

**机构名称：深圳市华中航技术检测有限公司**

**注册号：L4210**

**地 址：**

**A：广东省深圳市龙岗区布吉街道李朗大道甘李科技园**

**深港中海信科技园厂房第 1 栋 A 座 8 层 801-804**

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|    |    |                           |       |             |

**Name: Shenzhen Huazhonghang Technology Detection Co., Ltd.**

**Registration No.: L4210**

**ADDRESS:**

**A: Room 801-804, 8/F., Block A, Building 1, Shen'gang Zhonghaixin Science & Technology Park, Ganli Science & Technology Park, Lilang Road, Buji Street, Longgang District, Shenzhen, Guangdong, China**

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# 中国合格评定国家认可委员会 认可证书附件

(注册号: CNAS L4210)

名称: 深圳市华中航技术检测有限公司

地址: 广东省深圳市龙岗区布吉街道李朗大道甘李科技园深港中海信科  
技园厂房第1栋A座8层801-804

签发日期: 2015年09月29日

有效期至: 2018年10月14日

## 附件1 认可的授权签字人及领域

| 序号 | 姓名  | 授权签字领域                     | 备注 |
|----|-----|----------------------------|----|
| 1  | 雍清萍 | 全部检测和校准项目                  |    |
| 2  | 王兴  | 全部检测和校准项目                  |    |
| 3  | 胡晓荣 | 电气检测项目;<br>电磁、无线电、时间频率校准项目 |    |
| 4  | 杨志华 | 机械、电气检测项目;<br>热学、光学、化学校准项目 |    |
| 5  | 朱康宝 | 机械、电气检测项目;<br>力学、几何量校准项目   |    |
| 6  | 雍金祥 | 机械检测项目;<br>几何量校准项目         |    |



**CHINA NATIONAL ACCREDITATION SERVICE FOR CONFORMITY ASSESSMENT  
SCHEDULE OF ACCREDITATION CERTIFICATE**

**(Registration No. CNAS L4210)**

**NAME:** Shenzhen Huazhonghang Technology Detection Co., Ltd.

**ADDRESS:** Room 801-804, 8/F., Block A, Building 1, Shen'gang Zhonghaixin  
Science & Technology Park, Ganli Science & Technology Park,  
Lilang Road, Buji Street, Longgang District, Shenzhen, Guangdong,  
China

**Date of Issue:**2015-09-29

**Date of Expiry:**2018-10-14

SCHEDULE 1 ACCREDITED SIGNATORIES AND SCOPE

| No | Name          | Authorized Scope of Signature   | Note |
|----|---------------|---|------|
| 1  | Yong Qingping | All items   |      |
| 2  | Wang Xing     | All items   |      |
| 3  | Hu Xiaorong   | Electrical test items;<br>Electromagnetic, radio, time and<br>frequency calibration items |      |
| 4  | Yang Zhihua   | Mechanical and electrical test items;<br>Thermal, optical, chemical calibration items     |      |
| 5  | Zhu Kangbao   | Mechanical and electrical test items;<br>Mechanical and geometric calibration items       |      |
| 6  | Yong Jinxiang | Mechanical test items;<br>Geometric calibration items                                     |      |



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技园厂房第1栋A座8层801-804

认可依据: ISO/IEC 17025 以及 CNAS 特定认可要求

签发日期: 2015年09月29日

有效期至: 2018年10月14日

## 附件2 认可的检测能力范围

| 序号 | 检测对象                | 项目/参数 |      | 检测标准(方法)名称<br>及编号(含年号)                        | 限制范围                       | 说明 |
|----|---------------------|-------|------|---|----------------------------|----|
|    |                     | 序号    | 名称   |   |                            |    |
| 1  | 外壳对人和设备的防护<br>检验用试具 | 1     | 外形尺寸 | 外壳对人和设备的防护检验<br>用试具<br>GB 16842-2008          |                            |    |
| 2  | 零件几何参数              | 1     | 几何尺寸 | 产品几何量技术规范(GPS)<br>光滑工件尺寸的检验<br>GB/T 3177-2009 | 只测工<br>件尺寸<br>小于<br>1000mm |    |

| 序号 | 检测对象     | 项目/参数 |          | 检测标准(方法)名称及编号(含年号)                        | 限制范围                                 | 说明 |
|----|----------|-------|----------|---|--------------------------------------|----|
|    |          | 序号    | 名称       |   |                                      |    |
| 2  | 零件几何参数   | 2     | 形位尺寸     | 产品几何量技术规范(GPS)形状和位置公差 检测规定 GB/T 1958-2004 | 只测直线度、圆度、平行度、垂直度、同轴度、对称度、位置度、平行度和倾斜度 |    |
| 3  | 带式检针机    | 1     | 捕捉金属性能   | 带式检针机<br>QB/T 2638-2004                   |                                      |    |
|    |          | 2     | 运转均匀性    |   |                                      |    |
| 4  | 纸与纸板耐破度仪 | 1     | 压力测量性能   | 纸与纸板耐破度仪 QB/T 1057-2004                   |                                      |    |
| 5  | 电子吊称     | 1     | 示值误差     | 电子吊称<br>GB/T 11883-2002                   |                                      |    |
|    |          | 2     | 示值重复性    |   |                                      |    |
|    |          | 3     | 旋转性能     |   |                                      |    |
|    |          | 4     | 偏载       |   |                                      |    |
|    |          | 5     | 鉴别力      |   |                                      |    |
|    |          | 6     | 极限负载     |   |                                      |    |
| 6  | 机械振动台    | 1     | 频率示值误差   | 机械振动台 技术条件<br>GB/T 13309-2007             |                                      |    |
|    |          | 2     | 加速度波形失真度 |   |                                      |    |
|    |          | 3     | 位移幅值误差   |   |                                      |    |
|    |          | 4     | 最大噪声     |   |                                      |    |
| 7  | 电动振动台    | 1     | 频率示值误差   | 电动振动台<br>GB/T 13310-2007                  |                                      |    |

| 序号 | 检测对象         | 项目/参数 |          | 检测标准(方法)名称及编号(含年号)                       | 限制范围 | 说明 |
|----|--------------|-------|----------|--|------|----|
|    |              | 序号    | 名称       |  |      |    |
| 7  | 电动振动台        | 2     | 加速度波形失真度 | 电动振动台<br>GB/T 13310-2007                 |      |    |
|    |              | 3     | 速度示值误差   |  |      |    |
|    |              | 4     | 位移示值误差   |  |      |    |
|    |              | 5     | 耐电压试验    |  |      |    |
|    |              | 6     | 安全保护装置   |  |      |    |
|    |              | 7     | 最大噪声     |  |      |    |
| 8  | 登高工器具        | 1     | 静负荷试验    | 国家电网公司电力安全工作规程(送电部分)<br>国家电网安监[2009]664号 |      |    |
| 9  | 起重机具         | 1     | 静负荷试验    | 国家电网公司电力安全工作规程(送电部分)<br>国家电网安监[2009]664号 |      |    |
| 10 | 强制式单卧轴混凝土搅拌机 | 1     | 转速       | TGX 023-2008 强制式单卧轴混凝土搅拌机校验方法            |      |    |
|    |              | 2     | 质量       |  |      |    |
|    |              | 3     | 时间       |  |      |    |
| 11 | 混凝土抗渗仪       | 1     | 长度       | SL133-2014 混凝土抗渗仪校验方法                    |      |    |
|    |              | 2     | 压强       |  |      |    |
| 12 | 振筛机          | 1     | 摇摆次数     | SL411-2007 振筛机校验规程                       |      |    |
|    |              | 2     | 震击次数     |  |      |    |
|    |              | 3     | 长度       |  |      |    |
| 13 | 维勃稠度仪        | 1     | 振幅       | TGX 027-2008 维勃稠度仪校验方法                   |      |    |
|    |              | 2     | 频率       |  |      |    |

| 序号 | 检测对象         | 项目/参数 |        | 检测标准（方法）名称及编号（含年号）                   | 限制范围 | 说明 |
|----|--------------|-------|--------|--------------------------------------|------|----|
|    |              | 序号    | 名称     |                                      |      |    |
| 14 | 按键寿命试验机      | 1     | 频次     | HZH-WIF323-2015 按键寿命试验机检测方法          |      |    |
|    |              | 2     | 时间     |                                      |      |    |
|    |              | 3     | 力值     |                                      |      |    |
|    |              | 4     | 总次数    |                                      |      |    |
|    |              | 5     | 长度     |                                      |      |    |
|    |              | 6     | 硬度     |                                      |      |    |
| 15 | 带电作业工具、装置和设备 | 1     | 耐压试验   | 带电作业工具、装置和设备预防性试验规程<br>DL/T 976-2005 |      |    |
|    |              | 2     | 静负荷试验  |                                      |      |    |
| 16 | 电力安全工器具      | 1     | 耐压试验   | 电力安全工器具预防性试验规程<br>国电发[2002]777号 4-19 |      |    |
|    |              | 2     | 直流电阻试验 |                                      |      |    |
|    |              | 3     | 静负荷试验  |                                      |      |    |
| 17 | 屏蔽室(箱)       | 1     | 屏蔽效能   | 电磁屏蔽室效能的测量方法<br>GB/T 12190-2006      |      |    |
| 18 | 绝缘手套         | 1     | 电气绝缘性能 | 带电作业用绝缘手套<br>GB/T 17622-2008         |      |    |
| 19 | 绝缘鞋          | 1     | 电气绝缘性能 | 足部防护 电绝缘鞋 GB/T<br>12011-2009         |      |    |
| 20 | 防静电地板(面)     | 1     | 防静电性能  | 防静电工程施工与质量验收规范<br>GB 50944-2013      |      |    |
| 21 | 镇流器          | 1     | 电压/电流比 | 管形荧光灯用镇流器 性能要求<br>GB 14044-2008      |      |    |
|    |              | 2     | 功率因数   |                                      |      |    |



| 序号 | 检测对象  | 项目/参数 |     | 检测标准（方法）名称及编号（含年号）          | 限制范围 | 说明 |
|----|-------|-------|-----|-----------------------------|------|----|
|    |       | 序号    | 名称  |                             |      |    |
| 22 | 洁净房   | 1     | 洁净度 | 洁净室施工及验收规范<br>GB 50591-2010 |      |    |
|    |       | 2     | 噪声  |                             |      |    |
|    |       | 3     | 温湿度 |                             |      |    |
|    |       | 4     | 风速  |                             |      |    |
|    |       | 5     | 照度  |                             |      |    |
| 23 | 洁净工作台 | 1     | 洁净度 | 洁净工作台检验标准<br>JG/T 292-2010  |      |    |
|    |       | 2     | 风速  |                             |      |    |
|    |       | 3     | 噪声  |                             |      |    |
|    |       | 4     | 照度  |                             |      |    |



**CHINA NATIONAL ACCREDITATION SERVICE FOR CONFORMITY ASSESSMENT**  
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**ADDRESS:** Room 801-804, 8/F., Block A, Building 1, Shen'gang Zhonghaixin Science & Technology Park, Ganli Science & Technology Park, Lilang Road, Buji Street, Longgang District, Shenzhen, Guangdong, China

**Accreditation Criteria:** ISO/IEC 17025 and relevant requirements of CNAS

**Date of Issue:** 2015-09-29

**Date of Expiry:** 2018-10-14

SCHEDULE 2 ACCREDITED TESTING SCOPE

| No | Test Object  | Item/Parameter |                | Title, Code of Standard or Method   | Limitation  | Note |
|----|--|----------------|----------------|---|---|------|
|    |  | No             | Item/Parameter |   |   |      |
| 1  | Protection of persons and equipment by enclosures Probe for verification | 1              | Geometry       | Protection of persons and equipment by enclosures Probe for verification<br>GB 16842-2008       |   |      |
| 2  | The geometric parameters of parts  | 1              | Geometry       | Geometrical product specifications (GPS)-Inspection of plain workpiece size<br>GB / T 3177-2009 | Accredited only for workpiece size less than 1000mm |      |

| № | Test Object                       | Item/Parameter |                                  | Title, Code of Standard or Method   | Limitation  | Note |
|---|-----------------------------------|----------------|----------------------------------|---|---|------|
|   |                                   | №              | Item/Parameter                   |   |   |      |
| 2 | The geometric parameters of parts | 2              | Geometric dimensions             | Geometrical product specifications (GPS)-Geometrical tolerance -Verification prescription<br>GB / T 1958-2004 | Accredited only for straightness, roundness, parallelism, squareness, concentricity, symmetry, position, parallelism and tilt |      |
| 3 | Conveyor type needle detector     | 1              | Capture the metal performance    | Conveyor type needle detector<br>QB/T2638-2004  |   |      |
|   |                                   | 2              | Uniformity of the operation      |   |   |      |
| 4 | Tester of bursting strength       | 1              | Pressure Measurement Performance | Paper and board - Tester of bursting strength<br>QB/T 1057-2004   |   |      |
| 5 | Electronic hanging scale          | 1              | Indication error                 | Electronic hanging scale GB/T 11883-2002  |   |      |
|   |                                   | 2              | Repeatability                    |   |   |      |
|   |                                   | 3              | Rotation performance             |   |   |      |
|   |                                   | 4              | Partial load                     |   |   |      |
|   |                                   | 5              | Discrimination                   |   |   |      |

| № | Test Object                                | Item/Parameter |                                  | Title, Code of Standard or Method  | Limitation | Note |
|---|--|----------------|----------------------------------|--|------------|------|
|   |  | №              | Item/Parameter                   |  |            |      |
| 5 | Electronic hanging scale                   | 6              | Limit load                       | Electronic hanging scale GB/T 11883-2002                                 |            |      |
| 6 | Mechanical vibration generator systems     | 1              | Frequency indication error       | Specification for mechanical vibration generator systems GB/T 13309-2007 |            |      |
|   |  | 2              | Acceleration waveform distortion |  |            |      |
|   |  | 3              | Displacement amplitude error     |  |            |      |
|   |  | 4              | Maximum Noise                    |  |            |      |
| 7 | Electrodynamic vibration generator systems | 1              | Frequency indication error       | Electrodynamic vibration generator systems GB/T 13310-2007               |            |      |
|   |  | 2              | Acceleration waveform distortion |  |            |      |
|   |  | 3              | Speed indication error           |  |            |      |
|   |  | 4              | Displacement error               |  |            |      |
|   |  | 5              | Withstand voltage test           |  |            |      |
|   |  | 6              | Security devices                 |  |            |      |
|   |  | 7              | Maximum Noise                    |  |            |      |

| №  | Test Object                                   | Item/Parameter |                  | Title, Code of Standard or Method   | Limitation | Note |
|----|---|----------------|------------------|---|------------|------|
|    |   | №              | Item/Parameter   |   |            |      |
| 8  | Climbing tools and instruments                | 1              | Static load test | State Grid Corporation of electricity safety regulations (transmission part)<br>National Grid SAWS [2009] No. 664 |            |      |
| 9  | Crane tools and instruments                   | 1              | Static load test | State Grid Corporation of electricity safety regulations (transmission part)<br>National Grid SAWS [2009] No. 664 |            |      |
| 10 | Forced Single Horizontal Shaft Concrete Mixer | 1              | Rotational Speed | TGX 023-2008<br>Forced Single Horizontal Shaft Concrete Mixer   |            |      |
|    |   | 2              | Mass             | Calibration Metho   |            |      |
|    |   | 3              | Time             |   |            |      |
| 11 | Impermeability Instrument                     | 1              | Length           | SL133-2014<br>Impermeability Instrument   |            |      |
|    |   | 2              | Pressure         | Calibration Method  |            |      |
| 12 | Vibrating Sieve Machine                       | 1              | Swing times      | SL 411-2007<br>Vibrating Sieve Machine Calibration  |            |      |
|    |   | 2              | Shock times      | Procedures  |            |      |
|    |   | 3              | Length           |   |            |      |

| №  | Test Object   | Item/Parameter |                        | Title, Code of Standard or Method  | Limitation | Note |
|----|---|----------------|------------------------|--|------------|------|
|    |   | №              | Item/Parameter         |  |            |      |
| 13 | Weibo Consistency Instrument                                    | 1              | Amplitude              | TGX 027-2008<br>Weibo Consistency Instrument Calibration Method                              |            |      |
|    |   | 2              | frequency              |  |            |      |
| 14 | Button Life Testing Machine                                     | 1              | Frequency              | HZH-WIF323-2015<br>Button Life Testing Machine Testing Method                                |            |      |
|    |   | 2              | Time                   |  |            |      |
|    |   | 3              | Force value            |  |            |      |
|    |   | 4              | Count                  |  |            |      |
|    |   | 5              | dimension              |  |            |      |
|    |   | 6              | Length                 |  |            |      |
| 15 | Preventive code of tools,devices and equipment for live working | 1              | Withstand voltage test | Preventive code of tools,devices and equipment for live working DL/T 976-2005                |            |      |
|    |   | 2              | Static load test       |  |            |      |
| 16 | Preventive code of tools,devices and equipment for live working | 1              | Withstand voltage test | Preventive testing procedures electrical safety equipment State Power Fa [2002] No. 777 4~19 |            |      |
|    |   | 2              | DC resistance test     |  |            |      |
|    |   | 3              | Static load test       |  |            |      |

| №  | Test Object          | Item/Parameter |                                  | Title, Code of Standard or Method   | Limitation | Note |
|----|----------------------|----------------|----------------------------------|---|------------|------|
|    |                      | №              | Item/Parameter                   |   |            |      |
| 17 | Shielding Room (Box) | 1              | shielding effectiveness          | Measurement of shielding effectiveness of high-performance shielding enclosures<br>GB/T12190-2006 |            |      |
| 18 | Insulated gloves     | 1              | electrical insulation properties | Live working-gloves of insulating material<br>GB/T17622-2008                                      |            |      |
| 19 | Insulated shoes      | 1              | electrical insulation properties | Foot protection-Electrically insulating footwear<br>GB/T12011-2009                                |            |      |
| 20 | Antistatic floor     | 1              | Antistatic properties            | Code for construction and quality acceptance of antistatic engineering<br>GB 50944-2013           |            |      |
| 21 | Ballast              | 1              | Voltage / current ratio          | Ballasts for tubular fluorescent lamps--Performance requirements<br>GB 14044-2008                 |            |      |
|    |                      | 2              | Power Factor                     |   |            |      |
| 22 | Clean Room (or Area) | 1              | Class of Clean                   | Code for construction and acceptance of cleanroom<br>GB 50591-2010                                |            |      |
|    |                      | 2              | noise                            |   |            |      |

| №  | Test Object          | Item/Parameter |                             | Title, Code of Standard or Method                                  | Limitation | Note |
|----|----------------------|----------------|-----------------------------|--|------------|------|
|    |                      | №              | Item/Parameter              |  |            |      |
| 22 | Clean Room (or Area) | 3              | temperature and humidity    | Code for construction and acceptance of cleanroom<br>GB 50591-2010 |            |      |
|    |                      | 4              | Air Delivery and Wind Speed |  |            |      |
|    |                      | 5              | Illumino                    |  |            |      |
| 23 | Laminar clean bench  | 1              | Class of Clean              | Test standard for clean bench<br>JG/T 19-2010                      |            |      |
|    |                      | 2              | Air Delivery and Wind Speed |  |            |      |
|    |                      | 3              | noise                       |  |            |      |
|    |                      | 4              | Illumino                    |  |            |      |





# 中国合格评定国家认可委员会 认可证书附件

(注册号: CNAS L4210)

名称: 深圳市华中航技术检测有限公司

地址: 广东省深圳市龙岗区布吉街道李朗大道甘李科技园深港中海信科技园

厂房第1栋A座8层801-804

认可依据: ISO/IEC 17025 以及 CNAS 特定认可要求

签发日期: 2015年09月29日

有效期至: 2018年10月14日

## 附件3 认可的校准能力范围

| 序号    | 测量仪器名称 | 校准参量 | 规范代号(含年号)名称                | 测量范围             | 扩展不确定度(k=2)                        | 限制说明 | 备注 |
|-------|--------|------|----------------------------|------------------|------------------------------------|------|----|
| 一、几何量 |        |      |                            |                  |                                    |      |    |
| 1     | 量块     | 长度   | JJG 146-2011<br>量块         | (0.5~100)<br>mm  | $U=(0.15+1.5L)\mu\text{m}$<br>L: m | 钢制   |    |
|       |        |      |                            | (100~500)<br>mm  | $U=(0.2+1.5L)\mu\text{m}$<br>L: m  |      |    |
| 2     | 通用卡尺   | 长度   | JJG 30-2012<br>通用卡尺        | (0~500)m<br>m    | $U=0.01\text{mm}$                  |      |    |
|       |        |      |                            | (500~1000)<br>mm | $U=0.02\text{mm}$                  |      |    |
| 3     | 高度卡尺   | 长度   | JJG 31-2010<br>高度卡尺        | (0~500)m<br>m    | $U=0.01\text{mm}$                  |      |    |
|       |        |      |                            | (500~1000)<br>mm | $U=0.02\text{mm}$                  |      |    |
| 4     | 数显测高仪  | 长度   | JJF 1254-2010<br>数显测高仪校准规范 | (0~500)m<br>m    | $U=2.2\mu\text{m}$                 |      |    |

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|-----------------------------------|-----------------------------|--------------------|---------------------------------|-----------------------|--------------------|--------------------|---------------|
| 5                                 | 指示类<br>量具                   | 长度                 | JJG 34-2008<br>指示表(指针式、<br>数显式) | 百分表:<br>(0-10)mm      | $U=6.0\mu\text{m}$ |                    |               |
|                                   |                             |                    |                                 | 千分表:<br>(0-5)mm       | $U=2.0\mu\text{m}$ |                    |               |
|                                   |                             |                    | JJG 379-2009<br>大量程百分表          | (0-50)mm              | $U=7\mu\text{m}$   |                    |               |
|                                   |                             |                    | JJG 35-2006<br>杠杆表              | 百分表:<br>(0-2)mm       | $U=6.0\mu\text{m}$ |                    |               |
|                                   |                             |                    |                                 | 千分表:<br>(0-0.5)m<br>m | $U=2.0\mu\text{m}$ |                    |               |
|                                   |                             |                    | JJF 1102-2003<br>内径表校准规范        | 百分表:<br>(0-450)<br>mm | $U=6.0\mu\text{m}$ |                    |               |
|                                   |                             |                    |                                 | 千分表:<br>(0-400)<br>mm | $U=2.0\mu\text{m}$ |                    |               |
|                                   |                             |                    | 6                               | 千分尺                   | 长度                 | JJG 21-2008<br>千分尺 | (0-500)m<br>m |
| JJG 26-2001<br>杠杆千分尺、杠<br>杆卡规     | 杠杆千分<br>尺:<br>(0-100)m<br>m | $U=1.7\mu\text{m}$ |                                 |                       |                    |                    |               |
|                                   | 杠杆卡<br>规:<br>(0-200)m<br>m  | $U=1.7\mu\text{m}$ |                                 |                       |                    |                    |               |
| JJF 1411-2013<br>测量内尺寸千分<br>尺校准规范 | 内测千分<br>尺<br>(0-100)m<br>m  | $U=2.0\mu\text{m}$ |                                 |                       |                    |                    |               |
| 7                                 | 深度千分尺                       | 长度                 | JJG 24-2003<br>深度千分尺            | (0-100)<br>mm         | $U=1.5\mu\text{m}$ |                    |               |
|                                   |                             |                    |                                 | (100-200)<br>) mm     | $U=1.7\mu\text{m}$ |                    |               |
|                                   |                             |                    |                                 | (200-300)<br>) mm     | $U=1.9\mu\text{m}$ |                    |               |
| 8                                 | 深度指示表                       | 长度                 | JJG 830-2007<br>深度指示表           | (0-300)m<br>m         | $U=3.5\mu\text{m}$ |                    |               |

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|----|-----------------|------|----------------------------------|---|-----------------------------------|------|----|
| 9  | 平板              | 平面度  | JJG 117-2013<br>平板               | $\leq$<br>400mm×400mm                         | $U=0.5\mu\text{m}$                |      |    |
|    |                 |      |                                  | $\geq$<br>(630mm×400mm)~(1600mm×1000mm)       | $U=1.0\mu\text{m}$                |      |    |
|    |                 |      |                                  | $\geq$<br>(1600mm×1000mm)<br>~(2500mm×1600mm) | $U=1.5\mu\text{m}$                |      |    |
| 10 | 框、条式水平仪         | 角度   | JJF 1084-2002<br>框式水平仪和条式水平仪校准规范 | (0~1.5)m<br>m/m                               | $U=4\%Ax+0.003$<br>mm/m           |      |    |
| 11 | 钢直尺             | 长度   | JJG 1-1999<br>钢直尺                | (0-2000)<br>mm                                | $U=0.05\text{mm}$                 |      |    |
| 12 | 塞尺              | 长度   | JJG 62-2007<br>塞尺                | (0.02~3.00)<br>mm                             | $U=2.6\mu\text{m}$                |      |    |
| 13 | 钢卷尺             | 长度   | JJG 4-1999<br>钢卷尺                | (0-30)m                                       | $U=$<br>(0.1+0.02L)<br>mm<br>L: m |      |    |
| 14 | 木直(折)尺<br>(塑料尺) | 长度   | JJG 2-1999<br>木直(折)尺             | (0-1000)<br>mm                                | $U=0.1\text{mm}$                  |      |    |
| 15 | 纤维卷尺、测绳         | 长度   | JJG 5-2001<br>纤维卷尺、测绳            | (0-50)m                                       | $U=$<br>(0.1+0.02L)<br>mm<br>L: m |      |    |
| 16 | 万能角度尺           | 角度   | JJG 33-2002<br>万能角度尺             | 0°~360°                                       | $U=0.6'$                          |      |    |
| 17 | 磁性、电涡流式覆层厚度测量仪  | 长度   | JJG 818-2005<br>磁性、电涡流式覆层厚度测量仪   | (0-988) $\mu\text{m}$                         | $U=1.0\mu\text{m}~2.0\mu\text{m}$ |      |    |
| 18 | 光滑极限量规          | 长度   | JJG 343-2012<br>光滑极限量规           | (0-10)mm                                      | $U=0.6\mu\text{m}$                |      |    |
|    |                 |      |                                  | (10-18)m<br>m                                 | $U=0.7\mu\text{m}$                |      |    |

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|----|----------------|------|----------------------------------|--------------------------------|---------------------------------------|------|----|
| 18 | 光滑极限量规         | 长度   | JJG 343-2012<br>光滑极限量规           | (18-30)m<br>m                  | $U=0.8\mu\text{m}$                    |      |    |
|    |                |      |                                  | (30-50)m<br>m                  | $U=0.9\mu\text{m}$                    |      |    |
|    |                |      |                                  | (50-80)m<br>m                  | $U=1.0\mu\text{m}$                    |      |    |
|    |                |      |                                  | (80-100)<br>mm                 | $U=1.1\mu\text{m}$                    |      |    |
| 19 | 圆柱螺纹量规         | 长度   | JJF 1345-2012<br>圆柱螺纹量规校准规范      | 塞规:<br>M1-M200                 | $U=2.5\mu\text{m}$                    |      |    |
|    |                |      |                                  | 环规:<br>M2-M12                  | $U=3.0\mu\text{m}$                    |      |    |
| 20 | 读数、测量显微镜       | 长度   | JJG 571-2004<br>读数、测量显微镜         | (0-50mm)                       | $U=2\mu\text{m}$                      |      |    |
| 21 | 工具显微镜          | 长度   | JJG 56-2000<br>工具显微镜             | (0-200)<br>mm                  | $U=1.0\mu\text{m}$                    |      |    |
| 22 | 影像测量仪<br>(二次元) | 长度   | JJF 1318-2011<br>影像测量仪校准规范       | (0-300)m<br>m                  | $U=(1.1+2L)$<br>$\mu\text{m}$ L: m    |      |    |
| 23 | 投影仪            | 长度   | JJF 1093-2002<br>投影仪校准规范         | (0-300)m<br>m                  | $U=(1.2+4L)$<br>$\mu\text{m}$ L: m    |      |    |
| 24 | 坐标测量机          | 长度   | JJF 1064-2010<br>坐标测量机校准规范       | (0-1000)<br>mm                 | $U=(0.8+1L)$<br>$\mu\text{m}$<br>L: m |      |    |
| 25 | 圆度仪            | 圆度   | JJG 429-2000<br>圆度、圆柱度测量仪        | (0.06-20)<br>$\mu\text{m}$     | $U_{\text{rel}}=2\%$                  |      |    |
| 26 | 触针式表面粗糙度测量仪    | 粗糙度  | JJF 1105-2003<br>触针式表面粗糙度测量仪校准规范 | Ra: (0.1-3.2)<br>$\mu\text{m}$ | $U_{\text{rel}}=4.7\%$                |      |    |
| 27 | 半径样板           | 长度   | JJG 58-2010<br>半径样板              | 0.5mm-6m<br>m                  | $U=6\mu\text{m}$                      |      |    |
|    |                |      |                                  | >6mm-18m<br>m                  | $U=7\mu\text{m}$                      |      |    |
|    |                |      |                                  | >18mm-25<br>mm                 | $U=8\mu\text{m}$                      |      |    |
| 28 | X射线荧光镀层测厚仪     | 长度   | JJF 1306-2011<br>X射线荧光镀层测厚仪校准规范  | (0.18-6.7)<br>$\mu\text{m}$    | $U_{\text{rel}}=13\%$                 |      |    |

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|----|--------|------|---------------------------|---|------------------------------|------|----|
| 29 | 刀口形直尺  | 直线度  | JJG 63-2007<br>刀口形直尺      | (50-200)<br>mm                                | $U=0.3\mu\text{m}$           |      |    |
|    |        |      |                           | (200-275)<br>mm                               | $U=0.6\mu\text{m}$           |      |    |
|    |        |      |                           | (300-500)<br>mm                               | $U=0.8\mu\text{m}$           |      |    |
| 30 | 刮板细度计  | 长度   | JJG 905-2010<br>刮板细度计     | (0-15) $\mu\text{m}$<br>(0-25) $\mu\text{m}$  | $U=0.4\mu\text{m}$           |      |    |
|    |        |      |                           | (0-50) $\mu\text{m}$<br>(0-100) $\mu\text{m}$ | $U=0.7\mu\text{m}$           |      |    |
|    |        |      |                           | (0-150) $\mu\text{m}$                         | $U=0.9\mu\text{m}$           |      |    |
|    |        | 直线度  |                           | (0.3-2) $\mu\text{m}$                         | $U=0.3\mu\text{m}$           |      |    |
| 31 | 螺纹样板   | 长度   | JJG 60-2012<br>螺纹样板       | (0.40-0.60)<br>mm                             | $U=3\mu\text{m}$             |      |    |
|    |        |      |                           | (0.70-1.50)<br>mm                             | $U=4\mu\text{m}$             |      |    |
|    |        |      |                           | (1.75-6.00)<br>mm                             | $U=5\mu\text{m}$             |      |    |
| 32 | 螺纹千分尺  | 长度   | JJG 25-2004<br>螺纹千分尺      | (0-150)<br>mm                                 | $U=1\mu\text{m}$             |      |    |
|    |        |      |                           | (150-200)<br>mm                               | $U=2\mu\text{m}$             |      |    |
| 33 | 针规三针   | 长度   | JJF 1207-2008<br>针规三针校准规范 | 针规:<br>(0.1-10)<br>mm                         | $U=0.3\mu\text{m}$           |      |    |
|    |        |      |                           | 针规:<br>(>10-25)<br>mm                         | $U=0.5\mu\text{m}$           |      |    |
|    |        |      |                           | 三针:<br>(0.118-6.212)<br>mm                    | $U=0.2\mu\text{m}$           |      |    |
| 34 | 试验筛    | 长度   | JJF 1175-2007<br>试验筛校准规范  | 网孔:<br>(0.02-125)<br>mm                       | $U=2.0\mu\text{m}$<br>-0.6mm |      |    |
|    |        |      |                           | 筛孔:<br>(1-125)<br>mm                          | $U=12\mu\text{m}$<br>-0.20mm |      |    |

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|----|---------|------|--------------------------------------|---------------|--------------------------------|------|----|
| 35 | 小零件试验器  | 长度   | HZH-WIL11011-2<br>011<br>小零件试验器校准方法  | (0-62) mm     | $U=0.02\text{mm}$              |      |    |
| 36 | 可触及探头   | 长度   | HZH-WIL11012-2<br>011<br>可触及探头校准方法   | (0-500) mm    | $U=0.02\text{mm}$              |      |    |
| 37 | 锐利尖端测试仪 | 长度   | HZH-WIL11013-2<br>011<br>锐利尖端测试仪校准方法 | (0-2) mm      | $U=3\ \mu\text{m}$             |      |    |
|    |         | 力值   |                                      | (0-2.5)N      | $U=0.1\text{N}$                |      |    |
| 38 | 测试模板    | 长度   | HZH-WIL11014-2<br>011<br>测试模板校准方法    | (0-80) mm     | $U=0.02\text{mm}$              |      |    |
| 39 | 咬啮测试器   | 长度   | HZH-WIL11015-2<br>011<br>咬啮测试器校准方法   | (0-100) mm    | $U=0.02\text{mm}$              |      |    |
|    |         | 角度   |                                      | (0-180)°      | $U=2'$                         |      |    |
| 40 | 试模      | 长度   | JJF 1307-2011<br>试模校准规范              | (40-500) mm   | $U=0.2\text{mm}$               |      |    |
| 41 | 超声波测厚仪  | 长度   | JJF 1126-2004<br>超声波测厚仪校准规范          | (0-300) mm    | $U=(0.01-0.06)\text{mm}$       |      |    |
| 42 | 跳动检查仪   | 长度   | JJF 1109-2003<br>跳动检查仪校准规范           | (-2~+2) mm    | $U=1.2\ \mu\text{m}$           |      |    |
| 43 | 激光测径仪   | 直径   | JJF 1250-2010<br>激光测径仪校准规范           | (0-30) mm     | $U=(0.40-0.50)\ \mu\text{m}$   |      |    |
| 44 | 组合式角度尺  | 角度   | JJF 1132-2005<br>组合式角度尺校准规范          | (0-180)°      | $U=3'$                         |      |    |
| 45 | 水平尺     | 角度   | JJF 1085-2002<br>水平尺校准规范             | (200-1200) mm | $U_{\text{rel}}=8\%$           |      |    |
| 46 | 平尺      | 直线度  | JJF 1097-2003<br>平尺校准规范              | (0-6300) mm   | $U=(0.6\sim 1.3)\ \mu\text{m}$ |      |    |

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| 47 | 直角尺          | 垂直度  | JJG 7-2004<br>直角尺               | 30mm-300<br>mm                | $U=3.1 \mu\text{m}$    |      |    |
| 48 | 公法线千分尺       | 长度   | JJG 82-2010<br>公法线类千分尺          | (0-100)m<br>m                 | $U=2 \mu\text{m}$      |      |    |
|    |              |      |                                 | (100-200)<br>mm               | $U=3 \mu\text{m}$      |      |    |
| 49 | 内径千分尺        | 长度   | JJG 22-2014<br>内径千分尺            | (0-500)m<br>m                 | $U=(1-8) \mu\text{m}$  |      |    |
| 50 | 奇数沟千分尺       | 长度   | JJG 182-2005<br>奇数沟千分尺          | (1-20)mm                      | $U=1.3 \mu\text{m}$    |      |    |
| 51 | 厚度表          | 长度   | JJF 1255-2010<br>厚度表校准规范        | (0-30)mm                      | $U=8 \mu\text{m}$      |      |    |
| 52 | 机械式比较仪       | 长度   | JJG 39-2004<br>机械式比较仪           | (-300-<br>+300) $\mu\text{m}$ | $U=0.1 \mu\text{m}$    |      |    |
| 53 | 金相显微镜        | 长度   | JJG(教委)<br>012-1996<br>金相显微镜    | (0.7-100)<br>X                | $U_{\text{rel}}=0.7\%$ |      |    |
| 54 | 楔形塞尺         | 长度   | JJF 1110-2003<br>建筑工程质量检测器组校准规范 | (0-50)mm                      | $U=0.05\text{mm}$      |      |    |
| 55 | 碎石或卵石针片状规准仪  | 长度   | TGX013-2008<br>碎石或卵石针状规准仪校验方法   | (0-83)mm                      | $U=0.05\text{mm}$      |      |    |
|    |              |      | TGX014-2008<br>碎石或卵石片状规准仪校验方法   |                               |                        |      |    |
| 56 | 沥青路面用粗集料压碎值仪 | 长度   | TGX009-2008<br>沥青路面用粗集料压碎值仪校验方法 | (125-152)<br>mm               | $U=0.2\text{mm}$       |      |    |
| 57 | 坍落度筒及捣棒      | 长度   | TGX020-2008<br>坍落度筒及捣棒校验方法      | (100-300)<br>mm               | $U=0.3\text{mm}$       |      |    |
| 58 | 砂浆分层度仪       | 长度   | TGX022-2008<br>砂浆分层度仪校验方法       | (100-200)<br>mm               | $U=0.2\text{mm}$       |      |    |
| 59 | 混凝土抗渗试模      | 长度   | TGX030-2008<br>混凝土抗渗试模校验方法      | (150-180)<br>mm               | $U=0.2\text{mm}$       |      |    |

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| 60   | 混凝土立方体试模     | 长度   | TGX029-2008<br>混凝土立方体试模、抗折试模、砂浆试模的校验方法 | (100~200)mm | $U=0.2\text{mm}$       |      |    |
| 61   | 混凝土抗折试模、砂浆试模 | 长度   | TGX029-2008<br>混凝土立方体试模、抗折试模、砂浆试模的校验方法 | (100~500)mm | $U=0.2\text{mm}$       |      |    |
| 二、热学 |              |      |  |             |                        |      |    |
| 1    | 标准水银温度计      | 温度   | JJG 161-2010<br>标准水银温度计<br>检定规程        | (-30~0)°C   | $U=0.06\text{°C}$      |      |    |
|      |              |      |  | (0~100)°C   | $U=0.05\text{°C}$      |      |    |
|      |              |      |  | (100~200)°C | $U=0.06\text{°C}$      |      |    |
|      |              |      |  | (200~300)°C | $U=0.07\text{°C}$      |      |    |
| 2    | 工作用玻璃液体温度计   | 温度   | JJG 130-2011<br>工作用玻璃液体<br>温度计检定规程     | (-30~0)°C   | $U=0.11\text{°C}$      |      |    |
|      |              |      |  | (0~100)°C   | $U=0.09\text{°C}$      |      |    |
|      |              |      |  | (100~200)°C | $U=0.13\text{°C}$      |      |    |
|      |              |      |  | (200~300)°C | $U=0.15\text{°C}$      |      |    |
| 3    | 双金属温度计       | 温度   | JJG 226-2001<br>双金属温度计<br>检定规程         | (-30~300)°C | $U=(0.3-0.6)\text{°C}$ |      |    |
| 4    | 工作用廉金属热电偶    | 温度   | JJG 351-1996<br>工作用廉金属热<br>电偶检定规程      | (-30~0)°C   | $U=(0.3-0.2)\text{°C}$ |      |    |
|      |              |      |  | (0~300)°C   | $U=(0.2-0.5)\text{°C}$ |      |    |
| 5    | 工业铂、铜热电阻     | 温度   | JJG 229-2010<br>工业铂、铜热电<br>阻检定规程       | (-30~300)°C | 0°C: $U=0.1\text{°C}$  |      |    |



| 序号 | 测量仪器名称         | 校准参量 | 规范代号(含年号)名称                                  | 测量范围                     | 扩展不确定度(k=2)        | 限制说明 | 备注 |
|----|----------------|------|--|--------------------------|--------------------|------|----|
| 5  | 工业铂、铜热电阻       | 温度   | JJG 229-2010<br>工业铂、铜热电阻检定规程                 |                          | 100℃: $U=0.1$<br>℃ |      |    |
| 6  | 机械式温湿<br>度计(表) | 相对湿度 | JJG 205-2005<br>机械式温湿<br>度计<br>检定规程          | 相对湿度:<br>(30~<br>90)% RH | $U=2.2$ RH         |      |    |
|    |                | 温度   |  | 温度:<br>(10~<br>40)℃      | $U=0.6$ ℃          |      |    |
| 7  | 动圈式<br>温度仪表    | 温度   | JJG 186-1997<br>动圈式温度指<br>示、指示位式调<br>节仪表检定规程 | (0~<br>300)℃             | $U=(0.3-0.8)$<br>℃ |      |    |
| 8  | 工业过程测<br>量记录仪  | 温度   | JJG 74-2005<br>工业过程测量记<br>录仪检定规程             | 热电偶<br>(-30~<br>0)℃      | $U=(0.4-0.2)$<br>℃ |      |    |
|    |                |      |  | 热电偶<br>(0~<br>1300)℃     | $U=(0.2-1.2)$<br>℃ |      |    |
|    |                |      |  | 热电阻<br>(-30~<br>0)℃      | $U=(0.3-0.2)$<br>℃ |      |    |
|    |                |      |  | 热电阻<br>(0~<br>800)℃      | $U=(0.2-0.8)$<br>℃ |      |    |
| 9  | 数字温度指<br>示调节仪  | 温度   | JJG 617-1996<br>数字温度指示调<br>节仪检定规程            | 热电偶<br>(-30~<br>0)℃      | $U=(0.4-0.2)$<br>℃ |      |    |
|    |                |      |  | 热电偶<br>(0~<br>1300)℃     | $U=(0.2-1.2)$<br>℃ |      |    |
|    |                |      |  | 热电阻<br>(-30~<br>0)℃      | $U=(0.3-0.2)$<br>℃ |      |    |
|    |                |      |  | 热电阻<br>(0~<br>800)℃      | $U=(0.2-0.8)$<br>℃ |      |    |
| 10 | 温度指示控<br>制仪    | 温度   | JJG 874-2007<br>温度指示控制仪<br>检定规程              | 指针式:<br>(0~<br>300)℃     | $U=(0.3-0.6)$<br>℃ |      |    |

| 序号 | 测量仪器名称           | 校准参量  | 规范代号(含年号)名称                              | 测量范围                                       | 扩展不确定度(k=2)                          | 限制说明 | 备注 |
|----|------------------|-------|--|--|--------------------------------------|------|----|
| 10 | 温度指示控制仪          | 温度    | JJG 874-2007<br>温度指示控制仪<br>检定规程          | 数字式:<br>(-50~<br>300)°C                    | $U=(0.2-0.5)$<br>°C                  |      |    |
| 11 | 温度巡回检测仪(多路温度记录仪) | 温度    | JJF 1171-2007<br>温度巡回检测仪<br>校准规范         | (-30~<br>300)°C                            | $U=(0.2-0.4)$<br>°C                  |      |    |
| 12 | 环境试验设备           | 温度    | JJF 1101-2003<br>环境试验设备温<br>度、湿度校准规<br>范 | (-50~<br>0)°C                              | $U=(0.6-0.3)$<br>°C                  |      |    |
|    |                  | 相对湿度  |  | (0~<br>300)°C                              | $U=(0.3-0.7)$<br>°C                  |      |    |
|    |                  |       |  | (30~<br>90)% RH                            | $U=2.2\%RH$                          |      |    |
| 13 | 恒温槽              | 温度    | JJF 1030-2010<br>恒温槽技术性能<br>测试规范         | (-30-0)<br>°C                              | $U=$<br>(0.022-0.01<br>0)°C          |      |    |
|    |                  |       |  | (0-300)<br>°C                              | $U=$<br>(0.010-0.03<br>0)°C          |      |    |
| 14 | 灼热丝试验仪           | 时间    | JJF(浙)<br>1050-2010 灼<br>热丝试验仪校准<br>规范   | (0-3600)<br>s                              | $U=0.1s$                             |      |    |
|    |                  | 温度    |  | 960°C                                      | $U=3°C$                              |      |    |
|    |                  | 直径    |  | 4mm  | $U=0.004mm$                          |      |    |
| 15 | 盐雾试验箱            | 温度    | JJF(辽)75-2009<br>盐雾试验箱校准<br>规范           | (0-100)<br>°C                              | $U=0.3°C$                            |      |    |
|    |                  | 盐雾沉降率 |  | (1.0-2.0)<br>ml/<br>(80cm <sup>2</sup> .h) | $U=0.2ml/(80$<br>cm <sup>2</sup> .h) |      |    |
| 16 | 熔体流动速率仪          | 温度    | JJG 878-1994<br>熔体流动速率仪<br>检定规程          | (0-400)<br>°C                              | $U=0.3°C$                            |      |    |
|    |                  | 质量    |  | (0-5000)<br>g                              | $U=0.3g$                             |      |    |
|    |                  | 流动速率  |  | 1.96g/10<br>min                            | $U=0.15g/10m$<br>in                  |      |    |

| 序号   | 测量仪器名称   | 校准参量   | 规范代号(含年号)名称                          | 测量范围   | 扩展不确定度(k=2)                               | 限制说明 | 备注 |
|------|----------|--------|--------------------------------------|--|---|------|----|
| 17   | 箱式电阻炉    | 温度     | JJF 1376-2012<br>箱式电阻炉校准规范           | (0-1000)<br>℃                                | $U=2.1^{\circ}\text{C}$                   |      |    |
| 18   | 温度数据采集仪  | 温度     | JJF 1366-2012<br>温度数据采集仪校准规范         | 不带传感器:<br>(-50~1000)<br>℃                    | $U=(0.3-0.6)^{\circ}\text{C}$             |      |    |
|      |          |        |                                      | 带传感器:<br>(-30~300)<br>℃                      | $U=(0.2-0.3)^{\circ}\text{C}$             |      |    |
| 19   | 沙尘试验机    | 温度     | JJF (军工)<br>18-2012<br>沙尘试验设备校准规范    | (0-100)<br>℃                                 | $U=0.5^{\circ}\text{C}$                   |      |    |
|      |          | 湿度     |                                      | (30-90)%<br>RH                               | $U=2.3\%RH$                               |      |    |
|      |          | 风速     |                                      | (0-30)m/s                                    | $U=0.5\text{m/s}$                         |      |    |
|      |          | 沙尘沉降速率 |                                      | $(6\pm 1)\text{g}/(\text{m}^2\cdot\text{d})$ | $U=0.3\text{g}/(\text{m}^2\cdot\text{d})$ |      |    |
| 20   | 耐洗色牢度测试仪 | 温度     | JJF (纺织)<br>026-2010 耐洗色牢度测试仪校准规范    | (0-100)<br>℃                                 | $U=0.5^{\circ}\text{C}$                   |      |    |
|      |          | 转速     |                                      | (0-100)r/min                                 | $U=0.5\text{r/min}$                       |      |    |
|      |          | 时间     |                                      | (0-3600)s                                    | $U=0.1\text{s}$                           |      |    |
| 21   | 维卡热变形试验机 | 温度     | JJF (浙)<br>1051-2010<br>维卡热变形试验机校准规范 | (0-300)<br>℃                                 | $U=0.4^{\circ}\text{C}$                   |      |    |
|      |          | 升温速率   |                                      | (0-120)<br>℃/h                               | $U=0.2^{\circ}\text{C}/\text{h}$          |      |    |
|      |          | 变形量    |                                      | (0-10)mm                                     | $U=0.03\text{mm}$                         |      |    |
|      |          | 质量     |                                      | (0-5000)<br>g                                | $U=0.3\text{g}$                           |      |    |
| 三、力学 |          |        |                                      |  |   |      |    |

| 序号 | 测量仪器名称 | 校准参量 | 规范代号(含年号)名称                   | 测量范围   | 扩展不确定度( $k=2$ )          | 限制说明                              | 备注 |
|----|--------|------|-------------------------------|--|--------------------------|-----------------------------------|----|
| 1  | 砝码     | 质量   | JJG 99-2006<br>砝码检定规程         | (1-20)mg   | $U=0.016\text{mg}$       | 不做<br>磁性<br>和体<br>积(密<br>度)项<br>目 |    |
|    |        |      |                               | (20-500)<br>mg                                     | $U=0.03\text{mg}$        |                                   |    |
|    |        |      |                               | (1-50)g  | $U=0.16\text{mg}$        |                                   |    |
|    |        |      |                               | (50-500)<br>g                                      | $U=0.3\text{mg}$         |                                   |    |
|    |        |      |                               | (500-500<br>0)g                                    | $U=3\text{mg}$           |                                   |    |
|    |        |      |                               | (5-20)kg   | $U=0.03\text{g}$         |                                   |    |
| 2  | 电子天平   | 质量   | JJG 1036-2008<br>电子天平检定规<br>程 | 1mg-200g<br>( $0.1\text{mg}\leq e<1\text{mg}$ )    | $U=(0.05-0.50)\text{mg}$ |                                   |    |
|    |        |      |                               | 20mg-5Kg<br>( $1\text{mg}\leq e\leq 50\text{mg}$ ) | $U=(0.38-20)mg$          |                                   |    |
|    |        |      |                               | 5g~10kg<br>( $0.1\text{g}\leq e$ )                 | $U=(0.02~0.50)\text{g}$  |                                   |    |
|    |        |      |                               | 2g~20kg<br>( $0.1\text{g}\leq e\leq 2\text{g}$ )   | $U=(0.02-1)\text{g}$     |                                   |    |
|    |        |      |                               | 100g~<br>50kg<br>( $5\text{g}\leq e$ )             | $U=(0.5~2.5)\text{g}$    |                                   |    |
| 3  | 机械天平   | 质量   | JJG 98-2006<br>机械天平检定规<br>程   | 1mg-1g   | $U=0.02\text{mg}$        |                                   |    |
|    |        |      |                               | 1g-200g  | $U=0.50\text{mg}$        |                                   |    |
|    |        |      |                               | 200g-1kg   | $U=0.005\text{g}$        |                                   |    |
|    |        |      |                               | 1kg-10kg   | $U=0.10\text{g}$         |                                   |    |
| 4  | 架盘天平   | 质量   | JJG 156-2004<br>架盘天平检定规<br>程  | 100g-5kg   | $U=0.02\text{g}$         |                                   |    |
| 5  | 数字指示秤  | 力值   | JJG 539-1997<br>数字指示秤检定<br>规程 | 1g-50kg  | $U=0.15\text{g}$         |                                   |    |

| 序号 | 测量仪器名称   | 校准参量 | 规范代号(含年号)名称  | 测量范围               | 扩展不确定度( $k=2$ ) | 限制说明 | 备注 |
|----|--|------|--|--------------------|-----------------|------|----|
| 5  | 数字指示秤  | 力值   | JJG 539-1997<br>数字指示秤检定<br>规程  | 50kg-500<br>kg     | $U=15g$         |      |    |
|    |  |      |  | 500kg-50<br>00kg   | $U=0.1kg$       |      |    |
| 6  | 模拟指示秤  | 质量   | JJG 13-1997<br>模拟指示秤检定<br>规程   | 10g-100k<br>g      | $U=0.5g$        |      |    |
|    |  |      |  | 100kg-10<br>00kg   | $U=50g$         |      |    |
| 7  | 非自行<br>指示秤   | 质量   | JJG 14-1997 非<br>自行指示秤检定<br>规程   | 50g-5000<br>kg     | $U=0.5g$        |      |    |
| 8  | 拉力、压力和<br>万能<br>试验机  | 力值   | JJG 139-2014<br>拉力、压力和万<br>能试验机检定规<br>程                                    | (0.001-5<br>0) kN  | $U_{rel}=0.3\%$ |      |    |
|    |  |      |  | 50kN-300<br>0kN    | $U_{rel}=0.3\%$ |      |    |
| 9  | 电子式<br>万能试验机   | 力值   | JJG 475-2008<br>电子式万能试验<br>机检定规程   | 1N-1000k<br>N      | $U_{rel}=0.3\%$ |      |    |
| 10 | 工作测力仪  | 力值   | JJG 455-2000<br>工作测力仪检定<br>规程  | (0.001-2<br>00)N   | $U_{rel}=0.1\%$ |      |    |
|    |  |      |  | (200-200<br>0)N    | $U_{rel}=0.3\%$ |      |    |
| 11 | 抗折试验机  | 力值   | JJG 476-2001<br>抗折试验机检定<br>规程  | (0.1-5)k<br>N      | $U_{rel}=0.3\%$ |      |    |
| 12 | 扭矩扳子   | 扭矩   | JJG 707-2014<br>扭矩扳子检定规<br>程   | (0.001-5<br>00)N·m | $U_{rel}=0.3\%$ |      |    |
| 13 | 扭矩扳子<br>检定仪  | 扭矩   | JJG 797-2013<br>扭矩扳子检定仪<br>检定规程  | (0.1-50)<br>N·m    | $U_{rel}=0.3\%$ |      |    |
| 14 | 金属洛氏硬<br>度计<br>(A, B, C, D, E<br>, F, G, H, K, N,<br>T 标尺) | 硬度   | JJG 112-2013<br>金属洛氏硬度计<br>(A, B, C, D, E, F,<br>G, H, K, N, T 标尺)<br>检定规程 | (80-88)H<br>RA     | $U=0.4HR$       |      |    |

| 序号 | 测量仪器名称  | 校准参量 | 规范代号（含年号）名称   | 测量范围                | 扩展不确定度（ $k=2$ ）   | 限制说明 | 备注 |
|----|---|------|---|---------------------|-------------------|------|----|
| 14 | 金属洛氏硬度计<br>(A, B, C, D, E, F, G, H, K, N, T 标尺) | 硬度   | JJG 112-2013<br>金属洛氏硬度计<br>(A, B, C, D, E, F, G, H, K, N, T 标尺)<br>检定规程 | (85-100)<br>HRB     | $U=0.5HR$         |      |    |
|    |   |      |   | (20-70)H<br>RC      | $U=0.5HR$         |      |    |
|    |   |      |   | (89-91)H<br>R15N    | $U=0.5HR$         |      |    |
|    |   |      |   | (42-80)<br>HR30N    | $U=0.5HR$         |      |    |
|    |   |      |   | (32-61)<br>HR45N    | $U=0.5HR$         |      |    |
|    |   |      |   | (88-93)H<br>R15TW   | $U=0.5HR$         |      |    |
|    |   |      |   | (70-82)H<br>R30TW   | $U=0.6HR$         |      |    |
| 15 | 金属韦氏硬度计   | 硬度   | JJG 944-2013<br>金属韦氏硬度计<br>检定规程   | (0-20)HW            | $U=0.3HW$         |      |    |
| 16 | 金属维氏硬度计   | 硬度   | JJG 151-2006<br>金属维氏硬度计<br>检定规程   | (100-800)<br>HV     | $U_{rel}=1.4\%$   |      |    |
| 17 | A 型邵氏硬度计  | 硬度   | JJG 304-2003 A<br>型邵氏硬度计<br>检定规程  | (10-100)<br>HA      | $U_{rel}=0.3\%$   |      |    |
| 18 | 里氏硬度计   | 硬度   | JJG 747-1999<br>里氏硬度计<br>检定规程   | (500-700)<br>HLD    | $U=6HLD$          |      |    |
| 19 | 转速表   | 转速   | JJG 105-2000<br>转速表<br>检定规程   | (20-500)<br>r/min   | $U_{rel}=0.05\%$  |      |    |
|    |   |      |   | (500-3000)<br>r/min | $U_{rel}=0.016\%$ |      |    |
| 20 | 净浆标准稠度与凝结时间测定仪                                  | 角度   | JJG (建材)<br>105-1999 净浆<br>标准稠度与凝结<br>时间测定仪<br>检定<br>规程                 | (0-320)<br>°        | $U=0.16^\circ$    |      |    |
|    |   | 长度   |   | (0~<br>300)mm       | $U=0.04mm$        |      |    |

| 序号 | 测量仪器名称               | 校准参量 | 规范代号(含年号)名称                          | 测量范围          | 扩展不确定度(k=2)      | 限制说明           | 备注 |
|----|----------------------|------|--------------------------------------|---------------|------------------|----------------|----|
| 20 | 净浆标准稠度与凝结时间测定仪       | 质量   | JJG(建材)105-1999 净浆标准稠度与凝结时间测定仪检定规程   | (0~6200)g     | $U=0.5g$         |                |    |
| 21 | 水泥净浆搅拌机              | 转速   | JJG(建材)104-1994 水泥净浆搅拌机检定规程          | (57-295)r/min | $U=0.6r/min$     |                |    |
|    |                      | 时间   |                                      | (30-120)s     | $U=0.28s$        |                |    |
|    |                      | 长度   |                                      | (0.5-160)mm   | $U=0.04mm$       |                |    |
| 22 | 行星式胶砂搅拌机             | 转速   | JJG(建材)123-1999 行星式胶砂搅拌机检定规程         | (57-295)r/min | $U=0.6r/min$     |                |    |
|    |                      | 时间   |                                      | (30-90)s      | $U=0.28s$        |                |    |
|    |                      | 长度   |                                      | (1.5-202)mm   | $U=0.04mm$       |                |    |
| 23 | 水泥胶砂流动度测定仪           | 长度   | JJG(建材)126-1999 水泥胶砂流动度测定仪检定规程       | (10-285)mm    | $U=0.04mm$       |                |    |
|    |                      | 质量   |                                      | (3440-3460)g  | $U=0.5g$         |                |    |
|    |                      | 时间   |                                      | (0-30)s       | $U=0.28s$        |                |    |
| 24 | 弹性元件式一般压力表、压力真空表和真空表 | 压力   | JJG 52-2013 弹性元件式一般压力表、压力真空表和真空表检定规程 | (-0.1-0)MPa   | $U_{rel}=0.22\%$ | 不能校准电接式压力表的电参量 |    |
|    |                      |      |                                      | (0.06-60)MPa  | $U_{rel}=0.22\%$ |                |    |
| 25 | 利边测试仪                | 力值   | HZH-WIF11001-2011 利边测试仪校准方法          | (0.1-10)N     | $U_{rel}=0.5\%$  |                |    |
|    |                      | 长度   |                                      | (0-20)mm      | $U=0.02mm$       |                |    |

| 序号 | 测量仪器名称      | 校准参量 | 规范代号(含年号)名称                  | 测量范围                                    | 扩展不确定度(k=2)             | 限制说明 | 备注 |
|----|-------------|------|------------------------------|---|-------------------------|------|----|
| 26 | 常用玻璃量器      | 容量   | JJG 196-2006 常用玻璃量器检定规程      | (0.1~1)mL                               | $U=0.002\text{mL}$      |      |    |
|    |             |      |                              | (1~25)mL                                | $U=0.006\text{mL}$      |      |    |
|    |             |      |                              | (25~250)mL                              | $U=0.03\text{mL}$       |      |    |
|    |             |      |                              | (250~500)mL                             | $U=0.07\text{mL}$       |      |    |
|    |             |      |                              | (500~1000)mL                            | $U=0.11\text{mL}$       |      |    |
|    |             |      |                              | (1000~2000)mL                           | $U=0.24\text{mL}$       |      |    |
| 27 | 移液器         | 容量   | JJG 646-2006 移液器检定规程         | 5 $\mu\text{L}$ ~10 $\mu\text{L}$       | $U_{\text{rel}}=2.2\%$  |      |    |
|    |             |      |                              | 10 $\mu\text{L}$ ~100 $\mu\text{L}$     | $U_{\text{rel}}=1.0\%$  |      |    |
|    |             |      |                              | 100 $\mu\text{L}$ ~1000 $\mu\text{L}$   | $U_{\text{rel}}=0.3\%$  |      |    |
|    |             |      |                              | 1000 $\mu\text{L}$ ~10000 $\mu\text{L}$ | $U_{\text{rel}}=0.2\%$  |      |    |
| 28 | D型邵氏硬度计     | 力值   | JJG 1039-2008 D型邵氏硬度计检定规程    | (0.1-50)N                               | $U_{\text{rel}}=0.3\%$  |      |    |
| 29 | 扭转试验机       | 扭矩   | JJG 269-2006 扭转试验机检定规程       | (0.001-5)N·m                            | $U_{\text{rel}}=1.2\%$  |      |    |
| 30 | 静态扭矩测量仪     | 扭矩   | JJG 995-2005 静态扭矩测量仪检定规程     | (0.001-500)N·m                          | $U_{\text{rel}}=0.3\%$  |      |    |
| 31 | 活塞压力计       | 长度   | JJG 59-2007 活塞压力计检定规程        | (0-10)mm                                | $U=0.02\text{mm}$       |      |    |
|    |             | 质量   |                              | (0.01-6.2)kg                            | $U=0.15\text{g}$        |      |    |
| 32 | 轮胎压力表       | 压强   | JJG 927-2013 轮胎压力表检定规程       | (0.6~2.5)Mpa                            | $U_{\text{rel}}=0.22\%$ |      |    |
| 33 | 空盒气压表和空盒气压表 | 压强   | JJG 272-2007 空盒气压表和空盒气压表检定规程 | (800-1060)hPa                           | $U=1.0\text{hPa}$       |      |    |



| 序号 | 测量仪器名称              | 校准参量 | 规范代号(含年号)名称                         | 测量范围         | 扩展不确定度(k=2)      | 限制说明 | 备注 |
|----|---------------------|------|-------------------------------------|--------------|------------------|------|----|
| 34 | 压力变送器               | 压强   | JJG 882-2004 压力变送器检定规程              | (0~40)Mpa    | $U=0.06\%FS$     |      |    |
| 35 | 压力传感器(静态)           | 压强   | JJG 860-1994 压力传感器(静态)检定规程          | (0~60)MPa    | $U=0.06\%FS$     |      |    |
| 36 | 数字压力计               | 压强   | JJG 875-2005 数字压力计检定规程              | (-0.1~60)MPa | $U=0.06\%FS$     |      |    |
| 37 | 弹性元件式精密压力表和真空表      | 压强   | JJG 49-2013 弹性元件式精密压力表和真空表检定规程      | (-0.1~60)MPa | $U=0.06\%FS$     |      |    |
| 38 | 倾斜式微压计              | 压强   | JJG 172-2011 倾斜式微压计检定规程             | (10~2000)Pa  | $U_{rel}=0.65\%$ |      |    |
| 39 | 轻便磁感风向风速表           | 压强   | JJG 515-1987 轻便磁感风向风速表检定规程          | (1~500)Pa    | $U_{rel}=0.65\%$ |      |    |
| 40 | 沥青混合料和水泥混凝土搅拌设备计量系统 | 质量   | JJG(交通)071-2006 沥青混合料和水泥混凝土搅拌设备计量系统 | (1~5000)kg   | $U_{rel}=0.08\%$ |      |    |
| 41 | 水泥胶砂振动台             | 振幅   | JJG 918-1996 水泥胶砂振动台检定规程            | (0.1~2)m     | $U_{rel}=3\%$    |      |    |
|    |                     | 频率   |                                     | (20~100)Hz   | $U_{rel}=0.1\%$  |      |    |
|    |                     | 时间   |                                     | (0~1800)s    | $U=0.28s$        |      |    |
| 42 | 胶砂试体成型振实台           | 时间   | JJG(建材)124-1999 胶砂试体成型振实台检定规程       | (0~3)min     | $U=0.28s$        |      |    |
|    |                     | 长度   |                                     | (0~800)mm    | $U=0.1mm$        |      |    |
|    |                     | 质量   |                                     | (0.1~50)kg   | $U_{rel}=0.3\%$  |      |    |
| 43 | 非金属建材塑限测定仪          | 质量   | JJF 1090-2002 非金属建材塑限测定仪校准规范        | (0~500)g     | $U=0.01g$        |      |    |

| 序号 | 测量仪器名称         | 校准参量 | 规范代号(含年号)名称                            | 测量范围                       | 扩展不确定度( $k=2$ )                | 限制说明 | 备注 |
|----|----------------|------|--|----------------------------|--------------------------------|------|----|
| 43 | 非金属建材塑限测定仪     | 角度   | JJF 1090-2002<br>非金属建材塑限测定仪校准规范        | (0~360)<br>°               | $U=0.2^\circ$                  |      |    |
|    |                | 长度   |  | (0~300)m<br>m              | $U=0.02\text{mm}$              |      |    |
| 44 | 雷氏夹及雷氏夹膨胀测定仪   | 长度   | JJG(交通)<br>093-2009 雷氏夹及雷氏夹膨胀测定仪检定规程   | (0~300)mm                  | $U=0.02\text{mm}$              |      |    |
|    |                | 质量   |  | (0~500)g                   | $U=20\text{mg}$                |      |    |
| 45 | 土工击实仪          | 长度   | JJG(交通)058-2004 土工击实仪检定规程              | (0~600)mm                  | $U=0.04\text{mm}-0.2\text{mm}$ |      |    |
|    |                | 质量   |  | (0~5000)g                  | $U=1.3\text{g}$                |      |    |
| 46 | 泥浆密度计          | 密度   | JJG 1045-2008<br>泥浆密度计检定规程             | (0.1~10) g/cm <sup>3</sup> | $U=0.0003\text{g/cm}^3$        |      |    |
| 47 | 混凝土贯入阻力测定仪     | 力值   | JJG(交通)<br>095-2009 混凝土贯入阻力测定仪检定规程     | (1-5000)<br>N              | $U_{\text{rel}}=0.3\%$         |      |    |
|    |                | 长度   |  | (0~300)m<br>m              | $U=0.02\text{mm}$              |      |    |
| 48 | 勃氏透气比表面积仪      | 长度   | JJG(建材)<br>107-1999 勃氏透气比表面积仪检定规程      | (0~300)m<br>m              | $U=0.02\text{mm}$              |      |    |
| 49 | 水泥混凝土拌合物含气量测定仪 | 质量   | JJG(交通)<br>094-2009 水泥混凝土拌合物含气量测定仪检定规程 | (0~30)kg                   | $U=0.5\text{g}$                |      |    |
|    |                | 压强   |  | (0~0.6)MPa                 | $U=0.25\%FS$                   |      |    |
| 50 | 回弹仪            | 率定值  | JJG 817-2011 回弹仪检定规程                   | 0~100                      | $U=0.3$                        |      |    |
| 51 | 烘干法水分测定仪       | 质量   | JJG 658-2010 烘干法水分测定仪检定规程              | (0~10)g                    | $U=1\text{mg}$                 |      |    |

| 序号   | 测量仪器名称     | 校准参量                          | 规范代号(含年号)名称                  | 测量范围                           | 扩展不确定度(k=2)             | 限制说明 | 备注 |
|------|------------|-------------------------------|------------------------------|--------------------------------|-------------------------|------|----|
| 51   | 烘干法水分测定仪   | 温度                            | JJG 658-2010 烘干法水分测定仪检定规程    | (0-200) °C                     | $U=0.6^{\circ}\text{C}$ |      |    |
| 52   | 电液伺服万能试验机  | 力值                            | JJG 1063-2010 电液伺服万能试验机检定规程  | (5-3000) kN                    | $U_{\text{rel}}=0.3\%$  |      |    |
|      |            | 长度                            |                              | (0-2000) mm                    | $U=1\text{mm}$          |      |    |
| 53   | 液压千斤顶      | 力值                            | JJG 621-2012 液压千斤顶检定规程       | (5-2000) kN                    | $U_{\text{rel}}=0.4\%$  |      |    |
| 54   | 锚固试验机      | 力值                            | JJG 1083-2013 锚固试验机检定规程      | (5-3000) kN                    | $U_{\text{rel}}=0.4\%$  |      |    |
|      |            | 长度                            |                              | (0-100) m                      | $U=0.03\text{mm}$       |      |    |
| 55   | 离心式恒加速度试验机 | 转速                            | JJG 972-2002 离心式恒加速度试验机检定规程  | (100-1000) r/min               | $U_{\text{rel}}=0.2\%$  |      |    |
| 56   | 大气采样器      | 流量                            | JJG 956-2013 大气采样器           | (50-5000) mL/min               | $U_{\text{rel}}=1.5\%$  |      |    |
| 57   | 浮子流量计(气体)  | 流量                            | JJG 257-2007 浮子流量计           | (50-5000) mL/min               | $U_{\text{rel}}=1.4\%$  |      |    |
| 四、电学 |            |                               |                              |                                |                         |      |    |
| 1    | 交直流电流表     | 直流电流                          | JJG 124-2005 电流表、电压表、功率表及电阻表 | (0.01-329.999) mA              | $U_{\text{rel}}=0.03\%$ |      |    |
|      |            |                               |                              | 330 mA-10.9999 A               | $U_{\text{rel}}=0.06\%$ |      |    |
|      |            |                               |                              | 11 A-50 A                      | $U_{\text{rel}}=0.12\%$ |      |    |
|      |            | 交流电流                          |                              | 190 μA-3.2999 mA (45 Hz-1 kHz) | $U_{\text{rel}}=0.15\%$ |      |    |
|      |            | 3.3 mA-2.9999 A (45 Hz-1 kHz) |                              | $U_{\text{rel}}=0.07\%$        |                         |      |    |
|      |            | 3 A-50 A (45 Hz-1 kHz)        |                              | $U_{\text{rel}}=0.12\%$        |                         |      |    |

| 序号 | 测量仪器名称 | 校准参量 | 规范代号(含年号)名称                     | 测量范围   | 扩展不确定度( $k=2$ )    | 限制说明 | 备注 |
|----|--------|------|---------------------------------|--|--------------------|------|----|
| 2  | 交直流电压表 | 直流电压 | JJG 124-2005<br>电流表、电压表、功率表及电阻表 | 10mV~100<br>0V   | $U_{rel} = 0.03\%$ |      |    |
|    |        | 交流电压 |                                 | 10mV~100<br>0V<br>(45Hz~10<br>kHz)   | $U_{rel} = 0.04\%$ |      |    |
| 3  | 交直流功率表 | 功率   | JJG 124-2005<br>电流表、电压表、功率表及电阻表 | DCV: 33mV<br>~1000V<br>DCI: 0.33<br>mA~2.999<br>9A                         | $U_{rel} = 0.04\%$ |      |    |
|    |        |      |                                 | DCV: 33mV<br>~1000V<br>DCI: 3A~2<br>0.5A                                   | $U_{rel} = 0.07\%$ |      |    |
|    |        |      |                                 | ACV: 0.33<br>V~1000V<br>ACI: 3.3m<br>A<br>~2.99999<br>A<br>(45Hz~65<br>Hz) | $U_{rel} = 0.08\%$ |      |    |
|    |        |      |                                 | ACV: 3.3V<br>~1000V<br>ACI: 33mA<br>~2.99999<br>A<br>(45Hz~1k<br>Hz)       | $U_{rel} = 0.08\%$ |      |    |
|    |        |      |                                 | ACV: 3.3V<br>~1000V<br>ACI: 3A~2<br>0.5A<br>(45Hz~1k<br>Hz)                | $U_{rel} = 0.15\%$ |      |    |

| 序号 | 测量仪器名称  | 校准参量 | 规范代号(含年号)名称                     | 测量范围                                       | 扩展不确定度( $k=2$ )           | 限制说明 | 备注 |
|----|---------|------|---------------------------------|--|---------------------------|------|----|
| 3  | 交直流功率表  | 功率因数 | JJG 124-2005<br>电流表、电压表、功率表及电阻表 | PF=1~0.2<br>(45Hz~65 Hz)                   | $U_{rel}=0.08\%-0.9\%$    |      |    |
| 4  | 电阻表     | 电阻   | JJG 124-2005<br>电流表、电压表、功率表及电阻表 | $1\Omega \sim 1M\Omega$                    | $U_{rel} = 0.03\%$        |      |    |
| 5  | 直流数字电流表 | 电流   | JJG 598-1989 直流数字电流表(试行)        | (10~329.999) $\mu$ A                       | $U=0.018\%I_X+0.022\mu$ A |      |    |
|    |         |      |                                 | 0.33mA~3.29999mA                           | $U=0.012\%I_X+0.055\mu$ A |      |    |
|    |         |      |                                 | 3.3mA~32.9999mA                            | $U=0.012\%I_X+0.28\mu$ A  |      |    |
|    |         |      |                                 | 33mA~329.999mA                             | $U=0.012\%I_X+2.8\mu$ A   |      |    |
|    |         |      |                                 | 0.33A~1.09999A                             | $U=0.024\%I_X+44\mu$ A    |      |    |
|    |         |      |                                 | 1.1A~2.9999A                               | $U=0.046\%I_X+44\mu$ A    |      |    |
|    |         |      |                                 | 3A~10.999A                                 | $U=0.06\%I_X+0.55$ mA     |      |    |
|    |         |      |                                 | 11A~20.5A                                  | $U=0.12\%I_X+0.83$ mA     |      |    |
|    |         |      |                                 | 20.5A~50A                                  | $U=0.12\%I_X+1$ mA        |      |    |
| 6  | 交流数字电流表 | 电流   | JJG(航天) 35-1999 交流数字电流表 检定规程    | 190 $\mu$ A~329.99 $\mu$ A<br>(10Hz~20 Hz) | $U=0.24\%I_X+0.11\mu$ A   |      |    |
|    |         |      |                                 | 190 $\mu$ A~329.99 $\mu$ A<br>(20Hz~45 Hz) | $U=0.18\%I_X+0.11\mu$ A   |      |    |
|    |         |      |                                 | 190 $\mu$ A~329.99 $\mu$ A<br>(45Hz~1k Hz) | $U=0.15\%I_X+0.11\mu$ A   |      |    |

| 序号 | 测量仪器名称  | 校准参量 | 规范代号(含年号)名称                           | 测量范围  | 扩展不确定度( $k=2$ )                | 限制说明 | 备注 |
|----|---------|------|---------------------------------------|---|--------------------------------|------|----|
| 6  | 交流数字电流表 | 电流   | JJG(航天)<br>35-1999<br>交流数字电流表<br>检定规程 | 190 $\mu$ A~32<br>9.99 $\mu$ A<br>(1kHz~5k<br>Hz)   | $U=0.36\%I_X+0$<br>.17 $\mu$ A |      |    |
|    |         |      |                                       | 190 $\mu$ A~32<br>9.99 $\mu$ A<br>(5kHz~10<br>kHz)  | $U=1.0\%I_X+0$<br>22 $\mu$ A   |      |    |
|    |         |      |                                       | 190 $\mu$ A~32<br>9.99 $\mu$ A<br>(10kHz~3<br>0kHz) | $U=1.9\%I_X+0$<br>44 $\mu$ A   |      |    |
|    |         |      |                                       | 0.33mA~3<br>.2999mA<br>(10Hz~20<br>Hz)              | $U=0.24\%I_X+0$<br>.17 $\mu$ A |      |    |
|    |         |      |                                       | 0.33mA~3<br>.2999mA<br>(20Hz~45<br>Hz)              | $U=0.15\%I_X+0$<br>.17 $\mu$ A |      |    |
|    |         |      |                                       | 0.33mA~3<br>.2999mA<br>(45Hz~1k<br>Hz)              | $U=0.12\%I_X+0$<br>.17 $\mu$ A |      |    |
|    |         |      |                                       | 0.33mA~3<br>.2999mA<br>(1kHz~5k<br>Hz)              | $U=0.24\%I_X+0$<br>.22 $\mu$ A |      |    |
|    |         |      |                                       | 0.33mA~3<br>.2999mA<br>(5kHz~10<br>kHz)             | $U=0.6\%I_X+0$<br>33 $\mu$ A   |      |    |
|    |         |      |                                       | 0.33mA~3<br>.2999mA<br>(10kHz~3<br>0kHz)            | $U=1.2\%I_X+0$<br>66 $\mu$ A   |      |    |
|    |         |      |                                       | 3.3mA~32<br>.999mA<br>(10Hz~20<br>Hz)               | $U=0.22\%I_X+2$<br>.2 $\mu$ A  |      |    |

| 序号 | 测量仪器名称  | 校准参量 | 规范代号(含年号)名称                           | 测量范围                            | 扩展不确定度( $k=2$ )         | 限制说明 | 备注 |
|----|---------|------|---------------------------------------|---------------------------------|-------------------------|------|----|
| 6  | 交流数字电流表 | 电流   | JJG(航天)<br>35-1999<br>交流数字电流表<br>检定规程 | 3.3mA~32.999mA<br>(20Hz~45Hz)   | $U=0.11\%I_x+2.2\mu A$  |      |    |
|    |         |      |                                       | 3.3mA~32.999mA<br>(45Hz~1kHz)   | $U=0.048\%I_x+2.2\mu A$ |      |    |
|    |         |      |                                       | 3.3mA~32.999mA<br>(1kHz~5kHz)   | $U=0.12\%I_x+2.2\mu A$  |      |    |
|    |         |      |                                       | 3.3mA~32.999mA<br>(5kHz~10kHz)  | $U=0.24\%I_x+3.3\mu A$  |      |    |
|    |         |      |                                       | 3.3mA~32.999mA<br>(10kHz~30kHz) | $U=0.48\%I_x+4.4\mu A$  |      |    |
|    |         |      |                                       | 33mA~329.99mA<br>(10Hz~20Hz)    | $U=0.22\%I_x+2.2\mu A$  |      |    |
|    |         |      |                                       | 33mA~329.99mA<br>(20Hz~45Hz)    | $U=0.11\%I_x+2.2\mu A$  |      |    |
| 6  | 交流数字电流表 | 电流   | JJG(航天)<br>35-1999<br>交流数字电流表<br>检定规程 | 33mA~329.99mA<br>(45Hz~1kHz)    | $U=0.048\%I_x+22\mu A$  |      |    |
|    |         |      |                                       | 33mA~329.99mA<br>(1kHz~5kHz)    | $U=0.12\%I_x+5\mu A$    |      |    |
|    |         |      |                                       | 33mA~329.99mA<br>(5kHz~10kHz)   | $U=0.24\%I_x+0.11mA$    |      |    |

| 序号 | 测量仪器名称  | 校准参量 | 规范代号(含年号)名称                           | 测量范围                               | 扩展不确定度( $k=2$ )      | 限制说明 | 备注 |
|----|---------|------|---------------------------------------|------------------------------------|----------------------|------|----|
| 6  | 交流数字电流表 | 电流   | JJG(航天)<br>35-1999<br>交流数字电流表<br>检定规程 | 33mA-329<br>.99mA<br>(10kHz-30kHz) | $U=0.48\%I_X+0.22mA$ |      |    |
|    |         |      |                                       | 0.33A-1.09999A<br>(10Hz-45Hz)      | $U=0.22\%I_X+0.11mA$ |      |    |
|    |         |      |                                       | 0.33A-1.09999A<br>(45Hz-1kHz)      | $U=0.06\%I_X+0.11mA$ |      |    |
|    |         |      |                                       | 0.33A-1.09999A<br>(1kHz-5kHz)      | $U=0.7\%I_X+1.1mA$   |      |    |
|    |         |      |                                       | 0.33A-1.09999A<br>(5kHz-10kHz)     | $U=3\%I_X+5.5mA$     |      |    |
|    |         |      |                                       | 1.1A-2.99999A<br>(10Hz-45Hz)       | $U=0.22\%I_X+0.11mA$ |      |    |
|    |         |      |                                       | 1.1A-2.99999A<br>(45Hz-1kHz)       | $U=0.07\%I_X+0.11mA$ |      |    |
|    |         |      |                                       | 1.1A-2.99999A<br>(1kHz-5kHz)       | $U=0.7\%I_X+1.1mA$   |      |    |
|    |         |      |                                       | 1.1A-2.99999A<br>(5kHz-10kHz)      | $U=3\%I_X+5.5mA$     |      |    |
|    |         |      |                                       | 3A-10.9999A<br>(45Hz-100Hz)        | $U=0.07\%I_X+2.2mA$  |      |    |



| 序号 | 测量仪器名称  | 校准参量 | 规范代号(含年号)名称                           | 测量范围                                  | 扩展不确定度( $k=2$ )                 | 限制说明 | 备注 |
|----|---------|------|---------------------------------------|---------------------------------------|---------------------------------|------|----|
| 6  | 交流数字电流表 | 电流   | JJG(航天)<br>35-1999<br>交流数字电流表<br>检定规程 | 3A-10.99<br>99A<br>(100Hz-1<br>kHz)   | $U=0.12\%I_x+2$<br>.2mA         |      |    |
|    |         |      |                                       | 3A-10.99<br>99A<br>(1kHz-5k<br>Hz)    | $U=3.6\%I_x+2$<br>2mA           |      |    |
|    |         |      |                                       | 11A-20.5<br>A<br>(45Hz-10<br>0Hz)     | $U=0.14\%I_x+5$<br>.5mA         |      |    |
|    |         |      |                                       | 11A-20.5<br>A<br>(100Hz-1<br>kHz)     | $U=0.18\%I_x+5$<br>.5mA         |      |    |
|    |         |      |                                       | 11A-20.5<br>A<br>(1kHz-5k<br>Hz)      | $U=3.6\%I_x+5$<br>5mA           |      |    |
|    |         |      |                                       | 20.5A-50<br>A<br>(45Hz-1k<br>Hz)      | $U=0.18\%I_x+2$<br>8mA          |      |    |
| 7  | 直流数字电压表 | 电压   | JJG 315-1983<br>直流数字电压表               | (10-329.<br>9999)mV                   | $U=0.0024\%U_x$<br>+1.1 $\mu$ V |      |    |
|    |         |      |                                       | 0.33V-3.<br>299999V                   | $U=0.0013\%U_x$<br>+2.2 $\mu$ V |      |    |
|    |         |      |                                       | 3.3V-32.<br>99999V                    | $U=0.0014\%U_x$<br>+22 $\mu$ V  |      |    |
|    |         |      |                                       | 33V-329.<br>9999V                     | $U=0.0022\%U_x$<br>+0.17mV      |      |    |
|    |         |      |                                       | 330V-100<br>0.000V                    | $U=0.0022\%U_x$<br>+1.7mV       |      |    |
| 8  | 交流数字电压表 | 电压   | JJG(航天)<br>34-1999<br>交流数字电压表<br>检定规程 | 10mV-32.<br>999mV<br>(10Hz-45<br>Hz)  | $U=0.10\%U_x+6$<br>.6 $\mu$ V   |      |    |
|    |         |      |                                       | 10mV-32.<br>999mV<br>(45Hz-10<br>kHz) | $U=0.018\%U_x+$<br>6.6 $\mu$ V  |      |    |

| 序号 | 测量仪器名称  | 校准参量 | 规范代号(含年号)名称                           | 测量范围                              | 扩展不确定度(k=2)                | 限制说明 | 备注 |
|----|---------|------|---------------------------------------|-----------------------------------|----------------------------|------|----|
| 8  | 交流数字电压表 | 电压   | JJG(航天)<br>34-1999<br>交流数字电压表<br>检定规程 | 10mV~32.999mV<br>(10kHz~20kHz)    | $U=0.024\%U_{X+}+6.6\mu V$ |      |    |
|    |         |      |                                       | 10mV~32.999mV<br>(20kHz~50kHz)    | $U=0.12\%U_{X+}+6.6\mu V$  |      |    |
|    |         |      |                                       | 10mV~32.999mV<br>(50kHz~100kHz)   | $U=0.42\%U_{X+}+3\mu V$    |      |    |
|    |         |      |                                       | 10mV~32.999mV<br>(100kHz~500kHz)  | $U=1.0\%U_{X+}+55\mu V$    |      |    |
|    |         |      |                                       | 33mV~329.999mV<br>(10Hz~45Hz)     | $U=0.036\%U_{X+}+8.8\mu V$ |      |    |
|    |         |      |                                       | 33mV~329.999mV<br>(45Hz~10kHz)    | $U=0.017\%U_{X+}+8.8\mu V$ |      |    |
|    |         |      |                                       | 33mV~329.999mV<br>(10kHz~20kHz)   | $U=0.019\%U_{X+}+8.8\mu V$ |      |    |
| 8  | 交流数字电压表 | 电压   | JJG(航天)<br>34-1999<br>交流数字电压表<br>检定规程 | 33mV~329.999mV<br>(20kHz~50kHz)   | $U=0.042\%U_{X+}+8.8\mu V$ |      |    |
|    |         |      |                                       | 33mV~329.999mV<br>(50kHz~100kHz)  | $U=0.10\%U_{X+}+35\mu V$   |      |    |
|    |         |      |                                       | 33mV~329.999mV<br>(100kHz~500kHz) | $U=0.24\%U_{X+}+7\mu V$    |      |    |

| 序号 | 测量仪器名称  | 校准参量 | 规范代号(含年号)名称                           | 测量范围                              | 扩展不确定度(k=2)                     | 限制说明 | 备注 |
|----|---------|------|---------------------------------------|-----------------------------------|---------------------------------|------|----|
| 8  | 交流数字电压表 | 电压   | JJG(航天)<br>34-1999<br>交流数字电压表<br>检定规程 | 0.33V~3.29999V<br>(10Hz~45Hz)     | $U=0.036\%U_{X+}$<br>55 $\mu$ V |      |    |
|    |         |      |                                       | 0.33V~3.29999V<br>(45Hz~10kHz)    | $U=0.018\%U_{X+}$<br>66 $\mu$ V |      |    |
|    |         |      |                                       | 0.33V~3.29999V<br>(10kHz~20kHz)   | $U=0.023\%U_{X+}$<br>66 $\mu$ V |      |    |
|    |         |      |                                       | 0.33V~3.29999V<br>(20kHz~50kHz)   | $U=0.036\%U_{X+}$<br>55 $\mu$ V |      |    |
|    |         |      |                                       | 0.33V~3.29999V<br>(50kHz~100kHz)  | $U=0.084\%U_{X+}$<br>0.14mV     |      |    |
|    |         |      |                                       | 0.33V~3.29999V<br>(100kHz~500kHz) | $U=0.29\%U_{X+}$<br>0.66mV      |      |    |
|    |         |      |                                       | 3.3V~32.9999V<br>(10Hz~45Hz)      | $U=0.036\%U_{X+}$<br>0.72mV     |      |    |
|    |         |      |                                       | 3.3V~32.9999V<br>(45Hz~10kHz)     | $U=0.018\%U_{X+}$<br>0.66mV     |      |    |
|    |         |      |                                       | 3.3V~32.9999V<br>(10kHz~20kHz)    | $U=0.029\%U_{X+}$<br>0.66mV     |      |    |
|    |         |      |                                       | 3.3V~32.9999V<br>(20kHz~50kHz)    | $U=0.042\%U_{X+}$<br>0.66mV     |      |    |

| 序号 | 测量仪器名称        | 校准参量 | 规范代号(含年号)名称                                      | 测量范围                            | 扩展不确定度( $k=2$ )             | 限制说明 | 备注 |
|----|---------------|------|--|---------------------------------|-----------------------------|------|----|
| 8  | 交流数字电压表       | 电压   | JJG(航天)<br>34-1999<br>交流数字电压表<br>检定规程            | 3.3V~32.9999V<br>(50kHz~100kHz) | $U=0.11\%U_x+1.8\text{mV}$  |      |    |
|    |               |      |  | 33V~329.999V<br>(10Hz~45Hz)     | $U=0.023\%U_x+2.2\text{mV}$ |      |    |
|    |               |      |  | 33V~329.999V<br>(45Hz~10kHz)    | $U=0.024\%U_x+6.6\text{mV}$ |      |    |
|    |               |      |  | 33V~329.999V<br>(10kHz~20kHz)   | $U=0.030\%U_x+6.6\text{mV}$ |      |    |
|    |               |      |  | 33V~329.999V<br>(20kHz~50kHz)   | $U=0.036\%U_x+6.6\text{mV}$ |      |    |
|    |               |      |  | 33V~329.999V<br>(50kHz~100kHz)  | $U=0.24\%U_x+5.5\text{mV}$  |      |    |
|    |               |      |  | 330V~1000V<br>(10Hz~1kHz)       | $U=0.036\%U_x+11\text{mV}$  |      |    |
|    |               |      |  | 33V~329.999V<br>(1kHz~5kHz)     | $U=0.030\%U_x+11\text{mV}$  |      |    |
|    |               |      |  | 33V~329.999V<br>(5kHz~10kHz)    | $U=0.036\%U_x+11\text{mV}$  |      |    |
| 9  | 直流数字式欧姆表(电阻表) | 直流电阻 | JJG 724-1991<br>直流数字欧姆表<br>JJG 837-2003<br>直流低电阻 | 0.1m $\Omega$ ~10.9999 $\Omega$ | $U_{\text{rel}}=0.010\%$    |      |    |
|    |               |      |  | 11 $\Omega$ ~330k $\Omega$      | $U_{\text{rel}}=0.003\%$    |      |    |

| 序号 | 测量仪器名称        | 校准参量 | 规范代号(含年号)名称  | 测量范围  | 扩展不确定度( $k=2$ )   | 限制说明 | 备注 |
|----|---------------|------|--|---|-------------------|------|----|
| 9  | 直流数字式欧姆表(电阻表) | 直流电阻 | JIG 724-1991<br>直流数字欧姆表<br>JIG 837-2003<br>直流低电阻   | 330k $\Omega$ ~3<br>.3M $\Omega$                                    | $U_{rel}=0.003\%$ |      |    |
|    |               |      |  | 3.3M $\Omega$ ~3<br>3M $\Omega$                                     | $U_{rel}=0.013\%$ |      |    |
|    |               |      |  | 33M $\Omega$ ~33<br>0M $\Omega$                                     | $U_{rel}=0.12\%$  |      |    |
|    |               |      |  | 330M $\Omega$ ~1<br>100M $\Omega$                                   | $U_{rel}=0.6\%$   |      |    |
| 10 | 交流数字功率表       | 功率   | JIG 780-1992<br>交流数字功率表<br>JIG 440-2008<br>工频单相相位表 | 3.3mA~8.<br>999mA<br>(0.33V~<br>1000V, 45<br>Hz<br>~65Hz, PF<br>=1) | $U_{rel}=0.15\%$  |      |    |
|    |               |      |  | 9mA~32.9<br>99mA<br>(0.33V~<br>1000V, 45<br>Hz<br>~65Hz, PF<br>=1)  | $U_{rel}=0.10\%$  |      |    |
|    |               |      |  | 33mA~89.<br>99mA<br>(0.33V~<br>1000V, 45<br>Hz<br>~65Hz, PF<br>=1)  | $U_{rel}=0.15\%$  |      |    |
|    |               |      |  | 90mA~329<br>.99mA<br>(0.33V~<br>1000V, 45<br>Hz<br>~65Hz, PF<br>=1) | $U_{rel}=0.10\%$  |      |    |

| 序号 | 测量仪器名称  | 校准参量 | 规范代号(含年号)名称  | 测量范围   | 扩展不确定度( $k=2$ )  | 限制说明 | 备注 |
|----|---------|------|--|--|------------------|------|----|
| 10 | 交流数字功率表 | 功率   | JJG 780-1992<br>交流数字功率表<br>JJG 440-2008<br>工频单相相位表 | 0.33A-0.8999A<br>(0.33V-1000V, 45 Hz<br>~65Hz, PF=1) | $U_{rel}=0.13\%$ |      |    |
|    |         |      |  | 0.9A-2.1999A<br>(0.33V-1000V, 45 Hz<br>~65Hz, PF=1)  | $U_{rel}=0.11\%$ |      |    |
|    |         |      |  | 2.2A-4.4999mA<br>(0.33V-1000V, 45 Hz<br>~65Hz, PF=1) | $U_{rel}=0.15\%$ |      |    |
|    |         |      |  | 4.5A-20.5A<br>(0.33V-1000V, 45 Hz<br>~65Hz, PF=1)    | $U_{rel}=0.12\%$ |      |    |
|    |         |      |  | 33mA-89.99mA<br>(3.3V-1000V, 65Hz<br>~1kHz, PF=1)    | $U_{rel}=0.15\%$ |      |    |
|    |         |      |  | 90mA-329.99mA<br>(3.3V-1000V, 65Hz<br>~1kHz, PF=1)   | $U_{rel}=0.10\%$ |      |    |

| 序号 | 测量仪器名称  | 校准参量 | 规范代号(含年号)名称  | 测量范围  | 扩展不确定度( $k=2$ )  | 限制说明 | 备注 |
|----|---------|------|--|---|------------------|------|----|
| 10 | 交流数字功率表 | 功率   | JIG 780-1992<br>交流数字功率表<br>JIG 440-2008<br>工频单相相位表 | 0.33A-0.8999A<br>(3.3V-1000V, 65Hz<br>Z<br>~1kHz, PF=1) | $U_{rel}=0.13\%$ |      |    |
|    |         |      |  | 0.9A-2.1999A<br>(3.3V-1000V, 65Hz<br>Z<br>~1kHz, PF=1)  | $U_{rel}=0.11\%$ |      |    |
|    |         |      |  | 2.2A-4.4999mA<br>(3.3V-1000V, 65Hz<br>Z<br>~1kHz, PF=1) | $U_{rel}=0.15\%$ |      |    |
| 10 | 交流数字功率表 | 功率   | JIG 780-1992<br>交流数字功率表<br>JIG 440-2008<br>工频单相相位表 | 4.5A-20.5A<br>(3.3V-1000V, 65Hz<br>Z<br>~1kHz, PF=1)    | $U_{rel}=0.12\%$ |      |    |
|    |         |      |  | 9mA-32.999mA<br>(3.3V-1000V, 1kHz<br>Z<br>~5kHz, PF=1)  | $U_{rel}=0.3\%$  |      |    |
|    |         |      |  | 33mA-89.999mA<br>(3.3V-1000V, 1kHz<br>Z<br>~5kHz, PF=1) | $U_{rel}=0.6\%$  |      |    |

| 序号 | 测量仪器名称  | 校准参量 | 规范代号(含年号)名称  | 测量范围   | 扩展不确定度(k=2)              | 限制说明                    | 备注             |  |  |
|----|---------|------|--|--|--------------------------|-------------------------|----------------|--|--|
| 10 | 交流数字功率表 | 功率   | JIG 780-1992<br>交流数字功率表<br>JIG 440-2008<br>工频单相相位表 | 90mA-329.99mA<br>(3.3V-1000V, 1kHz<br>Z<br>~5kHz, PF=1)  | $U_{rel}=0.4\%$          |                         |                |  |  |
|    |         |      |  | 9mA-32.999mA<br>(3.3V-1000V, 5kHz<br>Z<br>~10kHz, PF=1)  | $U_{rel}=0.4\%$          |                         |                |  |  |
|    |         |      |  | 33mA-89.99mA<br>(3.3V-1000V, 5kHz<br>Z<br>~10kHz, PF=1)  | $U_{rel}=0.8\%$          |                         |                |  |  |
|    |         |      |  | 90mA-329.99mA<br>(3.3V-1000V, 5kHz<br>Z<br>~10kHz, PF=1) | $U_{rel}=0.5\%$          |                         |                |  |  |
|    |         |      |  | 相位   |                          | 0° ~360°<br>(45Hz-65Hz) | $U=0.15^\circ$ |  |  |
|    |         |      |  |  | 0° ~360°<br>(65Hz-500Hz) | $U=0.3^\circ$           |                |  |  |
|    |         |      |  |  | 0° ~360°<br>(500Hz-1kHz) | $U=0.6^\circ$           |                |  |  |
|    |         |      |  |  |                          |                         |                |  |  |



| 序号 | 测量仪器名称  | 校准参量 | 规范代号(含年号)名称  | 测量范围                             | 扩展不确定度( $k=2$ )  | 限制说明 | 备注 |
|----|---------|------|--|----------------------------------|------------------|------|----|
| 10 | 交流数字功率表 | 相位   | JJG 780-1992<br>交流数字功率表<br>JJG 440-2008<br>工频单相相位表 | 0° ~360°<br>(65Hz~500Hz)         | $U=3^\circ$      |      |    |
|    |         |      |  | 0° ~360°<br>(500Hz~1kHz)         | $U=6^\circ$      |      |    |
| 11 | 钳型电流表   | 直流电流 | JJF 1075-2001<br>钳形电流表校准规范                         | 10 $\mu$ A~20.5A                 | $U_{rel}=0.10\%$ |      |    |
|    |         |      |  | >20.5A~1000A                     | $U_{rel}=0.14\%$ |      |    |
|    |         | 交流电流 |  | 190 $\mu$ A~20.5A<br>(45Hz~1kHz) | $U_{rel}=0.15\%$ |      |    |
|    |         |      |  | >20.5A~1000A<br>(45Hz~1kHz)      | $U_{rel}=0.18\%$ |      |    |
| 12 | 耐电压测试仪  | 交流电压 | JJG 795-2004<br>耐电压测试仪                             | (0.1~10)kV<br>(50Hz、60Hz)        | $U_{rel}=0.3\%$  |      |    |
|    |         |      |  | (10~200)kV<br>(50Hz、60Hz)        | $U_{rel}=0.6\%$  |      |    |
|    |         | 直流电压 |  | (0.1~10)kV                       | $U_{rel}=0.2\%$  |      |    |
|    |         |      |  | (10~200)kV                       | $k=0.5\%$        |      |    |
|    |         | 交流电流 |  | 10 $\mu$ A~3A<br>(50Hz、60Hz)     | $U_{rel}=0.4\%$  |      |    |
|    |         |      |  | 10 $\mu$ A~3A                    | $U_{rel}=0.2\%$  |      |    |
|    |         | 直流电流 |  | 10 $\mu$ A~3A                    | $U_{rel}=0.2\%$  |      |    |
|    |         | 时间   |  | (1~60)s                          | $U_{rel}=0.6\%$  |      |    |

| 序号 | 测量仪器名称      | 校准参量 | 规范代号(含年号)名称   | 测量范围                                  | 扩展不确定度(k=2)                       | 限制说明 | 备注 |
|----|-------------|------|---|---------------------------------------|-----------------------------------|------|----|
| 13 | 绝缘电阻表       | 电阻   | JJG 622-1997<br>绝缘电阻表(兆欧表)<br>JJG 1005-2005<br>电子式绝缘电阻表 | $10^3 \Omega \sim 10^8 \Omega$        | $U_{rel} = 0.11\%$                |      |    |
|    |             |      |   | $>10^8 \Omega \sim 10^9 \Omega$       | $U_{rel} = 0.24\%$                |      |    |
|    |             |      |   | $>10^9 \Omega \sim 10^{10} \Omega$    | $U_{rel} = 0.5\%$                 |      |    |
|    |             |      |   | $>10^{10} \Omega \sim 10^{11} \Omega$ | $U_{rel} = 1.0\%$                 |      |    |
|    |             | 电压   |   | (0.001~10)kV                          | $U_{rel} = 0.8\%$                 |      |    |
| 14 | 泄漏电流测量仪     | 直流电压 | JJG 843-2007<br>泄漏电流测试仪                                 | 1V~1000V                              | $U = 0.06\%U_X + 6 \text{ mV}$    |      |    |
|    |             | 交流电压 |   | 1V~1000V<br>(45Hz~1kHz)               | $U = 0.09\%U_X + 6 \text{ mV}$    |      |    |
|    |             | 直流电流 |   | 10 $\mu$ A~500mA                      | $U = 0.15\%I_X + 0.02\mu\text{A}$ |      |    |
|    |             | 交流电流 |   | 10 $\mu$ A~500mA<br>(45Hz~1kHz)       | $U = 0.26\%I_X + 0.05\mu\text{A}$ |      |    |
| 15 | 静电腕带/脚盘测试仪  | 阈值电阻 | JJF(电子)31502-2010<br>静电腕带/脚盘测试仪                         | 1k $\Omega$ ~200M $\Omega$            | $U_{rel} = 2.3\%$                 |      |    |
| 16 | 宽量程数字RLC测量仪 | 电阻   | GJB/J 5412-2005<br>宽量程数字RLC测量仪<br>检定规程                  | 0.01 $\Omega$ ~0.1 $\Omega$<br>(1kHz) | $U_{rel} = 2.0\% \sim 0.4\%$      |      |    |
|    |             |      |   | 0.1 $\Omega$ ~1 $\Omega$<br>(1kHz)    | $U_{rel} = 0.4\%$                 |      |    |
|    |             |      |   | 1 $\Omega$ ~10 $\Omega$<br>(1kHz)     | $U_{rel} = 0.10\%$                |      |    |
|    |             |      |   | 10 $\Omega$ ~100k $\Omega$<br>(1kHz)  | $U_{rel} = 0.03\%$                |      |    |

| 序号 | 测量仪器名称        | 校准参量  | 规范代号(含年号)名称                             | 测量范围                                | 扩展不确定度( $k=2$ )                    | 限制说明 | 备注 |
|----|---------------|-------|---|-------------------------------------|------------------------------------|------|----|
| 16 | 宽量程数字 RLC 测量仪 | 电感    | GJB/J 5412-2005<br>宽量程数字 RLC<br>测量仪检定规程 | 0.1 $\mu$ H~10<br>$\mu$ H<br>(1kHz) | $U_{rel}=0.11\%$                   |      |    |
|    |               |       |   | 10 $\mu$ H~10H<br>(1kHz)            | $U_{rel}=0.09\%$                   |      |    |
|    |               | 电容    |   | 1pF~1nF<br>(1kHz)                   | $U_{rel}=0.08\%$                   |      |    |
|    |               |       |   | 1nF~190<br>$\mu$ F<br>(1kHz)        | $U_{rel}=0.06\%$                   |      |    |
| 17 | 特斯拉计          | 磁感应强度 | JJG 242-1995<br>特斯拉计                    | (0.001~3<br>000)mT                  | $U_{rel}=0.10\%$                   |      |    |
| 18 | 接地导通电阻测试仪     | 电阻    | JJG 984-2004 接<br>地导通电阻测试<br>仪          | 0.01 $\Omega$ ~1<br>$\Omega$        | $U_{rel}=0.14\%$                   |      |    |
|    |               | 电流    |   | 1A~30A                              | $U_{rel}=0.14\%$                   |      |    |
| 19 | 接地电阻表         | 电阻    | JJG 366-2004 接<br>地电阻表                  | (0.01~1)<br>$\Omega$                | $U_{rel}=0.6\%$                    |      |    |
|    |               |       |   | (1~10) $\Omega$                     | $U_{rel}=0.14\%$                   |      |    |
|    |               |       |   | (10~1000<br>0) $\Omega$             | $U_{rel}=0.10\%$                   |      |    |
| 20 | 直流电阻箱<br>(器)  | 电阻    | JJG 982-2003 直<br>流电阻箱                  | 0.1m $\Omega$ ~1<br>$\Omega$        | $U_{rel}=$<br>0.07%~0.015<br>%     |      |    |
|    |               |       |   | >1 $\Omega$ ~10<br>$\Omega$         | $U=0.0018\%R_X$<br>+0.06m $\Omega$ |      |    |
|    |               |       |   | >10 $\Omega$ ~10<br>0 $\Omega$      | $U=0.0015\%R_X$<br>+0.6m $\Omega$  |      |    |
|    |               |       |   | >100 $\Omega$ ~1<br>k $\Omega$      | $U=0.0012\%R_X$<br>+0.6m $\Omega$  |      |    |
|    |               |       |   | >1k $\Omega$ ~10<br>k $\Omega$      | $U=0.0012\%R_X$<br>+6m $\Omega$    |      |    |
|    |               |       |   | >10k $\Omega$ ~1<br>00k $\Omega$    | $U=0.0012\%R_X$<br>+60m $\Omega$   |      |    |
|    |               |       |   | >100k $\Omega$ ~<br>1M $\Omega$     | $U=0.0018\%R_X$<br>+2.4 $\Omega$   |      |    |
|    |               |       |   | >1M $\Omega$ ~10<br>M $\Omega$      | $U=0.006\%R_X+$<br>0.12k $\Omega$  |      |    |
| 21 | 电池内阻测试仪       | 电阻    | HZH-WI E021-201<br>4 电池内阻测试<br>仪校准方法    | (0.1~100<br>00)m $\Omega$           | $U_{rel}=0.10\%$                   |      |    |

| 序号 | 测量仪器名称    | 校准参量   | 规范代号(含年号)名称                    | 测量范围                          | 扩展不确定度(k=2)               | 限制说明 | 备注 |
|----|-----------|--------|--------------------------------|-------------------------------|---------------------------|------|----|
| 21 | 电池内阻测试仪   | 直流电压   | HZH-WI E021-2014 电池内阻测试仪校准方法   | (0.1~1000)V                   | $U_{rel}=0.03\%$          |      |    |
| 22 | 电池综合测试仪   | 识别电阻   | HZH-WI E022-2014 电池综合测试仪校准方法   | (0.1~100)k $\Omega$           | $U_{rel}=0.15\%$          |      |    |
|    |           | 电流     |                                | 0.1A~10A                      | $U_{rel}=0.16\%$          |      |    |
|    |           | 电阻     |                                | (1~10000)m $\Omega$           | $U=0.10\%R_x+0.06m\Omega$ |      |    |
|    |           | 电压     |                                | (0.1~1000)V                   | $U_{rel}=0.03\%$          |      |    |
| 23 | 电池保护板测试仪  | 电流     | HZH-WI E023-2014 电池保护板测试仪校准方法  | 10 $\mu$ A~10A                | $U=0.16\%I_x+0.06\mu A$   |      |    |
|    |           | 电阻     |                                | (1~10000)m $\Omega$           | $U=0.10\%R_x+0.06m\Omega$ |      |    |
|    |           | 电压     |                                | (0.1~1000)V                   | $U_{rel}=0.03\%$          |      |    |
| 24 | 变压器电参数测试仪 | 交流电压   | HZH-WI E024-2014 变压器电参数测试仪校准方法 | (1~500)V<br>(45Hz~65Hz)       | $U_{rel}=0.14\%$          |      |    |
|    |           | 直流电压   |                                | (0.1~500)V                    | $U_{rel}=0.09\%$          |      |    |
|    |           | 交流电流   |                                | 10 $\mu$ A~10A<br>(45Hz~65Hz) | $U_{rel}=0.16\%$          |      |    |
|    |           | 直流电流   |                                | 10 $\mu$ A~10A                | $U_{rel}=0.10\%$          |      |    |
| 25 | 半导体管特性图示仪 | 电压偏转因数 | JJF 1236-2010 半导体管特性图示仪校准规范    | (0.001~500)V/div              | $U_{rel}=0.3\%$           |      |    |
|    |           | 电流偏转因数 |                                | 1 $\mu$ A/div<br>~5A/div      | $U_{rel}=0.3\%$           |      |    |
|    |           | 阶梯电压信号 |                                | (0.05~1)V                     | $U_{rel}=0.8\%$           |      |    |
|    |           | 阶梯电流信号 |                                | 1 $\mu$ A~200mA               | $U_{rel}=0.8\%$           |      |    |
| 26 | 直流稳压电源    | 电压     | JJG(航天) 6-1999 直流稳压电源检定规程      | 10mV~100mV                    | $U=0.0045\%U_x+4\mu V$    |      |    |

| 序号 | 测量仪器名称       | 校准参量 | 规范代号(含年号)名称  | 测量范围                       | 扩展不确定度( $k=2$ )          | 限制说明 | 备注 |
|----|--------------|------|--|----------------------------|--------------------------|------|----|
| 26 | 直流稳压电源       | 电压   | JJG(航天)<br>6-1999<br>直流稳压电源检定规程                                    | >100mV-1V                  | $U=0.0029\%U_X+8\mu V$   |      |    |
|    |              |      |  | >1V-10V                    | $U=0.0028\%U_X+60\mu V$  |      |    |
|    |              |      |  | >10V-100V                  | $U=0.0045\%U_X+66\mu V$  |      |    |
|    |              |      |  | >100V-1000V                | $U=0.0049\%U_X+0.011V$   |      |    |
|    |              | 电流   |  | 10 $\mu$ A-100 $\mu$ A     | $U=0.06\%I_X+0.028\mu A$ |      |    |
|    |              |      |  | 100 $\mu$ A-1mA            | $U=0.06\%I_X+0.055\mu A$ |      |    |
|    |              |      |  | 1mA-10mA                   | $U=0.06\%I_X+2.2\mu A$   |      |    |
|    |              |      |  | 10mA-100mA                 | $U=0.06\%I_X+5.5\mu A$   |      |    |
|    |              |      |  | 100mA-1A                   | $U=0.06\%I_X+0.22mA$     |      |    |
|    |              |      |  | 1A-3A                      | $U=0.012\%I_X+0.18mA$    |      |    |
|    |              |      |  | 3A-30A                     | $U=0.012\%I_X+1.8mA$     |      |    |
|    |              |      |  | 30A-300A                   | $U=0.024\%I_X+18mA$      |      |    |
|    |              | 纹波噪声 |  | 0.3mV-10V                  | $U_{rel}=6\%$            |      |    |
| 27 | 交流稳压电源(变频电源) | 电压   | JJG(航天)<br>51-1999<br>交流标准电流源<br>检定规程<br>JJG 410-1994<br>精密交流电压校准源 | 10mV-100mV<br>(10Hz-20kHz) | $U=0.072\%U_X+0.046mV$   |      |    |
|    |              |      |  | 100mV-1V<br>(10Hz-20kHz)   | $U=0.072\%U_X+0.35mV$    |      |    |
|    |              |      |  | 1V-10V<br>(10Hz-20kHz)     | $U=0.072\%U_X+3.5mV$     |      |    |

| 序号 | 测量仪器名称       | 校准参量 | 规范代号(含年号)名称   | 测量范围                                  | 扩展不确定度( $k=2$ )                | 限制说明                  | 备注 |
|----|--------------|------|---|---------------------------------------|--------------------------------|-----------------------|----|
| 27 | 交流稳压电源(变频电源) | 电压   | JJG(航天) 51-1999<br>交流标准电流源<br>检定规程<br>JJG 410-1994<br>精密交流电压校准源 | 10V~100V<br>(10Hz~20 kHz)             | $U=0.072\%U_X+35\text{mV}$     |                       |    |
|    |              |      |   | 100V~1000V<br>(10Hz~20 kHz)           | $U=0.072\%U_X+0.35\text{V}$    |                       |    |
|    |              | 电流   |   | 10 $\mu$ A~100 $\mu$ A<br>(10Hz~5kHz) | $U=0.12\%I_X+0.046\mu\text{A}$ |                       |    |
|    |              |      |   | 100 $\mu$ A~1mA<br>(10Hz~5kHz)        | $U=0.12\%I_X+0.46\mu\text{A}$  |                       |    |
|    |              |      |   | 1mA~10mA<br>(10Hz~5kHz)               | $U=0.12\%I_X+4.6\mu\text{A}$   |                       |    |
|    |              |      |   | 10mA~100mA<br>(10Hz~5kHz)             | $U=0.12\%I_X+0.46\text{mA}$    |                       |    |
|    |              |      |   | 100mA~1A<br>(10Hz~5kHz)               | $U=0.12\%I_X+0.46\text{mA}$    |                       |    |
|    |              |      |   | 1A~3A<br>(45Hz~400Hz)                 | $U_{\text{rel}}=0.13\%$        |                       |    |
|    |              |      |   | 3A~30A<br>(45Hz~400Hz)                | $U_{\text{rel}}=0.13\%$        |                       |    |
|    |              |      |   | 30A~300A<br>(45Hz~400Hz)              | $U_{\text{rel}}=0.13\%$        |                       |    |
|    |              |      |   | 失真度                                   | 0.1%~30%                       | $U_{\text{rel}}=10\%$ |    |
| 28 | 电池充放电测试系统    | 电压   | HZH-WI E028-2014<br>4 电池充放电测试系统校准方法                             | 10mV~100mV                            | $U=0.0045\%U_X+4\mu\text{V}$   |                       |    |

| 序号 | 测量仪器名称    | 校准参量 | 规范代号（含年号）名称                    | 测量范围                         | 扩展不确定度（ $k=2$ ）          | 限制说明 | 备注 |
|----|-----------|------|--------------------------------|------------------------------|--------------------------|------|----|
| 28 | 电池充放电测试系统 | 电压   | HZH-WI E028-2014 电池充放电测试系统校准方法 | >100mV~1V                    | $U=0.0029\%U_X+8\mu V$   |      |    |
|    |           |      |                                | >1V~10V                      | $U=0.0028\%U_X+60\mu V$  |      |    |
|    |           |      |                                | >10V~100V                    | $U=0.0045\%U_X+66\mu V$  |      |    |
|    |           |      |                                | >100V~1000V                  | $U=0.0049\%U_X+0.011V$   |      |    |
|    |           | 电流   |                                | 10 $\mu$ A~100 $\mu$ A       | $U=0.06\%I_X+0.028\mu A$ |      |    |
|    |           |      |                                | 100 $\mu$ A~1mA              | $U=0.06\%I_X+0.055\mu A$ |      |    |
|    |           |      |                                | 1mA~10mA                     | $U=0.06\%I_X+0.2\mu A$   |      |    |
|    |           |      |                                | 10mA~100mA                   | $U=0.06\%I_X+0.5\mu A$   |      |    |
|    |           |      |                                | 100mA~1A                     | $U=0.06\%I_X+0.22mA$     |      |    |
|    |           |      |                                | 1A~3A                        | $U=0.012\%I_X+0.18mA$    |      |    |
|    |           |      |                                | 3A~30A                       | $U=0.012\%I_X+1.8mA$     |      |    |
|    |           |      |                                | 30A~300A                     | $U=0.024\%I_X+18mA$      |      |    |
| 29 | 直流电桥      | 电阻   | JJG 125-2004 直流电桥              | 0.1m $\Omega$ ~3 $\Omega$    | $U_{rel}=0.12\%-0.009\%$ |      |    |
|    |           |      |                                | >3 $\Omega$ ~1.1M $\Omega$   | $U_{rel}=0.006\%$        |      |    |
|    |           |      |                                | >1.1M $\Omega$ ~10M $\Omega$ | $U_{rel}=0.015\%$        |      |    |
| 30 | 线缆测试仪     | 交流电压 | JJF 1457-2014 线缆测试仪校准规范        | 1V~10kV (45-65)Hz            | $U_{rel}=0.3\%$          |      |    |
|    |           | 直流电压 |                                | 1V~10kV                      | $U_{rel}=0.2\%$          |      |    |
|    |           | 电容   |                                | 100pF~10 $\mu$ F             | $U_{rel}=0.3\%$          |      |    |

| 序号 | 测量仪器名称 | 校准参量 | 规范代号(含年号)名称                                      | 测量范围  | 扩展不确定度( $k=2$ )              | 限制说明 | 备注 |
|----|--------|------|--|---|------------------------------|------|----|
| 30 | 线缆测试仪  | 电流   | JJF 1457-2014<br>线缆测试仪校准<br>规范                   | 泄漏 ACI :<br>0.01mA~1<br>00mA<br>(45-65)H<br>Z | $U_{rel}=0.4\%$              |      |    |
|    |        | 电阻   |  | $10^3 \Omega \sim 10^8 \Omega$                | $U_{rel} = 0.11\%$           |      |    |
|    |        |      |  | $>10^8 \Omega \sim 10^9 \Omega$               | $U_{rel} = 0.24\%$           |      |    |
|    |        |      |  | $>10^9 \Omega \sim 10^{10} \Omega$            | $U_{rel} = 0.5\%$            |      |    |
|    |        |      |  | $>10^{10} \Omega \sim 10^{11} \Omega$         | $U_{rel} = 1.0\%$            |      |    |
| 31 | 模拟示波器  | 频带宽度 | JJG 262-1996<br>模拟示波器                            | DC~500MH<br>Z                                 | $U_{rel}=3\%$                |      |    |
|    |        | 电压   |  | 1mV/di v~<br>20V/di v                         | $U_{rel}=0.3\%$              |      |    |
|    |        | 时间   |  | 0.5ns/di<br>v~<br>0.5s/di v                   | $U_{rel}=0.3\%$              |      |    |
|    |        |      |  | 1s/di v~<br>20s/di v                          | $U_{rel}=0.6\%$              |      |    |
| 32 | 数字示波器  | 频带宽度 | GJB 7691-2012<br>数字示波器检定<br>规程                   | DC~500MH<br>Z                                 | $U_{rel}=3\%$                |      |    |
|    |        | 电压   |  | 1mV/di v~<br>20V/di v                         | $U_{rel}=0.3\%$              |      |    |
|    |        | 时间   |  | 0.5ns/di<br>v~<br>0.5s/di v                   | $U_{rel}=0.3\%$              |      |    |
|    |        |      |  | 1s/di v~<br>20s/di v                          | $U_{rel}=0.6\%$              |      |    |
| 33 | 频率计    | 频率   | JJG 349-2014<br>通用计数器<br>JJG 841-2012<br>微波频率计数器 | 0.01Hz~2<br>6.5GHz                            | $U_{rel}=1.0 \times 10^{-9}$ |      |    |
|    |        | 灵敏度  |  | DC~10MHz<br>:<br>10mV~3V                      | $U_{rel}=3\%$                |      |    |



| 序号 | 测量仪器名称  | 校准参量   | 规范代号(含年号)名称                                      | 测量范围                                     | 扩展不确定度(k=2)                 | 限制说明 | 备注 |
|----|---------|--------|--|--|-----------------------------|------|----|
| 33 | 频率计     | 灵敏度    | JJG 349-2014<br>通用计数器<br>JJG 841-2012<br>微波频率计数器 | (10~500)<br>MHz:<br>-30dBm~1<br>0dBm     | $U_{rel}=0.7\text{dB}$      |      |    |
|    |         |        |  | (0.5~26.<br>5)GHz:<br>-30dBm~1<br>0dBm   | $U_{rel}=1.0\text{dB}$      |      |    |
| 34 | 电子电压表   | 电压     | JJG 250-1990<br>电子电压表检定<br>规程                    | 1mV~<br>30mV<br>(1kHz)                   | $U_{rel}=0.7\%-0.2\%$       |      |    |
|    |         |        |  | >30mV~<br>1000V<br>(1kHz)                | $U_{rel}=0.15\%$            |      |    |
|    |         | 频率附加误差 |  | 0.3V~1.5<br>V<br>(30Hz~<br>100kHz)       | $U_{rel}=0.15\%$            |      |    |
|    |         |        |  | 0.3V~1.5<br>V<br>(100kHz<br>~<br>500MHz) | $U_{rel}=3\%$               |      |    |
| 35 | 低频信号发生器 | 频率     | JJG 602-1996<br>低频信号发生器<br>检定规程                  | 1Hz~<br>1MHz                             | $U_{rel}=1\times 10^{-6}$   |      |    |
|    |         | 电压     |  | 1mV~300V<br>(1kHz)                       | $U=0.3\%U_X+0.044\text{mV}$ |      |    |
|    |         | 幅频特性   |  | 0.3V~10V<br>(10Hz~<br>20kHz)             | $U_{rel}=0.3\%$             |      |    |
|    |         |        |  | 0.3V~10V<br>(20kHz~<br>100kHz)           | $U_{rel}=0.9\%$             |      |    |
|    |         |        |  | 0.3V~10V<br>(100kHz<br>~1MHz)            | $U_{rel}=2.4\%$             |      |    |
|    |         | 失真度    |  | 0.01%~<br>30%                            | $U_{rel}=10\%$              |      |    |
| 36 | 信号发生器   | 频率     | JJG 173-2003<br>信号发生器检定<br>规程                    | 1MHz~20G<br>Hz                           | $U_{rel}=3\times 10^{-9}$   |      |    |

| 序号   | 测量仪器名称                 | 校准参量 | 规范代号(含年号)名称                   | 测量范围  | 扩展不确定度( $k=2$ )                 | 限制说明 | 备注 |
|--|------------------------|------|-------------------------------|---|---------------------------------|------|----|
| 36   | 信号发生器                  | 电平   | JJG 173-2003<br>信号发生器检定<br>规程 | -120dBm~<br>20dBm<br>(5kHz~20<br>GHz)   | $U=0.32\text{dB}-0.15\text{dB}$ |      |    |
|  |                        | 调频   |                               | FM: (1~40)<br>kHz<br>(载<br>波: 250kHz<br>~10MHz,<br>调制信<br>号: 20Hz~<br>10kHz)        | $U_{\text{rel}}=2.4\%$          |      |    |
|  |                        |      |                               | FM: (1~40<br>0)kHz<br>(载<br>波: 10MHz<br>~1300MHz<br>,<br>调制信<br>号: 50Hz~<br>100kHz) | $U_{\text{rel}}=1.3\%$          |      |    |
|  |                        | 调幅   |                               | AM: (5~99)<br>)%<br>(载<br>波: 150kHz<br>~10MHz,<br>调制信<br>号: 50Hz~<br>10kHz)         | $U_{\text{rel}}=2.4\%$          |      |    |
| AM: (5~99)<br>)%<br>(载<br>波: 10MHz<br>~1300MHz<br>,<br>调制信<br>号: 50Hz~<br>50kHz) | $U_{\text{rel}}=1.3\%$ |      |                               |   |                                 |      |    |

| 序号 | 测量仪器名称 | 校准参量 | 规范代号(含年号)名称                    | 测量范围   | 扩展不确定度( $k=2$ )              | 限制说明 | 备注 |
|----|--------|------|--------------------------------|--|------------------------------|------|----|
| 36 | 信号发生器  | 调幅   | JJG 173-2003<br>信号发生器检定<br>规程  | AM: (5-99)%<br>(载波: 150kHz<br>z~10MHz,<br>调制信号: 20Hz-10kHz)      | $U_{rel} = 4\%$              |      |    |
|    |        |      |                                | AM: (5-99)%<br>(载波: 10MHz~1300MHz,<br>,<br>调制信号: 20Hz-100kHz)    | $U_{rel} = 4\%$              |      |    |
|    |        | 调相   |                                | PM: (1-400)rad<br>(载波: 150kHz<br>z~10MHz,<br>调制信号: 200Hz~10kHz)  | $U_{rel} = 5\%$              |      |    |
|    |        |      |                                | PM: (1-400)rad<br>(载波: 10MHz~1300MHz,<br>,<br>调制信号: 200Hz~20kHz) | $U_{rel} = 4\%$              |      |    |
| 37 | 频谱分析仪  | 频率   | JJF 1396-2013<br>频谱分析仪校准<br>规范 | 100Hz~26.5GHz  | $U_{rel} = 3 \times 10^{-9}$ |      |    |
|    |        | 电平   |                                | -120dBm~20dBm<br>(100Hz~26.5GHz)                                 | $U = 0.25\text{dB}$          |      |    |

| 序号 | 测量仪器名称  | 校准参量  | 规范代号(含年号)名称                | 测量范围   | 扩展不确定度( $k=2$ )                      | 限制说明 | 备注 |
|----|---------|-------|----------------------------|--|--------------------------------------|------|----|
| 37 | 频谱分析仪   | 频响    | JJF 1396-2013<br>频谱分析仪校准规范 | -30dBm-0 dBm<br>(100Hz-26.5 GHz)                       | $U= 0.25\text{dB}$                   |      |    |
|    |         | 扫频宽度  |                            | 100Hz-26.5GHz<br>(-30dBm-0dBm)                         | $U_{\text{rel}}= 0.3\%$              |      |    |
|    |         | 分辨力带宽 |                            | 1Hz-10MHz<br>(-30dBm-0dBm)                             | $U_{\text{rel}}= 5\%$                |      |    |
| 38 | 标准电感器   | 电感    | JJG 726-1991 标准电感器         | 0.1 $\mu\text{H}$ -100 $\mu\text{H}$<br>(20Hz-1MHz)    | $U_{\text{rel}}=0.12\%$              |      |    |
|    |         |       |                            | >0.1mH-10H<br>(20Hz-1MHz)                              | $U_{\text{rel}}=0.06\%$              |      |    |
| 39 | 标准电容器   | 电容    | JJG 183-1992 标准电容器         | >10 $\mu\text{F}$ -1F<br>,<br>1pF-100pF<br>(20Hz-1MHz) | $U_{\text{rel}}=0.12\%$              |      |    |
|    |         |       |                            | >100pF-10 $\mu\text{F}$<br>(20Hz-1MHz)                 | $U_{\text{rel}}=0.06\%$              |      |    |
|    |         | 损耗角正切 |                            | 0.00001-1  | $U=0.0006$                           |      |    |
|    |         |       |                            | 1-9.999999   | $U_{\text{rel}}=0.06\%$              |      |    |
| 40 | 直流标准电压源 | 电压    | JJG 445-1986 直流标准电压源       | 10mV-100mV   | $U=0.0011\%U_X$<br>$+0.4\mu\text{V}$ |      |    |
|    |         |       |                            | >100mV-1V  | $U=0.0010\%U_X$<br>$+0.4\mu\text{V}$ |      |    |
|    |         |       |                            | >1V-10V  | $U=0.0010\%U_X$<br>$+0.7\mu\text{V}$ |      |    |

| 序号 | 测量仪器名称  | 校准参量 | 规范代号(含年号)名称                | 测量范围                          | 扩展不确定度(k=2)                 | 限制说明 | 备注 |
|----|---------|------|----------------------------|-------------------------------|-----------------------------|------|----|
| 40 | 直流标准电压源 | 电压   | JJG 445-1986 直流标准电压源       | >10V~100V                     | $U=0.0012\%U_X$<br>+0.04mV  |      |    |
|    |         |      |                            | >100V~1000V                   | $U=0.0012\%U_X$<br>+0.13mV  |      |    |
|    |         | 纹波电压 |                            | 0.3mV~10V                     | $U_{rel}=6\%$               |      |    |
| 41 | 交流电压标准源 | 电压   | JJG 410-1994 精密交流电压标准源检定规程 | 10mV~100mV<br>(1Hz~40Hz)      | $U=0.036\%U_X+$<br>0.036mV  |      |    |
|    |         |      |                            | 10mV~100mV<br>(40Hz~1kHz)     | $U=0.024\%U_X+$<br>0.013mV  |      |    |
|    |         |      |                            | 10mV~100mV<br>(1kHz~20kHz)    | $U=0.036\%U_X+$<br>0.013mV  |      |    |
|    |         |      |                            | 10mV~100mV<br>(20kHz~50kHz)   | $U=0.12\%U_X+$<br>0.013mV   |      |    |
|    |         |      |                            | 10mV~100mV<br>(50kHz~100kHz)  | $U=0.6\%U_X+$<br>0.013mV    |      |    |
|    |         |      |                            | 10mV~100mV<br>(100kHz~300kHz) | $U=4.8\%U_X+$<br>0.024mV    |      |    |
|    |         |      |                            | 100mV~1V<br>(1Hz~40Hz)        | $U=0.0084\%U_X$<br>+0.048mV |      |    |
|    |         |      |                            | 100mV~1V<br>(40Hz~1kHz)       | $U=0.0084\%U_X$<br>+0.024mV |      |    |
|    |         |      |                            | 100mV~1V<br>(1kHz~20kHz)      | $U=0.017\%U_X+$<br>0.024mV  |      |    |

| 序号 | 测量仪器名称  | 校准参量 | 规范代号(含年号)名称                   | 测量范围                        | 扩展不确定度(k=2)                   | 限制说明 | 备注 |
|----|---------|------|-------------------------------|-----------------------------|-------------------------------|------|----|
| 41 | 交流电压标准源 | 电压   | JJG 410-1994<br>精密交流电压标准源检定规程 | 100mV~1V<br>(20kHz~50kHz)   | $U=0.036\%U_x+0.024\text{mV}$ |      |    |
|    |         |      |                               | 100mV~1V<br>(50kHz~100kHz)  | $U=0.096\%U_x+0.024\text{mV}$ |      |    |
|    |         |      |                               | 100mV~1V<br>(100kHz~300kHz) | $U=0.36\%U_x+0.12\text{mV}$   |      |    |
|    |         |      |                               | 100mV~1V<br>(300kHz~1MHz)   | $U=1.2\%U_x+0.12\text{mV}$    |      |    |
|    |         |      |                               | 100mV~1V<br>(1MHz~2MHz)     | $U=1.8\%U_x+0.12\text{mV}$    |      |    |
|    |         |      |                               | 1V~10V<br>(1Hz~40Hz)        | $U=0.0084\%U_x+0.48\text{mV}$ |      |    |
|    |         |      |                               | 1V~10V<br>(40Hz~1kHz)       | $U=0.0084\%U_x+0.24\text{mV}$ |      |    |
|    |         |      |                               | 1V~10V<br>(1kHz~20kHz)      | $U=0.017\%U_x+0.24\text{mV}$  |      |    |
|    |         |      |                               | 1V~10V<br>(20kHz~50kHz)     | $U=0.036\%U_x+0.24\text{mV}$  |      |    |
|    |         |      |                               | 1V~10V<br>(50kHz~100kHz)    | $U=0.096\%U_x+0.24\text{mV}$  |      |    |
|    |         |      |                               | 1V~10V<br>(100kHz~300kHz)   | $U=0.36\%U_x+0.2\text{mV}$    |      |    |
|    |         |      |                               | 1V~10V<br>(300kHz~1MHz)     | $U=1.2\%U_x+0.2\text{mV}$     |      |    |
|    |         |      |                               | 1V~10V<br>(1MHz~2MHz)       | $U=1.8\%U_x+0.2\text{mV}$     |      |    |

| 序号 | 测量仪器名称  | 校准参量 | 规范代号(含年号)名称                   | 测量范围                        | 扩展不确定度(k=2)                 | 限制说明 | 备注 |
|----|---------|------|-------------------------------|-----------------------------|-----------------------------|------|----|
| 41 | 交流电压标准源 | 电压   | JJG 410-1994<br>精密交流电压标准源检定规程 | 10V~100V<br>(1Hz~40Hz)      | $U=0.024\%U_{X+}$<br>4.8mV  |      |    |
|    |         |      |                               | 10V~100V<br>(40Hz~1kHz)     | $U=0.024\%U_{X+}$<br>2.4mV  |      |    |
|    |         |      |                               | 10V~100V<br>(1kHz~20kHz)    | $U=0.024\%U_{X+}$<br>2.4mV  |      |    |
|    |         |      |                               | 10V~100V<br>(20kHz~50kHz)   | $U=0.042\%U_{X+}$<br>2.4mV  |      |    |
|    |         |      |                               | 10V~100V<br>(50kHz~100kHz)  | $U=0.15\%U_{X+}$<br>2.4mV   |      |    |
|    |         |      |                               | 10V~100V<br>(100kHz~300kHz) | $U=0.48\%U_{X+}$<br>2mV     |      |    |
|    |         |      |                               | 10V~100V<br>(300kHz~1MHz)   | $U=1.8\%U_{X+}$<br>12mV     |      |    |
|    |         |      |                               | 100V~1000V<br>(1Hz~40Hz)    | $U=0.048\%U_{X+}$<br>0.048V |      |    |
|    |         |      |                               | 100V~1000V<br>(40Hz~1kHz)   | $U=0.048\%U_{X+}$<br>0.024V |      |    |
|    |         |      |                               | 100V~1000V<br>(1kHz~20kHz)  | $U=0.072\%U_{X+}$<br>0.024V |      |    |
|    |         |      |                               | 100V~1000V<br>(20kHz~50kHz) | $U=0.15\%U_{X+}$<br>0.024V  |      |    |

| 序号 | 测量仪器名称      | 校准参量 | 规范代号(含年号)名称                            | 测量范围  | 扩展不确定度(k=2)               | 限制说明 | 备注 |
|----|-------------|------|--|---|---------------------------|------|----|
| 41 | 交流电压标准源     | 电压   | JJG 410-1994<br>精密交流电压标准源检定规程          | 100V~100<br>0V<br>(50kHz~1<br>00kHz)          | $U=0.36\%U_x+0.024V$      |      |    |
|    |             | 失真度  |  | 0.0001%~<br>30%<br>(20Hz~10<br>0kHz)          | $U_{rel}=13\%$            |      |    |
| 42 | 交流标准<br>电流源 | 电流   | JJG(航天)<br>51-1999 交流<br>标准电流源检定<br>规程 | 10 $\mu$ A~100<br>$\mu$ A<br>(10Hz~20<br>Hz)  | $U=0.48\%I_x+0.036\mu A$  |      |    |
|    |             |      |  | 10 $\mu$ A~100<br>$\mu$ A<br>(20Hz~45<br>Hz)  | $U=0.18\%I_x+0.036\mu A$  |      |    |
|    |             |      |  | 10 $\mu$ A~100<br>$\mu$ A<br>(45Hz~10<br>0Hz) | $U=0.072\%I_x+0.036\mu A$ |      |    |
|    |             |      |  | 10 $\mu$ A~100<br>$\mu$ A<br>(100Hz~5<br>kHz) | $U=0.072\%I_x+0.036\mu A$ |      |    |
|    |             |      |  | 100 $\mu$ A~1m<br>A<br>(10Hz~20<br>Hz)        | $U=0.48\%I_x+0.24\mu A$   |      |    |
|    |             |      |  | 100 $\mu$ A~1m<br>A<br>(20Hz~45<br>Hz)        | $U=0.18\%I_x+0.24\mu A$   |      |    |
|    |             |      |  | 100 $\mu$ A~1m<br>A<br>(45Hz~10<br>0Hz)       | $U=0.072\%I_x+0.24\mu A$  |      |    |



| 序号 | 测量仪器名称  | 校准参量 | 规范代号(含年号)名称                 | 测量范围                                   | 扩展不确定度( $k=2$ )          | 限制说明 | 备注 |
|----|---------|------|-----------------------------|--|--------------------------|------|----|
| 42 | 交流标准电流源 | 电流   | JJG(航天) 51-1999 交流标准电流源检定规程 | 100 $\mu$ A~1mA<br>A<br>(100Hz~5kHz)   | $U=0.036\%I_X+0.24\mu$ A |      |    |
|    |         |      |                             | 100 $\mu$ A~1mA<br>A<br>(5kHz~20kHz)   | $U=0.072\%I_X+0.24\mu$ A |      |    |
|    |         |      |                             | 100 $\mu$ A~1mA<br>A<br>(20kHz~50kHz)  | $U=0.48\%I_X+0.48\mu$ A  |      |    |
|    |         |      |                             | 100 $\mu$ A~1mA<br>A<br>(50kHz~100kHz) | $U=0.66\%I_X+0.8\mu$ A   |      |    |
|    |         |      |                             | 1mA~10mA<br>(10Hz~20Hz)                | $U=0.48\%I_X+2.4\mu$ A   |      |    |
|    |         |      |                             | 1mA~10mA<br>(20Hz~45Hz)                | $U=0.18\%I_X+2.4\mu$ A   |      |    |
|    |         |      |                             | 1mA~10mA<br>(45Hz~100Hz)               | $U=0.072\%I_X+2.4\mu$ A  |      |    |
|    |         |      |                             | 1mA~10mA<br>(100Hz~5kHz)               | $U=0.036\%I_X+2.4\mu$ A  |      |    |
|    |         |      |                             | 1mA~10mA<br>(5kHz~20kHz)               | $U=0.072\%I_X+2.4\mu$ A  |      |    |
|    |         |      |                             | 1mA~10mA<br>(20kHz~50kHz)              | $U=0.48\%I_X+0.8\mu$ A   |      |    |

| 序号                      | 测量仪器名称               | 校准参量 | 规范代号(含年号)名称                 | 测量范围                         | 扩展不确定度( $k=2$ )        | 限制说明 | 备注 |
|-------------------------|----------------------|------|-----------------------------|------------------------------|------------------------|------|----|
| 42                      | 交流标准电流源              | 电流   | JJG(航天) 51-1999 交流标准电流源检定规程 | 1mA~10mA<br>(50kHz~100kHz)   | $U=0.66\%I_x+8\mu A$   |      |    |
|                         |                      |      |                             | 10mA~100mA<br>(10Hz~20Hz)    | $U=0.48\%I_x+0.024mA$  |      |    |
|                         |                      |      |                             | 10mA~100mA<br>(20Hz~45Hz)    | $U=0.18\%I_x+0.024mA$  |      |    |
|                         |                      |      |                             | 10mA~100mA<br>(45Hz~100Hz)   | $U=0.072\%I_x+0.024mA$ |      |    |
|                         |                      |      |                             | 10mA~100mA<br>(100Hz~5kHz)   | $U=0.036\%I_x+0.024mA$ |      |    |
|                         |                      |      |                             | 10mA~100mA<br>(5kHz~20kHz)   | $U=0.072\%I_x+0.024mA$ |      |    |
|                         |                      |      |                             | 10mA~100mA<br>(20kHz~50kHz)  | $U=0.48\%I_x+0.048mA$  |      |    |
|                         |                      |      |                             | 10mA~100mA<br>(50kHz~100kHz) | $U=0.66\%I_x+0.18mA$   |      |    |
|                         |                      |      |                             | 100mA~1A<br>(10Hz~20Hz)      | $U=0.48\%I_x+0.24mA$   |      |    |
| 100mA~1A<br>(20Hz~45Hz) | $U=0.20\%I_x+0.24mA$ |      |                             |                              |                        |      |    |

| 序号              | 测量仪器名称                           | 校准参量 | 规范代号(含年号)名称                 | 测量范围                      | 扩展不确定度( $k=2$ )              | 限制说明 | 备注                          |
|-----------------|----------------------------------|------|-----------------------------|---------------------------|------------------------------|------|-----------------------------|
| 42              | 交流标准电流源                          | 电流   | JJG(航天) 51-1999 交流标准电流源检定规程 | 100mA~1A<br>(45Hz~100Hz)  | $U=0.096\%I_X+0.24\text{mA}$ |      |                             |
|                 |                                  |      |                             | 100mA~1A<br>(100Hz~5kHz)  | $U=0.12\%I_X+0.24\text{mA}$  |      |                             |
|                 |                                  |      |                             | 100mA~1A<br>(5kHz~20kHz)  | $U=0.36\%I_X+0.24\text{mA}$  |      |                             |
|                 |                                  |      |                             | 100mA~1A<br>(20kHz~50kHz) | $U=1.2\%I_X+0.48\text{mA}$   |      |                             |
|                 |                                  |      |                             | 1A~3A<br>(45Hz~400Hz)     | $U_{\text{rel}}=0.13\%$      |      |                             |
|                 |                                  |      |                             | 3A~30A<br>(45Hz~400Hz)    | $U_{\text{rel}}=0.13\%$      |      |                             |
|                 |                                  |      |                             | 30A~300A<br>(45Hz~400Hz)  | $U_{\text{rel}}=0.13\%$      |      |                             |
|                 |                                  |      |                             | 43                        | 直流标准电流源                      | 电流   | JJG(航天) 38-1987 直流标准电流源检定规程 |
| 100 $\mu$ A~1mA | $U=0.0030\%I_X+0.006\mu\text{A}$ |      |                             |                           |                              |      |                             |
| 1mA~10mA        | $U=0.0030\%I_X+0.06\mu\text{A}$  |      |                             |                           |                              |      |                             |
| 10mA~100mA      | $U=0.0048\%I_X+0.6\mu\text{A}$   |      |                             |                           |                              |      |                             |
| 100mA~1A        | $U=0.014\%I_X+0.012\text{mA}$    |      |                             |                           |                              |      |                             |
| 1A~3A           | $U=0.012\%I_X+0.18\text{mA}$     |      |                             |                           |                              |      |                             |
| 3A~30A          | $U=0.012\%I_X+1.8\text{mA}$      |      |                             |                           |                              |      |                             |

| 序号   | 测量仪器名称                      | 校准参量                     | 规范代号(含年号)名称                | 测量范围                       | 扩展不确定度(k=2)                     | 限制说明                     | 备注 |  |
|------|-----------------------------|--------------------------|----------------------------|----------------------------|---------------------------------|--------------------------|----|--|
| 43   | 直流标准电流源                     | 电流                       | JJG(航天)38-1987 直流标准电流源检定规程 | 30A-300A                   | $U=0.024\%I_X+18\text{mA}$      |                          |    |  |
| 44   | 直流电子负载                      | 电压                       | JJF 1462-2014 直流电子负载校准规范   | (10-329.9999)mV            | $U=0.0024\%U_X+1.1\mu\text{V}$  |                          |    |  |
|      |                             |                          |                            | 0.33V-3.299999V            | $U=0.0013\%U_X+2.2\mu\text{V}$  |                          |    |  |
|      |                             |                          |                            | 3.3V-32.99999V             | $U=0.0014\%U_X+22\mu\text{V}$   |                          |    |  |
|      |                             |                          |                            | 33V-329.9999V              | $U=0.0022\%U_X+0.17\text{mV}$   |                          |    |  |
|      |                             |                          |                            | 330V-1000.000V             | $U=0.0022\%U_X+1.7\text{mV}$    |                          |    |  |
|      |                             | 电流                       |                            | (10-329.999) $\mu\text{A}$ | $U=0.018\%I_X+0.022\mu\text{A}$ |                          |    |  |
|      |                             |                          |                            | 0.33mA-3.29999mA           | $U=0.012\%I_X+0.055\mu\text{A}$ |                          |    |  |
|      |                             |                          |                            | 3.3mA-32.9999mA            | $U=0.012\%I_X+0.28\mu\text{A}$  |                          |    |  |
|      |                             |                          |                            | 33mA-329.999mA             | $U=0.012\%I_X+2.8\mu\text{A}$   |                          |    |  |
|      |                             |                          |                            | 0.33A-1A                   | $U=0.024\%I_X+44\mu\text{A}$    |                          |    |  |
|      |                             |                          |                            | 1A-3A                      | $U=0.012\%I_X+0.18\text{mA}$    |                          |    |  |
|      |                             |                          |                            | 3A-30A                     | $U=0.012\%I_X+1.8\text{mA}$     |                          |    |  |
|      |                             |                          |                            | 30A-300A                   | $U=0.024\%I_X+18\text{mA}$      |                          |    |  |
|      |                             |                          |                            | 恒定电压                       | 1V-1000V                        | $U_{\text{rel}}=0.005\%$ |    |  |
|      |                             |                          |                            | 恒定电流                       | 1mA-300A                        | $U_{\text{rel}}=0.011\%$ |    |  |
|      |                             |                          |                            | 恒定功率                       | 1mW-30kW                        | $U_{\text{rel}}=0.016\%$ |    |  |
| 恒定电阻 | 0.1 $\Omega$ -1000 $\Omega$ | $U_{\text{rel}}=0.018\%$ |                            |                            |                                 |                          |    |  |
| 45   | 高压静电电压表                     | 电压                       | JJG 494-2005 高压静电电压表       | AC:<br>(0.1-10)kV          | $U_{\text{rel}}=0.3\%$          |                          |    |  |

| 序号 | 测量仪器名称     | 校准参量 | 规范代号(含年号)名称               | 测量范围                            | 扩展不确定度(k=2)        | 限制说明 | 备注 |
|----|------------|------|---------------------------|---------------------------------|--------------------|------|----|
| 45 | 高压静电电压表    | 电压   | JJG 494-2005 高压静电电压表      | AC:<br>(10-50)kV                | $U_{rel} = 0.6\%$  |      |    |
|    |            |      |                           | DC:<br>(0.01~10)kV              | $U_{rel} = 0.15\%$ |      |    |
|    |            |      |                           | DC:<br>(10-50)kV                | $U_{rel} = 0.4\%$  |      |    |
| 46 | 数字高压表      | 电压   | DL/T 973-2005 数字高压表检定规程   | AC:<br>(0.1~10)kV               | $U_{rel} = 0.3\%$  |      |    |
|    |            |      |                           | AC:<br>(10-50)kV                | $U_{rel} = 0.6\%$  |      |    |
|    |            |      |                           | DC:<br>(0.01~10)kV              | $U_{rel} = 0.15\%$ |      |    |
|    |            |      |                           | DC:<br>(10-50)kV                | $U_{rel} = 0.4\%$  |      |    |
| 47 | 火花试验机      | 电压   | JJG(苏)74-2008 火花试验机       | AC:<br>(0.1~10)kV               | $U_{rel} = 0.4\%$  |      |    |
|    |            |      |                           | AC:<br>(10-50)kV                | $U_{rel} = 0.6\%$  |      |    |
|    |            |      |                           | DC:<br>(0.1~10)kV               | $k = 0.2\%$        |      |    |
|    |            |      |                           | DC:<br>(10-50)kV                | $k = 0.5\%$        |      |    |
| 48 | 变压比电桥(匝比仪) | 变压比  | JJG 970-2002 变压比电桥        | 1~100                           | $U_{rel} = 0.06\%$ |      |    |
|    |            |      |                           | 100~1000                        | $U_{rel} = 0.15\%$ |      |    |
| 49 | 表面电阻测试仪    | 电阻   | JJF 1285-2011 表面电阻测试仪校准规范 | $10^3 \Omega \sim 10^8 \Omega$  | $U_{rel} = 0.11\%$ |      |    |
|    |            |      |                           | $>10^8 \Omega \sim 10^9 \Omega$ | $U_{rel} = 0.24\%$ |      |    |

| 序号 | 测量仪器名称           | 校准参量 | 规范代号(含年号)名称   | 测量范围                                  | 扩展不确定度(k=2)         | 限制说明 | 备注 |
|----|------------------|------|---|---------------------------------------|---------------------|------|----|
| 49 | 表面电阻测试仪          | 电阻   | JJF 1285-2011<br>表面电阻测试仪<br>校准规范                    | $>10^0 \Omega \sim 10^{10} \Omega$    | $U_{rel} = 0.5\%$   |      |    |
|    |                  |      |   | $>10^{10} \Omega \sim 10^{11} \Omega$ | $U_{rel} = 1.0\%$   |      |    |
|    |                  | 电压   |   | (0.01~10)kV                           | $U_{rel} = 0.8\%$   |      |    |
| 50 | 高压分压器<br>(高压衰减棒) | 电压   | JJG 1007-2005<br>直流高压分压器<br>JJG 496-1996<br>工频高压分压器 | AC:<br>(0.1~10)kV                     | $U_{rel} = 0.3\%$   |      |    |
|    |                  |      |   | AC:<br>(10~50)kV                      | $U_{rel} = 0.6\%$   |      |    |
|    |                  |      |   | DC:<br>(0.01~10)kV                    | $U_{rel} = 0.15\%$  |      |    |
|    |                  |      |   | DC:<br>(10~50)kV                      | $U_{rel} = 0.4\%$   |      |    |
| 51 | 脉冲波形试验设备         | 电压   | HZH-WIE043-2014<br>脉冲波形试验设备<br>校准方法                 | 1V~40kV                               | $U_{rel} = 2.6\%$   |      |    |
|    |                  | 波形   |   | 1ns~50s                               | $U_{rel} = 0.8\%$   |      |    |
| 52 | 匝数仪              | 匝数   | SJ20241-1993 YG<br>系列匝数仪检定<br>规程                    | 1~19999                               | $U_{rel} = 0.12\%$  |      |    |
| 53 | 静电放电模拟器          | 电压   | JJF 1397-2013<br>静电放电模拟器<br>校准规范                    | (0.5~40)kV                            | $U_{rel} = 2.6\%$   |      |    |
| 54 | 频率表              | 频率   | JJG 603-2006 频率表                                    | 10 Hz~20 kHz                          | $U_{rel} = 0.010\%$ |      |    |
| 55 | 校表仪(钟表分析仪)       | 日差   | JJG 488-2008 校表仪                                    | (0.00~9.99) s/d                       | $U = 0.014s/d$      |      |    |
|    |                  |      |   | (0.0~99.9) s/d                        | $U = 0.10s/d$       |      |    |
|    |                  |      |   | (0~999) s/d                           | $U = 1.0s/d$        |      |    |
| 56 | 秒表               | 时间   | JJG 237-2010 秒表                                     | 电子秒表:<br>10s~1d                       | $U = 0.01s-0.05s$   |      |    |

| 序号 | 测量仪器名称       | 校准参量 | 规范代号(含年号)名称                | 测量范围                                     | 扩展不确定度( $k=2$ )                  | 限制说明 | 备注 |
|----|--------------|------|----------------------------|--|----------------------------------|------|----|
| 56 | 秒表           | 时间   | JJG 237-2010 秒表            | 机械秒表:<br>3s-60min                        | $U=0.02s-0.3s$                   |      |    |
|    |              |      |                            | 电秒表:<br>1ms-9.9s                         | $U=0.1ms$                        |      |    |
| 57 | 直流分流器        | 电阻   | JJG 1069-2011 直流分流器        | $10\mu\Omega \sim 10\Omega$<br>(1mA-50A) | $U_{rel}=0.04\%$                 |      |    |
| 58 | 磁通表          | 磁通量  | HZH-WI E055-2015 磁通表校准方法   | (0.1-1000) mWb                           | $U_{rel}=0.6\%$                  |      |    |
| 59 | 回路电阻测试仪(直阻仪) | 电流   | JJG 1052-2009 回路电阻测试仪、直阻仪  | 1mA-300A                                 | $U_{rel}=0.3\%$                  |      |    |
|    |              | 电阻   |                            | $10\mu\Omega \sim 100\mu\Omega$          | $U=0.15\mu\Omega$                |      |    |
|    |              |      |                            | $100\mu\Omega \sim 1000\Omega$           | $U_{rel}=0.15\%$                 |      |    |
| 60 | 钳形接地电阻仪      | 电阻   | JJG 1054-2009 钳形接地电阻仪      | (0.01-0.1) $\Omega$                      | $U=4m\Omega$                     |      |    |
|    |              |      |                            | (0.1-1) $\Omega$                         | $U=13m\Omega$                    |      |    |
|    |              |      |                            | (1-1000) $\Omega$                        | $U_{rel}=0.8\%$                  |      |    |
| 61 | 时间间隔测量仪      | 时间   | JJG 953-2000 精密时间间隔测量仪     | 1 $\mu$ s-10s                            | $U_{rel}=1 \times 10^{-6}$       |      |    |
| 62 | 时间间隔发生器      | 时间   | JJG 723-2008 时间间隔发生器       | 10ns-1000s                               | $U=3 \times 10^{-8} t_x + 1.2ns$ |      |    |
| 63 | 电子式时间继电器     | 时间   | JJF 1282-2011 电子式时间继电器校准规范 | 0.09s-999s                               | $U=0.15\% t_x + 30ms$            |      |    |

| 序号 | 测量仪器名称      | 校准参量 | 规范代号(含年号)名称  | 测量范围                                | 扩展不确定度(k=2)                            | 限制说明                              | 备注 |
|----|-------------|------|--|-------------------------------------|--|-----------------------------------|----|
| 64 | 漆膜连续性测试仪    | 电压   | JB/T<br>4279.12-2008<br>漆包绕组线试验<br>仪器设备检定方法<br>第12部分:<br>低压漆膜连续性<br>测试仪<br>JB/T<br>4279.13-2008<br>漆包绕组线试验<br>仪器设备检定方法<br>第13部分:<br>高压漆膜连续性<br>测试仪 | 10V-5000<br>V                       | $U_{rel} = 1.6\%$                      |                                   |    |
|    |             | 电流   |  | 10 $\mu$ A-100<br>$\mu$ A           | $U_{rel} = 0.9\%$                      |                                   |    |
| 65 | 磁粉探伤机       | 电流   | JJF 1273-2011<br>磁粉探伤机校准<br>规范   | 10A-2000<br>A                       | $U_{rel} = 1.6\%$                      |                                   |    |
| 66 | 磁粉探伤机       | 力值   | JJF 1458-2014<br>磁轭式磁粉探伤<br>机校准规范  | 40N-200N                            | $U_{rel} = 3\%$                        |                                   |    |
| 67 | 过程仪表校<br>验仪 | 温度   | JJF 1472-2014<br>过程仪表校验仪<br>校准规范   | 热电偶:<br>(-250~10<br>0) $^{\circ}$ C | $U=0.4^{\circ}$ C<br>~ $0.2^{\circ}$ C |                                   |    |
|    |             |      |  | 热电偶:<br>(100~180<br>0) $^{\circ}$ C | $U=0.2^{\circ}$ C<br>~ $0.4^{\circ}$ C |                                   |    |
|    |             |      |  | 热电阻:<br>(-200~85<br>0) $^{\circ}$ C | $U=0.1^{\circ}$ C                      |                                   |    |
|    |             | 直流电压 |  | 10mV~100<br>mV                      | $U=0.0024\%U_X$<br>+1.2 $\mu$ V        |                                   |    |
|    |             |      |  | >100mV~1<br>V                       | $U=0.0010\%U_X$<br>+0.4 $\mu$ V        |                                   |    |
|    |             |      |  | >1V~10V                             | $U=0.0010\%U_X$<br>+0.7 $\mu$ V        |                                   |    |
|    |             |      |  | >10V~100<br>V                       | $U=0.0012\%U_X$<br>+0.04mV             |                                   |    |
|    |             |      |  | 直流电流                                | 0.01mA~1<br>mA                         | $U=0.0030\%I_X$<br>+0.006 $\mu$ A |    |



| 序号 | 测量仪器名称  | 校准参量   | 规范代号(含年号)名称                      | 测量范围                            | 扩展不确定度( $k=2$ )                   | 限制说明              | 备注 |
|----|---------|--------|----------------------------------|---------------------------------|-----------------------------------|-------------------|----|
| 67 | 过程仪表校验仪 | 直流电流   | JJF 1472-2014<br>过程仪表校验仪<br>校准规范 | >1mA~10mA                       | $U=0.0030\%I_X$<br>$+0.06\mu A$   |                   |    |
|    |         |        |                                  | >10mA~100mA                     | $U=0.0048\%I_X$<br>$+0.6\mu A$    |                   |    |
|    |         |        |                                  | 0.01 $\Omega$ ~10 $\Omega$      | $U=0.0018\%R_X$<br>$+0.06m\Omega$ |                   |    |
|    |         | 电阻     |                                  | >10 $\Omega$ ~100 $\Omega$      | $U=0.0015\%R_X$<br>$+0.6m\Omega$  |                   |    |
|    |         |        |                                  | >100 $\Omega$ ~1k $\Omega$      | $U=0.0012\%R_X$<br>$+0.6m\Omega$  |                   |    |
|    |         |        |                                  | >1k $\Omega$ ~10k $\Omega$      | $U=0.0012\%R_X$<br>$+6m\Omega$    |                   |    |
|    |         |        |                                  | 频率                              | 1Hz~50kHz                         | $U_{rel}=0.003\%$ |    |
| 68 | 局部放电测量仪 | 峰值电压   | DL/T 356-2010<br>局部放电测量仪<br>校准规范 | 5 $\mu V$ ~10V                  | $U_{rel}=1.6\%$                   |                   |    |
|    |         | 频率     |                                  | 25Hz~1MHz                       | $U_{rel}=1.2\%$                   |                   |    |
|    |         | 电容     |                                  | 10pF~1nF                        | $U_{rel}=1.2\%$                   |                   |    |
| 69 | 音频分析仪   | 电压     | JJF 1395-2013<br>音频分析仪校准<br>规范   | 1mV~30mV<br>(DC, 10Hz~200kHz)   | $U_{rel}=0.7\%~0.2\%$             |                   |    |
|    |         |        |                                  | >30mV~300V<br>(DC, 10Hz~200kHz) | $U_{rel}=0.15\%$                  |                   |    |
|    |         | 源输出失真度 |                                  | 0.001%~1%<br>(20Hz~100kHz)      | $U_{rel}=13\%$                    |                   |    |
|    |         | 失真度测量  |                                  | 0.01%~0.1%<br>(20Hz~100kHz)     | $U_{rel}=13\%$                    |                   |    |
|    |         |        |                                  | 0.1%~90%<br>(20Hz~100kHz)       | $U_{rel}=6\%$                     |                   |    |

| 序号 | 测量仪器名称 | 校准参量 | 规范代号(含年号)名称   | 测量范围                      | 扩展不确定度(k=2)                  | 限制说明 | 备注 |
|----|--------|------|---|---------------------------|------------------------------|------|----|
| 69 | 音频分析仪  | 频率   | JJF 1395-2013<br>音频分析仪校准规范  | 10Hz~200 kHz              | $U_{rel}=1 \times 10^{-6}$   |      |    |
| 70 | 电声测试仪  | 电压   | JJF 1339-2012<br>电声测试仪校准规范  | 1mV~100V<br>(20Hz~20kHz)  | $U_{rel}=0.7\%-0.3\%$        |      |    |
|    |        | 频率   |   | 1V~300V<br>(DC)           | $U_{rel}=0.3\%$              |      |    |
|    |        | 失真度  |   | 20Hz~20k Hz               | $U_{rel}=1.1 \times 10^{-5}$ |      |    |
| 71 | 电话分析仪  | 直流电压 | JJG(YD)032-1995<br>双音多频电话机测试器<br>JJG(YD)021-1994<br>电话机脉冲号盘测试器<br>JJG 124-2005<br>电流表、电压表、功率表及电阻表 | 0.01%~30%<br>(20Hz~20kHz) | $U_{rel}=10\%$               |      |    |
|    |        | 直流电压 |   | 1V~60V                    | $U_{rel}=0.3\%$              |      |    |
|    |        | 直流电流 |   | 1mA~120mA                 | $U_{rel}=0.3\%$              |      |    |
|    |        | 交流电压 |   | 0.1V~120V                 | $U_{rel}=1.0\%$              |      |    |
|    |        | 时间   |   | 1ms~99ms                  | $U=0.3ms$                    |      |    |
| 72 | 示波器校准仪 | 方波电压 | JJG 278-2002<br>示波器校准仪  | 10Hz~2000Hz               | $U_{rel}=0.015\%$            |      |    |
|    |        |      |   | 0.1mV~100mV<br>(1kHz)     | $U=0.016\%U_{X+}+26\mu V$    |      |    |
|    |        |      |   | >100mV~1V<br>(1kHz)       | $U=0.015\%U_{X+}+30\mu V$    |      |    |
|    |        |      |   | >1V~10V<br>(1kHz)         | $U=0.015\%U_{X+}+80\mu V$    |      |    |
|    |        |      |   | >10V~100V<br>(1kHz)       | $U=0.017\%U_{X+}+0.68mV$     |      |    |

| 序号 | 测量仪器名称   | 校准参量 | 规范代号(含年号)名称                | 测量范围                      | 扩展不确定度( $k=2$ )           | 限制说明 | 备注 |
|----|----------|------|----------------------------|---------------------------|---------------------------|------|----|
| 72 | 示波器校准仪   | 方波电压 | JJG 278-2002 示波器校准仪        | >100V~200V<br>(1kHz)      | $U=0.017\%U_x+0.011V$     |      |    |
|    |          | 直流电压 |                            | 0.1mV~100mV               | $U=0.0045\%U_x+4\mu V$    |      |    |
|    |          |      |                            | >100mV~1V                 | $U=0.0029\%U_x+8\mu V$    |      |    |
|    |          |      |                            | >1V~10V                   | $U=0.0028\%U_x+60\mu V$   |      |    |
|    |          |      |                            | >10V~100V                 | $U=0.0045\%U_x+0.66mV$    |      |    |
|    |          |      |                            | >100V~200V                | $U=0.0049\%U_x+0.011V$    |      |    |
|    |          | 时标   |                            | 0.5ns~5s                  | $U_{rel}=1\times 10^{-7}$ |      |    |
| 73 | 函数信号发生器  | 频率   | JJG 840-1993 函数信号发生器       | 1Hz~30MHz                 | $U_{rel}=1\times 10^{-7}$ |      |    |
|    |          | 电压   |                            | 1mV~10mV<br>(1kHz)        | $U=0.06mV$                |      |    |
|    |          |      |                            | 10mV~30mV<br>(1kHz)       | $U_{rel}=0.4\%$           |      |    |
|    |          |      |                            | 30mV~300V<br>(1kHz)       | $U_{rel}=0.3\%$           |      |    |
|    |          |      |                            | 0.1V~10V<br>(DC~20kHz)    | $U_{rel}=0.3\%$           |      |    |
|    |          |      |                            | 0.1V~10V<br>(20kHz~25MHz) | $U_{rel}=0.9\%$           |      |    |
|    |          | 失真度  |                            | 0.1%~30%<br>(20Hz~100kHz) | $U_{rel}=10\%$            |      |    |
| 74 | 音波式皮带张力计 | 频率   | JJF 1216-2009 音波式皮带张力计校准规范 | 10Hz~5kHz                 | $U_{rel}=0.50\%$          |      |    |
| 75 | 网络分析仪    | 频率   | JJF 1495-2014 矢量网络分析仪校准规范  | 9kHz~20GHz                | $U_{rel}=3\times 10^{-8}$ |      |    |

| 序号 | 测量仪器名称 | 校准参量     | 规范代号(含年号)名称                      | 测量范围  | 扩展不确定度( $k=2$ )        | 限制说明 | 备注 |
|----|--------|----------|----------------------------------|---|------------------------|------|----|
| 75 | 网络分析仪  | 电平       | JJF 1495-2014<br>矢量网络分析仪<br>校准规范 | -20dBm~20dBm<br>(9kHz~20GHz)                                | $U=0.3\text{dB}$       |      |    |
|    |        | 两端散射系数模值 |                                  | 0dB~70 dB<br>(9kHz~20GHz)                                   | $U=0.3\text{dB}$       |      |    |
|    |        | 相位       |                                  | -180° ~+180°<br>(9kHz~20GHz)                                | $U=1.0^\circ$          |      |    |
|    |        | 反射系数模值   |                                  | 0~1<br>(9kHz~20GHz)   | $U_{\text{rel}}=5\%$   |      |    |
| 76 | 调制度仪   | 调幅       | JJF 1111-2003<br>调制度测量仪校准规范      | AM: (5~99)%<br>(CW: 150kHz~10MHz<br>,<br>Rates: 50Hz~10kHz) | $U_{\text{rel}}=2.4\%$ |      |    |
|    |        |          |                                  | AM: (5~99)%<br>(CW: 10MHz~130MHz,<br>Rates: 50Hz~50kHz)     | $U_{\text{rel}}=1.3\%$ |      |    |
|    |        |          |                                  | AM: (5~99)%<br>(CW: 150kHz~10MHz<br>,<br>Rates: 20Hz~10kHz) | $U_{\text{rel}}=4\%$   |      |    |

| 序号 | 测量仪器名称 | 校准参量 | 规范代号(含年号)名称                 | 测量范围  | 扩展不确定度( $k=2$ )              | 限制说明 | 备注 |
|----|--------|------|-----------------------------|---|------------------------------|------|----|
| 76 | 调制度仪   | 调幅   | JJF 1111-2003<br>调制度测量仪校准规范 | AM: (5-99)%<br>(CW: 10MHz~1300MHz)<br>Rates: 20Hz~100kHz)   | $U_{rel} = 4\%$              |      |    |
|    |        | 调频   |                             | FM: (1-40)kHz<br>(CW: 250kHz~10MHz)<br>Rates: 20Hz~10kHz)   | $U_{rel} = 2.4\%$            |      |    |
|    |        |      |                             | FM: (1-40)kHz<br>(CW: 10MHz~1300MHz)<br>Rates: 50Hz~100kHz) | $U_{rel} = 1.3\%$            |      |    |
|    |        | 调相   |                             | PM: (1-40)rad<br>(CW: 150kHz~10MHz)<br>Rates: 20Hz~10kHz)   | $U_{rel} = 5\%$              |      |    |
|    |        |      |                             | PM: (1-40)rad<br>(CW: 10MHz~1300MHz)<br>Rates: 200Hz~20kHz) | $U_{rel} = 4\%$              |      |    |
| 77 | 测量接收机  | 频率   | JJF 1173-2007<br>测量接收机校准规范  | 150kHz~20GHz  | $U_{rel} = 3 \times 10^{-7}$ |      |    |

| 序号 | 测量仪器名称  | 校准参量             | 规范代号(含年号)名称                | 测量范围  | 扩展不确定度(k=2)           | 限制说明 | 备注 |
|----|---|------------------|----------------------------|---|-----------------------|------|----|
| 77 | 测量接收机   | 电平               | JJF 1173-2007<br>测量接收机校准规范 | -120dBm-20dBm<br>(150kHz-20GHz)                             | $U=$<br>0.42dB-0.22dB |      |    |
|    |   | 调幅               |                            | AM: (5-99)%<br>(CW: 150kHz-10MHz<br>,<br>Rates: 50Hz-10kHz) | $U_{rel}= 2.4\%$      |      |    |
|    |   |                  |                            | AM: (5-99)%<br>(CW: 10MHz-1300MHz,<br>Rates: 50Hz-50kHz)    | $U_{rel}= 1.3\%$      |      |    |
|    |   |                  |                            | AM: (5-99)%<br>(CW: 150kHz-10MHz<br>,<br>Rates: 20Hz-10kHz) | $U_{rel}= 4\%$        |      |    |
|    |   |                  |                            | AM: (5-99)%<br>(CW: 10MHz-1300MHz,<br>Rates: 20Hz-100kHz)   | $U_{rel}= 4\%$        |      |    |
| 调频 | FM: (1-40)kHz<br>(CW: 250kHz-10MHz<br>,<br>Rates: 20Hz-10kHz) | $U_{rel}= 2.4\%$ |                            |   |                       |      |    |

| 序号 | 测量仪器名称     | 校准参量 | 规范代号(含年号)名称   | 测量范围   | 扩展不确定度( $k=2$ )              | 限制说明 | 备注 |
|----|------------|------|---|--|------------------------------|------|----|
| 77 | 测量接收机      | 调频   | JJF 1173-2007<br>测量接收机校准规范  | FM: (1-400)kHz<br>(CW: 10MHz-1300MHz), Rates: 50Hz-100kHz) | $U_{rel} = 1.3\%$            |      |    |
|    |            | 调相   |   | PM: (1-400)rad<br>(CW: 150kHz-10MHz), Rates: 200Hz-10kHz)  | $U_{rel} = 5\%$              |      |    |
|    |            |      |   | PM: (1-400)rad<br>(CW: 10MHz-1300MHz), Rates: 200Hz-20kHz) | $U_{rel} = 4\%$              |      |    |
| 78 | 电视/视频信号发生器 | 电压   | JJG (电子)<br>12006-1987 S305<br>全频道彩色电视信号发生器<br>JJF 1235-2010<br>电视视频信号发生器校准规范 | 亮度:<br>0.1mV-3V  | $U_{rel} = 0.6\%$            |      |    |
|    |            |      |   | 色度:<br>0.1mV-3V  | $U_{rel} = 1.2\%$            |      |    |
|    |            | 时间   |   | 1ns-150 $\mu$ s  | $U_{rel} = 0.4\%$            |      |    |
|    |            | 相位   |   | 0° ~360°   | $U = 0.6^\circ$              |      |    |
|    |            | 频率   |   | 48MHz-862MHz   | $U_{rel} = 2 \times 10^{-7}$ |      |    |
|    |            | 电平   |   | -100dBm-20dBm<br>(48MHz-862MHz)                            | $U = 0.33dB$                 |      |    |

| 序号 | 测量仪器名称  | 校准参量   | 规范代号(含年号)名称                  | 测量范围   | 扩展不确定度( $k=2$ )              | 限制说明          | 备注 |
|----|---------|--------|------------------------------|--|------------------------------|---------------|----|
| 79 | 功率计     | 功率校准因子 | GJB/J 3598-1999<br>小功率座检定规程  | -20dBm-30dBm<br>(150kHz-20GHz)                           | $U_{rel} = 3.5\%$            |               |    |
|    |         |        |                              | -70dBm--20dBm<br>(150kHz-20GHz)                          | $U_{rel} = 5\%$              |               |    |
| 80 | 电视信号场强仪 | 电平     | JJG 1057-2010<br>电视信号场强仪     | -100dBm-20dBm<br>(48MHz-862MHz)                          | $U=0.33dB$                   |               |    |
| 81 | 射频通信测试仪 | 频率     | JJF 1065-2000<br>射频通信测试仪校准规范 | 150kHz-20GHz   | $U_{rel} = 3 \times 10^{-8}$ | 只校模拟调制射频通信测试仪 |    |
|    |         | 电平     |                              | -120dBm-30dBm<br>(150kHz-20GHz)                          | $U = 0.32dB-0.15dB$          |               |    |
|    |         | 调幅     |                              | AM: (5-99)%<br>(CW: 150kHz-10MHz<br>, Rates: 50Hz-10kHz) | $U_{rel} = 2.4\%$            |               |    |
|    |         |        |                              | AM: (5-99)%<br>(CW: 10MHz-1300MHz,<br>Rates: 50Hz-50kHz) | $U_{rel} = 1.3\%$            |               |    |



| 序号 | 测量仪器名称   | 校准参量            | 规范代号(含年号)名称                      | 测量范围  | 扩展不确定度( $k=2$ )   | 限制说明                              | 备注 |
|----|--|-----------------|----------------------------------|---|-------------------|-----------------------------------|----|
| 81 | 射频通信测试仪  | 调幅              | JJF 1065-2000<br>射频通信测试仪<br>校准规范 | AM: (5-99)%<br>(CW: 150kHz-10MHz<br>,<br>Rates: 20Hz-10kHz)   | $U_{rel} = 4\%$   | 只校<br>模拟<br>调制<br>射频<br>通信<br>测试仪 |    |
|    |  |                 |                                  | AM: (5-99)%<br>(CW: 10MHz-1300MHz,<br>Rates: 20Hz-100kHz)     | $U_{rel} = 4\%$   |                                   |    |
|    |  | 调频              |                                  | FM: (1-40)kHz<br>(CW: 250kHz-10MHz<br>,<br>Rates: 20Hz-10kHz) | $U_{rel} = 2.4\%$ |                                   |    |
|    |  |                 |                                  | FM: (1-400)kHz<br>(CW: 10MHz-1300MHz,<br>Rates: 50Hz-100kHz)  | $U_{rel} = 1.3\%$ |                                   |    |
| 调相 | PM: (1-400)rad<br>(CW: 150kHz-10MHz<br>,<br>Rates: 20Hz-10kHz) | $U_{rel} = 5\%$ |                                  |   |                   |                                   |    |

| 序号 | 测量仪器名称  | 校准参量  | 规范代号(含年号)名称                      | 测量范围   | 扩展不确定度( $k=2$ )            | 限制说明          | 备注 |
|----|---------|-------|----------------------------------|--|----------------------------|---------------|----|
| 81 | 射频通信测试仪 | 调相    | JJF 1065-2000<br>射频通信测试仪<br>校准规范 | PM: (1-400)rad<br>(CW: 10MHz~1300MHz), Rates: 200Hz~20kHz) | $U_{rel}=4\%$              | 只校模拟调制射频通信测试仪 |    |
|    |         | 音频电压  |                                  | 1mV~30mV (DC, 10Hz~200kHz)                                 | $U_{rel}=0.7\%~0.2\%$      |               |    |
|    |         |       |                                  | >30mV~300V (DC, 10Hz~200kHz)                               | $U_{rel}=0.15\%$           |               |    |
|    |         | 音频失真  |                                  | 0.01%~30% (20Hz~100kHz)                                    | $U_{rel}=6\%$              |               |    |
|    |         | 音频频率  |                                  | 10Hz~200kHz  | $U_{rel}=1 \times 10^{-6}$ |               |    |
| 82 | 示波器电压探头 | 直流衰减比 | JJF 1437-2013<br>示波器电压探头<br>校准规范 | 1~1000   | $U_{rel}=0.3\%$            |               |    |
|    |         | 频率响应  |                                  | -3dB~3dB (DC, 30Hz~100kHz)                                 | $U=0.10dB$                 |               |    |
|    |         |       |                                  | -3dB~3dB (100kHz~500MHz)                                   | $U=0.3dB$                  |               |    |
|    |         | 上升时间  |                                  | 0.7ns~100ns  | $U_{rel}=3\%$              |               |    |
| 83 | 信纳表     | 电压    | JJF 1165-2007<br>信纳表校准规范         | 10mV~30V   | $U_{rel}=0.3\%$            |               |    |
|    |         | 信纳    |                                  | (0-60)dB   | $U=0.15dB$                 |               |    |
|    |         | 频率    |                                  | 10Hz~10kHz   | $U_{rel}=0.03\%$           |               |    |

| 序号   | 测量仪器名称    | 校准参量 | 规范代号(含年号)名称                          | 测量范围                          | 扩展不确定度(k=2)           | 限制说明 | 备注 |
|------|-----------|------|--------------------------------------|-------------------------------|-----------------------|------|----|
| 84   | 电视视频信号分析仪 | 电压   | JJF 1455-2014<br>电视视频信号分析仪校准规范       | 亮度:<br>0.1mV-3V               | $U_{rel}=0.6\%$       |      |    |
|      |           |      |                                      | 色度:<br>0.1mV-3V               | $U_{rel}=1.2\%$       |      |    |
|      |           | 时间   |                                      | 1ns-150<br>$\mu$ s            | $U_{rel}=0.2\%$       |      |    |
|      |           | 相位   |                                      | 0°-360°                       | $U=0.6^\circ$         |      |    |
| 85   | 波形监视器     | 幅度   | JJG 120-1990 波形监视器检定规程               | 10mV-3V                       | $U_{rel}=0.6\%$       |      |    |
|      |           | 时间   |                                      | 0.1 $\mu$ s-10<br>$\mu$ s     | $U_{rel}=0.6\%$       |      |    |
| 86   | 人工电源网络    | 分压系数 | JJF(电子)<br>30806-2007 人工电源网络         | (0-60)dB                      | $U=0.3$ dB            |      |    |
| 五、光学 |           |      |                                      |                               |                       |      |    |
| 1    | 镜向光泽计     | 光泽度  | 镜向光泽计和光泽度板检定规程<br>JJG 696-2002       | (0-150)<br>光泽单位               | $U=1.4$ 光泽单位          |      |    |
| 2    | 激光功率计     | 光功率  | 0.1mW~200W 激光功率计检定规程<br>JJG 249-2004 | 波长范围:<br>(405-780) nm         | $U_{rel}=3.1\%$       |      |    |
|      |           |      |                                      | 功率范围:<br>(0.1~150)mW          |                       |      |    |
| 3    | 标准光源箱     | 光照度  | 标准光源箱校准规范<br>JJF(纺织)<br>055-2012     | (50-3000)<br>lx               | $U=50$ lx             |      |    |
|      |           | 色温   |                                      | (2300-9500)K                  | $U=120$ K             |      |    |
| 4    | 光照度计      | 光照度  | 光照度计检定规程<br>JJG 245-2005             | (5-3000)<br>lx                | $U_{rel}=(2.5-2.0)$ % |      |    |
| 5    | 亮度计       | 光亮度  | 亮度计检定规程<br>JJG 211-2005              | (5-1000)<br>cd/m <sup>2</sup> | $U_{rel}=2.7\%$       |      |    |
| 六、化学 |           |      |                                      |                               |                       |      |    |

| 序号 | 测量仪器名称         | 校准参量 | 规范代号(含年号)名称                        | 测量范围   | 扩展不确定度(k=2)                   | 限制说明 | 备注 |
|----|----------------|------|------------------------------------|--|-------------------------------|------|----|
| 1  | 酸度(pH)计        | 酸度   | 实验室 pH(酸度)计检定规程<br>JJG 119-2005    | (0.00~14.00)pH                                   | 电计:<br>$U=0.01\text{pH}$      |      |    |
|    |                |      |                                    |  | 仪器:<br>$U=0.02\text{pH}$      |      |    |
| 2  | 电导率仪           | 电导率  | 电导仪检定规程<br>JJG 376-2007            | (0.05~10000) $\mu\text{S}/\text{cm}$             | 电计:<br>$U_{\text{rel}}=0.3\%$ |      |    |
|    |                |      |                                    |  | 仪器:<br>$U_{\text{rel}}=0.3\%$ |      |    |
| 3  | 尘埃粒子计数器        | 浓度   | 尘埃粒子计数器校准规范<br>JJF 1190-2008       | (100~100000)个/2.83L                              | $U_{\text{rel}}=14\%$         |      |    |
| 4  | 木材含水率测量仪       | 浓度   | 木材含水率测量仪检定规程<br>JJG 986-2004       | (0~40)%  | $U=1.1\%$                     |      |    |
| 5  | 流出杯式粘度计        | 粘度   | 流出杯式粘度计检定规程<br>JJG 743-2005        | (10~500) $\text{mm}^2/\text{s}$                  | $U_{\text{rel}}=2.0\%$        |      |    |
| 6  | 旋转黏度计          | 粘度   | 旋转黏度计检定规程<br>JJG 1002-2005         | (1~10 <sup>6</sup> ) $\text{mPa}\cdot\text{s}$   | $U_{\text{rel}}=3.0\%$        |      |    |
| 7  | 发射光谱仪          | 检出限  | 发射光谱仪检定规程<br>JJG 768-2005          | ICP 光谱仪: 金属元素<br>(0.0~10.0) $\text{g}/\text{mL}$ | $U_{\text{rel}}=2.6\%$        |      |    |
|    |                |      |                                    | 直读光谱仪: 金属元素<br>(0.001~99.9) %                    | $U_{\text{rel}}=2.6\%$        |      |    |
| 8  | 紫外、可见、近红外分光光度计 | 波长   | 紫外、可见、近红外分光光度计检定规程<br>JJG 178-2007 | (195~340) $\text{nm}$                            | $U=0.5 \text{ nm}$            |      |    |
|    |                |      |                                    | (340~850) $\text{nm}$                            | $U=0.7 \text{ nm}$            |      |    |
|    |                | 透射比  |                                    | (0~100) %  | $U=0.6\%$                     |      |    |

| 序号 | 测量仪器名称       | 校准参量   | 规范代号(含年号)名称                          | 测量范围  | 扩展不确定度(k=2)      | 限制说明 | 备注 |
|----|--------------|--------|--------------------------------------|---|------------------|------|----|
| 9  | 离子色谱仪        | 最小检测浓度 | 离子色谱仪检定规程<br>JJG 823-2014            | 电导检测器:<br>≤<br>0.02 μg/mL                           | $U_{rel}=5.8\%$  |      |    |
| 10 | 自动电位滴定仪      | mV     | 自动电位滴定仪检定规程 JJG 814-2015             | (-900~900) mV                                       | $U_{rel}=0.06\%$ |      |    |
| 11 | 能量色散X射线荧光光谱仪 | 检出限    | 能量色散X射线荧光光谱仪校准规范<br>JJF(闽) 1047-2011 | Cr:<br>(9-1000)<br>mg/kg                            | $U_{rel}=6.1\%$  |      |    |
| 12 | 液相色谱仪        | 最小检测浓度 | 液相色谱仪检定规程<br>JJG 705-2014            | 紫外-可见光检测器及二极管阵列检测器:<br>≤ $5 \times 10^{-8}$<br>g/mL | $U_{rel}=5.8\%$  |      |    |
|    |              |        |                                      | 荧光检测器:<br>≤ $5 \times 10^{-9}$<br>g/mL              | $U_{rel}=5.2\%$  |      |    |
|    |              |        |                                      | 示差折光率检测器:<br>≤ $5 \times 10^{-6}$<br>g/mL           | $U_{rel}=6.6\%$  |      |    |
|    |              |        |                                      | 蒸发光散射检测器:<br>≤ $5 \times 10^{-6}$<br>g/mL           | $U_{rel}=6.6\%$  |      |    |
| 13 | 气相色谱仪        | 灵敏度    | 气相色谱仪检定规程<br>JJG 700-1999            | TCD: ><br>800mV.mL<br>/mg                           | $U_{rel}=4.8\%$  |      |    |

| 序号 | 测量仪器名称       | 校准参量 | 规范代号(含年号)名称                       | 测量范围  | 扩展不确定度(k=2)       | 限制说明 | 备注 |
|----|--------------|------|-----------------------------------|---|-------------------|------|----|
| 13 | 气相色谱仪        | 检测限  | 气相色谱仪<br>检定规程<br>JJG 700-1999     | FID: $\leq$<br>$5 \times 10^{-10}$ g/<br>s  | $U_{rel}=6.0\%$   |      |    |
|    |              |      |                                   | ECD: $\leq$<br>$5 \times 10^{-12}$ g/<br>mL | $U_{rel}=6.2\%$   |      |    |
| 14 | 液相色谱-质谱联用仪   | 信噪比  | 液相色谱-质谱联用仪校准规范<br>JJF 1317-2011   | ESI+: $\geq$<br>10: 1                       | $U_{rel}=11\%$    |      |    |
|    |              |      |                                   | ESI-: $\geq$<br>10: 1                       | $U_{rel}=11\%$    |      |    |
|    |              |      |                                   | APCI+: $\geq$<br>10: 1                      | $U_{rel}=11\%$    |      |    |
| 15 | 台式气相色谱-质谱联用仪 | 信噪比  | 台式气相色谱-质谱联用仪校准规范<br>JJF 1164-2006 | EI+: $\geq$<br>10: 1                        | $U_{rel}=7\%$     |      |    |
|    |              |      |                                   | 正CI: $\geq$<br>10: 1                        | $U_{rel}=7\%$     |      |    |
|    |              |      |                                   | 负CI: $\geq$<br>10: 1                        | $U_{rel}=7\%$     |      |    |
| 16 | 手持糖量计        | 浓度   | 手持糖量(含量)计及折射仪检定规程<br>JJG 820-2005 | (10、30、50)%                                 | $U=2.0\%$         |      |    |
| 17 | 旋光仪及旋光糖量计    | 旋光度  | 旋光仪及旋光糖量计检定规程<br>JJG 536-2015     | (-45~45)°                                   | $U=0.007^\circ$   |      |    |
|    |              | 糖度   |                                   | (-20~105)° Z                                | $U=0.014^\circ Z$ |      |    |



**CHINA NATIONAL ACCREDITATION SERVICE FOR CONFORMITY ASSESSMENT**  
**SCHEDULE OF ACCREDITATION CERTIFICATE**  
**(Registration No. CNAS L4210)**

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**Accreditation Criteria:** ISO/IEC 17025 and relevant requirements of CNAS

**Date of Issue:** 2015-09-29

**Date of Expiry:** 2018-10-14

SCHEDULE 3 ACCREDITED CALIBRATION SCOPE

| No            | Instrument                                       | Parameter | Title, Code of Calibration Method   | Range                     | Uncertainty ( $k=2$ )             | Limitation | Note |
|---------------|--|-----------|---|---------------------------|-----------------------------------|------------|------|
| 一、Geometrical |  |           |   |                           |                                   |            |      |
| 1             | Gauge Blocks                                     | Length    | JJG 146-2011<br>Gauge Blocks  | (0.5~100)mm               | $U=(0.15+1.5L)\mu\text{m}$<br>L:m |            |      |
|               |  |           |   | (100~500)mm               | $U=(0.2+1.5L)\mu\text{m}$<br>L:m  |            |      |
| 2             | Current Calipers                                 | Length    | JJG 30-2012<br>Current Calipers   | (0~500)mm                 | $U=0.01\text{mm}$                 |            |      |
|               |  |           |   | (500~1000)mm              | $U=0.02\text{mm}$                 |            |      |
| 3             | Height Caliper                                   | Length    | JJG 31-2010<br>Height Caliper   | (0~500)mm                 | $U=0.01\text{mm}$                 |            |      |
|               |  |           |   | (500~1000)mm              | $U=0.02\text{mm}$                 |            |      |
| 4             | Height Measuring Instrument With Digital Display | Length    | JJF 1254-2010<br>Calibration Specification for Height Measuring Instrument With Digital Display | (0~500)mm                 | $U=2.2\mu\text{m}$                |            |      |
| 5             | Dial Gauges(dial and digital)                    | Length    | JJG 34-2008<br>Dial Gauges(dial and digital)  | Dial:<br>0.01mm :(0~10)mm | $U=6.0\mu\text{m}$                |            |      |

| No | Instrument                    | Parameter | Title, Code of Calibration Method   | Range                                 | Uncertainty ( $k=2$ )        | Limitation | Note |
|----|-------------------------------|-----------|---|---------------------------------------|------------------------------|------------|------|
| 5  | Dial Gauges(dial and digital) | Length    | JJG 34-2008<br>Dial Gauges(dial and digital)  | Dial gauge:<br>0.001mm:(0~5)mm        | $U=2.0\mu\text{m}$           |            |      |
|    |                               |           | JJG 379-2009<br>Wide Range Dages Reading in 0.01mm  | (0~50)mm                              | $U=7\mu\text{m}$             |            |      |
|    |                               |           | JJG 35-2006<br>Dial Test Indicator  | Dial:<br>0.01mm :(0~2)mm              | $U=6.0\mu\text{m}$           |            |      |
|    |                               |           |   | Dial gauge:<br>0.001mm :(0~0.5)mm     | $U=2.0\mu\text{m}$           |            |      |
|    |                               |           | JJF 1102-2003<br>Calibration Specification for Bore Dial Indicators                       | Dial:<br>0.01mm:<br>(0~450) mm        | $U=6.0\mu\text{m}$           |            |      |
|    |                               |           |   | Dial gauge:<br>0.001mm:<br>(0~400) mm | $U=2.0\mu\text{m}$           |            |      |
| 6  | Micrometer                    | Length    | JJG 21-2008<br>Micrometer   | (0~500)mm                             | $U=(1.0\sim 1.6)\mu\text{m}$ |            |      |
|    |                               |           | JJG 26-2001<br>Micrometers with Dial Comparator and Indicating Snap Gauge                 | Leverage micrometer:<br>(0~100)mm     | $U=1.7\mu\text{m}$           |            |      |
|    |                               |           |   | Leverage card rules:<br>(0~200)mm     | $U=1.7\mu\text{m}$           |            |      |
|    |                               |           | JJF 1411-2013<br>Calibration Specification for Micrometers for Measuring Inside Dimension | Niece micrometer<br>(0~100)mm         | $U=2.0\mu\text{m}$           |            |      |
| 7  | Depth Micrometers             | Length    | JJG 24-2003<br>Depth Micrometers  | (0~100) mm                            | $U=1.5\mu\text{m}$           |            |      |
|    |                               |           |   | (100~200) mm                          | $U=1.7\mu\text{m}$           |            |      |
|    |                               |           |   | (200~300) mm                          | $U=1.9\mu\text{m}$           |            |      |
| 8  | Depth Dial Gauge              | Length    | JJG 830-2007<br>Depth Dial Gauge  | (0~300)mm                             | $U=3.5\mu\text{m}$           |            |      |



| No | Instrument   | Parameter | Title, Code of Calibration Method   | Range   | Uncertainty ( $k=2$ )                      | Limitation | Note |
|----|--|-----------|---|---|--|------------|------|
| 9  | Surface Plates   | Flatness  | JJG 117-2013 Surface Plates   | $\leq 400\text{mm} \times 400\text{mm}$   | $U=0.5\mu\text{m}$                         |            |      |
|    |  |           |   | $\geq (630\text{mm} \times 400\text{mm}) \sim (1600\text{mm} \times 1000\text{mm})$ | $U=1.0\mu\text{m}$                         |            |      |
| 9  | Surface Plates   | Flatness  | JJG 117-2013 Surface Plates   | $\geq (1600\text{mm} \times 1000\text{mm}) \sim (2500\text{mm} \times$              | $U=1.5\mu\text{m}$                         |            |      |
| 10 | Frame Level and Shaft Levels   | Angle     | JJF 1084-2002 Calibration Specification of Frame Levels and Shaft Levels          | $(0 \sim 1.5)\text{mm}/\text{m}$  | $U=4\%Ax+0.003\text{mm}/\text{m}$          |            |      |
| 11 | Steel Rule   | Length    | JJG 1-1999 Steel Rule   | $(0 \sim 2000)\text{mm}$  | $U=0.05\text{mm}$                          |            |      |
| 12 | Feeler Gauges  | Length    | JJG 62-2007 Feeler Gauges   | $(0.02 \sim 3.00)\text{mm}$   | $U=2.6\mu\text{m}$                         |            |      |
| 13 | Steel Tape   | Length    | JJG 4-1999 Steel Tape   | $(0 \sim 30)\text{m}$   | $U=(0.1+0.02L)\text{mm}$<br>$L: \text{m}$  |            |      |
| 14 | Wood, Plastic Rule   | Length    | JJG 2-1999 Wooden Rule (Wooden Folded Rule)                                       | $(0 \sim 1000)\text{mm}$  | $U=0.1\text{mm}$                           |            |      |
| 15 | Fiber Tapes And Measuring Ropes                                      | Length    | JJG 5-2001 Fiber Tapes And Measuring Ropes  | $(0 \sim 50)\text{m}$   | $U=(0.1+0.02L)\text{mm}$ ,<br>$L:\text{m}$ |            |      |
| 16 | Universal Bevel Protractors  | Angle     | JJG 33-2002 Universal Bevel Protractors   | $0^\circ \sim 360^\circ$  | $U=0.6'$                                   |            |      |
| 17 | Magnetic and Eddy Current Measuring Instrument for Coating Thickness | Length    | JJG 818-2005 Magnetic and Eddy Current Measuring Instrument for Coating Thickness | $(0 \sim 988)\mu\text{m}$   | $U=1.0\mu\text{m} \sim 2.0\mu\text{m}$     |            |      |
| 18 | Smooth Limit Gauge   | Length    | JJG 343-2012 Smooth Limit Gauge   | $(0 \sim 10)\text{mm}$  | $U=0.6\mu\text{m}$                         |            |      |
|    |  |           |   | $(10 \sim 18)\text{mm}$   | $U=0.7\mu\text{m}$                         |            |      |
|    |  |           |   | $(18 \sim 30)\text{mm}$   | $U=0.8\mu\text{m}$                         |            |      |
|    |  |           |   | $(30 \sim 50)\text{mm}$   | $U=0.9\mu\text{m}$                         |            |      |
|    |  |           |   | $(50 \sim 80)\text{mm}$   | $U=1.0\mu\text{m}$                         |            |      |
|    |  |           |   | $(80 \sim 100)\text{mm}$  | $U=1.1\mu\text{m}$                         |            |      |

| No | Instrument  | Parameter       | Title, Code of Calibration Method   | Range                      | Uncertainty ( $k=2$ )       | Limitation | Note |
|----|---|-----------------|---|----------------------------|-----------------------------|------------|------|
| 19 | Cylindrical Thread Gauges   | Length          | JJF1345-2012 Calibration Specification for Cylindrical Thread Gauges  | Plug gauge:M1~M200         | $U=2.5\mu\text{m}$          |            |      |
|    |   |                 |   | Ring gauge:M2~M12          | $U=3.0\mu\text{m}$          |            |      |
| 20 | Reading Microscope and Measuring Microscope   | Length          | JJG 571-2004 Reading Microscope and Measuring Microscope  | (0~50mm)                   | $U=2\mu\text{m}$            |            |      |
| 21 | Toolmaker's Microscope  | Length          | JJG 56-2000 Toolmaker's Microscope  | (0~200)mm                  | $U=1.0\mu\text{m}$          |            |      |
| 22 | Vedio Measuring System (2D)   | Length          | JJF1318-2011 Calibration Specification for Imaging Probe Measuring Machines   | (0~300)mm                  | $U=(1.1+2L)\mu\text{m}$ L:m |            |      |
| 23 | Projectors  | Length          | JJF 1093-2002 Calibration Specification for Projectors  | (0~300)mm                  | $U=(1.2+4L)\mu\text{m}$ L:m |            |      |
| 24 | Coordinate Measuring Machines   | Length          | JJF 1064-2010 Calibration Specification for Coordinate Measuring Machines   | (0~1000)mm                 | $U=(0.8+1L)\mu\text{m}$ L:m |            |      |
| 25 | Roundness Measuring Instrument  | Circular degree | JJG 429-2000 Measurement Standard Instrument of Roundness and Cylindricity  | (0.06~20) $\mu\text{m}$    | $U_{\text{rel}}=2\%$        |            |      |
| 26 | Contact (Stylus) Instruments of surface Roughness Measurement by the Profile Method | Roughness       | JJF 1105-2003 Calibration Specification for Contact (Stylus) Instruments of surface Roughness Measurement by the Profile Method | Ra:(0.1~3.2) $\mu\text{m}$ | $U_{\text{rel}}=4.7\%$      |            |      |

| No | Instrument                                       | Parameter    | Title, Code of Calibration Method  | Range   | Uncertainty ( $k=2$ ) | Limitation | Note |
|----|--|--------------|--|---|-----------------------|------------|------|
| 27 | Radius Gauges                                    | Length       | JJG 58-2010<br>Radius Gauges   | 0.5mm~6mm                                     | $U=6\mu\text{m}$      |            |      |
|    |  |              |  | ><br>6mm~18mm                                 | $U=7\mu\text{m}$      |            |      |
|    |  |              |  | ><br>18mm~25mm                                | $U=8\mu\text{m}$      |            |      |
| 28 | X-Ray Fluorescence Coating Thickness Instruments | Length       | JJF 1306-2011<br>Caibration Specification for X-Ray Fluorescence Coating Thickness Instruments | (0~6.7) $\mu\text{m}$                         | $U_{\text{rel}}=13\%$ |            |      |
| 29 | Straight Edge                                    | Straightness | JJG 63-2007<br>Straight Edge   | (50~200)mm                                    | $U=0.3\mu\text{m}$    |            |      |
| 29 | Straight Edge                                    | Straightness | JJG 63-2007<br>Straight Edge   | (200~275)mm                                   | $U=0.6\mu\text{m}$    |            |      |
|    |  |              |  | (300~500)mm                                   | $U=0.8\mu\text{m}$    |            |      |
| 30 | Fineness of Grind Gage                           | Length       | JJG 905-2010<br>Fineness of Grind Gage   | (0~15) $\mu\text{m}$<br>(0~25) $\mu\text{m}$  | $U=0.4\mu\text{m}$    |            |      |
|    |  |              |  | (0~50) $\mu\text{m}$<br>(0~100) $\mu\text{m}$ | $U=0.7\mu\text{m}$    |            |      |
|    |  |              |  | (0~150) $\mu\text{m}$                         | $U=0.9\mu\text{m}$    |            |      |
|    |  | Straightness |  | (0.3~2) $\mu\text{m}$                         | $U=0.3\mu\text{m}$    |            |      |
| 31 | Screw Templates                                  | Screw Pitch  | JJG 60-2012<br>Screw Templates   | (0.40~0.60)mm                                 | $U=3\mu\text{m}$      |            |      |
|    |  |              |  | (0.70~1.50)mm                                 | $U=4\mu\text{m}$      |            |      |
|    |  |              |  | (1.75~6.00)mm                                 | $U=5\mu\text{m}$      |            |      |
| 32 | Screw Thread Micrometers                         | Length       | JJG 25-2004<br>Screw Thread Micrometers  | (0~150)mm                                     | $U=1\mu\text{m}$      |            |      |
|    |  |              |  | (150~200)mm                                   | $U=2\mu\text{m}$      |            |      |
| 33 | Cylindrical Measuring Pin                        | Length       | JJF 1207-2008<br>Caibration Specification for Cylindrical Measuring Pin                        | Pin:<br>(0.1~10)mm                            | $U=0.3\mu\text{m}$    |            |      |
|    |  |              |  | Pin:<br>(>10~25)mm                            | $U=0.5\mu\text{m}$    |            |      |
|    |  |              |  | Three-pin:<br>(0.118~6.585)mm                 | $U=0.2\mu\text{m}$    |            |      |

| No | Instrument                             | Parameter | Title, Code of Calibration Method   | Range                | Uncertainty ( $k=2$ )                 | Limitation | Note |
|----|--|-----------|---|----------------------|---------------------------------------|------------|------|
| 34 | Test Sieves                            | Length    | JJF 1175-2007<br>Caibration<br>Specification for Test<br>Sieves                         | Net:<br>(1~125)mm    | $U=2.0\mu\text{m} \sim 0.6\text{mm}$  |            |      |
|    |  |           |   | Sieves:<br>(1~125)mm | $U= 12\mu\text{m} \sim 0.20\text{mm}$ |            |      |
| 35 | Small Components                       | Length    | HZH-WIL11011-2011<br>Small parts tester<br>calibration method                           | (0~62) mm            | $U=0.02\text{mm}$                     |            |      |
| 36 | Articulated<br>Accessibility<br>Probe  | Length    | HZH-WIL11012-201<br>1<br>Reach the probe<br>calibration method                          | (0~500) mm           | $U=0.02\text{mm}$                     |            |      |
| 37 | Point Sharp Teste                      | Length    | HZH-WIL11013-201<br>1 Sharp point tester<br>calibration method                          | (0~2) mm             | $U=3\mu\text{m}$                      |            |      |
| 37 | Point Sharp Teste                      | Force     | HZH-WIL11013-201<br>1 Sharp point tester<br>calibration method                          | (0~2.5)N             | $U=0.1\text{N}$                       |            |      |
| 38 | Test Template                          | Length    | HZH-WIL11014-201<br>1<br>Calibration Method<br>For Test Template                        | A,B,C                | $U=0.02\text{mm}$                     |            |      |
| 39 | Bite Tester                            | Length    | HZH-WIL11015-201<br>1<br>Calibration Method<br>For Bite Tester                          | (0~100) mm           | $U=0.02\text{mm}$                     |            |      |
|    |  | Angle     |   | (0~180) °            | $U=2'$                                |            |      |
| 40 | Moulds                                 | Length    | JJF1307-2011<br>Caibration<br>Specification for<br>Moulds                               | (40~600)<br>mm       | $U=0.2\text{mm}$                      |            |      |
| 41 | Ultrasonic<br>Thickness<br>Instruments | Length    | JJF 1126-2004<br>Caibration<br>Specification for<br>Ultrasonic Thickness<br>Instruments | (0~300)mm            | $U=(0.01\sim 0.06)\text{mm}$          |            |      |
| 42 | Concentricity<br>Tester                | Length    | JJF 1109-2003<br>Caibration<br>Specification for<br>Concentricity Tester                | (-2~+2)<br>mm        | $U=1.2\mu\text{m}$                    |            |      |
| 43 | Laser Diameter<br>Measuring Gauges     | Diameter  | JJF 1250-2010<br>Caibration<br>Specification for<br>Laser Diameter<br>Measuring Gauges  | (0~30)mm             | $U=(0.40\sim 0.50)\mu\text{m}$        |            |      |

| No | Instrument  | Parameter    | Title, Code of Calibration Method   | Range                         | Uncertainty ( $k=2$ )        | Limitation | Note |
|----|---|--------------|---|-------------------------------|------------------------------|------------|------|
| 44 | Combined Type Angle Rules                               | Angle        | JJF 1132-2005<br>Caibration<br>Specification for<br>Combined Type Angle<br>Rules        | (0~180)°                      | $U=3'$                       |            |      |
| 45 | Level Rules   | Angle        | JJF 1085-2002<br>Caibration<br>Specification for<br>Level Rules                         | (200~<br>1200)mm              | $U_{rel}=8\%$                |            |      |
| 46 | Straight Edges  | Straightness | JJF 1097-2003<br>Caibration<br>Specification for<br>Straight Edges                      | (0~6300)<br>mm                | $U=(0.6\sim 1.3)\mu\text{m}$ |            |      |
| 47 | Squares   | Verticality  | JJG 7-2004<br>Squares   | 30mm~300m<br>m                | $U=3.1\mu\text{m}$           |            |      |
| 48 | Common Normal Micrometer                                | Length       | JJG 82-2010<br>Common Normal<br>Micrometer  | (0~100) mm                    | $U=2\mu\text{m}$             |            |      |
| 48 | Common Normal Micrometer                                | Length       | JJG 82-2010<br>Common Normal<br>Micrometer  | (100~200)m<br>m               | $U=3\mu\text{m}$             |            |      |
| 49 | Internal Micrometers                                    | Length       | JJG 22-2014<br>Internal Micrometers   | (0~500)mm                     | $U=(1\sim 8)\mu\text{m}$     |            |      |
| 50 | Micrometers with Prismatically Arranged Measuring Faces | Length       | JJG 182-2005<br>Micrometers with<br>Prismatically<br>Arranged Measuring<br>Faces        | (1-20) mm                     | $U=1.3\mu\text{m}$           |            |      |
| 51 | Thickness Gauges  | Length       | JJF 1255-2010<br>Caibration<br>Specification for<br>Thickness Gauges                    | (0~30) mm                     | $U=0.02\text{mm}$            |            |      |
| 52 | Comparators of Machine Type                             | Length       | JJG 39-2004<br>Comparators of<br>Machine Type   | (-300~<br>+300) $\mu\text{m}$ | $U=0.1\mu\text{m}$           |            |      |
| 53 | Metallographic microscope                               | Length       | JJG(Board of<br>Education)012-1996<br>metallographic<br>microscope                      | (0.7~100)X                    | $U_{rel}=0.7\%$              |            |      |
| 54 | Wedge feeler  | Length       | JJF 1110-2003<br>Caibration<br>Specification for<br>Construction Quality<br>Tester Sets | (9~50)mm                      | $U=0.05\text{mm}$            |            |      |

| No           | Instrument   | Parameter   | Title, Code of Calibration Method  | Range       | Uncertainty ( $k=2$ )    | Limitation | Note |
|--------------|--|-------------|--|-------------|--------------------------|------------|------|
| 55           | Gravel or pebbles gage needle-flake instrument                   | Length      | TGX013-2008 gravel or pebbles needle gage instrument calibration methods<br>TGX014-2008 gravel or pebbles flake gage instrument calibration method | (0~83) mm   | $U=0.05\text{mm}$        |            |      |
| 56           | Asphalt pavement with coarse aggregate crushing value instrument | Length      | TGX009-2008 Asphalt pavement with coarse aggregate crushing value instrument calibration methods   | (125~152)mm | $U=0.2\text{mm}$         |            |      |
| 57           | Slump cone and tamper  | Length      | TGX020-2008 Slump cone and tamper verification methods   | (100~300)mm | $U=0.3\text{mm}$         |            |      |
| 58           | The stratification of mortar instrument                          | Length      | TGX022-2008 mortar layered meter calibration method  | (100~200)mm | $U=0.2\text{mm}$         |            |      |
| 59           | The concrete impermeability test mode                            | Length      | TGX030-2008 concrete impermeability tryout validation methods  | (150~180)mm | $U=0.2\text{mm}$         |            |      |
| 60           | Concrete cube test model   | Length      | TGX029-2008 Concrete cube test model, Flexural test model, Mortar test model validation method   | (100~200)mm | $U=0.2\text{mm}$         |            |      |
| 61           | Flexural test model, Mortar test model                           | Length      | TGX029-2008 Concrete cube test model, Flexural test model, Mortar test model validation method   | (100~500)mm | $U=0.2\text{mm}$         |            |      |
| 二、Thermotics |  |             |  |             |                          |            |      |
| 1            | Standard Mercury-in- Glass Thermometer                           | Temperature | JJG 161-2010 Verification Regulation of Standard Mercury-in-Glass Thermometers   | (-30~0)°C   | $U=0.06^{\circ}\text{C}$ |            |      |
|              |  |             |  | (0~100)°C   | $U=0.05^{\circ}\text{C}$ |            |      |
|              |  |             |  | (100~200)°C | $U=0.06^{\circ}\text{C}$ |            |      |
|              |  |             |  | (200~300)°C | $U=0.07^{\circ}\text{C}$ |            |      |

| No | Instrument   | Parameter         | Title, Code of Calibration Method  | Range                           | Uncertainty ( $k=2$ )                       | Limitation | Note |
|----|--|-------------------|--|---------------------------------|---|------------|------|
| 2  | Liquid-in-Glass Thermometers                       | Temperature       | JIG 130-2011<br>Verification<br>Regulation of<br>Liquid-in-Glass<br>Thermometers for<br>Working  | $(-30\sim 0)^{\circ}\text{C}$   | $U=0.11^{\circ}\text{C}$                    |            |      |
|    |  |                   |  | $(0\sim 100)^{\circ}\text{C}$   | $U=0.09^{\circ}\text{C}$                    |            |      |
|    |  |                   |  | $(100\sim 200)^{\circ}\text{C}$ | $U=0.13^{\circ}\text{C}$                    |            |      |
|    |  |                   |  | $(200\sim 300)^{\circ}\text{C}$ | $U=0.15^{\circ}\text{C}$                    |            |      |
| 3  | Bimetallic Thermometer                             | Temperature       | JIG 226-2001<br>Verification<br>Regulation of<br>Bimetallic<br>Thermometers  | $(-30\sim 300)^{\circ}\text{C}$ | $U=(0.3\sim 0.6)^{\circ}\text{C}$           |            |      |
| 4  | Working Base Metal Thermometer                     | Temperature       | JIG 351-1996<br>Verification<br>Regulation of<br>Working Base Metal<br>Thermocouple  | $(-30\sim 0)^{\circ}\text{C}$   | $U=(0.3\sim 0.2)^{\circ}\text{C}$           |            |      |
|    |  |                   |  | $(0\sim 300)^{\circ}\text{C}$   | $U=(0.2\sim 0.5)^{\circ}\text{C}$           |            |      |
| 5  | Industrial Platinum Copper Resistance Thermistor   | Temperature       | JIG 229-2010<br>Verification<br>Regulation of<br>Industry Platinum and<br>Copper Resistance<br>Thermometers  | $(-30\sim 300)^{\circ}\text{C}$ | $0^{\circ}\text{C}:U=0.1^{\circ}\text{C}$   |            |      |
|    |  |                   |  |                                 | $100^{\circ}\text{C}:U=0.1^{\circ}\text{C}$ |            |      |
| 6  | Mechanical Thermo-hygrometer                       | Relative Humidity | JIG 205-2005<br>Verification<br>Regulation of<br>Mechanical<br>Thermo-hygrometers  | $(30\sim 90)\%$<br>RH           | $U=2.2\%\text{RH}$                          |            |      |
|    |  | Temperature       |  | $(10\sim 40)^{\circ}\text{C}$   | $U=0.6^{\circ}\text{C}$                     |            |      |
| 7  | Moving-Coil Type Temperature Indicating Instrument | Temperature       | JIG 186-1997<br>Verification<br>Regulation of Moving<br>Coil Indicators and<br>Step -indication<br>Controllers<br>Associated for<br>Measuring<br>Temperature | $(0\sim 300)^{\circ}\text{C}$   | $U=(0.3\sim 0.8)^{\circ}\text{C}$           |            |      |

| No | Instrument   | Parameter         | Title, Code of Calibration Method   | Range                | Uncertainty ( $k=2$ )           | Limitation | Note |
|----|--|-------------------|---|----------------------|---------------------------------|------------|------|
| 8  | Recorders for Industrial-Process Measurement       | Temperature       | JJG 74-2005<br>Verification Regulation of Recorders for Industrial - Process Measurement              | TC: (-30~0)°C        | $U=(0.4\sim 0.2)^\circ\text{C}$ |            |      |
|    |  |                   |   | TC: (0~1300)°C       | $U=(0.2\sim 1.2)^\circ\text{C}$ |            |      |
|    |  |                   |   | RTD: (-30~0)°C       | $U=(0.3\sim 0.2)^\circ\text{C}$ |            |      |
|    |  |                   |   | RTD: (0~800)°C       | $U=(0.2\sim 0.8)^\circ\text{C}$ |            |      |
| 9  | Digital Temperature Indicators and Controllers     | Temperature       | JJG 617-1996<br>Verification Regulation of Digital Temperature Indicators and Controllers             | TC: (-30~0)°C        | $U=(0.4\sim 0.2)^\circ\text{C}$ |            |      |
|    |  |                   |   | TC: (0~1300)°C       | $U=(0.2\sim 1.2)^\circ\text{C}$ |            |      |
| 9  | Digital Temperature Indicators and Controllers     | Temperature       | JJG 617-1996<br>Verification Regulation of Digital Temperature Indicators and Controllers             | RTD: (-30~0)°C       | $U=(0.3\sim 0.2)^\circ\text{C}$ |            |      |
|    |  |                   |   | RTD: (0~800)°C       | $U=(0.2\sim 0.8)^\circ\text{C}$ |            |      |
| 10 | Temperature Indication Controller                  | Temperature       | JJG 874-2007<br>Verification Regulation of Temperature Indication Controller                          | Pointer: (0~300)°C   | $U=(0.3\sim 0.6)^\circ\text{C}$ |            |      |
|    |  |                   |   | Digital: (-50~300)°C | $U=(0.2\sim 0.5)^\circ\text{C}$ |            |      |
| 11 | Temperature Itinerant Detecting of Instrument      | Temperature       | JJF 1171-2007<br>Calibration Specification for Temperature Itinerant Detecting Instrument             | (-30~300)°C          | $U=(0.2\sim 0.4)^\circ\text{C}$ |            |      |
| 12 | Environmental Testing for Temperature and Humidity | Temperature       | JJF 1101-2003<br>Calibration Specification for the Environmental Testing for Temperature and Humidity | (-50~0)°C            | $U=(0.6\sim 0.3)^\circ\text{C}$ |            |      |
|    |  |                   |   | (0~300)°C            | $U=(0.3\sim 0.7)^\circ\text{C}$ |            |      |
|    |  | Relative Humidity |   | (30~90)% RH          | $U=2.2\% \text{RH}$             |            |      |



| No | Instrument                               | Parameter                   | Title, Code of Calibration Method  | Range                               | Uncertainty ( $k=2$ )                          | Limitation | Note |
|----|--|-----------------------------|--|-------------------------------------|--|------------|------|
| 13 | Constant Temperature Bath                | Temperature                 | JJF1030-2010 Measurement and Test Norm of Thermostatic Bath's Metrological Characteristics | (-30~0) °C                          | $U=(0.022\sim0.010)^\circ\text{C}$             |            |      |
|    |  |                             |  | (0~300) °C                          | $U=(0.010\sim0.030)^\circ\text{C}$             |            |      |
| 14 | Glow Wire Tester                         | Time                        | JJF(Zhe) 1050-2010 Calibration Specification for Glow Wire Tester                          | (0~3600)s                           | $U=0.1\text{s}$                                |            |      |
|    |  | Temperature                 |  | 960°C                               | $U=3^\circ\text{C}$                            |            |      |
|    |  | Diameter                    |  | 4mm                                 | $U=0.004\text{mm}$                             |            |      |
| 15 | Salt spray test chamber                  | Temperature                 | JJF(Liao) 75-2009 Calibration Specification for Salt spray test chamber                    | (0~100)°C                           | $U=0.3^\circ\text{C}$                          |            |      |
|    |  | Salt fog sedimentation rate |  | (1.0~2.0) ml/(80cm <sup>2</sup> ·h) | $U=0.2\text{ ml}/(80\text{cm}^2\cdot\text{h})$ |            |      |
| 16 | Extrusion Plastometer                    | Temperature                 | JJG 878-1994 Verification Regulation of Extrusion Plastometer                              | (0~400) °C                          | $U=0.3^\circ\text{C}$                          |            |      |
|    |  | Quality                     |  | (0~5000)g                           | $U=0.3\text{g}$                                |            |      |
|    |  | Flow Rate                   |  | 1.96g/10min                         | $U=0.15\text{g}/10\text{min}$                  |            |      |
| 17 | Box-type Resistance Furnace              | Temperature                 | JJF 1376-2012 Calibration Specification for Box-type Resistance Furnace                    | (0~1000)°C                          | $U=2.1^\circ\text{C}$                          |            |      |
| 18 | Temperature Data Acquisition Instruments | Temperature                 | JJF 1366-2012 Calibration Specification of Temperature Data Acquisition Instruments        | Without Sensor: (-50~1000) °C       | $U=(0.3\sim0.6)^\circ\text{C}$                 |            |      |
|    |  |                             |  | With Sensor: (-30~300) °C           | $U=(0.2\sim0.3)^\circ\text{C}$                 |            |      |

| No          | Instrument  | Parameter                        | Title, Code of Calibration Method   | Range  | Uncertainty ( $k=2$ )                     | Limitation                                | Note |
|-------------|---|----------------------------------|---|--|---|---|------|
| 19          | Dust and Sand tester                                      | Temperature                      | JJF (Jungong) 18-2012 Calibration Specification for Dust and Sand Tester                                    | (0~100)°C                                    | $U=0.5^{\circ}\text{C}$                   |   |      |
|             |   | Humidity                         |   | (30~90)%RH                                   | $U=2.3\%RH$                               |   |      |
|             |   | Wind speed                       |   | (0~30)m/s                                    | $U=0.5\text{m/s}$                         |   |      |
|             |   | Dust and Sand Sedimentation Rate |   | $(6\pm 1)\text{g}/(\text{m}^2\cdot\text{d})$ | $U=0.3\text{g}/(\text{m}^2\cdot\text{d})$ |   |      |
| 20          | Colour Fastness to Washing Testers                        | Temperature                      | JJF (Fangzhi) 026-2010 Calibration Specification for Colour Fastness to Washing Testers                     | (0~100)°C                                    | $U=0.5^{\circ}\text{C}$                   |   |      |
|             |   | Speed                            |   | (0~100)r/min                                 | $U=0.5\text{r/min}$                       |   |      |
| 20          | Colour Fastness to Washing Testers                        | Time                             | JJF (Fangzhi) 026-2010 Calibration Specification for Colour Fastness to Washing Testers                     | (0~3600)s                                    | $U=0.1\text{s}$                           |   |      |
| 21          | Heat Distortion and Vicat Softening Temperature Apparatus | Temperature                      | JJF (Zhe) 1051-2010 Calibration Specification for Heat Distortion and Vicat Softening Temperature Apparatus | (0~300)°C                                    | $U=0.4^{\circ}\text{C}$                   |   |      |
|             |   | Heating Rate                     |   | (0~120)°C/h                                  | $U=0.2^{\circ}\text{C/h}$                 |   |      |
|             |   | Deformation                      |   | (0~10)mm                                     | $U=0.03\text{mm}$                         |   |      |
|             |   | Quality                          |   | (0~5000)g                                    | $U=0.3\text{g}$                           |   |      |
| 三、Mechanics |   |                                  |   |  |   |   |      |
| 1           | Weights   | Mass                             | JJG 99-2006 V.R.of Weights  | (1~20)mg                                     | $U=0.016\text{mg}$                        | Except for magnetism and volume (density) |      |
|             |   |                                  |   | (20~500)mg                                   | $U=0.03\text{mg}$                         |   |      |
|             |   |                                  |   | (1~50)g                                      | $U=0.16\text{mg}$                         |   |      |
|             |   |                                  |   | (50~500)g                                    | $U=0.3\text{mg}$                          |   |      |
|             |   |                                  |   | (500~5000)g                                  | $U=3\text{mg}$                            |   |      |
|             |   |                                  |   | (5~20)kg                                     | $U=0.03\text{g}$                          |   |      |

| No | Instrument                              | Parameter | Title, Code of Calibration Method                             | Range                                | Uncertainty ( $k=2$ )        | Limitation | Note |
|----|---|-----------|---|--------------------------------------|------------------------------|------------|------|
| 2  | Electronic Balance                      | Mass      | JJG 1036-2008<br>V.R.of Electronic Balance                    | 1mg~200g<br>(0.1mg $\leq$ e<1mg)     | $U=(0.05\sim 0.50)$ mg       |            |      |
|    |   |           |   | 20mg~5Kg(1mg $\leq$ e $\leq$ 50mg)   | $U=(0.38\sim 20)$ mg         |            |      |
|    |   |           |   | 5g~10kg<br>(0.1g $\leq$ e)           | $U=(0.02\sim 0.50)$ g        |            |      |
|    |   |           |   | 2g~20kg<br>(0.1g $\leq$ e $\leq$ 2g) | $U=(0.02\sim 1)$ g           |            |      |
|    |   |           |   | 100g~50kg<br>(5g $\leq$ e)           | $U=(0.5\sim 2.5)$ g          |            |      |
| 3  | Mechanical Balance                      | Mass      | JJG 98-2006<br>V.R.of Mechanical Balance                      | 1mg~1g                               | $U=0.02$ mg                  |            |      |
| 3  | Mechanical Balance                      | Mass      | JJG 98-2006<br>V.R.of Mechanical Balance                      | 1g~200g                              | $U=0.50$ mg                  |            |      |
|    |   |           |   | 200g~1kg                             | $U=0.005$ g                  |            |      |
|    |   |           |   | 1kg~10kg                             | $U=0.10$ g                   |            |      |
| 4  | Table Balances                          | Mass      | JJG 156-2004<br>V.R.of Table Balances                         | 100g~5kg                             | $U=(0.02\text{g}\sim 2.0)$ g |            |      |
| 5  | Digital Indicating Weighing Instrument  | Mass      | JJG 539-1997<br>V.R.of Digital Indicating Weighing Instrument | 1g~50kg                              | $U=0.15$ g                   |            |      |
|    |   |           |   | 50kg~500kg                           | $U=15$ g                     |            |      |
|    |   |           |   | 500kg~5000kg                         | $U=0.1$ kg                   |            |      |
| 6  | Analogue Indication Weighing Instrument | Mass      | JJG 13-1997<br>V.R.of Analogue Indication Weighing Instrument | 10g~100kg                            | $U=0.5$ g                    |            |      |
|    |   |           |   | 100kg~1000kg                         | $U=50$ g                     |            |      |
| 7  | NonselF-indicating Weighing Instrument  | Mass      | JJG 14-1997<br>V.R.of NonselF-indicating Weighing Instrument  | 50g~5000kg                           | $U=0.5\text{g}\sim 1.0$ kg   |            |      |

| No | Instrument   | Parameter   | Title, Code of Calibration Method   | Range           | Uncertainty ( $k=2$ ) | Limitation | Note |
|----|--|-------------|---|-----------------|-----------------------|------------|------|
| 8  | Universal Tension and Compression Testing Machines                 | Force value | JJG139-2014<br>V.R.of Universal Tension and Compression Testing Machines                  | (0.001~50) kN   | $U_{rel}=0.3\%$       |            |      |
|    |  |             |   | 50kN~3000kN     | $U_{rel}=0.3\%$       |            |      |
| 9  | Electronic Universal Testing Machine                               | Force value | JJG475-2008<br>V.R.of Electronic Universal Testing Machine                                | 1N~1000kN       | $U_{rel}=0.3\%$       |            |      |
| 10 | Working Dynamometers   | Force value | JJG455-2000<br>V.R.of Working Dynamometers  | (0.001~200) N   | $U_{rel}=0.1\%$       |            |      |
|    |  |             |   | (200~2000)N     | $U_{rel}=0.3\%$       |            |      |
| 11 | Flexure Testing Machine  | Force value | JJG 476-2001<br>V.R.of Flexure Testing Machine  | (0.1~5)kN       | $U_{rel}=0.3\%$       |            |      |
| 12 | Torque Wrenches  | Torque      | JJG 707-2014<br>V.R.of Torque Wrenches  | (0.001~500) N·m | $U_{rel}=0.3\%$       |            |      |
| 13 | Calibrating Instrument for Torque Wrenches                         | Torque      | JJG 797-2013<br>V.R.of Calibrating Instrument for Torque Wrenches                         | (0.1~50)N·m     | $U_{rel}=0.3\%$       |            |      |
| 14 | Metallic Rockwell Hardness Testers (scales A,B,C,D,E,F,G,H, K,N,T) | Hardness    | JJG 112-2013<br>V.R.of Metallic Rockwell Hardness Testers (scales A,B,C,D,E,F,G,H,K,N ,T) | (80~88)HRA      | $U=0.4HR$             |            |      |
|    |  |             |   | (85~100)HRB     | $U=0.5HR$             |            |      |
|    |  |             |   | (20~70)HRC      | $U=0.5HR$             |            |      |
|    |  |             |   | (89~91)HR15N    | $U=0.5HR$             |            |      |
|    |  |             |   | (42~80) HR30N   | $U=0.5HR$             |            |      |
|    |  |             |   | (32~61) HR45N   | $U=0.5HR$             |            |      |
|    |  |             |   | (88~93)HR15TW   | $U=0.5HR$             |            |      |
|    |  |             |   | (70~82)HR30TW   | $U=0.6HR$             |            |      |
| 15 | Metallic Webster Hardness Testing Machine                          | Hardness    | JJG 944-2013<br>V.R.of Metallic Webster Hardness Testing Machine                          | (0~20)HW        | $U=0.3HW$             |            |      |

| No | Instrument  | Parameter    | Title, Code of Calibration Method  | Range              | Uncertainty ( $k=2$ ) | Limitation | Note |
|----|---|--------------|--|--------------------|-----------------------|------------|------|
| 16 | Metallic Vickers Hardness Testers                   | Hardness     | JJG 151-2006<br>V.R.of Metallic Vickers Hardness Testers                                       | (100~800)HV        | $U_{rel}=1.4\%$       |            |      |
| 17 | Shore A Durometers                                  | Hardness     | JJG 304-2003<br>V.R.of Shore A Durometers  | (10~100)HA         | $U_{rel}=0.3\%$       |            |      |
| 18 | Leeb Hardness tester                                | Hardness     | JJG 747-1999<br>V.R.of Leeb Hardness tester  | (500~700)HLD       | $U=6HLD$              |            |      |
| 19 | Tachometer  | Rotate Speed | JJG 105-2000<br>V.R.of Tachometer  | (20~500)r/min      | $U_{rel}=0.05\%$      |            |      |
|    |   |              |  | (500~30000)r/min   | $U_{rel}=0.016\%$     |            |      |
| 20 | apparatus of the onrml consistency and setting time | Angle        | JJG(buildingmater-ials) 105-1999<br>V.R.of apparatus of the onrml consistency and setting time | (0~320) $^{\circ}$ | $U=0.16^{\circ}$      |            |      |
| 20 | apparatus of the onrml consistency and setting time | Length       | JJG(buildingmater-ials) 105-1999<br>V.R.of apparatus of the onrml consistency and setting time | (0~300)mm          | $U=0.04mm$            |            |      |
|    |   | Mass         |  | (0~6200)g          | $U=0.5g$              |            |      |
| 21 | Mixer for cement paste                              | Rotate Speed | JJG(buildingmater-ials) 104-199<br>V.R.of Mixer for cement paste                               | (57~295)r/min      | $U=0.6r/min$          |            |      |
|    |   | Time         |  | (30~120)s          | $U=0.28s$             |            |      |
|    |   | Length       |  | (0.5~160)m         | $U=0.04mm$            |            |      |
| 22 | Cement Mortar Mixer Complying                       | Rotate Speed | JJG(buildingmater-ials) 123-1999<br>V.R.of Cement Mortar Mixer Complying                       | (57~295)r/min      | $U=0.6r/min$          |            |      |
|    |   | Time         |  | (30~90)s           | $U=0.28s$             |            |      |
|    |   | Length       |  | (1.5~202)m         | $U=0.04mm$            |            |      |
| 23 | apparatus of fluidity of cement mortar              | Length       | JJG(buildingmater-ials) 126-1999<br>V.R.of apparatus of fluidity of cement mortar              | (10~285)mm         | $U=0.04mm$            |            |      |
|    |   | Mass         |  | (3440~3460)g       | $U=0.5g$              |            |      |
|    |   | Time         |  | (0~30)s            | $U=0.28s$             |            |      |

| No | Instrument   | Parameter   | Title, Code of Calibration Method  | Range                      | Uncertainty ( $k=2$ ) | Limitation  | Note |
|----|--|-------------|--|----------------------------|-----------------------|---|------|
| 24 | Elastic Element Pressure Gauges, Pressure -Vacuum Gauges and Vacuum Gauges for General Use | Pressure    | JJG 52-2013<br>V.R.of Elastic Element Pressure Gauges, Pressure -Vacuum Gauges and Vacuum Gauges for General Use | (0~30)s                    | $U=0.28s$             | Can't calibrate the electrical parameters of the pressure gauge with electric contact |      |
|    |  |             |  | (-0.1~60)MPa               | $U_{rel}=0.22\%$      |   |      |
| 25 | Sharp Edge Tester  | Force value | HZH-WIF11001-2011<br>Sharp Edge Tester Calibration Method  | (0.1-10)N                  | $U_{rel}=0.5\%$       |   |      |
| 25 | Sharp Edge Tester  | Length      | HZH-WIF11001-2011<br>Sharp Edge Tester Calibration Method  | (0~20)mm                   | $U=0.02mm$            |   |      |
| 26 | Volumetric Glass   | Capacity    | JJG 196-2006<br>General Volumetric Glass   | (0.1~1)mL                  | $U=0.002mL$           |   |      |
|    |  |             |  | (1~25)mL                   | $U=0.006mL$           |   |      |
|    |  |             |  | (25~250)mL                 | $U=0.03mL$            |   |      |
|    |  |             |  | (250~500)mL                | $U=0.07mL$            |   |      |
|    |  |             |  | (500~1000)mL               | $U=0.11mL$            |   |      |
|    |  |             |  | (1000~2000)mL              | $U=0.24mL$            |   |      |
| 27 | Quantitative Adjustable Pipet  | Capability  | JJG 646-2006<br>Quantitative Adjustable Pipet  | 5 $\mu$ L~10 $\mu$ L       | $U_{rel}=2.2\%$       |   |      |
|    |  |             |  | 10 $\mu$ L~100 $\mu$ L     | $U_{rel}=1.0\%$       |   |      |
|    |  |             |  | 100 $\mu$ L~1000 $\mu$ L   | $U_{rel}=0.3\%$       |   |      |
|    |  |             |  | 1000 $\mu$ L~10000 $\mu$ L | $U_{rel}=0.2\%$       |   |      |
| 28 | Shore D Durometer  | Force value | JJG 1039-2008<br>V.R.of Shore D Durometer  | (0.1-50)N                  | $U_{rel}=0.3\%$       |   |      |
| 29 | Torsion Testing Machines   | Torque      | JJG269-2006<br>V.R.of Torsion Testing Machines   | (0.001~5)N·m               | $U_{rel}=1.2\%$       |   |      |

| No | Instrument   | Parameter | Title, Code of Calibration Method  | Range               | Uncertainty ( $k=2$ ) | Limitation | Note |
|----|--|-----------|--|---------------------|-----------------------|------------|------|
| 30 | Torque Measuring Devices   | Torque    | JJG 995-2005<br>V.R.of Static Torque Measuring Devices   | (0.001~500 )<br>N·m | $U_{rel}=0.3\%$       |            |      |
| 31 | Piston Gauge   | Length    | JJG 59-2007<br>V.R.of Piston Gauge   | (0-10)mm            | $U=0.02\text{mm}$     |            |      |
|    |  | Mass      |  | (0.01-6.2)kg        | $U=0.15\text{g}$      |            |      |
| 32 | Tyre Pressure Gauges   | Pressure  | JJG 927-2013<br>V.R.of Tyre Pressure Gauges  | (0.6~2.5)Mpa        | $U_{rel}=0.22\%$      |            |      |
| 33 | Aneroid Barometer & Aneroid Barograph                            | Pressure  | JJG 272-2007<br>V.R.of Aneroid Barometer & Aneroid Barograph                                     | (800-1060)hPa       | $U=1.0\text{hPa}$     |            |      |
| 34 | Pressure Transmitter   | Pressure  | JJG 882-2004<br>V.R.of Pressure Transmitter  | (0~40)MPa           | $U=0.06\%FS$          |            |      |
| 35 | Pressure Transducer (Static)                                     | Pressure  | JJG 860-1994<br>V.R.of the Pressure Transducer(Static)   | (0~60)MPa           | $U=0.06\%FS$          |            |      |
| 36 | Digital Pressure Gauges  | Pressure  | JJG 875-2005<br>V.R.of Digital Pressure Gauges   | (-0.1~60 )<br>MPa   | $U=0.06\%FS$          |            |      |
| 37 | Elastic Element Precise Pressure Gauges and Vacuum Gauges        | Pressure  | JJG 49-2013 Elastic Element Precise Pressure Gauges and Vacuum Gauges                            | (-0.1~60)<br>MPa    | $U=0.06\%FS$          |            |      |
| 38 | Tilting Tube Micromanometers                                     | Pressure  | JJG 172-2011<br>V.R.of Tilting Tube Micromanometers  | (10~2000)Pa         | $U_{rel}=0.65\%$      |            |      |
| 39 | Portable Induction Anemometer                                    | Pressure  | JJG 515-1987<br>V.R.of Portable Induction Anemometer   | (1~500)Pa           | $U_{rel}=0.65\%$      |            |      |
| 40 | Asphalt Mixture and Cement Concrete Mixing Device Measure System | Mass      | JJG(Traffic) 071-2006<br>V.R.of Asphalt Mixture and Cement Concrete Mixing Device Measure System | (1~5000)kg          | $U_{rel}=0.08\%$      |            |      |
| 41 | Vibrator for Cimpacting Mortar Specimen                          | Amplitudy | JJG 918-1996<br>V.R.of Vibrator for Cimpacting Mortar Specimen                                   | (0.1~2)mm           | $U_{rel}=3\%$         |            |      |
|    |  | Frequeny  |  | (20~100)<br>Hz      | $U_{rel}=0.1\%$       |            |      |
|    |  | Time      |  | (0~1800)s           | $U=0.28s$             |            |      |

| No | Instrument   | Parameter   | Title, Code of Calibration Method  | Range                      | Uncertainty ( $k=2$ ) | Limitation | Note |
|----|--|-------------|--|----------------------------|-----------------------|------------|------|
| 42 | Cement Mortar Specimen Jolting Table Complying with ISO 679                  | Time        | JJG(State Bureau of Building Materials) 124-1999<br>V.R.of Cement Mortar Specimen Jolting Table Complying with ISO 679 | (0~3)min                   | $U=0.28s$             |            |      |
|    |  | Length      |  | (0~800)mm                  | $U=0.1mm$             |            |      |
|    |  | Mass        |  | (0.1~50)kg                 | $U=0.05kg$            |            |      |
| 43 | Nonmetal Building Materials Plastic Limit Measuring Instruments              | Mass        | JJF 1090-2002 Calibration Specification for Nonmetal Building Materials Plastic Limit Measuring Instruments            | (0~500)g                   | $U=0.01g$             |            |      |
|    |  | Angle       |  | (0~360)°                   | $U=0.2°$              |            |      |
| 43 | Nonmetal Building Materials Plastic Limit Measuring Instruments              | Length      | JJF 1090-2002 Calibration Specification for Nonmetal Building Materials Plastic Limit Measuring Instruments            | (0~200)mm                  | $U=0.02mm$            |            |      |
| 44 | Le Chatelier, Tester for Determining Expansion meter of Le Chatelier Needles | Scale ruler | JJG(Traffic)093-2009<br>Le Chatelier, Tester for Determining Expansion meter of Le Chatelier Needles                   | (0~300)mm                  | $U_{rel}=0.3%$        |            |      |
|    |  | Weight mass |  | (0~500)g                   | $U=20mg$              |            |      |
| 45 | Compaction Instrument of soil  | Length      | JJG(Traffic)058-2004<br>V.R.of Compaction Instrument of soil   | (0~600)mm                  | $U=0.04mm\sim 0.2mm$  |            |      |
|    |  | Mass        |  | (0~5000)g                  | $U=1.3g$              |            |      |
| 46 | Mud Density Meter  | Density     | JJG 1045-2008<br>V.R.of Mud Density Meter  | (0.1~10) g/cm <sup>3</sup> | $U=0.0003 g/cm^3$     |            |      |



| No | Instrument   | Parameter         | Title, Code of Calibration Method  | Range       | Uncertainty ( $k=2$ )   | Limitation | Note |
|----|--|-------------------|--|-------------|-------------------------|------------|------|
| 47 | Apparatus for Time of Setting Concrete Mixture by Penetration Resistance | Force value       | JJG(Traffic) 095-2009<br>V.R.of Apparatus for Time of Setting Concrete Mixture by Penetration Resistance                     | (1~5000) N  | $U_{rel}=0.3\%$         |            |      |
|    |  | Length            |  | (0-300)mm   | $U=0.02\text{mm}$       |            |      |
| 48 | Determination Specific Surface Area of Aie Permeability Apparatus        | Length            | JJG(State Bureau of Building Materials) 107-1999<br>V.R.of Determination Specific Surface Area of Aie Permeability Apparatus | (0-300)mm   | $U=0.02\text{mm}$       |            |      |
| 49 | Air Entrainment Mater of Freshly Mixed Concre by The Volumet Method      | Mass              | JJG(Traffic) 094-2009<br>V.R.of Air Entrainment Mater of Freshly Mixed Concre by The Volumet Method                          | (0-30)kg    | $U=0.5\text{g}$         |            |      |
|    |  | Pressure          |  | (0~0.6)MPa  | $U=0.25\%FS$            |            |      |
| 50 | Rebound Test Hammer  | Calibration value | JJG 817-2011<br>V.R.of Rebound Test Hammer   | 0~100       | $U=0.3$                 |            |      |
| 51 | Thermogravimetric Moisture Meters  | Mass              | JJG658-2010<br>V.R.of Thermogravimetric Moisture Meters  | (0~10)g     | $U=1\text{mg}$          |            |      |
|    |  | temperature       |  | (0~200) °C  | $U=0.6^{\circ}\text{C}$ |            |      |
| 52 | Electro-hydraulic Servo Universal Testing Machines                       | Force value       | JJG1063-2010<br>V.R.of Electro-hydraulic Servo Universal Testing Machines  | (5~3000) kN | $U_{rel}=0.3\%$         |            |      |
|    |  | Length            |  | (0~2000)mm  | $U=1\text{mm}$          |            |      |
| 53 | Hydraulic Jacks  | Force value       | JJG 621-2012<br>V.R.of Hydraulic Jacks   | (5~2000)kN  | $U_{rel}=0.4\%$         |            |      |
| 54 | Anchorage Testing Machines   | Force value       | JJG 1083-2013<br>V.R.of Anchorage Testing Machines   | (5~3000)kN  | $U_{rel}=0.4\%$         |            |      |
|    |  | Length            |  | (0~100)mm   | $U=0.03\text{mm}$       |            |      |

| No             | Instrument                                      | Parameter        | Title, Code of Calibration Method                                   | Range                      | Uncertainty (k=2) | Limitation | Note |
|----------------|---|------------------|---|----------------------------|-------------------|------------|------|
| 55             | Constant Acceleration Centrifugal Test Machines | Rotational Speed | JJG 972-2002 V.R.of Constant Acceleration Centrifugal Test Machines | (100~10000) r/min          | $U_{rel}=0.2\%$   |            |      |
| 56             | Air Sampler                                     | flow             | JJG 956-2013 V.R.of Air Samplers                                    | (50~5000)m L/min           | $U_{rel}=1.5\%$   |            |      |
| 57             | Flow meter (air)                                | flow             | JJG257-2007 V.R.of Flow meter                                       | (50~5000)m L/min           | $U_{rel}=1.4\%$   |            |      |
| 四、Eeectronical |   |                  |   |                            |                   |            |      |
| 1              | Amperemeters                                    | DCA              | JJG 124-2005 Amperemeters, Voltmeters, Wattmeters and Ohmmeters     | (0.01~329.999)mA           | $U_{rel}=0.03\%$  |            |      |
|                |   |                  |   | 330mA~10.999A              | $U_{rel}=0.06\%$  |            |      |
|                |   |                  |   | 11A~50A                    | $U_{rel}=0.12\%$  |            |      |
|                |   | ACA              |   | 190μA~3.2999mA (45Hz~1kHz) | $U_{rel}=0.15\%$  |            |      |
|                |   |                  |   | 3.3mA~2.9999A (45Hz~1kHz)  | $U_{rel}=0.07\%$  |            |      |
| 1              | Amperemeters                                    | ACA              | JJG 124-2005 Amperemeters, Voltmeters, Wattmeters and Ohmmeters     | 3A~50A (45Hz~1kHz)         | $U_{rel}=0.12\%$  |            |      |
| 2              | Voltmeters                                      | DCV              | JJG 124-2005 Amperemeters, Voltmeters, Wattmeters and Ohmmeters     | 10mV~1000V                 | $U_{rel}=0.03\%$  |            |      |
|                |   | ACV              |   | 10mV~1000V (45Hz~10kHz)    | $U_{rel}=0.04\%$  |            |      |

| No | Instrument | Parameter | Title, Code of Calibration Method   | Range  | Uncertainty ( $k=2$ )  | Limitation | Note |
|----|------------|-----------|---|--|------------------------|------------|------|
| 3  | Wattmeters | Power     | JIG 124-2005<br>Amperemeters,<br>Voltmeters, Wattmeters and Ohmmeters       | DCV:33mV~1000V<br>DCI:0.33mA~2.9999A                 | $U_{rel}=0.04\%$       |            |      |
|    |            |           |   | DCV:33mV~1000V<br>DCI:3A~20.5A                       | $U_{rel}=0.07\%$       |            |      |
|    |            |           |   | ACV:0.33V~1000V<br>ACI:3.3mA~2.99999A<br>(45Hz~65Hz) | $U_{rel}=0.08\%$       |            |      |
|    |            |           |   | ACV:3.3V~1000V<br>ACI:33mA~2.99999A<br>(45Hz~1kHz)   | $U_{rel}=0.08\%$       |            |      |
|    |            |           |   | ACV:3.3V~1000V<br>ACI:3A~20.5A<br>(45Hz~1kHz)        | $U_{rel}=0.15\%$       |            |      |
|    |            |           |   | PF=1~0.2<br>(45Hz~65Hz)                              | $U_{rel}=0.08\%~0.9\%$ |            |      |
| 4  | Ohmmeters  | Resistors | JIG 124-2005<br>Amperemeters,<br>Voltmeters,<br>Wattmeters and<br>Ohmmeters | 1 $\Omega$ ~1M $\Omega$                              | $U_{rel}=0.03\%$       |            |      |

| No | Instrument              | Parameter | Title, Code of Calibration Method   | Range                                       | Uncertainty ( $k=2$ )       | Limitation | Note |
|----|-------------------------|-----------|---|---|-----------------------------|------------|------|
| 5  | DC Digital Ampere-meter | Current   | JJG 598-1989 DC Digital Amperemeter   | (10~329.999) $\mu$ A                        | $U=0.018\%Ix+0.022\mu$<br>A |            |      |
|    |                         |           |   | 0.33mA~3.29999mA                            | $U=0.012\%Ix+0.055\mu$<br>A |            |      |
|    |                         |           |   | 3.3mA~32.9999mA                             | $U=0.012\%Ix+0.28\mu$ A     |            |      |
|    |                         |           |   | 33mA~329.999mA                              | $U=0.012\%Ix+2.8\mu$ A      |            |      |
|    |                         |           |   | 0.33A~1.09999A                              | $U=0.024\%Ix+44\mu$ A       |            |      |
|    |                         |           |   | 1.1A~2.99999A                               | $U=0.046\%Ix+44\mu$ A       |            |      |
|    |                         |           |   | 3A~10.9999A                                 | $U=0.06\%Ix+0.55$ mA        |            |      |
|    |                         |           |   | 11A~20.5A                                   | $U=0.12\%Ix+0.83$ mA        |            |      |
|    |                         |           |   | 20.5A~50A                                   | $U=0.12\%Ix+11$ mA          |            |      |
| 6  | AC Digital Ampere-meter | Current   | JJG(spaceflight) 35-1999 Verification regulation for AC digital current meter | 190 $\mu$ A~329.99 $\mu$ A<br>(10Hz~20Hz)   | $U=0.24\%Ix+0.11\mu$ A      |            |      |
|    |                         |           |   | 190 $\mu$ A~329.99 $\mu$ A<br>(20Hz~45Hz)   | $U=0.18\%Ix+0.11\mu$ A      |            |      |
|    |                         |           |   | 190 $\mu$ A~329.99 $\mu$ A<br>(45Hz~1kHz)   | $U=0.15\%Ix+0.11\mu$ A      |            |      |
|    |                         |           |   | 190 $\mu$ A~329.99 $\mu$ A<br>(1kHz~5kHz)   | $U=0.36\%Ix+0.17\mu$ A      |            |      |
|    |                         |           |   | 190 $\mu$ A~329.99 $\mu$ A<br>(5kHz~10kHz)  | $U=1.0\%Ix+0.22\mu$ A       |            |      |
|    |                         |           |   | 190 $\mu$ A~329.99 $\mu$ A<br>(10kHz~30kHz) | $U=1.9\%Ix+0.44\mu$ A       |            |      |
|    |                         |           |   | 0.33mA~3.2999mA<br>(10Hz~20Hz)              | $U=0.24\%Ix+0.17\mu$ A      |            |      |

| No | Instrument              | Parameter | Title, Code of Calibration Method   | Range                            | Uncertainty ( $k=2$ )  | Limitation | Note |
|----|-------------------------|-----------|---|----------------------------------|------------------------|------------|------|
| 6  | AC Digital Ampere-meter | Current   | JJG(spaceflight) 35-1999 Verification regulation for AC digital current meter | 0.33mA~3.2999mA<br>(20Hz~45Hz)   | $U=0.15\%Ix+0.17\mu A$ |            |      |
|    |                         |           |   | 0.33mA~3.2999mA<br>(45Hz~1kHz)   | $U=0.12\%Ix+0.17\mu A$ |            |      |
|    |                         |           |   | 0.33mA~3.2999mA<br>(1kHz~5kHz)   | $U=0.24\%Ix+0.22\mu A$ |            |      |
|    |                         |           |   | 0.33mA~3.2999mA<br>(5kHz~10kHz)  | $U=0.6\%Ix+0.33\mu A$  |            |      |
|    |                         |           |   | 0.33mA~3.2999mA<br>(10kHz~30kHz) | $U=1.2\%Ix+0.66\mu A$  |            |      |
|    |                         |           |   | 3.3mA~32.999mA<br>(10Hz~20Hz)    | $U=0.22\%Ix+2.2\mu A$  |            |      |
|    |                         |           |   | 3.3mA~32.999mA<br>(20Hz~45Hz)    | $U=0.11\%Ix+2.2\mu A$  |            |      |
|    |                         |           |   | 3.3mA~32.999mA<br>(45Hz~1kHz)    | $U=0.048\%Ix+2.2\mu A$ |            |      |
| 6  | AC Digital Ampere-meter | Current   | JJG(spaceflight) 35-1999 Verification regulation for AC digital current meter | 3.3mA~32.999mA<br>(1kHz~5kHz)    | $U=0.12\%Ix+2.2\mu A$  |            |      |
|    |                         |           |   | 3.3mA~32.999mA<br>(5kHz~10kHz)   | $U=0.24\%Ix+3.3\mu A$  |            |      |
|    |                         |           |   | 3.3mA~32.999mA<br>(10kHz~30kHz)  | $U=0.48\%Ix+4.4\mu A$  |            |      |
|    |                         |           |   | 33mA~329.99mA<br>(10Hz~20Hz)     | $U=0.22\%Ix+22\mu A$   |            |      |

| No | Instrument              | Parameter | Title, Code of Calibration Method   | Range                              | Uncertainty (k=2)     | Limitation | Note |
|----|-------------------------|-----------|---|------------------------------------|-----------------------|------------|------|
| 6  | AC Digital Ampere-meter | Current   | JJG(spaceflight) 35-1999 Verification regulation for AC digital current meter | 33mA~329.9<br>9mA<br>(20Hz~45Hz)   | $U=0.11\%Ix+22\mu A$  |            |      |
|    |                         |           |   | 33mA~329.9<br>9mA<br>(45Hz~1kHz)   | $U=0.048\%Ix+22\mu A$ |            |      |
|    |                         |           |   | 33mA~329.9<br>9mA<br>(1kHz~5kHz)   | $U=0.12\%Ix+55\mu A$  |            |      |
|    |                         |           |   | 33mA~329.9<br>9mA<br>(5kHz~10kHz)  | $U=0.24\%Ix+0.11mA$   |            |      |
|    |                         |           |   | 33mA~329.9<br>9mA<br>(10kHz~30kHz) | $U=0.48\%Ix+0.22mA$   |            |      |
|    |                         |           |   | 0.33A~1.099<br>99A<br>(10Hz~45Hz)  | $U=0.22\%Ix+0.11mA$   |            |      |
|    |                         |           |   | 0.33A~1.099<br>99A<br>(45Hz~1kHz)  | $U=0.06\%Ix+0.11mA$   |            |      |
|    |                         |           |   | 0.33A~1.099<br>99A<br>(1kHz~5kHz)  | $U=0.7\%Ix+1.1mA$     |            |      |
|    |                         |           |   | 0.33A~1.099<br>99A<br>(5kHz~10kHz) | $U=3\%Ix+5.5mA$       |            |      |
|    |                         |           |   | 1.1A~2.9999<br>9A<br>(10Hz~45Hz)   | $U=0.22\%Ix+0.11mA$   |            |      |
|    |                         |           |   | 1.1A~2.9999<br>9A<br>(45Hz~1kHz)   | $U=0.07\%Ix+0.11mA$   |            |      |
|    |                         |           |   | 1.1A~2.9999<br>9A<br>(1kHz~5kHz)   | $U=0.7\%Ix+1.1mA$     |            |      |

| No | Instrument              | Parameter | Title, Code of Calibration Method   | Range                             | Uncertainty ( $k=2$ )   | Limitation | Note |
|----|-------------------------|-----------|---|-----------------------------------|-------------------------|------------|------|
| 6  | AC Digital Ampere-meter | Current   | JJG(spaceflight) 35-1999 Verification regulation for AC digital current meter | 1.1A~2.9999<br>9A<br>(5kHz~10kHz) | $U=3\%Ix+5.5mA$         |            |      |
|    |                         |           |   | 3A~10.9999<br>A<br>(45Hz~100Hz)   | $U=0.07\%Ix+2.2mA$      |            |      |
|    |                         |           |   | 3A~10.9999<br>A<br>(100Hz~1kHz)   | $U=0.12\%Ix+2.2mA$      |            |      |
|    |                         |           |   | 3A~10.9999<br>A<br>(1kHz~5kHz)    | $U=3.6\%Ix+2.2mA$       |            |      |
|    |                         |           |   | 11A~20.5A<br>(45Hz~100Hz)         | $U=0.14\%Ix+5.5mA$      |            |      |
|    |                         |           |   | 11A~20.5A<br>(100Hz~1kHz)         | $U=0.18\%Ix+5.5mA$      |            |      |
|    |                         |           |   | 11A~20.5A<br>(1kHz~5kHz)          | $U=3.6\%Ix+5.5mA$       |            |      |
|    |                         |           |   | 20.5A~50A<br>(45Hz~1kHz)          | $U=0.18\%Ix+28mA$       |            |      |
| 7  | DC Digital Voltmeter    | Voltage   | JJG 315-1983 DC Digital Voltmeter   | 10~329.999<br>9mV                 | $U=0.0024\%Ux+1.1\mu V$ |            |      |
|    |                         |           |   | 0.33V~3.299<br>999V               | $U=0.0013\%Ux+2.2\mu V$ |            |      |
|    |                         |           |   | 3.3V~32.999<br>99V                | $U=0.0014\%Ux+22\mu V$  |            |      |
|    |                         |           |   | 33V~329.99<br>99V                 | $U=0.0022\%Ux+0.17mV$   |            |      |
|    |                         |           |   | 330V~1000.<br>000V                | $U=0.0022\%Ux+1.7mV$    |            |      |
| 8  | AC Digital Voltmeter    | ACV       | JJG(spaceflight) 34-1999 Verification regulation for AC digital Voltmeter     | 10mV~32.99<br>9mV<br>(10Hz~45Hz)  | $U=0.10\%Ux+6.6\mu V$   |            |      |
|    |                         |           |   | 10mV~32.99<br>9mV<br>(45Hz~10kHz) | $U=0.018\%Ux+6.6\mu V$  |            |      |

| No | Instrument           | Parameter | Title, Code of Calibration Method   | Range                                 | Uncertainty ( $k=2$ )    | Limitation | Note |
|----|----------------------|-----------|---|---------------------------------------|--------------------------|------------|------|
| 8  | AC Digital Voltmeter | ACV       | JJG(spaceflight) 34-1999 Verification regulation for AC digital Voltmeter | 10mV~32.99<br>9mV<br>(10kHz~20kHz)    | $U=0.024\% U_x+6.6\mu V$ |            |      |
|    |                      |           |   | 10mV~32.99<br>9mV<br>(20kHz~50kHz)    | $U=0.12\% U_x+6.6\mu V$  |            |      |
|    |                      |           |   | 10mV~32.99<br>9mV<br>(50kHz~100kHz)   | $U=0.42\% U_x+13\mu V$   |            |      |
|    |                      |           |   | 10mV~32.99<br>9mV<br>(100kHz~500kHz)  | $U=1.0\% U_x+55\mu V$    |            |      |
|    |                      |           |   | 33mV~329.9<br>99mV<br>(10Hz~45Hz)     | $U=0.036\% U_x+8.8\mu V$ |            |      |
|    |                      |           |   | 33mV~329.9<br>99mV<br>(45Hz~10kHz)    | $U=0.017\% U_x+8.8\mu V$ |            |      |
|    |                      |           |   | 33mV~329.9<br>99mV<br>(10kHz~20kHz)   | $U=0.019\% U_x+8.8\mu V$ |            |      |
|    |                      |           |   | 33mV~329.9<br>99mV<br>(20kHz~50kHz)   | $U=0.042\% U_x+8.8\mu V$ |            |      |
|    |                      |           |   | 33mV~329.9<br>99mV<br>(50kHz~100kHz)  | $U=0.10\% U_x+35\mu V$   |            |      |
|    |                      |           |   | 33mV~329.9<br>99mV<br>(100kHz~500kHz) | $U=0.24\% U_x+77\mu V$   |            |      |
|    |                      |           |   | 0.33V~3.299<br>99V<br>(10Hz~45Hz)     | $U=0.036\% U_x+55\mu V$  |            |      |
|    |                      |           |   | 0.33V~3.299<br>99V<br>(45Hz~10kHz)    | $U=0.018\% U_x+66\mu V$  |            |      |



| No | Instrument           | Parameter | Title, Code of Calibration Method   | Range                           | Uncertainty (k=2)       | Limitation | Note |
|----|----------------------|-----------|---|---------------------------------|-------------------------|------------|------|
| 8  | AC Digital Voltmeter | ACV       | JJG(spaceflight) 34-1999 Verification regulation for AC digital Voltmeter | 0.33V~3.299 99V (10kHz~20kHz)   | $U=0.023\% U_x+66\mu V$ |            |      |
|    |                      |           |   | 0.33V~3.299 99V (20kHz~50kHz)   | $U=0.036\% U_x+55\mu V$ |            |      |
|    |                      |           |   | 0.33V~3.299 99V (50kHz~100kHz)  | $U=0.084\% U_x+0.14mV$  |            |      |
|    |                      |           |   | 0.33V~3.299 99V (100kHz~500kHz) | $U=0.29\% U_x+0.66mV$   |            |      |
|    |                      |           |   | 3.3V~32.999 9V (10Hz~45Hz)      | $U=0.036\% U_x+0.72mV$  |            |      |
|    |                      |           |   | 3.3V~32.999 9V (45Hz~10kHz)     | $U=0.018\% U_x+0.66mV$  |            |      |
| 8  | AC Digital Voltmeter | ACV       | JJG(spaceflight) 34-1999 Verification regulation for AC digital Voltmeter | 3.3V~32.999 9V (10kHz~20kHz)    | $U=0.029\% U_x+0.66mV$  |            |      |
|    |                      |           |   | 3.3V~32.999 9V (20kHz~50kHz)    | $U=0.042\% U_x+0.66mV$  |            |      |
|    |                      |           |   | 3.3V~32.999 9V (50kHz~100kHz)   | $U=0.11\% U_x+1.8mV$    |            |      |
|    |                      |           |   | 33V~329.99 9V (10Hz~45Hz)       | $U=0.023\% U_x+2.2mV$   |            |      |
|    |                      |           |   | 33V~329.99 9V (45Hz~10kHz)      | $U=0.024\% U_x+6.6mV$   |            |      |
|    |                      |           |   | 33V~329.99 9V (10kHz~20kHz)     | $U=0.030\% U_x+6.6mV$   |            |      |

| No | Instrument            | Parameter | Title, Code of Calibration Method  | Range  | Uncertainty ( $k=2$ ) | Limitation | Note |
|----|-----------------------|-----------|--|--|-----------------------|------------|------|
| 8  | AC Digital Voltmeter  | ACV       | JJG(spaceflight) 34-1999 Verification regulation for AC digital Voltmeter                      | 33V~329.99<br>9V<br>(20kHz~50kHz)            | $U=0.036\% U_x+6.6mV$ |            |      |
|    |                       |           |  | 33V~329.99<br>9V<br>(50kHz~100kHz)           | $U=0.24\% U_x+55mV$   |            |      |
|    |                       |           |  | 330V~1000<br>V<br>(10Hz~1kHz)                | $U=0.036\% U_x+11mV$  |            |      |
|    |                       |           |  | 33V~329.99<br>9V<br>(1kHz~5kHz)              | $U=0.030\% U_x+11mV$  |            |      |
|    |                       |           |  | 33V~329.99<br>9V<br>(5kHz~10kHz)             | $U=0.036\% U_x+11mV$  |            |      |
| 9  | DC Digital Ohmmeter   | Resistor  | JJG 724-1991 DC Digital Ohmmeter<br>JJG 837-2003 DC. Low Resistance Meters                     | 0.1mΩ~10.9999Ω                               | $U_{rel}=0.010\%$     |            |      |
|    |                       |           |  | 11Ω~330kΩ                                    | $U_{rel}=0.003\%$     |            |      |
|    |                       |           |  | 330kΩ~3.3MΩ                                  | $U_{rel}=0.003\%$     |            |      |
|    |                       |           |  | 3.3MΩ~33MΩ                                   | $U_{rel}=0.013\%$     |            |      |
|    |                       |           |  | 33MΩ~330MΩ                                   | $U_{rel}=0.12\%$      |            |      |
|    |                       |           |  | 330MΩ~1100MΩ                                 | $U_{rel}=0.6\%$       |            |      |
| 10 | AC Digital Powermeter | Power     | JJG 780-1992 AC Digital Powermeter<br>JJG 440-2008 Industry Frequency Single-Phase Phase Meter | 3.3mA~8.999mA<br>(0.33V~100V,45Hz~65Hz,PF=1) | $U_{rel}=0.15\%$      |            |      |
|    |                       |           |  | 9mA~32.999mA<br>(0.33V~100V,45Hz~65Hz,PF=1)  | $U_{rel}=0.10\%$      |            |      |

| No | Instrument            | Parameter | Title, Code of Calibration Method  | Range   | Uncertainty ( $k=2$ ) | Limitation | Note |
|----|-----------------------|-----------|--|---|-----------------------|------------|------|
| 10 | AC Digital Powermeter | Power     | JIG 780-1992 AC Digital Powermeter<br>JIG 440-2008 Industry Frequency Single-Phase Phase Meter | 33mA~89.99 mA<br>(0.33V~1000V,45Hz~65Hz,PF=1) | $U_{rel}=0.15\%$      |            |      |
|    |                       |           |  | 90mA~329.99mA<br>(0.33V~1000V,45Hz~65Hz,PF=1) | $U_{rel}=0.10\%$      |            |      |
|    |                       |           |  | 0.33A~0.8999A<br>(0.33V~1000V,45Hz~65Hz,PF=1) | $U_{rel}=0.13\%$      |            |      |
|    |                       |           |  | 0.9A~2.1999A<br>(0.33V~1000V,45Hz~65Hz,PF=1)  | $U_{rel}=0.11\%$      |            |      |
|    |                       |           |  | 2.2A~4.4999mA<br>(0.33V~1000V,45Hz~65Hz,PF=1) | $U_{rel}=0.15\%$      |            |      |
|    |                       |           |  | 4.5A~20.5A<br>(0.33V~1000V,45Hz~65Hz,PF=1)    | $U_{rel}=0.12\%$      |            |      |
| 10 | AC Digital Powermeter | Power     | JIG 780-1992 AC Digital Powermeter<br>JIG 440-2008 Industry Frequency Single-Phase Phase Meter | 33mA~89.99 mA<br>(3.3V~1000V,65Hz~1kHz,PF=1)  | $U_{rel}=0.15\%$      |            |      |
|    |                       |           |  | 90mA~329.99mA<br>(3.3V~1000V,65Hz~1kHz,PF=1)  | $U_{rel}=0.10\%$      |            |      |

| No | Instrument            | Parameter | Title, Code of Calibration Method  | Range  | Uncertainty ( $k=2$ ) | Limitation | Note |
|----|-----------------------|-----------|--|--|-----------------------|------------|------|
| 10 | AC Digital Powermeter | Power     | JIG 780-1992 AC Digital Powermeter<br>JIG 440-2008 Industry Frequency Single-Phase Phase Meter | 0.33A~0.8999A<br>(3.3V~1000V,65Hz~1kHz,PF=1) | $U_{rel}=0.13\%$      |            |      |
|    |                       |           |  | 0.9A~2.1999A<br>(3.3V~1000V,65Hz~1kHz,PF=1)  | $U_{rel}=0.11\%$      |            |      |
|    |                       |           |  | 2.2A~4.4999mA<br>(3.3V~1000V,65Hz~1kHz,PF=1) | $U_{rel}=0.15\%$      |            |      |
|    |                       |           |  | 4.5A~20.5A<br>(3.3V~1000V,65Hz~1kHz,PF=1)    | $U_{rel}=0.12\%$      |            |      |
|    |                       |           |  | 9mA~32.999mA<br>(3.3V~1000V,1kHz~5kHz,PF=1)  | $U_{rel}=0.3\%$       |            |      |
|    |                       |           |  | 33mA~89.99mA<br>(3.3V~1000V,1kHz~5kHz,PF=1)  | $U_{rel}=0.6\%$       |            |      |
|    |                       |           |  | 90mA~329.99mA<br>(3.3V~1000V,1kHz~5kHz,PF=1) | $U_{rel}=0.4\%$       |            |      |
|    |                       |           |  | 9mA~32.999mA<br>(3.3V~1000V,5kHz~10kHz,PF=1) | $U_{rel}=0.4\%$       |            |      |

| No | Instrument                  | Parameter | Title, Code of Calibration Method  | Range   | Uncertainty ( $k=2$ ) | Limitation | Note |
|----|-----------------------------|-----------|--|---|-----------------------|------------|------|
| 10 | AC Digital Powermeter       | Power     | JIG 780-1992 AC Digital Powermeter<br>JIG 440-2008 Industry Frequency Single-Phase Phase Meter | 33mA~89.99mA<br>(3.3V~1000V,5kHz~10kHz,PF=1)  | $U_{rel}=0.8\%$       |            |      |
|    |                             |           |  | 90mA~329.99mA<br>(3.3V~1000V,5kHz~10kHz,PF=1) | $U_{rel}=0.5\%$       |            |      |
|    |                             | Phase     |  | 0°~360°<br>(45Hz~65Hz)                        | $U=0.15^\circ$        |            |      |
|    |                             |           |  | 0°~360°<br>(65Hz~500Hz)                       | $U=0.3^\circ$         |            |      |
|    |                             |           |  | 0°~360°<br>(500Hz~1kHz)                       | $U=0.6^\circ$         |            |      |
|    |                             |           |  | 0°~360°<br>(65Hz~500Hz)                       | $U=3^\circ$           |            |      |
|    |                             |           |  | 0°~360°<br>(500Hz~1kHz)                       | $U=6^\circ$           |            |      |
| 11 | Clamp Ammeter               | DCA       | JJF 1075-2001 Calibration Specification of Clamp Ammeters                                      | 10μA~20.5A                                    | $U_{rel}=0.10\%$      |            |      |
|    |                             |           |  | >20.5A~1000A                                  | $U_{rel}=0.14\%$      |            |      |
|    |                             | ACA       |  | 190μA~20.5A<br>(45Hz~1kHz)                    | $U_{rel}=0.15\%$      |            |      |
|    |                             |           |  | >20.5A~1000A<br>(45Hz~1kHz)                   | $U_{rel}=0.18\%$      |            |      |
| 12 | Withstanding Voltage Tester | ACV       | JIG 795-2004 Withstanding Voltage Testers  | (0.1~10)kV<br>(50Hz、60Hz)                     | $U_{rel}=0.3\%$       |            |      |
|    |                             |           |  | (10~200)kV<br>(50Hz、60Hz)                     | $U_{rel}=0.6\%$       |            |      |
|    |                             | DCV       |  | (0.1~10)kV                                    | $U_{rel}=0.2\%$       |            |      |

| No | Instrument                           | Parameter  | Title, Code of Calibration Method  | Range   | Uncertainty ( $k=2$ )      | Limitation | Note |
|----|--------------------------------------|------------|--|---|----------------------------|------------|------|
| 12 | Withstanding Voltage Tester          | DCV        | JJG 795-2004<br>Withstanding Voltage Testers   | (10~200)kV  | $k=0.5\%$                  |            |      |
|    |                                      | ACA        |  | 10 $\mu$ A~3A<br>(50Hz、60Hz)                          | $U_{rel}=0.4\%$            |            |      |
|    |                                      | DCA        |  | 10 $\mu$ A~3A   | $U_{rel}=0.2\%$            |            |      |
|    |                                      | Time       |  | (1~60)s   | $U_{rel}=0.6\%$            |            |      |
| 13 | Megohm- meter                        | Resistor   | JJG 622-1997<br>Megohm-meter<br>JJG 1005-2005<br>Electronic Insulating Resistance Meters | 10 <sup>3</sup> $\Omega$ ~10 <sup>8</sup> $\Omega$    | $U_{rel}=0.11\%$           |            |      |
|    |                                      |            |  | >10 <sup>8</sup> $\Omega$ ~10 <sup>9</sup> $\Omega$   | $U_{rel}=0.24\%$           |            |      |
|    |                                      |            |  | >10 <sup>9</sup> $\Omega$ ~10 <sup>10</sup> $\Omega$  | $U_{rel}=0.5\%$            |            |      |
|    |                                      |            |  | >10 <sup>10</sup> $\Omega$ ~10 <sup>11</sup> $\Omega$ | $U_{rel}=1.0\%$            |            |      |
|    |                                      | Voltage    |  | (0.001~10)kV  | $U_{rel}=0.8\%$            |            |      |
| 14 | Leakage Current Instrument and Meter | DC Voltage | JJG 843-2007<br>Leakage Current Tester   | 1V~1000V (DC)   | $U=0.06\% U_x+6mV$         |            |      |
|    |                                      | AC Voltage |  | 1V~1000V (45Hz~1kHz)                                  | $U=0.09\% U_x+6mV$         |            |      |
|    |                                      | DC Current |  | 10 $\mu$ A~500mA                                      | $U=0.15\% I_x+0.02\mu A$   |            |      |
|    |                                      | AC Current |  | 10 $\mu$ A~500mA (45Hz~1kHz)                          | $U=0.26\% I_x+0.05\mu A$   |            |      |
| 15 | Wrist Strap and Footwear Tester      | Resistance | JJF(Electronic)31502-2010 Wrist Strap and Footwear Tester                                | 1k $\Omega$ ~200M $\Omega$                            | $U_{rel}=2.3\%$            |            |      |
| 16 | Wide range digital RLC meter         | Resistance | GJB/J 5412-2005<br>Verification regulation for wide range digital RLC meter              | 0.01 $\Omega$ ~0.1 $\Omega$ (1kHz)                    | $U_{rel}=2.0\% \sim 0.4\%$ |            |      |
|    |                                      |            |  | 0.1 $\Omega$ ~1 $\Omega$ (1kHz)                       | $U_{rel}=0.4\%$            |            |      |
|    |                                      |            |  | 1 $\Omega$ ~10 $\Omega$ (1kHz)                        | $U_{rel}=0.10\%$           |            |      |
|    |                                      |            |  | 10 $\Omega$ ~100k $\Omega$ (1kHz)                     | $U_{rel}=0.03\%$           |            |      |

| No | Instrument                         | Parameter           | Title, Code of Calibration Method  | Range                         | Uncertainty ( $k=2$ )         | Limitation | Note |
|----|------------------------------------|---------------------|--|-------------------------------|-------------------------------|------------|------|
| 16 | Wide range digital RLC meter       | Inductor            | GJB/J 5412-2005 Verification regulation for wide range digital RLC meter | 0.1 $\mu$ H~10 $\mu$ H (1kHz) | $U_{rel}=0.11\%$              |            |      |
|    |                                    |                     |  | 10 $\mu$ H~10H (1kHz)         | $U_{rel}=0.09\%$              |            |      |
|    |                                    | Capacitor           |  | 1pF~1nF (1kHz)                | $U_{rel}=0.08\%$              |            |      |
|    |                                    |                     |  | 1nF~190 $\mu$ F (1kHz)        | $U_{rel}=0.06\%$              |            |      |
| 17 | Tesla-Meter                        | Magnetic Induction  | JJG 242-1995 Tesla-Meter   | (0.001~3000)mT                | $U_{rel}=0.10\%$              |            |      |
| 18 | Earth -Continuity Testers          | Resistance          | JJG 984-2004 Earth -Continuity Testers                                   | 0.01 $\Omega$ ~1 $\Omega$     | $U_{rel}=0.14\%$              |            |      |
|    |                                    | Current             |  | 1A~30A                        | $U_{rel}=0.14\%$              |            |      |
| 19 | Earth Resistance Meters            | Resistance          | JJG 366-2004 Earth Resistance Meters                                     | (0.01~1) $\Omega$             | $U_{rel}=0.6\%$               |            |      |
|    |                                    |                     |  | (1~10) $\Omega$               | $U_{rel}=0.14\%$              |            |      |
|    |                                    |                     |  | (10~10000) $\Omega$           | $U_{rel}=0.10\%$              |            |      |
| 20 | D.C. Resistance Box (Resistors)    | Resistance          | JJG 982-2003 D.C. Resistance Box   | 0.1m $\Omega$ ~1 $\Omega$     | $U_{rel}=0.07\% \sim 0.015\%$ |            |      |
|    |                                    |                     |  | >1 $\Omega$ ~10 $\Omega$      | $U=0.0018\% Rx+0.06m\Omega$   |            |      |
|    |                                    |                     |  | >10 $\Omega$ ~100 $\Omega$    | $U=0.0015\% Rx+0.6m\Omega$    |            |      |
|    |                                    |                     |  | >100 $\Omega$ ~1k $\Omega$    | $U=0.0012\% Rx+0.6m\Omega$    |            |      |
|    |                                    |                     |  | >1k $\Omega$ ~10k $\Omega$    | $U=0.0012\% Rx+6m\Omega$      |            |      |
|    |                                    |                     |  | >10k $\Omega$ ~100k $\Omega$  | $U=0.0012\% Rx+60m\Omega$     |            |      |
|    |                                    |                     |  | >100k $\Omega$ ~1M $\Omega$   | $U=0.0018\% Rx+2.4\Omega$     |            |      |
|    |                                    |                     |  | >1M $\Omega$ ~10M $\Omega$    | $U=0.006\% Rx+0.12k\Omega$    |            |      |
| 21 | Battery Internal Resistance Tester | Resistance          | HZH-WIE021-2014 Calibration Method of Battery Internal Resistance Tester | (0.1~10000)m $\Omega$         | $U_{rel}=0.10\%$              |            |      |
|    |                                    | Voltage             |  | (0.1~1000)V                   | $U_{rel}=0.03\%$              |            |      |
| 22 | Battery Tester                     | Identify resistance | HZH-WIE022-2014 Calibration Method of Battery Tester                     | (0.1~100)k $\Omega$           | $U_{rel}=0.15\%$              |            |      |

| No | Instrument                                   | Parameter                       | Title, Code of Calibration Method  | Range                             | Uncertainty ( $k=2$ )     | Limitation | Note |
|----|--|---------------------------------|--|-----------------------------------|---------------------------|------------|------|
| 22 | Battery Tester                               | Current                         | HZH-WIE022-2014<br>Calibration Method of<br>Battery<br>Tester                              | 0.1A~10A                          | $U_{rel}=0.16\%$          |            |      |
|    |  | Resistance                      |  | (1~10000)<br>m $\Omega$           | $U=0.10\%R_x+0.06m\Omega$ |            |      |
|    |  | Voltage                         |  | (0.1~1000)V                       | $U_{rel}=0.03\%$          |            |      |
| 23 | Battery protection<br>board tester           | Current                         | HZH-WIE023-2014<br>Calibration Method of<br>Battery<br>Protection Board<br>Tester          | 10 $\mu$ A~10A                    | $U=0.16\%I_x+0.06\mu A$   |            |      |
|    |  | Resistance                      |  | (1~10000)<br>m $\Omega$           | $U=0.10\%R_x+0.06m\Omega$ |            |      |
|    |  | Voltage                         |  | (0.1~1000)V                       | $U_{rel}=0.03\%$          |            |      |
| 24 | Transformer<br>Electric<br>parameters Tester | AC Voltage                      | HZH-WIE024-2014<br>Calibration Method of<br>Transformer<br>Electric Parameters<br>Tester   | (1~500)V<br>(45Hz~65Hz<br>)       | $U_{rel}=0.14\%$          |            |      |
|    |  | DC Voltage                      |  | (0.1~500)V                        | $U_{rel}=0.09\%$          |            |      |
|    |  | AC Current                      |  | 10 $\mu$ A~10A<br>(45Hz~65Hz<br>) | $U_{rel}=0.16\%$          |            |      |
|    |  | DC Current                      |  | 10 $\mu$ A~10A                    | $U_{rel}=0.10\%$          |            |      |
| 25 | Semiconductor<br>Device Curve<br>Tracers     | Voltage<br>deflection<br>factor | JJF 1236-2010<br>Calibration<br>Specification for<br>Semiconductor<br>Device Curve Tracers | (0.001~500)<br>V/div              | $U_{rel}=0.3\%$           |            |      |
|    |  | Current<br>deflection<br>factor |  | 1 $\mu$ A/div~5A/<br>div          | $U_{rel}=0.3\%$           |            |      |
|    |  | Step voltage<br>signal          |  | (0.05~1) V                        | $U_{rel}=0.8\%$           |            |      |
|    |  | Step current<br>signal          |  | 1 $\mu$ A~200mA                   | $U_{rel}=0.8\%$           |            |      |
| 26 | DC Voltage Stable<br>Source                  | Voltage                         | JJG(Aviation) 6-1999<br>Verification<br>regulation for DC<br>voltage stable source         | 10mV~100m<br>V                    | $U=0.0045\%U_x+4\mu V$    |            |      |
|    |  |                                 |  | >100mV~1V                         | $U=0.0029\%U_x+8\mu V$    |            |      |
|    |  |                                 |  | >1V~10V                           | $U=0.0028\%U_x+60\mu V$   |            |      |
|    |  |                                 |  | >10V~100V                         | $U=0.0045\%U_x+66\mu V$   |            |      |



| No | Instrument                      | Parameter | Title, Code of Calibration Method   | Range                      | Uncertainty ( $k=2$ )     | Limitation    | Note |
|----|---------------------------------|-----------|---|----------------------------|---------------------------|---------------|------|
| 26 | DC Voltage Stable Source        | Voltage   | JJG(Aviation) 6-1999<br>Verification regulation for DC voltage stable source  | >100V~1000V                | $U=0.0049\% U_x+0.011V$   |               |      |
|    |                                 |           |   | 10 $\mu$ A~100 $\mu$ A     | $U=0.06\% I_x+0.028\mu A$ |               |      |
|    |                                 | Current   |   | 100 $\mu$ A~1mA            | $U=0.06\% I_x+0.055\mu A$ |               |      |
|    |                                 |           |   | 1mA~10mA                   | $U=0.06\% I_x+2.2\mu A$   |               |      |
|    |                                 |           |   | 10mA~100mA                 | $U=0.06\% I_x+5.5\mu A$   |               |      |
|    |                                 |           |   | 100mA~1A                   | $U=0.06\% I_x+0.22mA$     |               |      |
|    |                                 |           |   | 1A~3A                      | $U=0.012\% I_x+0.18mA$    |               |      |
|    |                                 |           |   | 3A~30A                     | $U=0.012\% I_x+1.8mA$     |               |      |
|    |                                 |           |   | 30A~300A                   | $U=0.024\% I_x+18mA$      |               |      |
|    |                                 |           |   | Ripple noise               | 0.3mV~10V                 | $U_{rel}=6\%$ |      |
| 27 | AC power supply(power inverter) | Voltage   | JJG(Aviation) 51-1999<br>Verification regulation for AC standard current source<br>JJG 410-1994<br>Verification Regulation of Precise AC Voltage Calibration Source | 10mV~100mV<br>(10Hz~20kHz) | $U=0.072\% U_x+0.046mV$   |               |      |
|    |                                 |           |   | 100mV~1V<br>(10Hz~20kHz)   | $U=0.072\% U_x+0.35mV$    |               |      |
|    |                                 |           |   | 1V~10V<br>(10Hz~20kHz)     | $U=0.072\% U_x+3.5mV$     |               |      |
|    |                                 |           |   | 10V~100V<br>(10Hz~20kHz)   | $U=0.072\% U_x+35mV$      |               |      |
|    |                                 |           |   | 100V~1000V<br>(10Hz~20kHz) | $U=0.072\% U_x+0.35V$     |               |      |

| No       | Instrument                               | Parameter                | Title, Code of Calibration Method   | Range                     | Uncertainty (k=2)       | Limitation | Note |
|----------|--|--------------------------|---|---------------------------|-------------------------|------------|------|
| 27       | AC power supply(power inverter)          | Current                  | JJG(Aviation) 51-1999 Verification regulation for AC standard current source JJG 410-1994 Precise AC Voltage Calibration Source | 10μA~100μA<br>(10Hz~5kHz) | $U=0.12\%Ix+0.046\mu A$ |            |      |
|          |  |                          |   | 100μA~1mA<br>(10Hz~5kHz)  | $U=0.12\%Ix+0.46\mu A$  |            |      |
|          |  |                          |   | 1mA~10mA<br>(10Hz~5kHz)   | $U=0.12\%Ix+4.6\mu A$   |            |      |
|          |  |                          |   | 10mA~100mA<br>(10Hz~5kHz) | $U=0.12\%Ix+0.046mA$    |            |      |
|          |  |                          |   | 100mA~1A<br>(10Hz~5kHz)   | $U=0.12\%Ix+0.46mA$     |            |      |
|          |  |                          |   | 1A~3A<br>(45Hz~400Hz)     | $U_{rel}=0.13\%$        |            |      |
|          |  |                          |   | 3A~30A<br>(45Hz~400Hz)    | $U_{rel}=0.13\%$        |            |      |
|          |  | 30A~300A<br>(45Hz~400Hz) |   | $U_{rel}=0.13\%$          |                         |            |      |
|          |  | Distortion               |   | 0.1%~30%                  | $U_{rel}=10\%$          |            |      |
| 28       | Battery charge and discharge test system | Voltage                  | HZH-WIE028-2014 Calibration Method of Battery Charge and Discharge Test System  | 10mV~100mV                | $U=0.0045\%Ux+4\mu V$   |            |      |
|          |  |                          |   | >100mV~1V                 | $U=0.0029\%Ux+8\mu V$   |            |      |
|          |  |                          |   | >1V~10V                   | $U=0.0028\%Ux+60\mu V$  |            |      |
|          |  |                          |   | >10V~100V                 | $U=0.0045\%Ux+66\mu V$  |            |      |
|          |  |                          |   | >100V~1000V               | $U=0.0049\%Ux+0.011V$   |            |      |
|          |  | Current                  |   | 10μA~100μA                | $U=0.06\%Ix+0.028\mu A$ |            |      |
|          |  |                          |   | 100μA~1mA                 | $U=0.06\%Ix+0.055\mu A$ |            |      |
| 1mA~10mA | $U=0.06\%Ix+2.2\mu A$                    |                          |   |                           |                         |            |      |

| No | Instrument                               | Parameter           | Title, Code of Calibration Method  | Range   | Uncertainty ( $k=2$ )         | Limitation | Note |
|----|--|---------------------|--|---|-------------------------------|------------|------|
| 28 | Battery charge and discharge test system | Current             | HZH-WIE028-2014 Calibration Method of Battery Charge and Discharge Test System | 10mA~100mA  | $U=0.06\%Ix+5.5\mu A$         |            |      |
|    |  |                     |  | 100mA~1A  | $U=0.06\%Ix+0.22mA$           |            |      |
|    |  |                     |  | 1A~3A   | $U=0.012\%Ix+0.18mA$          |            |      |
|    |  |                     |  | 3A~30A  | $U=0.012\%Ix+1.8mA$           |            |      |
|    |  |                     |  | 30A~300A  | $U=0.024\%Ix+18mA$            |            |      |
| 29 | DC Bridges                               | Resistance          | JJG 125-2004 D.C. Bridges  | 0.1m $\Omega$ ~33 $\Omega$                            | $U_{rel}=0.12\% \sim 0.009\%$ |            |      |
|    |  |                     |  | >33 $\Omega$ ~1.1M $\Omega$                           | $U_{rel}=0.006\%$             |            |      |
|    |  |                     |  | >1.1M $\Omega$ ~10M $\Omega$                          | $U_{rel}=0.015\%$             |            |      |
| 30 | Cable Tester                             | AC Voltage          | JJF 1457-2014 Calibration Specification for Cable Testers                      | 1V~10kV (45-65)Hz                                     | $U_{rel}=0.3\%$               |            |      |
|    |  | DC Voltage          |  | 1V~10kV   | $U_{rel}=0.2\%$               |            |      |
|    |  | Capacitor           |  | 100pF~10 $\mu$ F                                      | $U_{rel}=0.3\%$               |            |      |
|    |  | Current             |  | Leakage ACI:<br>0.01mA~100mA (45-65)Hz                | $U_{rel}=0.4\%$               |            |      |
|    |  | Resistance          |  | 10 <sup>3</sup> $\Omega$ ~10 <sup>8</sup> $\Omega$    | $U_{rel}=0.11\%$              |            |      |
|    |  |                     |  | >10 <sup>8</sup> $\Omega$ ~10 <sup>9</sup> $\Omega$   | $U_{rel}=0.24\%$              |            |      |
|    |  |                     |  | >10 <sup>9</sup> $\Omega$ ~10 <sup>10</sup> $\Omega$  | $U_{rel}=0.5\%$               |            |      |
|    |  |                     |  | >10 <sup>10</sup> $\Omega$ ~10 <sup>11</sup> $\Omega$ | $U_{rel}=1.0\%$               |            |      |
| 31 | Analogue Oscilloscope                    | Frequency bandwidth | JJG 262-1996 Analogue Oscilloscope   | DC~500MHz   | $U_{rel}=3\%$                 |            |      |
|    |  | Voltage             |  | 1mV/div~20V/div                                       | $U_{rel}=0.3\%$               |            |      |
|    |  | Time                |  | 0.5ns/div~0.5s/div                                    | $U_{rel}=0.3\%$               |            |      |
|    |  |                     |  | 1s/div~20s/div  | $U_{rel}=0.6\%$               |            |      |

| No | Instrument                     | Parameter                                   | Title, Code of Calibration Method  | Range                          | Uncertainty ( $k=2$ )        | Limitation | Note |
|----|--------------------------------|---|--|--------------------------------|------------------------------|------------|------|
| 32 | Digital oscilloscope           | Frequency bandwidth                         | JJF 1057-1998<br>Verification regulation for digital oscilloscope                  | DC~500MHz                      | $U_{rel}=3\%$                |            |      |
|    |                                | Voltage                                     |  | 1mV/div~20V/div                | $U_{rel}=0.3\%$              |            |      |
|    |                                | Time  |  | 0.5ns/div~0.5s/div             | $U_{rel}=0.3\%$              |            |      |
|    |                                |   |  | 1s/div~20s/div                 | $U_{rel}=0.6\%$              |            |      |
| 33 | Frequency Counter              | Frequency                                   | JJG 349-2014<br>Universal counters<br>JJG 841-2012<br>Microwave Frequency Counters | 0.01Hz~26.5GHz                 | $U_{rel}=1.0\times 10^{-9}$  |            |      |
|    |                                | Sensitivity                                 |  | DC~10MHz:<br>10mV~3V           | $U_{rel}=3\%$                |            |      |
|    |                                |   |  | (10~500)MHz:<br>-30dBm~10dBm   | $U_{rel}=0.7\text{dB}$       |            |      |
|    |                                |   |  | (0.5~26.5)GHz:<br>-30dBm~10dBm | $U_{rel}=1.0\text{dB}$       |            |      |
| 34 | Electronic Voltmeter           | Voltage basic error                         | JJG 250-1990<br>Electronic Voltmeter   | 1mV~30mV (1kHz)                | $U_{rel}=0.7\% \sim 0.2\%$   |            |      |
|    |                                |   |  | >30mV~1000V (1kHz)             | $U_{rel}=0.15\%$             |            |      |
|    |                                | Frequency of additional error               |  | 0.3V~1.5V (30Hz~100kHz)        | $U_{rel}=0.15\%$             |            |      |
|    |                                |   |  | 0.3V~1.5V (100kHz~500MHz)      | $U_{rel}=3\%$                |            |      |
| 35 | Low Frequency Signal Generator | Frequency                                   | JJG 602-1996 Low Frequency Signal Generator  | 1Hz~1MHz                       | $U_{rel}=1\times 10^{-6}$    |            |      |
|    |                                | Level                                       |  | 1mV~300V (1kHz)                | $U=0.3\% U_x+0.044\text{mV}$ |            |      |
|    |                                | amplitude-frequency response characteristic |  | 0.3V~10V (10Hz~20kHz)          | $U_{rel}=0.3\%$              |            |      |
|    |                                |   |  | 0.3V~10V (20kHz~100kHz)        | $U_{rel}=0.9\%$              |            |      |

| No | Instrument                     | Parameter                                   | Title, Code of Calibration Method           | Range   | Uncertainty ( $k=2$ )           | Limitation | Note |
|----|--------------------------------|---|---|---|---------------------------------|------------|------|
| 35 | Low Frequency Signal Generator | amplitude-frequency response characteristic | JIG 602-1996 Low Frequency Signal Generator | 0.3V~10V (100kHz~1MHz)                              | $U_{rel}=2.4\%$                 |            |      |
|    |                                | Distortion                                  |   | 0.01%~30%   | $U_{rel}=10\%$                  |            |      |
| 36 | Signal Generator               | Frequency                                   | JIG 173-2003 Signal Generator               | 1MHz~20GHz  | $U_{rel}=3\times 10^{-9}$       |            |      |
|    |                                | Level                                       |   | -120dBm~20dBm (5kHz~20GHz)                          | $U=0.32\text{dB}-0.15\text{dB}$ |            |      |
|    |                                | FM  |   | FM:(1~40)kHz (CW:250kHz~10MHz, Rates:20Hz~10kHz)    | $U_{rel}=2.4\%$                 |            |      |
|    |                                |   |   | FM:(1~400)kHz (CW:10MHz~1300MHz, Rates:50Hz~100kHz) | $U_{rel}=1.3\%$                 |            |      |
|    |                                | AM  |   | AM:(5~99)% (CW:150kHz~10MHz, Rates:50Hz~10kHz)      | $U_{rel}=2.4\%$                 |            |      |
|    |                                |   |   | AM:(5~99)% (CW:10MHz~1300MHz, Rates:50Hz~50kHz)     | $U_{rel}=1.3\%$                 |            |      |
|    |                                |   |   | AM:(5~99)% (CW:150kHz~10MHz, Rates:20Hz~10kHz)      | $U_{rel}=4\%$                   |            |      |
|    |                                |   |   | AM:(5~99)% (CW:10MHz~1300MHz, Rates:20Hz~100kHz)    | $U_{rel}=4\%$                   |            |      |
|    |                                | PM  |   | PM:(1~400)rad (CW:150kHz~10MHz, Rates:200Hz~10kHz)  | $U_{rel}=5\%$                   |            |      |

| No | Instrument                     | Parameter             | Title, Code of Calibration Method                                     | Range   | Uncertainty ( $k=2$ )        | Limitation | Note |
|----|--------------------------------|-----------------------|---|---|------------------------------|------------|------|
| 36 | Signal Generator               | PM                    | JJG 173-2003<br>Signal Generator                                      | PM:(1~400)rad<br>(CW:10MHz~1300MHz,<br>Rates:200Hz~20kHz) | $U_{rel}=4\%$                |            |      |
| 37 | Frequency<br>Spectrum Analyzer | Frequency             | JJF 1396-2013<br>Calibration<br>Specification of<br>Spectrum Analyzer | 100Hz~26.5<br>GHz   | $U_{rel}=3\times 10^{-9}$    |            |      |
|    |                                | Level                 |   | -120dBm~20<br>dBm<br>(100Hz~26.5<br>GHz)                  | $U=0.25\text{dB}$            |            |      |
|    |                                | Frequency<br>response |   | -30dBm~0dBm<br>(100Hz~26.5<br>GHz)                        | $U=0.25\text{dB}$            |            |      |
|    |                                | Span                  |   | 100Hz~26.5<br>GHz<br>(-30dBm~0dBm)                        | $U_{rel}=0.3\%$              |            |      |
|    |                                | RBW                   |   | 1Hz~10MHz<br>(-30dBm~0dBm)                                | $U_{rel}=5\%$                |            |      |
| 38 | Standard Inductors             | Inductance            | JJG 726-1991<br>Standard Inductors                                    | 0.1 $\mu$ H~100 $\mu$<br>H<br>(20Hz~1MHz)                 | $U_{rel}=0.12\%$             |            |      |
|    |                                |                       |   | >0.1mH~10<br>H<br>(20Hz~1MHz)                             | $U_{rel}=0.06\%$             |            |      |
| 39 | Standard<br>Capacitors         | Capacitance           | JJG 183-1992<br>Standard Capacitors                                   | >10 $\mu$ F~1F、<br>1pF~100pF<br>(20Hz~1MHz)               | $U_{rel}=0.12\%$             |            |      |
|    |                                |                       |   | ><br>100pF~10 $\mu$ F<br>(20Hz~1MHz)                      | $U_{rel}=0.06\%$             |            |      |
|    |                                | Loss tangent          |   | 0.00001~1   | $U=0.0006$                   |            |      |
|    |                                |                       |   | 1~9.999999  | $U_{rel}=0.06\%$             |            |      |
| 40 | DC Standard<br>Voltage Source  | Voltage               | JJG 445-1986 DC<br>Standard Voltage<br>Source                         | 10mV~100m<br>V  | $U=0.0011\% U_x+0.4\mu$<br>V |            |      |
|    |                                |                       |   | >100mV~1V   | $U=0.0010\% U_x+0.4\mu$<br>V |            |      |

| No | Instrument                    | Parameter      | Title, Code of Calibration Method   | Range                         | Uncertainty ( $k=2$ )           | Limitation | Note |
|----|-------------------------------|----------------|---|-------------------------------|---------------------------------|------------|------|
| 40 | DC Standard Voltage Source    | Voltage        | JJG 445-1986 DC Standard Voltage Source                                       | >1V~10V                       | $U=0.0010\% U_x+0.7\mu\text{V}$ |            |      |
|    |                               |                |   | >10V~100V                     | $U=0.0012\% U_x+0.04\text{mV}$  |            |      |
|    |                               |                |   | >100V~1000V                   | $U=0.0012\% U_x+0.13\text{mV}$  |            |      |
|    |                               | Ripple Voltage |   | 0.3mV~10V                     | $U_{\text{rel}}=6\%$            |            |      |
| 41 | AC Voltage Calibration Source | Voltage        | JJG 410-1994 Verification Regulation of Precise AC Voltage Calibration Source | 10mV~100mV<br>(1Hz~40Hz)      | $U=0.036\% U_x+0.036\text{mV}$  |            |      |
|    |                               |                |   | 10mV~100mV<br>(40Hz~1kHz)     | $U=0.024\% U_x+0.013\text{mV}$  |            |      |
|    |                               |                |   | 10mV~100mV<br>(1kHz~20kHz)    | $U=0.036\% U_x+0.013\text{mV}$  |            |      |
|    |                               |                |   | 10mV~100mV<br>(20kHz~50kHz)   | $U=0.12\% U_x+0.013\text{mV}$   |            |      |
|    |                               |                |   | 10mV~100mV<br>(50kHz~100kHz)  | $U=0.6\% U_x+0.013\text{mV}$    |            |      |
|    |                               |                |   | 10mV~100mV<br>(100kHz~300kHz) | $U=4.8\% U_x+0.024\text{mV}$    |            |      |
|    |                               |                |   | 100mV~1V<br>(1Hz~40Hz)        | $U=0.0084\% U_x+0.048\text{mV}$ |            |      |
|    |                               |                |   | 100mV~1V<br>(40Hz~1kHz)       | $U=0.0084\% U_x+0.024\text{mV}$ |            |      |
|    |                               |                |   | 100mV~1V<br>(1kHz~20kHz)      | $U=0.017\% U_x+0.024\text{mV}$  |            |      |
|    |                               |                |   | 100mV~1V<br>(20kHz~50kHz)     | $U=0.036\% U_x+0.024\text{mV}$  |            |      |
|    |                               |                |   | 100mV~1V<br>(50kHz~100kHz)    | $U=0.096\% U_x+0.024\text{mV}$  |            |      |

| No                        | Instrument                    | Parameter | Title, Code of Calibration Method  | Range                       | Uncertainty (k=2)              | Limitation | Note |
|---------------------------|-------------------------------|-----------|--|-----------------------------|--------------------------------|------------|------|
| 41                        | AC Voltage Calibration Source | Voltage   | JJG 410-1994<br>Verification Regulation of Precise AC Voltage Calibration Source | 100mV~1V<br>(100kHz~300kHz) | $U=0.36\% U_x+0.12\text{mV}$   |            |      |
|                           |                               |           |  | 100mV~1V<br>(300kHz~1MHz)   | $U=1.2\% U_x+0.12\text{mV}$    |            |      |
|                           |                               |           |  | 100mV~1V<br>(1MHz~2MHz)     | $U=1.8\% U_x+0.12\text{mV}$    |            |      |
|                           |                               |           |  | 1V~10V<br>(1Hz~40Hz)        | $U=0.0084\% U_x+0.48\text{mV}$ |            |      |
|                           |                               |           |  | 1V~10V<br>(40Hz~1kHz)       | $U=0.0084\% U_x+0.24\text{mV}$ |            |      |
|                           |                               |           |  | 1V~10V<br>(1kHz~20kHz)      | $U=0.017\% U_x+0.24\text{mV}$  |            |      |
|                           |                               |           |  | 1V~10V<br>(20kHz~50kHz)     | $U=0.036\% U_x+0.24\text{mV}$  |            |      |
|                           |                               |           |  | 1V~10V<br>(50kHz~100kHz)    | $U=0.096\% U_x+0.24\text{mV}$  |            |      |
|                           |                               |           |  | 1V~10V<br>(100kHz~300kHz)   | $U=0.36\% U_x+1.2\text{mV}$    |            |      |
|                           |                               |           |  | 1V~10V<br>(300kHz~1MHz)     | $U=1.2\% U_x+1.2\text{mV}$     |            |      |
|                           |                               |           |  | 1V~10V<br>(1MHz~2MHz)       | $U=1.8\% U_x+1.2\text{mV}$     |            |      |
|                           |                               |           |  | 10V~100V<br>(1Hz~40Hz)      | $U=0.024\% U_x+4.8\text{mV}$   |            |      |
|                           |                               |           |  | 10V~100V<br>(40Hz~1kHz)     | $U=0.024\% U_x+2.4\text{mV}$   |            |      |
|                           |                               |           |  | 10V~100V<br>(1kHz~20kHz)    | $U=0.024\% U_x+2.4\text{mV}$   |            |      |
| 10V~100V<br>(20kHz~50kHz) | $U=0.042\% U_x+2.4\text{mV}$  |           |  |                             |                                |            |      |



| No | Instrument                    | Parameter                    | Title, Code of Calibration Method  | Range                        | Uncertainty (k=2)       | Limitation | Note |
|----|-------------------------------|------------------------------|--|------------------------------|-------------------------|------------|------|
| 41 | AC Voltage Calibration Source | Voltage                      | JJG 410-1994<br>Verification Regulation of Precise AC Voltage Calibration Source | 10V~100V<br>(50kHz~100kHz)   | $U=0.15\% U_x+2.4mV$    |            |      |
|    |                               |                              |  | 10V~100V<br>(100kHz~300kHz)  | $U=0.48\% U_x+12mV$     |            |      |
|    |                               |                              |  | 10V~100V<br>(300kHz~1MHz)    | $U=1.8\% U_x+12mV$      |            |      |
|    |                               |                              |  | 100V~1000V<br>(1Hz~40Hz)     | $U=0.048\% U_x+0.048V$  |            |      |
|    |                               |                              |  | 100V~1000V<br>(40Hz~1kHz)    | $U=0.048\% U_x+0.024V$  |            |      |
|    |                               |                              |  | 100V~1000V<br>(1kHz~20kHz)   | $U=0.072\% U_x+0.024V$  |            |      |
|    |                               |                              |  | 100V~1000V<br>(20kHz~50kHz)  | $U=0.15\% U_x+0.024V$   |            |      |
|    |                               | 100V~1000V<br>(50kHz~100kHz) |  | $U=0.36\% U_x+0.024V$        |                         |            |      |
|    |                               | Distortion                   |  | 0.0001%~30%<br>(20Hz~100kHz) | $U_{rel}=13\%$          |            |      |
| 42 | AC Standard Current Source    | Current                      | JJG(Aviation) 51-1999<br>Verification regulation for AC standard current source  | 10μA~100μA<br>(10Hz~20Hz)    | $U=0.48\% I_x+0.036μA$  |            |      |
|    |                               |                              |  | 10μA~100μA<br>(20Hz~45Hz)    | $U=0.18\% I_x+0.036μA$  |            |      |
|    |                               |                              |  | 10μA~100μA<br>(45Hz~100Hz)   | $U=0.072\% I_x+0.036μA$ |            |      |

| No | Instrument                 | Parameter | Title, Code of Calibration Method  | Range                                  | Uncertainty ( $k=2$ )       | Limitation | Note |
|----|----------------------------|-----------|--|--|-----------------------------|------------|------|
| 42 | AC Standard Current Source | Current   | JJG(Aviation) 51-1999 Verification regulation for AC standard current source | 10 $\mu$ A~100 $\mu$ A<br>(100Hz~5kHz) | $U=0.072\%Ix+0.036\mu$<br>A |            |      |
|    |                            |           |  | 100 $\mu$ A~1mA<br>(10Hz~20Hz)         | $U=0.48\%Ix+0.24\mu$ A      |            |      |
|    |                            |           |  | 100 $\mu$ A~1mA<br>(20Hz~45Hz)         | $U=0.18\%Ix+0.24\mu$ A      |            |      |
|    |                            |           |  | 100 $\mu$ A~1mA<br>(45Hz~100Hz)        | $U=0.072\%Ix+0.24\mu$ A     |            |      |
|    |                            |           |  | 100 $\mu$ A~1mA<br>(100Hz~5kHz)        | $U=0.036\%Ix+0.24\mu$ A     |            |      |
|    |                            |           |  | 100 $\mu$ A~1mA<br>(5kHz~20kHz)        | $U=0.072\%Ix+0.24\mu$ A     |            |      |
|    |                            |           |  | 100 $\mu$ A~1mA<br>(20kHz~50kHz)       | $U=0.48\%Ix+0.48\mu$ A      |            |      |
|    |                            |           |  | 100 $\mu$ A~1mA<br>(50kHz~100kHz)      | $U=0.66\%Ix+1.8\mu$ A       |            |      |
|    |                            |           |  | 1mA~10mA<br>(10Hz~20Hz)                | $U=0.48\%Ix+2.4\mu$ A       |            |      |
|    |                            |           |  | 1mA~10mA<br>(20Hz~45Hz)                | $U=0.18\%Ix+2.4\mu$ A       |            |      |
|    |                            |           |  | 1mA~10mA<br>(45Hz~100Hz)               | $U=0.072\%Ix+2.4\mu$ A      |            |      |
|    |                            |           |  | 1mA~10mA<br>(100Hz~5kHz)               | $U=0.036\%Ix+2.4\mu$ A      |            |      |
|    |                            |           |  | 1mA~10mA<br>(5kHz~20kHz)               | $U=0.072\%Ix+2.4\mu$ A      |            |      |

| No                      | Instrument                 | Parameter | Title, Code of Calibration Method  | Range                        | Uncertainty ( $k=2$ ) | Limitation | Note |
|-------------------------|----------------------------|-----------|--|------------------------------|-----------------------|------------|------|
| 42                      | AC Standard Current Source | Current   | JJG(Aviation) 51-1999 Verification regulation for AC standard current source | 1mA~10mA<br>(20kHz~50kHz)    | $U=0.48\%Ix+4.8\mu A$ |            |      |
|                         |                            |           |  | 1mA~10mA<br>(50kHz~100kHz)   | $U=0.66\%Ix+18\mu A$  |            |      |
|                         |                            |           |  | 10mA~100mA<br>(10Hz~20Hz)    | $U=0.48\%Ix+0.024mA$  |            |      |
|                         |                            |           |  | 10mA~100mA<br>(20Hz~45Hz)    | $U=0.18\%Ix+0.024mA$  |            |      |
|                         |                            |           |  | 10mA~100mA<br>(45Hz~100Hz)   | $U=0.072\%Ix+0.024mA$ |            |      |
|                         |                            |           |  | 10mA~100mA<br>(100Hz~5kHz)   | $U=0.036\%Ix+0.024mA$ |            |      |
|                         |                            |           |  | 10mA~100mA<br>(5kHz~20kHz)   | $U=0.072\%Ix+0.024mA$ |            |      |
|                         |                            |           |  | 10mA~100mA<br>(20kHz~50kHz)  | $U=0.48\%Ix+0.048mA$  |            |      |
|                         |                            |           |  | 10mA~100mA<br>(50kHz~100kHz) | $U=0.66\%Ix+0.18mA$   |            |      |
|                         |                            |           |  | 100mA~1A<br>(10Hz~20Hz)      | $U=0.48\%Ix+0.24mA$   |            |      |
| 100mA~1A<br>(20Hz~45Hz) | $U=0.20\%Ix+0.24mA$        |           |  |                              |                       |            |      |

| No       | Instrument   | Parameter | Title, Code of Calibration Method   | Range                     | Uncertainty ( $k=2$ )  | Limitation | Note |
|----------|--|-----------|---|---------------------------|------------------------|------------|------|
| 42       | AC Standard Current Source                         | Current   | JJG(Aviation) 51-1999 Verification regulation for AC standard current source          | 100mA~1A<br>(45Hz~100Hz)  | $U=0.096\%Ix+0.24mA$   |            |      |
|          |  |           |   | 100mA~1A<br>(100Hz~5kHz)  | $U=0.12\%Ix+0.24mA$    |            |      |
|          |  |           |   | 100mA~1A<br>(5kHz~20kHz)  | $U=0.36\%Ix+0.24mA$    |            |      |
|          |  |           |   | 100mA~1A<br>(20kHz~50kHz) | $U=1.2\%Ix+0.48mA$     |            |      |
|          |  |           |   | 1A~3A<br>(45Hz~400Hz)     | $U_{rel}=0.13\%$       |            |      |
|          |  |           |   | 3A~30A<br>(45Hz~400Hz)    | $U_{rel}=0.13\%$       |            |      |
|          |  |           |   | 30A~300A<br>(45Hz~400Hz)  | $U_{rel}=0.13\%$       |            |      |
| 43       | DC Standard Current Source (Offset Current Source) | Current   | JJG (Aviation) 38-1987 The Verification regulation for Direct Current Standard Source | 10μA~100μA                | $U=0.0030\%Ix+0.96nA$  |            |      |
|          |  |           |   | 100μA~1mA                 | $U=0.0030\%Ix+0.006μA$ |            |      |
|          |  |           |   | 1mA~10mA                  | $U=0.0030\%Ix+0.06μA$  |            |      |
|          |  |           |   | 10mA~100mA                | $U=0.0048\%Ix+0.6μA$   |            |      |
|          |  |           |   | 100mA~1A                  | $U=0.014\%Ix+0.012mA$  |            |      |
|          |  |           |   | 1A~3A                     | $U=0.012\%Ix+0.18mA$   |            |      |
|          |  |           |   | 3A~30A                    | $U=0.012\%Ix+1.8mA$    |            |      |
| 30A~300A | $U=0.024\%Ix+18mA$                                 |           |   |                           |                        |            |      |
| 44       | DC Electronic Load                                 | Voltage   | JJF 1462-2014 Calibration Specification for DC Electronic Loads                       | (10~329.9999)mV           | $U=0.0024\%Ux+1.1μV$   |            |      |

| No | Instrument                            | Parameter         | Title, Code of Calibration Method                               | Range                   | Uncertainty ( $k=2$ )      | Limitation | Note |
|----|---------------------------------------|-------------------|---|-------------------------|----------------------------|------------|------|
| 44 | DC Electronic Load                    | Voltage           | JJF 1462-2014 Calibration Specification for DC Electronic Loads | 0.33V~3.299999V         | $U=0.0013\% U_x+2.2\mu V$  |            |      |
|    |                                       |                   |   | 3.3V~32.999999V         | $U=0.0014\% U_x+22\mu V$   |            |      |
|    |                                       |                   |   | 33V~329.99999V          | $U=0.0022\% U_x+0.17mV$    |            |      |
|    |                                       |                   |   | 330V~1000.000V          | $U=0.0022\% U_x+1.7mV$     |            |      |
|    |                                       | Current           |   | (10~329.999999) $\mu A$ | $U=0.018\% I_x+0.022\mu A$ |            |      |
|    |                                       |                   |   | 0.33mA~3.299999mA       | $U=0.012\% I_x+0.055\mu A$ |            |      |
|    |                                       |                   |   | 3.3mA~32.99999mA        | $U=0.012\% I_x+0.28\mu A$  |            |      |
|    |                                       |                   |   | 33mA~329.99999mA        | $U=0.012\% I_x+2.8\mu A$   |            |      |
|    |                                       |                   |   | 0.33A~1A                | $U=0.024\% I_x+44\mu A$    |            |      |
|    |                                       |                   |   | 1A~3A                   | $U=0.012\% I_x+0.18mA$     |            |      |
|    |                                       |                   |   | 3A~30A                  | $U=0.012\% I_x+1.8mA$      |            |      |
|    |                                       |                   |   | 30A~300A                | $U=0.024\% I_x+18mA$       |            |      |
|    |                                       | CV                |   | 1V~1000V                | $U_{rel}=0.005\%$          |            |      |
|    |                                       | CC                |   | 1mA~300A                | $U_{rel}=0.011\%$          |            |      |
| CP | 1mW~30kW                              | $U_{rel}=0.016\%$ |   |                         |                            |            |      |
| CR | 0.1 $\Omega$ ~10000 $\Omega$          | $U_{rel}=0.018\%$ |   |                         |                            |            |      |
| 45 | High Voltage Electrostatic Voltmeters | Voltage           | JJG 494-2005 High Voltage Electrostatic Voltmeters              | AC: (0.1~10)kV          | $U_{rel} = 0.3\%$          |            |      |
|    |                                       |                   |   | AC: (10~50)kV           | $U_{rel} = 0.6\%$          |            |      |
|    |                                       |                   |   | DC: (0.01~10)kV         | $U_{rel} = 0.15\%$         |            |      |
|    |                                       |                   |   | DC: (10~50)kV           | $U_{rel} = 0.4\%$          |            |      |
| 46 | Digital High-voltage meters           | Voltage           | DL/T 973-2005 Verification regulation of digital high voltmeter | AC: (0.1~10)kV          | $U_{rel} = 0.3\%$          |            |      |
|    |                                       |                   |   | AC: (10~50)kV           | $U_{rel} = 0.6\%$          |            |      |
|    |                                       |                   |   | DC: (0.01~10)kV         | $U_{rel} = 0.15\%$         |            |      |

| No | Instrument   | Parameter  | Title, Code of Calibration Method  | Range                              | Uncertainty ( $k=2$ ) | Limitation | Note |
|----|--|------------|--|------------------------------------|-----------------------|------------|------|
| 46 | Digital High-voltage meters                            | Voltage    | DL/T 973-2005 Verification regulation of digital high voltmeter                                | DC:<br>(10~50)kV                   | $U_{rel}=0.4\%$       |            |      |
| 47 | Spark Tester   | Voltage    | JJG(su)74-2008 Wire Spark Tester   | AC:<br>(0.1~10)kV                  | $U_{rel}=0.4\%$       |            |      |
|    |  |            |  | AC:<br>(10~50)kV                   | $U_{rel}=0.6\%$       |            |      |
|    |  |            |  | DC:<br>(0.1~10)kV                  | $k=0.2\%$             |            |      |
|    |  |            |  | DC:<br>(10~50)kV                   | $k=0.5\%$             |            |      |
| 48 | Transformer Tester                                     | Turn Ratio | JJG 970-2002 Transformers Turn Ratio Test Sets   | 1~100                              | $U_{rel}=0.06\%$      |            |      |
|    |  |            |  | 100~1000                           | $U_{rel}=0.15\%$      |            |      |
| 49 | Surface Impedance Tester                               | Resistance | JJG1005-2005 Electronic Insulating Resistance Meters   | $10^3\Omega\sim 10^8\Omega$        | $U_{rel}=11\%$        |            |      |
|    |  |            |  | $>10^8\Omega\sim 10^9\Omega$       | $U_{rel}=0.24\%$      |            |      |
|    |  |            |  | $>10^9\Omega\sim 10^{10}\Omega$    | $U_{rel}=0.5\%$       |            |      |
|    |  |            |  | $>10^{10}\Omega\sim 10^{11}\Omega$ | $U_{rel}=1.0\%$       |            |      |
|    |  | Voltage    |  | (0.01~10)kV                        | $U_{rel}=0.8\%$       |            |      |
| 50 | High Voltage Dividers (High-Voltage attenuation Probe) | Voltage    | JJG 1007-2005 DC High Voltage Dividers<br>JJG 496-1996 High Voltage Divider at Power Frequency | AC:<br>(0.1~10)kV                  | $U_{rel}=0.3\%$       |            |      |
|    |  |            |  | AC:<br>(10~50)kV                   | $U_{rel}=0.6\%$       |            |      |
|    |  |            |  | DC:<br>(0.01~10)kV                 | $U_{rel}=0.15\%$      |            |      |
|    |  |            |  | DC:<br>(10~50)kV                   | $U_{rel}=0.4\%$       |            |      |
| 51 | Pulse waveform test equipment                          | Voltage    | HZH-WIE043-2014 Pulse waveform test equipment calibration method                               | 1V~40kV                            | $U_{rel}=2.6\%$       |            |      |
|    |  | Waveform   |  | 1ns~50s                            | $U_{rel}=0.8\%$       |            |      |
| 52 | Turns Ratio Meter                                      | Turns      | SJ20241-1993 Verification regulation of YG series coil number tester                           | 1~19999                            | $U_{rel}=0.12\%$      |            |      |

| No | Instrument                                    | Parameter     | Title, Code of Calibration Method   | Range                                 | Uncertainty ( $k=2$ )       | Limitation | Note |
|----|---|---------------|---|---------------------------------------|-----------------------------|------------|------|
| 53 | Electrostatic Discharge Generator             | Voltage       | JJF 1238-2010 Calibration Specification for Electrostatic Discharge Generator | (0.5~40)kV                            | $U_{rel}=2.6\%$             |            |      |
| 54 | Frequency Meters                              | Frequency     | JJG 603-2006 Frequency Meters   | 10 Hz~20 kHz                          | $U_{rel}=0.010\%$           |            |      |
| 55 | Watch Tester (Clocks Analyzer)                | Day Error     | JJG488-2008 Watch Tester  | (0.00~9.99) s/d                       | $U=0.014s/d$                |            |      |
|    |   |               |   | (0.0~99.9) s/d                        | $U=0.10s/d$                 |            |      |
|    |   |               |   | (0~999) s/d                           | $U=1.0s/d$                  |            |      |
| 56 | Stopwatch                                     | time          | JJG 237-2010 Stopwatches  | Electric stopwatch: 10s~1d            | $U=0.01s\sim 0.05s$         |            |      |
|    |   |               |   | Mechanical stopwatch: 3s~60min        | $U=0.02s\sim 0.3s$          |            |      |
|    |   |               |   | Electric watch: 1ms~9.9s              | $U=0.1ms$                   |            |      |
| 57 | DC Shunts                                     | Resistance    | JJG 1069-2011 DC Shunts   | 10 $\mu\Omega$ ~10 $\Omega$ (1mA~50A) | $U_{rel}=0.04\%$            |            |      |
| 58 | Magnetic Flux Meter                           | Magnetic Flux | HZH-WIE055-2015 Magnetic Flux Meter Calibration Method                        | (0.1~1000) mWb                        | $U_{rel}=0.6\%$             |            |      |
| 59 | Loop Resistance Tester (DC Resistance Meters) | Current       | JJG 1052-2009 Loop Resistance Tester and DC Resistance Meters                 | 1mA~300A                              | $U_{rel}=0.3\%$             |            |      |
|    |   | Resistance    |   | 10 $\mu\Omega$ ~100 $\mu\Omega$       | $U=0.15\mu\Omega$           |            |      |
|    |   |               |   | 100 $\mu\Omega$ ~1000 $\Omega$        | $U_{rel}=0.15\%$            |            |      |
| 60 | Clamp Earth Resistance Meters                 | Resistance    | JJG 1054-2009 Clamp Earth Resistance Meters                                   | (0.01~0.1) $\Omega$                   | $U=4m\Omega$                |            |      |
|    |   |               |   | (0.1~1) $\Omega$                      | $U=13m\Omega$               |            |      |
|    |   |               |   | (1~1000) $\Omega$                     | $U_{rel}=0.8\%$             |            |      |
| 61 | Time Interval Meter                           | Time          | JJG 953-2000 Precision Time Interval Meter                                    | 1 $\mu$ s~10s                         | $U_{rel}=1\times 10^{-6}$   |            |      |
| 62 | Time Interval Generator                       | Time          | JJG 723-2008 Time Interval Generator  | 10ns~10000s                           | $U=3\times 10^{-8}tx+1.2ns$ |            |      |
| 63 | Electronic time relay                         | Time          | JJF 1282-2011 Calibration Specification for Electronic time relay             | 0.09s~9999s                           | $U=0.15\%tx+30ms$           |            |      |

| No | Instrument                       | Parameter | Title, Code of Calibration Method  | Range  | Uncertainty ( $k=2$ )              | Limitation | Note |
|----|----------------------------------|-----------|--|--|------------------------------------|------------|------|
| 64 | Continuity of insulation tester  | Voltage   | JB/T 4279.12-2008<br>Verification procedure for test equipment of enamelled winding wire -Part 12 :<br>Continuity of insulation tester (low voltage method)<br>JB/T 4279.13-2008<br>Verification procedure for test equipment of enamelled winding wire -Part 13 :<br>Continuity of insulation tester<br>(high-voltage method) | 10V~5000V  | $U_{rel} = 1.6\%$                  |            |      |
|    |                                  | Current   |  | 10 $\mu$ A~100 $\mu$ A                             | $U_{rel} = 0.9\%$                  |            |      |
| 65 | Magnetic Particle Flaw Detectors | Current   | JJF 1273-2011<br>Calibration Specification for Magnetic Particle Flaw Detectors  | 10A~2000A  | $U_{rel} = 1.6\%$                  |            |      |
| 66 | Magnetic Particle Flaw Detectors | Force     | JJF 1458-2014<br>Calibration Specification for Magnetic Yoke Detectors   | 40N~200N   | $U_{rel} = 3\%$                    |            |      |
| 67 | Process Calibrators              | Force     | JJF 1472-2014<br>Calibration Specification for Process Calibrators   | Thermocouple :<br>(-250~100)<br>$^{\circ}$ C       | $U=0.4^{\circ}$ C~0.2 $^{\circ}$ C |            |      |
|    |                                  |           |  | Thermocouple :<br>(100~1800)<br>$^{\circ}$ C       | $U=0.2^{\circ}$ C~0.4 $^{\circ}$ C |            |      |
|    |                                  |           |  | Thermal Resistance :<br>(-200~850)<br>$^{\circ}$ C | $U=0.1^{\circ}$ C                  |            |      |
|    |                                  |           |  | 10mV~100mV   | $U=0.0024\% U_x+1.2\mu$<br>V       |            |      |
|    |                                  |           |  | >100mV~1V  | $U=0.0010\% U_x+0.4\mu$<br>V       |            |      |
|    |                                  |           |  | >1V~10V  | $U=0.0010\% U_x+0.7\mu$<br>V       |            |      |
|    |                                  |           |  | >10V~100V  | $U=0.0012\% U_x+0.04$<br>mV        |            |      |



| No | Instrument                          | Parameter                | Title, Code of Calibration Method  | Range                          | Uncertainty ( $k=2$ )      | Limitation | Note |
|----|-------------------------------------|--------------------------|--|--------------------------------|----------------------------|------------|------|
| 67 | Process Calibrators                 | Force                    | JJF 1472-2014 Calibration Specification for Process Calibrators                | 0.01mA~1mA                     | $U=0.0030\%Ix+0.006\mu A$  |            |      |
|    |                                     |                          |  | >1mA~10mA                      | $U=0.0030\%Ix+0.06\mu A$   |            |      |
|    |                                     |                          |  | >10mA~100mA                    | $U=0.0048\%Ix+0.6\mu A$    |            |      |
|    |                                     |                          |  | 0.01Ω~10Ω                      | $U=0.0018\%Rx+0.06m\Omega$ |            |      |
|    |                                     |                          |  | >10Ω~100Ω                      | $U=0.0015\%Rx+0.6m\Omega$  |            |      |
|    |                                     |                          |  | >100Ω~1kΩ                      | $U=0.0012\%Rx+0.6m\Omega$  |            |      |
|    |                                     |                          |  | >1kΩ~10kΩ                      | $U=0.0012\%Rx+6m\Omega$    |            |      |
|    |                                     |                          |  | 1Hz~ 50kHz                     | $U_{rel}=0.003\%$          |            |      |
| 68 | Partial discharge measuring devices | Peak voltage             | DL/T 356-2010 Calibration Specification of partial discharge measuring devices | 5μV~10V                        | $U_{rel}=1.6\%$            |            |      |
|    |                                     | Frequency                |  | 25Hz~1MHz                      | $U_{rel}=1.2\%$            |            |      |
|    |                                     | Capacity                 |  | 10pF~1nF                       | $U_{rel}=1.2\%$            |            |      |
| 69 | Audio Analyzer                      | Voltage                  | JJF 1395-2013 Calibration Specification for Audio Analyzer                     | 1mV~30mV<br>(DC,10Hz~200kHz)   | $U_{rel}=0.7\%~0.2\%$      |            |      |
|    |                                     |                          |  | >30mV~300V<br>(DC,10Hz~200kHz) | $U_{rel}=0.15\%$           |            |      |
|    |                                     | Source output distortion |  | 0.001%~1%<br>(20Hz~100kHz)     | $U_{rel}=13\%$             |            |      |
|    |                                     | Distortion Measure       |  | 0.01%~0.1%<br>(20Hz~100kHz)    | $U_{rel}=13\%$             |            |      |
|    |                                     |                          |  | 0.1%~90%<br>(20Hz~100kHz)      | $U_{rel}=6\%$              |            |      |
|    |                                     | Frequency                |  | 10Hz~200kHz                    | $U_{rel}=1\times 10^{-6}$  |            |      |

| No        | Instrument                                | Parameter      | Title, Code of Calibration Method   | Range                  | Uncertainty (k=2)            | Limitation | Note |
|-----------|---|----------------|---|------------------------|------------------------------|------------|------|
| 70        | Electro-acoustical Measurement Instrument | Voltage        | JJF 1339-2012 Calibration Specification for Electro-acoustical Measurement Instruments  | 1mV~100V (20Hz~20kHz)  | $U_{rel}=0.7\% \sim 0.3\%$   |            |      |
|           |   |                |   | 1V~300V (DC)           | $U_{rel}=0.3\%$              |            |      |
|           |   | Frequency      |   | 20Hz~20kHz             | $U_{rel}=1.1 \times 10^{-5}$ |            |      |
|           |   | Distortion     |   | 0.01%~30% (20Hz~20kHz) | $U_{rel}=10\%$               |            |      |
| 71        | Telephone Analyzer                        | DC Voltage     | JJG(YD)032-1995 Tone telephone Analyzer<br>JJG(YD)021-1994 The Telephone Pulse Dial Test Set<br>JJG 124-2005 Amperemeters, Voltmeters, Wattmeters and Ohmmeters | 1V~60V                 | $U_{rel} = 0.3\%$            |            |      |
|           |   | DC Current     | 1mA~120mA   | $U_{rel} = 0.3\%$      |                              |            |      |
|           |   | AC Voltage     | 0.1V~120V   | $U_{rel}=1.0\%$        |                              |            |      |
|           |   | Time           | 1ms~99ms  | $U=0.3ms$              |                              |            |      |
|           |   | Frequency      | 10Hz~2000Hz   | $U_{rel} = 0.015\%$    |                              |            |      |
| 72        | Oscilloscope Calibrator                   | Square Voltage | JJG 278-2002 Oscilloscope Calibrator  | 0.1mV~100mV (1kHz)     | $U=0.016\% U_x+26\mu V$      |            |      |
|           |   |                |   | >100mV~1V (1kHz)       | $U=0.015\% U_x+30\mu V$      |            |      |
|           |   |                |   | >1V~10V (1kHz)         | $U=0.015\% U_x+80\mu V$      |            |      |
|           |   |                |   | >10V~100V (1kHz)       | $U=0.017\% U_x+0.68mV$       |            |      |
|           |   | DC Voltage     |   | >100V~200V (1kHz)      | $U=0.017\% U_x+0.011V$       |            |      |
|           |   |                |   | 0.1mV~100mV            | $U=0.0045\% U_x+4\mu V$      |            |      |
|           |   |                |   | >100mV~1V              | $U=0.0029\% U_x+8\mu V$      |            |      |
|           |   |                |   | >1V~10V                | $U=0.0028\% U_x+60\mu V$     |            |      |
| >10V~100V | $U=0.0045\% U_x+0.66mV$                   |                |   |                        |                              |            |      |

| No | Instrument                | Parameter   | Title, Code of Calibration Method                                     | Range  | Uncertainty ( $k=2$ )     | Limitation | Note |
|----|---------------------------|-------------|---|--|---------------------------|------------|------|
| 72 | Oscilloscope Calibrator   | DC Voltage  | JJG 278-2002 Oscilloscope Calibrator                                  | >100V~200V                                     | $U=0.0049\% U_x+0.011$ V  |            |      |
|    |                           | Time        |   | 0.5ns~5s                                       | $U_{rel}=1\times 10^{-7}$ |            |      |
| 73 | Function Generator        | Frequency   | JJG 840-1993 Function Generator                                       | 1Hz~30MHz                                      | $U_{rel}=1\times 10^{-7}$ |            |      |
|    |                           |             |   | 1mV~10mV (1kHz)                                | $U=0.06$ mV               |            |      |
|    |                           | Voltage     |   | 10mV~30mV (1kHz)                               | $U_{rel}=0.4\%$           |            |      |
|    |                           |             |   | 30mV~300V (1kHz)                               | $U_{rel}=0.3\%$           |            |      |
|    |                           |             |   | 0.1V~10V (DC~20kHz)                            | $U_{rel}=0.3\%$           |            |      |
|    |                           |             |   | 0.1V~10V (20kHz~25MHz)                         | $U_{rel}=0.9\%$           |            |      |
|    |                           | Distortion  |   | 0.1%~30% (20Hz~100kHz)                         | $U_{rel}=10\%$            |            |      |
| 74 | Sonic Belt Tension Meters | Frequency   | JJF 1216-2009 Calibration Specification for Sonic Belt Tension Meters | 10Hz~5kHz                                      | $U_{rel}=0.50\%$          |            |      |
| 75 | Network Analyzer          | Frequency   | JJF 1495-2014 Calibration Specification for Vector Network Analyzers  | 9kHz~20GHz                                     | $U_{rel}=3\times 10^{-8}$ |            |      |
|    |                           | Level       |   | -20dBm~20dBm (9kHz~20GHz)                      | $U=0.3$ dB                |            |      |
|    |                           | Attenuation |   | 0dB~70 dB (9kHz~20GHz)                         | $U=0.3$ dB                |            |      |
|    |                           | Phase       |   | -180°~+180° (9kHz~20GHz)                       | $U=1.0^\circ$             |            |      |
|    |                           | SWR         |   | 0~1 (9kHz~20GHz)                               | $U_{rel}=5\%$             |            |      |
| 76 | Modulation Meters         | AM          | JJF 1111-2003 Calibration Specification for Modulation Meters         | AM:(5~99)% (CW:150kHz~10MHz, Rates:50Hz~10kHz) | $U_{rel}=2.4\%$           |            |      |

| No  | Instrument             | Parameter | Title, Code of Calibration Method                                       | Range   | Uncertainty ( $k=2$ )            | Limitation | Note |
|---|------------------------|-----------|---|---|----------------------------------|------------|------|
| 76  | Modulation Meters      | AM        | JJF 1111-2003<br>Calibration<br>Specification for<br>Modulation Meters  | AM:(5~99)%<br>(CW:10MHz<br>~1300MHz,<br>Rates:50Hz~<br>50kHz)         | $U_{rel}= 1.3\%$                 |            |      |
|   |                        |           |   | AM:(5~99)%<br>(CW:150kHz<br>~10MHz,<br>Rates:20Hz~<br>10kHz)          | $U_{rel}= 4\%$                   |            |      |
|   |                        |           |   | AM:(5~99)%<br>(CW:10MHz<br>~1300MHz,<br>Rates:20Hz~<br>100kHz)        | $U_{rel}= 4\%$                   |            |      |
|   |                        | FM        |   | FM:(1~40)k<br>Hz<br>(CW:250kHz<br>~10MHz,<br>Rates:20Hz~<br>10kHz)    | $U_{rel}= 2.4\%$                 |            |      |
|   |                        |           |   | FM:(1~400)k<br>Hz<br>(CW:10MHz<br>~1300MHz,<br>Rates:50Hz~<br>100kHz) | $U_{rel}= 1.3\%$                 |            |      |
|   |                        | PM        |   | PM:(1~400)r<br>ad<br>(CW:150kHz<br>~10MHz,<br>Rates:200Hz<br>~10kHz)  | $U_{rel}= 5\%$                   |            |      |
| PM:(1~400)r<br>ad<br>(CW:10MHz<br>~1300MHz,<br>Rates:200Hz<br>~20kHz) | $U_{rel}= 4\%$         |           |   |   |                                  |            |      |
| 77  | Measuring<br>Receivers | Frequency | JJF 1173-2007<br>Calibration<br>Specification of<br>Measuring Receivers | 150kHz~20G<br>Hz  | $U_{rel}=3\times 10^{-7}$        |            |      |
|   |                        | Level     |   | -120dBm~20<br>dBm<br>(150kHz~20<br>GHz)                               | $U= 0.42\text{dB}~0.22\text{dB}$ |            |      |

| No | Instrument          | Parameter | Title, Code of Calibration Method                                 | Range   | Uncertainty ( $k=2$ ) | Limitation | Note |
|----|---------------------|-----------|---|---|-----------------------|------------|------|
| 77 | Measuring Receivers | AM        | JJF 1173-2007<br>Calibration Specification of Measuring Receivers | AM:(5~99)%<br>(CW:150kHz~10MHz,<br>Rates:50Hz~10kHz)      | $U_{rel}= 2.4\%$      |            |      |
|    |                     |           |   | AM:(5~99)%<br>(CW:10MHz~1300MHz,<br>Rates:50Hz~50kHz)     | $U_{rel}= 1.3\%$      |            |      |
|    |                     |           |   | AM:(5~99)%<br>(CW:150kHz~10MHz,<br>Rates:20Hz~10kHz)      | $U_{rel}= 4\%$        |            |      |
|    |                     |           |   | AM:(5~99)%<br>(CW:10MHz~1300MHz,<br>Rates:20Hz~100kHz)    | $U_{rel}= 4\%$        |            |      |
|    |                     | FM        |   | FM:(1~40)kHz<br>(CW:250kHz~10MHz,<br>Rates:20Hz~10kHz)    | $U_{rel}= 2.4\%$      |            |      |
|    |                     |           |   | FM:(1~400)kHz<br>(CW:10MHz~1300MHz,<br>Rates:50Hz~100kHz) | $U_{rel}= 1.3\%$      |            |      |
|    |                     | PM        |   | PM:(1~400)rad<br>(CW:150kHz~10MHz,<br>Rates:200Hz~10kHz)  | $U_{rel}= 5\%$        |            |      |
|    |                     |           |   | PM:(1~400)rad<br>(CW:10MHz~1300MHz,<br>Rates:200Hz~20kHz) | $U_{rel}= 4\%$        |            |      |

| No | Instrument               | Parameter                | Title, Code of Calibration Method   | Range  | Uncertainty ( $k=2$ )                       | Limitation   | Note |
|----|--------------------------|--------------------------|---|--|---|--|------|
| 78 | TV Signal Generator      | Voltage                  | JJG (Electronic) 12006-1987 V.R. of S305 Color TV Signal Generator<br>JJF 1235-2010 Calibration Specification for Television Video Signal Generator | Luminosity:<br>0.1mV~3V                              | $U_{rel}=0.6\%$                             |  |      |
|    |                          | Time                     |   | Chroma:<br>0.1mV~3V                                  | $U_{rel}=1.2\%$                             |  |      |
|    |                          | Phase                    |   | 1ns~150 $\mu$ s                                      | $U_{rel}=0.4\%$                             |  |      |
|    |                          | Frequency                |   | 0°~360°  | $U=0.6^\circ$                               |  |      |
|    |                          | Level                    |   | 48MHz~862 MHz<br>-100dBm~20 dBm<br>(48MHz~862 MHz)   | $U_{rel}=2\times 10^{-7}$<br><br>$U=0.33dB$ |  |      |
| 79 | RF Power Meters          | Power calibration factor | GJB/J 3598-1999 Verification regulation for lower power mount   | -20dBm~30dBm<br>(150kHz~20 GHz)                      | $U_{rel}= 3.5\%$                            |  |      |
|    |                          |                          |   | -70dBm~-20 dBm<br>(150kHz~20 GHz)                    | $U_{rel}= 5\%$                              |  |      |
| 80 | TV Field Strength Meter  | Level                    | JJG 1057-2010 TV Signal Field Strength Meter  | -100dBm~20 dBm<br>(48MHz~862 MHz)                    | $U=0.33dB$                                  |  |      |
| 81 | RF Communication Testers | Frequency                | JJF 1065-2000 Calibration Specification for RF Communication Test Set   | 150kHz~20GHz   | $U_{rel}=3\times 10^{-8}$                   | Calibrated only for analog modulated RF communication tester |      |
|    |                          | Level                    |   | -120dBm~30 dBm<br>(150kHz~20 GHz)                    | $U= 0.32dB\sim 0.15dB$                      |  |      |
|    |                          | AM                       |   | AM:(5~99)%<br>(CW:150kHz~10MHz,<br>Rates:50Hz~10kHz) | $U_{rel}= 2.4\%$                            |  |      |

| No | Instrument               | Parameter     | Title, Code of Calibration Method                                     | Range   | Uncertainty ( $k=2$ ) | Limitation   | Note |
|----|--------------------------|---------------|---|---|-----------------------|--|------|
| 81 | RF Communication Testers | AM            | JJF 1065-2000 Calibration Specification for RF Communication Test Set | AM:(5~99)%<br>(CW:10MHz~1300MHz,<br>Rates:50Hz~50kHz)     | $U_{rel}=1.3\%$       | Calibrated only for analog modulated RF communication tester |      |
|    |                          |               |   | AM:(5~99)%<br>(CW:150kHz~10MHz,<br>Rates:20Hz~10kHz)      | $U_{rel}=4\%$         |  |      |
|    |                          |               |   | AM:(5~99)%<br>(CW:10MHz~1300MHz,<br>Rates:20Hz~100kHz)    | $U_{rel}=4\%$         |  |      |
|    |                          | FM            |   | FM:(1~40)kHz<br>(CW:250kHz~10MHz,<br>Rates:20Hz~10kHz)    | $U_{rel}=2.4\%$       |  |      |
|    |                          |               |   | FM:(1~400)kHz<br>(CW:10MHz~1300MHz,<br>Rates:50Hz~100kHz) | $U_{rel}=1.3\%$       |  |      |
|    |                          | PM            |   | PM:(1~400)rad<br>(CW:150kHz~10MHz,<br>Rates:200Hz~10kHz)  | $U_{rel}=5\%$         |  |      |
|    |                          |               |   | PM:(1~400)rad<br>(CW:10MHz~1300MHz,<br>Rates:200Hz~20kHz) | $U_{rel}=4\%$         |  |      |
|    |                          | Audio Voltage |   | 1mV~30mV<br>(DC,10Hz~200kHz)                              | $U_{rel}=0.7\%~0.2\%$ |  |      |

| No | Instrument                       | Parameter            | Title, Code of Calibration Method  | Range                               | Uncertainty ( $k=2$ )     | Limitation   | Note |
|----|----------------------------------|----------------------|--|-------------------------------------|---------------------------|--|------|
| 81 | RF Communication Testers         | Audio Voltage        | JJF 1065-2000 Calibration Specification for RF Communication Test Set        | >30mV~300V (DC,10Hz~200kHz)         | $U_{rel}=0.15\%$          | Calibrated only for analog modulated RF communication tester |      |
|    |                                  | Audio Distortion     |  | 0.01%~100% (20Hz~100kHz)            | $U_{rel}=6\%$             |  |      |
|    |                                  | Audio Frequency      |  | 10Hz~200kHz                         | $U_{rel}=1\times 10^{-6}$ |  |      |
| 82 | Voltage Oscilloscope Probes      | DC attenuation ratio | JJF 1437-2013 Calibration Specification for Voltage Oscilloscope Probes      | 1~1000                              | $U_{rel}=0.3\%$           |  |      |
|    |                                  | Frequency response   |  | -3dB~3dB (DC,30Hz~100kHz)           | $U=0.10\text{dB}$         |  |      |
|    |                                  |                      |  | -3dB~3dB (100kHz~500MHz)            | $U=0.3\text{dB}$          |  |      |
|    |                                  | Rise time            |  | 0.7ns~100ns                         | $U_{rel}=3\%$             |  |      |
| 83 | SINAD Meters                     | Voltage              | JJF 1165-2007 Calibration Specification for SINAD Meters                     | 10mV~30V                            | $U_{rel}=0.3\%$           |  |      |
|    |                                  | SINAD                |  | (0~60) dB                           | $U=0.15\text{dB}$         |  |      |
|    |                                  | Frequency            |  | 10Hz~10kHz                          | $U_{rel}=0.03\%$          |  |      |
| 84 | Television Video Signal Analyzer | Voltage              | JJF 1455-2014 Calibration Specification for Television Video Signal Analyzer | Luminosity: 0.1mV~3V                | $U_{rel}=0.6\%$           |  |      |
|    |                                  |                      |  | Chroma: 0.1mV~3V                    | $U_{rel}=1.2\%$           |  |      |
|    |                                  | Time                 |  | 1ns~150 $\mu\text{s}$               | $U_{rel}=0.2\%$           |  |      |
|    |                                  | Phase                |  | 0°~360°                             | $U=0.6^\circ$             |  |      |
| 85 | Wave Form Monitor                | Amplitude            | JJG 120-1990 V.R.of Wave Form Monitor  | 10mV~3V                             | $U_{rel}=0.6\%$           |  |      |
|    |                                  | Time                 |  | 0.1 $\mu\text{s}$ ~10 $\mu\text{s}$ | $U_{rel}=0.6\%$           |  |      |



| No          | Instrument                                    | Parameter                 | Title, Code of Calibration Method                          | Range                                | Uncertainty ( $k=2$ )                      | Limitation | Note |
|-------------|---|---------------------------|--|--------------------------------------|--|------------|------|
| 86          | Artificial Mains Network                      | Voltage dividing factor   | JJF (Electronic) 30806-2007 Artificial Mains Network       | (0~60)dB                             | $U=0.3\text{dB}$                           |            |      |
| 五、Optical   |   |                           |  |                                      |  |            |      |
| 1           | Specular Gloss Meters                         | Glossiness                | V.R.of Specular Gloss Meters And Gloss plates JIG 696-2002 | (0~150) glossiness                   | $U=1.4$ glossiness                         |            |      |
| 2           | Laser Power Meter                             | Laser Power               | V.R.of 0.1mW~200W Laser Power Meter JIG 249-2004           | (405~780) nm<br>(0.1~150)mW          | $U_{\text{rel}}=3.1\%$                     |            |      |
| 3           | Standard light both                           | Illuminance               | C.S. of standard light both                                | (50~3000)lx                          | $U_{\text{rel}}=50\text{lx}$               |            |      |
|             |   | Color temperature         | JJF(fangzhi)055-2012                                       | (2300~9500)K                         | $U=120\text{K}$                            |            |      |
| 4           | illuminance meter (multi-function photometer) | Illuminance               | V.R.of illuminance meter JIG 245-2005                      | (5~3000) lx                          | $U_{\text{rel}}=(2.5\sim 2.0)\%$           |            |      |
| 5           | luminance meter                               | Luminance                 | V.R.of luminance meter JIG 211-2005                        | (5~1000) $\text{cd}/\text{m}^2$      | $U_{\text{rel}}=2.7\%$                     |            |      |
| 六、Chemistry |   |                           |  |                                      |  |            |      |
| 1           | pH Meter                                      | pH                        | V.R.of Laboratory pH Meters JIG 119-2005                   | (0.00~14.00)pH                       | Electronic unit:<br>$U=0.01\text{pH}$      |            |      |
|             |   |                           |  |                                      | Meter: $U=0.02\text{pH}$                   |            |      |
| 2           | Electrolyte Conductivity Meter                | Electrolytic Conductivity | V.R.of Electrolytic Conductivity Meter JIG 376-2007        | (0.05~10000) $\mu\text{S}/\text{cm}$ | Electronic unit:<br>$U_{\text{rel}}=0.3\%$ |            |      |
|             |   |                           |  |                                      | Meter:<br>$U_{\text{rel}}=0.3\%$           |            |      |
| 3           | Dust Particles Counts                         | Concentration             | C. S.for Dust Particles Counts JJF 1190-2008               | (100~10000)/2.83 L                   | $U_{\text{rel}}=14\%$                      |            |      |
| 4           | Wood moisture content measuring meter         | Concentration             | V.R.of Wood Moisture Content Measuring Meter JIG 986-2004  | (0~40)%                              | $U=1.1\%$                                  |            |      |
| 5           | Flow Cupe Viscosi-meter                       | Viscosity                 | V.R.of Flow Cupe Viscosimeter JIG 743-2005                 | (10~500) $\text{mm}^2/\text{s}$      | $U_{\text{rel}}=2.0\%$                     |            |      |

| No | Instrument   | Parameter                       | Title, Code of Calibration Method  | Range   | Uncertainty ( $k=2$ ) | Limitation | Note |
|----|--|---------------------------------|--|---|-----------------------|------------|------|
| 6  | Rotational Viscometer                                      | Viscosity                       | V.R.of Rotational Viscometers<br>JJG 1002-2005                                     | ( $1\sim 10^6$ )mPa·s                               | $U_{rel}=3.0\%$       |            |      |
| 7  | Emission Spectrometer                                      | Detection Limit                 | V.R.of Emission Spectrometer<br>JJG 768-2005                                       | ICP-AES:<br>(0.0~10.0) mg/L                         | $U_{rel}=2.6\%$       |            |      |
|    |  |                                 |  | Direct Reading Spectrometer:<br>(0.001~99.9)%       | $U_{rel}=2.6\%$       |            |      |
| 8  | Ultraviolet Visible Near Infrared Range Spectro-photometer | Wavelength                      | V.R.of Ultraviolet, Visible, Near Infrared Spectro-photometers<br>JJG 178-2007     | (195~340)nm   | $U=0.5$ nm            |            |      |
|    |  |                                 |  | (340~850)nm   | $U=0.7$ nm            |            |      |
|    |  | Transmissivity                  |  | (0~100)%  | $U=0.6\%$             |            |      |
| 9  | Ion Chromatograph  | Concentration                   | V.R.of Ion Chromatograph<br>JJG 823-2014   | Conductivity detector:<br>$\leq 0.02\mu\text{g/mL}$ | $U_{rel}=5.8\%$       |            |      |
| 10 | Automatic Potentiometric Titrator                          | mV                              | V.R.of Automatic Potentiometric Titrator<br>JJG 814-2015                           | (-900~900) mV                                       | $U_{rel}=0.06\%$      |            |      |
| 11 | Wavelength Dispersive X-Ray Fluorescence Spectrometers     | Detection limit                 | C.S. for Energy Dispersive X-Ray Fluorescence Spectrometers<br>JJF (min) 1047-2011 | Cr:<br>(9~1000)mg/kg                                | $U_{rel}=6.1\%$       |            |      |
| 12 | Liquid Chromatograph                                       | Minimum Detection Concentration | V.R.of Liquid Chromatographs<br>JJG 705-2014                                       | VWD/DAD:<br>$\leq 5\times 10^{-8}$ g/mL             | $U_{rel}=5.8\%$       |            |      |
|    |  |                                 |  | FLD:<br>$5\times 10^{-9}$ g/mL                      | $U_{rel}=5.2\%$       |            |      |
|    |  |                                 |  | RID:<br>$\leq 5\times 10^{-6}$ g/mL                 | $U_{rel}=6.6\%$       |            |      |
|    |  |                                 |  | ELSD: $\leq 5\times 10^{-6}$ g/mL                   | $U_{rel}=6.6\%$       |            |      |
| 13 | Gas Chromatograph  | Sensitivity                     | V.R.of Gas Chromatographs<br>JJG 700-1999  | TCD: >800 mV·mL/mg;                                 | $U_{rel}=4.8\%$       |            |      |

| No | Instrument                                       | Parameter             | Title, Code of Calibration Method  | Range   | Uncertainty ( $k=2$ )    | Limitation | Note |
|----|--|-----------------------|--|---|--------------------------|------------|------|
| 13 | Gas Chromatograph                                | Detection Limit       | V.R.of Gas Chromatographs JIG 700-1999                                   | FID :<br>$\leq 5 \times 10^{-10} \text{g/s}$ ;  | $U_{\text{rel}}=6.0\%$   |            |      |
|    |  |                       |  | ECD :<br>$\leq 5 \times 10^{-12} \text{g/mL}$ ; | $U_{\text{rel}}=6.2\%$   |            |      |
| 14 | liquid chromatograph-mass spectrometer           | Signal-to-Noise Ratio | C. S. for liquid chromatograph-mass spectrometer JIF 1317-2011           | ESI+: $\geq 10: 1$                              | $U_{\text{rel}}=11\%$    |            |      |
|    |  |                       |  | ESI-: $\geq 10: 1$                              | $U_{\text{rel}}=11\%$    |            |      |
|    |  |                       |  | APCI+: $\geq 10: 1$                             | $U_{\text{rel}}=11\%$    |            |      |
| 15 | Bench top gas chromatography - mass spectrometer | Signal-to-Noise Ratio | C. S. for Bench top gas chromatography - mass spectrometer JIF 1164-2006 | EI+: $\geq 10: 1$                               | $U_{\text{rel}}=7\%$     |            |      |
|    |  |                       |  | CI+: $\geq 10: 1$                               | $U_{\text{rel}}=7\%$     |            |      |
|    |  |                       |  | CI-: $\geq 10: 1$                               | $U_{\text{rel}}=7\%$     |            |      |
| 16 | Handheld saccharimeter                           | Concentration         | V.R.of Handheld saccharimeter and refractometer JIG 820-2005             | (10、30、50)%                                     | $U=2.0\%$                |            |      |
| 17 | Rotation and a rotation saccharimeter            | Polarized Light       | V.R.of Rotation and a rotation saccharimeters JIG 536-2015               | $(-45 \sim 45)^\circ$                           | $U=0.007^\circ$          |            |      |
|    |  | Saccharized Light     |  | $(-20 \sim 105)^\circ \text{Z}$                 | $U=0.014^\circ \text{Z}$ |            |      |

