Compliance sheet — star-spline

Everything a supplier qualification, a legal review or an export check usually asks about star-spline 0.1.0, in one document.

1. Identity

Document	STAR-PKG-STAR-SPLINE-EN · v2.3 · 2026-11-14
Package	star-spline
Version	0.1.0
Capability	star.numerics.cubic-spline
Maturity	Released & Verified (RELEASED)
Python	>=3.9
Source commit	dc09f61d
Source	https://github.com/Andrea07072000/S.T.A.R.-/tree/main/packages/star_spline

2. Licence and obligations

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3. What it needs at run time

Nothing beyond the Python standard library: it works offline.

4. Integrity

SHA-256 fingerprints of the files published on this website. Check a downloaded file with:

```
python -c "import
hashlib,sys;print(hashlib.sha256(open(sys.argv[1],'rb').read()).hexdigest())" star_spline-
0.1.0-py3-none-any.whl
```

FILE	SHA-256
star_spline-0.1.0-py3-none-any.whl	24ccc0ee6622fe252b512569896acc164055b71da6439890b17670fd106dd4fa
star_spline.py	194f69e9c6c0fbff1da40334159cbb1bc4cfa95b2761aec47ce12c65d5ca5876
star_spline-0.1.0-source.zip	0a264c5cb087a03517cd0baf396a8124772abfd4b42dafdce65d9e9e82b91cbe

5. What it does, and its limits

Natural cubic spline through 2 to 300 tabulated points: values, first derivative, second derivatives at the knots and integral, with the tridiagonal system solved in exact rational arithmetic and every result rounded once; within 8e-15 of SciPy and Hipparchus on 151 unevenly spaced tables.

The natural end condition only (zero second derivative at both ends): no clamped, not-a-knot or periodic spline, no smoothing spline, no extrapolation. A spline through noisy or unevenly sampled data can overshoot between the knots; exact arithmetic does not make it a good model. Exact arithmetic is slow: about a second for a table of 300 knots, and every call solves the table again (pass all the points you need in one call). Nothing beyond 300 knots. "Nearest float" refers to the floats passed in, not to the decimal numbers you may have meant.

- `values(xs, ys, points)` and `derivatives(xs, ys, points)` return the natural cubic spline through the points (xs strictly increasing) and its first derivative at each point; `second_derivatives(xs, ys)` its second derivative at the knots (zero at the two ends); `integral(xs, ys, a, b)` its integral between two abscissas of the table.
- The tridiagonal system is solved in exact rational arithmetic on the floats given and each result is evaluated exactly and rounded once: knots very close together, values far from zero or a long table cost no digit.
- Measured on 151 tables of 3 to 40 unevenly spaced knots, 25 points each: values within 8e-15 and first derivatives within 2e-14 of SciPy (relative to the scale of each table), second derivatives within 2e-12, the integral within 3e-13; values within 7e-15 and first derivatives within 2e-15 of Hipparchus.

- Every function returns floats or raises `ValueError`: tables that are not 2 to 300 finite real numbers within 1e100, different lengths, knots that are not strictly increasing, a point outside the table (a spline is not extrapolated), a result too large for a float.

6. Export, use and certification

The package is published and freely available. That usually takes software out of export-control lists, but not every use of it: read the page on space activities and export control before using it in a controlled programme. It is not certified or qualified for flight; the evidence describes what was tested and how.

7. Citation and bill of materials

```
@software{cavazzini_star_spline_0_1_0,
  author  = {Cavazzini, Andrea},
  title   = {{star-spline}: Natural cubic spline, correctly rounded},
  version = {0.1.0},
  year    = {2026},
  url     = {https://andrea07072000.github.io/S.T.A.R.-/software/star_spline/},
  note    = {Apache-2.0. Source: https://github.com/Andrea07072000/S.T.A.R.-, commit dc09f61d}
}
```

CITATION.cff · BibTeX · SBOM CycloneDX 1.5 · SBOM SPDX 2.3

8. Warranty and liability

Provided "as is", without warranties or conditions of any kind (Apache License 2.0, sections 7 and 8), to the extent the law allows. This never excludes liability that the law does not allow to exclude.

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