

Safety Measures to Protect Roof Workers against Falls While Working on Rooftop Solar Equipment

Solar equipment-related fatalities, 2015 to 2019 (27 cases, 27 deaths)

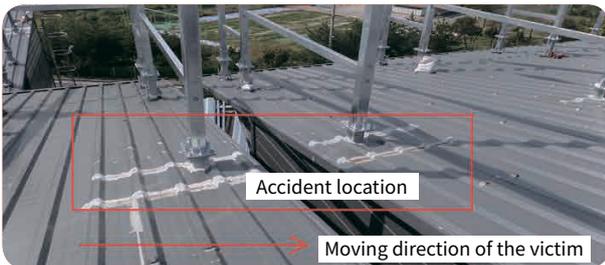
Location type	N	Percentage
Barns	12	44.4
Factories	8	29.6
Warehouses	3	11.1
Other (utility poles, aerial work platforms)	4	14.8
Total	27	100.0

Cause	N	Percentage
Skylight/roof damage	17	63.0
Slippage	5	18.5
Unsecured ladders	1	3.7
Other (electrocution, drowning)	4	14.8
Total	27	100.0

Article 45, Rules on the Industrial Safety and Health Standards (Preventing Rooftop Hazards)

Employers shall take the necessary safety measures, such as installing work plates that are at least 30 centimeters in width and fall-prevention nets, when workers work on rooftops made of crack-prone and non-durable materials, such as slates and Sunlight panels.

Actual cases of solar work-related fatalities



▶ A worker died after falling through a crack while walking on the rooftop of a factory (Sept. 2019).



▶ A worker was moving materials (frames) on the rooftop when he fell through a skylight to die (Sept. 2019).



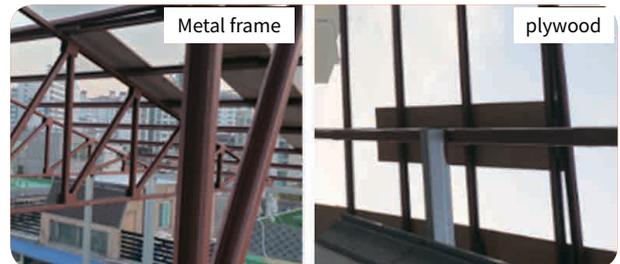
▶ A worker was walking on the rooftop when he fell through a skylight to die (June 2019).



▶ A worker was installing a photovoltaic energy module on a rooftop when he fell through a skylight and died (Jan. 2019).



▶ A worker was electrocuted when he came in contact with a utility pole near the rooftop on a barn on which he was working, and fell and died in the result (Oct. 2017).



▶ A worker was walking atop the steel structure housing a photovoltaic energy unit when he fell through the roof and died (Nov. 2016).

Checklist for Preventing Solar Work-Related Injuries and Fatalities



Risks	Checklist	Applicable	Status
Fall	<ul style="list-style-type: none"> Is there an elevator* to help the worker access the rooftop? * A fixed ladder, a walking tower, an aerial work platform (vehicle), etc. 	<input type="checkbox"/>	<input type="checkbox"/> Acceptable <input type="checkbox"/> Not acceptable
	<ul style="list-style-type: none"> Are there objects/materials (photovoltaic modules and props) concentrated/over-loaded on the rooftop? 	<input type="checkbox"/>	<input type="checkbox"/> Acceptable <input type="checkbox"/> Not acceptable
	<ul style="list-style-type: none"> Is there at least one fall-protection device (a work plate, a safety covering*, a safety net, and/or a harness) to prevent possible injuries due to the vulnerability of the roof structure (e.g., skylights)? * A safety covering must be installed over a skylight. Workers are not supposed to step or tread on such coverings, but the coverings should be designed to prevent workers' fall in case they accidentally step on them. 	<input type="checkbox"/>	<input type="checkbox"/> Acceptable <input type="checkbox"/> Not acceptable
	<ul style="list-style-type: none"> Is there at least one fall-protection devices (safety rails, fall-prevention nets, and/or harnesses) available at the edge of rooftop? 	<input type="checkbox"/>	<input type="checkbox"/> Acceptable <input type="checkbox"/> Not acceptable
	<ul style="list-style-type: none"> Are workers wearing personal protection equipments (hard hats, harnesses, etc.) properly while working? 	<input type="checkbox"/>	<input type="checkbox"/> Acceptable <input type="checkbox"/> Not acceptable
Equipment	<ul style="list-style-type: none"> Is the work site secured to prevent unauthorized/unmonitored access? 	<input type="checkbox"/>	<input type="checkbox"/> Acceptable <input type="checkbox"/> Not acceptable
	<ul style="list-style-type: none"> Are workers on the aerial work platform (vehicle) protected by safety rails? ※ Workers must still wear harnesses even if there are safety rails on such platforms/vehicles. 	<input type="checkbox"/>	<input type="checkbox"/> Acceptable <input type="checkbox"/> Not acceptable

Elevator (walking tower)



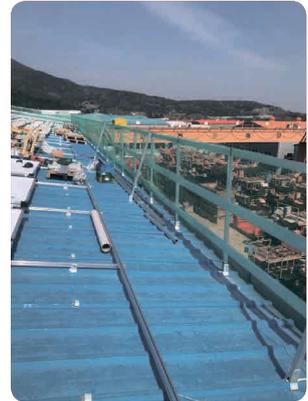
Materials concentrated/overloaded



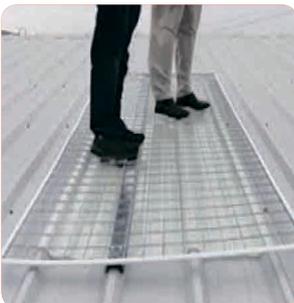
Work plate for pathway



Safety rails along rooftop



Safety covering for skylight



Fall-prevention net



Harness and harness-securing device



Aerial work platform without safety rails

