

# SAFETY: FIBER LASER HANDLING AND OPERATION

Application note on safety when handling and operating fiber lasers

## INTRODUCTION

Operators familiar with lasers such as gas-, solid state or diode lasers may not be aware of the special features of fiber lasers and fiber laser subassemblies. The cavity and the gain medium of fiber lasers are optical fibers, made of glass. Such configuration has many advantages from a handling and operation point of view:

- In general, a fiber laser subassembly will always be spatially aligned, since it is fused together.
- In fiber laser subassemblies, the light is always contained within the glass. Inside the device, there are no “free-space” beams.
- Glass material is inherently strong and thermally stable.

Despite these very advantageous features, there are safety issues that should be taken into considerations.

Listed below is a set of rules/guidelines that are commonly used to ensure safe operation of fiber lasers.

## FIBER LASER HANDLING

- Never expose the fiber to a bend diameter less than 200 times the fiber diameter:
  - For 200 µm fiber: 40 mm bend diameter
  - For 400µm fiber: 80 mm bend diameter
- Never place tools or other hard and heavy items on top of the fiber
- Never allow the fiber to come into contact with sharp edges (such as edges of optical tables)
- Never wipe an optical fiber with abrasive material or organic solvents such as acetone
- Keep fiber facets very clean at all times
- Never dispose of loose glass fibers into a wastebasket and never allow loose pieces of glass to accumulate
- Do not eat or drink in the termination area. Ingested fibers can cause internal damage

## FIBER LASER OPERATION

Almost all fiber lasers are class IV lasers. Typically, laser beams have very high beam quality and very high brightness. Such beams can propagate a long distance and still be potentially hazardous.

Furthermore, many fiber lasers emits laser power in the multi-Watt regime, which must be taken into considerations when trying to block the beam and enclose the area around the laser

- In general, for fiber laser installation and operation, adhere to local safety regulations corresponding to the laser class classification.
- Wear laser safety glasses with a sufficient protection level.
- Use warning light and door interlocks when the laser is on.
- Make sure that beam blocks and beam dumps are made of sufficiently strong and durable material. Black anodized aluminum can often be used.

## CONTACT INFORMATION

Crystal Fibre A/S  
Blokken 84  
DK-3460  
Birkerød  
Denmark

☎ US toll-free: 877-810-2800  
☎ International: +45 4348 2800  
Fax: +45 4348 2801  
E-mail: [contact@crystal-fibre.com](mailto:contact@crystal-fibre.com)  
Web: [www.crystal-fibre.com](http://www.crystal-fibre.com)