4 Evidence not attributable to a declared field class, or gathered only in fair weather or on benign terrain, shall be **inadmissible** as support for a broader class or envelope claim and shall not raise the score; fair-weather-only evidence shall not support an all-weather envelope.

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-1	VRS-GEN-101 §6.1
SF-2	VRS-GEN-101 §6.2
SF-4	VRS-GEN-101 §6.4
SF-5	VRS-GEN-101 §6.5
SF-6	VRS-GEN-101 §6.6
SF-8	VRS-GEN-101 §6.8
RL-2	VRS-GEN-102 §6.2
RL-3	VRS-GEN-102 §6.3
SV-1	VRS-GEN-103 §6.1
SV-5	VRS-GEN-103 §6.5
SV-6	VRS-GEN-103 §6.6
CY-3	VRS-GEN-105 §6.3
CY-4	VRS-GEN-105 §6.4
MS-1	VRS-GEN-106 §6.1
MS-7	VRS-GEN-106 §6.7
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	FLD-1 Anchor conformity (ISO 18497 / 17757 / 3691-4 / 12100 by class)	0–14	12	12	14
6.2	FLD-2 Person-in-zone detection and stop at speed and load	0–14	8	12	14
6.3	FLD-3 Zone-boundary (geofence) enforcement and excursion behaviour	0–12	6	10	12
6.4	FLD-4 Slope, rollover and terrain stability at limits	0–12	8	9	12
6.5	FLD-5 Weather-degraded perception and fail-safe	0–10	7	9	10
6.6	FLD-6 Implement and stored-energy hazards during service	0–8	6	7	8
6.7	FLD-7 Remote-site recovery and serviceability	0–10	8	8	10
6.8	FLD-8 Link, GNSS and tele-operation integrity	0–12	9	10	12
6.9	FLD-9 Field-context incident record	0–8	6	8	8
Total		100	70	85	100

6.1 FLD-1 Anchor conformity (ISO 18497 / 17757 / 3691-4 / 12100 by class) (0–14)

ROW	
What is measured	.
Ladder	14 = third-party-assessed + validated at envelope · 12 = evidenced by documents alone (public or pack), not demonstrated · 11 = third-party-assessed conformity ((public certificate)) · 9 = self-declared + internal validation · 5 = declaration only · 0 = not established. · 0. Legged/other without a recognised anchor: ISO 12100 + functional-safety evidence on the same rungs
Unverified — evidence & ceiling	Public DoC; certificates. Ceiling 12.
Verified — evidence & ceiling	DoC + certificates + validation. Ceiling 12.
Certified — evidence & ceiling	Witnessed FLD-2...5 confirm validation. Ceiling 14.
Company-wide fallback	n/a
Evidence bar	Declaration for the rated version.
Applicability	agricultural · construction/earthmoving · mining · inspection/survey (legged, wheeled, tracked). All criteria apply to all classes; FLD-6 applies where an implement or hydraulic system exists.

6.2 FLD-2 Person-in-zone detection and stop at speed and load (0–14)

ROW	
What is measured	Detection/stop of a human-sized test target entering the zone at declared max speed and load, on declared worst terrain.
Ladder	14 = witnessed at limits · 12 = pack-evidenced (documents), not demonstrated · 10 = nominal witnessed · 8 = certified with published data · 5 = validation report · 0 = not established
Unverified — evidence & ceiling	Public third-party tests; certificate. Ceiling 8.
Verified — evidence & ceiling	Validation at limits. Ceiling 12.
Certified — evidence & ceiling	Witnessed with target at declared speed/load/terrain; stop distance marked. Ceiling 14.
Company-wide fallback	n/a
Evidence bar	Envelope declared.
Applicability	agricultural · construction/earthmoving · mining · inspection/survey (legged, wheeled, tracked). All criteria apply to all classes; FLD-6 applies where an implement or hydraulic system exists.

6.3 FLD-3 Zone-boundary (geofence) enforcement and excursion behaviour (0–12)

ROW	
What is measured	Robot never crosses a configured boundary; on boundary-system fault → declared stop.
Ladder	12 = witnessed incl. GNSS-degraded case · 10 = pack-evidenced (documents), not demonstrated · 8 = witnessed nominal · 6 = documented + tested · 3 = documented · 0 = not established
Unverified — evidence & ceiling	Manual; public tests. Ceiling 6.
Verified — evidence & ceiling	Boundary-system spec + validation. Ceiling 10.
Certified — evidence & ceiling	Witnessed boundary approach, crossing refusal, GNSS-degraded fallback. Ceiling 12.
Company-wide fallback	n/a
Evidence bar	Boundary system declared.
Applicability	agricultural · construction/earthmoving · mining · inspection/survey (legged, wheeled, tracked). All criteria apply to all classes; FLD-6 applies where an implement or hydraulic system exists.

6.4 FLD-4 Slope, rollover and terrain stability at limits (0–12)

ROW	
What is measured	No rollover at declared max slope/side-slope with declared load; behaviour on soft ground.
Ladder	12 = witnessed · 9 = pack-evidenced (documents), not demonstrated · 8 = certified/tested ((public)) · 6 = validation report · 3 = documented · 0 = not established
Unverified — evidence & ceiling	Datasheet; public tests. Ceiling 8.
Verified — evidence & ceiling	Stability test evidence. Ceiling 9.
Certified — evidence & ceiling	Witnessed on declared slope/side-slope with load. Ceiling 12.
Company-wide fallback	n/a
Evidence bar	Slope limits declared.
Applicability	agricultural · construction/earthmoving · mining · inspection/survey (legged, wheeled, tracked). All criteria apply to all classes; FLD-6 applies where an implement or hydraulic system exists.

6.5 FLD-5 Weather-degraded perception and fail-safe (0–10)

ROW	
What is measured	Behaviour under declared rain/dust/low-light/glare limits: declared safe state entered.
Ladder	10 = witnessed declared conditions · 9 = pack-evidenced (documents), not demonstrated · 7 = documented + independently tested · 3 = documented · 0 = not established
Unverified — evidence & ceiling	Manual; tests. Ceiling 7.
Verified — evidence & ceiling	Degraded-condition validation. Ceiling 9.
Certified — evidence & ceiling	Witnessed obscuration/lighting cases; feed shows safe state. Ceiling 10.
Company-wide fallback	n/a
Evidence bar	Weather envelope declared.
Applicability	agricultural · construction/earthmoving · mining · inspection/survey (legged, wheeled, tracked). All criteria apply to all classes; FLD-6 applies where an implement or hydraulic system exists.

6.6 FLD-6 Implement and stored-energy hazards during service (0–8)

ROW	
What is measured	Implement lock-out, hydraulic/stored-energy isolation, service-position interlocks.
Ladder	8 = witnessed · 7 = pack-evidenced (documents), not demonstrated · 6 = certified/documented in detail · 3 = documented · 0 = not established. · 0. Applies where an implement/hydraulic system exists
Unverified — evidence & ceiling	Manual; certificates. Ceiling 6.
Verified — evidence & ceiling	Service procedures + interlock spec. Ceiling 7.
Certified — evidence & ceiling	Witnessed lock-out and isolation steps. Ceiling 8.
Company-wide fallback	n/a
Evidence bar	Applies where implements/hydraulics exist.
Applicability	agricultural · construction/earthmoving · mining · inspection/survey (legged, wheeled, tracked). All criteria apply to all classes; FLD-6 applies where an implement or hydraulic system exists.

6.7 6.7 FLD-7 Remote-site recovery and serviceability (0–10)

ROW	
What is measured	Field-repairable modules, recovery procedure for a stranded unit, parts logistics for remote sites, seasonal-peak support commitments.
Ladder	10 = witnessed swap + commitments + record · 8 = commitments + record · 7 = company-wide record in place of model-specific data · 4 = documented · 0 = not established
Unverified — evidence & ceiling	Manual; service pages. Ceiling 8.
Verified — evidence & ceiling	Service commitments + repair/parts record. Ceiling 8.
Certified — evidence & ceiling	Witnessed field module swap; recovery procedure walk-through. Ceiling 10.
Company-wide fallback	Record company-wide → 7
Evidence bar	None.
Applicability	agricultural · construction/earthmoving · mining · inspection/survey (legged, wheeled, tracked). All criteria apply to all classes; FLD-6 applies where an implement or hydraulic system exists.

6.8 6.8 FLD-8 Link, GNSS and tele-operation integrity (0–12)

ROW	
What is measured	Lost-link fail-safe; GNSS spoofing/jamming resilience or safe degradation; tele-op authentication.
Ladder	12 = witnessed lost-link + spoof/jam degradation · 10 = pack-evidenced (documents), not demonstrated · 9 = documented in detail + public audit · 6 = documented · 3 = partial · 0 = not established
Unverified — evidence & ceiling	Security/network documentation. Ceiling 9.
Verified — evidence & ceiling	Link/GNSS design + test evidence + access model. Ceiling 10.
Certified — evidence & ceiling	Witnessed link cut → fail-safe; GNSS-denied behaviour; tele-op auth. Ceiling 12.
Company-wide fallback	n/a
Evidence bar	Link and positioning architecture declared.
Applicability	agricultural · construction/earthmoving · mining · inspection/survey (legged, wheeled, tracked). All criteria apply to all classes; FLD-6 applies where an implement or hydraulic system exists.

6.9 FLD-9 Field-context incident record (0–8)

ROW	
What is measured	Incidents in field deployments over the window.
Ladder	8 = none above near-miss (model) · 6 = null-result rung with company-wide exposure · 5 = remediated · 0 = unremediated major
Unverified — evidence & ceiling	Regulator/press databases. Ceiling 6.
Verified — evidence & ceiling	Register + exposure. Ceiling 8.
Certified — evidence & ceiling	From Verified evidence. Ceiling 8.
Company-wide fallback	Company-wide → 6
Evidence bar	Exposure or null search.
Applicability	agricultural · construction/earthmoving · mining · inspection/survey (legged, wheeled, tracked). All criteria apply to all classes; FLD-6 applies where an implement or hydraulic system exists.

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-FLD-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. agricultural · construction/earthmoving · mining · inspection/survey (legged, wheeled, tracked). All criteria apply to all classes; FLD-6 applies where an implement or hydraulic system exists... 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.

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; published declarations of conformity, product listings and the anchor standards they cite (ISO 18497 series for agriculture, ISO 17757:2024 for earth-moving/mining, ISO 3691-4:2023 for wheeled/tracked ground platforms, ISO 12100:2010 as the generic fallback); independent published test reports and audits; public security and network documentation; and — for the field-record criterion (FLD-9) — regulator and press incident 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 ISO 18497-2:2024 obstacle-protection design file with its ISO 18497-4:2024 verification and validation record (agriculture) or the ISO 17757:2024 ASAMS file (earth-moving/mining), together with the ISO 25119 / ISO 19014 SRP/CS grade for the detection and boundary functions (FLD-1, FLD-2); the ISO 18497-3:2024 operating-zone and ISO 18497-4:2024 boundary-integrity records (FLD-3); the slope/stability and weather-degradation test evidence (FLD-4, FLD-5); the service and stored-energy isolation procedures and the EU Machinery Regulation 2023/1230 CE technical file (FLD-6); the ISO 14224:2016 maintenance/downtime records and seasonal-duty and parts-logistics commitments (FLD-7); the IEC 62443-3-3:2013 security-level statement, link/GNSS-integrity design and spoofing/jamming test evidence (FLD-8); and the field incident register with its exposure basis (FLD-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: person-in-zone detection and stop with a human-sized target at the declared speed, load and worst terrain, stop distance marked (FLD-2); boundary approach, crossing refusal and GNSS-degraded fallback (FLD-3); no rollover on the declared slope/side-slope with load (FLD-4); the declared obscuration and lighting cases entering the safe state (FLD-5); implement lock-out and stored-energy isolation steps (FLD-6); a field module swap and the stranded-unit recovery walk-through (FLD-7); and link-cut fail-safe, GNSS-denied behaviour and tele-operation authentication (FLD-8). The documentary criteria (FLD-1, FLD-9) 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; evidence gathered only in fair weather or on benign terrain shall not raise a criterion above the conditions actually observed (Clause 4.4).

8.5 Null-result rule. For FLD-9 a recorded search of the regulator and press incident 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 (FLD-7, FLD-9) 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.

9.2 The per-class letters and the recorded environmental envelope are the underwriting hooks: the letter informs rate relativity, and the covered field classes and envelope inform coverage scope, so that operation outside the assessed envelope 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 **severity driver** (FLD-2 person-in-zone protection and FLD-4 rollover — the bodily-injury and third-party severity of a multi-tonne machine, evidenced by demonstrated detection, stop and stability rather than inferred); and the **correlated fleet driver** (FLD-8 link, GNSS and tele-operation integrity — where many units share one positioning correction service, tele-operation link or site network, one spoofing, jamming or intrusion event can degrade the fleet at once, so the exposure does not diversify the way independent mechanical failures do, and the per-fleet accumulation attribute records whether that regime holds an IEC 62443-3-3:2013 SL statement and a GNSS-integrity test result).

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 for remote-site field assets: FLD-7 informs recoverability (remote-site recovery logistics and parts lead time) and the business-interruption exposure of a seasonal duty peak, while the intrinsic reliability, serviceability and support criteria drawn into the pool (Clause 5) inform the residual curve and 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 environmental envelope 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 (e.g. FLD-6 where no implement or hydraulic system exists) and the resulting applicable-pool range; the contributing intrinsic criteria used; the **AR tier**; the **edition** (VRS 2026); the VRS-FLD-501 data-twin version; and the correlated fleet-accumulation attribute (FLD-8). 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:

- [] Field class(es) confirmed (agricultural / construction-earthmoving / mining / inspection-survey) with the environmental envelope (Clause 1.2; VRS-FLD-001 §4).

- [] Assessment tier fixed (Clause 8); the not-applicable set recorded per class (FLD-6 where no implement/hydraulics) and the applicable-pool range computed (Clause 4).
- [] Contributing intrinsic criteria drawn from their source standards at their own points and tiers (Clause 5).
- [] **FLD-1** anchor conformity scored; a declaration for the rated version exists (evidence bar).
- [] **FLD-2** person-in-zone detection and stop scored; the envelope (speed/load/terrain) is declared (evidence bar).
- [] **FLD-3** zone-boundary enforcement and excursion behaviour scored; the boundary system is declared (evidence bar).
- [] **FLD-4** slope, rollover and terrain stability scored; slope limits are declared (evidence bar).
- [] **FLD-5** weather-degraded perception and fail-safe scored; the weather envelope is declared (evidence bar).
- [] **FLD-6** implement and stored-energy hazards scored where an implement/hydraulic system exists (evidence bar); otherwise removed from the pool.
- [] **FLD-7** remote-site recovery and serviceability scored; company-wide fallback recorded if used.
- [] **FLD-8** link, GNSS and tele-operation integrity scored; the link and positioning architecture is declared (evidence bar).
- [] **FLD-9** field-context incident record scored; null-result search applied per Clause 8.5; company-wide fallback recorded if used.
- [] 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 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 autonomous row-crop sprayer, model code **FLD-AGV-04**, is assessed for the **agricultural** application class at the **Verified** tier: a manufacturer evidence pack is examined and no behaviour is witnessed. The model carries a spray boom and hydraulics, so FLD-6 applies; 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 environmental envelope covers “dry to light rain, daylight, ≤ 15° slope”.

Sector criteria (Verified tier).

§	CRITERION	VERIFIED CEILING	POINTS EARNED
6.1	FLD-1	12	12
6.2	FLD-2	12	12
6.3	FLD-3	10	10
6.4	FLD-4	9	9
6.5	FLD-5	9	7
6.6	FLD-6	7	7
6.7	FLD-7	8	8
6.8	FLD-8	10	8
6.9	FLD-9	8	8
Sector subtotal		85	81

Contributing intrinsic criteria (Verified tier). Drawn at their own points, the seventeen criteria of Clause 5 have a combined range of **171 points** and a combined Verified ceiling of **138**; this model earns **126** of them, each at or below its Verified ceiling (for example SF-4 at 11, SI-2 at 17 of its 19-point Verified ceiling, and the two connectivity contributors CY-3 and CY-4 at 6 of 7 each).

Letter. The applicable pool for the agricultural class is the sector range 100 plus the contributor range 171 = **271 points**. Points earned = 81 (sector) + 126 (contributors) = **207**. As a percentage of the pool, $207 \div 271 = 76.4\%$, which falls in the **AA** band ($\geq 75\%$, below AAA's 90 %). The result is **Field & Outdoor AR: AA (VRS 2026) – Verified**.

Tier ceiling by construction. At the Verified tier the pool's own ceiling is $(85 + 138) \div 271 = 223 \div 271 = 82.3\%$, so AA is the best letter attainable without a witnessed demonstration (Clause 7.2); AAA would require Certified-tier evidence. No separate modifier is applied — the ceiling does the work.

Envelope contraction. Because all pack evidence was gathered in dry-to-light-rain daylight conditions, a heavy-rain or night claim is unsupported; per Clause 4.3 the recorded environmental envelope contracts to “dry to light rain, daylight, $\leq 15^\circ$ slope”, and operation outside it is an underwriting exclusion (Clause 9.2) rather than a stretched score.

Refusal variant. Had **FLD-AGV-04** held no ISO 18497-2/-4 obstacle-protection file and no listing for the class, FLD-1 would score at its low no-evidence rung (5 for a bare declaration, 0 for none) rather than 12, and the letter would fall out of the reduced total — there is no separate safety-floor modifier. Numbers illustrate mechanics only.

13 Bibliography

The full FLD anchor regime is verified in VRS-FLD-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:

- ISO 18497-1:2024 / -2:2024 / -3:2024 / -4:2024 — Agricultural machinery and tractors — safety of partially automated, semi-autonomous and autonomous machinery ([iso.org 82684/82686/82687/82688](https://www.iso.org/standard/82684/82686/82687/82688); series replacing ISO 18497:2018) — FLD-1/FLD-2 obstacle-protection, FLD-3 operating-zone and verification lanes.
- ISO 17757:2024 (Ed. 2) — Earth-moving machinery and mining — autonomous and semi-autonomous machine system safety (ASAMS) ([iso.org 76126](https://www.iso.org/standard/76126)) — earth-moving/mining anchor lane.
- ISO 25119-1:2018 (+Amd 1:2020) / -2:2019 / -3:2018 / -4:2018 (+Amd 1:2020) — agricultural SRP/CS, AgPL grading; ISO 19014-1:2018 (Corr. 2019) / -2:2022 / -3:2024 / TS -5:2021 — earth-moving functional safety, MPL grading — the detection/boundary safety-function lane for FLD-1/FLD-2.
- ISO 3691-4:2023 (Ed. 2) — Industrial trucks — safety requirements and verification — driverless industrial trucks and their systems ([iso.org 83545](https://www.iso.org/standard/83545)) — wheeled/tracked ground inspection/survey anchor lane.
- ISO 12100:2010 — Safety of machinery — general principles for design, risk assessment and risk reduction ([iso.org 51528](https://www.iso.org/standard/51528)) — generic anchor for a legged/other model without a recognised sector-specific anchor.
- ISO 14224:2016 — Collection and exchange of reliability and maintenance data for equipment ([iso.org 64076](https://www.iso.org/standard/64076)) — FLD-7 maintenance/downtime and parts-logistics lane.
- IEC 62443-3-3:2013 — System security requirements and security levels SL 1–4 (webstore.iec.ch/publication/7033) — FLD-8 connectivity/tele-operation cyber lane.
- Regulation (EU) 2023/1230 of 14 June 2023 on machinery, repealing Directive 2006/42/EC (OJ L 165, 29.6.2023; applicable 20 January 2027; eur-lex.europa.eu/eli/reg/2023/1230/oj) — EU market floor and CE technical-file evidence lane (FLD-6).
- ISO 8373:2021 — Robotics — Vocabulary ([iso.org 75539](https://www.iso.org/standard/75539)) — robot-term basis.
- ISO 18497:2018 ([iso.org 62659](https://www.iso.org/standard/62659)) — superseded single-standard predecessor (historic).
- VRS-FLD-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 FLD-1...FLD-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 field classes (agricultural / construction-earthmoving / mining / inspection-survey) with FLD-6 implement-class applicability; re-anchored the former §7 modifiers into criterion rungs and the §4 contraction rule (7.1 anchor-compliance → FLD-1; 7.2 envelope mismatch → the envelope-contraction rule of §4.3/§4.4); added the ISO 3691-4:2023 and ISO 12100:2010 anchor lanes now cited by FLD-1; retired the confidence bands, provisional flags, renormalisation, weighted-mean, assessed-unrated and stage-prior markers; dropped the GEN-201/GEN-202 references; VRS-FLD-501 data twin regenerated by the dispatcher from Clauses 5–7; see GEN-005 §6.	VRS 2026 rewrite Stage 4
2026-09-11	0.2.0	Draft	ACTUARIAL: added exposure denominator, evidence-lane conformity-artefact reuse (dated anchors), loss-driver mapping, underwriting/credit use, passport recording, worked example; retired the bare pending marker; seasonal-severity weighting logged as design question	CEO ACTUARIAL 2026-09-11
2026-09-05	0.1.0	Draft	Initial draft — FLD rubric; envelope-mismatch handled by contraction, not modifier	CEO goal 2026-09-05

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