Research on volume determination of mass standards with two acoustic measuring chambers

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**• The major points of extension in a supplementary file:**

In the extended paper, the major points of extension are shown in Figure 7 and Table 5. Comparing with the paper in APMF 2015, relative high acoustic volume measuring accuracy has been experimentally achieved by reducing the residual air in the acoustic chambers.

|  |  |
| --- | --- |
| (a) | |
|  |  |
| (b) | (c) |
| Figure 7 After reducing the remaining air in the chambers (a), The 1 kg reference weight and test weights ranging from 100 g to 5 kg (b) and the measuring results (c) | |

Table 5. Uncertainty budget of test weights using 1 kg weight as reference weight after reducing the air in the acoustic chambers

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Sources | Test weights | | | | | |
| 5 kg | 2 kg | 1 kg | 500 g | 200 g | 100 g |
| Volume of reference weight(cm3) | 0.003 | 0.003 | 0.003 | 0.003 | 0.003 | 0.003 |
| *R*1(cm3) | 0.068 | 0.028 | 0.017 | 0.009 | 0.005 | 0.002 |
| *R*2(cm3) | 0.014 | 0.008 | 0.005 | 0.004 | 0.002 | 0.001 |
| *R*3(cm3) | 0.084 | 0.041 | 0.026 | 0.012 | 0.006 | 0.003 |
| Combined uncertainty(cm3) | 0.109 | 0.051 | 0.031 | 0.016 | 0.008 | 0.005 |
| Extended uncertainty(cm3) | 0.218 | 0.102 | 0.062 | 0.033 | 0.017 | 0.010 |
| Relative extended uncertainty( *k*=2, ×10-2) | 0.035 | 0.041 | 0.049 | 0.052 | 0.068 | 0.078 |