0550 Zep Solar

Zep System III - UK

Compliance Report

Client

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The structural analysis includes 9 pages inclusive front page

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Report Revision History

The following revisions have been implemented in this report.

Revision	Date	Modification
-	2011-12-23	Preliminary
-	2012-01-25	Established

STRUCTURAL CODES OF PRACTICE USED FOR THE REVIEW OF "ZSIII SYSTEM"

Eurocode 0 – Basis of structural design

BS–EN-1990

UK National Annex (NA) for Eurocode 0 – Basis of structural design

NA to BS–EN -1990

Eurocode 1 – Action on structures

Part 1-3: General actions – Snow loads

BS–EN-1991-1-3

UK National Annex (NA) for Eurocode 1 – Part 1-3: General actions – Snow loads

NA to BS–EN -1991-1-3

Eurocode 1 – Action on structures

Part 1-4: General actions – Wind actions

BS–EN-1991-1-4

UK National Annex (NA) for Eurocode 1 – Part 1-4: General actions – Wind actions

NA to BS–EN -1991-1-4

Eurocode 3 – Design of Steel structures

Part 2: Steel bridges

EN-1993-2

Wind-tunnel investigation from RWDI

Final report with reference no: 1100143 from 09.02.2011

with additional Eurocode letter from 19.08.2011

1 Introduction

Zep System III from Zep Solar, Inc. is a ballast optimized installation system for flat roofs. The roof pitch can be up to 5°; the module pitch is 11°. The key: Zep System III is aerodynamically optimized. This system can be installed as a ballast only system, requiring no roof penetrations. This method of installation is supported with concrete ballast which resist against uplift -and sliding forces. In cases where site absolute maximum design loads exceed the maximum uplift resistance capacity of the concrete ballasts, mechanical attachments can be properly distributed to provide securement. The mechanical attachments need to be calculated separately and approved by a licensed engineer.

Zep System III consists of Row connectors, Ballast pans, Front legs, Rear legs, Wind diffusers, Diffuser supports, and Ground Zeps. The system has been analyzed for Zep Compatible PV Modules with maximum dimensions of 1000mm x 1660mm.

Zep System III Photovoltaic mounting system from Zep Solar, Inc. has been reviewed according to British European Standard. The Zep System III photovoltaic mounting system complies with the required structural criteria in European Standards including the National Annexes of the United Kingdom.

1 Requirements

1. The basic wind velocity for the United Kingdom was determined according to the zonal wind map in British Structural code of practice BS EN 1991 1-4/Part 1 of the National Annex.
2. The influence of altitude is considered according to British Structural code of practice (BS EN 1991 1-4/Part 2 of the National Annex).
3. The terrain category was determined according to Annex A in BS EN 1991 1-4. The exposure factors c_e and c_t for the terrain categories are considered in the calculator and all relevant charts were converted into tables by ZEP solar and are attached to this document in Annex B.
4. Exposed areas are not part of this calculation and should be determined separately.
5. Load combinations are calculated using the British Structural code of practice BS EN 1990 and its National Annex.
6. The roof pitch can be up to 5° (α = 0° till 5°).
7. The proof of sliding is done according to section A.3.3 of BS EN 1993-2. The partial safety factors are determined according to the National Annex of BS EN 1990. The friction coefficient is taken from Table A.1 in section A.3.3 of BS EN 1993-2.
8. The equation of the verification of static equilibrium and resistance (proof of uplift) is taken from section 6.4.2 of BS EN 1990. The partial safety factors are determined according to the National Annex of BS EN 1990.
9. The recommended pressure coefficients (cp-values) for Zep System III are the result of the wind-tunnel investigation from RWDI (see table 1; Annex A). The cp-values are differentiated into the following zones; North Corner, North Leading Edge, East & West Edges, Field, South Corner and South Leading Edge. For the proof of uplift, these recommended cp-values are the basis for the design calculation. For the proof of sliding the given cp-values can be reduced by a recommended appropriate area reduction factor, which allow the consideration of the whole photovoltaic system on the roof as one unit. Therefore, it is a precondition that the whole PV-system is connected together and stiff enough.
10. The maximum allowable roof height for Zep System III is 18m.
11. Snow load is not a determinant for the ballast optimized Zep System III and will be not considered in further calculations.