Assurance of energy handling capability in accordance with ISO 21254-3

Measurement Report

Sample: R16075-2
Request from: Central Laser Facility  
STFC Rutherford Appleton Laboratory  
Chilton, Didcot, OX11 0QX, United Kingdom  

Contact person: Mariastefania De Vido  

Testing institute: Lidaris Ltd.  
Saulétekio al. 10,  
LT-10223, Vilnius, Lithuania, EU  

Tester/date: L. Vigricaitė / 2017-05-08  

Specimen  
Name of sample: R16075-2  
Type of specimen: Glass  
Storage, cleaning: Plastic box, wrapped in paper for optics  

Test specification  
Fundamental harmonic of pulsed Nd:YAG InnoLas Laser: SpitLight Hybrid laser ($\lambda = 1064$ nm, linear polarization, pulse duration 10.0 ns), $\lambda/2$ plate combined with additional polarizer attenuator, online scattered light damage detection, offline inspection of damage detection using Nomarski microscopy (100x).  

Laser parameters used for testing  
Wavelength: 1064 nm  
Angle of incidence: 0 deg.  
Polarisation state: linear  
Pulse repetition frequency: 100 Hz  
Spatial beam profile in target plane: TEM$_{00}$  
Longitudinal beam profile: Single longitudinal mode (SLM)  
Beam diameter in target plane ($1/e^2$): $(976.4 \pm 42.7) \mu$m (average from 500 pulses)  
Pulse duration (FWHM): $(10.0 \pm 0.4)$ ns (average from 1000 pulses)
Assurance levels:
Number of sites per assurance level: 449
Number of shots per site: 1000
Tested area: 1 cm$^2$
Arrangement of test sites: Hexagon, equally spaced, 50% overlap (Fig 2.)
Damage detection: Post-test inspection, Nomarski microscopy
Storage of the specimen: Manufacturer’s packaging, normal laboratory conditions
Test environment: Industrial environment
Cleaning: Dust blown off with clean air
Fig. 2. Arrangement of test sites

Test result:

Table 1. Test results for sample R16075-2.

<table>
<thead>
<tr>
<th>Assurance level</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.5 ± 0.6 J/cm²</td>
<td>Passed</td>
</tr>
<tr>
<td>5.0 ± 0.9 J/cm²</td>
<td>Passed</td>
</tr>
<tr>
<td>7.5 ± 1.1 J/cm²</td>
<td>Passed</td>
</tr>
<tr>
<td>10.0 ± 1.4 J/cm²</td>
<td>Failed</td>
</tr>
</tbody>
</table>
Typical damage morphology:

![Fig. 3. Typical front surface damage morphology.](image1)

![Fig. 4. Typical front surface damage morphology.](image2)