Compliance sheet — star-atmosphere

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

1. Identity

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

2. Licence and obligations

Apache License 2.0. You may use, copy, modify and distribute it, also commercially, and you receive a patent licence from the contributors. When you redistribute it: keep the LICENSE file and the copyright notices (and a NOTICE file, if a future version adds one), and state in modified files that you changed them. You may not use the S.T.A.R. name to endorse your product.

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_atmosphere-
0.1.0-py3-none-any.whl
```

FILE	SHA-256
star_atmosphere-0.1.0-py3-none-any.whl	fd5a6323464ac05b993396702e08f031 27d999b3aeb67ab60a99035e25c71cd9
star_atmosphere.py	3cc142e896a963a1229a0cbb32709c1e bc62ea5482ecbec4e85baae5228c9dca
star_atmosphere-0.1.0-source.zip	fa7523e7544966df284e723933236e36 5bdaae195e8041a9d27316f3e50b7fdb

5. What it does, and its limits

Temperature, pressure, density and speed of sound of the 1976 U.S. Standard Atmosphere at geometric altitude from -5 km to 86 km; reproduces the published tables to the printed digits and refuses altitudes outside the model.

A standard atmosphere, not the weather: real density at a given place and day differs by tens of percent. Above 86 km the standard uses a different formulation, not implemented here. Above 80 km the temperature returned is the molecular-scale temperature (0.04 % above the kinetic temperature at 86 km); see the module docstring.

- `ussa1976(z_m)`: the seven-layer model of "U.S. Standard Atmosphere, 1976" with the constants of the standard (R* = 8.31432 J/(mol K)). Reproduces the published base pressure of every layer within 2e-7 and eight rows of the main table to the printed digits (0.001 K; one unit in the fifth digit of pressure and density).
- `geopotential_m(z)` / `geometric_m(h)`: the standard's conversion with r0 = 6 356 766 m; the input of `ussa1976` is GEOMETRIC altitude (the usual source of 0.3 % errors at 20 km is passing one for the other).
- Measured against two independent implementations on 308 altitudes: fluids within 4e-15 relative; hapsira COESA76 within 3e-16 in temperature and 5.7e-5 in pressure and density (its table of base pressures is rounded to 4-5 digits: verified in its data file).
- Valid from -5000 m to 86 000 m geometric. Outside, and for non-numeric, boolean, NaN or infinite input: `ValueError`. Nothing is extrapolated.

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_atmosphere_0_1_0,
  author  = {Cavazzini, Andrea},
  title   = {{star-atmosphere}: U.S. Standard Atmosphere 1976 (below 86 km)},
  version = {0.1.0},
  year    = {2026},
  url     = {https://andrea07072000.github.io/S.T.A.R.-/software/star_atmosphere/},
  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.

Related: space activities and export control · acceptable use · evidence and limits · licence texts