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VEYRUM ROBOTICS STANDARD



VRS - HAZ - 501

Hazardous & Emergency — AR Rubric Data Twin

Machine-readable criteria, tier ceilings, contributors and bands of VRS-HAZ-201 (VRS 2026 (draft)); generated, never hand-edited.

VEYRUM RESEARCH INSTITUTE

DOCUMENT

VRS-HAZ-501

VERSION

1.0.0

STATUS

Draft

DATE

16 September 2026

Foreword. Data Artifact: the machine-readable twin of **VRS-HAZ-201** (VRS 2026 (draft)) — the sector criteria with their point ranges, rungs and tier ceilings, the contributing intrinsic criteria, the letter bands and the application classes — generated FROM the protocol's Clause 5–7 by `tools/vrs-twin-generate.py`. Consistency is by construction and re-verified on every build (conformance check 15). The JSON in Clause 4 is the normative payload; scorer tooling consumes it directly. A change to VRS-HAZ-201 and to this twin is one change instrument.

1 Scope

This Data Artifact carries the rubric data of the Hazardous & Emergency (HAZ) sector in machine-readable form: the 9 sector criteria of VRS-HAZ-201 Clause 6 with points, rungs and Unverified / Verified / Certified ceilings; the contributing intrinsic criteria of Clause 5; the letter bands and application classes of Clause 7. It states no independent requirements. Where this artifact and VRS-HAZ-201 could be read to differ, VRS-HAZ-201 governs and this twin is regenerated to match.

2 Normative references

- **VRS-HAZ-201**, *Hazardous & Emergency — AR Assessment Protocol* — source protocol twinned (Clauses 5–7).
- **VRS-HAZ-001**, *Hazardous & Emergency — Sector Standard* — application classes and hazard groups.
- **VRS-GEN-005**, *IR Methodology* — point sum, tier ceilings, no-evidence rule.
- **VRS-GEN-006**, *AR Scheme* — pool mechanics, letter bands, tier caps by construction.
- **VRS-GEN-002**, *Designation and Drafting Rules* — criterion layout (§6.5) and versioning.

3 Terms and definitions

The terms of VRS-GEN-001 and VRS-HAZ-201 apply. **data twin** — a machine-readable artifact regenerated one-to-one from a source protocol's normative clauses. **rung** — a named state of a criterion awarding a stated integer number of points (VRS-GEN-002 §3.9). **ceiling** — the maximum points a criterion awards at a stated tier (VRS-GEN-002 §3.10).

4 Payload

Sector criteria total **100** points; ceilings Unverified **70**, Verified **85**, Certified **100**.

```
{
  "_meta": {
    "description": "HAZ sector AR rubric data twin – machine-readable form of VRS-HAZ-201 Clause 5/6/7 (VRS 2026 (draft)). Generated by tools",
    "edition": "VRS 2026 (draft)",
    "source_protocol": "VRS-HAZ-201 v1.0.0",
    "generated": "2026-09-16",
    "conforms_to": "VRS-GEN-005 §6 (point sum, tier ceilings); VRS-GEN-006 §6–§8 (pool, bands, tier caps by construction)"
  },
  "sector_code": "haz",
  "bands_percent": {
    "AAA": 90,
    "AA": 75,
    "A": 60,
    "B": 45,
    "C": 0
  },
  "application_classes": [
    "explosive-atmosphere",
    "nuclear/radiological",
    "firefighting",
    "EOD",
    "search-and-rescue"
  ],
  "contributing_ir_criteria": [
    {
      "id": "SF-1",
      "document": "VRS-GEN-101",
      "clause": "6.1"
    },
    {
      "id": "SF-2",
      "document": "VRS-GEN-101",
      "clause": "6.2"
    }
  ]
}
```

```

{
  "id": "SF-5",
  "document": "VRS-GEN-101",
  "clause": "6.5"
},
{
  "id": "SF-8",
  "document": "VRS-GEN-101",
  "clause": "6.8"
},
{
  "id": "RL-2",
  "document": "VRS-GEN-102",
  "clause": "6.2"
},
{
  "id": "RL-5",
  "document": "VRS-GEN-102",
  "clause": "6.5"
},
{
  "id": "SV-2",
  "document": "VRS-GEN-103",
  "clause": "6.2"
},
{
  "id": "SV-5",
  "document": "VRS-GEN-103",
  "clause": "6.5"
},
{
  "id": "CY-4",
  "document": "VRS-GEN-105",
  "clause": "6.4"
},
{
  "id": "MS-1",
  "document": "VRS-GEN-106",
  "clause": "6.1"
},
{
  "id": "MS-6",
  "document": "VRS-GEN-106",
  "clause": "6.6"
},
{
  "id": "MS-7",
  "document": "VRS-GEN-106",
  "clause": "6.7"
},
{
  "id": "SI-2",
  "document": "VRS-GEN-104",
  "clause": "6.2"
},
{
  "id": "SI-6",
  "document": "VRS-GEN-104",
  "clause": "6.5"
}
],
"sector_criteria": [
  {
    "clause": "6.1",
    "id": "HAZ-1",
    "name": "Environment-specific certification / qualification",
    "points_max": 14,
    "what_is_measured": "Explosive-atmosphere: ATEX/IECEx certificate for the declared zone; nuclear: radiation-tolerance qualification; fi

```

```

    "rungs": [
      {
        "points": 14,
        "state": "third-party certificate/qualification public + validated"
      },
      {
        "points": 12,
        "state": "pack-evidenced (documents), not demonstrated"
      },
      {
        "points": 11,
        "state": "certificate public"
      },
      {
        "points": 8,
        "state": "self-qualification with reports"
      },
      {
        "points": 4,
        "state": "declared"
      },
      {
        "points": 0,
        "state": "not established"
      }
    ],
    "ceiling": {
      "unverified": 11,
      "verified": 12,
      "certified": 14
    },
    "company_wide": null,
    "evidence_bar": "Class and environment declared.",
    "applicability": "explosive-atmosphere · nuclear/radiological · firefighting · EOD · search-and-rescue. HAZ-1 anchor differs by class (
    "not_applicable_by_class": false
  },
  {
    "clause": "6.2",
    "id": "HAZ-2",
    "name": "Mission-critical failure behaviour",
    "points_max": 12,
    "what_is_measured": "On fault mid-mission: declared safe state; self-recovery or retrieval procedure; never an obstacle in an egress ro
    "rungs": [
      {
        "points": 12,
        "state": "witnessed"
      },
      {
        "points": 10,
        "state": "pack-evidenced (documents), not demonstrated"
      },
      {
        "points": 8,
        "state": "validated"
      },
      {
        "points": 7,
        "state": "publicly evidenced only (no pack, no demonstration)"
      },
      {
        "points": 5,
        "state": "documented"
      },
      {
        "points": 0,
        "state": "not established"
      }
    ]
  },

```

```

    "ceiling": {
      "unverified": 7,
      "verified": 10,
      "certified": 12
    },
    "company_wide": null,
    "evidence_bar": "Fault behaviours documented.",
    "applicability": "explosive-atmosphere · nuclear/radiological · firefighting · EOD · search-and-rescue. HAZ-1 anchor differs by class (
    "not_applicable_by_class": false
  },
  {
    "clause": "6.3",
    "id": "HAZ-3",
    "name": "Operator-link loss and control handover",
    "points_max": 12,
    "what_is_measured": "Link loss in shielded/underground/burning structures: declared behaviour (hold, retrace, autonomous return); hando
    "rungs": [
      {
        "points": 12,
        "state": "witnessed"
      },
      {
        "points": 10,
        "state": "pack-evidenced (documents), not demonstrated"
      },
      {
        "points": 9,
        "state": "documented in detail + tested"
      },
      {
        "points": 8,
        "state": "publicly evidenced only (no pack, no demonstration)"
      },
      {
        "points": 6,
        "state": "documented"
      },
      {
        "points": 0,
        "state": "not established"
      }
    ],
    "ceiling": {
      "unverified": 8,
      "verified": 10,
      "certified": 12
    },
    "company_wide": null,
    "evidence_bar": "Link architecture declared.",
    "applicability": "explosive-atmosphere · nuclear/radiological · firefighting · EOD · search-and-rescue. HAZ-1 anchor differs by class (
    "not_applicable_by_class": false
  },
  {
    "clause": "6.4",
    "id": "HAZ-4",
    "name": "Environmental attrition qualification",
    "points_max": 12,
    "what_is_measured": "Radiation dose, thermal, corrosive/abrasive exposure qualification with stated limits and dose budgets.",
    "rungs": [
      {
        "points": 12,
        "state": "qualification reports + published limits + third-party test"
      },
      {
        "points": 11,
        "state": "pack-evidenced (documents), not demonstrated"
      }
    ]
  }

```

```

      "points": 8,
      "state": "reports"
    },
    {
      "points": 5,
      "state": "limits declared"
    },
    {
      "points": 0,
      "state": "not established"
    }
  ],
  "ceiling": {
    "unverified": 8,
    "verified": 11,
    "certified": 12
  },
  "company_wide": null,
  "evidence_bar": "Environmental limits declared.",
  "applicability": "explosive-atmosphere · nuclear/radiological · firefighting · EOD · search-and-rescue. HAZ-1 anchor differs by class (
  "not_applicable_by_class": false
},
{
  "clause": "6.5",
  "id": "HAZ-5",
  "name": "Ignition-source and contamination-spread controls",
  "points_max": 12,
  "what_is_measured": "No ignition source in declared zone; sealed against contamination carry-out; surface decontaminability.",
  "rungs": [
    {
      "points": 12,
      "state": "witnessed + certified"
    },
    {
      "points": 10,
      "state": "certified ((public))"
    },
    {
      "points": 8,
      "state": "publicly evidenced only (no pack, no demonstration)"
    },
    {
      "points": 6,
      "state": "documented"
    },
    {
      "points": 0,
      "state": "not established"
    }
  ],
  "ceiling": {
    "unverified": 8,
    "verified": 10,
    "certified": 12
  },
  "company_wide": null,
  "evidence_bar": "Zone/contamination envelope declared.",
  "applicability": "explosive-atmosphere · nuclear/radiological · firefighting · EOD · search-and-rescue. HAZ-1 anchor differs by class (
  "not_applicable_by_class": false
},
{
  "clause": "6.6",
  "id": "HAZ-6",
  "name": "Decontamination and disposal procedures",
  "points_max": 10,
  "what_is_measured": "Validated decontamination procedure; disposal path for contaminated units; consumable dependency.",
  "rungs": [
    {

```

```

      "points": 10,
      "state": "validated + witnessed"
    },
    {
      "points": 8,
      "state": "validated procedure documented"
    },
    {
      "points": 4,
      "state": "procedure only"
    },
    {
      "points": 0,
      "state": "not established"
    }
  ],
  "ceiling": {
    "unverified": 8,
    "verified": 8,
    "certified": 10
  },
  "company_wide": null,
  "evidence_bar": "Procedure exists.",
  "applicability": "explosive-atmosphere · nuclear/radiological · firefighting · EOD · search-and-rescue. HAZ-1 anchor differs by class (
  "not_applicable_by_class": false
},
{
  "clause": "6.7",
  "id": "HAZ-7",
  "name": "Responder interaction and incident-command integration",
  "points_max": 10,
  "what_is_measured": "Markings, lighting, responder-accessible e-stop, comms with incident command, hand-signal/stop response.",
  "rungs": [
    {
      "points": 10,
      "state": "witnessed"
    },
    {
      "points": 8,
      "state": "pack-evidenced (documents), not demonstrated"
    },
    {
      "points": 7,
      "state": "documented in detail"
    },
    {
      "points": 4,
      "state": "documented"
    },
    {
      "points": 0,
      "state": "not established"
    }
  ],
  "ceiling": {
    "unverified": 7,
    "verified": 8,
    "certified": 10
  },
  "company_wide": null,
  "evidence_bar": "None.",
  "applicability": "explosive-atmosphere · nuclear/radiological · firefighting · EOD · search-and-rescue. HAZ-1 anchor differs by class (
  "not_applicable_by_class": false
},
{
  "clause": "6.8",
  "id": "HAZ-8",
  "name": "Recovery logistics and field repair",

```

```

    "points_max": 10,
    "what_is_measured": "Field-replaceable modules; recovery of a stranded unit; parts logistics for deployed teams.",
    "rungs": [
      {
        "points": 10,
        "state": "witnessed swap + commitments + record"
      },
      {
        "points": 8,
        "state": "pack-evidenced (documents), not demonstrated"
      },
      {
        "points": 7,
        "state": "commitments + record"
      },
      {
        "points": 4,
        "state": "documented"
      },
      {
        "points": 0,
        "state": "not established"
      }
    ],
    "ceiling": {
      "unverified": 7,
      "verified": 8,
      "certified": 10
    },
    "company_wide": {
      "text": "Record company-wide → 7",
      "ceiling": 7
    },
    "evidence_bar": "None.",
    "applicability": "explosive-atmosphere · nuclear/radiological · firefighting · EOD · search-and-rescue. HAZ-1 anchor differs by class (
    "not_applicable_by_class": false
  },
  {
    "clause": "6.9",
    "id": "HAZ-9",
    "name": "Mission incident record",
    "points_max": 8,
    "what_is_measured": "Incidents over the window.",
    "rungs": [
      {
        "points": 8,
        "state": "none above near-miss (model)"
      },
      {
        "points": 6,
        "state": "null-result rung"
      },
      {
        "points": 5,
        "state": "remediated"
      },
      {
        "points": 0,
        "state": "not established"
      }
    ],
    "ceiling": {
      "unverified": 6,
      "verified": 8,
      "certified": 8
    },
    "company_wide": {
      "text": "Company-wide → 6",

```

```

    "ceiling": 6
  },
  "evidence_bar": "Exposure or null search.",
  "applicability": "explosive-atmosphere · nuclear/radiological · firefighting · EOD · search-and-rescue. HAZ-1 anchor differs by class (
  "not_applicable_by_class": false
}
],
"pool": {
  "sector_only": {
    "points": 100,
    "ceiling_unverified": 70,
    "ceiling_verified": 85,
    "ceiling_certified": 100,
    "best_letter": {
      "unverified": "A",
      "verified": "AA",
      "certified": "AAA"
    }
  },
  "with_contributors": "contributor ceilings are those of the cited IR standards; the combined pool sums are verified by the conformance ga
},
"rules": {
  "no_evidence": "0 points (VRS-GEN-005 §6, R3.3); the criterion stays in the pool at full range",
  "not_applicable": "criterion removed from numerator and denominator for that class (VRS-GEN-006 §6)",
  "tier_rule": "AR tier ≤ IR tier (VRS-GEN-006 §7)"
}
}
```

5 5 Field dictionary

FIELD	MEANING
sector_criteria[].clause	VRS-HAZ-201 subclause (6.k) — the “Required by” reference used in derived packs and protocols
sector_criteria[].points_max	Upper end of the criterion's integer range
sector_criteria[].rungs[]	Every verifiable state and its points, highest first; the 0 state is implicit where not listed
sector_criteria[].ceiling	Maximum points at each tier; always equal to a rung value (VRS-GEN-002 §7.5.1)
sector_criteria[].company_wide	Field-record criteria only: the reduced ceiling when company-wide data substitutes for model data
sector_criteria[].applicability / not_applicable_by_class	Application classes the criterion applies to; excluded criteria leave the pool for that class
contributing_ir_criteria[]	Intrinsic criteria counted in the sector pool, with the standard and clause that score them
pool.sector_only	Sums over the sector criteria and the best attainable letter at each tier (A / AA / AAA by construction)
bands_percent	Letter thresholds as a percentage of the applicable pool (VRS-GEN-006 §4)

6 6 Verification

Regenerate with `python3 tools/vrs-twin-generate.py --sector haz --check`; a non-zero exit means the committed twin no longer matches VRS-HAZ-201 and shall be regenerated before publication.

7 Bibliography

- VRS-HAZ-201, *Hazardous & Emergency Response — AR Assessment Protocol*, v1.0.0, 2026 — the source of every number in Clause 4.
- VRS-HAZ-001, *HAZ Sector Standard*, 2026 — sector scope, hazard taxonomy and application classes.
- VRS-GEN-005, *Intrinsic Rating — Methodology*, 2026 — point aggregation and tier ceilings for the contributing IR criteria.
- VRS-GEN-006, *Application Rating Scheme*, 2026 — letter bands and pool mechanics reproduced in `bands_percent` and `pool`.
- VRS-GEN-002, *Designation and Drafting Rules*, 2026 — §6.5 criterion layout and §7.5.1 (ceilings equal rungs) that this twin verifies.
- VRS-GEN-004, *Change, Edition and Review Policy*, 2026 — how a twin regeneration is designated.

- VRS-GEN-009, *Robot Risk Passport and Registry – Data Schema*, 2026 – consumer of the payload.
- ISO/IEC 21778:2017, *Information technology – The JSON data interchange syntax*.

8 Change history

VERSION	DATE	CHANGE
1.0.0 (draft)	2026-09-16	VRS 2026 (draft) rewrite: regenerated from VRS-HAZ-201 Clause 5–7 (criteria, rungs, tier ceilings, contributors, bands, classes). Weights, modifiers, confidence and stage- prior fields removed.

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