Visibility conditions on earthmoving machinery

Conditions de visibilité sur les engins de mouvement de terre

Dipl.-Ing. Horst Leisering, BG BAU – 04.10.2011

Organization of occupational health and safety in Germany

European directives
Harmonised european standards

National authorities for occupational health and safety

DGUV = Umbrella association of the accident insurance institutions for the industrial and public sectors

BG BAU = Statutory accident insurance and prevention in the building trade

Regulations for the prevention of industrial accidents

National standards

Visibility on earth-moving machinery horst.leisering@bgbau.de Seite 202
Expert committees at DGUV

expert committee “Building”
- Personal protective equipment
- Building works
- Pre-fabricated section work
  - Etc.

expert committee “Civil engineering”
- Special field: „Underground- and foundation engineering“
  (Head: Walter Ensinger)
- Special field: Earth – moving and road works
  (Head: Horst Leisering)
- Special field: Contaminated areas, deconstruction and demolition…
- Special field: Track construction works…
Example for accidents caused by excavators

Excavators, serious and fatal accidents (1996-2000)
Source: Volker Sinnhuber - BG BAU

Lethal accidents in the period 2008 to Sept. 2010

Analysis of 32 fatal accidents
- about 10 accidents occurred within the jurisdiction of the BG BAU.
- 22 accidents occurred in the competence of other statutory accident insurances.
Example 1

Colleague wanted to pass behind the excavator

Operator is unable to see his colleague!

Example 1

„Blind spot“ in the rear of an excavator

Blickwinkel des Fahrers

Toter Winkel
Example 2, fatal accident caused by a dumper

Operator is unable to see his colleague while driving backwards

Person fatally injured

After having run over his colleague the operator stops the dumper
**Legal provisions, general overview**

Addressees of the norm concerning health and safety requirements of machinery and the operating of machinery,

<table>
<thead>
<tr>
<th>Manufacturer:</th>
<th>Operating company:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Machinery directive 2006/42/ec</td>
<td>Directive 2009/104/EC</td>
</tr>
<tr>
<td>National rules and standards for specification of the directive 2009/104/EC</td>
<td></td>
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**Requirements addressed to the manufacturer of a machine or the who is placing machinery on the market**

_owned to certify the conformity of their machinery to the provisions of the machinery directive 2006/42/ec

**Annex 1:**

⇒ Essential health and safety requirements
General requirements related to the subject visibility
- specified in the general scope of Annex 1 -
- binding for all kinds of machinery -

From each control position, the operator must be able to ensure that no-one is in the danger zones, or the control system must be designed and constructed in such a way that starting is prevented while someone is in the danger zone. If neither of these possibilities is applicable, before the machinery starts, an acoustic and/or visual warning signal must be given. The exposed persons must have time to leave the danger zone or prevent the machinery starting up.

(1.2.2. Control devices)

Supplementary essential health and safety requirements to offset hazards due to the mobility of machinery

The following specification can be found here:
Visibility from the driving position must be such that the driver can, in complete safety for himself and the exposed persons, operate the machinery and its tools in their foreseeable conditions of use.
Where necessary, appropriate devices must be provided to remedy hazards due to inadequate direct vision.

(3.2.1. Driving position)

Furthermore can be found:
The above mentioned requirement in the general scope, concerning acoustic and/or visual warning signals, applies only in the case of reversing.

(3.3.1. Control devices)
Presumption of conformity and harmonised standards

Machinery directive - article 7: Machinery….

- manufactured in conformity with a harmonised standard,
- the references to which have been published in the Official Journal of the European Union,
- shall be presumed to comply with the essential health and safety requirements (of the machinery directive) covered by such a harmonised standard.

⇒ (Presumption of conformity)

Earth-moving machinery - Safety

- harmonised standard EN 474:2006 (valid since 30.11.2008)
- refers to ISO 5006:2006 "Earth-moving machinery – Operator’s field of view – Test method and performance criteria"

⇒ Applying these harmonized standards gives presumption of conformity of machinery with the essential health and safety requirements of the Machinery Directive
Earth-moving machinery shall be designed in accordance with ISO 5006:2006 so that the operator has sufficient visibility from the operator's station in relation to the travel and work areas of the machine that are necessary for the intended use of the machine.

......

NOTE: It is sufficient to measure the machine with the most challenging standard attachment within the limits of the intended use.


(5.8.1 Operator's field of view)


- ISO 5006 is an international standard that was developed in consultation with the European standardisation committees.
- Binding even in Europe
  (Vienna Agreement between ISO and CEN)
- Describes a test method in order to measure and assess obstructed view.
- Goal is:
  - to allow the driver to operate proper, effective and safe.
  - in addition to quantify tolerable maskings in objective engineering terms.
In the earlier ISO 5006 restricted sight was only assessed in a distance from a 12m radius around the machine.

Main new feature introduced by the new ISO 5006:2006:

Additional measurement in the close range of the machinery
Technical measures of manufactures to improve visibility since 2009
Problem No. 1:
Visibility restrictions compensated by mirrors, fitted on the rear of the machine

Source: R. Clemens
What can the social partners do to improve the situation in the field of standardization to improve a harmonised standard?

**General situation:**
- Social partners are often not equally represented in the standardization bodies.
- Manufacturers are often represented disproportionately high.
- The interests of the users of machinery, e.g. construction companies or workers, are often considered only in a small measure.

**Participation in standardization bodies**
(Only the one, who is contributing in suchlike bodies, has an influence on the result of the work of these committees)

**In serious cases:**
Initiating a procedure for disputing a harmonised standard (Article 10)
Procedure for disputing a harmonised standard (Formal objection)

- Member State or the Commission considers that a harmonised standard does not entirely satisfy the essential health and safety requirements which it covers and which are set out in Annex I
- Commission or the Member State shall bring the matter before the committee set up by Directive 98/34/EC
  - The committee shall deliver an opinion without delay
- Commission shall decide
  - to maintain,
  - to maintain with restriction or
  - to withdraw
  the references to the harmonised standard concerned in the Official Journal of the European Union.

Consequence: The presumption of conformity is lost!

Requirements on existing machines

Directive 2009/104/EC
Minimum safety and health requirements for the use of work equipment by workers at work

- Employer shall obtain and/or use work equipment which, complies with the provisions of the machinery directive
- Since 1997 mobile work equipment has to comply also with the minimum requirements laid down in Annex I of directive 2009/104/EC

The following is specified in the annex I:
- Self-propelled work equipment (earth-moving machinery) which may, when in motion, engender risks for persons must fulfil the following conditions:
  - where the driver’s direct field of vision is inadequate to ensure safety (?), adequate auxiliary devices must be installed to improve visibility;
Requirements on existing machines

In which case the driver’s direct field of vision is inadequate to ensure safety?

⇒ Employer is obligated to identify the specific hazards for the safety and health of the workers, posed by the use of earth-moving machinery.

⇒ He has to take the measures to ensure that the earth-moving machinery may be used by workers without impairment to their safety or health.

⇒ Where it is not possible in this way fully to ensure that earth-moving machinery can be used by workers without risk to their safety or health, the employer shall take appropriate measures to minimise the risks.

Identify the specific hazards for the safety and health of the workers, posed by the use of earth-moving machinery with restricted visibility.
Measures to ensure that the earth-moving machinery may be used by workers without impairment to their safety or health. ⇒ Improving visibility by monitor and rear view camera

Appropriate measures to minimise the risks
Final appeal to the social partners

- Get involved in the standardisation bodies in each of your member countries and try to improve the visibility on earth-moving machinery.
- To improve visibility on earth-moving machinery brings advantage for both social partners (in the point of view economic, ergonomic and health and safety).
- Rear-view cameras are an optimal technical solution.