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CME tests offered by AAC

For some spacecraft components, the length change due to outgassing needs to be evaluated:
For the determination of the CME the mass loss and the change of length has to be measured. These two datasets are taken in two different facilities with two parallel-samples. Both samples are conditioned in same behaviour, where the water uptake is checked. After the samples gained some water, they are transferred to the measurement facilities. These facilities are vacuum chambers, where the samples loose water and therefore loose some mass and change their length. Mass loss and length change are recorded to calculate the CME:

$$CME = \frac{\frac{dl}{l_0}}{\frac{dm}{m_0}}$$

… dl/l0 in [m/m]
… dm/m0 in [% of mass at start of test]

The reported CME values are average values of the area, where the CME is constant. Temperature is hold constant while the whole test procedure to reduce influence of CTE. Due the long-term measurement principle of the CME, temperature stabilization just means to reduce noise signal due temperature expansion but not to increase accuracy, because CTE is just fluctuating around some median value while the measurement time.

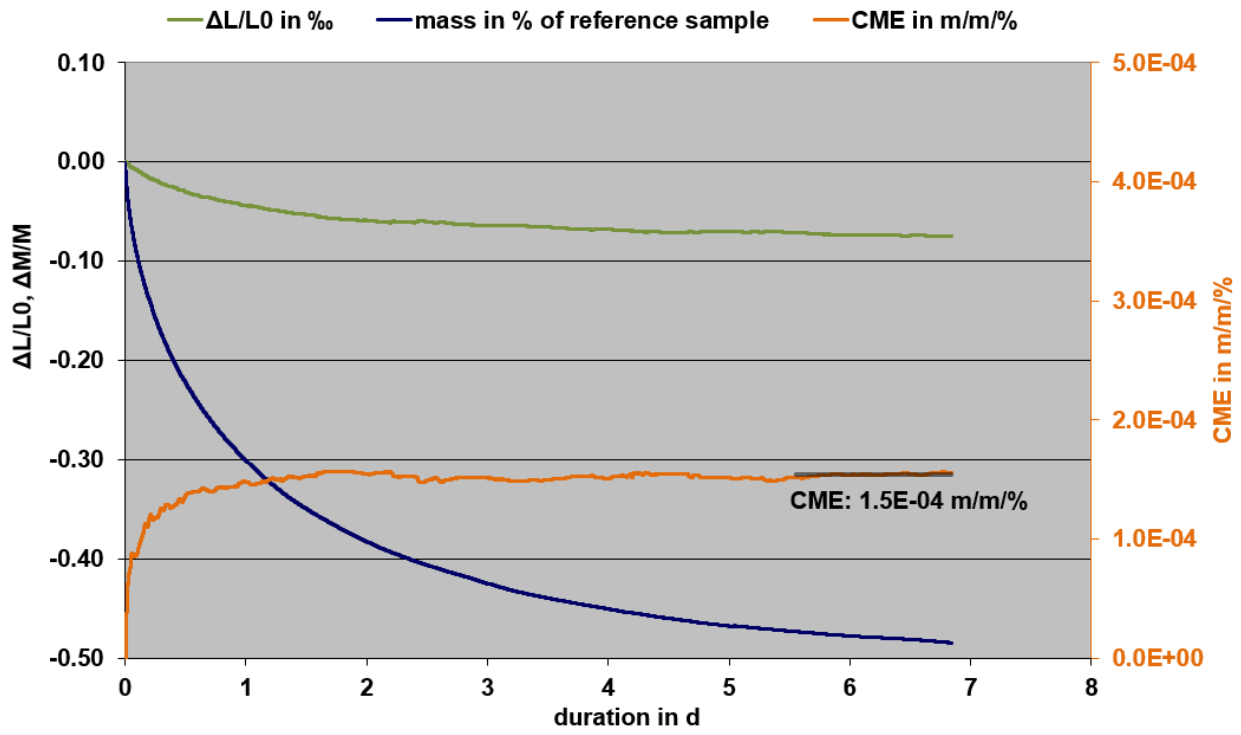

Figure 1: Result of CME determination

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CME test	
Sample dimensions	1 sample for Δm: 20x50mm (max 25g) 1 sample for Δl: 30x150mm (measurement in direction of 150mm) max. thickness 4 mm other geometries on request
Materials per test run	For each material 1 Δl sample and 1 Δm sample is needed
Vacuum	$P < 10^{-5}$ mbar
Temperatures	Room temperature only; stabilized by irradiation
Accuracy	vacuum-balance: ±1µg time drift of vacuum-balance: < 5x10-7 g/h length measurement: ±10nm
Results	CME in [m/m/%]

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