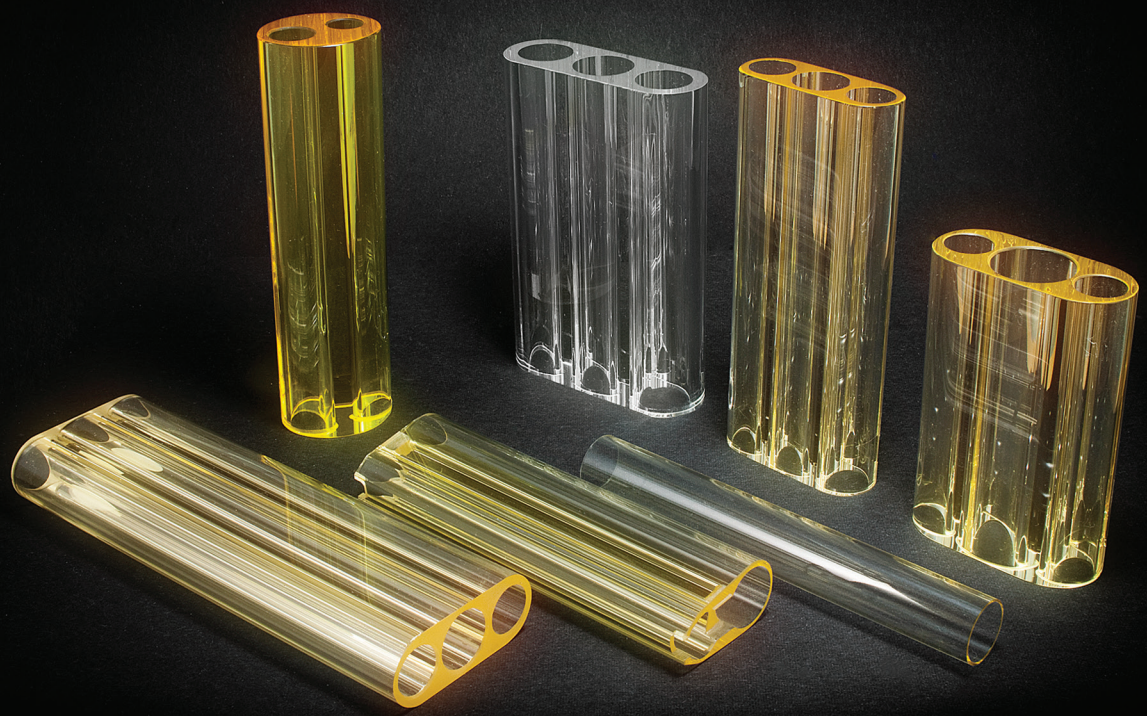

Flowtubes & Filter Flowtubes for Lamp Pumped Laser Heads

Application

Flowtubes and Filter Flowtubes combine and integrate in one solid optical element attributes and technical characteristics necessary to perform simultaneously the following functions:

(a) cooling duct for both lamp(s) and laser rod(s);

(b) filtering-absorbing undesired UV radiation, thus protecting the rod from long term solarization;

(c) attenuating “lateral depumping” effects i.e. energy losses caused by the rod’s side emission, by absorbing it and preventing its back-reflection.

Flowtubes satisfy only the first of the above functions while Filter Flowtubes may satisfy the first two or all three of them. This last category is of increasing interest for Nd:YAG Q-Switched lasers. For this case, Samarium doped Glass is the material of choice because it attenuates lateral depumping effects, thus avoiding super luminescence phenomena and absorbing undesired UV radiation.

Cerium Glass and Europium Quartz Glass are also interesting cladding materials, because these materials absorbs undesired UV radiation and additionally re-emits this energy at useful wavelengths.

For Flowtubes, Duran and Quartz Glass are the materials of choice, while YAG and Sapphire can also be used for very harsh conditions.

Technical Description

Flowtubes and Filter Flowtubes are machined out of a block or a rod of carefully selected materials, undoped or doped with the appropriate rare earth or metal ions, depending on the filtering results we are looking after and on the state of the available doping/filtering optical materials technology.

From its skilled alignment during the deep-boring to produce the holes that shall house the rods and lamps, till its polishing stage, the highest parallelism and perpendicularity tolerances must be observed in order to achieve an efficiently operating element. The polished exterior cylindrical surface, is characteristic of Flowtubes and Filter Flowtubes. Upon request we can measure and control the transmission characteristics of the produced elements using Zeiss spectrophotometer.

In case of Samarium and Europium doped Glass, because this material is relatively fragile, we apply chemical hardening of its surface by ion exchange following strict instructions of glass manufacturer Company.

Capabilities

LT-PYRKAL undertakes applied research, design and development of Flowtube and Filter Flowtube elements to customer’s requirements. Our optical design and manufacturing experience includes working with various hard crystals and all kinds of soft, medium and hard glasses and ceramics currently known and available in the Optics and Laser Optics market. We have specific capabilities for the design and for the execution of all accurate cutting, deep-boring, grinding and polishing operations necessary to build various shapes and configurations. Most probably, we can be of assistance to your Solid State Laser Pump Heads concepts, drawings and specifications. Upon request, we can use Europium, Samarium, Cerium or other doped materials for intra-cavity filtering.

All shapes and configurations Flowtubes and Filter Flowtubes to be used in Solid State Laser Heads are available including multi-hole cylindrical, ellipsoid, shotgun and horserace sections with flat or indented end-surfaces. Samarium and Cerium doped Glass Flowtubes are delivered chemically hardened.

Skilled and experienced LT-PYRKAL technicians shall handicraft to your exacting specifications the most demanding laser Cavity Flowtube and Filter designs for your Solid State Laser Pump Heads, out of a wide choice of the best available materials.

Technical Specifications

Material	High quality Undoped or Doped Quartz Glass (Si02), Duran, Zerodur, YAG or doped Glass.
Dopant filtering elements	Samarium, Cerium, Europium
Length	Max 120 mm
Inside hole diameter	6 mm to 20 mm
Tolerances:	
• Length	0.0 to+/-0.1 mm
• External diameter	0.0 to+/-0.1 mm
• Inside hole diameter	+/-0.1mm
• Angular	90°+/-15arc.min
Hole Parallelism	<0.05 mm per 25 mm length
Surface quality	60-40
Edge Bevel	0.2 to 0.4 at 45°