RD-01 Description of the dispersion measurement procedures for the acceptance tests

REQ-034674/A

**Dispersion requirement verification procedure.** Thedispersion of the chirped mirror will be measured at least 10 spots within the operational clear aperture and within the operational wavelength range. The dispersion will be measured using a KLM Chromatis at the Contracting Authority’s site. Suggested KLM Chromatis settings for the verification measurement are: AOI 0 deg, scanning range 600 fs, 30 times averaging, and with a bandpass filter 600 – 1000 nm. The output of the measurement at each spot is a GDD curve with an estimate of the confidence interval, i.e. GDD(λ)±σ(λ).
The mirror will qualify for the dispersion requirement, if the estimated confidence interval has nonzero intersection with the specified tolerance interval at all measured spots and for every wavelength within the operational range. The evaluation procedure is also illustrated in Fig 1. and Fig. 2.

Figure 1. Measured GDD curve does not comly with the dispersion requirement, because at 810 nm the measured GDD is outside of the allowed tolerance band with the whole confidence interval.

Figure 2. The measured curve is compliant with the requirement, because the confidence interval has nonzero intersection in the whole wavelength range. As it cannot be proved that the GDD is out of specs, the mirror is considered to be compliant with the Dispersion req.

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**Average GDD requirement verification procedure**

The GDD averaged over the operational wavelength range will be calculated from the data set obtained the same way as in the Dispersion requirement. The average will be calculated from the measured function GDD(λ), regardless the estimated standard deviation.

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**Uniformity requirement verification procedure.**

The data for the verification of the uniformity requirement will be acquired in the same way as in the Dispersion requirement. During the verification procedure, each two spots, measured within the clear aperture will be compared with each other. The mirror will NOT comply with the Uniformity requirement, if the gap between confidence intervals of any two measurements is greater than 120 fs2 at any wavelength within the operational wavelength range. Otherwise, the mirror is compliant with the requirement. The evaluation procedure is also illustrated in Fig. 3 and Fig. 4.

Figure 3. Example of GDD measurement at points A and B which is NOT complient with the Uniformity requirement.

Figure 4. Example of GDD measurement at points A and B which complies with the Uniformity requirement.

Alternatively, the contracting authority may evaluate the uniformity based on a factory report, which contains information on mirror uniformity. The supplier may suggest a method to estimate the uniformity and shall agree on this method with the Contracting authority. The contracting authority, however, reserves a right to use the direct GDD measurement as the decisive verification procedure.