



DEHN + SÖHNE

Isolated Air-termination Systems for Omnidirectional Antennas.





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Antennas with 360° emitting characteristics are used for different radio applications. These antennas are also known as “*omnidirectional antennas*” on the market. Typical applications for omnidirectional antennas in practice are e.g. private mobile radio (PMR) systems, emergency call networks and sometimes also GSM networks. However, they are only applied in GSM networks, if there is a low frequency of radio waves.

For omnidirectional antennas it has to be considered that metal structures situated close to them have a negative influence on the emitting characteristics, i.e. they are attenuated by the structures. The more far away the metal structures are situated from the antenna, the less they interfere with the emitting characteristics.

To evaluate how and how much influence close metal structures have on the emitting performance, we have tested products of DEHN + SÖHNE under these criteria together with the company *Kathrein in Rosenheim/Germany*.

When installing *isolated air-termination systems* for omnidirectional antennas, it has to be ensured that an isolated air-termination rod covers the antenna to be protected with a sufficient protective angle. Furthermore, a sufficient separation distance *s* has to be kept.

If the HVI® conductor of the DEHNconductor System is used for *isolated air-termination systems*, a max. separation distance of 0.75 m in air has to be maintained. Under consideration of the mechanical deflection of the antenna and the air-termination system in case of wind loads, a mechanical distance of 1 m between the antenna and isolated air-termination system has been defined for a maximum wind velocity of 145 km/h.

The result of a radio-specific evaluation is a distance corresponding to a quarter of the wave length. The following illustrations will show the calculation of the wave length and a table.

$$\text{wave length} = \frac{\text{velocity of light}}{\text{frequency}}$$
$$\lambda = \frac{c}{f} \left[\begin{array}{c} m \\ s \\ 1 \\ s \end{array} \right]$$

velocity of light $c = 300\,000 \text{ km/s} = 3 \times 10^8 \text{ m/s}$

Calculation of the wave length

Frequency (Hz = $\frac{1}{s}$)	Wave length (m)
100 000	3000
1 000 000	300
10 000 000	30
100 000 000	3
40 x 10 ⁶	7.5
80 x 10 ⁶	3.75
160 x 10 ⁶	1.875
900 x 10 ⁶	0.33
1800 x 10 ⁶	0.17

Table

Private mobile radio systems often work in a frequency range of 40 MHz. The presently existing emergency call networks (fire brigade, police, etc.) work typically in frequency ranges of 80 MHz and 160 MHz. The future digital emergency call networks for authorities and organisations with security functions will work with a frequency of 400 MHz. Present GSM networks communicate with 900 MHz, 1800 MHz and UMTS networks with 2 GHz.

The corresponding wave length can be taken from the above table. As can be read from the table, the quarter-wave distance is more critical for applications with a lower transmission frequency, than e.g. GSM and UMTS networks.

Examinations have been performed for application of an air-termination system, which is installed in parallel to the antenna with a diameter of 50 mm (metal mast) and the HVI® conductor with a diameter of 20 mm (copper conductor with a diameter of 5 mm). The detailed test results can be requested from DEHN + SÖHNE.

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The technical implementation of the isolated air-termination system is shown in Fig. 1. It is based on an omnidirectional antenna with a length of approx. 1000 mm and an insulating pipe with a 1000 mm long air-termination tip. Part Nos. 819 320, 819 321 or 819322 can be used for the design shown according to the used HVI® conductor I, II or III (e.g. black).

The lengths of the omnidirectional antennas can be up to approx. 3000 mm. These lengths require customised types of the insulating pipe with an air-termination rod of up to 2500 mm for covering the corresponding protective area. Fig. 2 shows a possible design and the required types.

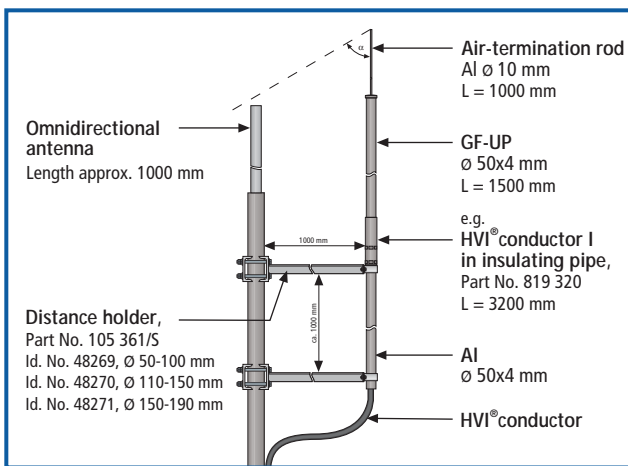


Fig. 1

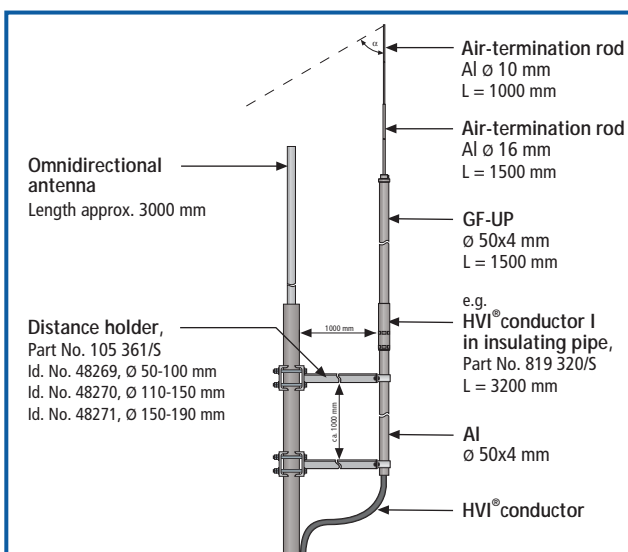


Fig. 2

For connecting the HVI® conductor to the air-termination rod, a special connecting element is required. This connecting plate for the HVI® conductor consists of a terminal bolt (D = 16 mm) and a KS connector (6-10 mm).



HVI® Conductor in insulating pipe	Total length	5700 mm
Insulating pipe (GF-UP/Al)	Length	3200 mm
Air-termination rod (Al 16/10 mm)	Length	2500 mm

Type	Part No.	Id. No.
HVI conductor I in insulating pipe	819 320/S	048272
HVI conductor II in insulating pipe	819 321/S	048273
HVI conductor III in insulating pipe	819 322/S	048274

Min. order length: 6 m. Please confirm the length required when placing your order.



Insulating Pipe with air-termination rod	Total length	5700 mm
Insulating pipe (GF-UP/Al)	Length	3200 mm
Air-termination rod (Al 16/10 mm)	Length	2500 mm

Type	Part No.	Id. No.
Insulating pipe with M16 thread	105 300/S	048276



Terminal Plate		
Material		StSt (V2A)
Terminal bolt / KS Connector		StSt (V2A)

Type	Part No.	Id. No.
Terminal plate 16/6-10 mm	301 229/S	048275



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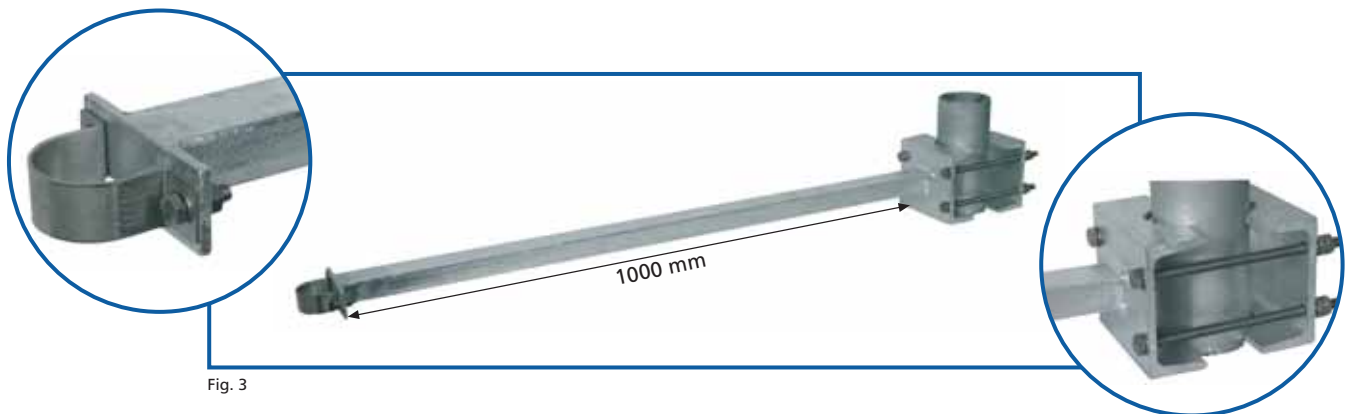


Fig. 3

Fixing the construction with the insulating pipe at the antenna mast in a distance requires special supports. The type of these distance holders is shown in Fig. 3.

Minimum two distance holders per insulating pipe of the isolated air-termination system must be mounted. These can be obtained according to the diameter of the mast.

Distance Holder for DEHNiso Combi Insulating Pipes (D=50 mm)
T profile Material St/tZn Length 1000 mm
Screws Material StSt (V2A)

Mast diameter	Part No.	Id. No.
55 - 100 mm	105 361/S	048269
100 - 150 mm	105 361/S	048270
150 - 190 mm	105 361/S	048271

The DEHN installation instructions No. 1521 has to be observed for installing the isolated air-termination system.

For the entire topic of isolated air-termination systems for omnidirectional antennas and the above shown design, the wind load and the resulting statics have to be approved by the operator or owner of the installation.

Further information about the own weight and surface exposed to the wind loads available on request.

Our components and configurations of the structure are dimensioned according to DIN 4131 for wind load zones II with a wind velocity of 145 km/h.

Available from