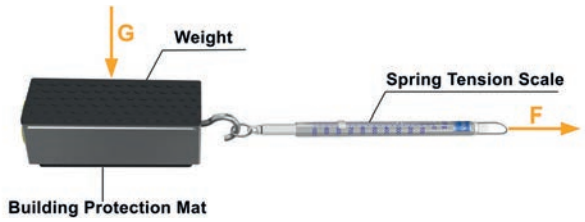
PROTOCOL COEFFICIENT OF FRICTION

SL Rack
Schletter Ludwig

Instructions

When installing a flat roof system, it is crucial to ensure optimal positional stability. The objective is to calculate the **optimal ballasting** for the flat roof system, which ensures the safety of the system and keeps the amount of ballast within reasonable limits. Static friction plays a pivotal role in this process. The static friction depends on a number of factors, including the weight of the PV system and the **friction** between the flat roof surface and the building protection mats of the racking. The **PV system weight** includes the total weight of the modules, the racking, ballast, cables, inverters and grounding cables. The roofing material of a flat roof usually consists of bitumen or some type of foil. EPDM or building protection mats are inserted at the contact points of racking and roofing material. These factors are used to calculate the **coefficient of friction**, from which the optimum ballast for the system can be determined..

How to determine the coefficient of friction
The coefficient of friction, also known as the friction coefficient (formula symbol μ), is a dimensionless measure for the frictional force in relation to the contact pressure between two bodies.



Tensile force, F [kg]	Weight force, G = 1 Kg
Weight force, G [kg]	(Approx. 1 kg when using the enclosed weight and a building
Coefficient of friction, μ	protection mat. Deviations are negligible.)
F/G = μ	Example:
	0.7 kg / 1.0 kg = 0.7

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Test Procedure

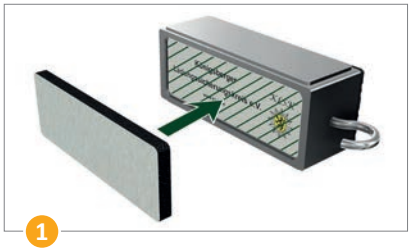
The following items are required for the test:

FLA Coefficient of Friction Measuring Case, item no. 09500-50:

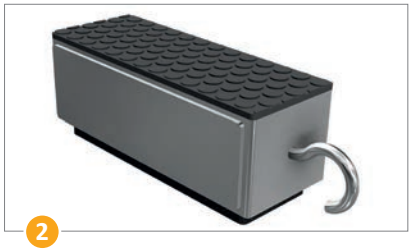
» Test weight with building protection mat permanently attached to the bottom

» Spring tension scale

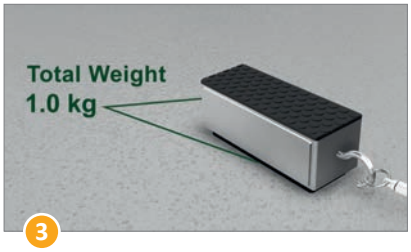
Make sure to choose the appropriate type of building protection mat for the respective project site.



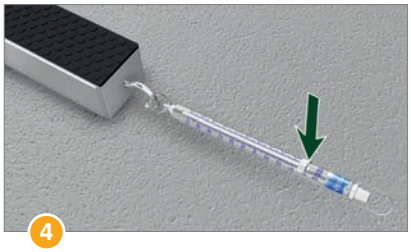
1 Insert the building protection mat into the recess provided on the weight.



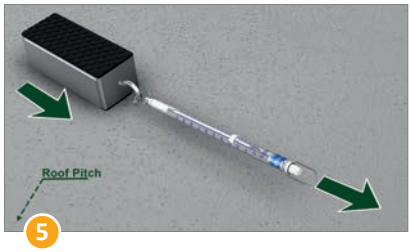
2 Test weight ready for measure-ment.



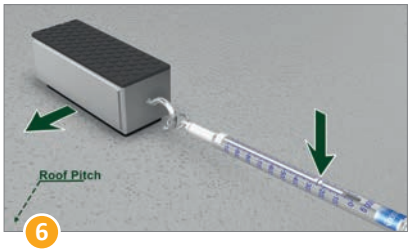
3 The combined weight of the building protection mat and test weight is 1.0 kg.



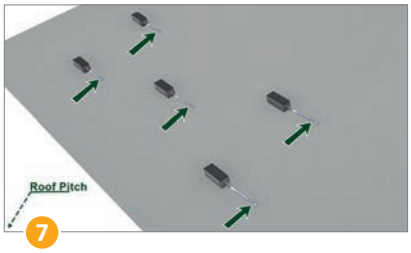
4 Ensure that the scales are set to „0“ before each measurement.



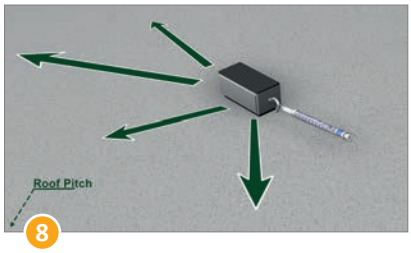
5 Pull the test weight with the spring tension scale transversely to the roof pitch.



6 Read off the tensile force in kg as soon as the test weight starts to slip (end position of the spring tension scale).



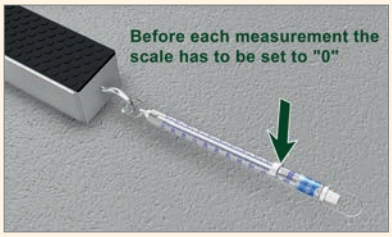
7 Read off the measurement results at several points on the surface of the array area, on both dry and wet surfaces.

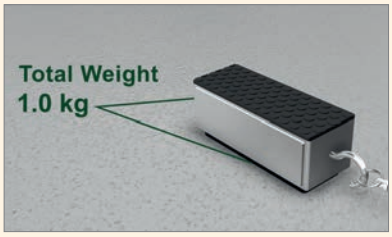


8 Enter the measurement results of the high points, low points, corner, edge and centre areas of the surface.

Note: For each measurement, ensure that the unloaded scale is at zero. Use the building protection mat provided for the test. The combined weight of the protective mat and test weight should be 1.0 kg.
The weight can be adjusted by adding additional weights or removing lead balls.

Sample calculation for illustrative purposes:
The test weight weighs 1.0 kg. The spring tension scale shows 0.70 kg before the weight moves.
F [indication on spring tension scale in kg]: G[test weight in kg] = μ [coefficient of friction]
0.7 kg : 1.0 kg = 0.7
μ = 0.7





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Test Log

ROOF			
Roofing Manufacturer	Type of Roofing	Age of Roofing	Weight [G] Test Weight [kg]

MEASURED VALUES*	TENSILE FORCE F IN KG
Measuring Point 1 – dry	
Measuring Point 1 – wet	
Measuring Point 2 – dry	
Measuring Point 2 – wet	
Measuring Point 3 – dry	
Measuring Point 3 – wet	
Measuring Point 4 – dry	
Measuring Point 4 – wet	
Measuring Point 5 – dry	
Measuring Point 5 – wet	

** It is recommended that the number of measuring points be increased for larger roof areas. Then take the lowest value of all the measuring points and divide it by the weight of the test specimen.*

Measured values in the Solar.Pro.Tool

Please note the following when entering your measured values into our Solar.Pro.Tool design software:

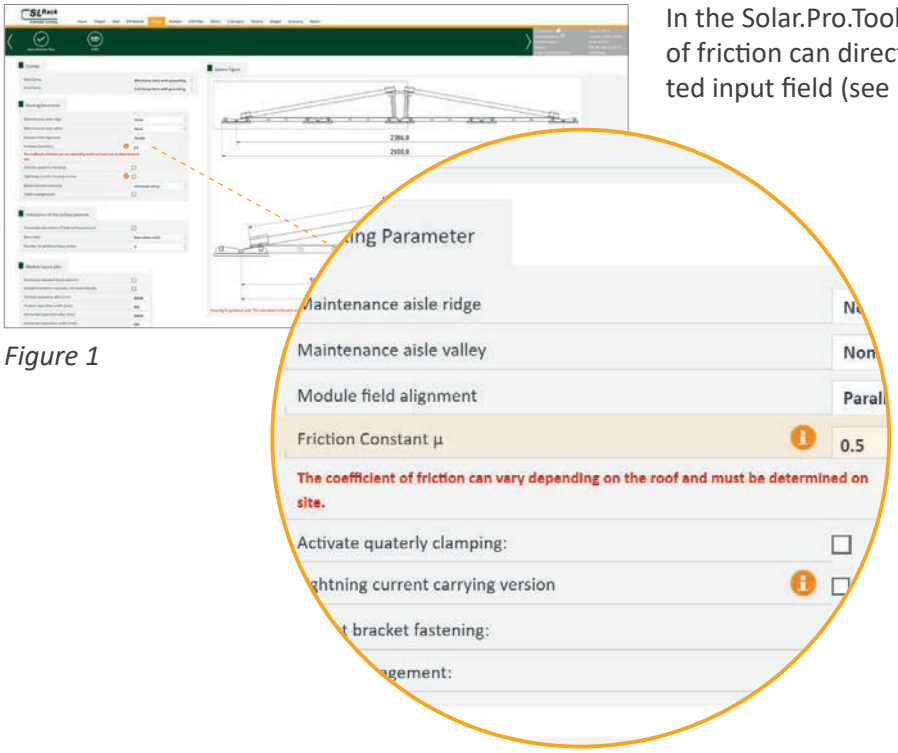

Figure 1

In the Solar.Pro.Tool design software, the coefficient of friction can directly be entered into the designated input field (see Figure 1).

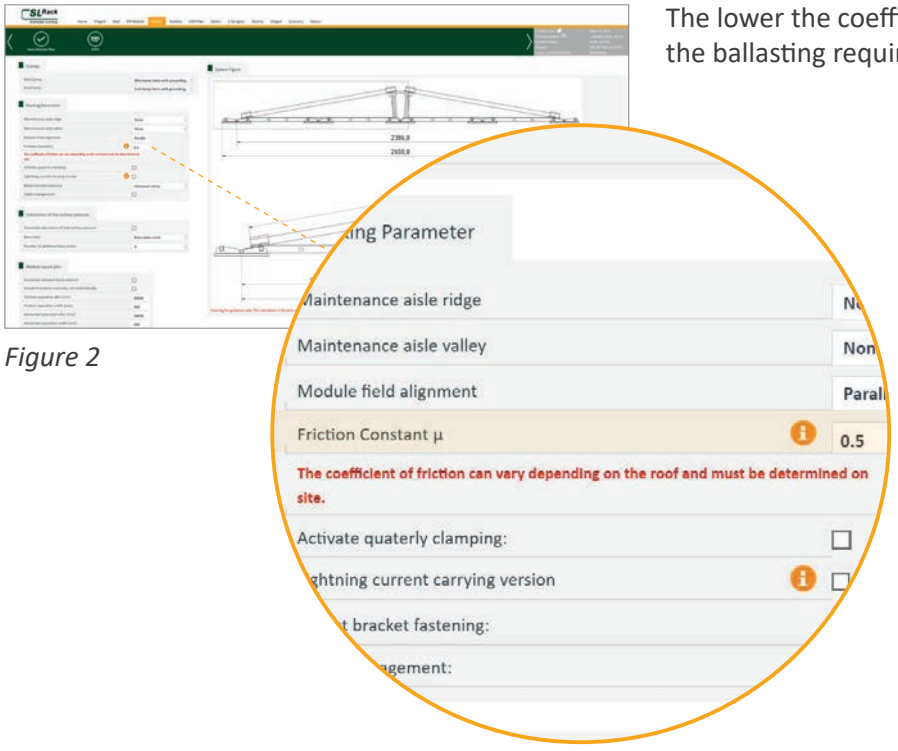

Figure 2

The lower the coefficient of friction (µ), the higher the ballasting requirement (see Figure 2).

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It is our top priority to make the installation process for you as quick, easy and efficient as possible. Please share your experiences, ideas or criticism with us, so we can continue to improve our products and develop new ones.

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