Structural Assessment – Sunpark Omega System

1. Introduction

This document describes the structural assessment of the **Sunpark Omega System**, a self-supporting canopy system in which photovoltaic panels function as the roof.

The assessment is based on structural calculations carried out by an external engineering consultant (Alcomtek) for various roof spans. The purpose of this document is to consolidate these calculations into one clear and verifiable overview, demonstrating that the system is suitable for application under typical Dutch conditions.

---

2. System Description

The Sunpark Omega System consists of a V-shaped pitched roof in which photovoltaic panels, glazing bars and ridge elements together form the roof structure.

The load transfer is as follows:

- PV panels → glazing bars → gutters → main supporting structure
-

The gutters act as primary beams and allow for free spans.

---

3. Geometry and Configurations

The following roof spans have been assessed:

Roof span	Panel size	Power
3.40 m	1762 × 1134 mm	± 460 Wp
3.75 m	1961 × 1134 mm	± 510 Wp
4.00 m	2094 × 1134 mm	± 545 Wp
4.30 m	2278 × 1134 mm	± 600 Wp
4.50 m	2382 × 1134 mm	± 625 Wp
4.65 m	2465 × 1134 mm	± 650 Wp

For all configurations:

- **Span between gutters: 5.00 m**
- Roof pitch: approx. 20–23°

---

4. Standards and Design Basis

The structural assessment is based on:

- **EN 1990** – Basis of structural design
- **EN 1991-1-3** – Snow loads
- **EN 1991-1-4** – Wind loads
- Dutch National Annex
-

For greenhouse applications EN 13031 applies, however for these applications the **Eurocodes are governing**.

---

5. Loads

5.1 Wind Load

Assumptions:

- Wind region: I (Netherlands)
- Terrain: open terrain
- Building height: ≤ 10 m

Typical peak velocity pressure:

$$q_p \approx 0.8–1.0\ \text{kN/m}^2$$

With unfavorable pressure coefficients (edge zones), this may locally increase to:

$$q_{wind} \approx 2.0–3.0\ \text{kN/m}^2$$

5.2 Snow Load

Depending on roof pitch and location:

$$q_{snow} \approx 0.7–1.0\ \text{kN/m}^2$$

5.3 Load Combinations

According to EN 1990, the governing load cases are:

- wind uplift (critical for fixings and glazing bars)
- snow load (critical for beams/gutters)

---

6. Calculation Methodology

For each roof span, a separate structural calculation has been carried out by Alcomtek, including verification of:

- Ultimate Limit State (ULS)
- Serviceability Limit State (SLS)
- Profile stability
- Fixings

The following components are governing:

- gutters (primary beams)
- glazing bars
- PV panel fixings

---

7. Results per Configuration (Summary)

The calculations show that:

- All configurations comply with Eurocode requirements
- Utilisation ratios remain within allowable limits
- The highest loads occur for:
    - the largest roof span (4.65 m)
    - combined wind and snow loading

Indicatively:

- **profile stresses**: well below allowable limits
- **deflection**: within serviceability limits
- **fixings**: sufficient capacity

---

8. Governing Case

The governing configuration is:

- largest roof span: **4.65 m**
- gutter span: **5.00 m**
- wind loading in edge zones

This configuration determines the dimensioning of:

- gutters
- glazing bars
- fixings

All smaller roof spans fall within this range and are therefore also compliant.

---

9. Applicability

Based on the performed calculations, it can be concluded that:

The Sunpark Omega System is suitable for application:

- in **wind region I**
- up to a **building height of approximately 10 metres**
- with a **gutter span up to 5.00 metres**

The structure provides sufficient resistance against:

- wind loads
- snow loads
- load combinations

---

10. Conclusion

The Sunpark Omega System complies with the structural safety requirements according to the Eurocodes.

The calculations demonstrate that:

- the system is **structurally robust**
- key components have sufficient capacity
- adequate safety margins are present

The system can therefore be considered a **reliable and safe roofing solution** within the stated design conditions.

---

11. Disclaimer

This assessment is based on:

- Dutch wind and snow conditions
- standard system configurations

For projects:

- outside the Netherlands
- with different geometries
- or higher load conditions

the structural design must always be:
verified and approved by a locally certified structural engineer
in accordance with national regulations.