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## REFLECTORLESS EDM – LASER CLASS

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With the TPS1200 Total Station, Leica Geosystems has introduced two reflectorless options – the Pinpoint R100 and R300. These reflectorless EDM instruments are now being widely used throughout the world.

Both reflectorless EDMs provide ideal technical specifications for surveying: very high accuracy (3mm + 2ppm), high range (R300: up to and beyond 500m), small beam width, and a visible red laser spot.

To reach these excellent specifications, Leica Geosystems has selected to use a visible laser classified as class 3R.

As the laser class 3R is still relatively new to the international laser standard, it is often mixed up with the well-known laser class 3B. This newsletter is to provide background information on laser class 3R, its specifications, as well as the practical implications of its use.

### LASER CLASS 3R (VISIBLE RADIATION)

Laser class 3R (visible radiation) is a relatively new laser class which is regarded as 'low level eye risk' if the precautionary measures are not applied. In comparison, the former laser class 3B\*, was generally regarded as 'intrabeam viewing may be potentially hazardous'.

The risks can be completely eliminated by applying the precautionary measures.

The introduction of laser class 3R to the international laser standard was initiated in 1997. The currently applicable international laser standard IEC 60825-1 (2001-08) contains and describes the laser class 3R, for which significantly less stringent safety guidelines are valid as compared to class 3B. The 'R' has been used to denote 'Reduced requirements'.

### CLASS 3B\* LASER PRODUCTS - USED SINCE DECADES IN MANY INDUSTRIES

Lasers, which now would fall into the class 3R of the new standard have been used in large quantities for industrial products in many fields

(e.g. medicine, research) for many years already.

Also in the surveying and construction industry class 3B\* lasers have been used for many years, mainly for alignments and levelling.

The current international laser standard (IEC 60825-1) now describes the use of laser class 3R products for surveying, alignment and levelling and recommends certain precautions for using class 3R laser products.

### INCREASING PRODUCTIVITY USING CLASS 3R LASER

The class 3R reflectorless EDM provides a significantly higher range for reflectorless measurements when compared to EDMs of similar technology using lower laser classes.

While this is certainly advantageous for the surveyor in terms of increased productivity, there are some simple guidelines to be followed in order to comply with the international safety standards set for laser class 3R.

In accordance with this safety standard, the operator of a class 3R laser should avoid that persons look directly into the laser beam. In addition, care should be taken to ensure that the laser beam is not unintentionally directed at mirror-like surfaces.

The precautions are described in detail within the user manual delivered with each instrument, in order to comply with the international safety standards and to make the field operator aware of potential eye injuries if the instrument is deliberately misused.

Contrary to laser products, which are typically always on and directed in a not controlled area, the class 3R laser optionally included in Leica Total Stations is only active when triggered by the operator for measuring a point, and switched off again once the measurement is made. It is also active when the red laser pointer is deliberately turned on.

Therefore the likelihood that a human eye is accidentally exposed to this laser beam long

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enough to become injured is practically eliminated.

## SHORT INTRA-BEAM VIEWING

Even in the rather unlikely event that someone's eye is exposed to the laser beam of a TPS1200 instrument, the risk of retinal injury is minimal or negligible as the exposure will not last long enough.

The scientific community, that has defined the laser class 3R standard, is not aware of any event where such short intra-beam viewing has led to an injury.

Only intentional staring into a class 3R laser beam for several seconds, which is actually extremely uncomfortable, can potentially lead to retinal injuries. However, when the human eye is accidentally exposed to a laser class 3R, natural aversion responses (e.g. pupillary constriction, squinting, looking away) reduce the risk for harmful exposure to a minimum.

## FURTHER INFORMATION

The purpose of this newsletter is to remove any concerns regarding the safe usage of class 3R lasers. Customers who wish to know more about this topic are welcome to approach their Leica Geosystems sales representative in order to obtain further information on the safe and efficient use of Leica total stations with reflectorless EDM.

An official expert opinion on laser class 3R, which details the information given in this newsletter is also available on request.

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## REFERENCE

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IEC 60821-1 (2001-08) "Safety of laser products – Part 1. Equipment classification, requirements and user's guide".



Please contact your local Selling Unit or local Leica dealer if there are specific topics you would like covered in these newsletters.

We welcome all suggestions for TPS1200, GPS1200, specific applications or LGO. We look forward to receive your idea.

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