**校准结果的测量不确定度评定**

1. 测量方法

在规范规定的校准条件下，将被校S型皮托管安装在标准流量装置实验段中，以标准流量计的值为参考标准，在标准流量装置中用比较法对流量计进行校准，具体实验步骤件参考本规范第七节中的校准方法。

2 不确定分析

2.1 数学模型



 其中：

——俯仰角为α偏航角为β第i校准点第j次校准的示值误差；

——被校皮托管的示值，m/s；

——标准速度值，m/s；

根据不确定度传播规律可得出：



或



C.2.2 灵敏系数

根据JJF1059.1《不确定度评定与表示》中4.4.2.3中的模型进行评定，则





2.3 校准数据

以某参比方法用S型皮托管的校准为例为例，进行实验室校准。将S型皮托管安装在风洞坐标架上，调整S型皮托管与风洞轴线垂直，气流流动方向与S型皮托管标识方向一致。

表1 充分发展流场超声流量计校准数据

|  |  |  |  |
| --- | --- | --- | --- |
| 校准地点 | 烟气流量实验室 | 校准时间 | / |
| 标准值（m/s） | 5 | 温度（℃） | 33 |
| 湿度（%RH） | 48 | 密度 | 1.12kg/m3 |
| S皮托管原校准系数 | 0.80 | 其它 | 大气压：99.924kPa |
| 校准位置 | 俯仰角（°） | 偏航角（°） | 被校皮托管值（Pa） | 标准风速（m/s）□或标准皮托管值（Pa）☑ |
| 1 | 2 | 3 | 1 | 2 | 3 |
| 1 | -45 | -45 | 5.22 | 5.18  | 5.09  | 14.31 | 14.26  | 14.13  |
| 2 | -40 | -40 | 7.08 | 7.03  | 6.94  | 14.27 | 14.09  | 14.19  |
| 3 | -35 | -35 | 9.06 | 8.98  | 9.00  | 14.31 | 14.12  | 14.28  |
| 4 | -30 | -30 | 11.26 | 11.23  | 11.23  | 14.36 | 14.22  | 14.30  |
| 5 | -25 | -25 | 13.41 | 13.29  | 13.25  | 14.22 | 14.07  | 14.11  |
| 6 | -20 | -20 | 15.09 | 15.01  | 15.05  | 14.21 | 14.14  | 14.16  |
| 7 | -15 | -15 | 17.13 | 16.97  | 17.11  | 14.18 | 14.03  | 14.02  |
| 8 | -10 | -10 | 20.74 | 20.65  | 20.55  | 14.12 | 13.96  | 14.02  |
| 9 | -5 | -5 | 20.57 | 20.40  | 20.50  | 14.14 | 14.02  | 13.98  |
| 10 | 0 | 0 | 21.58 | 21.52  | 21.47  | 14.27 | 14.22  | 14.19  |
| 11 | 5 | 5 | 21.43 | 21.42  | 21.30  | 14.17 | 14.06  | 14.10  |
| 12 | 10 | 10 | 21.55 | 21.45  | 21.37  | 14.1 | 14.08  | 13.96  |
| 13 | 15 | 15 | 23.48 | 23.47  | 23.37  | 14.15 | 14.01  | 14.09  |
| 14 | 20 | 20 | 24.48 | 24.31  | 24.40  | 14.17 | 14.05  | 14.03  |
| 15 | 25 | 25 | 24.36 | 24.28  | 24.23  | 14.23 | 14.04  | 14.14  |
| 16 | 30 | 30 | 22.46 | 22.30  | 22.45  | 14.24 | 14.15  | 14.12  |
| 17 | 35 | 35 | 21.04 | 20.95  | 20.99  | 14.04 | 13.93  | 13.95  |
| 18 | 40 | 40 | 24.39 | 24.22  | 24.25  | 14.19 | 14.02  | 14.00  |
| 19 | 45 | 45 | 26.93 | 26.75  | 26.92  | 14.15 | 14.06  | 14.07  |
| 20 | -45 | 45 | 5.67 | 5.57  | 5.65  | 14.4 | 14.34  | 14.27  |
| 21 | -40 | 40 | 6.85 | 6.68  | 6.83  | 14.41 | 14.40  | 14.39  |
| 22 | -35 | 35 | 8.75 | 8.70  | 8.55  | 14.39 | 14.19  | 14.33  |
| 23 | -30 | 30 | 11.30 | 11.28  | 11.14  | 14.41 | 14.38  | 14.38  |
| 24 | -25 | 25 | 13.24 | 13.14  | 13.12  | 14.14 | 13.95  | 14.02  |
| 25 | -20 | 20 | 15.15 | 15.11  | 14.96  | 14.27 | 14.08  | 14.15  |
| 26 | -15 | 15 | 16.64 | 16.63  | 16.57  | 14.12 | 13.99  | 14.03  |
| 27 | -10 | 10 | 21.04 | 20.94  | 20.94  | 14.19 | 14.07  | 14.17  |
| 28 | -5 | 5 | 20.68 | 20.62  | 20.65  | 14.26 | 14.22  | 14.11  |
| 29 | 0 | 0 | 21.58 | 21.54  | 21.54  | 14.27 | 14.24  | 14.18  |
| 30 | 5 | -5 | 21.32 | 21.20  | 21.29  | 14.2 | 14.10  | 14.13  |
| 31 | 10 | -10 | 21.78 | 21.72  | 21.62  | 14.14 | 13.98  | 13.99  |
| 32 | 15 | -15 | 23.42 | 23.29  | 23.25  | 14.17 | 14.06  | 13.99  |
| 33 | 20 | -20 | 23.79 | 23.72  | 23.76  | 14.11 | 14.03  | 14.08  |
| 34 | 25 | -25 | 23.28 | 23.19  | 23.20  | 14.09 | 13.96  | 13.93  |
| 35 | 30 | -30 | 22.74 | 22.65  | 22.61  | 14.18 | 14.06  | 14.09  |
| 36 | 35 | -35 | 23.88 | 23.86  | 23.71  | 14.05 | 13.98  | 14.04  |
| 37 | 40 | -40 | 28.53 | 28.47  | 28.52  | 14.17 | 14.05  | 14.07  |
| 38 | 45 | -45 | 27.88 | 27.80  | 27.68  | 14.19 | 14.00  | 14.11  |
| 39 | -45 | 0 | 18.75 | 18.60  | 18.71  | 14.14 | 14.04  | 14.04  |
| 40 | -40 | 0 | 20.62 | 20.55  | 20.43  | 14.17 | 14.04  | 14.09  |
| 41 | -35 | 0 | 20.73 | 20.62  | 20.58  | 14.12 | 14.11  | 14.01  |
| 42 | -30 | 0 | 21.26 | 21.13  | 21.20  | 14.14 | 13.99  | 14.03  |
| 43 | -25 | 0 | 21.92 | 21.90  | 21.74  | 14.19 | 14.17  | 14.06  |
| 44 | -20 | 0 | 21.13 | 20.99  | 21.05  | 14.25 | 14.11  | 14.23  |
| 45 | -15 | 0 | 21.14 | 20.98  | 21.12  | 14.17 | 14.14  | 14.07  |
| 46 | -10 | 0 | 21.39 | 21.31  | 21.25  | 14.17 | 14.11  | 14.02  |
| 47 | -5 | 0 | 21.51 | 21.31  | 21.47  | 14.1 | 14.06  | 13.96  |
| 48 | 0 | 0 | 21.58 | 21.42  | 21.46  | 14.27 | 14.23  | 14.26  |
| 49 | 5 | 0 | 20.56 | 20.48  | 20.55  | 14.28 | 14.09  | 14.26  |
| 50 | 10 | 0 | 20.90 | 20.83  | 20.82  | 14.21 | 14.06  | 14.12  |
| 51 | 15 | 0 | 18.01 | 17.83  | 17.86  | 14.24 | 14.06  | 14.21  |
| 52 | 20 | 0 | 15.28 | 15.16  | 15.19  | 14.2 | 14.09  | 14.19  |
| 53 | 25 | 0 | 14.17 | 14.13  | 14.08  | 14.24 | 14.04  | 14.10  |
| 54 | 30 | 0 | 13.61 | 13.49  | 13.60  | 14.44 | 14.34  | 14.37  |
| 55 | 35 | 0 | 13.35 | 13.30  | 13.32  | 14.44 | 14.25  | 14.30  |
| 56 | 40 | 0 | 12.62 | 12.48  | 12.51  | 14.4 | 14.34  | 14.22  |
| 57 | 45 | 0 | 9.89 | 9.82  | 9.82  | 14.39 | 14.21  | 14.22  |
| 58 | 0 | -45 | 17.01 | 16.85  | 16.86  | 14.23 | 14.19  | 14.16  |
| 59 | 0 | -40 | 18.60 | 18.46  | 18.58  | 14.09 | 14.01  | 13.91  |
| 60 | 0 | -35 | 19.58 | 19.51  | 19.53  | 14.14 | 14.09  | 14.08  |
| 61 | 0 | -30 | 20.93 | 20.77  | 20.84  | 14.15 | 14.09  | 14.14  |
| 62 | 0 | -25 | 21.34 | 21.17  | 21.17  | 14.16 | 14.12  | 13.99  |
| 63 | 0 | -20 | 21.39 | 21.30  | 21.34  | 14.18 | 14.17  | 14.03  |
| 64 | 0 | -15 | 21.22 | 21.07  | 21.09  | 14.11 | 14.03  | 14.03  |
| 65 | 0 | -10 | 21.14 | 21.09  | 20.95  | 14.19 | 14.10  | 14.16  |
| 66 | 0 | -5 | 21.04 | 20.89  | 20.85  | 14.16 | 14.12  | 14.15  |
| 67 | 0 | 0 | 21.58 | 21.44  | 21.50  | 14.27 | 14.09  | 14.18  |
| 68 | 0 | 5 | 20.92 | 20.86  | 20.76  | 14.15 | 14.07  | 14.11  |
| 69 | 0 | 10 | 21.07 | 20.88  | 20.98  | 14.14 | 14.02  | 14.10  |
| 70 | 0 | 15 | 21.97 | 21.88  | 21.90  | 14.24 | 14.13  | 14.20  |
| 71 | 0 | 20 | 21.67 | 21.49  | 21.64  | 14.13 | 14.12  | 13.96  |
| 72 | 0 | 25 | 21.70 | 21.69  | 21.69  | 14.2 | 14.15  | 14.04  |
| 73 | 0 | 30 | 20.99 | 20.96  | 20.80  | 14.2 | 14.06  | 14.12  |
| 74 | 0 | 35 | 20.10 | 19.91  | 19.96  | 14.28 | 14.14  | 14.16  |
| 75 | 0 | 40 | 18.97 | 18.96  | 18.78  | 14.15 | 13.98  | 13.98  |
| 76 | 0 | 45 | 17.30 | 17.19  | 17.11  | 14.16 | 14.15  | 14.09  |

输入量的标准不确定度评定

不确定度分量包括测量重复性引入的不确定度，标准装置溯源引入的不确定度。

2.3.1 标准器溯源引入的不确定度

标准器L型皮托管不确定度为0.41%，k=2，则



2.3.2 标准皮托管测量重复性引入的不确定度

标准皮托管测得值如表1所示，采用极差法计算重复型，并取最大值为器测量重复性。



由测量重复性引入的不确定度见表C.2为



2.3.3 标准器不确定度



2.4 被校皮托管引入的不确定度

被校皮托管主要由测量重复性引入的不确定度，见表C.2中



表2 各点由重复性引入的相对不确定度

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 标准皮托管压力值（Pa） | 标准风速值（m/s） | 重复性 | 相对不确定度 | S型皮托管压力值（Pa） | S型皮托管测量值（m/s） | 重复性 | 相对不确定度 |
| 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 |
| 14.31  | 14.26  | 14.13  | 5.06  | 5.05  | 5.02  | 0.02  | 0.22% | 5.22  | 5.18  | 5.09  | 2.44  | 2.43  | 2.41  | 0.02  | 0.42% |
| 14.27  | 14.09  | 14.19  | 5.05  | 5.02  | 5.03  | 0.02  | 0.22% | 7.08  | 7.03  | 6.94  | 2.84  | 2.83  | 2.82  | 0.02  | 0.35% |
| 14.31  | 14.12  | 14.28  | 5.06  | 5.02  | 5.05  | 0.02  | 0.23% | 9.06  | 8.98  | 9.00  | 3.22  | 3.20  | 3.21  | 0.01  | 0.16% |
| 14.36  | 14.22  | 14.30  | 5.06  | 5.04  | 5.05  | 0.01  | 0.17% | 11.26  | 11.23  | 11.23  | 3.59  | 3.58  | 3.58  | 0.00  | 0.05% |
| 14.22  | 14.07  | 14.11  | 5.04  | 5.01  | 5.02  | 0.02  | 0.18% | 13.41  | 13.29  | 13.25  | 3.91  | 3.90  | 3.89  | 0.01  | 0.21% |
| 14.21  | 14.14  | 14.16  | 5.04  | 5.02  | 5.03  | 0.01  | 0.09% | 15.09  | 15.01  | 15.05  | 4.15  | 4.14  | 4.15  | 0.01  | 0.09% |
| 14.18  | 14.03  | 14.02  | 5.03  | 5.00  | 5.00  | 0.02  | 0.19% | 17.13  | 16.97  | 17.11  | 4.42  | 4.40  | 4.42  | 0.01  | 0.16% |
| 14.12  | 13.96  | 14.02  | 5.02  | 4.99  | 5.00  | 0.02  | 0.20% | 20.74  | 20.65  | 20.55  | 4.87  | 4.86  | 4.85  | 0.01  | 0.15% |
| 14.14  | 14.02  | 13.98  | 5.02  | 5.00  | 5.00  | 0.02  | 0.20% | 20.57  | 20.40  | 20.50  | 4.85  | 4.83  | 4.84  | 0.01  | 0.14% |
| 14.27  | 14.22  | 14.19  | 5.05  | 5.04  | 5.03  | 0.01  | 0.09% | 21.58  | 21.52  | 21.47  | 4.97  | 4.96  | 4.95  | 0.01  | 0.09% |
| 14.17  | 14.06  | 14.10  | 5.03  | 5.01  | 5.02  | 0.01  | 0.13% | 21.43  | 21.42  | 21.30  | 4.95  | 4.95  | 4.93  | 0.01  | 0.11% |
| 14.10  | 14.08  | 13.96  | 5.02  | 5.01  | 4.99  | 0.01  | 0.17% | 21.55  | 21.45  | 21.37  | 4.96  | 4.95  | 4.94  | 0.01  | 0.14% |
| 14.15  | 14.01  | 14.09  | 5.03  | 5.00  | 5.02  | 0.01  | 0.17% | 23.48  | 23.47  | 23.37  | 5.18  | 5.18  | 5.17  | 0.01  | 0.08% |
| 14.17  | 14.05  | 14.03  | 5.03  | 5.01  | 5.01  | 0.01  | 0.17% | 24.48  | 24.31  | 24.40  | 5.29  | 5.27  | 5.28  | 0.01  | 0.12% |
| 14.23  | 14.04  | 14.14  | 5.04  | 5.01  | 5.02  | 0.02  | 0.24% | 24.36  | 24.28  | 24.23  | 5.28  | 5.27  | 5.26  | 0.01  | 0.09% |
| 14.24  | 14.15  | 14.12  | 5.04  | 5.03  | 5.02  | 0.01  | 0.15% | 22.46  | 22.30  | 22.45  | 5.07  | 5.05  | 5.07  | 0.01  | 0.12% |
| 14.04  | 13.93  | 13.95  | 5.01  | 4.99  | 4.99  | 0.01  | 0.14% | 21.04  | 20.95  | 20.99  | 4.90  | 4.89  | 4.90  | 0.01  | 0.08% |
| 14.19  | 14.02  | 14.00  | 5.03  | 5.00  | 5.00  | 0.02  | 0.23% | 24.39  | 24.22  | 24.25  | 5.28  | 5.26  | 5.26  | 0.01  | 0.12% |
| 14.15  | 14.06  | 14.07  | 5.03  | 5.01  | 5.01  | 0.01  | 0.10% | 26.93  | 26.75  | 26.92  | 5.55  | 5.53  | 5.55  | 0.01  | 0.12% |
| 14.40  | 14.34  | 14.27  | 5.07  | 5.06  | 5.05  | 0.01  | 0.15% | 5.67  | 5.57  | 5.65  | 2.55  | 2.52  | 2.54  | 0.01  | 0.30% |
| 14.41  | 14.40  | 14.39  | 5.07  | 5.07  | 5.07  | 0.00  | 0.03% | 6.85  | 6.68  | 6.83  | 2.80  | 2.76  | 2.79  | 0.02  | 0.43% |
| 14.39  | 14.19  | 14.33  | 5.07  | 5.03  | 5.06  | 0.02  | 0.23% | 8.75  | 8.70  | 8.55  | 3.16  | 3.15  | 3.13  | 0.02  | 0.39% |
| 14.41  | 14.38  | 14.38  | 5.07  | 5.07  | 5.07  | 0.00  | 0.03% | 11.30  | 11.28  | 11.14  | 3.59  | 3.59  | 3.57  | 0.02  | 0.25% |
| 14.14  | 13.95  | 14.02  | 5.02  | 4.99  | 5.00  | 0.02  | 0.24% | 13.24  | 13.14  | 13.12  | 3.89  | 3.88  | 3.87  | 0.01  | 0.15% |
| 14.27  | 14.08  | 14.15  | 5.05  | 5.01  | 5.03  | 0.02  | 0.23% | 15.15  | 15.11  | 14.96  | 4.16  | 4.16  | 4.14  | 0.02  | 0.21% |
| 14.12  | 13.99  | 14.03  | 5.02  | 5.00  | 5.01  | 0.01  | 0.16% | 16.64  | 16.63  | 16.57  | 4.36  | 4.36  | 4.35  | 0.01  | 0.08% |
| 14.19  | 14.07  | 14.17  | 5.03  | 5.01  | 5.03  | 0.01  | 0.15% | 21.04  | 20.94  | 20.94  | 4.90  | 4.89  | 4.89  | 0.01  | 0.08% |
| 14.26  | 14.22  | 14.11  | 5.05  | 5.04  | 5.02  | 0.02  | 0.18% | 20.68  | 20.62  | 20.65  | 4.86  | 4.85  | 4.86  | 0.00  | 0.05% |
| 14.27  | 14.24  | 14.18  | 5.05  | 5.04  | 5.03  | 0.01  | 0.10% | 21.58  | 21.54  | 21.54  | 4.97  | 4.96  | 4.96  | 0.00  | 0.04% |
| 14.20  | 14.10  | 14.13  | 5.04  | 5.02  | 5.02  | 0.01  | 0.12% | 21.32  | 21.20  | 21.29  | 4.94  | 4.92  | 4.93  | 0.01  | 0.10% |
| 14.14  | 13.98  | 13.99  | 5.02  | 5.00  | 5.00  | 0.02  | 0.19% | 21.78  | 21.72  | 21.62  | 4.99  | 4.98  | 4.97  | 0.01  | 0.13% |
| 14.17  | 14.06  | 13.99  | 5.03  | 5.01  | 5.00  | 0.02  | 0.22% | 23.42  | 23.29  | 23.25  | 5.17  | 5.16  | 5.16  | 0.01  | 0.12% |
| 14.11  | 14.03  | 14.08  | 5.02  | 5.01  | 5.01  | 0.01  | 0.09% | 23.79  | 23.72  | 23.76  | 5.21  | 5.21  | 5.21  | 0.00  | 0.05% |
| 14.09  | 13.96  | 13.93  | 5.02  | 4.99  | 4.99  | 0.02  | 0.20% | 23.28  | 23.19  | 23.20  | 5.16  | 5.15  | 5.15  | 0.01  | 0.07% |
| 14.18  | 14.06  | 14.09  | 5.03  | 5.01  | 5.02  | 0.01  | 0.15% | 22.74  | 22.65  | 22.61  | 5.10  | 5.09  | 5.08  | 0.01  | 0.10% |
| 14.05  | 13.98  | 14.04  | 5.01  | 5.00  | 5.01  | 0.01  | 0.09% | 23.88  | 23.86  | 23.71  | 5.22  | 5.22  | 5.21  | 0.01  | 0.12% |
| 14.17  | 14.05  | 14.07  | 5.03  | 5.01  | 5.01  | 0.01  | 0.14% | 28.53  | 28.47  | 28.52  | 5.71  | 5.70  | 5.71  | 0.00  | 0.04% |
| 14.19  | 14.00  | 14.11  | 5.03  | 5.00  | 5.02  | 0.02  | 0.23% | 27.88  | 27.80  | 27.68  | 5.64  | 5.64  | 5.62  | 0.01  | 0.12% |
| 14.14  | 14.04  | 14.04  | 5.02  | 5.01  | 5.01  | 0.01  | 0.12% | 18.75  | 18.60  | 18.71  | 4.63  | 4.61  | 4.62  | 0.01  | 0.14% |
| 14.17  | 14.04  | 14.09  | 5.03  | 5.01  | 5.02  | 0.01  | 0.16% | 20.62  | 20.55  | 20.43  | 4.85  | 4.85  | 4.83  | 0.01  | 0.16% |
| 14.12  | 14.11  | 14.01  | 5.02  | 5.02  | 5.00  | 0.01  | 0.14% | 20.73  | 20.62  | 20.58  | 4.87  | 4.85  | 4.85  | 0.01  | 0.13% |
| 14.14  | 13.99  | 14.03  | 5.02  | 5.00  | 5.01  | 0.02  | 0.18% | 21.26  | 21.13  | 21.20  | 4.93  | 4.91  | 4.92  | 0.01  | 0.11% |
| 14.19  | 14.17  | 14.06  | 5.03  | 5.03  | 5.01  | 0.01  | 0.15% | 21.92  | 21.90  | 21.74  | 5.01  | 5.00  | 4.98  | 0.01  | 0.14% |
| 14.25  | 14.11  | 14.23  | 5.04  | 5.02  | 5.04  | 0.01  | 0.17% | 21.13  | 20.99  | 21.05  | 4.91  | 4.90  | 4.90  | 0.01  | 0.12% |
| 14.17  | 14.14  | 14.07  | 5.03  | 5.03  | 5.01  | 0.01  | 0.12% | 21.14  | 20.98  | 21.12  | 4.92  | 4.90  | 4.91  | 0.01  | 0.13% |
| 14.17  | 14.11  | 14.02  | 5.03  | 5.02  | 5.00  | 0.02  | 0.18% | 21.39  | 21.31  | 21.25  | 4.94  | 4.94  | 4.93  | 0.01  | 0.11% |
| 14.10  | 14.06  | 13.96  | 5.02  | 5.01  | 4.99  | 0.02  | 0.18% | 21.51  | 21.31  | 21.47  | 4.96  | 4.94  | 4.95  | 0.01  | 0.16% |
| 14.27  | 14.23  | 14.26  | 5.05  | 5.04  | 5.05  | 0.00  | 0.05% | 21.58  | 21.42  | 21.46  | 4.97  | 4.95  | 4.95  | 0.01  | 0.13% |
| 14.28  | 14.09  | 14.26  | 5.05  | 5.02  | 5.05  | 0.02  | 0.22% | 20.56  | 20.48  | 20.55  | 4.85  | 4.84  | 4.85  | 0.01  | 0.06% |
| 14.21  | 14.06  | 14.12  | 5.04  | 5.01  | 5.02  | 0.02  | 0.18% | 20.90  | 20.83  | 20.82  | 4.89  | 4.88  | 4.88  | 0.01  | 0.06% |
| 14.24  | 14.06  | 14.21  | 5.04  | 5.01  | 5.04  | 0.02  | 0.21% | 18.01  | 17.83  | 17.86  | 4.54  | 4.51  | 4.52  | 0.01  | 0.17% |
| 14.20  | 14.09  | 14.19  | 5.04  | 5.02  | 5.03  | 0.01  | 0.14% | 15.28  | 15.16  | 15.19  | 4.18  | 4.16  | 4.17  | 0.01  | 0.14% |
| 14.24  | 14.04  | 14.10  | 5.04  | 5.01  | 5.02  | 0.02  | 0.24% | 14.17  | 14.13  | 14.08  | 4.02  | 4.02  | 4.01  | 0.01  | 0.11% |
| 14.44  | 14.34  | 14.37  | 5.08  | 5.06  | 5.07  | 0.01  | 0.11% | 13.61  | 13.49  | 13.60  | 3.94  | 3.93  | 3.94  | 0.01  | 0.16% |
| 14.44  | 14.25  | 14.30  | 5.08  | 5.04  | 5.05  | 0.02  | 0.22% | 13.35  | 13.30  | 13.32  | 3.91  | 3.90  | 3.90  | 0.00  | 0.06% |
| 14.40  | 14.34  | 14.22  | 5.07  | 5.06  | 5.04  | 0.02  | 0.21% | 12.62  | 12.48  | 12.51  | 3.80  | 3.78  | 3.78  | 0.01  | 0.18% |
| 14.39  | 14.21  | 14.22  | 5.07  | 5.04  | 5.04  | 0.02  | 0.21% | 9.89  | 9.82  | 9.82  | 3.36  | 3.35  | 3.35  | 0.01  | 0.12% |
| 14.23  | 14.19  | 14.16  | 5.04  | 5.03  | 5.03  | 0.01  | 0.09% | 17.01  | 16.85  | 16.86  | 4.41  | 4.39  | 4.39  | 0.01  | 0.16% |
| 14.09  | 14.01  | 13.91  | 5.02  | 5.00  | 4.98  | 0.02  | 0.22% | 18.60  | 18.46  | 18.58  | 4.61  | 4.59  | 4.61  | 0.01  | 0.13% |
| 14.14  | 14.09  | 14.08  | 5.02  | 5.02  | 5.01  | 0.01  | 0.07% | 19.58  | 19.51  | 19.53  | 4.73  | 4.72  | 4.72  | 0.00  | 0.06% |
| 14.15  | 14.09  | 14.14  | 5.03  | 5.02  | 5.02  | 0.01  | 0.07% | 20.93  | 20.77  | 20.84  | 4.89  | 4.87  | 4.88  | 0.01  | 0.13% |
| 14.16  | 14.12  | 13.99  | 5.03  | 5.02  | 5.00  | 0.02  | 0.21% | 21.34  | 21.17  | 21.17  | 4.94  | 4.92  | 4.92  | 0.01  | 0.14% |
| 14.18  | 14.17  | 14.03  | 5.03  | 5.03  | 5.01  | 0.02  | 0.18% | 21.39  | 21.30  | 21.34  | 4.94  | 4.93  | 4.94  | 0.01  | 0.07% |
| 14.11  | 14.03  | 14.03  | 5.02  | 5.00  | 5.01  | 0.01  | 0.10% | 21.22  | 21.07  | 21.09  | 4.92  | 4.91  | 4.91  | 0.01  | 0.12% |
| 14.19  | 14.10  | 14.16  | 5.03  | 5.02  | 5.03  | 0.01  | 0.11% | 21.14  | 21.09  | 20.95  | 4.92  | 4.91  | 4.89  | 0.01  | 0.16% |
| 14.16  | 14.12  | 14.15  | 5.03  | 5.02  | 5.03  | 0.00  | 0.04% | 21.04  | 20.89  | 20.85  | 4.90  | 4.89  | 4.88  | 0.01  | 0.16% |
| 14.27  | 14.09  | 14.18  | 5.05  | 5.02  | 5.03  | 0.02  | 0.21% | 21.58  | 21.44  | 21.50  | 4.97  | 4.95  | 4.96  | 0.01  | 0.11% |
| 14.15  | 14.07  | 14.11  | 5.03  | 5.01  | 5.02  | 0.01  | 0.10% | 20.92  | 20.86  | 20.76  | 4.89  | 4.88  | 4.87  | 0.01  | 0.13% |
| 14.14  | 14.02  | 14.10  | 5.02  | 5.00  | 5.02  | 0.01  | 0.15% | 21.07  | 20.88  | 20.98  | 4.91  | 4.89  | 4.90  | 0.01  | 0.15% |
| 14.24  | 14.13  | 14.20  | 5.04  | 5.02  | 5.04  | 0.01  | 0.13% | 21.97  | 21.88  | 21.90  | 5.01  | 5.00  | 5.00  | 0.01  | 0.07% |
| 14.13  | 14.12  | 13.96  | 5.02  | 5.02  | 4.99  | 0.02  | 0.20% | 21.67  | 21.49  | 21.64  | 4.98  | 4.96  | 4.97  | 0.01  | 0.14% |
| 14.20  | 14.15  | 14.04  | 5.04  | 5.03  | 5.01  | 0.02  | 0.20% | 21.70  | 21.69  | 21.69  | 4.98  | 4.98  | 4.98  | 0.00  | 0.00% |
| 14.20  | 14.06  | 14.12  | 5.04  | 5.01  | 5.02  | 0.02  | 0.17% | 20.99  | 20.96  | 20.80  | 4.90  | 4.89  | 4.88  | 0.01  | 0.16% |
| 14.28  | 14.14  | 14.16  | 5.05  | 5.03  | 5.03  | 0.01  | 0.17% | 20.10  | 19.91  | 19.96  | 4.79  | 4.77  | 4.78  | 0.01  | 0.17% |
| 14.15  | 13.98  | 13.98  | 5.03  | 5.00  | 5.00  | 0.02  | 0.20% | 18.97  | 18.96  | 18.78  | 4.66  | 4.65  | 4.63  | 0.01  | 0.17% |
| 14.16  | 14.15  | 14.09  | 5.03  | 5.03  | 5.02  | 0.01  | 0.08% | 17.30  | 17.19  | 17.11  | 4.45  | 4.43  | 4.42  | 0.01  | 0.19% |

2.5 合成标准不确定度的评价

2.5.1 标准不确定度汇总表

表3 标准不确定度汇总表

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 符号 | 不确定度来源 | 输入不确定度 | 系数*pi* | 合成不确定度 |
|  | 重复性 | 043% | 1 | 0.43% |
|  | 溯源证书 | 0.32% | -1 | 0.32% |
| 合成标准不确定度：，扩展不确定度：，k=2 |

2.5.2 合成标准不确定度

输入量彼此独立不相关，所以合成标准不确定度按下式得到：



2.6 扩展不确定度的评定

固定源烟气流速（量）参比方法用S型皮托管的校准，取覆盖因子k=2,校准结果的不确定度为

