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Retained fasteners required for safety fences?

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Machine builders currently have quite a few questions about how to deal with the requirements of the new Machinery Directive 2006/42/EC as regards fixed guards, and in particular safety fence systems. There are suppliers who take Article 1.4.2 of Annex I of the Machinery Directive, 'Special requirements for guards', to mean that fasteners must remain attached to the fixed guard and/or the machinery. Other suppliers state that the legislator is not equating 'fixed guards' with 'safety fence systems' as described above. The key questions are, of course, 'how was this legislation meant to be interpreted?' and 'who is right?'

What exactly does it say in the new 2006/42/EC Machinery Directive? Two types of guards are mentioned in the Machinery Directive. There mention of a fixed or a movable guards with an interlocking device. Fixed guards can refer to the housing of a machine, which might take the form of panels, which would require tools for removal. The fixed guard should, where possible, not stay connected to the machine. Movable guards, on the other hand, are associated with sliding doors, hinged doors or inspection hatches. Movable guards, when open, should in fact remain attached to the machine as much as possible.

Everyone understands that a safety fence system consists of a combination of fixed and movable guards (fixed panels with posts and hinged or sliding doors). No one will disagree with anything that has been said so far.

In the same requirement 1.4.2.1 of Annex I of the Machinery Directive, it is further stated that the fastenings for fixed guards must remain attached to the machine or to the guard (requirement 1.4.2.1. Fixed guards) 'Their fixing systems must remain attached to the guards or to the machinery when the guards are removed.' To be able to give a clear answer on what the legislature meant, we must first consider how such security fence systems are applied to protect a machine in practice. In most cases, security fence systems (Figure 1) are used for larger machinery or installations where there is often a combination of multiple machines (a 'machine' as defined in the Machinery Directive in Article 2, paragraph a, 4th dash). In many cases, the security fence is completely detached from the machine(s) or, for example, only mechanically connected to the machine in a few places. In addition, there are many variations on the security fence systems mentioned above, such as, for example, an all-steel casing around a welding robot. In many cases, this housing (see Figure 2) is made of hardened sheeting and these panels are connected to each other by means of bolted connections in the hardened flanges. Did the legislature have this kind of a security fence system in mind when writing this requirement in section 1.4.2.1?

They were most likely thinking of the following, much more common situation. Many of you will have seen or experienced part of a machine's housing needing to be removed for maintenance purposes. It is also not uncommon to discover that the housing hasn't been replaced a few weeks later. The housing ends up wandering around the production area and is often not replaced. Various causes can be given. In many cases, the manufacturer provides the machine housing with M6 bolts or screws (self-tapping) and fasteners. It is very easy for a serviceman to lose a few of these small bolts or screws when disassembling the housing of a machine for drive maintenance. He would then have to go to the warehouse to get replacements in order to be able to put the housing back on again. However, in situations such as this, the machine, plant or line will often be returned to service without putting the housing back or putting it back properly in order to get the plant running again, as fast as

possible. People often think they will get around to it in the near future, but that near future soon becomes never. In this way, maintenance work can end up resulting in part of the guard system specified by the manufacturer going missing. This fixed guard is part of the manufacturer's risk analysis and risk reduction measures and its absence can lead to a dangerous situation for the user of the system or machine. The relevant requirement is easier to understand in this context. The legislator is clearly asking the manufacturer/designer to devise other fastening solutions.

It would not be very hard to replace the bolts or screws with a different fastening system. In the general requirements for guards (requirement 1.4.1), there is also mention of removing fixed guards in connection with tool changes or maintenance work. But when are security fences actually removed for maintenance or tool change? Probably never. The panels of a security fence protecting machinery or equipment are only very rarely removed during the entire lifetime of the installation, for example, to replace a portion of the machine/installation inside the security fence and only if the parts that need to be replaced don't fit through the doors in the security fence. Furthermore, the fastenings of security fence panels are often of a totally different size than the previously mentioned small bolts and screws. It is therefore much harder to lose this type of fastenings. Certain types of security fence systems, such as machine guards, require special fastening methods, which would make it impossible to meet this requirement. Think of the well-known aluminium safety fence system built from bolted together standard profiles filled with Lexan, mesh or plate. Should these manufacturers also start thinking about new attachment methods? We therefore suggest that it is not necessarily always necessary to apply this part of requirement 1.4.2.1 to a security fence system and that suppliers of security fence systems and machine builders who themselves manufacture security fence systems or enclosures will in most cases be able to stick with the attachment method they have been using thus far. A standard solid bolt connection.

The foregoing is underlined by the European interpretation of the new Machinery Directive in the draft translation of the 'Guide to application of Directive 2006/42/EC'. The explanation below relates to requirement 1.4.2.1:

... 1.4.2.1 requires fastening systems for fixed guards to remain attached to the guards themselves or to the machinery when the guards are removed. This requirement aims to reduce risks caused by guards not being replaced or being only partially fastened due to loss of one or more of the fastenings when fixed guards are removed, for example, for maintenance purposes. Application of this requirement depends on the manufacturer's assessment of the risk concerned. The requirement applies to any fixed guards that are liable to be removed by the user with a risk of loss of the fixings, for example, to fixed guards that are liable to be removed during routine cleaning, setting or maintenance operations carried out at the place of use. The requirement does not necessarily apply to fixed guards that are only liable to be removed, for example, when the machinery is completely overhauled, is subject to major repairs or is dismantled for transfer to another site. The above explanation contains a substantiation of our previous reading of requirement 1.4.2.1. It is very clearly stated that the manufacturer may decide whether to use retained fasteners for its fixed guards when performing its risk assessment. There is talk of the risk of losing the fasteners and related replacement or incomplete replacement of the fixed guards. In addition, it is indicated that, if fixed guards need to be removed sporadically removed in connection with major repairs to the machine or installation, this requirement does not necessarily apply. In our opinion, the latter clearly applies to safety fence systems around machinery and installations.

Our conclusion is therefore that in most cases standard bolted connections are sufficient for use in safety fence systems. Don't be fooled by the sales talk of the safety fence suppliers and make sure to carefully assess whether you really need to use retained screws and bolt connections. You have every legal right to do so.

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