**Supplement** **A.1 Description of measurement facility and measurement method**

**Results of measurements in year 2014 Step 4**

Laboratory: PTB AG 4.24 Reflection and Transmission

The spectral transmittance of the filter set (A\_\_, B\_\_, C\_\_, D\_\_, E\_\_) was determined in two different set-ups as described below. The main difference in both set-ups is the geometry of the measurement beam. A correction for the convergent beam is made for the results of the second set-up (NaNoTrans) and where appropriate, the different effects of uncertainty are determined for the different set-ups. The mean transmittance scale is given in the following five tables as the final result and the given uncertainty accounts for the maximum observed effects for both set-ups.

Laboratory: PTB AG 4.24 Reflection and Transmission, Filter Identifier: **A\_\_**

Table A.1-Step4.1 Final Results

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Wavelength  (nm) | 380 | 400 | 500 | 600 | 700 | 800 | 900 | 1000 |
| Spectral Trans-mittance | 9,1316e-1 | 9,1478e-1 | 9,1729e-1 | 9,1873e-1 | 9,1979e-1 | 9,2056e-1 | 9,2111e-1 | 9,2136e-1 |
| Total Uncertainty | **3,23e-4** | **3,12e-4** | **3,03e-4** | **3,03e-4** | **3,12e-4** | **3,29e-4** | **3,16e-4** | **3,18e-4** |

Laboratory: PTB AG 4.24 Reflection and Transmission, Filter Identifier: B\_\_

Table A.1-Step4.2 Final Results

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Wavelength  (nm) | 380 | 400 | 500 | 600 | 700 | 800 | 900 | 1000 |
| Spectral Trans-mittance | 4,0738e-1 | 6,0779e-1 | 6,2124e-1 | 6,0900e-1 | 6,3649e-1 | 5,7567e-1 | 5,0039e-1 | 4,5165e-1 |
| Total Uncertainty | **4,61e-4** | **2,10e-4** | **1,96e-4** | **1,75e-4** | **1,61e-4** | **2,06e-4** | **1,25e-4** | **2,27e-4** |

Laboratory: PTB AG 4.24 Reflection and Transmission, Filter Identifier: **C\_\_**

Table A.1-Step4.3 Final Results

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Wavelength  (nm) | 380 | 400 | 500 | 600 | 700 | 800 | 900 | 1000 |
| Spectral Trans-mittance | 2,1263e-2 | 9,4810e-2 | 9,1274e-2 | 7,6404e-2 | 1,6031e-1 | 1,4929e-1 | 1,0223e-1 | 7,5967e-2 |
| Total Uncertainty | **4,54e-5** | **4,23e-5** | **1,97e-5** | **1,92e-5** | **4,20e-5** | **4,21e-5** | **2,14e-5** | **4,67e-5** |

**Signature :Schir Date : 12.01.15 / 12.02.16**

Laboratory: PTB AG 4.24 Reflection and Transmission, Filter Identifier: **D\_\_**

Table A.1-Step4.4 Final Results

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Wavelength  (nm) | 380 | 400 | 500 | 600 | 700 | 800 | 900 | 1000 |
| Spectral Trans-mittance | 3,3783e-4 | 4,9715e-3 | 8,1167e-3 | 8,0233e-3 | 2,5728e-2 | 3,1363e-2 | 2,1851e-2 | 1,6135e-2 |
| Total Uncertainty | **1,20e-6** | **4,10e-6** | **4,83e-6** | **1,08e-5** | **1,25e-5** | **1,56e-5** | **1,60e-5** | **1,39e-5** |

Laboratory: PTB AG 4.24 Reflection and Transmission, Filter Identifier: **E\_\_**

Table A.1-Step4.5 Final Results

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Wavelength  (nm) | 380 | 400 | 500 | 600 | 700 | 800 | 900 | 1000 |
| Spectral Trans-mittance | 1,2870e-5 | 3,4027e-4 | 9,4441e-4 | 1,0092e-3 | 5,0738e-3 | 9,7358e-3 | 8,4766e-3 | 7,1653e-3 |
| Total Uncertainty | **5,94e-8** | **6,65e-7** | **7,79e-7** | **1,00e-6** | **3,15e-6** | **5,00e-6** | **6,09e-6** | **6,29e-6** |

**Signature : Schir Date : 12.01.15 / 12.02.16**

**Supplement 1 Measurement Results**

Laboratory: PTB AG 4.24 Reflection and Transmission, Filter Identifier: **A\_\_**

Table A-2i Measurement Results

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Wavelength  (nm) | 380 | 400 | 500 | 600 | 700 | 800 | 900 | 1000 |
| Spectral Transmittance(a) | 9,1316e-1 | 9,1478e-1 | 9,1729e-1 | 9,1873e-1 | 9,1979e-1 | 9,2056e-1 | 9,2111e-1 | 9,2136e-1 |
| Number of Measurements | ≥5 x 10 | ≥5 x 10 | ≥5 x 10 | ≥5 x 10 | ≥5 x 10 | ≥5 x 10 | ≥5 x 10 | ≥5 x 10 |
| Temperature | 23,0(e) | 23,0 | 23,0 | 23,0 | 23,0 | 23,0 | 23,0 | 23,0 |
| Type A Uncertainty(b) | **1,09e-4** | **6,58e-5** | **3,00e-5** | **2,52e-5** | **2,81e-5** | **1,14e-4** | **6,15e-5** | **7,06e-5** |
| Type B Uncertainty(c) | **3,01e-4** | **3,02e-4** | **2,99e-4** | **2,99e-4** | **3,07e-4** | **3,05e-4** | **3,07e-4** | **3,06e-4** |
| Total Uncertainty(d) | **3,23e-4** | **3,12e-4** | **3,03e-4** | **3,03e-4** | **3,12e-4** | **3,29e-4** | **3,16e-4** | **3,18e-4** |
| Degrees of Freedom | **59** | **50** | **46** | **44** | **44** | **61** | **46** | **53** |

**(a)Spectral transmittance.** The value of the spectral transmittance of the central 17 mm diameter of the filter as measured by the participant laboratory. **(b)Type A Uncertainty.** The uncertainties associated with the spectral transmittance values attributed to reproducibility of the measurement. **(c)Type B Uncertainty.** The uncertainties associated with the spectral transmittance values attributed to all type B sources. **(d)Total Uncertainty.** The total uncertainty of the measurement of spectral transmittance for a coverage factor of k=1.

(e)Nominal temperature given; corrections for observed offsets are made for individual measurements of all filters

Laboratory: PTB AG 4.24 Reflection and Transmission

Table A-2ii Type B Uncertainty Budget(a), Filter Identifier: **A\_\_**

Fill out the table below for the uncertainty contributions in measurement at Step 2. All uncertainties should be reported as absolute uncertainties.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Wavelength  (nm) | 380 | 400 | 500 | 600 | 700 | 800 | 900 | 1000 |
| Nonlinearity | **1,00e-7** | **2,73e-6** | **3,75e-6** | **4,30e-6** | **4,33e-6** | **4,00e-6** | **4,28e-6** | **4,67e-5** |
| Temperature | **0,00** | **0,00** | **0,00** | **0,00** | **0,00** | **0,00** | **0,00** | **0,00** |
| Wavelength | **1,78e-6** | **8,66e-7** | **4,16e-7** | **1,04e-7** | **3,33e-6** | **1,04e-7** | **5,02e-8** | **1,04e-7** |
| Stray Light | **1,41e-7** | **1,28e-7** | **8,98e-8** | **6,96e-8** | **5,77e-8** | **4,99e-8** | **4,48e-8** | **4,11e-8** |
| Beam Size & Position | **2,05e-7** | **1,82e-7** | **1,43e-7** | **1,19e-7** | **1,03e-7** | **8,90e-8** | **8,43e-8** | **7,64e-8** |
| Inter-reflection | **2,07e-4** | **2,08e-4** | **2,08e-4** | **2,09e-4** | **2,09e-4** | **2,09e-4** | **2,10e-4** | **2,10e-4** |
| Obliquity | **1,65e-6** | **1,62e-6** | **1,58e-6** | **1,55e-6** | **1,53e-6** | **1,52e-6** | **1,51e-6** | **1,50e-6** |
| Polarization | **3,33e-5** | **3,33e-5** | **3,34e-5** | **3,35e-5** | **3,35e-5** | **3,35e-5** | **3,36e-5** | **3,36e-5** |
| Source Drift & Fluctuation(c) | **0,00** | **0,00** | **0,00** | **0,00** | **0,00** | **0,00** | **0,00** | **0,00** |
| Bandwidth | **7,90e-5** | **7,91e-5** | **7,94e-5** | **7,95e-5** | **7,96e-5** | **7,91e-5** | **7,92e-5** | **7,97e-5** |
| Prismatic effect | **1,87e-4** | **1,87e-4** | **1,87e-4** | **1,87e-4** | **1,87e-4** | **1,87e-4** | **1,87e-4** | **1,87e-4** |
| Resolution | **7,25e-5** | **7,46e-5** | **5,97e-5** | **5,82e-5** | **9,15e-5** | **8,42e-5** | **8,75e-5** | **7,17e-5** |
| Total Type B Uncertainty | **3,01e-4** | **3,02e-4** | **2,99e-4** | **2,99e-4** | **3,07e-4** | **3,05e-4** | **3,07e-4** | **3,06e-4** |
| Degrees of Freedom | **45** | **44** | **43** | **42** | **42** | **46** | **41** | **46** |

(a) Please record any uncertainties considered negligible as zero (rather than e.g. < some value) (b)Add lines to the table as necessary, itemising other components of uncertainty considered (c) As no correction for source drift & fluctuation is performed the attributed components of uncertainty are contained in the type A uncertainty

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Laboratory: PTB AG 4.24 Reflection and Transmission, Filter Identifier: **B\_\_**

Table A-2i Measurement Results

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Wavelength  (nm) | 380 | 400 | 500 | 600 | 700 | 800 | 900 | 1000 |
| Spectral Transmittance(a) | 4,0738e-1 | 6,0779e-1 | 6,2124e-1 | 6,0900e-1 | 6,3649e-1 | 5,7567e-1 | 5,0039e-1 | 4,5165e-1 |
| Number of Measurements | ≥5 x 10 | ≥5 x 10 | ≥5 x 10 | ≥5 x 10 | ≥5 x 10 | ≥5 x 10 | ≥5 x 10 | ≥5 x 10 |
| Temperature | 23,0 | 23,0 | 23,0 | 23,0 | 23,0 | 23,0 | 23,0 | 23,0 |
| Type A Uncertainty(b) | **3,84e-4** | **1,50e-4** | **1,28e-4** | **1,00e-4** | **5,00e-5** | **1,57e-4** | **5,00e-5** | **1,14e-4** |
| Type B Uncertainty(c) | **2,46e-4** | **1,43e-4** | **1,43e-4** | **1,40e-4** | **1,49e-4** | **1,28e-4** | **1,12e-4** | **1,94e-4** |
| Total Uncertainty(d) | **4,61e-4** | **2,10e-4** | **1,96e-4** | **1,75e-4** | **1,61e-4** | **2,06e-4** | **1,25e-4** | **2,27e-4** |
| Degrees of Freedom | **88** | **74** | **65** | **54** | **30** | **75** | **42** | **150** |

**(a)Spectral transmittance.** The value of the spectral transmittance of the central 17 mm diameter of the filter as measured by the participant laboratory. **(b)Type A Uncertainty.** The uncertainties associated with the spectral transmittance values attributed to reproducibility of the measurement. **(c)Type B Uncertainty.** The uncertainties associated with the spectral transmittance values attributed to all type B sources. **(d)Total Uncertainty.** The total uncertainty of the measurement of spectral transmittance for a coverage factor of k=1.

Laboratory: PTB AG 4.24 Reflection and Transmission

Table A-2ii Type B Uncertainty Budget(a), Filter Identifier: **B\_\_**

Fill out the table below for the uncertainty contributions in measurement at Step 2. All uncertainties should be reported as absolute uncertainties.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Wavelength  (nm) | 380 | 400 | 500 | 600 | 700 | 800 | 900 | 1000 |
| Nonlinearity | **1,00e-7** | **1,01e-5** | **1,39e-5** | **1,66e-5** | **1,62e-5** | **1,65e-5** | **1,95e-5** | **1,69e-4** |
| Temperature | **8,21e-6** | **1,56e-5** | **6,58e-6** | **1,60e-5** | **8,63e-6** | **4,76e-6** | **3,48e-6** | **5,91e-6** |
| Wavelength | **2,31e-4** | **1,05e-5** | **1,80e-6** | **8,80e-7** | **4,36e-6** | **1,10e-5** | **1,13e-5** | **5,64e-6** |
| Stray Light | **6,22e-7** | **4,75e-7** | **3,34e-7** | **2,69e-7** | **2,15e-7** | **2,08e-7** | **2,04e-7** | **1,95e-7** |
| Beam Size & Position | **2,86e-6** | **2,18e-6** | **2,11e-6** | **2,17e-6** | **2,03e-6** | **2,33e-6** | **2,63e-6** | **2,77e-6** |
| Inter-reflection | **6,69e-5** | **1,15e-4** | **1,18e-4** | **1,15e-4** | **1,23e-4** | **1,07e-4** | **8,80e-5** | **7,67e-5** |
| Obliquity | **7,26e-6** | **6,01e-6** | **5,87e-6** | **5,99e-6** | **5,71e-6** | **6,31e-6** | **6,88e-6** | **7,12e-6** |
| Polarization | **1,49e-5** | **2,22e-5** | **2,26e-5** | **2,22e-5** | **2,32e-5** | **2,10e-5** | **1,82e-5** | **1,65e-5** |
| Source Drift & Fluctuation | **0,00** | **0,00** | **0,00** | **0,00** | **0,00** | **0,00** | **0,00** | **0,00** |
| Bandwidth | **1,60e-5** | **5,70e-5** | **5,42e-5** | **5,33e-5** | **5,57e-5** | **4,58e-5** | **4,32e-5** | **3,90e-5** |
| Resolution | **4,49e-5** | **5,45e-5** | **5,18e-5** | **5,02e-5** | **5,45e-5** | **4,34e-5** | **4,55e-5** | **3,55e-5** |
| Total Type B Uncertainty | **2,46e-4** | **1,43e-4** | **1,43e-4** | **1,40e-4** | **1,49e-4** | **1,28e-4** | **1,12e-4** | **1,94e-4** |
| Degrees of Freedom | **55** | **26** | **24** | **25** | **22** | **23** | **28** | **99** |

(a) Please record any uncertainties considered negligible as zero (rather than e.g. < some value) (b)Add lines to the table as necessary, itemising other components of uncertainty considered

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Laboratory: PTB AG 4.24 Reflection and Transmission, Filter Identifier: **C\_\_**

Table A-2i Measurement Results

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Wavelength  (nm) | 380 | 400 | 500 | 600 | 700 | 800 | 900 | 1000 |
| Spectral Transmittance(a) | 2,1263e-2 | 9,4810e-2 | 9,1274e-2 | 7,6404e-2 | 1,6031e-1 | 1,4929e-1 | 1,0223e-1 | 7,5967e-2 |
| Number of Measurements | ≥5 x 10 | ≥5 x 10 | ≥5 x 10 | ≥5 x 10 | ≥5 x 10 | ≥5 x 10 | ≥5 x 10 | ≥5 x 10 |
| Temperature | 23,0 | 23,0 | 23,0 | 23,0 | 23,0 | 23,0 | 23,0 | 23,0 |
| Type A Uncertainty(b) | **1,20e-5** | **1,33e-5** | **4,78e-6** | **2,52e-6** | **6,23e-6** | **2,80e-5** | **2,54e-6** | **5,71e-6** |
| Type B Uncertainty(c) | **4,34e-5** | **3,99e-5** | **1,89e-5** | **1,88e-5** | **4,11e-5** | **3,08e-5** | **2,10e-5** | **4,58e-5** |
| Total Uncertainty(d) | **4,54e-5** | **4,23e-5** | **1,97e-5** | **1,92e-5** | **4,20e-5** | **4,21e-5** | **2,14e-5** | **4,67e-5** |
| Degrees of Freedom | **61** | **137** | **80** | **40** | **97** | **105** | **57** | **98** |

**(a)Spectral transmittance.** The value of the spectral transmittance of the central 17 mm diameter of the filter as measured by the participant laboratory. **(b)Type A Uncertainty.** The uncertainties associated with the spectral transmittance values attributed to reproducibility of the measurement. **(c)Type B Uncertainty.** The uncertainties associated with the spectral transmittance values attributed to all type B sources. **(d)Total Uncertainty.** The total uncertainty of the measurement of spectral transmittance for a coverage factor of k=1.

Laboratory: PTB AG 4.24 Reflection and Transmission

Table A-2ii Type B Uncertainty Budget(a), Filter Identifier: **C\_\_**

Fill out the table below for the uncertainty contributions in measurement at Step 2. All uncertainties should be reported as absolute uncertainties.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Wavelength  (nm) | 380 | 400 | 500 | 600 | 700 | 800 | 900 | 1000 |
| Nonlinearity | **7,14e-6** | **2,68e-5** | **3,46e-6** | **3,78e-6** | **6,93e-6** | **6,50e-6** | **4,85e-6** | **4,34e-5** |
| Temperature | **1,75e-6** | **1,28e-5** | **5,60e-6** | **1,19e-5** | **1,01e-5** | **4,78e-6** | **2,59e-6** | **3,44e-6** |
| Wavelength | **4,25e-5** | **1,85e-5** | **7,42e-6** | **3,75e-6** | **2,56e-5** | **8,79e-6** | **6,50e-6** | **2,60e-6** |
| Stray Light | **1,39e-7** | **3,50e-7** | **2,47e-7** | **1,75e-7** | **2,19e-7** | **1,85e-7** | **1,37e-7** | **1,06e-7** |
| Beam Size & Position | **2,65e-7** | **7,10e-7** | **6,96e-7** | **6,27e-7** | **9,22e-7** | **8,94e-7** | **7,41e-7** | **6,25e-7** |
| Inter-reflection | **2,47e-6** | **1,19e-5** | **1,14e-5** | **9,43e-6** | **2,14e-5** | **1,98e-5** | **1,29e-5** | **9,37e-6** |
| Obliquity | **1,62e-6** | **4,43e-6** | **4,34e-6** | **3,90e-6** | **5,83e-6** | **5,64e-6** | **4,63e-6** | **3,89e-6** |
| Polarization | **7,75e-7** | **3,46e-6** | **3,33e-6** | **2,79e-6** | **5,84e-6** | **5,44e-6** | **3,73e-6** | **2,77e-6** |
| Source Drift & Fluctuation | **0,00** | **0,00** | **0,00** | **0,00** | **0,00** | **0,00** | **0,00** | **0,00** |
| Bandwidth | **2,40e-6** | **1,00e-5** | **7,90e-6** | **6,60e-6** | **1,40e-5** | **1,30e-5** | **9,00e-6** | **6,70e-6** |
| Resolution | **2,04e-6** | **9,54e-6** | **5,96e-6** | **5,40e-6** | **1,27e-5** | **1,36e-5** | **9,21e-6** | **6,62e-6** |
| Total Type B Uncertainty | **4,34e-5** | **3,99e-5** | **1,89e-5** | **1,88e-5** | **4,11e-5** | **3,08e-5** | **2,10e-5** | **4,58e-5** |
| Degrees of Freedom | **51** | **112** | **68** | **37** | **89** | **52** | **53** | **91** |

(a) Please record any uncertainties considered negligible as zero (rather than e.g. < some value) (b)Add lines to the table as necessary, itemising other components of uncertainty considered

**Signature : Schir Date : 12.01.15 / 12.02.16**

Laboratory: PTB AG 4.24 Reflection and Transmission, Filter Identifier: **D\_\_**

Table A-2i Measurement Results

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Wavelength  (nm) | 380 | 400 | 500 | 600 | 700 | 800 | 900 | 1000 |
| Spectral Transmittance(a) | 3,3783e-4 | 4,9715e-3 | 8,1167e-3 | 8,0233e-3 | 2,5728e-2 | 3,1363e-2 | 2,1851e-2 | 1,6135e-2 |
| Number of Measurements | ≥5 x 10 | ≥5 x 10 | ≥5 x 10 | ≥5 x 10 | ≥5 x 10 | ≥5 x 10 | ≥5 x 10 | ≥5 x 10 |
| Temperature | 23,0 | 23,0 | 23,0 | 23,0 | 23,0 | 23,0 | 23,0 | 23,0 |
| Type A Uncertainty(b) | **2,06e-7** | **1,19e-6** | **8,90e-7** | **7,83e-7** | **1,96e-6** | **2,35e-6** | **1,21e-5** | **2,22e-6** |
| Type B Uncertainty(c) | **1,17e-6** | **3,88e-6** | **4,73e-6** | **1,06e-5** | **1,22e-5** | **1,53e-5** | **1,03e-5** | **1,36e-5** |
| Total Uncertainty(d) | **1,20e-6** | **4,10e-6** | **4,83e-6** | **1,08e-5** | **1,25e-5** | **1,56e-5** | **1,60e-5** | **1,39e-5** |
| Degrees of Freedom | **57** | **82** | **115** | **48** | **123** | **108** | **121** | **96** |

**(a)Spectral transmittance.** The value of the spectral transmittance of the central 17 mm diameter of the filter as measured by the participant laboratory. **(b)Type A Uncertainty.** The uncertainties associated with the spectral transmittance values attributed to reproducibility of the measurement. **(c)Type B Uncertainty.** The uncertainties associated with the spectral transmittance values attributed to all type B sources. **(d)Total Uncertainty.** The total uncertainty of the measurement of spectral transmittance for a coverage factor of k=1.

Laboratory: PTB AG 4.24 Reflection and Transmission

Table A-2ii Type B Uncertainty Budget(a), Filter Identifier: **D\_\_**

Fill out the table below for the uncertainty contributions in measurement at Step 2. All uncertainties should be reported as absolute uncertainties.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Wavelength  (nm) | 380 | 400 | 500 | 600 | 700 | 800 | 900 | 1000 |
| Nonlinearity | **1,38e-7** | **2,13e-6** | **4,33e-6** | **4,34e-6** | **9,13e-6** | **1,42e-5** | **9,38e-6** | **1,31e-5** |
| Temperature | **6,11e-8** | **1,55e-6** | **9,77e-7** | **2,37e-6** | **3,26e-6** | **1,75e-6** | **1,17e-6** | **1,38e-6** |
| Wavelength | **1,15e-6** | **2,67e-6** | **4,51e-7** | **8,10e-7** | **5,82e-6** | **8,40e-7** | **1,19e-6** | **4,42e-7** |
| Stray Light | **4,50e-9** | **4,12e-8** | **4,41e-8** | **3,44e-8** | **7,03e-8** | **7,09e-8** | **4,92e-8** | **3,62e-8** |
| Beam Size & Position | **8,98e-9** | **8,65e-8** | **1,28e-7** | **1,27e-7** | **3,05e-7** | **3,51e-7** | **2,71e-7** | **2,16e-7** |
| Inter-reflection | **3,84e-8** | **5,70e-7** | **9,34e-7** | **9,23e-7** | **3,02e-6** | **3,70e-6** | **2,55e-6** | **1,87e-6** |
| Obliquity | **5,34e-8** | **5,22e-7** | **7,75e-7** | **7,68e-7** | **1,87e-6** | **2,15e-6** | **1,66e-6** | **1,32e-6** |
| Polarization | **1,23e-8** | **1,81e-7** | **2,96e-7** | **2,92e-7** | **9,37e-7** | **1,14e-6** | **7,97e-7** | **5,88e-7** |
| Source Drift & Fluctuation | **0,00** | **0,00** | **0,00** | **0,00** | **0,00** | **0,00** | **0,00** | **0,00** |
| Bandwidth | **1,10e-7** | **5,18e-7** | **6,98e-7** | **9,27e-6** | **2,34e-6** | **2,61e-6** | **1,31e-6** | **1,51e-6** |
| Resolution | **2,06e-8** | **3,31e-7** | **6,05e-7** | **6,14e-7** | **1,71e-6** | **1,89e-6** | **2,06e-6** | **1,41e-6** |
| Total Type B Uncertainty | **1,17e-6** | **3,88e-6** | **4,73e-6** | **1,06e-5** | **1,22e-5** | **1,53e-5** | **1,03e-5** | **1,36e-5** |
| Degrees of Freedom | **52** | **67** | **105** | **46** | **115** | **101** | **104** | **88** |

(a) Please record any uncertainties considered negligible as zero (rather than e.g. < some value) (b)Add lines to the table as necessary, itemising other components of uncertainty considered

**Signature : Schir Date : 12.01.15 / 12.02.16**

Laboratory: PTB AG 4.24 Reflection and Transmission, Filter Identifier: **E\_\_**

Table A-2i Measurement Results

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Wavelength  (nm) | 380 | 400 | 500 | 600 | 700 | 800 | 900 | 1000 |
| Spectral Transmittance(a) | 1,2870e-5 | 3,4027e-4 | 9,4441e-4 | 1,0092e-3 | 5,0738e-3 | 9,7358e-3 | 8,4766e-3 | 7,1653e-3 |
| Number of Measurements | ≥5 x 10 | ≥5 x 10 | ≥5 x 10 | ≥5 x 10 | ≥5 x 10 | ≥5 x 10 | ≥5 x 10 | ≥5 x 10 |
| Temperature | 23,0 | 23,0 | 23,0 | 23,0 | 23,0 | 23,0 | 23,0 | 23,0 |
| Type A Uncertainty(b) | **1,99e-8** | **5,19e-7** | **4,93e-7** | **6,18e-7** | **6,23e-7** | **2,19e-6** | **3,52e-6** | **1,96e-6** |
| Type B Uncertainty(c) | **5,53e-8** | **4,05e-7** | **5,93e-7** | **7,64e-7** | **3,07e-6** | **4,47e-6** | **4,93e-6** | **5,92e-6** |
| Total Uncertainty(d) | **5,94e-8** | **6,65e-7** | **7,79e-7** | **1,00e-6** | **3,15e-6** | **5,00e-6** | **6,09e-6** | **6,29e-6** |
| Degrees of Freedom | **68** | **104** | **118** | **49** | **111** | **151** | **154** | **115** |

**(a)Spectral transmittance.** The value of the spectral transmittance of the central 17 mm diameter of the filter as measured by the participant laboratory. **(b)Type A Uncertainty.** The uncertainties associated with the spectral transmittance values attributed to reproducibility of the measurement. **(c)Type B Uncertainty.** The uncertainties associated with the spectral transmittance values attributed to all type B sources. **(d)Total Uncertainty.** The total uncertainty of the measurement of spectral transmittance for a coverage factor of k=1.

Laboratory: PTB AG 4.24 Reflection and Transmission

Table A-2ii Type B Uncertainty Budget(a), Filter Identifier: **E\_\_**

Fill out the table below for the uncertainty contributions in measurement at Step 2. All uncertainties should be reported as absolute uncertainties.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Wavelength  (nm) | 380 | 400 | 500 | 600 | 700 | 800 | 900 | 1000 |
| Nonlinearity | **6,25e-9** | **1,41e-7** | **5,28e-7** | **5,62e-7** | **2,14e-6** | **4,03e-6** | **4,56e-6** | **5,65e-6** |
| Temperature | **3,38e-9** | **1,62e-7** | **1,68e-7** | **4,36e-7** | **9,56e-7** | **7,49e-7** | **5,78e-7** | **1,01e-6** |
| Wavelength | **5,45e-8** | **3,29e-7** | **5,66e-8** | **1,67e-7** | **1,60e-6** | **4,95e-7** | **3,85e-7** | **6,36e-9** |
| Stray Light | **1,60e-10** | **4,18e-9** | **7,37e-9** | **6,16e-9** | **2,00e-8** | **2,94e-8** | **2,38e-8** | **1,92e-8** |
| Beam Size & Position | **6,20e-10** | **1,15e-8** | **2,76e-8** | **2,92e-8** | **1,11e-7** | **1,86e-7** | **1,67e-7** | **1,47e-7** |
| Inter-reflection | **1,46e-9** | **3,88e-8** | **1,08e-7** | **1,15e-7** | **5,82e-7** | **1,12e-6** | **9,76e-7** | **8,24e-7** |
| Obliquity | **2,73e-9** | **5,37e-8** | **1,30e-7** | **1,38e-7** | **5,32e-7** | **8,94e-7** | **8,03e-7** | **7,02e-7** |
| Polarization | **4,70e-10** | **1,24e-8** | **3,44e-8** | **3,68e-8** | **1,85e-7** | **3,55e-7** | **3,09e-7** | **2,61e-7** |
| Source Drift & Fluctuation | **0,00** | **0,00** | **0,00** | **0,00** | **0,00** | **0,00** | **0,00** | **0,00** |
| Bandwidth | **5,19e-9** | **6,66e-8** | **8,31e-8** | **1,02e-7** | **7,70e-7** | **5,07e-7** | **7,81e-7** | **6,05e-7** |
| Resolution | **8,04e-10** | **2,84e-8** | **6,47e-8** | **6,80e-8** | **3,40e-7** | **6,59e-7** | **8,07e-7** | **6,49e-7** |
| Total Type B Uncertainty | **5,53e-8** | **4,05e-7** | **5,93e-7** | **7,64e-7** | **3,07e-6** | **4,47e-6** | **4,93e-6** | **5,92e-6** |
| Degrees of Freedom | **52** | **67** | **65** | **19** | **101** | **108** | **101** | **92** |

(a) Please record any uncertainties considered negligible as zero (rather than e.g. < some value) (b)Add lines to the table as necessary, itemising other components of uncertainty considered

**Signature : Schir Date : 12.01.15 / 12.02.16**