Wrocław, 13 June 2024

Wietrzna 14 D/4
53-024 Wroclaw, Poland
+48 601 218-262
m.kurowski@solartechnik.net.pl
https://www.solartechnik.net.pl
NIP PL8992934430

Report on the strength of supports for photovoltaic panels

The load strength test was carried out on an assembled, complete set intended for installation on flat roofs. The set consisted of a photovoltaic panel measuring 1130mm by 1720mm, metal supports and concrete weights weighing 15kg to stabilize the supports. The test consisted in gradual, even loading of the PV panel surface with successive pairs of weights (cartons) weighing 14 kg each. The test was carried out using a load in the load range from 0 kg to 448 kg. After each load change, the results of the measurement of the strain of the vertical support were checked using KENNEDY 300-750 and LIMIT dial indicators with a measuring range of 10 mm and a resolution of 0.01 mm. The configuration of the test bench for testing the strength of PV panel supports is shown in Figure 1.

Figure 1. Configuration of the PV panel support strength test bench

The results of measurements collected during the testing of the strength of PV panel supports are presented in the table in Figure 2 and presented in the diagram in Figure 3. The course of the test was documented photographically (photos of the station, load and measurement results of dial indicators for each load value).

Nr testu	Obciążenie [kg]	Numer zdjęcia stanowiska	Numer zdjęcia obciążenia	Odkształcenie podpory lewej [mm]	Odkształcenie podpory prawej [mm]	Nr zdjęcia Czujnik zegarowy podpora lewa	Nr zdjęcia Czujnik zegarowy podpora prawa
0	0	DSC00525	-	0,00	0,00	DSC_5436	DSC_5435
1	28	DSC00526	DSC_5439	1,84	1,08	DSC_5440	DSC_5441
2	56	DSC00527	DSC_5442	3,30	1,98	DSC_5443	DSC_5444
3	84	DSC00528	DSC_5445	3,71	2,50	DSC_5446	DSC_5447
4	112	DSC00529	DSC_5448	4,39	2,82	DSC_5449	DSC_5450
5	140	DSC00530	DSC_5451	4,96	3,12	DSC_5452	DSC_5453
6	168	DSC00531	DSC_5454	6,08	4,08	DSC_5455	DSC_5456
7	196	DSC00532	DSC_5457	8,27	6,41	DSC_5458	DSC_5459
8	224	DSC00533	DSC_5460	9,71	7,40	DSC_5461	DSC_5462
9	252	DSC00534	DSC_5465	11,34	8,83	DSC_5466	DSC_5467
10	280	DSC00535	DSC_5468	13,91	11,07	DSC_5469	DSC_5470
11	308	DSC00536	DSC_5472	14,03	11,26	DSC_5473	DSC_5474
12	336	DSC00537	DSC_5475	13,63	10,94	DSC_5476	DSC_5477
13	364	DSC00538	DSC_5478	13,54	10,90	DSC_5479	DSC_5480
14	392	DSC00539	DSC_5481	18,27	15,92	DSC_5482	DSC_5483
15	420	DSC00540	DSC_5486	25,01	22,66	DSC_5487	DSC_5489
16	448	DSC00541	DSC_5493	32,84	30,49	DSC_5494	DSC_5495

Figure 2. Summary of the results of the PV panel strength test

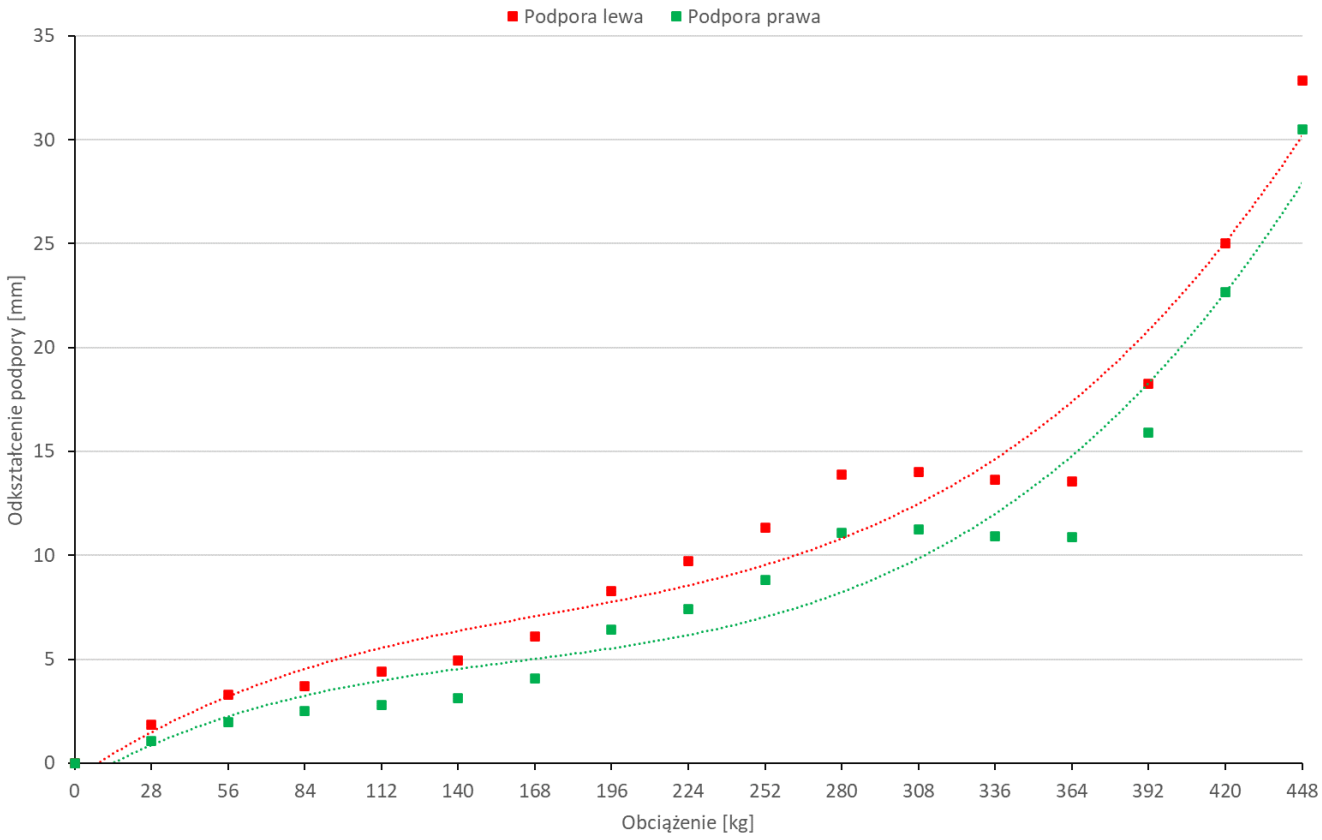

Figure 3. Dependence of Deformation of Vertical Support of PV Panel under Load

At the maximum load of the PV panel with a weight of 448 kg, the vertical supports underwent significant deformation of 32.84 mm (left support) and 30.49 mm (right support) (Figure 4, photo on the left). After removing the load on the PV panel, the vertical supports remained slightly deformed (Figure 4 photo on the right). At maximum load, the PV panel rested on concrete blocks stabilizing the supports.

Figure 4. Deformation of the support leg at a maximum load of 448 kg (picture left) and after load removal of 0 kg (picture on the right)

The maximum load of the PV panel did not cause the brackets to move at the point of the bolted connection connecting the horizontal element with the vertical support.