



Risk assessment according to DIN EN ISO 14971 for magnifying glasses

The DIN EN ISO 14971 standard provides a structured approach to the identification, assessment, control and monitoring of risks. The risk assessment for the magnifying glasses, including the specific risk of fire due to solar radiation in the event of negligent abandonment, is set out below.

1st area of application

Magnifying glasses are optical precision instruments used in quality assurance and material testing. The aim of the risk assessment is to identify all potential risks that may arise during use, storage and handling and to develop measures to minimize them.

2. Risk analysis

2.1 Risk identification

Recognized risks:

1. Mechanical risks:

- Breakage of the lens or housing due to falling or improper handling.
- Injuries due to sharp edges in the event of damage.

2. Optical risks:

- Glare due to reflections on the lens.
- Eye fatigue during prolonged use without ergonomic adjustment.

3. Risks of use:

- Misinterpretation of measured values due to unclear scales or calibration errors.
- Reduced precision due to dirty or scratched lenses.

4. Environmental risks:

- Material ageing due to UV radiation or extreme temperatures.
- Risk of fire due to sunlight if the magnifying glass is left lying around.

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5. Chemical risks:

- Release of harmful substances due to insufficiently tested materials under extreme conditions.

6. Electrical risks (for models with lighting):

- Overheating of the light source.
- Electrical short circuits or malfunctions.

2.2 Risk assessment

Each risk is assessed in terms of **severity (S)** and **probability (P)**. The risk priority number (RPN) is calculated as:

$$RPZ=S \times P \text{ \text{ } } \text{RPZ} = S \times P$$

Rating scales:

- Severity (S): 1 (low) to 5 (critical)
- Probability (P): 1 (unlikely) to 5 (frequent)

Risk	S	P	RPZ	Comment
Breakage of the lens/housing	3	3	9	Possible risk of injury and loss of function.
Injuries due to broken edges	4	2	8	Risk can be reduced by housing material and design.
Glare through reflection	2	3	6	Anti-reflective coatings can minimize risk.
Misinterpretation of data	4	3	12	Clearer scales and training are required.
Material ageing due to UV radiation	2	3	6	Durable materials reduce this risk.
Fire hazard due to solar radiation	5	2	10	Critical risk, depending on use and environment.
Overheating of the light source	4	2	8	Use of high-quality LEDs recommended.

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3. Risk control

The identified risks are controlled through preventive measures:

Risk	Measures
Breakage of the lens/housing	Use of shatterproof materials such as polycarbonate.
Injuries due to broken edges	Design housing with splinter protection.
Glare through reflection	Anti-reflective coating on the lens.
Misinterpretation of data	Optimize scales, clear instructions and regular calibration.
Material ageing due to UV radiation	UV-resistant materials and protective covers.
Fire hazard due to solar radiation	Warnings on the product and in the instructions: <i>"Do not leave in direct sunlight"</i> . Provide protective covers or cases.
Overheating of the light source	Temperature monitoring and high-quality LEDs.

4. Risk due to solar radiation: details

Risk: In direct sunlight, the magnifying glass can act like a burning glass and cause a fire by focusing the light. This risk is particularly relevant if the magnifying glass is left unattended near flammable materials.

Rating: Severity (S): 5 (critical, as there is a risk of property damage and personal injury) Probability (P): 2 (rare, as several factors must come together)

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RPZ: 10 |

Risk mitigation measures:

1. Design:

- Provide protective covers or covers.
- Stray light protection that prevents light bundling when not in use.

2. Notes:

- Warnings on the product and in the operating instructions: "*Do not leave in direct sunlight.*"
- Recommendations for safe storage (e.g. in a case).

3. User education:

- Information material on correct handling and storage.

4. Materials:

- Heat-resistant housing to further delay possible fires.

5. residual risk and monitoring

- **Residual risk:** Despite the measures taken, a small residual risk remains, particularly in the event of improper use or ignoring the warnings.
- **Monitoring:**
 - Feedback from users and reported incidents should be systematically collected and analyzed.
 - Regular review and, if necessary, improvement of design and warnings.

6. conclusion

The risks of magnifiers can be reduced to an acceptable level through appropriate technical, organizational and educational measures. The greatest attention should be paid to the risk of fire due to solar radiation, which can be effectively minimized by warnings, protective covers and design adjustments.