

SPECIAL STRUCTURAL ENGINEERING FOR SOLAR POWER PLANTS




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GENOSER
STRUCTURAL DESIGN OFFICE

GENOSER Structural Engineering is a civil engineering office established in Izmir in 2011, specializing in renewable energy, working in the fields of construction, earthquake and geotechnical.





Our company prepares static projects in accordance with TEDAŞ technical specifications for solar power plants to be installed both on the fields and on the roofs within the scope of licensed and unlicensed electricity generation. In this context, the static suitability of the existing building roof system is determined, as well as the solar panel carrier sub-frame

elements. Problems and structural system deficiencies in the examined roofs within the scope of solar panel roof installation are resolved by preparing reinforcement projects. Roof static compliance studies and static reports can be prepared for different types of buildings such as houses, villas, schools, hospitals, industrial buildings, warehouses.

Our Special Activities for Solar Power Plants

- Solar Panel Frame Design and Control
- Bearing Capacity Analysis of Existing Roof and Roof Strengthening Project
- Turnkey Project Design Based on GES Administrative Permits
- Innovative Assembly Frame Design and Supply



Solar Panel Frame Design and Control



The main purpose of the service is to provide the economy and safety balance of the construction (frame) system chosen by the EPC (Engineering Procurement and Construction) companies.

Static control of the constructions (frames) previously selected by the investor is carried out within the framework of the relevant regulations, taking into account local conditions.

At this stage, suggestions for making the system more economical or for static improvement are reported to the investors.

GENOSER currently controls and improves the carrier systems developed by many international manufacturers/designers according to local specifications.

Solar panel sub-construction is selected to be compatible with the roof covering. This choice depends on the type of roof covering as well as the placement of the solar panel. For this reason, solar panel placements that will cause non-economic results are changed after evaluation with the electricity project designer. Construction part lengths, hole spacings, fastener types are specified in the project. Designs are based on TS498, Regulation on Design, Calculation and Construction Principles of Steel Structures-2016, TBDY-2018, Eurocode 3-9 regulations
Construction design – static calculation and project design, the most economical and safe construction designs are made under snow, wind and earthquake loads determined according to PV panel and local conditions.

Designs are based on TS498, Regulation on Design, Calculation and Construction Principles of Steel Structures-2016, TBDY-2018, Eurocode 3-9 regulations.

The construction can consist of a single building material, or mixed systems such as steel + aluminum can be designed.

Existing Roof Bearing Capacity Analysis and Roof Reinforcement Project

Our current roof static control works are the most demanded service item by both the building owners and industrial facilities managers as well as the electrical contractors.

There are **two** different scopes of work

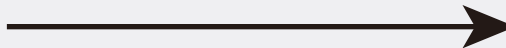
1

**ROOF VISUAL
EXPLORATION**

2

**ROOF VISUAL
EXPLORATION**

Speedy



Wide

WHICH EXAMINATION SHOULD BE DONE?

1. We want that our roof be examined **visually** by an expert.
2. We would like to get **preliminary information** about our roof carrier system.
3. We do not need a static account-based review at this time.
4. We request information on the suitability of the **roof covering**.
5. We want to know approximately how much installed power we can make by determining the suitable areas of our roof in general.
6. We are an EPC company that will bid on the employer. We want to do a low-budget information study.

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ROOF VISUAL EXPLORATION



Our service according to your demands above is roof visual reconnaissance.

SCOPE OF ROOF VISUAL RECONNAISSANCE:

1. **Observational** studies to provide general information to the employer.
2. It is done by the expert technical team.
3. The general geometry of the building and the carrier system are visually examined.
4. Static calculations and loading simulations are **not performed**.
5. Upon request, **the survey drawing**, which will be the basis for panel placement, can be delivered.
6. A general roadmap of what needs to be done is reported.
7. The solar mounting **construction** to be used is defined.
8. Summary discovery report is given.

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ROOF VISUAL EXPLORATION



WHICH EXAMINATION SHOULD BE DONE?

1. We want to find out if our roof can handle the **additional loads** from solar panels.
2. We want to have a static calculation-based control done by an authorized engineering office.
3. Instead of visual comments about the roof, We want to proceed with **numerical results**.
4. We will receive a GES Conformity Letter from the relevant civil administration based on its report.
5. We think that our roof is insufficient, we want to see reinforcement alternatives and their **approximate costs**

2

ROOF STATIC CONTROL



SCOPE OF ROOF STATIC CONTROL

1. The building is examined on site, and the existing static projects, if any, are obtained from the Workplace.
2. A model of the building is created in the computer environment, and loading simulations are made.
3. In addition to loads such as coating, snow, wind, solar panel loads are affected.
4. According to the structure type, earthquake lateral translations, which are determinative in earthquake damage, are made.
5. The work done can be used in GES official permit processes.
6. The study is focused on the roof carrier system, its scope can be expanded according to the special request of the employer.
7. In case of possible inadequacies, retrofit alternatives are reported and approximate quantities are given.

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ROOF STATIC CONTROL



WHAT SHOULD I DO AS AN EMPLOYER BEFORE DETERMINATION?

The following documents
in your archive should be
provided if possible.

**ARCHITECTURAL
PROJECT**

**STATIC / REINFORCED
CONCRETE PROJECT**

FREQUENTLY ASKED QUESTIONS

1. The building is examined on site, and the existing static projects, if any, are obtained from the Workplace ?

Yes!

In this section, we try to clarify the questions frequently asked by building owners, industrial facility managers and EPC companies about static controls in solar panel roof installations.

2. Our roof is steel carrier and has no projects. How are you progressing?

Since steel profiles are the elements that can be measured on their cross-sections and have standard features according to these dimensions, we can easily take the dimensions to establish a computer model with our on-site survey work.

We take care to measure the wall thickness of closed-section profiles such as boxes and pipes. We confirm the measurements with the supporting documents of the employers such as waybill and invoice belonging to these profiles.

3. Our roof does not have prefabricated reinforced concrete types and assets. How are you progressing?

In reinforced concrete structures that do not have a static project, we detect the reinforcing bars by scraping the concrete cover under 1 purlin and 1 roof truss for each type of hall.

4. Do you take concrete core samples from the columns?

Static examinations based on solar panel installations are made for roof carrier elements according to the specifications of TEDAŞ General Directorate. In these elements, which work as bending elements, it is not necessary and in many cases not necessary to take a damaged concrete core sample to determine the bearing capacity.

5. Is the important earthquake investigations are included in your scope?

Yes.

Earthquake effects do not, in many cases, have a significant effect on the roof elements, which are the protectors. In the roof static controls we carry out in industrial buildings, major earthquake investigations such as the earthquake risk of the operation and lateral drift are carried out. However, earthquake investigations are not within the scope of Earthquake Performance Analysis, which is based on soil survey and destructive samples to be taken from the building.

6. As a result of the report, do we learn how to strengthen our roof if it is insufficient?

Yes.

As a result of the analysis, we report how to strengthen the purlin, truss and column-roof connections. However, a detailed reinforcement application project is being prepared upon your additional request.

7. Your work is an earthquake performance analysis?

No.

Earthquake performance analysis is an analysis based on soil survey, destructive samples to be taken from the building and earthquake simulation. In cases where the employer does not have a special request within the scope of roof gusset installations, high-cost Earthquake Performance analysis is not required and in many cases it is not necessary.

FEATURED PROJECTS

ALİ SAMİ YEN SPORTS COMPLEX NEF GALATASARAY STADIUM

- Existing roof static control
- Sub-assembly construction design control



BRİSA AKSARAY FACILITY

- Existing roof static control
- Sub-assembly construction design control



ERDEM HOLDING IZMIT FACILITIES

- Existing roof static control
- Sub-assembly construction design control



**MA'ADRA VINEYARDS,
BALIKESIR**

- Existing roof static control



**YILDIRIM HOLDING - GEMPORT
GEMLIK, BURSA**

- Existing roof static control



**YILDIRIM HOLDING - ROTAPORT
KOCAELI, GULF**

- Existing roof static control



FRİTERM THERMAL GEBZE FACILITY

- Existing roof static control
- Sub-assembly construction design control



OMYA MINING KARABIGA FACILITY

- Existing roof static control



TEGNATIA EPC SOLUTIONS MUŞ FIELD SOLAR POWER PLANT

- Sub-assembly construction design control



MAXION INCI ALUMINIUM ROOF-TOP SOLAR POWER PLANT

- Existing roof static control
- Sub-assembly construction design control



ÖREN CABLE ISTANBUL

- Existing roof static control



DEFNE AGRICULTURE TIRE, IZMIR FACILITY

- Existing roof static control



KILIÇ DENİZ ALL FACILITIES

- Existing roof static control



BAŞARANLAR DENİZLİ WAREHOUSES

- Existing roof static control



AKÇA HOLDİNG KÖŞK and SARUHANLI FACILITIES

- Existing roof static control



TURKUAZ AUTOMOTIVE DENIZLI

- Sub-assembly construction design control



PEPSICO KEMALPAŞA, IZMIR FACILITY

- Existing roof static control



İŞBİR SYNTHETIC BALIKESİR

- Existing roof static control



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