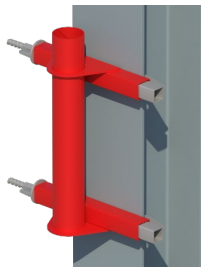


THE „HINGED GALLOWS [150]” SECURITY SYSTEM

S A F E W O R K A T H E I G H T



ONE USER



2.3 PERMISSIBLE WORKING PARAMETERS

The gallows together with the self-locking device and safety harness constitute a set of cooperating links of the fall protection system, knowledge of the principles of their operation and awareness of limitations in the use of the system is a prerequisite for its safe operation.

Safety harnesses are the only approved PPE that works with a fall arrest device and a self-locking device

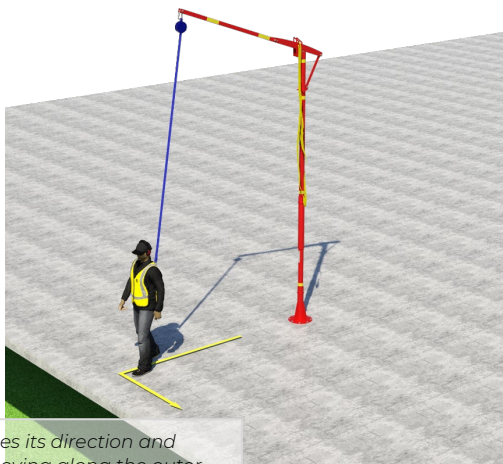
2.3.1 PENDULUM PHENOMENON

The main, potentially dangerous phenomenon that occurs when working with the "gallows" device is the so-called The "Pendulum Effect". It appears when a user moving perpendicular to the edge changes its direction and starts moving along the outer edge. This causes the angle between the Equipment Axis and the Axis Perpendicular to the edge to increase (see figure below).

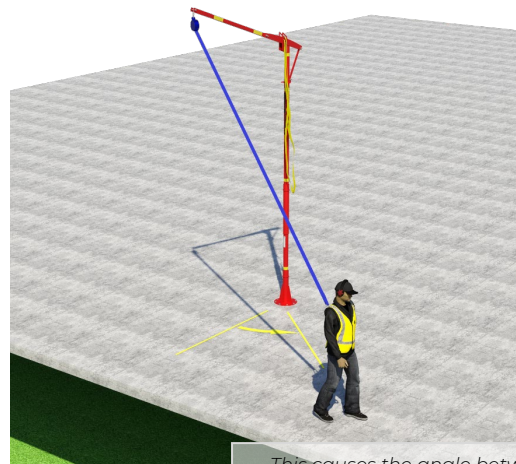
In the event of a fall over the edge, the user attached to the device performs a swinging motion in which the safety line contacts the edge of the ceiling.

The occurrence of such an event is a direct threat to life and health.

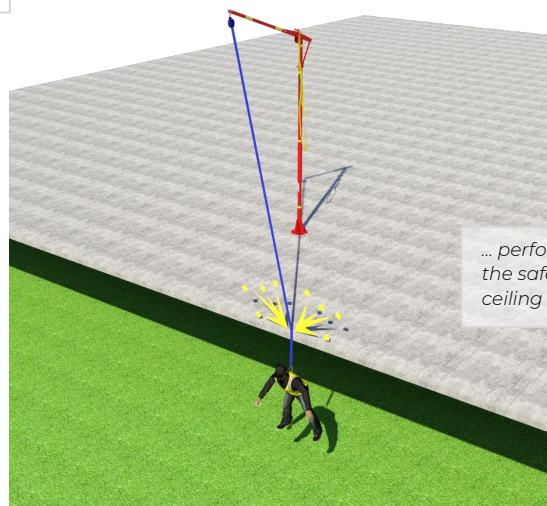
The occurrence of this type of fall is not permitted by the manufacturer of standard self-securing devices, and possible work with devices that allow for a fall over the edge requires the use of other types of belaying devices, not offered in the discussed security system.



... changes its direction and starts moving along the outer edge ...



... This causes the angle between the Equipment Axis and the Axis Perpendicular to the edge to increase ...



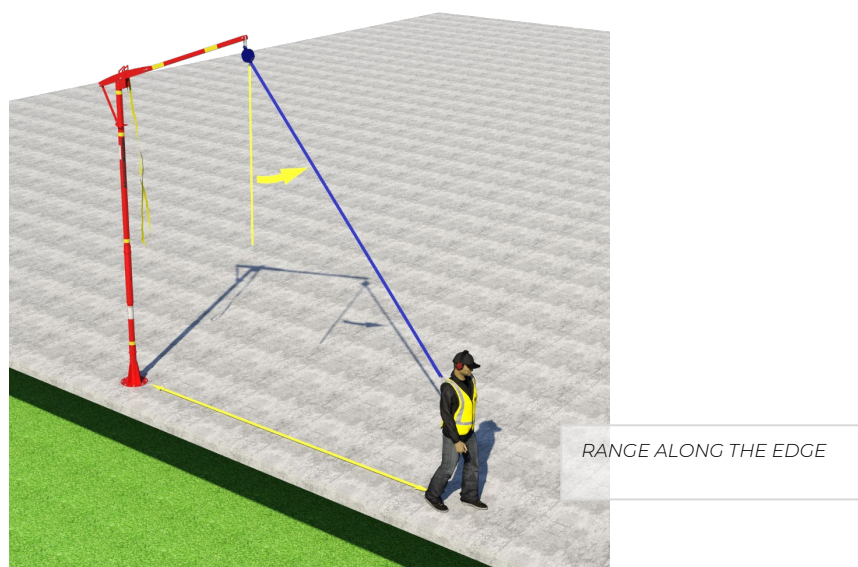
... performs a swinging motion in which the safety line contacts the edge of the ceiling ...



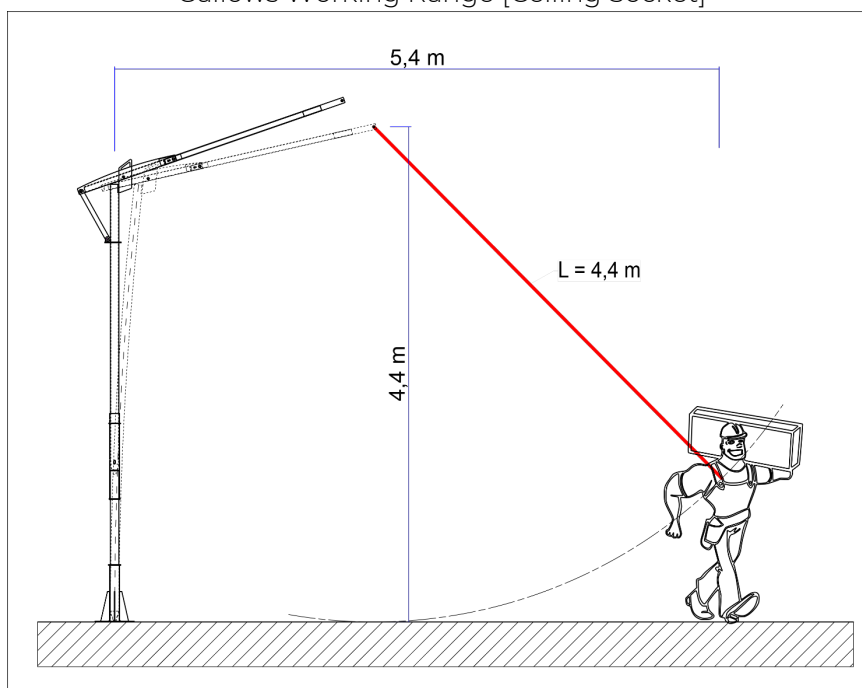
2.3.2 WORKING RANGE OF A SAFETY DEVICE

RANGE ALONG THE EDGE

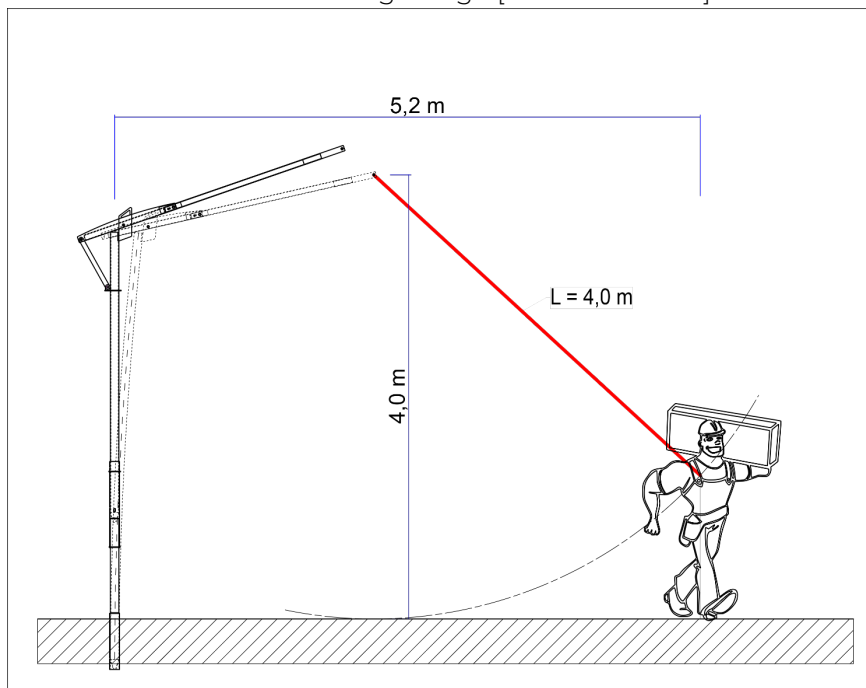
Due to the pendulum phenomenon, a limitation has been introduced in the range of operation of the fall protection device, which is determined geometrically and does not depend on the length of the safety cable of the self-locking device used. The maximum range of operation along the edge is specified in the table below. The figure below shows schematically the range of the galleys work within the outer edge of the working area.



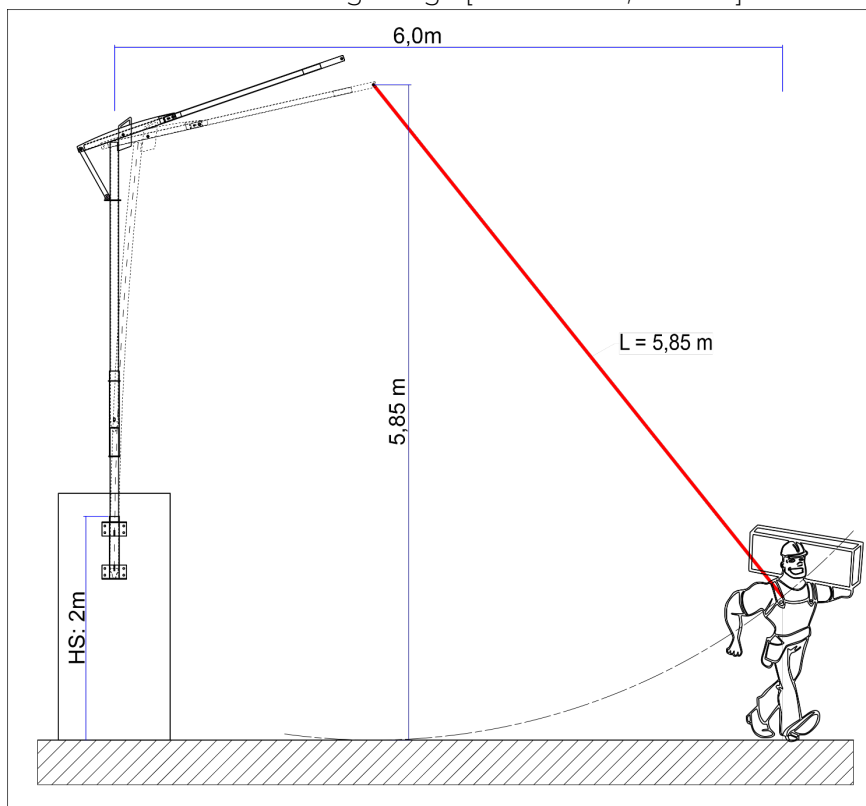
Galleys Working Range [Ceiling Socket]



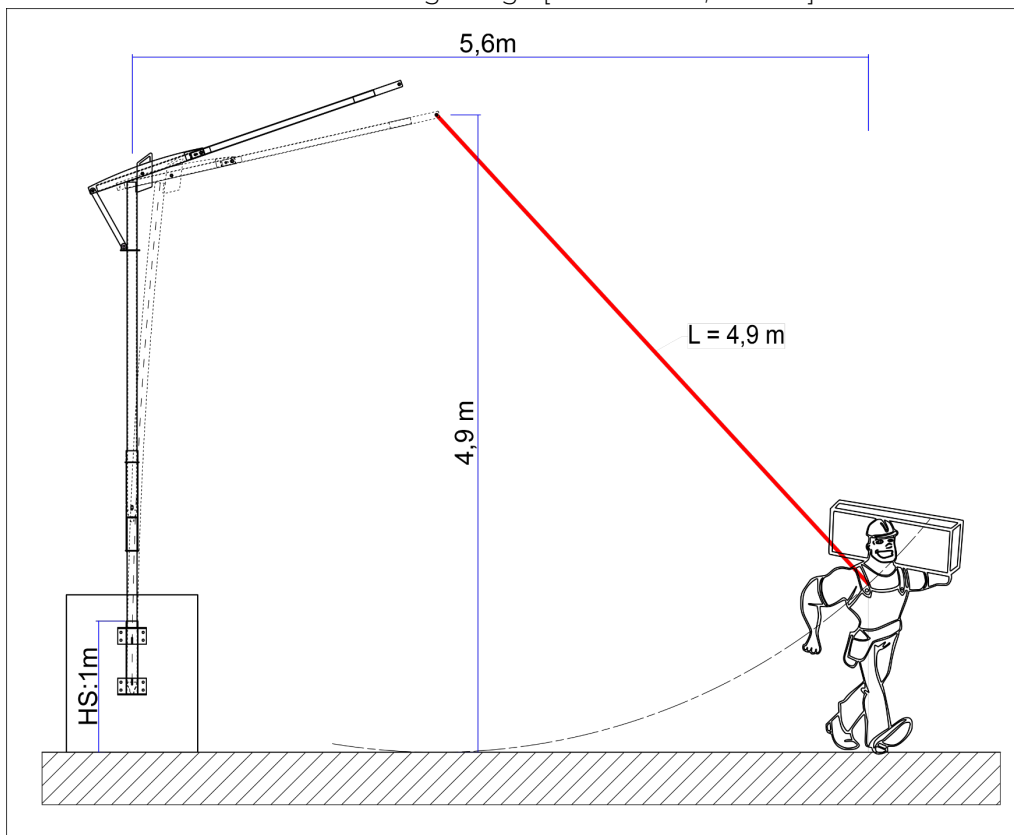
Gallows Working Range [Sunken Socket]



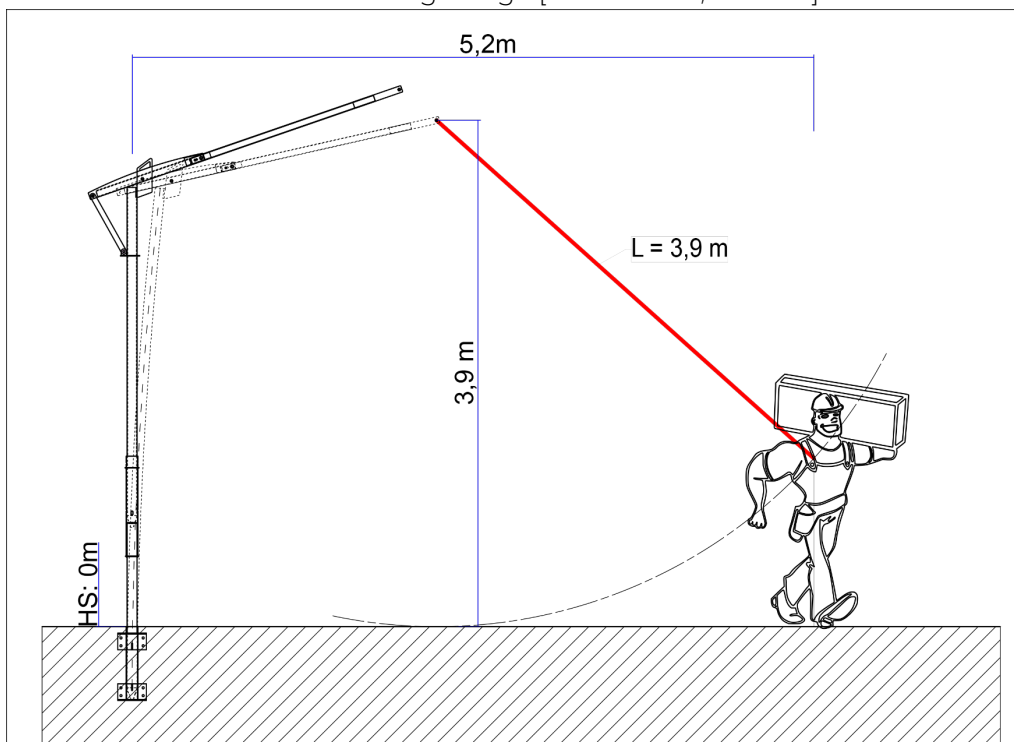
Gallows Working Range [Side Socket, HS=2m]



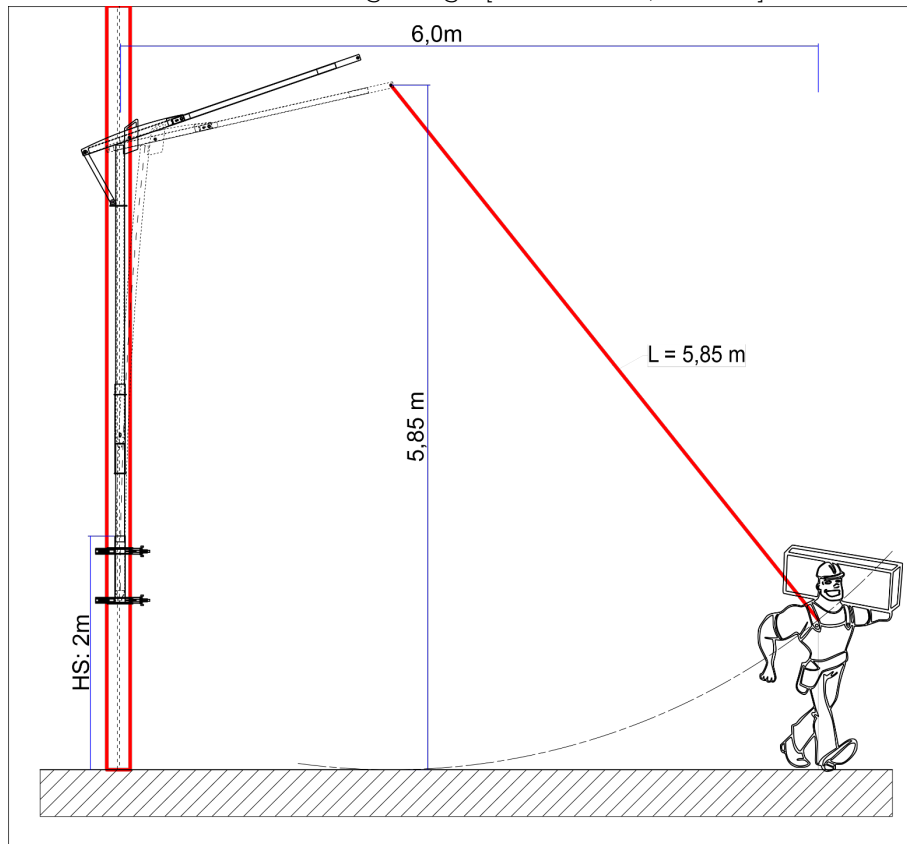
Gallows Working Range [Side Socket, HS=1m]



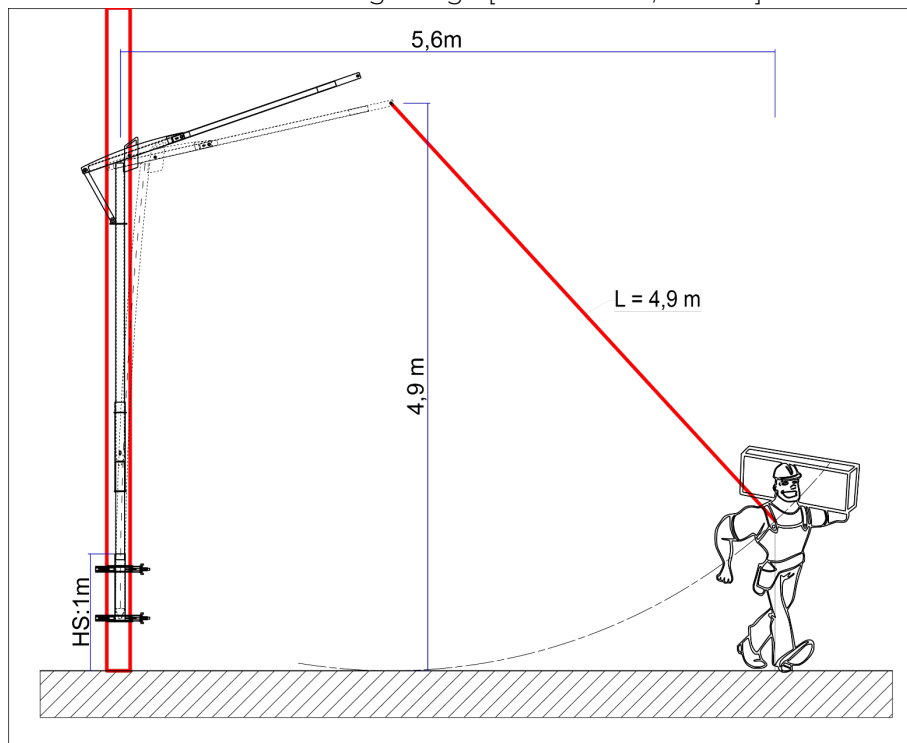
Gallows Working Range [Side Socket, HS=0m]



Gallows Working Range [HEB Socket, HS=2m]

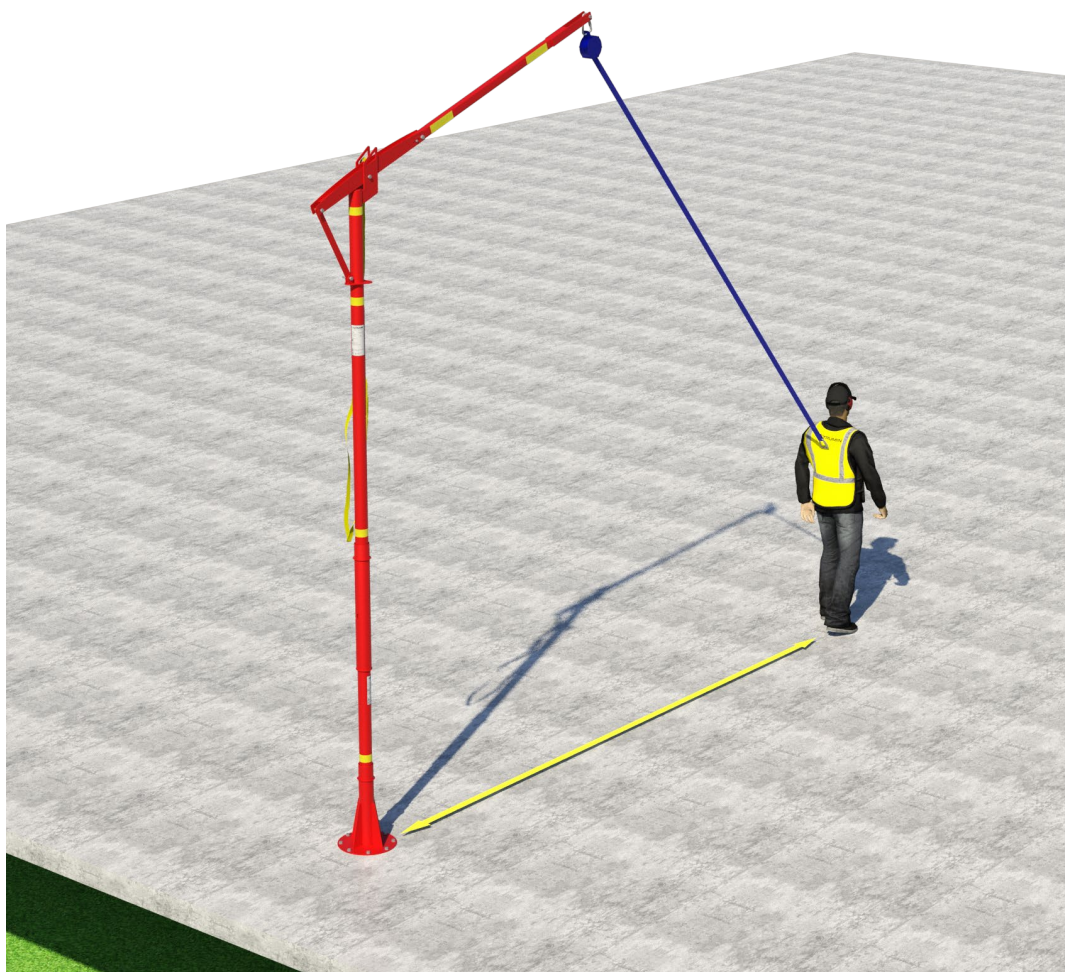


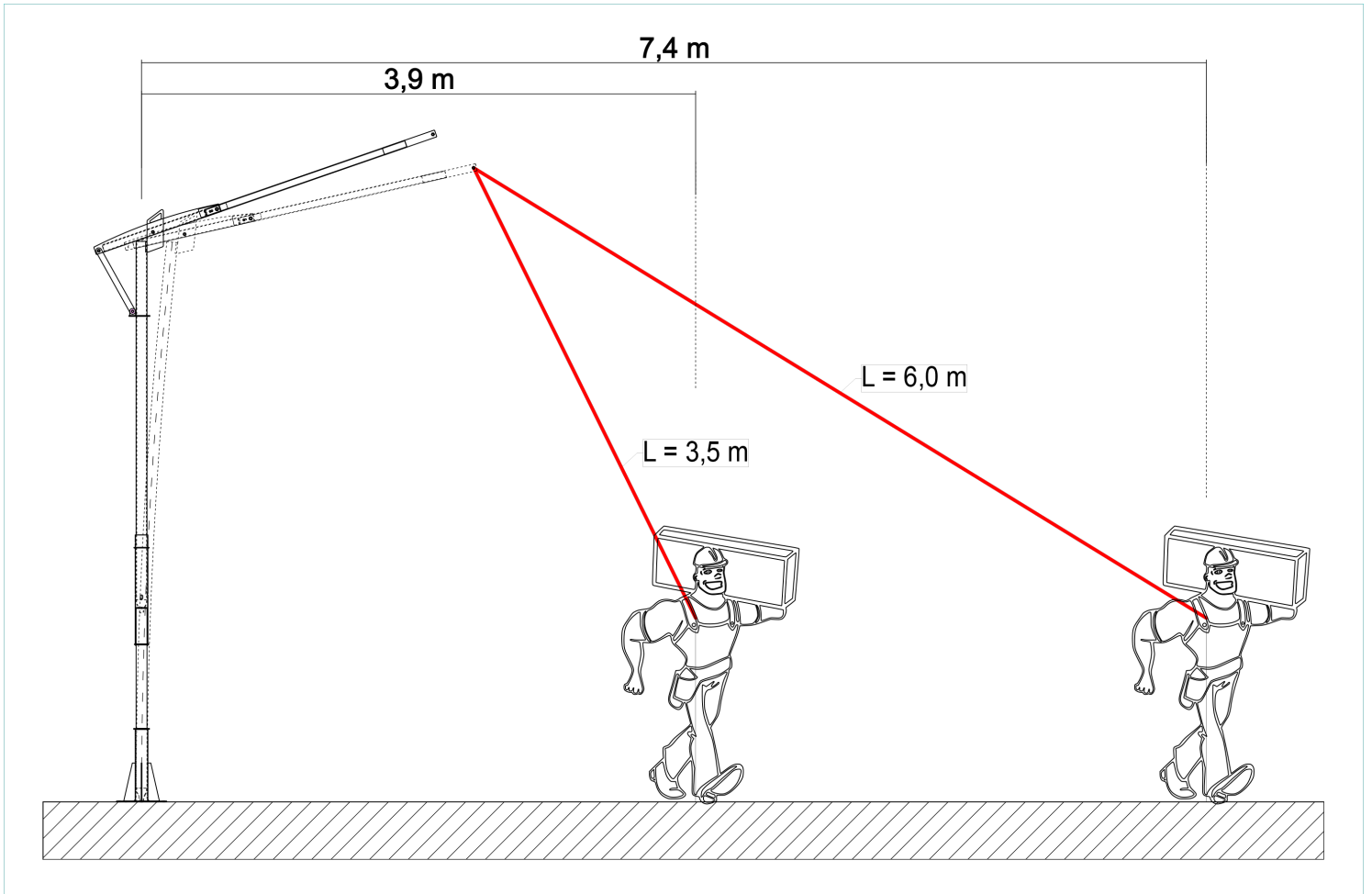
Gallows Working Range [HEB Socket, HS=1m]



MAXIMUM RANGE

The maximum range of the gallows within the ceiling (in the direction opposite to the ceiling edge) results directly from the maximum length of the safety line L.





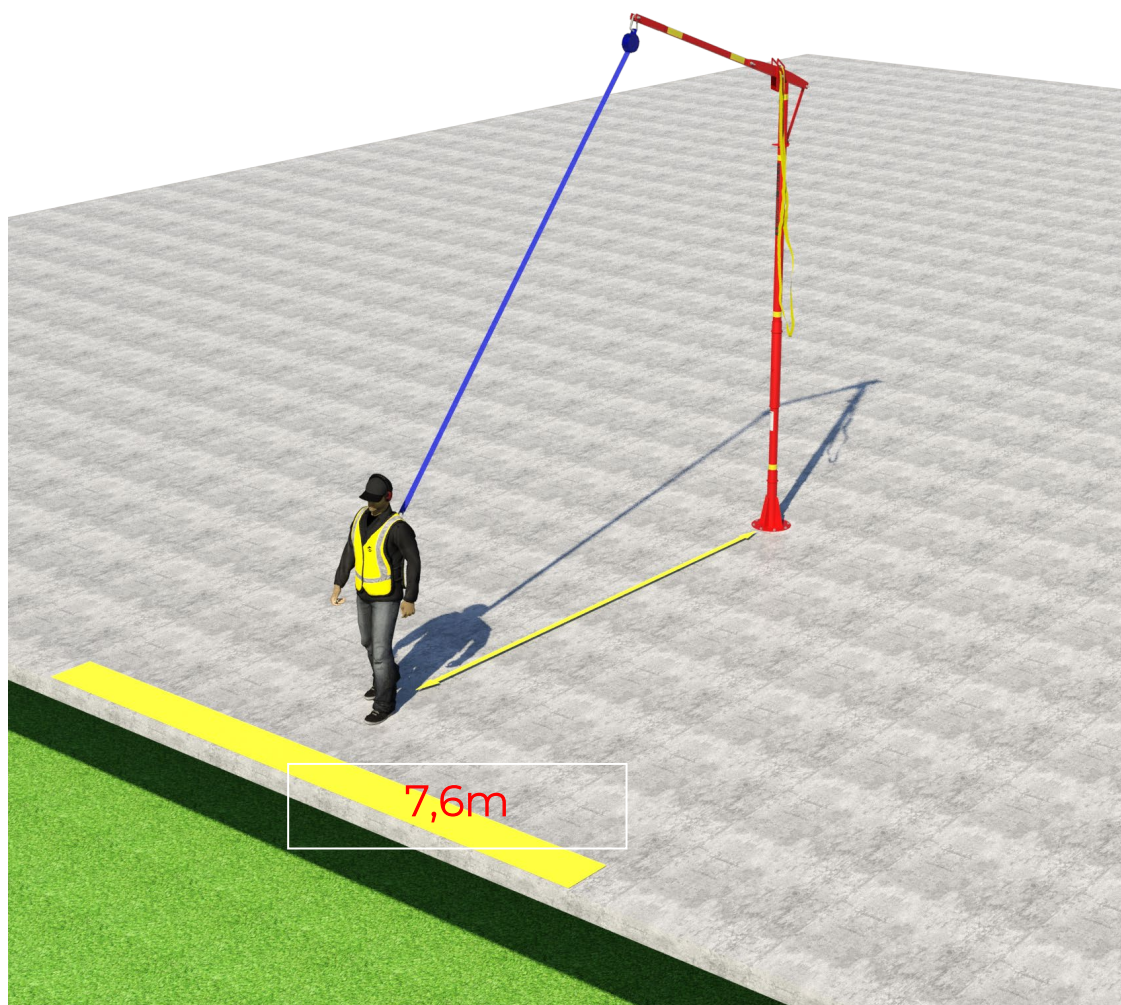
POSITION OF THE GALLOWS WITH REGARD TO THE CEILING

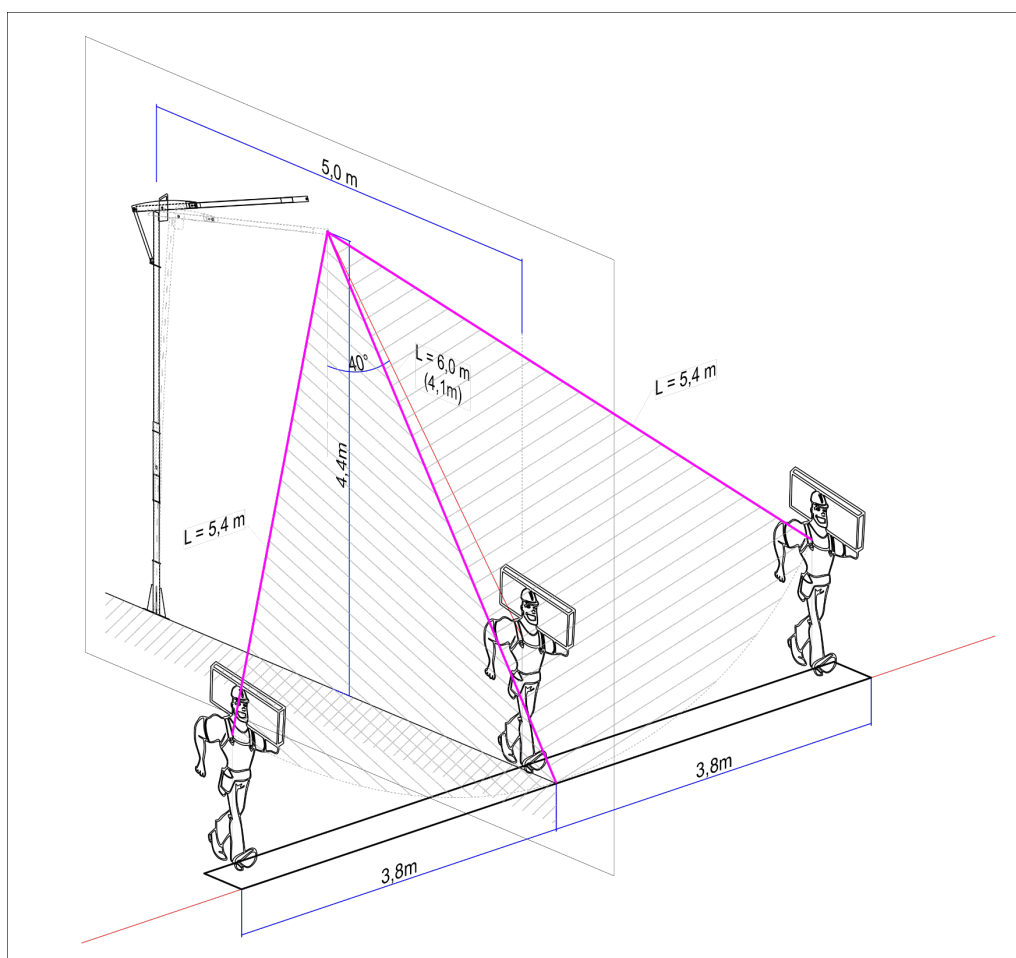
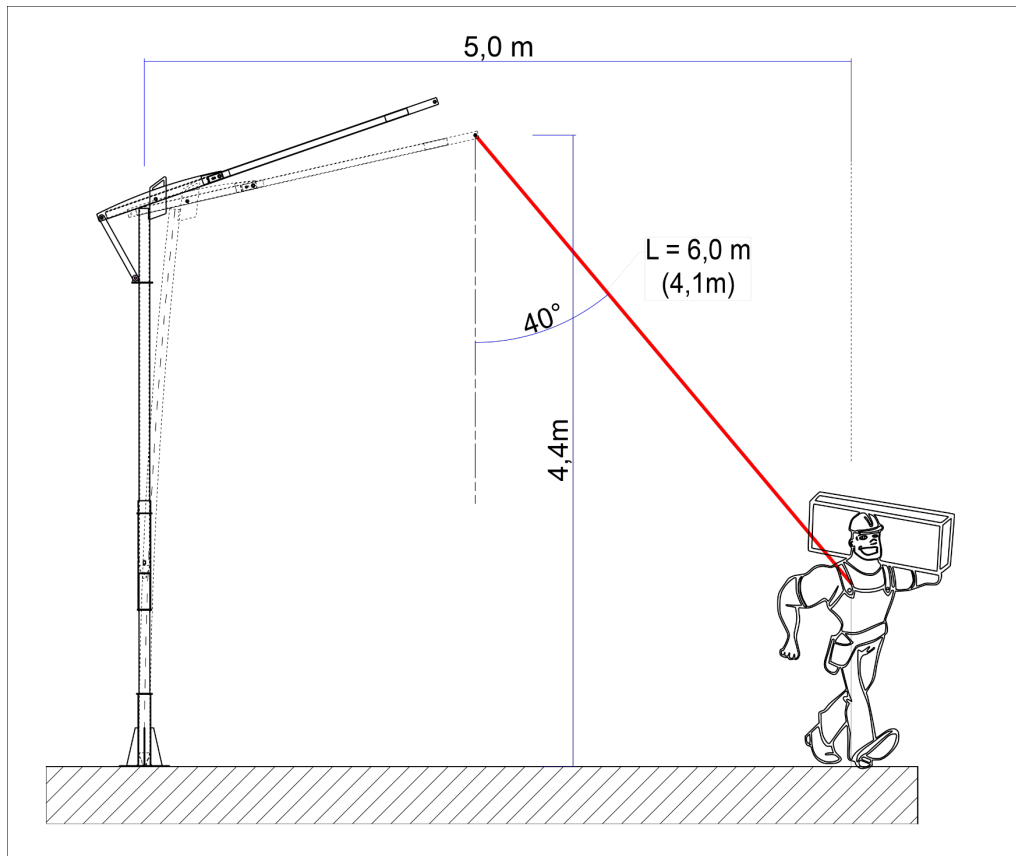
From the above conditions (the pendulum effect, the risk of the safety line contacting the edge of the ceiling), another guideline for the location of the gallows in relation to the edge of the ceiling follows.

The recommended maximum distance of the gallows axis from the ceiling is determined by the previously described value Z_k .

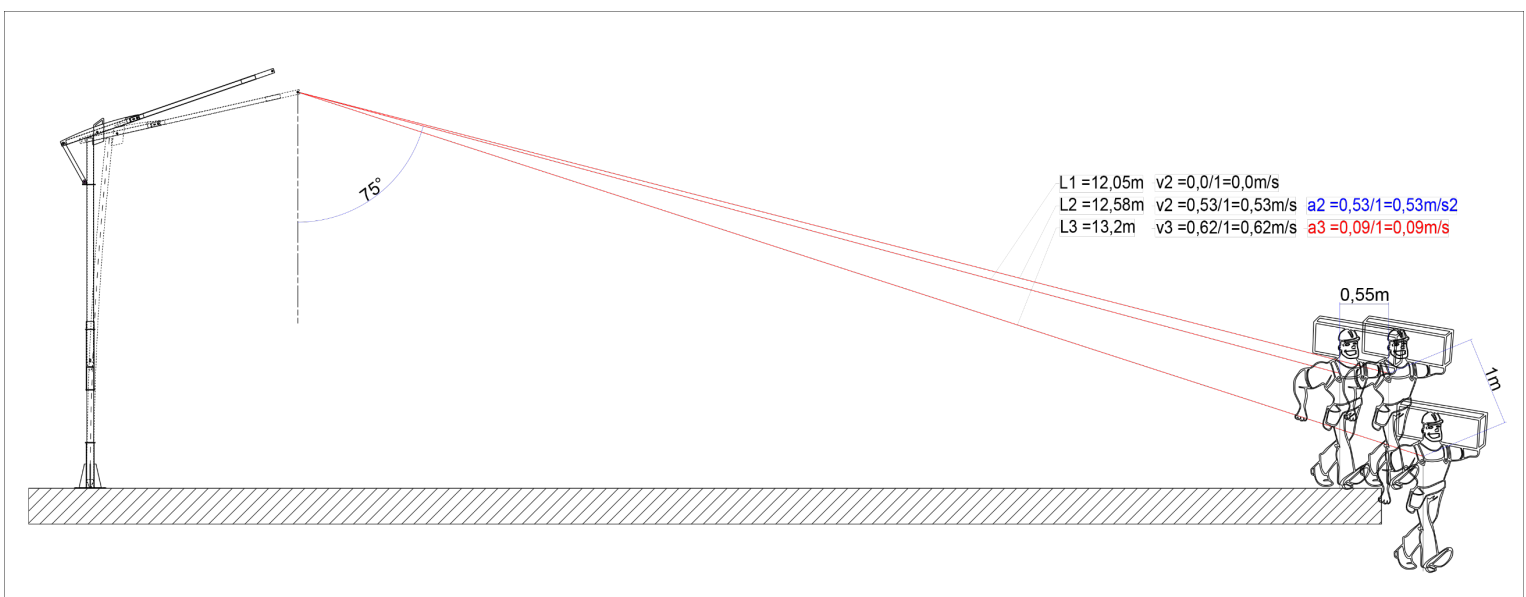
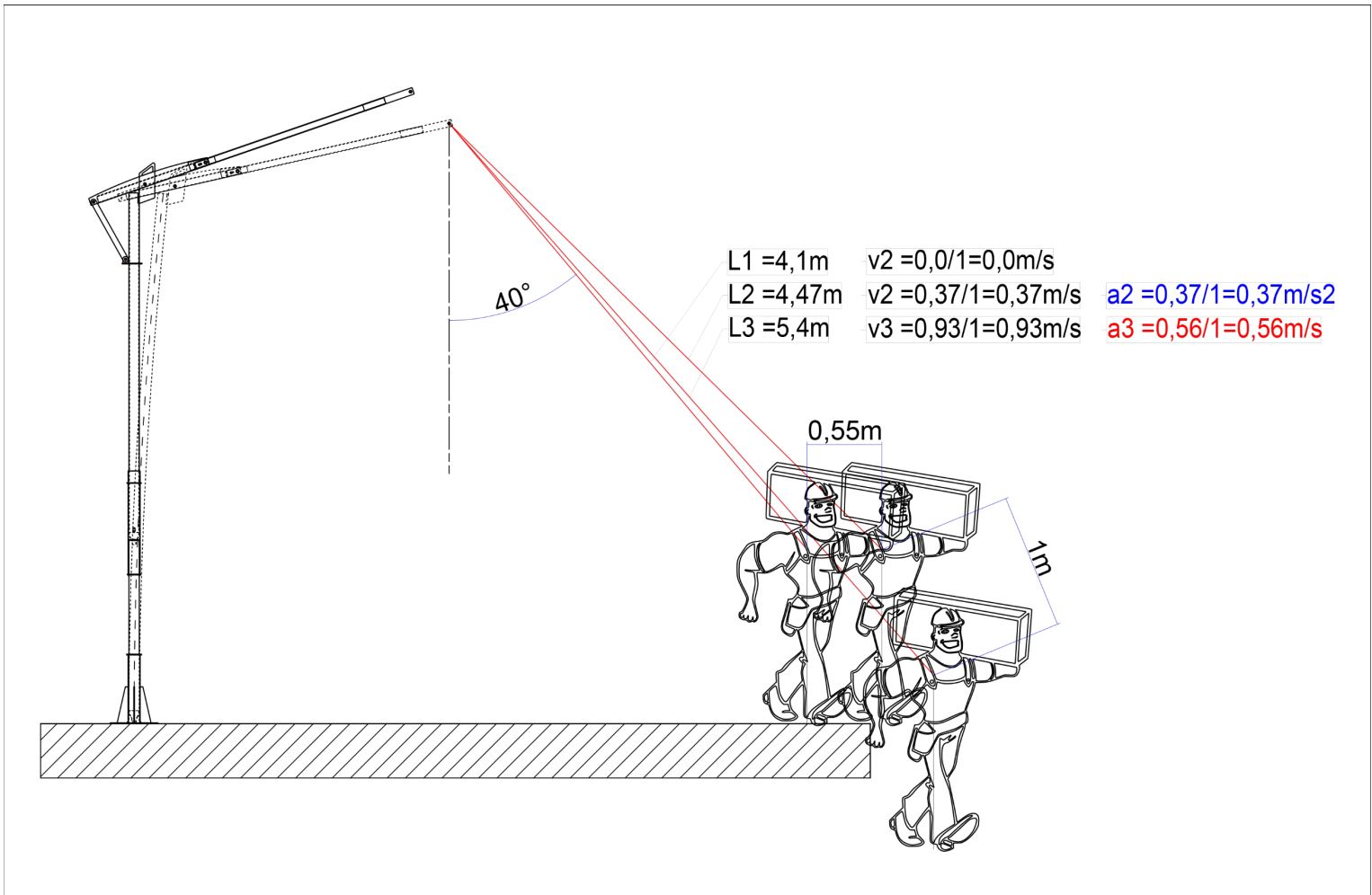
For an exemplary position of the gallows located 2 meters away from the ceiling, it is recommended that the access to the edge of the ceiling be limited to a section of 3 m in length. The following pictures clearly explain this principle.

The above rule results from the PPE 89/686 / EEC + CNB / P / 11.060 directive - concerning falls over the edge. The experience gained from the provisions of this directive is helpful in defining the safe limits of the safety system.





POSITION OF THE GALLOW WITH REGARD TO THE CEILING - SELF-LOCKING CAPABILITY



2.3.3 SAFE HEIGHT ABOVE AN OBSTACLE.

The total length of the fall is the result of two variables:

- a) Deflection (vertical displacement) of the gallows anchorage point,
- b) Safety rope length of the self-locking device - Lsh,

It is assumed that the maximum displacement of the anchor point is 0.7 m.

The safe distance from the obstacle is calculated for the maximum unwinding of the fall arrest device safety rope (e.g. 6m, 3.3m, etc.).

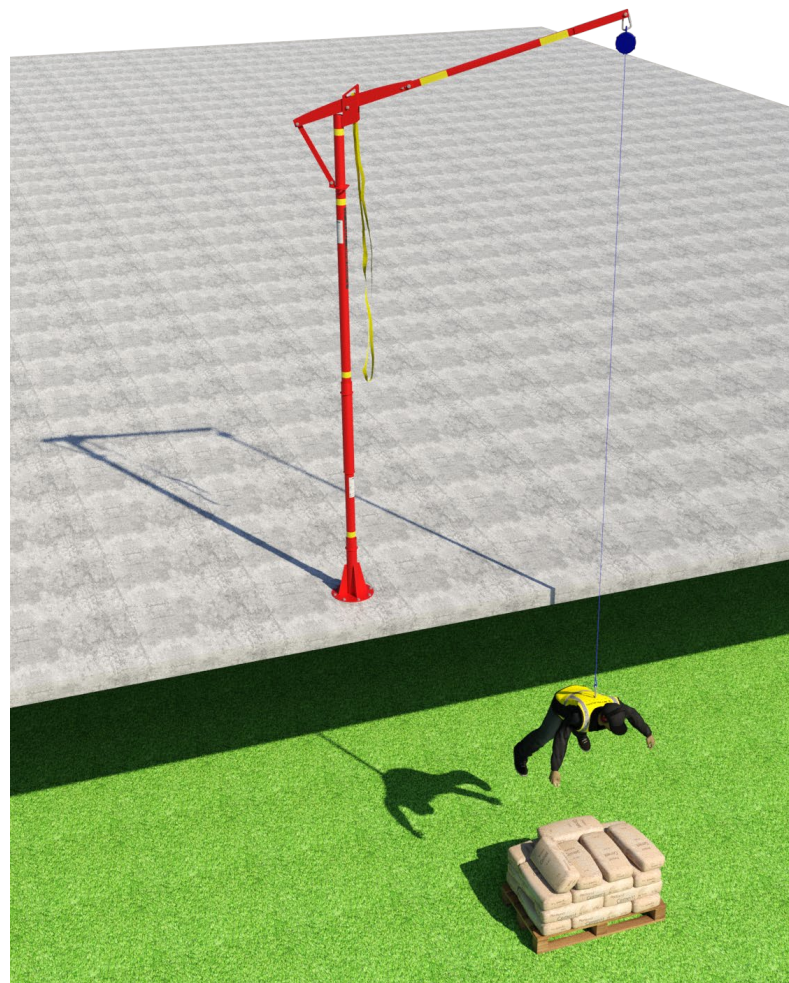
The safe distance from an obstacle can be estimated from the following relationship:

$$\frac{Lsh}{H} < 2,6$$

Lsh [m] The length of the safety rope of the self-locking device.

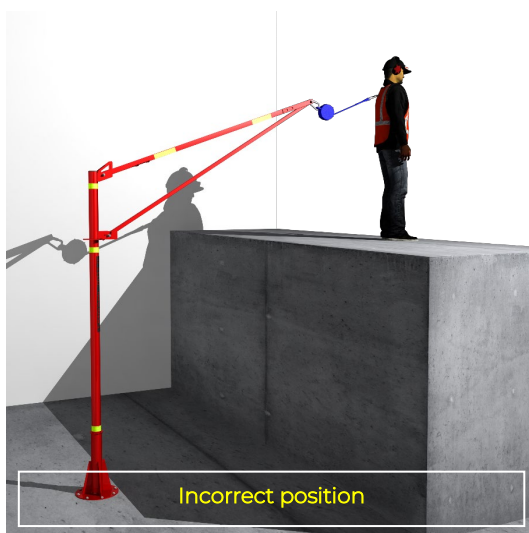
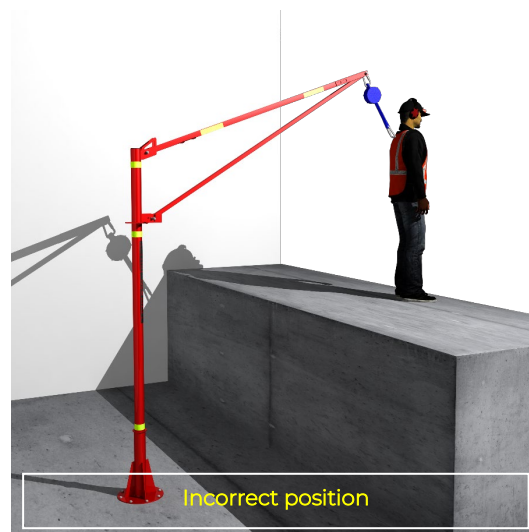
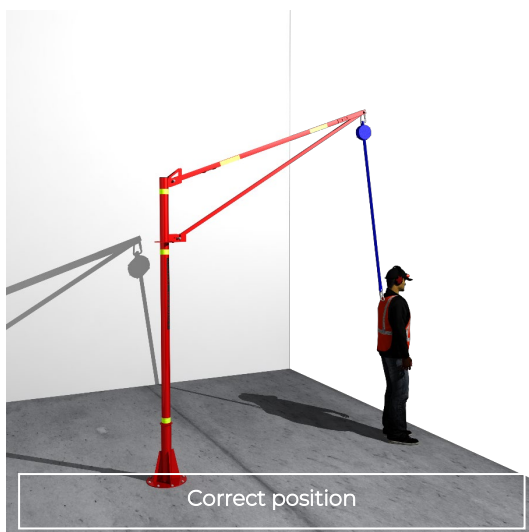
H [m] – distance to the nearest obstacle below the working level of the Belay Device.

If the ratio between the length of the fall arrest device and the height of the working level above the obstacle is less than 2.6, this means a safe distance from the obstacle by the user in the event of a fall (with the maximum extension of the safety line).



2.3.4 POSITION OF ANCHOR POINT WITH REGARD TO THE USER.

The position of the anchor point depends directly on the requirements of the fall arrest device as well as the dependencies and phenomena described in 2.3.1 and 2.3.2. If the permissible angle of deviation of the anchor line is 40° , the height of the anchorage point should be selected so that it is possible to meet this condition. The anchor point must not be below the user's head.



The position of the anchor point should be as high as possible, it increases the range of the gallows operation.
 The low location of the anchor point increases the similarity of the phenomenon of the pendulum and the fall over the edge. This poses a direct threat to life and health.

