机动车转向盘转向力－转向角检测仪校准规范

Calibration Specification of steering force - steering angle detector for steering wheel of motor vehicle

（试验报告）

《机动车转向盘转向力－转向角检测仪校准规范》起草小组

二零二一年八月

一．任务来源

JJF 1196-2008《机动车转向盘转向力-转向角检测仪校准规范》于2008发布，距今已12年。经过多年的实践，发现其存在较多的问题，需要进行修订。根据MTC1/SC2[2021]1号文件的要求由全国法制计量管理计量技术委员会机动车检验检测分技术委员会关于委托起草《机动车方向盘转向力-转向角检测仪校准规范〉等2项国家计量技术规范的函。由河南省计量科学研究院、江西省计量测试研究院、上海计量测试技术研究院、石家庄华燕交通科技有限公司、上海西派埃自动化仪表工程有限责任公司、山东赛格测试仪器有限公司负责《机动车方向盘转向力一转向角检测仪校准规范》制修订工作，完成日期为2022年12月。

二．试验目的

JJF《机动车转向盘转向力-转向角检测仪校准规范》国家计量技术规范参照JJF 1071-2010 《国家计量校准规范编写规则》编写，有必要进行试验以验证校准方法的可行性及有效性。

三．试验设备

1.转向参数测试仪、汽车转向盘转向力-转向角检测仪

2.标准测力仪，0.3级；砝码；标准角度仪。

3.游标卡尺

4.秒表

四．试验厂家

|  |  |
| --- | --- |
| **试验厂家编号** | **试验厂家** |
| A | 山东赛格测试仪器有限公司 |
| B | 石家庄华燕交通科技有限公司 |
| C | 淄博凯迪汽车保修设备有限公司 |
| D | 上海西派埃自动化仪表工程有限责任公司 |

五．试验项目

主要验证机动车转向盘转向力-转向角检测仪校准规范对力角仪的计量技术指标要求是否合理。

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| **A、转向参数测试仪 SG-312 SG-21013121716 山东赛格测试仪器有限公司 2021.4.26** | | | | | | | | |
|  |  | **标准值（N）** | **测量值（N）** | | | | **示值误差（%）** | **重复性（%）** |
| **转向力** | **方向** | **1** | **2** | **3** | **平均值** |
| **L** | **95.74** | **97.5** | **96.5** | **96.5** | **96.83** | **1.1** | **0.6** |
| **193.9** | **196.5** | **195** | **194.5** | **195.33** | **0.7** | **0.6** |
| **291.81** | **295.5** | **292.5** | **292.5** | **293.50** | **0.6** | **0.6** |
| **389.81** | **392.5** | **390** | **389.5** | **390.67** | **0.2** | **0.5** |
| **438.81** | **441.5** | **439** | **438** | **439.50** | **0.2** | **0.5** |
| **R** | **95.74** | **94.5** | **94.5** | **94.5** | **94.50** | **-1.3** | **0.0** |
| **193.9** | **192** | **191.5** | **191** | **191.50** | **-1.2** | **0.3** |
| **291.81** | **289.5** | **288.5** | **287.5** | **288.50** | **-1.1** | **0.4** |
| **389.81** | **386** | **385.5** | **384** | **385.17** | **-1.2** | **0.3** |
| **438.81** | **434** | **433** | **432** | **433.00** | **-1.3** | **0.3** |
| **时间（min）** | **0** | **5** | **10** | **零点漂移** |  |  |  |  |
| **示值（N）** | **0.0** | **0.0** | **0.0** | **0.0** |  |  |  |  |
| **转向角** | **方向** | **标准值（°）** | **测量值（°）** | | |  | **示值误差（°）** | **重复性（°）** |
| **1** | **2** | **3** |  |
| **L** | **-10.08** | **-10.2** | **-10.2** | **-10.1** | **-10.17** | **-0.09** | **0.06** |
| **-30.09** | **-30.3** | **-30.4** | **-30.2** | **-30.30** | **-0.21** | **0.12** |
| **-49.96** | **-50.2** | **-50.4** | **-50.2** | **-50.27** | **-0.31** | **0.12** |
| **-180** | **-179.9** | **-180.5** | **-180.3** | **-180.23** | **-0.23** | **0.36** |
| **-720** | **-718.9** | **-719** | **-718.8** | **-718.90** | **1.10** | **0.12** |
|  |  |  |  |  |  | **0.00** |
| **R** | **10.08** | **9.8** | **9.9** | **9.9** | **9.87** | **-0.21** | **0.06** |
| **30.09** | **29.7** | **29.6** | **29.6** | **29.63** | **-0.46** | **0.06** |
| **49.96** | **49.3** | **49.4** | **49.6** | **49.43** | **-0.53** | **0.18** |
| **180** | **178.5** | **178.5** | **178.7** | **178.57** | **-1.43** | **0.12** |
| **720** | **718.6** | **718.7** | **718.3** | **718.53** | **-1.47** | **0.24** |
|  |  |  |  |  |  |  |
| **时间（min）** | **0** | **5** | **10** | **零点漂移** |  |  |  |  |
| **示值（°）** | **0.0** | **0.0** | **-0.1** | **-0.1** |  |  |  |  |

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| **A、转向参数测试仪 SG-312 SG-21013121717 山东赛格测试仪器有限公司 2021.4.26** | | | | | | | | |
|  |  | **标准值（N）** | **测量值（N）** | | | | **示值误差（%）** | **重复性（%）** |
| **转向力** | **方向** | **1** | **2** | **3** | **平均值** |
| **L** | **95.74** | **96** | **96.5** | **96** | **96.17** | **0.4** | **0.3** |
| **193.9** | **194** | **195** | **193.5** | **194.17** | **0.1** | **0.5** |
| **291.81** | **293** | **292** | **291.5** | **292.17** | **0.1** | **0.3** |
| **389.81** | **391** | **390** | **389.5** | **390.17** | **0.1** | **0.2** |
| **438.81** | **439.5** | **439** | **438** | **438.83** | **0.0** | **0.2** |
| **R** | **95.74** | **95.5** | **94.5** | **95.5** | **95.17** | **-0.6** | **0.6** |
| **193.9** | **193.5** | **191** | **193** | **192.50** | **-0.7** | **0.8** |
| **291.81** | **289.5** | **290** | **290** | **289.83** | **-0.7** | **0.1** |
| **389.81** | **384.5** | **387.5** | **387** | **386.33** | **-0.9** | **0.5** |
| **438.81** | **431.5** | **436** | **436** | **434.50** | **-1.0** | **0.6** |
| **时间（min）** | **0** | **5** | **10** | **零点漂移** |  |  |  |  |
| **示值（N）** | **0.0** | **0.0** | **0.0** | **0.0** |  |  |  |  |
| **转向角** | **方向** | **标准值（°）** | **测量值（°）** | | |  | **示值误差（°）** | **重复性（°）** |
| **1** | **2** | **3** |  |
| **L** | **-10.08** | **-10.3** | **-9.9** | **-10** | **-10.07** | **0.01** | **0.24** |
| **-29.95** | **-30.4** | **-29.9** | **-29.8** | **-30.03** | **-0.08** | **0.36** |
| **-49.96** | **-50.6** | **-50** | **-50.1** | **-50.23** | **-0.27** | **0.36** |
| **-180.14** | **-180.9** | **-180.1** | **-180.5** | **-180.50** | **-0.36** | **0.47** |
| **-720.14** | **-719.9** | **-719.2** | **-719.8** | **-719.63** | **0.51** | **0.41** |
| **-1080.14** | **-1079.9** | **-1078.9** | **-1079.6** | **-1079.47** | **0.67** | **0.59** |
| **R** | **9.93** | **10** | **9.8** | **9.6** | **9.80** | **-0.13** | **0.24** |
| **30.09** | **30.1** | **29.9** | **29.6** | **29.87** | **-0.22** | **0.30** |
| **50.11** | **50** | **49.7** | **49.4** | **49.70** | **-0.41** | **0.36** |
| **180.14** | **179.3** | **178.9** | **178.4** | **178.87** | **-1.27** | **0.53** |
| **720** | **719.5** | **718.8** | **720.14** | **719.48** | **-0.52** | **0.79** |
| **1080** | **1079.3** | **1078.4** | **1078.5** | **1078.73** | **-1.27** | **0.53** |
| **时间（min）** | **0** | **5** | **10** | **零点漂移** |  |  |  |  |
| **示值（°）** | **0.0** | **0.0** | **0.0** | **0.0** |  |  |  |  |

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| **A、转向参数测试仪 SG-312 SG-21013121715 山东赛格测试仪器有限公司 2021.4.26** | | | | | | | | |
|  |  | **标准值（N）** | **测量值（N）** | | | | **示值误差（%）** | **重复性（%）** |
| **转向力** | **方向** | **1** | **2** | **3** | **平均值** |
| **L** | **95.74** | **96** | **96.5** | **96** | **96.17** | **0.4** | **0.3** |
| **193.9** | **194** | **195** | **195.5** | **194.83** | **0.5** | **0.5** |
| **291.81** | **293** | **293.5** | **291.5** | **292.67** | **0.3** | **0.4** |
| **389.81** | **391** | **390.5** | **388.5** | **390.00** | **0.0** | **0.4** |
| **438.81** | **438.5** | **439.5** | **436.5** | **438.17** | **-0.1** | **0.4** |
| **R** | **95.74** | **95** | **96.5** | **95.5** | **95.67** | **-0.1** | **0.9** |
| **193.9** | **194.5** | **195** | **193** | **194.17** | **0.1** | **0.6** |
| **291.81** | **293** | **291.5** | **290** | **291.50** | **-0.1** | **0.6** |
| **389.81** | **390** | **389** | **387** | **388.67** | **-0.3** | **0.5** |
| **438.81** | **438** | **437** | **435** | **436.67** | **-0.5** | **0.4** |
| **时间（min）** | **0** | **5** | **10** | **零点漂移** |  |  |  |  |
| **示值（N）** | **0.0** | **0.0** | **0.0** | **0.0** |  |  |  |  |
| **转向角** | **方向** | **标准值（°）** | **测量值（°）** | | |  | **示值误差（°）** | **重复性（°）** |
| **1** | **2** | **3** |  |
| **L** | **-10.22** | **-10.4** | **-10.2** | **-10.1** | **-10.23** | **-0.01** | **0.18** |
| **-30.09** | **-30.2** | **-30** | **-30.1** | **-30.10** | **-0.01** | **0.12** |
| **-49.96** | **-50.4** | **-50.5** | **-50.1** | **-50.33** | **-0.37** | **0.24** |
| **-179.85** | **-180.5** | **-180.7** | **-180.2** | **-180.47** | **-0.62** | **0.30** |
| **-720.14** | **-719.7** | **-720** | **-720.14** | **-719.95** | **0.19** | **0.26** |
| **/** | **/** | **/** | **/** |  |  | **0.00** |
| **R** | **10.08** | **9.9** | **10.3** | **10.3** | **10.17** | **0.09** | **0.24** |
| **30.09** | **29.6** | **30.3** | **30** | **29.97** | **-0.12** | **0.41** |
| **49.96** | **49.2** | **49.7** | **49.8** | **49.57** | **-0.39** | **0.36** |
| **180** | **178.1** | **178.9** | **179.1** | **178.70** | **-1.30** | **0.59** |
| **720** | **718.5** | **719.3** | **719.8** | **719.20** | **-0.80** | **0.77** |
| **/** | **/** | **/** | **/** |  |  | **0.00** |
| **时间（min）** | **0** | **5** | **10** | **零点漂移** |  |  |  |  |
| **示值（°）** | **0.0** | **0.0** | **0.0** | **0.0** |  |  |  |  |

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| **A、转向参数测试仪 SG-330 SG-21013301693 山东赛格测试仪器有限公司 2021.4.26** | | | | | | | | |
|  |  | **标准值（N）** | **测量值（N）** | | | | **示值误差（%）** | **重复性（%）** |
| **转向力** | **方向** | **1** | **2** | **3** | **平均值** |
| **L** | **95.74** | **96** | **96** | **96** | **96.00** | **0.3** | **0.0** |
| **193.9** | **195** | **195** | **195** | **195.00** | **0.6** | **0.0** |
| **291.81** | **292** | **292** | **293** | **292.33** | **0.2** | **0.2** |
| **389.81** | **391** | **391** | **391** | **391.00** | **0.3** | **0.0** |
| **438.81** | **/** | **/** | **/** |  |  |  |
| **R** | **95.74** | **96** | **96** | **96** | **96.00** | **0.3** | **0.0** |
| **193.9** | **195** | **195** | **195** | **195.00** | **0.6** | **0.0** |
| **291.81** | **293** | **293** | **293** | **293.00** | **0.4** | **0.0** |
| **389.81** | **392** | **391** | **391** | **391.33** | **0.4** | **0.2** |
| **438.81** | **/** | **/** | **/** |  |  |  |
| **时间（min）** | **0** | **5** | **10** | **零点漂移** |  |  |  |  |
| **示值（N）** | **0.0** | **0.0** | **0.0** | **0.0** |  |  |  |  |
| **转向角** | **方向** | **标准值（°）** | **测量值（°）** | | |  | **示值误差（°）** | **重复性（°）** |
| **1** | **2** | **3** |  |
| **L** | **-10.08** | **-10** | **-10** | **-10** | **-10.00** | **0.08** | **0.00** |
| **-30.09** | **-30** | **-30** | **-30** | **-30.00** | **0.09** | **0.00** |
| **-49.96** | **-50** | **-49** | **-49** | **-49.33** | **0.63** | **0.59** |
| **-180** | **-180** | **-180** | **-179** | **-179.67** | **0.33** | **0.59** |
| **-720** | **-720** | **-719** | **-719** | **-719.33** | **0.67** | **0.59** |
|  |  |  |  |  |  |  |
| **R** | **10.08** | **10** | **10** | **10** | **10.00** | **-0.08** | **0.00** |
| **30.09** | **30** | **29** | **29** | **29.33** | **-0.76** | **0.59** |
| **49.96** | **50** | **49** | **49** | **49.33** | **-0.63** | **0.59** |
| **180** | **179** | **178** | **178** | **178.33** | **-1.67** | **0.59** |
| **720** | **719** | **720** | **719** | **719.33** | **-0.67** | **0.59** |
|  |  |  |  |  |  |  |
| **时间（min）** | **0** | **5** | **10** | **零点漂移** |  |  |  |  |
| **示值（°）** | **0.0** | **0.0** | **0.0** | **0.0** |  |  |  |  |

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| **A、转向参数测试仪 SG-330 SG-21013301694 山东赛格测试仪器有限公司 2021.4.26** | | | | | | | | |
|  |  | **标准值（N）** | **测量值（N）** | | | | **示值误差（%）** | **重复性（%）** |
| **转向力** | **方向** | **1** | **2** | **3** | **平均值** |
| **L** | **95.74** | **96** | **96** | **96** | **96.00** | **0.3** | **0.0** |
| **193.9** | **194** | **194** | **194** | **194.00** | **0.1** | **0.0** |
| **291.81** | **292** | **291** | **293** | **292.00** | **0.1** | **0.4** |
| **389.81** | **389** | **389** | **389** | **389.00** | **-0.2** | **0.0** |
| **438.81** | **/** | **/** | **/** |  |  |  |
| **R** | **95.74** | **96** | **96** | **96** | **96.00** | **0.3** | **0.0** |
| **193.9** | **194** | **194** | **195** | **194.33** | **0.2** | **0.3** |
| **291.81** | **291** | **293** | **292** | **292.00** | **0.1** | **0.4** |
| **389.81** | **388** | **390** | **389** | **389.00** | **-0.2** | **0.3** |
| **438.81** | **/** | **/** | **/** |  |  |  |
| **时间（min）** | **0** | **5** | **10** | **零点漂移** |  |  |  |  |
| **示值（N）** | **0.0** | **0.0** | **0.0** | **0.0** |  |  |  |  |
| **转向角** | **方向** | **标准值（°）** | **测量值（°）** | | |  | **示值误差（°）** | **重复性（°）** |
| **1** | **2** | **3** |  |
| **L** | **-10.08** | **-10** | **-10** | **-11** | **-10.33** | **-0.25** | **0.59** |
| **-30.09** | **-30** | **-30** | **-30** | **-30.00** | **0.09** | **0.00** |
| **-49.96** | **-50** | **-49** | **-49** | **-49.33** | **0.63** | **0.59** |
| **-180** | **-180** | **-180** | **-181** | **-180.33** | **-0.33** | **0.59** |
| **-720** | **-720** | **-719** | **-719** | **-719.33** | **0.67** | **0.59** |
|  |  |  |  |  |  |  |
| **R** | **10.08** | **10** | **10** | **9** | **9.67** | **-0.41** | **0.59** |
| **30.09** | **30** | **30** | **29** | **29.67** | **-0.42** | **0.59** |
| **49.96** | **50** | **50** | **49** | **49.67** | **-0.29** | **0.59** |
| **180** | **179** | **179** | **179** | **179.00** | **-1.00** | **0.00** |
| **720** | **719** | **720** | **720** | **719.67** | **-0.33** | **0.59** |
|  |  |  |  |  |  |  |
| **时间（min）** | **0** | **5** | **10** | **零点漂移** |  |  |  |  |
| **示值（°）** | **0.0** | **0.0** | **0.0** | **0.0** |  |  |  |  |

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| **A、转向参数测试仪 SG-330 SG-21013301691 山东赛格测试仪器有限公司 2021.4.26** | | | | | | | | |
|  |  | **标准值（N）** | **测量值（N）** | | | | **示值误差（%）** | **重复性（%）** |
| **转向力** | **方向** | **1** | **2** | **3** | **平均值** |
| **L** | **95.74** | **96** | **96** | **96** | **96.00** | **0.3** | **0.0** |
| **193.9** | **195** | **195** | **195** | **195.00** | **0.6** | **0.0** |
| **291.81** | **293** | **293** | **293** | **293.00** | **0.4** | **0.0** |
| **389.81** | **391** | **391** | **391** | **391.00** | **0.3** | **0.0** |
| **438.81** | **/** | **/** | **/** |  |  |  |
| **R** | **95.74** | **96** | **96** | **96** | **96.00** | **0.3** | **0.0** |
| **193.9** | **194** | **195** | **195** | **194.67** | **0.4** | **0.3** |
| **291.81** | **293** | **293** | **293** | **293.00** | **0.4** | **0.0** |
| **389.81** | **391** | **391** | **391** | **391.00** | **0.3** | **0.0** |
| **438.81** | **/** | **/** | **/** |  |  |  |
| **时间（min）** | **0** | **5** | **10** | **零点漂移** |  |  |  |  |
| **示值（N）** | **0.0** | **0.0** | **0.0** | **0.0** |  |  |  |  |
| **转向角** | **方向** | **标准值（°）** | **测量值（°）** | | |  | **示值误差（°）** | **重复性（°）** |
| **1** | **2** | **3** |  |
| **L** | **-10.08** | **-10** | **-10** | **-11** | **-10.33** | **-0.25** | **0.59** |
| **-30.09** | **-30** | **-31** | **-30** | **-30.33** | **-0.24** | **0.59** |
| **-49.96** | **-50** | **-50** | **-50** | **-50.00** | **-0.04** | **0.00** |
| **-180** | **-180** | **-181** | **-181** | **-180.67** | **-0.67** | **0.59** |
| **-720** | **-720** | **-720** | **-719** | **-719.67** | **0.33** | **0.59** |
|  |  |  |  |  |  | **0.00** |
| **R** | **10.08** | **10** | **10** | **11** | **10.33** | **0.25** | **0.59** |
| **30.09** | **30** | **30** | **29** | **29.67** | **-0.42** | **0.59** |
| **49.96** | **50** | **49** | **49** | **49.33** | **-0.63** | **0.59** |
| **180** | **179** | **179** | **179** | **179.00** | **-1.00** | **0.00** |
| **720** | **720** | **720** | **720** | **720.00** | **0.00** | **0.00** |
|  |  |  |  |  |  |  |
| **时间（min）** | **0** | **5** | **10** | **零点漂移** |  |  |  |  |
| **示值（°）** | **0.0** | **0.0** | **0.0** | **0.0** |  |  |  |  |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **B、汽车转向盘转向力-转向角检测仪 HZLJ-B1 398 石家庄华燕交通科技有限公司 2021.6.17**  **（方向盘直径：400mm）** | | | | | | | | |
|  |  | **标准值（Nm）** | **测量值（Nm）** | | | | **示值误差（%）** | **重复性（%）** |
| **转向力** | **方向** | **1** | **2** | **3** | **平均值** |
| **L** | **24.5** | **24.4** | **24.4** | **24.4** | **24.40** | **-0.4** | **0.0** |
| **49** | **49** | **49** | **49** | **49.00** | **0.0** | **0.0** |
| **73.5** | **73.4** | **73.4** | **73.4** | **73.40** | **-0.1** | **0.0** |
| **98** | **98** | **98** | **98** | **98.00** | **0.0** | **0.0** |
|  | **/** | **/** | **/** |  |  |  |
| **R** | **24.5** | **24.5** | **24.4** | **24.4** | **24.43** | **-0.3** | **0.2** |
| **49** | **49** | **49** | **49** | **49.00** | **0.0** | **0.0** |
| **73.5** | **73.4** | **73.4** | **73.4** | **73.40** | **-0.1** | **0.0** |
| **98** | **97.8** | **97.8** | **97.8** | **97.80** | **-0.2** | **0.0** |
|  | **/** | **/** | **/** |  |  |  |
| **时间（min）** | **0** | **5** | **10** | **零点漂移** |  |  |  |  |
| **示值（N）** | **0.0** | **0.0** | **0.0** | **0.0** |  |  |  |  |
| **转向角** | **方向** | **标准值（°）** | **测量值（°）** | | |  | **示值误差（°）** | **重复性（°）** |
| **1** | **2** | **3** |  |
| **L** | **-10** | **-9.97** | **-9.98** | **-9.99** | **-9.98** | **0.02** | **0.01** |
| **-30** | **-30.05** | **-30.01** | **-30.03** | **-30.03** | **-0.03** | **0.02** |
| **-50** | **-50.38** | **-50.29** | **-50.38** | **-50.35** | **-0.35** | **0.05** |
| **-180** | **-181.4** | **-180.9** | **-180.8** | **-181.03** | **-1.03** | **0.36** |
| **-720** | **-719.65** | **-719.65** | **-719.6** | **-719.63** | **0.37** | **0.03** |
| **-1080** | **-1080.1** | **-1080** | **-1080** | **-1080.05** | **-0.05** | **0.05** |
| **R** | **10** | **9.65** | **9.68** | **9.65** | **9.66** | **-0.34** | **0.02** |
| **30** | **29.49** | **29.44** | **29.47** | **29.47** | **-0.53** | **0.03** |
| **50** | **49.12** | **49.15** | **49.08** | **49.12** | **-0.88** | **0.04** |
| **180** | **178.9** | **178.9** | **179.2** | **179.00** | **-1.00** | **0.18** |
| **720** | **719.68** | **719.74** | **719.68** | **719.70** | **-0.30** | **0.04** |
| **1080** | **1079.62** | **1079.59** | **1079.48** | **1079.56** | **-0.44** | **0.08** |
| **时间（min）** | **0** | **5** | **10** | **零点漂移** |  |  |  |  |
| **示值（°）** | **0.0** | **0.0** | **0.0** | **0.0** |  |  |  |  |

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| **B、汽车转向盘转向力-转向角检测仪 HZLJ-B1 397 石家庄华燕交通科技有限公司 2021.6.17**  **（方向盘直径：400mm）** | | | | | | | | |
|  |  | **标准值（Nm）** | **测量值（Nm）** | | | | **示值误差（%）** | **重复性（%）** |
| **转向力** | **方向** | **1** | **2** | **3** | **平均值** |
| **L** | **24.5** | **24.5** | **24.5** | **24.5** | **24.50** | **0.0** | **0.0** |
| **49** | **49** | **49** | **49** | **49.00** | **0.0** | **0.0** |
| **73.5** | **73.5** | **73.5** | **73.5** | **73.50** | **0.0** | **0.0** |
| **98** | **97.9** | **97.9** | **97.9** | **97.90** | **-0.1** | **0.0** |
|  | **/** | **/** | **/** |  |  |  |
| **R** | **24.5** | **24.5** | **24.5** | **24.5** | **24.50** | **0.0** | **0.0** |
| **49** | **49** | **49** | **49** | **49.00** | **0.0** | **0.0** |
| **73.5** | **73.4** | **73.4** | **73.4** | **73.40** | **-0.1** | **0.0** |
| **98** | **97.8** | **97.8** | **97.8** | **97.80** | **-0.2** | **0.0** |
|  | **/** | **/** | **/** |  |  |  |
| **时间（min）** | **0** | **5** | **10** | **零点漂移** |  |  |  |  |
| **示值（N）** | **0.0** | **0.0** | **0.0** | **0.0** |  |  |  |  |
| **转向角** | **方向** | **标准值（°）** | **测量值（°）** | | |  | **示值误差（°）** | **重复性（°）** |
| **1** | **2** | **3** |  |
| **L** | **-10** | **-9.99** | **-9.99** | **-9.99** | **-9.99** | **0.01** | **0.00** |
| **-30** | **-30.04** | **-30.01** | **-30.01** | **-30.02** | **-0.02** | **0.02** |
| **-50** | **-49.98** | **-49.99** | **-49.97** | **-49.98** | **0.02** | **0.01** |
| **-180** | **-179.96** | **-179.95** | **-179.98** | **-179.96** | **0.04** | **0.02** |
| **-720** | **-719.96** | **-719.89** | **-719.69** | **-719.85** | **0.15** | **0.16** |
| **-1080** | **-1080.1** | **-1080.2** | **-1080.2** | **-1080.16** | **-0.16** | **0.06** |
| **R** | **10** | **9.75** | **9.78** | **9.75** | **9.76** | **-0.24** | **0.02** |
| **30** | **29.47** | **29.44** | **29.42** | **29.44** | **-0.56** | **0.03** |
| **50** | **49.24** | **49.14** | **49.21** | **49.20** | **-0.80** | **0.06** |
| **180** | **180.56** | **180.44** | **180.56** | **180.52** | **0.52** | **0.07** |
| **720** | **719.58** | **719.64** | **719.52** | **719.58** | **-0.42** | **0.07** |
| **1080** | **1079.42** | **1079.59** | **1079.38** | **1079.46** | **-0.54** | **0.12** |
| **时间（min）** | **0** | **5** | **10** | **零点漂移** |  |  |  |  |
| **示值（°）** | **0.0** | **0.0** | **0.0** | **0.0** |  |  |  |  |

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| **B、汽车转向盘转向力-转向角检测仪 HZLJ-B1 373 石家庄华燕交通科技有限公司 2021.6.17**  **（方向盘直径：400mm）** | | | | | | | | |
|  |  | **标准值（Nm）** | **测量值（Nm）** | | | | **示值误差（%）** | **重复性（%）** |
| **转向力** | **方向** | **1** | **2** | **3** | **平均值** |
| **L** | **24.5** | **24.4** | **24.4** | **24.4** | **24.40** | **-0.4** | **0.0** |
| **49** | **49.1** | **49** | **49.1** | **49.07** | **0.1** | **0.1** |
| **73.5** | **73.5** | **73.5** | **73.5** | **73.50** | **0.0** | **0.0** |
| **98** | **98** | **98** | **98** | **98.00** | **0.0** | **0.0** |
|  | **/** | **/** | **/** |  |  |  |
| **R** | **24.5** | **24.5** | **24.5** | **24.5** | **24.50** | **0.0** | **0.0** |
| **49** | **49** | **49** | **49** | **49.00** | **0.0** | **0.0** |
| **73.5** | **73.4** | **73.4** | **73.4** | **73.40** | **-0.1** | **0.0** |
| **98** | **97.8** | **97.8** | **97.8** | **97.80** | **-0.2** | **0.0** |
|  | **/** | **/** | **/** |  |  |  |
| **时间（min）** | **0** | **5** | **10** | **零点漂移** |  |  |  |  |
| **示值（N）** | **0.0** | **0.0** | **0.0** | **0.0** |  |  |  |  |
| **转向角** | **方向** | **标准值（°）** | **测量值（°）** | | |  | **示值误差（°）** | **重复性（°）** |
| **1** | **2** | **3** |  |
| **L** | **-10** | **-10.27** | **-10.2** | **-10.12** | **-10.20** | **-0.20** | **0.09** |
| **-30** | **-30.56** | **-30.45** | **-30.46** | **-30.49** | **-0.49** | **0.07** |
| **-50** | **-50.62** | **-50.42** | **-50.5** | **-50.51333** | **-0.51** | **0.12** |
| **-180** | **-180.96** | **-180.85** | **-180.76** | **-180.8567** | **-0.86** | **0.12** |
| **-720** | **-719.86** | **-719.98** | **-719.95** | **-719.93** | **0.07** | **0.07** |
| **-1080** | **-1079.8** | **-1079.9** | **-1079.9** | **-1079.85** | **0.15** | **0.04** |
| **R** | **10** | **9.95** | **9.94** | **9.98** | **9.9566667** | **-0.04** | **0.02** |
| **30** | **30.29** | **30.24** | **30.21** | **30.246667** | **0.25** | **0.05** |
| **50** | **50.56** | **50.42** | **50.51** | **50.496667** | **0.50** | **0.08** |
| **180** | **181.59** | **181.69** | **181.49** | **181.59** | **1.59** | **0.12** |
| **720** | **719.88** | **719.97** | **719.98** | **719.94333** | **-0.06** | **0.06** |
| **1080** | **1079.82** | **1079.89** | **1079.88** | **1079.86** | **-0.14** | **0.04** |
| **时间（min）** | **0** | **5** | **10** | **零点漂移** |  |  |  |  |
| **示值（°）** | **0.0** | **0.0** | **0.0** | **0.0** |  |  |  |  |

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| **C、转向参数测试仪 ZC-2A 20190826 淄博凯迪 2021.5.13 （方向盘直径：400mm）** | | | | | | | | |
|  |  | **标准值（Nm）** | **测量值（Nm）** | | | | **示值误差（%）** | **重复性（%）** |
| **转向力** | **方向** | **1** | **2** | **3** | **平均值** |
| **L** | **20** | **19.7** | **19.9** | **20.1** | **19.90** | **-0.5** | **1.2** |
| **40** | **39.7** | **40** | **40.1** | **39.93** | **-0.2** | **0.6** |
| **60** | **59.6** | **59.7** | **59.8** | **59.70** | **-0.5** | **0.2** |
| **80** | **79.5** | **79.5** | **79.7** | **79.57** | **-0.5** | **0.1** |
| **100** | **99.2** | **99.2** | **99.5** | **99.30** | **-0.7** | **0.2** |
| **R** | **20** | **19.9** | **19.9** | **19.8** | **19.87** | **-0.7** | **0.3** |
| **40** | **40** | **39.6** | **39.7** | **39.77** | **-0.6** | **0.6** |
| **60** | **59.8** | **59.5** | **59.6** | **59.63** | **-0.6** | **0.3** |
| **80** | **79.6** | **79.3** | **79.3** | **79.40** | **-0.8** | **0.2** |
| **100** | **99..2** | **99.1** | **99.2** | **99.15** | **-0.8** | **0.1** |
| **时间（min）** | **0** | **5** | **10** | **零点漂移** |  |  |  |  |
| **示值（N）** | **0.0** | **0.0** | **0.0** | **0.0** |  |  |  |  |
| **转向角** | **方向** | **标准值（°）** | **测量值（°）** | | |  | **示值误差（°）** | **重复性（°）** |
| **1** | **2** | **3** |  |
| **L** | **-10** | **-10** | **-9** | **-10** | **-9.67** | **0.3** | **0.59** |
| **-30** | **-30** | **-30** | **-30** | **-30.00** | **0.0** | **0.00** |
| **-50** | **-50** | **-50** | **-50** | **-50.00** | **0.0** | **0.00** |
| **/** |  |  |  |  |  |  |
| **/** |  |  |  |  |  |  |
|  |  |  |  |  |  | **0.00** |
| **R** | **10** | **9** | **9** | **9** | **9.00** | **-1.0** | **0.00** |
| **30** | **29** | **29** | **29** | **29.00** | **-1.0** | **0.00** |
| **50** | **49** | **49** | **49** | **49.00** | **-1.0** | **0.00** |
| **/** |  |  |  |  |  |  |
| **/** |  |  |  |  |  |  |
|  |  |  |  |  |  |  |
| **时间（min）** | **0** | **5** | **10** | **零点漂移** |  |  |  |  |
| **示值（°）** | **0.0** | **0.0** | **0.0** | **0.0** |  |  |  |  |

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| **D、汽车转向盘转向力-转向角检测仪 SAF-01 21121 生产厂家：上海西派埃 2021.8.03** | | | | | | | | |
|  |  | **标准值（N）** | **测量值（N）** | | | | **示值误差（%）** | **重复性（%）** |
| **转向力** | **方向** | **1** | **2** | **3** | **平均值** |
| **L** | **100** | **100** | **100** | **100** | **100.00** | **0.0** | **0.0** |
| **200** | **201** | **200** | **200** | **200.33** | **0.2** | **0.3** |
| **300** | **299** | **299** | **300** | **299.33** | **-0.2** | **0.2** |
| **400** | **400** | **400** | **399** | **399.67** | **-0.1** | **0.1** |
| **500** | **501** | **500** | **499** | **500.00** | **0.0** | **0.2** |
| **R** | **100** | **100** | **100** | **100** | **100.00** | **0.0** | **0.0** |
| **200** | **200** | **200** | **201** | **200.33** | **0.2** | **0.3** |
| **300** | **299** | **300** | **299** | **299.33** | **-0.2** | **0.2** |
| **400** | **398** | **400** | **398** | **398.67** | **-0.3** | **0.3** |
| **500** | **498** | **499** | **498** | **498.33** | **-0.3** | **0.1** |
| **时间（min）** | **0** | **5** | **10** | **零点漂移** |  |  |  |  |
| **示值（N）** | **0.0** | **0.0** | **0.0** | **0.0** |  |  |  |  |
| **转向角** | **方向** | **标准值（°）** | **测量值（°）** | | |  | **示值误差（°）** | **重复性（°）** |
| **1** | **2** | **3** |  |
| **L** | **-10** | **-10** | **-10** | **-10** | **-10.00** | **0.00** | **0.00** |
| **-30** | **-30** | **-30** | **-30** | **-30** | **0.00** | **0.00** |
| **-50** | **-50** | **-50** | **-50** | **-50** | **0.00** | **0.00** |
| **-180** | **-180** | **-180** | **-180** | **-180** | **0.00** | **0.00** |
| **-720** | **-720** | **-720** | **-720** | **-720** | **0.00** | **0.00** |
| **-1080** | **-1080** | **-1080** | **-1079** | **-1079.67** | **0.33** | **0.59** |
| **R** | **10** | **10** | **10** | **10** | **10** | **0.00** | **0.00** |
| **30** | **30** | **30** | **30** | **30** | **0.00** | **0.00** |
| **50** | **50** | **50** | **50** | **50** | **0.00** | **0.00** |
| **180** | **180** | **180** | **180** | **180** | **0.00** | **0.00** |
| **720** | **720** | **721** | **719** | **720** | **0.00** | **1.18** |
| **1080** | **1080** | **1081** | **1079** | **1080.00** | **0.00** | **1.18** |
| **时间（min）** | **0** | **5** | **10** | **零点漂移** |  |  |  |  |
| **示值（°）** | **0.0** | **0.0** | **0.0** | **0.0** |  |  |  |  |

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| **D、汽车转向盘转向力-转向角检测仪 SAF-01 21122 生产厂家：上海西派埃 2021.8.03** | | | | | | | | |
|  |  | **标准值（N）** | **测量值（N）** | | | | **示值误差（%）** | **重复性（%）** |
| **转向力** | **方向** | **1** | **2** | **3** | **平均值** |
| **L** | **100** | **100** | **100** | **100** | **100.00** | **0.0** | **0.0** |
| **200** | **201** | **201** | **201** | **201.00** | **0.5** | **0.0** |
| **300** | **300** | **301** | **301** | **300.67** | **0.2** | **0.2** |
| **400** | **401** | **401** | **401** | **401.00** | **0.3** | **0.0** |
| **500** | **501** | **502** | **501** | **501.33** | **0.3** | **0.1** |
| **R** | **100** | **100** | **100** | **100** | **100.00** | **0.0** | **0.0** |
| **200** | **200** | **200** | **201** | **200.33** | **0.2** | **0.3** |
| **300** | **299** | **300** | **300** | **299.67** | **-0.1** | **0.2** |
| **400** | **400** | **400** | **401** | **400.33** | **0.1** | **0.1** |
| **500** | **500** | **500** | **501** | **500.33** | **0.1** | **0.1** |
| **时间（min）** | **0** | **5** | **10** | **零点漂移** |  |  |  |  |
| **示值（N）** | **0.0** | **0.0** | **0.0** | **0.0** |  |  |  |  |
| **转向角** | **方向** | **标准值（°）** | **测量值（°）** | | |  | **示值误差（°）** | **重复性（°）** |
| **1** | **2** | **3** |  |
| **L** | **-10** | **-10** | **-10** | **-10** | **-10.00** | **0.00** | **0.00** |
| **-30** | **-30** | **-30** | **-30** | **-30** | **0.00** | **0.00** |
| **-50** | **-50** | **-50** | **-50** | **-50** | **0.00** | **0.00** |
| **-180** | **-180** | **-180** | **-180** | **-180** | **0.00** | **0.00** |
| **-720** | **-721** | **-721** | **-720** | **-720.67** | **-0.67** | **0.59** |
| **-1080** | **-1081** | **-1081** | **-1080** | **-1080.67** | **-0.67** | **0.59** |
| **R** | **10** | **10** | **10** | **10** | **10** | **0.00** | **0.00** |
| **30** | **30** | **30** | **30** | **30** | **0.00** | **0.00** |
| **50** | **50** | **50** | **50** | **50** | **0.00** | **0.00** |
| **180** | **180** | **180** | **180** | **180** | **0.00** | **0.00** |
| **720** | **721** | **720** | **720** | **720.33** | **0.33** | **0.59** |
| **1080** | **1082** | **1081** | **1081** | **1081.33** | **1.33** | **0.59** |
| **时间（min）** | **0** | **5** | **10** | **零点漂移** |  |  |  |  |
| **示值（°）** | **0.0** | **0.0** | **0.0** | **0.0** |  |  |  |  |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **D、汽车转向盘转向力-转向角检测仪 SAF-01 21123 生产厂家：上海西派埃 2021.8.03** | | | | | | | | |
|  |  | **标准值（N）** | **测量值（N）** | | | | **示值误差（%）** | **重复性（%）** |
| **转向力** | **方向** | **1** | **2** | **3** | **平均值** |
| **L** | **100** | **100** | **100** | **100** | **100.00** | **0.0** | **0.0** |
| **200** | **199** | **200** | **200** | **199.67** | **-0.2** | **0.3** |
| **300** | **300** | **301** | **301** | **300.67** | **0.2** | **0.2** |
| **400** | **398** | **400** | **400** | **399.33** | **-0.2** | **0.3** |
| **500** | **498** | **499** | **499** | **498.67** | **-0.3** | **0.1** |
| **R** | **100** | **99** | **100** | **100** | **99.67** | **-0.3** | **0.6** |
| **200** | **199** | **199** | **199** | **199.00** | **-0.5** | **0.0** |
| **300** | **300** | **299** | **299** | **299.33** | **-0.2** | **0.2** |
| **400** | **401** | **400** | **400** | **400.33** | **0.1** | **0.1** |
| **500** | **502** | **501** | **500** | **501.00** | **0.2** | **0.2** |
| **时间（min）** | **0** | **5** | **10** | **零点漂移** |  |  |  |  |
| **示值（N）** | **0.0** | **0.0** | **0.0** | **0.0** |  |  |  |  |
| **转向角** | **方向** | **标准值（°）** | **测量值（°）** | | |  | **示值误差（°）** | **重复性（°）** |
| **1** | **2** | **3** |  |
| **L** | **-10** | **-10** | **-10** | **-10** | **-10.00** | **0.00** | **0.00** |
| **-30** | **-30** | **-30** | **-30** | **-30** | **0.00** | **0.00** |
| **-50** | **-50** | **-50** | **-50** | **-50** | **0.00** | **0.00** |
| **-180** | **-180** | **-180** | **-180** | **-180** | **0.00** | **0.00** |
| **-720** | **-720** | **-720** | **-720** | **-720** | **0.00** | **0.00** |
| **-1080** | **-1080** | **-1080** | **-1080** | **-1080** | **0.00** | **0.00** |
| **R** | **10** | **10** | **10** | **10** | **10** | **0.00** | **0.00** |
| **30** | **30** | **30** | **30** | **30** | **0.00** | **0.00** |
| **50** | **50** | **50** | **50** | **50** | **0.00** | **0.00** |
| **180** | **180** | **180** | **180** | **180** | **0.00** | **0.00** |
| **720** | **719** | **719** | **720** | **719.33** | **-0.67** | **0.59** |
| **1080** | **1079** | **1079** | **1080** | **1079.33** | **-0.67** | **0.59** |
| **时间（min）** | **0** | **5** | **10** | **零点漂移** |  |  |  |  |
| **示值（°）** | **0.0** | **0.0** | **0.0** | **0.0** |  |  |  |  |

**《机动车转向盘转向力－转向角检测仪校准规范》起草小组**

**二零二一年八月十六日**