

2009 EN 207 and EN 208 Revisions

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2009 EN 207 and EN 208 revisions

- These are the first changes since 2002
- The revisions bring them closer to ANSI Z 136.1 and ANSI Z 136.7 in a few critical areas, namely laser damage testing.
- Provides for more information for the user to help make better and more informed eyewear safety choices.

Changes to laser damage testing

- Reduced direct laser testing from 10 seconds to 5 seconds or min of 50 pulses for a pulsed laser
- Note ANSI Z 136.7 does not reference any time criteria but does state you must use direct laser radiation to test for saturable absorption for any filter with a stated OD above 4

Changes to laser damage testing

■ Beam Diameter

- Changed from $\geq 2\text{mm}$ to $1\text{mm} \pm 1\text{mm}$ for cw and pulsed lasers $>1\text{ns}$ pulse length
- This could increase **protection** level of eyewear in borderline cases as heat dissipates faster from a smaller beam area



Changes to laser damage testing

- Old version....If a smaller beam diameter than 2mm was used, a correction factor had to be applied during testing that was different for glass and plastic filters and increased the energy / power density actually used for testing
- No correction factor is to be applied during testing, instead this is taken into account in annex of selection eyewear
- This helps to harmonize test conditions
- Again, the new standard is providing more information for the LSO and user to make a more informed safety decision when selecting the protection level for their laser eyewear

Changes to impact testing

- Old Standard....filter had to be a minimum of 1.4mm thick or undergo impact testing
- Revision: must meet EN 166 for impact
 - Note this is similar to ANSI Z 136.7 where there is a minimum impact requirement, namely Z 80.1



Changes to product markings

- To clearly distinguish between new and old standard, markings will change as follows:
 - Old std 1064 DIR L5
 - New std 1064 DIR LB5
 - For EN 208 they change from R 5 to RB 5
 - “B” in markings denote the new standard

Additional revision to EN 208



- Studies showed that majority of people do not actually blink in .25 seconds (who wrote the study? *Not noted in standard, but was by Prof. Reidenbach/ Cologne*)
- Based on these studies, they have an additional column based on a 2 sec aversion response
- Now user is able to select based on more detailed criteria

Revision to the informative annexes of EN 207 and EN 208

- New standard provides more detailed directions on how to calculate protection levels and select appropriate eyewear
- Example: more extensive description on how to select the correct protection level for fast pulse series; More detail on how to calculate the required protection levels

What this means to you... (FAQs)

- Q: When do I need to implement this?
- A: There is no fixed date by which users must implement the new standard, in particular because previous products have not become unsafe. However, the revisions represent the latest state of technology, and as such should be addressed.

FAQs Continued...

- Q: Why can't I yet buy the eyewear I need in a version certified to the 2009 standard?
- A: The standards are only being published in 2010. Before Mfrs can start to sell laser eyewear marked in accordance to the new standard, the independent test institute must certify and re-test eyewear to the new standard as appropriate. Mfrs may still use up existing stock, and implement as a running change.

FAQs Continued...

■ Q: Is for example a “D LB 5” in the new standard the same as a “D L5” was in the previous standard?

■ A: Not necessarily...

The protection level required could differ. A product that achieved D L5 under previous laser damage testing, might achieve a different protection level under the new standard.

■ FYI: The higher the beam divergence which is taken into account for the calculation

And.. The larger the beam size in 10cm distance from the focus point which is used to calculate the energy/power density

... the more likely it is you will need a higher protection level under the new standard than you did before.



Conclusions



- Recent changes provide the end user with more information on how to select their eyewear and to make better and more informed eyewear safety choices.
- Changes harmonize test results from different test houses
- Changes bring it closer to ANSI Z 136.7 which hopefully will lead to a global harmonized standard

Questions?

Thank you!



LASER INFORMATION BULLETIN

Revised European laser eyewear standards

The latest versions of the European laser eyewear standards, namely EN 207:2009 and EN 208: 2009, replace the previous editions EN 207:1998 + A1:2002 and EN 208:1998 + A1:2002. The revisions of the European laser eyewear standards for laser safety eyewear (EN 207) and laser alignment eyewear (EN 208) adapt the test methods to the latest state of knowledge in this field, and can be broadly divided into three areas:

1. Product marking

Users will notice the following changes to product markings, for products that have been certified in accordance with the 2009 standards:

EN 207:1998 + A1:2002 EN 208: 1998 + A1:2002	EN 207:2009, EN 208:2009	Significance
Protection level marked on product : L1, L2....L10 (EN 207) R1, R2....R5 (EN 208)	Protection level marked on product: LB1, LB2....LB10 RB1, RB2....RB5 (EN 208)	User can easily tell if eyewear is certified to the new standard or a previous version
	For pulsed lasers, testing shall be done with low repetition rates (≤ 25 Hz). If it is not possible, the energy density used for testing shall be given in the test report and the protection level on the product shall have the suffix 'Y' added e.g. RLB5Y;	This gives the user additional information as to how a product was tested and achieved a specific protection level.

2. Testing of the eyewear

EN 207:1998 + A1:2002 EN 208: 1998 + A1:2002	EN 207:2009, EN 208:2009	Significance
Laser damage testing shall be done at least for 10s or 100 pulses.	Testing shall be done at least for 5s but never with less than 50 pulses.	Shorter test time could increase protection level attained by products in borderline cases
Test beam diameter ≥ 2 mm.	Test beam diameter $1\text{mm} \pm 0,1\text{mm}$. Note exception: Beam diameter for testing pulsed lasers $< 1\text{ns}$ remains unchanged at $\geq 0,5\text{mm}$	Could increase the protection level attained by products in borderline cases, as heat dissipates faster from a smaller beam area.
A beam diameter between 0,5mm-2mm could be used if the power density/energy density was increased by a specific correction factor for glass filters, and a different correction factor for polymer filters.	No correction factor to be applied during the test, instead this is taken into account in the informative annex for selecting eyewear.	Helps to harmonize test conditions so that different test houses achieve similar results.
Filters must be either minimum 1.4mm thick or undergo impact testing (EN 166)	Filters must undergo impact testing (EN 166)	



3. Calculating the required protection level

EN 207:1998 + A1:2002	EN 207:2009	Significance
	Protection levels are determined for the different laser modes D, I, R, and M. For pulsed lasers a protection level for one of the symbols I, R, or M is calculated as well as a protection level for mode D. For each of the two modes either an individual protection level may be applied or the maximum of the two values.	Explicitly advises that for a pulsed laser you calculate D and the pulsed mode (I, R or M). You can then either select eyewear which has both protection levels (D and the pulsed one) OR eyewear which has the higher of the two protection levels eg DLB5 + RLB7 calculated => either use eyewear with DLB5 + RLB7 OR just with RLB7
	If beam diameters d other than 1 mm (that is the diameter used to test the resistance to laser radiation) are used to determine the protection level of an appropriate filter, then power and energy densities of Table B1 should be multiplied by one of the following functions (d is the beam diameter in mm), depending on which material the protecting filter is made of: Glass $F(d) = d^{1,1693}$ Plastic $F(d) = d^{1,2233}$ NOTE: This is an error in the standard: The power and energy density you have calculated for your laser should be multiplied by these functions, NOT the values in table B1.	Due to heat dissipation, the resistance to laser radiation depends not only on the power and energy density but also on the diameter of the irradiated area. This change will in some cases increase the protection level required, in particular for divergent beams.
The protection has been designed on the basis of 10 s with regard to transmission (attenuation of the laser beam) for wavelengths in the range above 400 nm, otherwise on the basis of 30 000 s. Actual laser damage testing is carried out for 10 s in both cases.	The protection has been designed on the basis of 5 s with regard to transmission (attenuation of the laser beam) for wavelengths in the range above 315 nm, otherwise on the basis of 30 000 s. Actual laser damage testing is tested for 5 s in both cases.	Calculated protection levels 315nm-400nm range can be different under the new standard

EN 208:1998 + A1:2002	EN 208:2009	Significance
Table for selecting suitable eyewear based on blink reflex within 0,25s	Additional columns allow for selection if aversion response is delayed to 2s	User is able to select more detailed criteria
	More detailed directions for how to calculate the protection levels.	Easier for the user and reduce errors in interpretation.



Frequently asked questions:

Q: What do the modes D, I, R and M mean?

A:

D = continuous wave lasers

I = pulsed laser with pulse length $>10^{-6} - 0.25$ sec.

R = Q switched pulsed laser with pulse length $>10^{-9} - 10^{-6}$ sec.

M= Mode-coupled pulsed laser with pulse length $< 10^{-9}$ sec.

Q: Can I continue to use my laser eyewear that was certified to a previous standard?

A: Yes, the revisions do not mean that previous products are no longer safe

Q: When do I have to implement this by?

A: There is no fixed date by which users must implement the new standard, in particular since previous products have not become unsafe. However the revisions represent the latest state of technology, and as such should be addressed when new laser eyewear needs to be purchased, in as far as suitable product is already available.

Q: Why can't I yet buy the eyewear I need in a version certified to the new 2009 standard?

A: The standards are only being published in 2010. Before manufacturers can start to sell laser eyewear marked in accordance to the new standard, the independent test institute must certify and re-test eyewear to the new standard as appropriate. Manufacturers may still use up existing stock, and implement as a running change.

Q: Is for example a D LB 5 the same as a D L5 was?

A: Not necessarily:

- The protection level required could differ (see section three above).
- A product that achieved D L5 under previous laser damage testing, might achieve a different protection level under the new standard.

Note: This Information Bulletin does not purport to be exhaustive. For comprehensive information, please refer to the officially released European laser eyewear standards.

Should you have any questions please do not hesitate to contact your Area Sales Manager at

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