

Antitheft systems

This section discusses article surveillance. Electronic Article Surveillance (EAS) systems are used in stores and libraries to prevent theft. There are different types of EAS in circulation that work differently but they all use electromagnetism. Do these systems imply a risk for the consumers?

You have probably witnessed the following before - a peep sound at the exit of a store, a sudden commotion followed by the inspection of someone's bag. It was possibly a false alarm but it could also be an attempt to get an unpaid item out of the store.

How does EAS work?

An EAS system works with detection antennas that are installed at the exit of the store.



Detection antenna

The antennas react to a hard tag or label that has been attached by store personnel or the manufacturer during production. The labels (or hard tags) are removed at the register or can be automatically deactivated via scanning. If a customer leaves a store with an unpaid article, the EAS system will give an audible, possibly visible, signal to make store personnel aware of it.

The detection antennas constantly emit electromagnetic energy. When a customer passes these antennas with an article, a hard tag or label - if it is not deactivated - causes a short electromagnetic signal that is received by the antennas. The hard tags or labels themselves do not contain transmitters but an electric current is generated by the electromagnetic field of the antennas. This electric current only lasts for a short while at the time when the hard tag or label is carried past the detection antennas.

Several electromagnetic frequencies are used for antitheft detection. The EAS systems of the EM type (electromagnetic) and AM type (acousto-magnetic) work with extremely low



EM label

or intermediate electromagnetic frequencies. You probably have seen the EM label (photo to the left) before on the inside or outside page of a book you borrowed from the library; these labels are reusable. You often find the AM label (photo to the right) on clothes.

These labels are a bit more expensive and that is why they are used on more expensive articles. The RF systems work on radio frequencies; the RF label (photo to the right) can often be seen in supermarkets, on small articles such as DVDs and electronic accessories.



AM label



RF label

Regulation for EAS systems

The EAS systems fall under multiple European directives: The European [R&TTE-directive](#) (R&TTE stands for 'Radio and Telecommunications Terminal Equipment'), the [low-voltage directive 2006/95/EC](#) and the [directive 2004/108/EC electromagnetic compatibility](#).

These directives require that the product (EAS system) does not result in a risk for the health and safety of the user and of other people and does not cause electromagnetic interferences.

The manufacturer needs to test his products to make sure that they meet all criteria. The threshold values and the measurement procedures are described in the harmonised European standards.

The compliance of this regulation is checked by the FPS Economy, SMEs, Self-Employed and Energy.

Threshold values

The recommendations of the [ICNIRP](#) (International Commission on Non-Ionizing Radiation Protection) are the scientific basis for the threshold values.

The threshold values are established in relation to the operating frequency. Several threshold values apply since the EAS systems work on different frequencies. The biological effects that need to be avoided, are also different. The fact is that low frequencies cause different effects in the body than higher frequencies.

- Electromagnetic alternating fields in the frequency band 1 Hz - 10 MHz can generate an electric current in the body. If the alternating fields are too strong, the generated current can disrupt the functioning of nerves and muscles in the body and cause flashes of light in the field of vision. The threshold value for the generated current density must prevent these effects.
- Another effect is induced in the frequency band 100 kHz - 10 GHz: a thermal effect, a warming up effect, as is the case with mobile telephones. This effect is measured in SAR (Specific Absorption Rate) value and expressed in W/kg. A threshold value is imposed for the SAR value to protect against these effects.
- Both effects are present in the frequency band 100 kHz - 10 MHz and both threshold values need to be checked (the threshold values on the current density and on the SAR).

The SAR value and current density within the body are difficult to measure. That is why reference quantities (electric and magnetic field strength or magnetic flux density) are derived from it and hence these quantities are easier to measure. It is assumed that the product meets the exposure limits when these reference levels for the electromagnetic fields are not exceeded. However, the opposite does not apply: it is possible that the exposure limits are met but that the reference levels are exceeded anyway.

Health risks

The existing exposure limits (threshold values on the current density and SAR value) have been established to protect against known short-term effects (thermal load, harmful effects on the nervous system). It is the responsibility of the manufacturer to launch only safe products on the market that meet the threshold values. Only little is known about long-term effects to establish standards for it.

Measurements of electric or magnetic fields around EAS detection ports demonstrate that the reference levels are sometimes exceeded without there being any proof of risk for the health. Some people experience health problems when using wireless devices or with nearby electrical devices at field values that do not cause any hindrance for most people. This phenomenon is called "Electromagnetic hypersensitivity".

There are reports in literature about interferences in the functioning of electronic implants near the ports (detection antennas) of EM and AM systems.

Precautionary measures

The conformity measurements are performed by the manufacturer by default at a distance of 20 cm and more. After all, the assumption is that the public does not hang around the entrance of a store and that no one will lean on the detection ports.

That is why it is advisable to pay attention to how you position yourself with respect to the detection ports. Do not stand in between these ports for a long time, do not lean on them and also make your children aware of it. You will obviously not suffer burns or see flashes of light appear in your eyes - the threshold values provide a large safety margin. Yet, caution is advised.

Particularly people wearing electronic implants must be careful. The risk of interference to the normal functioning of the implant is not that big (electronic implants must be resistant to electromagnetic influences), but the consequences of such an interference can be extremely unpleasant (people who wear an implanted defibrillator have reported that this defibrillator repeatedly gave electric shocks near the detection ports of AM and EM systems). That is why it is also advisable here not to stand between the detection ports but just calmly walk through them.



Unfortunately, the regulation does not provide for the placing of a specific signal (warning) on the detection ports.