



VEYRUM ROBOTICS STANDARD



VRS-MAR-501

Marine & Subsea — AR Rubric Data Twin

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

VEYRUM RESEARCH INSTITUTE

DOCUMENT

VRS-MAR-501

VERSION

1.0.0

STATUS

Draft

DATE

16 September 2026

Foreword. Data Artifact: the machine-readable twin of **VRS-MAR-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-MAR-201 and to this twin is one change instrument.

1 Scope

This Data Artifact carries the rubric data of the Marine & Subsea (MAR) sector in machine-readable form: the 9 sector criteria of VRS-MAR-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-MAR-201 could be read to differ, VRS-MAR-201 governs and this twin is regenerated to match.

2 Normative references

- **VRS-MAR-201**, *Marine & Subsea — AR Assessment Protocol* — source protocol twinned (Clauses 5–7).
- **VRS-MAR-001**, *Marine & Subsea — 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-MAR-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": "MAR sector AR rubric data twin – machine-readable form of VRS-MAR-201 Clause 5/6/7 (VRS 2026 (draft)). Generated by tools",
    "edition": "VRS 2026 (draft)",
    "source_protocol": "VRS-MAR-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": "mar",
  "bands_percent": {
    "AAA": 90,
    "AA": 75,
    "A": 60,
    "B": 45,
    "C": 0
  },
  "application_classes": [
    "ROV (tethered)",
    "AUV (untethered)",
    "USV (surface)",
    "hull-crawler"
  ],
  "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"
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  {
    "id": "SF-8",
    "document": "VRS-GEN-101",
    "clause": "6.8"
  },
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    "id": "RL-1",
    "document": "VRS-GEN-102",
    "clause": "6.1"
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  {
    "id": "RL-2",
    "document": "VRS-GEN-102",
    "clause": "6.2"
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    "id": "RL-5",
    "document": "VRS-GEN-102",
    "clause": "6.5"
  },
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    "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-7",
    "document": "VRS-GEN-106",
    "clause": "6.7"
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    "id": "SI-1",
    "document": "VRS-GEN-104",
    "clause": "6.1"
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    "id": "SI-2",
    "document": "VRS-GEN-104",
    "clause": "6.2"
  },
  {
    "id": "SI-6",
    "document": "VRS-GEN-104",
    "clause": "6.5"
  },
  {
    "id": "EC-3",
    "document": "VRS-GEN-107",
    "clause": "6.3"
  }

```

```

    }
  ],
  "sector_criteria": [
    {
      "clause": "6.1",
      "id": "MAR-1",
      "name": "Class / anchor fit (classification rules, ISO 12100)",
      "points_max": 14,
      "what_is_measured": ".",
      "rungs": [
        {
          "points": 14,
          "state": "class certificate + validated"
        },
        {
          "points": 12,
          "state": "class certificate or third-party survey public"
        },
        {
          "points": 11,
          "state": "publicly evidenced only (no pack, no demonstration)"
        },
        {
          "points": 9,
          "state": "self-declared + internal validation"
        },
        {
          "points": 5,
          "state": "declared"
        },
        {
          "points": 0,
          "state": "not established"
        }
      ],
      "ceiling": {
        "unverified": 11,
        "verified": 12,
        "certified": 14
      },
      "company_wide": null,
      "evidence_bar": "Class and depth rating declared.",
      "applicability": "ROV (tethered) · AUV (untethered) · USV (surface) · hull-crawler. MAR-6 tether items apply to tethered classes; all o",
      "not_applicable_by_class": false
    },
    {
      "clause": "6.2",
      "id": "MAR-2",
      "name": "Pressure and ingress qualification at depth",
      "points_max": 14,
      "what_is_measured": "Hull/penetrator pressure test to declared depth with margin; ingress after cycling.",
      "rungs": [
        {
          "points": 14,
          "state": "witnessed pressure test (lab route) or certified with published data"
        },
        {
          "points": 12,
          "state": "certified ((public))"
        },
        {
          "points": 9,
          "state": "test reports"
        },
        {
          "points": 5,
          "state": "declared"
        }
      ],
    }
  ],

```

```

    {
      "points": 0,
      "state": "not established"
    }
  ],
  "ceiling": {
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    "verified": 12,
    "certified": 14
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  "company_wide": null,
  "evidence_bar": "Depth rating declared.",
  "applicability": "ROV (tethered) · AUV (untethered) · USV (surface) · hull-crawler. MAR-6 tether items apply to tethered classes; all o
  "not_applicable_by_class": false
},
{
  "clause": "6.3",
  "id": "MAR-3",
  "name": "Loss-at-sea prevention",
  "points_max": 12,
  "what_is_measured": "Abort ascent/buoyancy, drop-weight, locator beacons, drift-away prevention.",
  "rungs": [
    {
      "points": 12,
      "state": "witnessed"
    },
    {
      "points": 10,
      "state": "pack-evidenced (documents), not demonstrated"
    },
    {
      "points": 9,
      "state": "validated"
    },
    {
      "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": "Recovery aids declared.",
  "applicability": "ROV (tethered) · AUV (untethered) · USV (surface) · hull-crawler. MAR-6 tether items apply to tethered classes; all o
  "not_applicable_by_class": false
},
{
  "clause": "6.4",
  "id": "MAR-4",
  "name": "Loss-of-comms behaviour and GNSS-denied drift",
  "points_max": 12,
  "what_is_measured": "Acoustic/RF loss → declared behaviour; navigation drift bounds stated and tested.",
  "rungs": [
    {
      "points": 12,
      "state": "witnessed"
    }
  ]
},

```

```

    {
      "points": 10,
      "state": "pack-evidenced (documents), not demonstrated"
    },
    {
      "points": 9,
      "state": "validated"
    },
    {
      "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": "Comms/navigation architecture declared.",
  "applicability": "ROV (tethered) · AUV (untethered) · USV (surface) · hull-crawler. MAR-6 tether items apply to tethered classes; all o
  "not_applicable_by_class": false
},
{
  "clause": "6.5",
  "id": "MAR-5",
  "name": "Collision avoidance and surfacing protections",
  "points_max": 12,
  "what_is_measured": "Obstacle avoidance; surfacing-into-traffic checks; diver-proximity protections.",
  "rungs": [
    {
      "points": 12,
      "state": "witnessed"
    },
    {
      "points": 10,
      "state": "pack-evidenced (documents), not demonstrated"
    },
    {
      "points": 9,
      "state": "validated"
    },
    {
      "points": 6,
      "state": "documented"
    },
    {
      "points": 0,
      "state": "not established"
    }
  ],
  "ceiling": {
    "unverified": 6,
    "verified": 10,
    "certified": 12
  },
  "company_wide": null,
  "evidence_bar": "Protections declared.",
  "applicability": "ROV (tethered) · AUV (untethered) · USV (surface) · hull-crawler. MAR-6 tether items apply to tethered classes; all o
  "not_applicable_by_class": false
}

```

```

    },
    {
      "clause": "6.6",
      "id": "MAR-6",
      "name": "Launch-and-recovery deck-operation hazards",
      "points_max": 10,
      "what_is_measured": "Lift points, handling procedures, tether management, pinch/crush points during LARS.",
      "rungs": [
        {
          "points": 10,
          "state": "witnessed procedure"
        },
        {
          "points": 8,
          "state": "documented in detail + certified lift points"
        },
        {
          "points": 7,
          "state": "publicly evidenced only (no pack, no demonstration)"
        },
        {
          "points": 4,
          "state": "documented"
        },
        {
          "points": 0,
          "state": "not established"
        }
      ],
      "ceiling": {
        "unverified": 7,
        "verified": 8,
        "certified": 10
      },
      "company_wide": null,
      "evidence_bar": "Tether items for tethered classes.",
      "applicability": "ROV (tethered) · AUV (untethered) · USV (surface) · hull-crawler. MAR-6 tether items apply to tethered classes; all o",
      "not_applicable_by_class": false
    },
    {
      "clause": "6.7",
      "id": "MAR-7",
      "name": "Environmental release and sensitive-site controls",
      "points_max": 8,
      "what_is_measured": "Fluid containment, contact-with-infrastructure protections.",
      "rungs": [
        {
          "points": 8,
          "state": "witnessed + certified"
        },
        {
          "points": 7,
          "state": "documented in detail"
        },
        {
          "points": 4,
          "state": "documented"
        },
        {
          "points": 0,
          "state": "not established"
        }
      ],
      "ceiling": {
        "unverified": 7,
        "verified": 7,
        "certified": 8
      },
    },

```

```

    "company_wide": null,
    "evidence_bar": "None.",
    "applicability": "ROV (tethered) · AUV (untethered) · USV (surface) · hull-crawler. MAR-6 tether items apply to tethered classes; all o
    "not_applicable_by_class": false
  },
  {
    "clause": "6.8",
    "id": "MAR-8",
    "name": "Corrosion, bio-fouling and maintenance programme",
    "points_max": 10,
    "what_is_measured": "Published maintenance programme; anode/coating regime; post-dive inspection.",
    "rungs": [
      {
        "points": 10,
        "state": "witnessed inspection + programme"
      },
      {
        "points": 9,
        "state": "programme documented in detail"
      },
      {
        "points": 8,
        "state": "publicly evidenced or company-wide record"
      },
      {
        "points": 5,
        "state": "partial"
      },
      {
        "points": 0,
        "state": "not established"
      }
    ],
    "ceiling": {
      "unverified": 8,
      "verified": 9,
      "certified": 10
    },
    "company_wide": {
      "text": "Record company-wide → 8",
      "ceiling": 8
    },
    "evidence_bar": "None.",
    "applicability": "ROV (tethered) · AUV (untethered) · USV (surface) · hull-crawler. MAR-6 tether items apply to tethered classes; all o
    "not_applicable_by_class": false
  },
  {
    "clause": "6.9",
    "id": "MAR-9",
    "name": "Incident and loss record",
    "points_max": 8,
    "what_is_measured": "Vehicle losses/incidents over the window.",
    "rungs": [
      {
        "points": 8,
        "state": "none (model)"
      },
      {
        "points": 7,
        "state": "pack-evidenced (documents), not demonstrated"
      },
      {
        "points": 6,
        "state": "null-result rung"
      },
      {
        "points": 5,
        "state": "remediated"
      }
    ]
  }

```

```
    },
    {
      "points": 0,
      "state": "not established"
    }
  ],
  "ceiling": {
    "unverified": 6,
    "verified": 7,
    "certified": 8
  },
  "company_wide": {
    "text": "Company-wide → 6",
    "ceiling": 6
  },
  "evidence_bar": "Exposure or null search.",
  "applicability": "ROV (tethered) · AUV (untethered) · USV (surface) · hull-crawler. MAR-6 tether items apply to tethered classes; all o",
  "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-MAR-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 Verification

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

7 Bibliography

- VRS-MAR-201, *Marine & Subsea – AR Assessment Protocol*, v1.0.0, 2026 – the source of every number in Clause 4.
- VRS-MAR-001, *MAR 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-MAR-201 Clause 5–7 (criteria, rungs, tier ceilings, contributors, bands, classes). Weights, modifiers, confidence and stage- prior fields removed.

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