

**OPTICAL BEAM SMOKE
DETECTORS
RK SERIES**

INSTALLATION GUIDE





OPTICAL BEAM SMOKE DETECTORS - **RK SERIES**

TECHNICAL INFORMATIONS

EDS OPTICAL BEAM SMOKE DETECTORS INSTALLATION GUIDE

For optical beam smoke detectors he intends a device of fire detection that uses the attenuation e/o the changes of one or more optical beams. The detector consists at least a transmitter TX and a receiver RX or also a transmitting / receiving complex TRX and an optical reflector.

The EDS optical beam smoke detectors are type:

- barrier (TX and separated RX) - models **RK..B**
- reflection (TRX - transmitter and receiver in an only drive) - models **RK..R**

Besides the EDS optical beam smoke detectors differentiate him for the detection method:

- based operation on the principle of the **darkening - attenuation** of the optical beam - models **RK..B** **RK..R**
- based operation on the phenomenon of the **turbulence** or changes of the optical beam derived upward by the heat or gateway of the clouds of smoke in their path upward - the EDS smoke detectors founded on this principle, are normally also equipped with the classical circuit of detection based on the principle of the darkening - attenuation- models **RK..BT** **RK..RT**

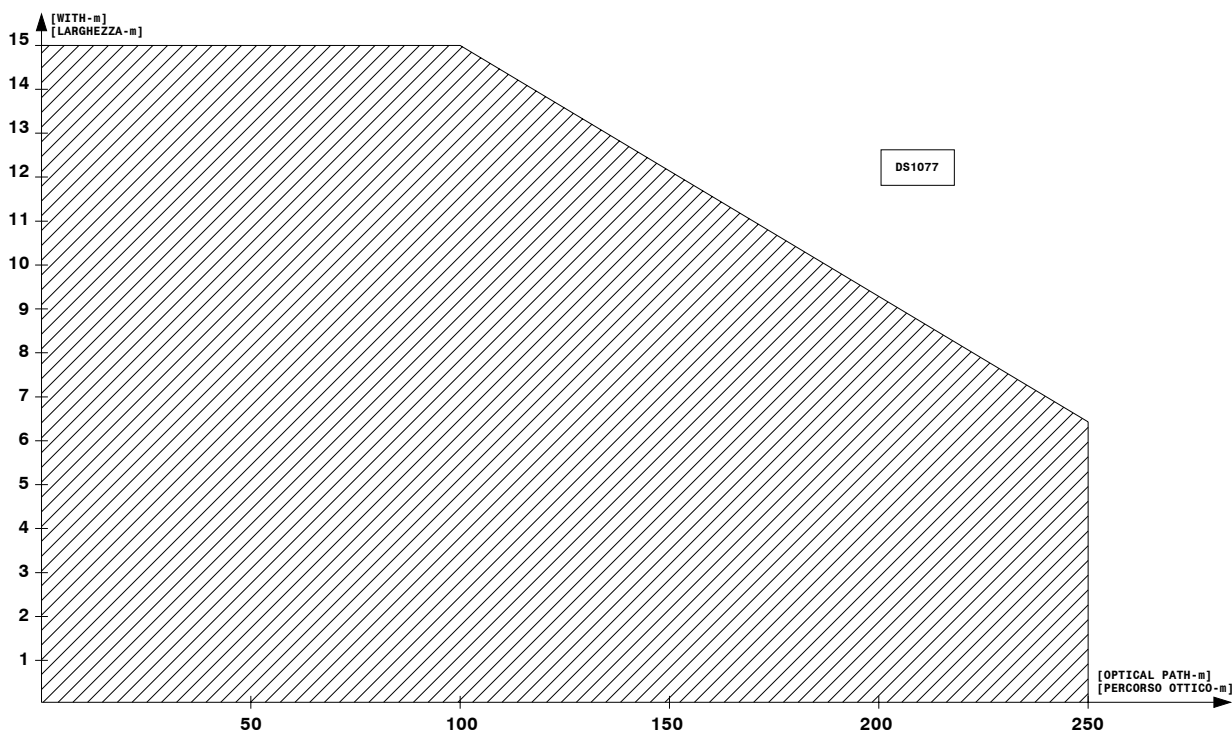
1 - Protection area of of the EDS optical beam smoke detectors

In relationship to the new norms national UNI 9795 and international EN 54-14, the linear optic detectors owe:

- to protect non superior Areas to 1.600 mqs
- the width of the protected Area by 1 detector, normally indicated as maximum, must not conventionally be great of 15 ms.

In base to these rules, if the optic path of a detector D, understood as distance between the transmitter and the receiver (barrier model) or distance between detector and the reflector (reflection model), is smaller of 106 ms, the width of the maximum protected Area L is of 15m, if the optic path is great of 106 ms, it is necessary to consequently reduce the width of the protected Area so that the multiplication $D \times L \leq 1.600$ mqs

The chart of fig.1 illustrates the relationship among the width of the protected Area and the optical path.



2 - height of installation of the EDS optical beam smoke detectors from the ceiling with plain hedging

The optical beam smoke detectors must be installed, in comparison to the plan of hedging, within the 10% of the overall height of the place to be protected. In the figs. 2-3-4 are suitable some examples of setup.

Insofar you must be foreseen:

$$K \leq 0,1H$$

These indications can be varied by the planner, that can estimate the possible necessity of different positionings, in relationship to the following parameters:

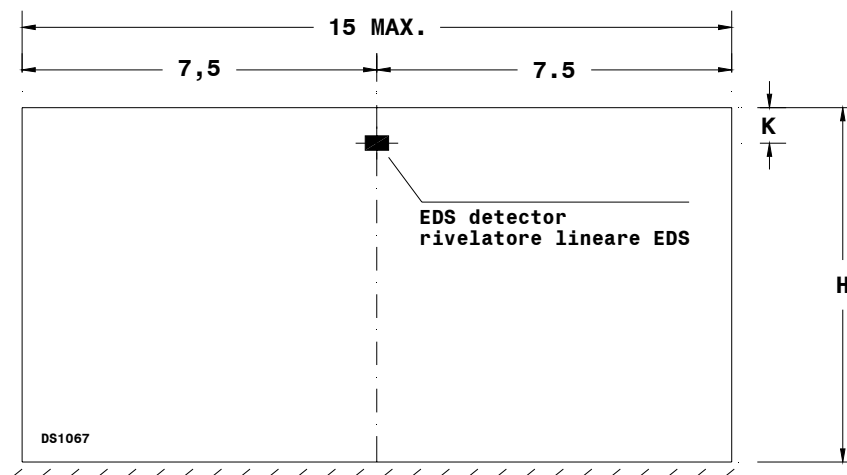
- characteristics and speed of propagation of fire of the contained combustible materials in the environment
- variations of the midrange temperatures under hedging because of persistent heatings or coolings produced by seasonal climatic conditions, fittings, cars of trial, etc.
- rare or nonexistent insulation of the hedging
- conditions of ventilation, and/or variations of pressure and environmental dampening in the cases of possible principles of fire to brooding, cold, goslow and hard-working evolution
- dusty of the environment

The planner in the cases above indicated, can foresee also more detectors at different heights.

* Example of installation in a building with plain hedging with L=15m

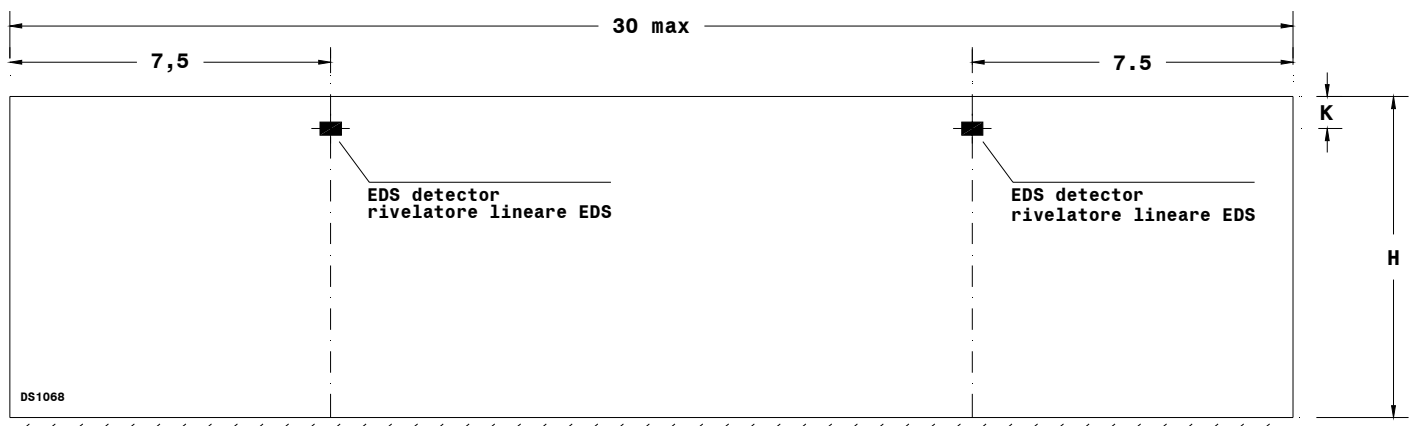
In this case it is enough one optical beam smoke detector in symmetrical way in comparison to the side walls of the room to protect. The height of installation derives from the following computation:

If $H=6m$ $K \leq 0,1H$ we will have $K \leq 60cm$



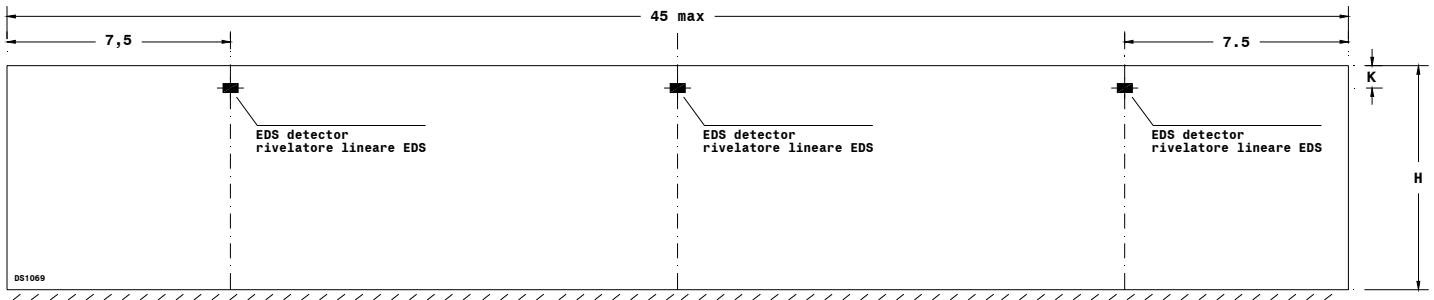
* Example of installation in a building with plain hedging with L=30m

In this case they are enough 2 optical beam smoke detectors as in figure. To notice that the distance from the side walls must not overcome the 7,5m. The distance K from the ceiling must follow the general rule previously enunciated.



* Example of installation in a building with plain hedging with L=45m.

In this case they are enough 3 optical beam smoke detectors as in figure. To notice that, as in the preceding case, the distance from the side walls must not overcome the 7,5m. The distance K from the ceiling must follow the general rule previously enunciated.



3 - height of EDS optical beam smoke detectors from the ceiling with strata hedging tilted or to shed

The optical beam smoke detectors can be installed in parallel sense to the course of the shed or the hedging to two-tier stratum or in transversal sense. The solution adopted, when possible, must privilege solutions that foresee the installation of the detectors near to the line of stratum or height of the roof and parallel to the line of height.

3.1 - installation of optical beam smoke detectors in longitudinal sense (along the line of height)

In this case, particularly favorable for the speed of detection, the detector must be installed under the height to a distance K from the ceiling that the general rule must previously respect enunciated.

When the detector is installed under the height of a strata ceiling tilted as suitable in the figure, the width of the protected Area can be increased of 1% for every degree of the angle @ of inclination of the stratum with a maximum of 25% (norm EN54-14). In this case in fact the smoke is driven toward the height with consequent increase of the speed of revelation. Therefore the maximum width L of the protected Area of the detector results from the following formula:

$$L \leq 15 + 15 @\%$$

For instance if the angle @ = 10 degrees it is had $L = 15 + 15 \times 10\% = 15 + 1,5 = 16,5$ ms

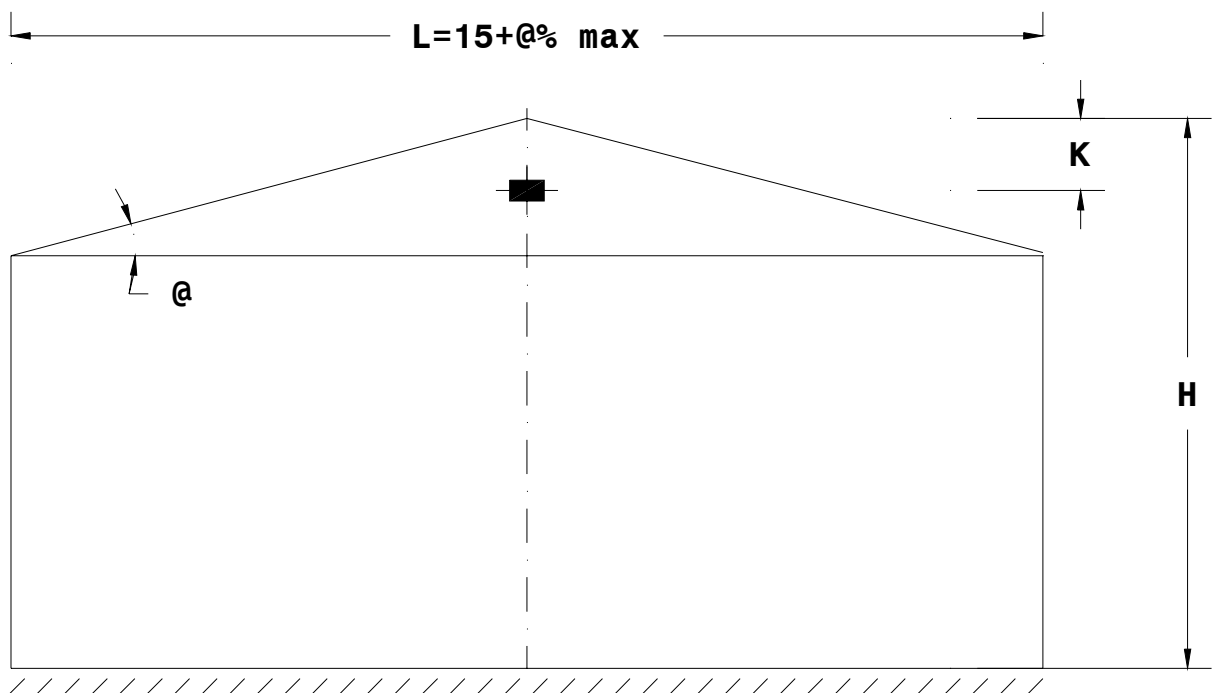


Fig.5

Example of installation in building with strata ceiling tilted with angle of pendency of 15°.

Using the the preceding rule exposed him highlights that, with three linear detectors, a building can be protected with width of 49,5m. The distance K from the ceiling must follow the general rule previously enunciated.

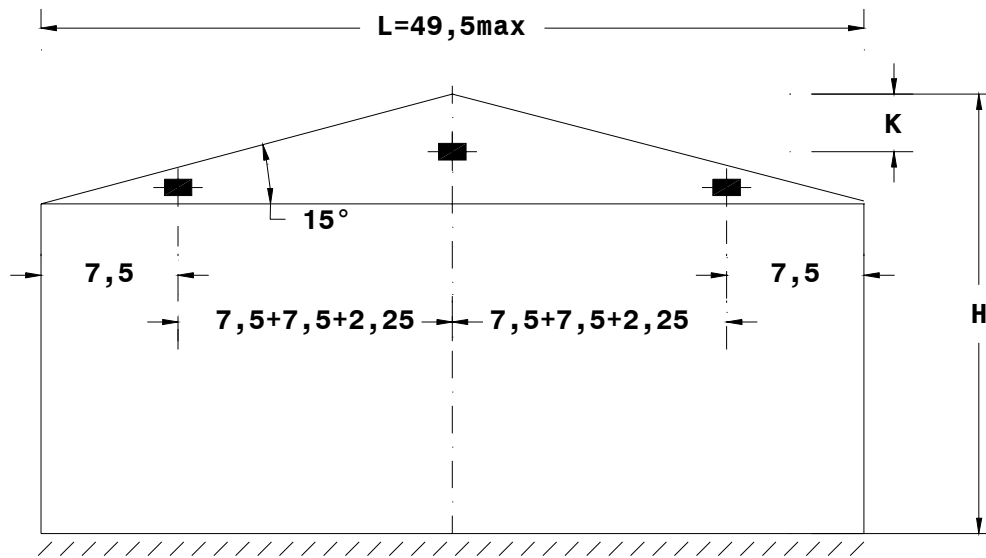


Fig.6

* Example of installation in longitudinal sense in a place with hedging to shed. In this case the optical beam smoke detectors are installed inside the sheds. The distance K from the ceiling must follow the general rule previously enunciated.

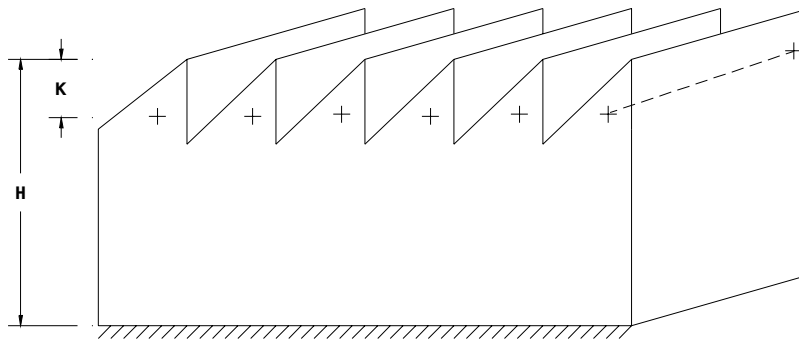


Fig.7

* Example of installation in longitudinal sense in a place with hedging to an only tilted stratum. The same criterions are worth installed you suitable for hedging to 2 tilted strata, with the only difference that the distance D from the highest vertical wall must be $> / =$ to 50 cms.

The distance K from the ceiling must follow the general rule previously enunciated

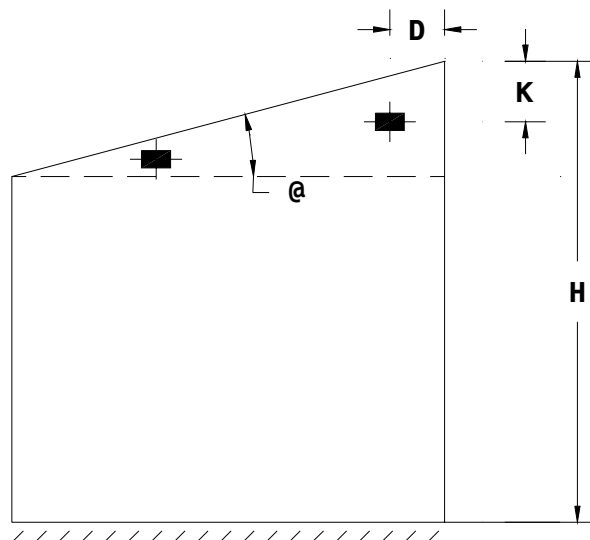


Fig.8

3.2 - installation of optical beam smoke detectors under the base of the beam triangular flood or in transversal sense to the course of the sheds

The detectors are able nevertheless to be mails in transversal sense to the course of the shed or the base of the beam triangular flood, using the criterions following listed:

- height A of the shed, two-tier stratum (triangular beam) $\leq 15\%$ of the overall height of the place and width of the Area of conventional hedging
- height A of the shed $> 15\%$ of the overall height of the place and it competes one or more than the suitable conditions to the chapter 2. In this case the adoption is conventionally necessary of an additional detector every two anticipated detectors, with a minimum of two for span

* Example of installation under the base of a beam triangular flood with height A of the **smaller** beam of the 15% of H. In this case it is enough an installed revealing solo as in figure. The distance K from the ceiling must follow the general rule previously enunciated.

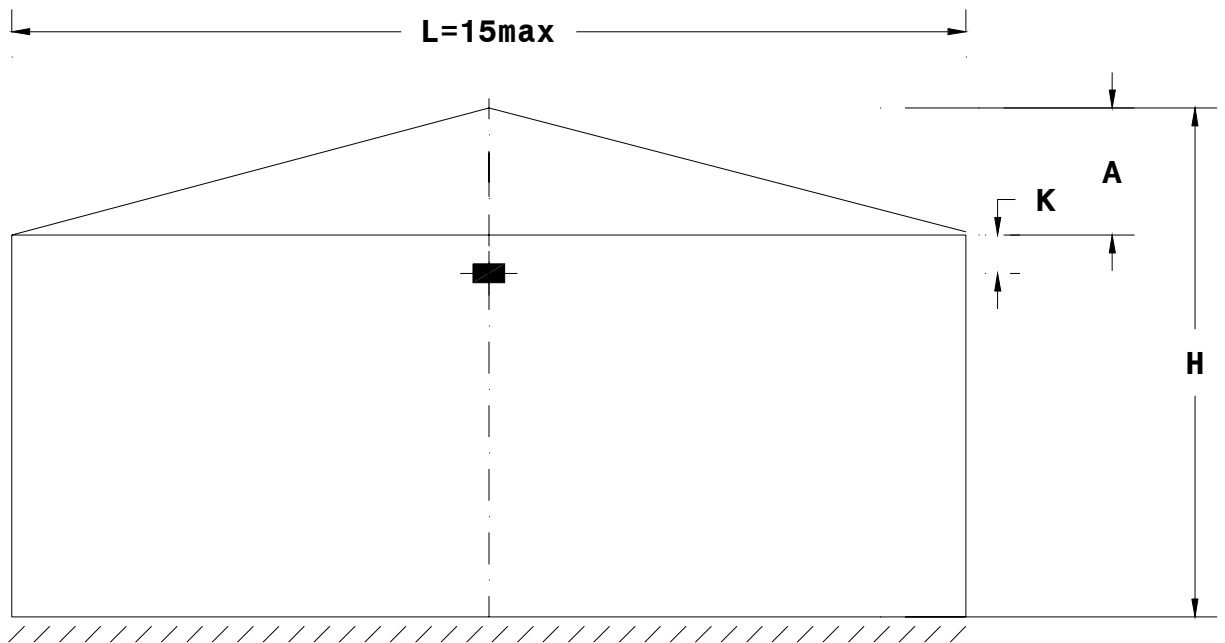


Fig.9

* Example of installation under the base of a beam triangular flood with height A of the beam greater of the 15% of H. In this case it is enough an installed revealing solo as in figure. The distance K from the ceiling must follow the general rule previously enunciated.

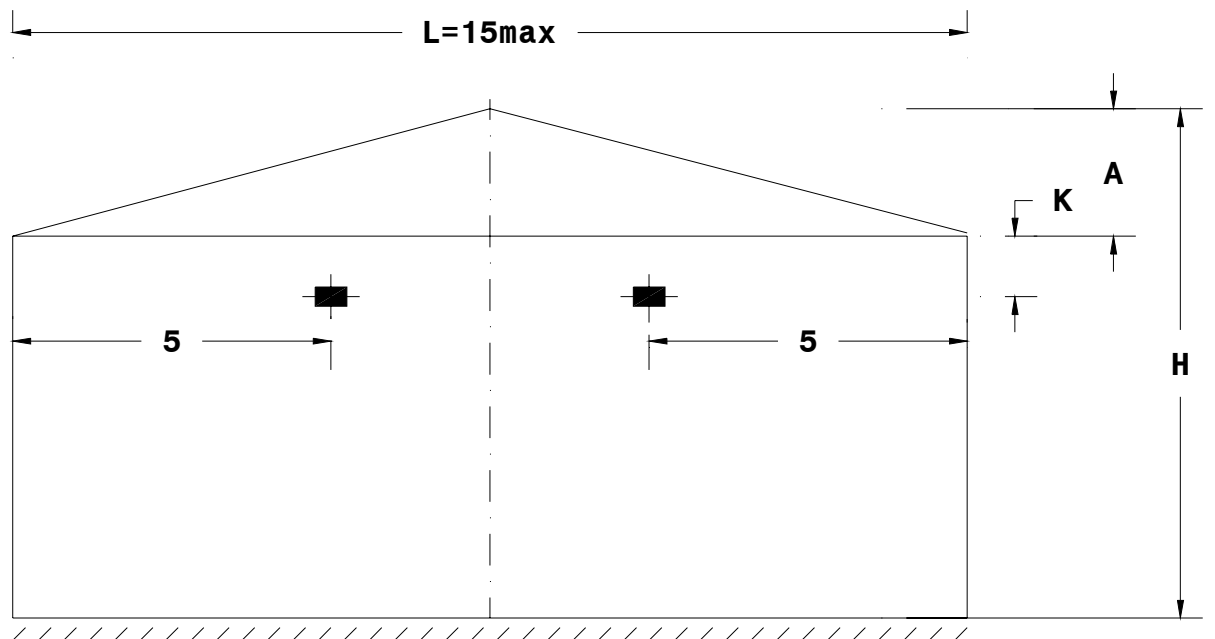
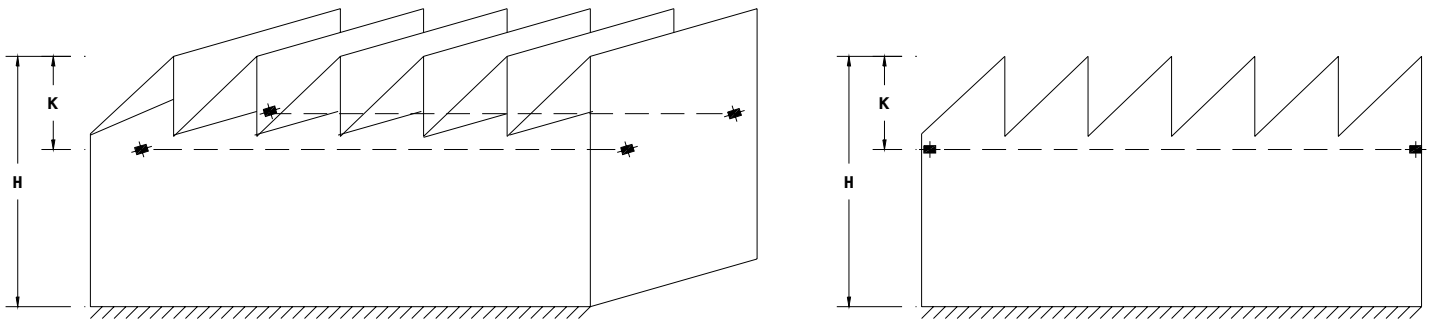


Fig.10

* Example of installation in transversal sense in a place with hedging to shed.
 The distance K from the ceiling must follow the general rule previously enunciated

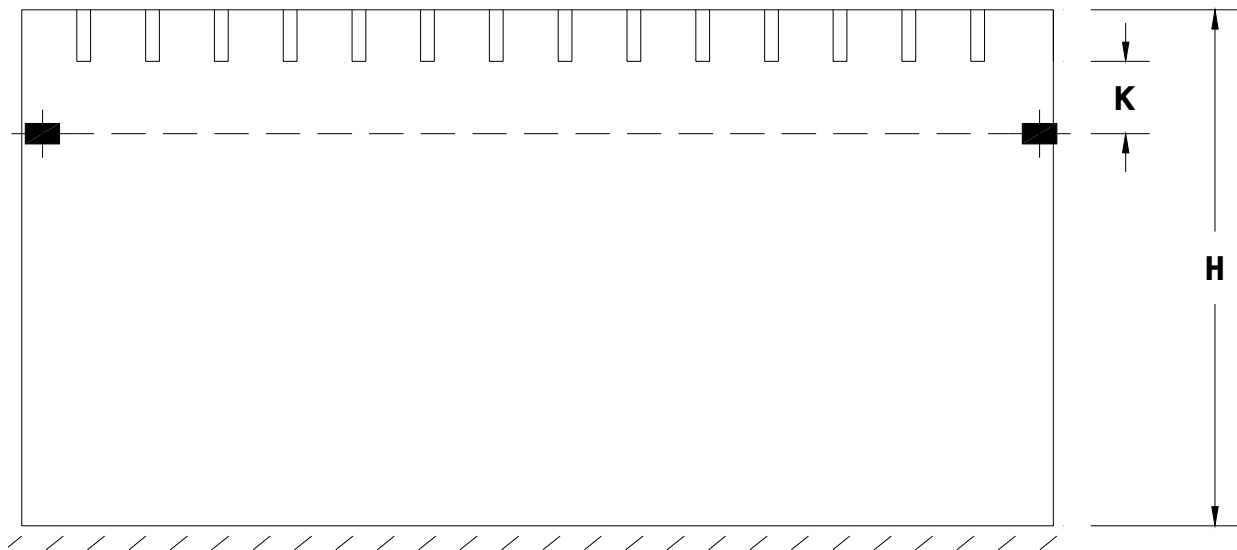
Fig.11



4 - height of EDS optical beam smoke detectors from the ceiling in the case of hedgings with leaning elements

In these cases the criterions must be applied installed you anticipated to the chapter 3.
 The distance K from the ceiling must follow the general rule previously enunciated.

Fig.12



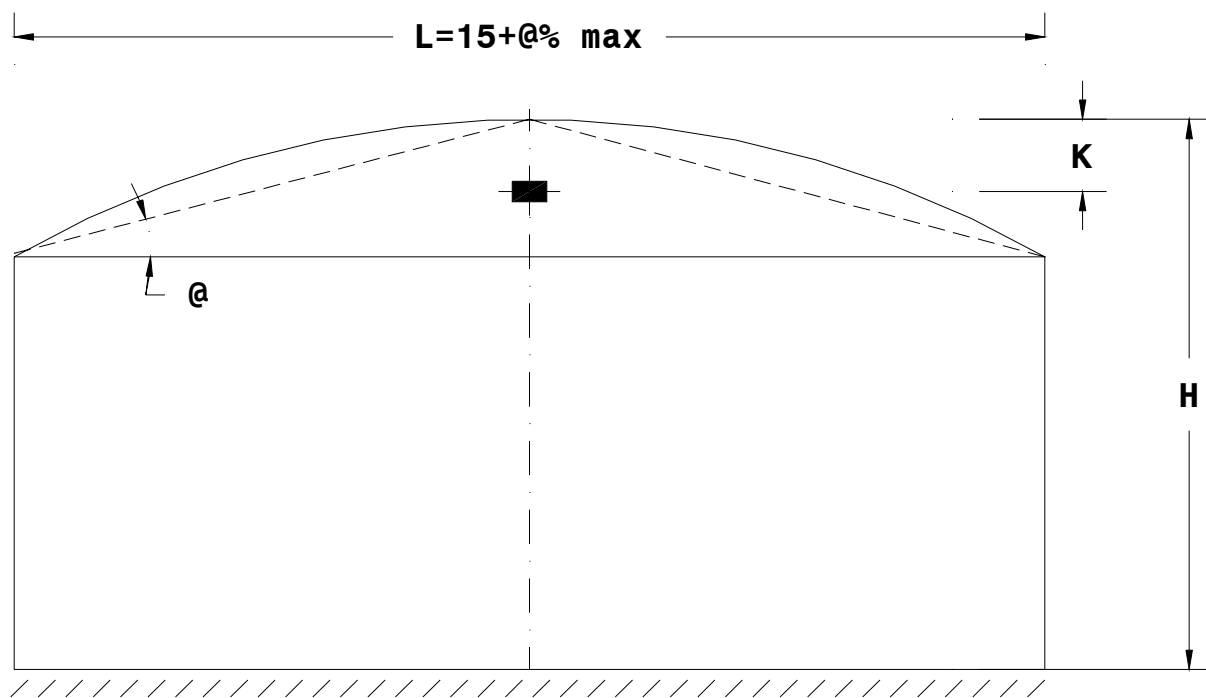
5 - height of EDS optical beam smoke detectors from the ceiling in the case of ceilings at times

They apply the criterions installed you suitable to the chapter 3.
 In this case, particularly favorable for the speed of revelation, the detector must be installed under the height to a distance K from the ceiling that the general rule must previously respect enunciated.
 Besides, as suitable to the cap. 3.1, the width of the protected Area of 1% can be increased for every degree of the angle @ of midrange (suitable outlined in figure) inclination with a maximum of 25% (norm EN54-14).
 In this case in fact the smoke is driven toward the height with consequent increase of the speed of detection..
 Insofar the maximum width L of the protected Area by the detector results from the following formula:

$$L \leq 15 + @\%$$

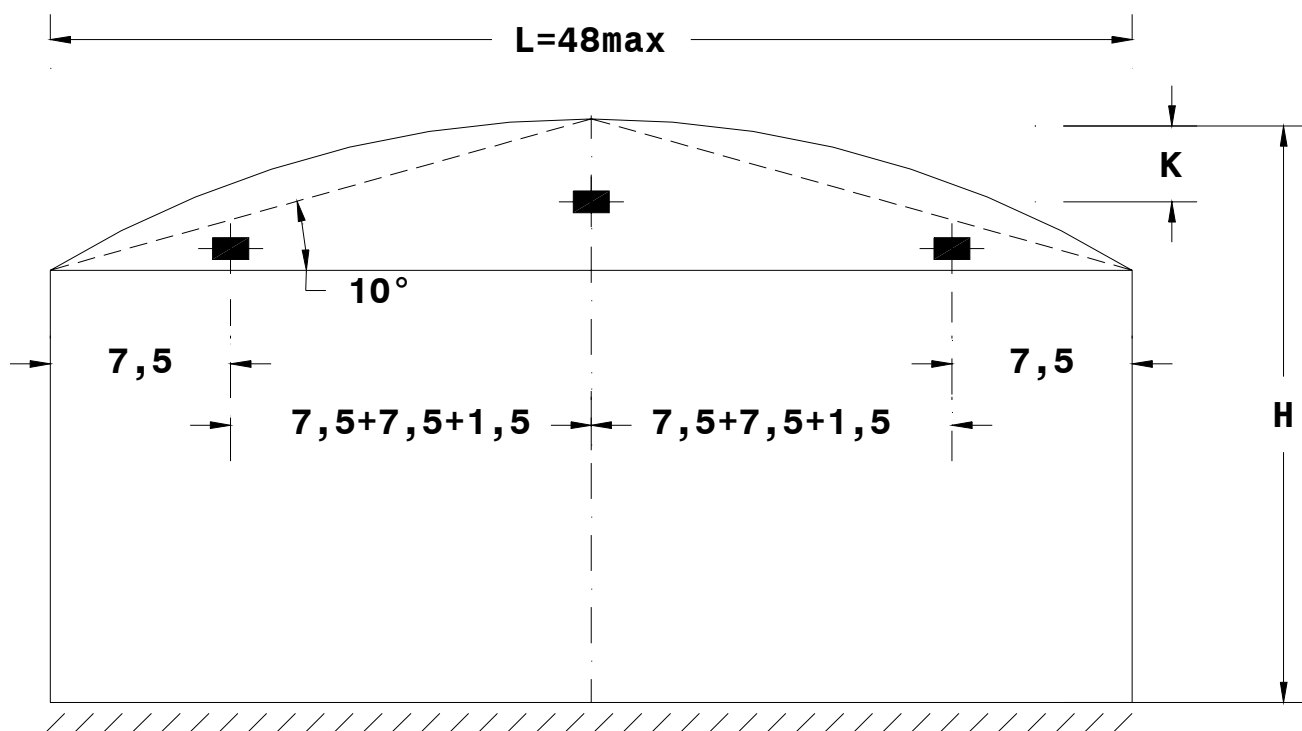
For instance if the angle @ = 10% we had L=15+1,5 = 16,5m max.

Fig.13



In the example under brought with 3 detectors it is possible the protection of a room with width $L=48\text{m}$

Fig.14



5 - height of EDS optical beam smoke detectors from the ceiling in the case of cap ceilings semisferica or to dome

This particular case is typical in the protection of domes of ancient churches with works of art, that is with the in-house party of the dome covered of frescos of great artistic value. In such case the installation of the linear detectors is not possible to the inside or in proximity of the ceiling of the dome. Insofar in this case the optical beam smoke detectors must be installed with the following rules:

- the position must happen in the plan of backing or base of the cap or dome
- the optical beam of every detector must be in the plan of backing or base of the cap or dome
- the maximum width of the protected Area of every detector must be of 8m max

In the example under brought they are indicated two detectors installed orthogonally along the axes of the base of the dome. In these cases, where the installation of the optical beam smoke detectors is executed not to ceiling, but to mesne quotas, the employment of EDS optical beam smoke detectors endowed with the **additional circuit of the turbulence**, is very useful.

During the phase of beginning of the fire they are generally formed of the clouds of smoke and the thermal energy developed by the fire (heat) produces some beads of warm air that climb toward the ceiling. When these clouds and beads intercept the infrared beam produced by the detector, they provoke a perturbation of it in how much they produce a variation of the characteristics optic-physics of the mean of transmission of the infrared beam. This variation is obviously correlated in the time. An opportune circuit has been projected to reveal this variation and, when these reach the amplitude and the duration in the time programmed, a signal of alarm is produced. The advantage offered by the circuit of turbulence detection is a great speed of detection of the fire, in how much it is revealed in its initial phase.

The optical beam smoke detectors norm EN54-12 **certified VDS and CPD (RK90R - RK100R - RK100B - RK200B)** and all the models EDS with the suffix trailing T, are equipped with the additional circuit of the turbulence (**RK..BT RK..RT**).

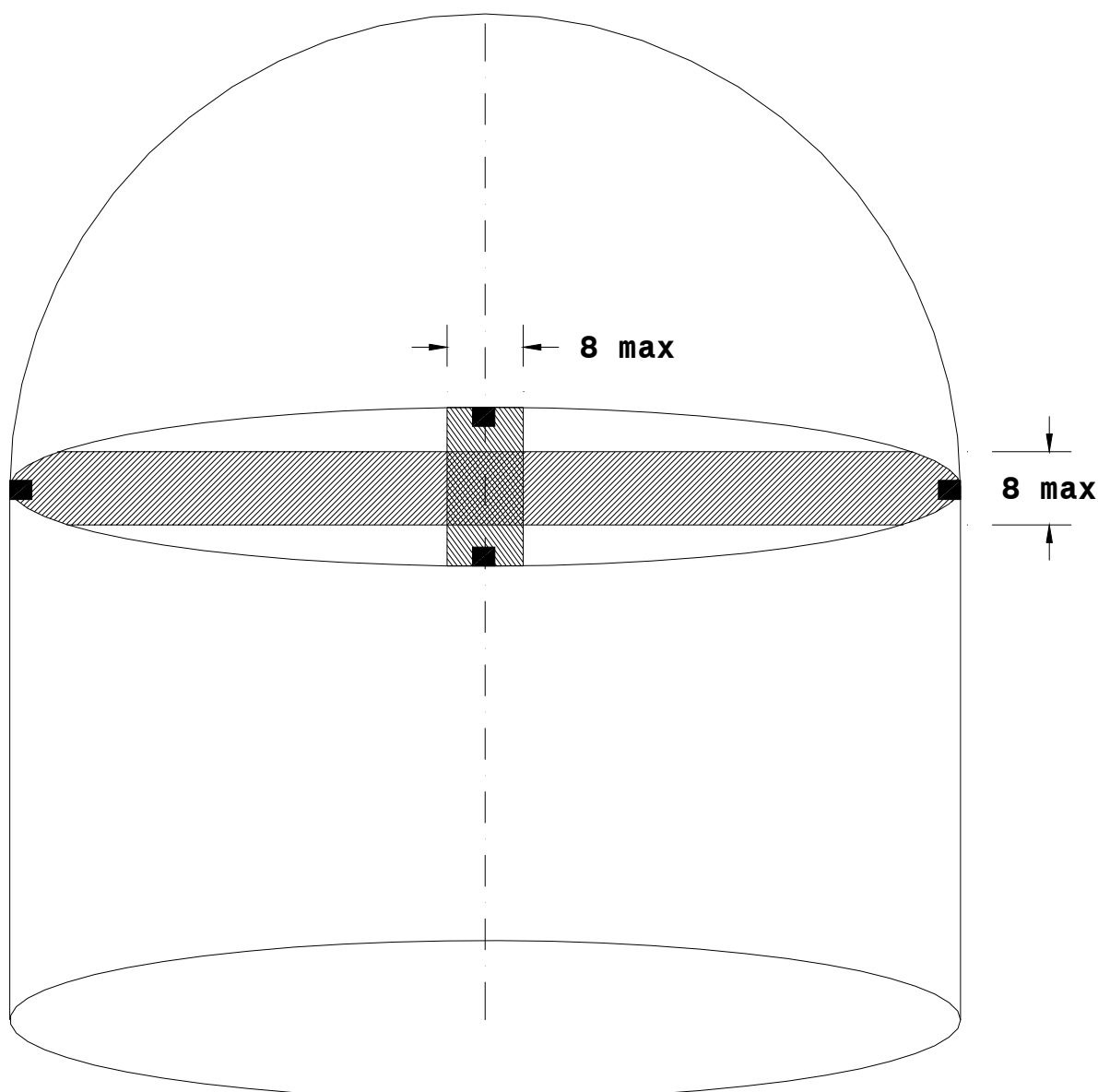


Fig.15

6 - height of installation of the EDS optical beam smoke detectors from the ceiling in the case of places of great height ($> / = 11\text{m}$)

It is recommended besides the detectors to be installed under the ceiling according to the rules contemplated in the preceding chapters, also the use of detectors installed at quotas mesne.

In this case, where the installation of the detectors is executed not to ceiling, but to quotas mesne, as suitable in the precedent chapter, the employment of EDS optical beam detectors, endowed with the additional circuit of the turbulence, is useful.

In the case of stores, included the palletizatis, situated in buildings of great height of 11 ms, it is recommended that it is utilized, besides the ceiling detectors according to the dispositions contemplated in the present norm, also the installation of quotas detectors mesne, sets out of the corridors of load-unloaded-transit and positioned between line and line of the shelves.

In these cases the installation can happen or along the formed interstices among back and back of pallet along the greatest side of the shelves if possible or, in the same position but in vertical.

* Example of installation in a room of great height - $H > 11\text{m}$.

The detectors are installed to quotas $K - K1 - K2$.

The distance K from the ceiling must follow the general rule previously enunciated.

The quotas detectors $K1$ and $K2$ he advises is of the type with **additional circuit of the turbulence**

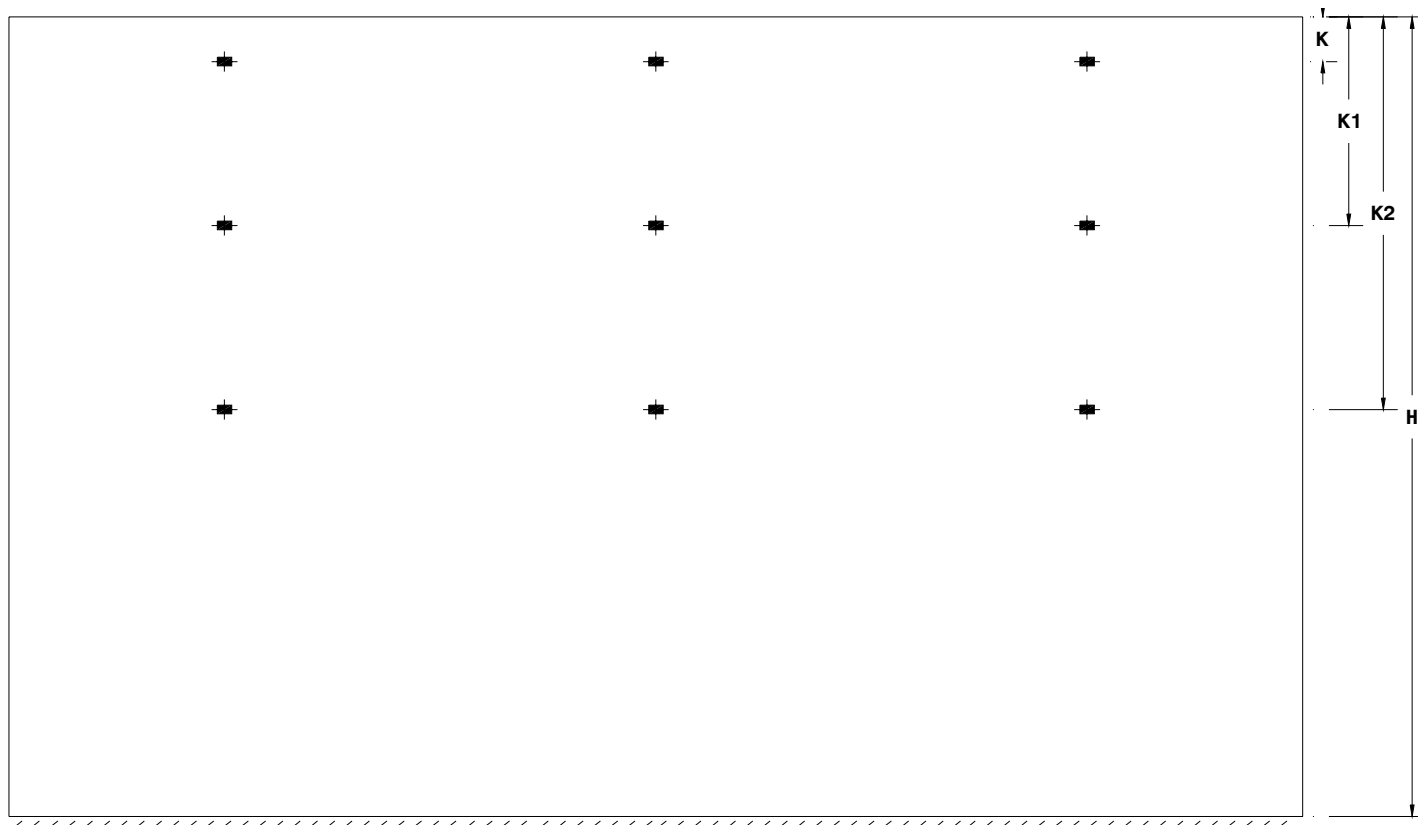
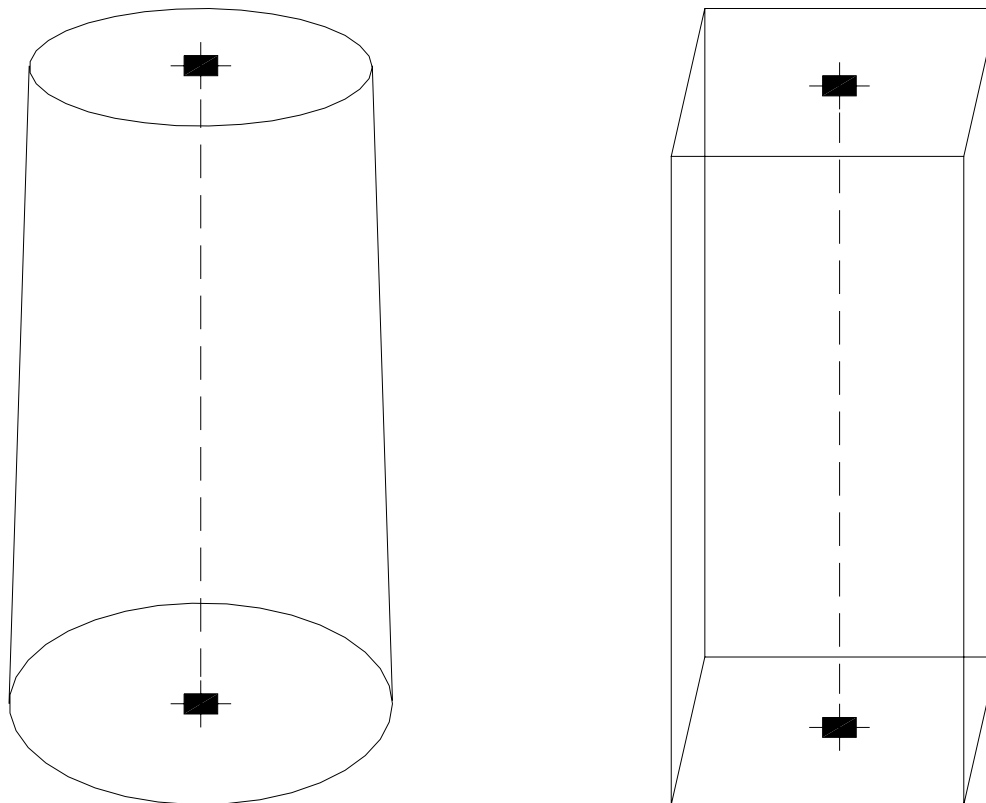


Fig.16

7 - installation of the EDS optical beam smoke detectors in vertical

The optical beam smoke detectors can be installed in vertical in cavedi, burrows, vain staircases, bell tower, towers and similar. When the environment conditions allow, the detectors can suitably be installed in vertical as in the examples under brought.

Fig.17



8 - installation of the EDS optical beam smoke detectors in the false ceilings and hidden spaces

The hidden spaces above the false ceilings and bottom the heightened floors, any both their height and dimension, if they contain electric cables and/or data nets and/or introduces hazard of fire, they must directly be guards.

In these spaces, especially to allow one suitable future maintenance of the implant, it is useful the employment of the optical beam smoke detectors which, being installed on the walls, they allow an easier logging for the maintenance.

In these narrow spaces it advises him to install barrier type optical beam smoke detectors and not reflection type to avoid that possible sprites (pipes, connecting rods, etc.) positioned in proximity of the axis of the optical beam, can reflect party of the beam with consequent possible malfunction of the detectors.

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