

**On approval of the list of measurements related to state regulation**

***Invalidated***
***Unofficial translation***

Order of the acting Minister of Industry and Infrastructure Development of the Republic of Kazakhstan dated March 29, 2019 No. 170. Registered in the Ministry of Justice of the Republic of Kazakhstan on March 29, 2019 No. 18444. Abolished by the joint order of the Acting Minister of Industry and Infrastructure Development of the Republic of Kazakhstan dated July 11, 2023 No. 497 and the Acting Minister of Trade and Integration of the Republic of Kazakhstan dated July 18, 2023 No. 285-NK.

*Unofficial translation*

      Footnote. Abolished by the joint order of the Acting Minister of Industry and Infrastructure Development of the Republic of Kazakhstan dated July 11, 2023 No. 497 and the Acting Minister of Trade and Integration of the Republic of Kazakhstan dated July 18, 2023 No. 285-NK (effective sixty calendar days after the date of its first official publication).

      In accordance with subparagraph 2) of article 6-3 of the Law of the Republic of Kazakhstan dated June 7, 2000 "On ensuring the uniformity of measurements", I HEREBY ORDER:

      1. To approve the attached list of measurements related to state regulation.

      2. The Committee for technical regulation and metrology of the Ministry of Industry and Infrastructure Development of the Republic of Kazakhstan, in the manner prescribed by law, to ensure:

      1) state registration of this order in the Ministry of Justice of the Republic of Kazakhstan;

      2) within ten calendar days from the date of the state registration of this order, its sending in the Kazakh and Russian languages to the Republican state enterprise on the basis of the right of economic management “Republican Legal Information Center” for official publication and inclusion in the Reference Control Bank of regulatory legal acts of the Republic of Kazakhstan;

      3) placement of this order on the Internet resource of the Ministry of Industry and Infrastructure Development of the Republic of Kazakhstan.

      3. The supervising vice minister of industry and infrastructure development of the Republic of Kazakhstan shall be authorized to oversee the execution of this order.

      4. This order shall come into force on April 11, 2019 and shall be subject to official publication.

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| *Acting Minister* | *K. Uskenbayev* |

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|  | Approved by the order of the Acting Minister of industry and infrastructure development of the Republic of Kazakhstan dated March 29, 2019 № 170 |

**The List of measurements related to government regulation**

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| --- | --- | --- | --- | --- |
| № | Name of measurements indicating the object and scope of application | Metrological requirements | | Note |
| Measuring range | Maximum permissible error or accuracy class |
| 1 | 2 | 3 | 4 | 5 |
| In the field of technical regulation and metrology | | | | |
| 1. | Measurement of the geometric dimensions of the State flag | from 0 to 500 mm  from 0 to 2000 mm | ± 0,1 mm  accuracy class 2 | ST RK 988  GOST 7502 |
| 2. | Measurement of the geometric dimensions of the State Emblem | from 0 to 1000 mm | ± 0,1 mm | ST RK 989 |
| 3. | Measurement of color of samples of the State Emblem and the State Flag and material objects depicting the State Emblem and the State Flag or elements of its symbols | No limits | Absolute measurement error of color coordinates ± 2; chromaticity coefficients ± 0,02 | ST RK 989  ST RK 988 |
| 4. | Measurements made during state metrological control: | | | ST RK 2.156 |
| mass measurement | from 0,5 to 6200 g | ± 0,02 % |
| temperature measurement | From minus 25 ºС to 120 ºС | ± 0,5 ºС |
| volume measurement | nominal volume of 100.0 ml at 20 ºС | ± 0,1 % |
| 100,0 ml | ± 0,02 % |
| humidity measurement | (20 – 90) % | ± 7,0 % |
| In the field of civil aviation | | | | |
| 5. | Measurement of meteorological optical visibility range | 10 m – 100 km | ± 50 m to 600 m  ± 10 % from 600 m to 1500 m  ± 20 % over 1500 m | relative accuracy |
| 6. | Ceiling measurement | 0 m – 30 km | ± 10 m (33 foots) to 100 m (330 foots)  ± 10 % over 100 m (330 foots) | relative accuracy |
| 7. | Measurement of air flow displacement directions | from 0 to 360° | ± 10 ° |  |
| 8. | Air displacement velocity measurement | from 0 to 75 m/s | from 0,5 m/s (1 knot) to 5 m/s (10 knots)  ± 10 % over 5 m/s (10 knots) | relative accuracy |
| 9. | Atmospheric pressure measurement | from 5002 to 1080 hPa | ± 0,5 hPa | 2 Taking into account the climatic characteristics of the aerodrome, meteorological equipment may include instruments with smaller ranges |
| 10. | Ambient temperature measurement | from minus 80 to plus 60 ° С | ± 1 °С |  |
| 11. | Measurement of relative humidity | from 0 to 100% | ± 5% at temperatures above 0 ° C,  ± 10% at temperatures below 0 ° C | relative accuracy |
| In the field of roads | | | | |
| 12. | Measurement of length when determining the length of sections (roads) | Below 1000 m  Above 1000 m | ± 0,1 m  ± 1,0 m | GOST 33475 |
| 13. | Measurement of the evenness of the road pavement (roads) | (0 - 200) mm | ± 0,1 mm | ST RK 1219  PR RK 218-03 |
| (0 - 200) cm/km | reducial error ± 10 % | GOST 33101  ST RK 1219  PR RK 218-03 |
| By the international roughness index (IRI)  (0 - 10) m/km | reducial error ± 2 % | GOST 33101  ST RK 1219  PR RK 218-03 |
| 14. | Slope measurement when determining slope of sections (roads) | ± 120 permille | ± 3 permille | GOST 33475  RK SET OF RULES 3.03-101  RK SET OF RULES 3.04-101 |
| 15. | Turn angle measurement (roads) | ± 180○ | reducial error ± 1○ | GOST 33475  RK SET OF RULES 3.03-101 |
| 16. | Measurement of turning radius (of roads) | (10 - 3000) m | reducial error ± 10 % | GOST 33475  RK SET OF RULES 3.03-101 |
| 17. | Measurement of the height of the elements of the microprofile of surface of the coating (roads) | (0,001 - 0,150) m | relative accuracy ± 10 % | GOST 33101 |
| 18. | Measurement of depth gauge of road pavement (roads) | (0,003 - 0,150) m | ± 0,002 m | GOST 32825 |
| 19. | Measurement of the elastic deflection of the road pavement (roads) | (0,2 - 1,5) mm | reducial error ± 5 % | GOST 32729  ST RK 1377 |
| 20. | Coating thickness measurement (roads) | (0,05 - 0,50) m | ± 0,02 m | RK SET OF RULES 3.03-101 |
| 21. | Measurement of the grip of a vehicle tire with road pavement | (0,1 - 0,7) | reducial error ± 0,05 % | GOST 33078  ST RK 1279 |
| 22. | Road sign visibility measurement | (0,3 - 150) m | reducial error ± 1 % | GOST 32945  GOST 32946  ST RK 1125 |
| 23. | Brightness measurement when determining the brightness level of the road pavement (roads) | (10 - 2·105) cd/m2 | relative accuracy ± 10 % | GOST 33176  GOST 33175  ST RK GOST Р 54305 |
| 24. | Measurement of the level of illumination of the road pavement (roads) | (10 - 2·105) lx | relative accuracy ± 8 % | GOST 33176  GOST 33175  ST RK GOST Р 54305 |
| 25. | Road sign luminance measurement | (0 - 100) % | relative accuracy ± 2 % | GOST 32945  GOST 32946  ST RK 1125 |
| 26. | Measurement of luminance factor of road markings | (0 - 100) % | relative accuracy ± 2 % | GOST 32953  GOST 32952  ST RK 1124 |
| In the field of railway transport | | | | |
| Rail Track Measurement | | | | |
| 27. | Track width | (1510-1550) mm | ± 1,0 mm | Order of the Minister of Investment and Development of the Republic of Kazakhstan dated April 30, 2015 No. 544 “On approval of the Rules for technical operation of railway transport” (registered in the Register of state registration of regulatory legal acts under No. 11897) |
| 28. | Relative position of both rail threads in height (level) | 150 mm | ± 1,0 mm |
| 29. | Rail bend arrow in horizontal (levelling) | ± 225 mm | ± 1,0 mm |
| 30. | Rail bend arrow in a vertical plane (depression of track) | ± 50 mm | ± 1,0 mm |
| 31. | Measurement of multichannel vibration diagnostics of structures, foundations, bases, bridge structures | 0.5 - 100) Hz  (5 - 1000) Hz  vibration velocity measuring range,  (0,1 – 500) mm/s | ± 5,0 % |  |
| Contact network measurement | | | | |
| 32. | Measurement of the height of the contact wire from the level of the rail head | (5675 – 6800) mm | ± 3 mm | Order of the Minister of Investment and Development of the Republic of Kazakhstan dated April 30, 2015 No. 544 “On approval of the Rules for technical operation of railway transport” (registered in the Register of state registration of regulatory legal acts under No. 11897) |
| Rail profile measurement | | | | |
| 33. | Vertical rail head wear | (0-13) mm | ± 0,01 m |  |
| 34. | Side wear of rail head | (0-20) mm | ± (1-2) mm |  |
| 35. | Rail head metal hardness measurement | МТР (HRC)  25 ± 5  45 ± 5  65 ± 5  НВ  100 ± 25  200 ± 50  400 ± 50  HV  450 ± 50  800 ± 75  HSD  30 ± 7  60 ± 7  95 ± 7 | ±1,5 HRC  ±10 HB  ±12 HV  ±2 HSD |  |
| Identification (measurement) of the depth of the rail defects (flaw detection) | | | | |
| 36. | Rail defect depth and its location | (3 – 580) mm | ± 2 % |  |
| Rolling stock measurement | | | | |
| Motion parameters | | | | |
| 37. | Speed measurement | from 0 to 140 km / h (passenger);  from 0 to 90 km / h (freight) | ± 1 km / h (passenger);  ± 2 km / h (freight) |  |
| 38. | Measurement (conversion) of pressure | (0 – 1) MPa | ± 0,02 MPa |  |
| 39. | Rotation angle measurement | Angle of rotation of the axis of the sensor modulator, 0 - 8,57...359,94 | ± 1,3 |  |
| Rolling stock design parameters | | | | |
| 40. | Measurement of parameters of wheel sets of cars | (94,5 - 95,1) mm  (2,9 - 3,1) mm  (5,9 - 6,1) mm  (45,3 - 45,7) mm  (98,8 - 99,2) mm  (123,7-124,3) mm  (154,7-155,3) mm  (97,5-98,2) mm  (5,9-6,1) mm  (45,4-45,6) mm  (7,32-7,68) mm  (154,8-155,2) mm  (97,8-98,2) mm  (96,8-97,2) mm  (950 – 1200) mm  (33,9-34,1) mm  (17,9-18,1) mm  (27,9-28,1) mm  (17,9 - 18,1) mm  (12,82 – 13) mm  (70,0 - 70,1) mm  (829,9-830,1) mm  (1439,5 - 1440,5) mm  (0-16) mm  (0-90) mm  (18-33) mm  (0 – 20) mm  (25 – 40) mm | D = ± 0,1 mm  D = ± 0,1 mm  D = ± 0,1 mm  D = ± 0,2 mm  D = ± 0,2 mm  D = ± 0,3 mm  D = ± 0,3 mm  D = ± 0,5 mm  D = ± 0,18 mm |  |
| 41. | Monitoring the height of the axis of the automatic coupling of the rolling stock above the top level of the rail heads, determining the difference between the heights of the automatic coupling | - milling bar, slid flat, weld-on deposit (0 – 10) mm,  - ridge thickness (18- 33) mm | ± 0,1  ± 0,3 mm |  |
| 42. | Box angle temperature measurements | From minus 20 °С to 600°С | ± 1 °С |  |
| 43. | Measurement of serviceability of non-coupled automatic coupling of cars | (97,5 - 98,2) mm  (5,9 - 6,1) mm  (45,4- 45,6) mm  (7,32-7,68) mm  (154,8 - 155,2) mm  (97,8-98,2) mm  (96,8 - 97,2) mm | D = ± 0,2 mm  D = ± 0,1 mm  D = ± 0,1 mm  D = ± 0,18 mm  D = ± 0,2 mm  D = ± 0,2 mm  D = ± 0,2 mm |  |
| 44. | Measurement of measurements between the side radial blocks of the car | (1439,5 - 1440,5) mm | D = ± 0,1 mm |  |
| 45. | Determination of position of the wedge in relation to the truck bolster in the operation of the car | (829,9-830,1) mm | D = ± 0,1 mm |  |
| Measurement of parameters of alarm, centralization and blocking devices (ACB) | | | | |
| 46. | Measurement of voltage, alternating and direct current, magnitude of direct and alternating current, resistance to direct current | 0 to 30 A DC  0 to 300 A AC  0 to 1000 V  from 0 to 10 megohms | Accuracy class:  1,0 ÷ 4,0 |  |
| 47. | Measurement of voltage, alternating and direct current, magnitude of direct and alternating current, resistance to direct current | 0 to 30 A DC  0 to 300 A AC  0 to 1000 V  from 0 to 10 megohms | Accuracy class:  1,0 ÷ 4,0 |  |
| 48. | Measurement of voltage, alternating and direct current, magnitude of direct and alternating current (including in code rail circuits and in tone frequency rail circuits, in broadband and selective modes), resistance to direct current | from 0 to 20 A  0 to 1000 V  from 0 to 200 megohms  5 Hz to 100 kHz | ± (0,5 ÷ 2) % |  |
| 49. | Measurement of time parameters of ALSN code signals | 60 ms – 1999 s | ± 10 мc |  |
| 50. | Measurement of insulation resistance in rail circuits | (0,1 – 10) Ohm / km | ± 5 % |  |
| 51. | Phase difference measurement in phase-sensitive rail circuits | (0,1 – 250) V | ± 1 % |  |
| 52. | Measurement of insulation resistance of installation and cable conductors | (0 – 10000) Megohms | ± 15 % |  |
| 53. | Earth resistance measurement | (0,1 – 1000) Ohm | ± 5,0 % |  |
| 54. | Measurement of the potential difference "cable-to-ground", drainage current | 50 mA to 50 A  75 mV to 600 V | 1,0 – 4,0  1,0 – 4,0 |  |
| 55. | Arrow transition force measurement | (0 – 10) kN | ± 10 % |  |
| 56. | Measurement of deceleration of signal relays and feeder switching time | (1 – 10) s | d = ± 0,03 s |  |
| 57. | Measurement of time parameters of automation at crossings | 0.2 s and 60 minute counter with 1 min division | ± 0,6 ms  ± 1,8 ms |  |
| 58. | Relay time measurement | from 1 to 105 ms | ± 0,005 % |  |
| 59. | Measurement of direct voltage and current strength, alternating voltages and current strength, direct current electrical resistance | 0 to 40 A DC  0 to 20 A AC  By voltage:  0 to 1000 V  by resistance:  from 0 to 200 megohms  by frequency:  0 to 100 kHz | ± 0,05 % |  |
| 60. | AC voltage measurement | By voltage:  0 to 300 V  by frequency:  from 0 to 5 MHz | ± 4 % |  |
| 61. | Measurement of electrical vibrations of sound and ultrasonic frequencies, measurement of the level of a sinusoidal signal | by frequency:  0.3 to 620 kHz  by level:  from minus 50 dB to 10 dB  by frequency:  0.2 kHz to 1620 kHz  By level:  from minus 70 dB to 10 dB | ± 0.5 kHz  ± 0.2 dB  ± 0.5%  ± 0.2 dB |  |
| 62. | Measurement at test benches of phase-sensitive signaling relays of ACS devices of their electrical and time parameters | 25, 50 Hz  50 to 220 V  10 to 10 mA  0.25 to 1.0 ohm  from 0.03 to 0.3 s | - |  |
| 63. | Measurement of time parameters of the ACS relay | from 1 ms to 100 s | ± 0,005 % |  |
| 64. | Measurement of waveforms and measurement of their parameters | from 0 to 100 MHz  0.005 ms to 50 ms | ± 2 % |  |
| 65. | Measurement of electrical vibrations of sound and ultrasonic frequencies (low-frequency generators) | from 20 Hz to 200 kHz | Harmonic coefficient K.g. - from 0.05%  Frequency setting from 0.01 Hz |  |
| 66. | Measurement of electrical oscillations of radio frequencies (high frequency generators) | from 100 kHz to 1 GHz | Frequency setting from 1×10-7 |  |
| 67. | Measurement of the frequency of electrical vibrations, the period of electrical vibrations, time intervals, pulse duration, counting the number of electrical pulses (frequency meters) | Frequency:  from 0.01 Hz to 1 GHz  Period:  from 10 -6 C to 10 C | ± 2,5 × 10-7 |  |
| 68. | Measurement of electric capacitance, inductance, impedance | 0,15 % | ± 0,02 % |  |
| 69. | Measurement of magnetic flux to magnetic induction | 25-0-25 uV,  50-0-50 uV,  100-0-100 uV,  250-0-250 uV | ± 1 % |  |
| 70. | Wire thickness measurement | from 0 to 25 mm | ± 2,0 mm |  |
| Measurement of the parameters of telecommunication devices on the main railway network | | | | |
| 71. | Measurement of resistances, level, gain, attenuation of symmetry or reflection, special measurements, laboratory measurements of high precision of equipment of carrier frequency communication equipment | From 0.2 kHz to 1620 kHz | ± 1 Hz |  |
| 72. | Measurement of amplitude and time parameters of an electric signal supplied to its input | (0 – 100) MHz  (0,05 – 200) ms | ± 2 % |  |
| 73. | Measurement of frequency and period of sinusoidal signals | from 0.1 Hz to 10 MHz  0.1 ms to 100 s | ± 1 % |  |
| 74. | Measurement of cable line parameters and determination of fault locations мест повреждений | from 0.1 Ohm to 1 GOhm  100 nF to 10 mF | ± 2,5 % |  |
| 75. | Measurement of parameters and heterogeneities of cable cores in the mode of a DC / AC bridge and an OTDR at a distance of up to 20 km | (0 - 100) V,  10 kW to 20 GW  from 50 m to 20 km | ± 2,5 % |  |
| 76. | Measurement by localization of damage by direct and alternating current, Murray measurement; Küpfmüller measurement, analysis of interference voltage using additional automatic filtering, insulation resistance measurement, loop resistance measurement, resistance difference measurement, capacitance measurement (two-wire and four-wire), ground-capacitance measurement, measurement of open and wire crossings, damage localization in areas with mixed cables | 1 Ohm to 10 kOhm | ± 0,2 % indication ± 0,005 Ohm |  |
| 77. | Measurement of the function of the level of interference (noise) during the passage of the routes of communication cables and metal communications at intersections with cables | from 0.2 m to 4.6 m  in probe mode 10%  from 4.6 m to 6 m,  50 Hz, 100 Hz, 450 Hz or 60 Hz, 120 Hz,  540 Hz  15 kHz to 60 kHz | ± 5 % |  |
| 78. | Optical - physical measurements of illuminance of crossings, aprons, shunting parks, etc | from 5 lx to 100 lx | ± 10 % |  |
| 79. | Measurement of the heating temperature on the surface of the object (contact connection of wires, disconnectors of the contact network, equipment, etc. | from minus 20 ° C to 650 ° C  from minus 20 to 120 ° C  0 to 650 ° C  300 to 1500 ° C | ± 2 % |  |
| 80. | Cargo weight measurement | The largest weighing limit LWLi, where LWLi = LWL;  the smallest weighing limit SWLi, where SWLi = SWL (i-1) and SWLi = SWL. | Class I-up to 50,000 e incl.;  from 50,000 e to 200,000 e incl.; St. 200 000 e  Class II - from 0 to 5 000s inclusive; from 5,000 e to 20,000 e incl .; St. 20 000 e  Class III - from 0 to 500 e inclusive; from 500 e to 2,000 e incl .; St. 2 000 e  Class IV - from 0 to 50 e incl .; from 50 e to 200 e incl. ± 0.5 e; ± 1.0 e; St. 200 e; ± 1.5 e | ST RK 2.102  ST RK 2.247 |
| 81. | Measurement of static tensile forces on diesel locomotives | The smallest measurement limit is 0.005, 0.01, 0.025, 0.05, 0.1, 0.25, 1, 2 kN. The largest measurement limit is 0.1, 0.2, 0.5, 1, 0, 2.0, 5.0, 10, 20 kN | ± 2 % |  |
| In the field of automobile transport | | | | |
| 82. | Measurement of axial loads of freight vehicles | per axle:  rom 0.2 t to 30 t | ± 10 % of the measured mass of the axial load | Order of the Minister of Investment and Development of the Republic of Kazakhstan No. 342 dated March 26, 2015 “On approval of the permissible parameters of vehicles intended for movement on the roads of the Republic of Kazakhstan” (registered in the Register of state registration of regulatory legal acts under No. 11009);  Order of the acting Minister of Transport and Communications of the Republic of Kazakhstan dated August 13, 2010 No. 362 “On approval of the rules for organization of work of transport control posts on the territory of the Republic of Kazakhstan” (registered in the Register of state registration of regulatory legal acts under No. 6472) |
| 83. | Measurement of axial loads and the total mass of freight vehicles | per total weight:  from 1 t to 200 t | ± 3% of the measured mass of the axial load or a group of axles |
| 84. | Measurement of axial loads and the total mass of freight vehicles on the weighing equipment | By total weight:  from 3.5 t to 200 t  by axes:  from 1 t to 50 t | - by total  weight ± 5%  - by axes  ± 8%  - group of axles  ± 10%  - per axis in a group of axes ± 10%  - center distance, geometric parameters ± 2% |
| 85. | Measurement of axial loads, gross weight and overall parameters of freight vehicles on weighing equipment | -By total weight:  from 0.1 t to 150 t  - by axes:  from 0.5 t to 20 t | - By total weight: ± 4%  - by axes: ± 10%,  - per group of axles ± 10%  - per axis in a group of axes ± 14%  - length ± 50 mm  - height and width ± 35 mm  - center distance ± 50 mm |
| 86. | Measurement of overall parameters of vehicles | from 0.05 m to 50 m | ± (1.5 mm + 0.05L) m  L - overall parameters |
| 87. | Measurement used when registering drivers' work and rest regimes | From 0 to 220 km / h | ± 6 km / h | Order of the acting Minister of Investment and Development of the Republic of Kazakhstan dated December 31, 2015 No. 1288 “On approval of the Rules for organization of work and rest of drivers, as well as the use of tachographs” (registered in the Register of state registration of regulatory legal acts under No. 14095);  Decree of the President of the Republic of Kazakhstan dated May 12, 1995 No. 2272 “On accession of the Republic of Kazakhstan to the European Agreement concerning the work of crews of vehicles engaged in international road transportation” |
| In the field of water transport | | | | |
| 88. | Relative humidity measurement | (0 - 100)% by volume | ± 1,5 % | GOST 12.1.014-84 |
| 89. | Measurement of air temperature of a working zone | From minus 20 to 70 ºС | ± 1,5 ºС | GOST 12.1.014-84 |
| 90. | Measurement of illumination of workplaces | (1 - 20000) lx | ± 5 lx | Order of the Minister of National Economy of the Republic of Kazakhstan dated February 28, 2015 No. 169 “On approval of Hygienic standards for physical factors affecting a person” (registered in the Register of state registration of regulatory legal acts under No. 11147) |
| 91. | Workplace noise measurement | (25 – 140) dB | ± 1 dB |
| 92. | Wind speed measurement | (10 – 40) m/s | ± 1,5 m/s | Appendix 379 of the Order of the Minister of Transport and Communications of the Republic of Kazakhstan dated March 09, 2011 No. 127 “On approval of the Rules for construction of inland navigation vessels” (registered in the Register of state registration of regulatory legal acts under No. 6871) |
| 93. | Measurement of insulation resistance of electrical circuits | from 100 kiloohm to 50 megohm | ± 0,05 kiloohm | Order of the acting Minister of Transport and Communications of the Republic of Kazakhstan dated April 21, 2011 No. 216 “On approval of the Rules for inspection of ships in operation” (registered in the Register of state registration of regulatory legal acts under No. 6991) |
| 94. | Ambient temperature measurement | from minus 30 to 50 ºС | ± 1,5 ºС | Appendix 379 of the Order of the Minister of Transport and Communications of the Republic of Kazakhstan dated March 09, 2011 No. 127 “On approval of the Rules for construction of inland navigation vessels” (registered in the Register of state registration of regulatory legal acts under No. 6871) |
| 95. | Measurement of the weight of materials extracted from water | (100 - 15000) kg | ± 50 kg | Order of the Minister of Transport and Communications of the Republic of Kazakhstan dated September 27, 2013 No. 761 “On approval of the Rules for planning and conducting engineering works to ensure the safety of navigation on inland waterways” (registered in the Register of state registration of regulatory legal acts under No. 8861) |
| 96. | Measurement of excess points of reference, distances | (0 - 1000) m | ± 0,01 m |
| 97. | Measurement of horizontal angles when leveling on the ground | (0 - 360) º | ± 1 º |
| 98. | Inland waterway depth measurement | (1 – 50) м | ± 0,2 м | Order of the Minister for Investment and Development of the Republic of Kazakhstan dated February 24, 2015 No. 161 “On approval of the Rules for operation of inland waterways” (registered in the Register of state registration of regulatory legal acts under No. 10870) |
| 99. | Pressure measurement in hydraulic systems | (80-106) MPa | ± 0,2 MPa | Order of the acting Minister of Transport and Communications of the Republic of Kazakhstan dated April 21, 2011 No. 216 “Rules for inspection of ships in operation” (registered in the Register of state registration of regulatory legal acts under No. 6991) |
| 100. | Pressure measurement in pneumatic systems | (600-800) MPa | ± 0,5 MPa |
| 101. | Oil pressure measurement in the lubrication system of internal combustion engines | (1-25) MPa | ± 0,5 MPa |
| 102. | Measurement of oxygen gas pressure in pressured vessels | (1- 25) MPa | ± 0,5 MPa | Order of the Minister of Investment and Development of the Republic of Kazakhstan dated December 30, 2014 No. 358 “On approval of the Rules for ensuring industrial safety during operation of pressured equipment” (registered in the Register of state registration of regulatory legal acts under No. 10303) |
| 103. | Propane gas pressure measurement in pressured vessels | (1- 4) MPa | ± 0,2 MPa |
| 104. | Measurement of water and oil temperature of engines | (0 – 120) °С | ± 2 °С | Order of the acting Minister of Transport and Communications of the Republic of Kazakhstan dated April 21, 2011 No. 216 “On approval of the Rules for inspection of ships in operation” (registered in the Register of state registration of regulatory legal acts under No. 6991) |
| 105. | Measurement of distances between control points on the ground | (0 - 250) m | ± 0,5 m | Order of the Minister of Transport and Communications of the Republic of Kazakhstan dated September 27, 2013 No. 761 “On approval of the Rules for planning and conducting engineering works to ensure the safety of navigation on inland waterways” (registered in the Register of state registration of regulatory legal acts under No. 8861) |
| 106. | Measurement of metric values of intermediates and products used in ship repair | (0 – 200) mm | ± 0,2 mm | Order of the Minister of Transport and Communications of the Republic of Kazakhstan dated April 07, 2011 No. 201 “On approval of the Rules for ship repair” (registered in the Register of state registration of regulatory legal acts under No. 6938) |
| 107. | Voltage measurement | (4 – 600) V | ± 0,1 V | Order of the acting Minister of Transport and Communications of the Republic of Kazakhstan dated April 21, 2011 No. 216 “On approval of the Rules for inspection of ships in operation” (registered in the Register of state registration of regulatory legal acts under No. 6991) |
| 108. | Current measurement | (0 – 100) А | ± 0,5 А |
| 109. | Current frequency measurement | (0 – 60) Hz | ± 0,5 Hz | Order of the Minister of Transport and Communications of the Republic of Kazakhstan dated March 09, 2011 No. 127 “On approval of the Rules for construction of inland navigation vessels” (registered in the Register of state registration of regulatory legal acts under No. 6871) |
| 110. | Measurement of the rotational speed of the crankshaft of internal combustion engines | (0 – 1500) rpm | ± 1 rpm | Order of the acting Minister of Transport and Communications of the Republic of Kazakhstan dated April 21, 2011 No. 216 “On approval of the Rules for inspection of ships in operation” (registered in the Register of state registration of regulatory legal acts under No. 6991) |
| 111. | Atmospheric pressure measurement | (600 – 800) mm Hg | ± 1,5 mm Hg | Appendix 379 of the Order of the Minister of Transport and Communications of the Republic of Kazakhstan dated March 09, 2011 No. 127 “On approval of the Rules for construction of inland navigation vessels” (registered in the Register of state registration of regulatory legal acts under No. 6871) |
| 112. | Measurement of the thickness of products made of various materials during the work on the corrosion protection of metal gates and locks of water gates of hydraulic structures | (1,0 - 199,9) mm | ± 1 mm | Order of the Minister of Investment and Development of the Republic of Kazakhstan dated April 30, 2015 No. 550 “Rules for technical operation, inspection and repair of navigable hydraulic structures (locks)” (registered in the Register of state registration of regulatory legal acts under No. 11915) |
| 113. | Measurement of coordinates of occurrence of defects;  equivalent defect sizes in concrete structures | (1,0 – 6000,0) mm | ± 5 mm |
| 114. | Measurement of thickness of products with one-sided access to concrete structures | (0,5 – 6000,0) mm | ± 0,1 mm |
| 115. | Measurement of distances (horizontal and vertical) movements of earthwork and concrete structures and their foundations | (0 - 5000) mm | ± 3 mm/km |
| 116. | Vessel roll measurement | (0 - 40)º | ± 1º | Appendix 384 of the Order of the Minister of Transport and Communications of the Republic of Kazakhstan dated March 09, 2011 No. 127 “On approval of the Rules for construction of inland navigation vessels” (registered in the Register of state registration of regulatory legal acts under No. 6871) |
| 117. | Thickness measurement of hull structures of inland waterway vessels | (0,8 – 100) mm | ± 0,1 mm | Order of the acting Minister of Transport and Communications of the Republic of Kazakhstan dated April 21, 2011 No. 216 “On approval of the Rules for inspection of ships in operation” (registered in the Register of state registration of regulatory legal acts under No. 6991) |
| 118. | Measurement of the external and internal dimensions of parts of a cylinder-piston group of internal combustion engines | (0 – 250) mm | ± 0,01 mm |
| 119. | Measurement of the hull, working surfaces of parts of the screw-steering complex of ships | (3 – 500) mm | ± 0,1 mm |
| In the field of energy conservation and energy efficiency | | | | |
| 120. | Temperature measurement on the surface of materials in the field of energy conservation and energy efficiency | from minus 40 to 280 ° C | ± 5,0 % | GOST 26629;  GOST 11828  GOST 25380  SP-RK-4.0203;  RD-153-34.0-20363;  RD-13-04; |
| 121. | Measurement of flow and metering of fluid and coolant in the field of energy conservation and energy efficiency | from 0.7 to 1500000 m³ / s | ± 3.0% at flow rates from 0.1 to 1 m³ / s;  ± 1.5% at flow rates from 1.0 to 20 m³ / s; | GOST 8.611;  GOST 28702;  GOST 15528 |
| 122. | Thickness measurement in the field of energy conservation and energy efficiency | from 0,2 to 1000 mm | ± 0,3 mm | GOST 28702 |
| 123. | Measurement of ambient temperature and materials in the field of energy conservation and energy efficiency | from 0 to 550 °C | ± 10 °C | GOST 26629;  SP-RK-4.0203;  RD-153-34.0-20363;  RD-13-04; |
| 124. | Measurement of heat flux density in the field of energy conservation and energy efficiency | (10 – 999) W / m² | ± 6 % | GOST 25380; |
| 125. | Temperature measurement of heat flux density in the field of energy conservation and energy efficiency | from minus 30 to 80 ° C | ± 0,2 °С | GOST 8.558;  GOST 26629;  (it is applied when carrying out an energy audit of industrial enterprises) |
| 126. | Measurement of AC resistance in the field of energy conservation and energy efficiency | (2 – 200) Megohms | ± 1,5 % | GOST 13109 |
| 127. | Measurement of AC power in the field of energy conservation and energy efficiency | (2 – 400) А | ± 2 % | GOST 13109 |
| 128. | Measurement of AC voltage in the field of energy conservation and energy efficiency | (2 – 600) V | ± 2 % | GOST 13109 |
| 129. | Measurement of gas and air velocity | (0,80 -30,00) m/s | ± 2 % | GOST 12.1.005 |
| 130. | Air humidity measurement | (0-90) % | ± 3 % | GOST 12.1.005 |
| 131. | Light measurement | (1-200 000) lx | ± 10 % |  |
| 132. | Distance measurement | (0,05-100) m | ± 1,5 % | GOST 21830;  GOST 8.051; |
| 133. | Measurement of power quality indicators | (2 -200) Megohms | ± 10 % | GOST 13109 |
| 134. | Measurement of liquid and gas pressure | (0-200) mm WG | ± (0,08-0,98) mm WG |  |
| 135. | Measurement of the quality and quantity of the composition of gas mixtures | (O) from 0 to 25% (CO) from 4 to 4000%  (NO) from 0 to 3000% | (O-oxygen) ± 3.3%;  (CO-carbon) ± 6.6%;  (NO-nitrogen) ± 6.6%; | GOST 8.207;  RD 34.01.101;  RD 34.25.514;  RD 34 RK 1-26.303 |
| In the field of industrial safety | | | | |
| Measurement of the temperature of the working environment of pressured vessels (boiler drum, reservoir, tank) | | | | |
| 136. | - air | (0 – 100) °С | Accuracy class 2,5 |  |
| 137. | - water | (0 – 115) °С |
| 138. | - steam | (115 – 650) °С |
| 139. | - gas | (minus 200 – 0) °С |
| Measurement of the temperature of the working environment of pressured vessels (pipeline) | | | | |
| 140. | - water | (0 – 115) °С | Accuracy class 2,5 |  |
| 141. | - steam | (115 – 650) °С |
| Measurement of the pressure of the working environment of pressured vessels (boiler drum, reservoir, tank) | | | | |
| 142. | - air | 0 MPa (kgf / cm2) – 2,5 MPa (25 kgf / cm2) | Accuracy class not below 2,5 |  |
| 143. | - water | more than 2.5 to 14 MPa (more than 25 to 140 kgf / cm2) | Accuracy class not below 1,5 |  |
| 144. | - steam | more than 14 MPa (140 kgf / cm2) | Accuracy class not below 1,0 |  |
| 145. | - gas | (0 – 120) MPa | Accuracy class not below:  1) 2.5 - at a working pressure of the vessel up to 2.5 MPa (25 kgf / cm2);  2) 1.5 - at a working pressure of the vessel over 2.5 MPa (25 kgf / cm2) |  |
| 146. | Measurement of pressure of a working environment (water, steam) of the pipeline | 0 MPa (kgf / cm2) - 2.5MPa (25 kgf / cm2) | Accuracy class not below 2,5 |  |
| more than 2.5 to 14 MPa (more than 25 to 140 kgf / cm2) | Accuracy class not below 1,5 |  |
| more than 14 MPa (140 kgf / cm2) | Accuracy class not below 1,0 |  |
| 147. | Temperature measurement during the melt of ferrous, non-ferrous, precious metals and alloys based on these metals | (0 – 2500) °С | ± 2 °С |  |
| In the field of construction | | | | |
| 148. | Measurements used to determine the tensile strength of concrete, compressive strength in construction | from 0 to 1500 kN | ± 2 % | GOST 10180 |
| 149. | Measurements used to determine the adhesion strength of masonry in construction | from 0 to 160 MPa | Axial tensile strength is calculated with an error of up to 0.01 MPa | GOST 24992 |
| 150. | Measurements used to determine the deflection of structures in construction | No limits | ± 2 % | GOST 8829 |
| 151. | Measurements used to determine the protective layer of concrete and the location of reinforcement in reinforced concrete structures in construction | from 5 to 130 mm | ±(0,05tpr + 0,5) mm  tpr – range of thickness of the protective layer of concrete | GOST 22904 |
| 152. | Measurement of geometric dimensions in construction | from 0 to 5000 mm  from 0,05 to 100 m | ± 0,06 mm  ± 2,0 mm | GOST 26433.0  GOST 26433.1  GOST 13015  GOST 21520  GOST 25485  GOST 25820  GOST 31359  GOST 31360  GOST 379  GOST 530  GOST 9480  GOST 10922  GOST 8478  GOST 14098  GOST 23279  GOST 5781 |
| 153. | Measurement of temperature and humidity in construction | From minus 0 to 100 % | ± 5 % | RK SET OF RULES EN 1991-1-5:2003/2017  RK TDS 01-01-5.1-2013  GOST ISO 3745 |
| From minus 10 °С to 60 °С | ± 0,5°С |
| 154. | Measurement of acoustic control systems in construction | Measured thickness range from 0.5 to 6000 mm  Range of measurements of the depth of the defect from 2 to 6000 mm | ± (0,1+0,02ˑН) mm  ± (0,3+0,03ˑХ) mm |  |
| 155. | Mass measurement in construction | No limits | ± 2 % | - |
| 156. | Pressure measurement in construction | from 0.6 to 1600 kgf / cm2 | ± 2,5 % | - |
| 157. | Measurements used to determine the strength characteristics of materials in construction | The maximum ultimate load of at least 2000 N, a constant speed of movement of the movable clamp (100 ± 10) mm / min | ± 2 % | GOST 31899-1 |
| 158. | Measurement of horizontal and vertical angles during geodetic works in construction | The smallest viewing distance - 1.2 m | ± 3 mm | - |
| 159. | Измерения, применяемые при полевых испытаний грунтов в строительстве | (0 – 80) mm | ± 0,1 % | GOST 5686 |
| 160. | Measurement of the bearing capacity of piles during construction | (0,3 – 1200) tf | ± 5 % | GOST 5686 |
| 161. | Measurements used in stamp tests of soil in construction | (0 – 200) mm | ± 0,1 % | GOST 20276 |
| 162. | Measurements used in determining the geometric dimensions of products in construction | No limits | ± 2 mm | GOST 530 |
| 163. | Measurement of normative and design resistance to tensile, compression, bending, crushing, shear - of structures during construction | (0 – 50) tf | ± 1∙ 10-2 tf | GOST 10180  SNiP ІІ-23-881 |
| 164. | Measurement of stress to tensile, compression, bending, crushing, shear in construction | (0 – 50) tf | ± 1∙ 10-2 tf | GOST 10180 |
| 165. | Measurement of elastic coefficient foundation during construction | (0,1 – 5) t/m3 | ± 5 % | GOST 10922  ST RK 10922 |
| 166. | Cross-sectional measurement during construction | (0,1 – 6000) mm | ± 1 % | GOST 10180 |
| 167. | Measurement of yield strength, elasticity, reinforcing products in construction | (0 – 350) mm | ± 2 % | GOST 12004 |
| 168. | Measurement of the flexural strength of cement beams in construction | (0-10) kN | ± 1 % | GOST 310.4 |
| 169. | Measurement of the bending strength of wall materials in construction | (20-1000) kN | ± 1 % | GOST 8462 |
| 170. | Measurement of compressive strength of products in construction | (0 – 250) mm | ± 1 mm | GOST 8462;  GOST 24332 |
| 171. | Measurement of strength of products in construction | No limits | Relative accuracy ± 2 % | GOST 24992 |
| 172. | Measurement of mobility of concrete in construction | (0 – 1000) mm | ± 2 % | GOST 7473 |
| 173. | Measurement of stiffness of concrete in construction | (0 – 10000) MPa·s | ± 1 % | GOST 28013 |
| 174. | Measurement of delamination of concrete in construction | No limits | ± 2 % | GOST 28013 |
| 175. | Bulk density measurement of concrete in construction | No limits | ± 2 % | GOST 28013;  GOST 17623;  GOST 27005 |
| 176. | Measurements used to determine the density of concrete in construction | No limits | ± 1 % | GOST 12730.1 |
| 177. | True density measurement in construction | No limits | Up to ± 1000 g/cm3 | GOST 12730.1 |
| 178. | Measurements used to determine porosity, water tightness, breathability, moisture and water absorption of concrete in construction | No limits | relative accuracy ± 0,1 % | GOST 12730.0  GOST 12730.2  GOST 12730.3  GOST 12730.4  GOST 12730.5 |
| 179. | Measurement used to determine the frost resistance of concrete in construction | No limits | ± 1 % | GOST 10060-2  GOST 10060-3 |
| 180. | Water resistance measurements in construction | (0 - 2,0) MPa | ± 1 % | GOST 12730.0 GOST 12730.5 |
| 181. | Breathability measurements in construction | (0 – 1) kPa | ± 1 % | GOST 12730.0 GOST 12730.2 |
| 182. | Measurements used to determine the specific heat of cement in concrete during construction | No limits | no more than ± 0,1 kcal / kg | GOST 24316 |
| 183. | Thermal conductivity measurement in construction | (0 – 100) °С | ± 0,25 % | GOST 24316 |
| 184. | Measurement of water absorption in construction | (0 – 100) % | ± 0,1 % | GOST 12730.3 |
| 185. | Measurement of vapor permeability coefficient of concrete in construction | No limits | ± 1 % | GOST 12852.5 |
| 186. | Measurements used to determine sound power levels of noise sources in construction | No limits | ± 1 % | GOST EN 29053; GOST ISO 3745 |
| 187. | Acoustic resistivity measurements in construction | (100 – 10000) Hz | ± 5 % | GOST EN 29053  GOST ISO 3745 |
| 188. | Measurement of mechanical resistance in construction | (10 – 1000) Hz | ± 5% for amplitude and ± 10 ° for phase |  |
| 189. | Measurements used to determine parameters of free vibrations in construction | No limits | ± 1 % | RK SET OF RULES 2.03-30 |
| In the field of housing and communal services | | | | |
| 190. | Water flow measurement D from 15 to 50 mm (winged)  D from 65 to 150 mm  (turbine) | D 15 mm  from 0.01 to 3.5 m3 / h  D 20 mm  from 0.015 to 5.0 m3 / h  D 25 mm  from 0.02 to 7.9 m3 / h  D 32 mm  from 0.03 to 13.0 m3 / h  D 40 mm  from 0.04 to 20.0 m3 / h  D 50 mm  from 0.05 to 31.5 m3 / h  D 65 mm  from 0.1 to 120.0 m3 / h  D 80 mm  from 0.1 to 200.0 m3 / h  D 100 mm  0.2 to 300.0 m3 / h  D 125 mm  0.2 to 350.0 m3 / h  D 150 mm  0.2 to 600.0 m3 / h | For cold water:  Q1 to Q2  d = ± 5%  Q2 to Q4  d = ± 2%  For hot water: Q1 to Q2  d = ± 5%  Q2 to Q4  d = ± 3% | For commercial metering (depending on installation, V - vertically or H -horizontally) for metering water up to 30 ° C according to GOST R 50193.1 Accuracy class is not lower than C, according to ST RK STB ISO 4064-1 the ratio Q3 / Q1 is not lower than 100, for water accounting from 30 to 90 ˚С according to GOST R 50193.1 Accuracy class is not lower than B, according to ST RK STB ISO 4064-1 the ratio Q3 / Q1 is not lower than 50  ∆Qmin - minimum temperature difference between the heat carrier of the direct and return flows of the heat supply system  ∆Q - temperature difference between the heat carrier of the direct and return flows of the heat supply system  Q1 - minimum flow rate;  Q2 - nominal flow rate;  Q4 - maximum flow rate;  ∆ - the absolute error;  d - the relative error. |
| 191. | Water flow measurement (ultrasonic) | D 10 mm  from 0.028 to 1.4 m3 / h  D 15 mm  from 0.1 to 3.5 m3 / h  D 20 mm  from 0.02 to 8.1 m3 / h  D 25 mm  from 0.06 to 12.2 m3 / h  D 32mm  from 0.07 to 40.0 m3 / h  D 40 mm  from 0.1 to 45.0 m3 / h  D 50 mm  from 0.1 to 70.0 m3 / h  D 65 mm  from 0.65 to 120 m3 / h  D 80 mm  from 0.4 to 180 m3 / h  D 100 mm  from 0.63 to 280m3 / h  D 150 mm  from 1.5 to 750m3 / h  D 200 mm  from 2 to 1100m3 / h  D 250 mm  from 5 to 2000 m3 / h  D 300 mm  from 6 to 2500 m3 / h  D 350 mm  from 7 to 3500 m3 / h  D 400 mm  from 8 to 4500 m3 / h  D 500 mm  10 to 7000 m3 / h  D 600 mm  12 to 10,000 m3 / h  D 700 mm  from 14 to 14000 m3 / h  D 800 mm  from 16 to 18000 m3 / h  D 900 mm  from 18 to 23000 m3 / h  D 1000 mm  from 20 to 28000 m3 / h | For cold water:  Q1 to Q2  d = ± 5%  Q2 to Q4  d = ± 2%  For hot water: Q1 to Q2  d = ± 5%  Q2 to Q4  d = ± 3% |
| 192. | Water flow measurement (electromagnetic) | D 15 mm  from 0.002 to 9.0 m3 / h  D 20 mm  from 0.025 to 12.0 m3 / h  D 25 mm  from 0.04 to 16.0 m3 / h  D32 mm  from 0.09 to 20 m3 / h  D 40 mm  from 0.1 to 27.0 m3 / h  D 50 mm  0.3 to 40.0 m3 / h  D 65 mm  from 0.4 to 60.0 m3 / h  D 80 mm  from 0.8 to 80 m3 / h  D 100 mm  from 0.16 to 160 m3 / h  D 150 mm  1.25 to 450.0 m3 / h  D 200 mm  from 2.5 to 650 m3 / h  D 250mm  from 3.2 to 1100 m3 / h  D 300 mm  1.0 to 1800 m3 / h  D 350 mm  from 3.8 to 2600 m3 / h  D 400 mm  from 4.9 to 3400 m3 / h  D 450 mm  from 6.2 to 4200 m3 / h  D 500 mm  from 7.7 to 5000 m3 / h  D 600mm  from 11.2 to 5800 m3 / h  D 1000 mm  32.7 to 8200 m3 / h | For cold water:  Q1 to Q2  d = ± 5%  Q2 to Q4  d = ± 2%  For hot water: Q1 to Q2  d = ± 5%  Q2 to Q4  d = ± 3% |
| 193. | Measurement of the amount of heat (thermal energy) | No limits | d = ±(0,5 + ∆Qmin ⁄∆Q) % |  |
| 194. | Measurement of fluid flow when measuring the amount of heat (thermal energy)  (electromagnetic flow meters) | D 15 mm  from 0.002 to 9.0 m3 / h  D 20 mm  from 0.025 to 12.0 m3 / h  D 25 mm  from 0.04 to 16.0 m3 / h  D32 mm  from 0.09 to 20 m3 / h  D 40 mm  from 0.1 to 27.0 m3 / h  D 50 mm  0.3 to 40.0 m3 / h  D 65 mm  from 0.4 to 60.0 m3 / h  D 80 mm  from 0.8 to 80 m3 / h  D 100 mm  from 0.16 to 160 m3 / h  D 150 mm  1.25 to 450.0 m3 / h  D 200 mm  from 2.5 to 650 m3 / h  D 250mm  from 3.2 to 1100 m3 / h  D 300 mm  1.0 to 1800 m3 / h  D 350 mm  from 3.8 to 2600 m3 / h  D 400 mm  from 4.9 to 3400 m3 / h  D 450 mm  from 6.2 to 4200 m3 / h  D 500 mm  from 7.7 to 5000 m3 / h  D 600mm  from 11.2 to 5800 m3 / h  D 1000 mm  32.7 to 8200 m3 / h | d = ±5 % |  |
| 195. | Measurement of fluid flow when measuring the amount of heat (thermal energy)  (ultrasonic flow meters) | D 10 mm  from 0.028 to 1.4 m3 / h  D 15 mm  from 0.1 to 3.5 m3 / h  D 20 mm  from 0.02 to 8.1 m3 / h  D 25 mm  from 0.06 to 12.2 m3 / h  D 32mm  from 0.07 to 40.0 m3 / h  D 40 mm  from 0.1 to 45.0 m3 / h  D 50 mm  from 0.1 to 70.0 m3 / h  D 65 mm  from 0.65 to 120 m3 / h  D 80 mm  from 0.4 to 180 m3 / h  D 100 mm  from 0.63 to 280m3 / h  D 150 mm  from 1.5 to 750m3 / h  D 200 mm  from 2 to 1100m3 / h  D 250 mm  from 5 to 2000 m3 / h  D 300 mm  from 6 to 2500 m3 / h  D 350 mm  from 7 to 3500 m3 / h  D 400 mm  from 8 to 4500 m3 / h  D 500 mm  10 to 7000 m3 / h  D 600 mm  12 to 10,000 m3 / h  D 700 mm  from 14 to 14000 m3 / h  D 800 mm  from 16 to 18000 m3 / h  D 900 mm  from 18 to 23000 m3 / h  D 1000 mm  from 20 to 28000 m3 / h | d = ±5 % |  |
| 196. | Measurement of liquid temperature when measuring the amount of heat (thermal energy) | from 0,1 to 150 ºС | ∆ = ± 2,1 º С |  |
| 197. | Measurement of fluid pressure (pressure transmitter) when measuring the amount of heat (thermal energy) | from 0 to 2500 kPa | d = ± 0,5% |  |
| 198. | Liquid temperature measurement | From minus 50 to 300 0С | ± 0,05 % |  |
| 199. | Water mass measurement | from 0 to 6000 kg | ± 1,0 % |  |
| 200. | Atmospheric pressure measurement | from 80 to 106 kPa | ± 0,5 % |  |
| 201. | Time measurement | from 0 to 60 s,  from 0 to 60 min | ± 2,0 % |  |
| 202. | Pressure measurement, pressure gauges | from 0 to 1.0 kgf / cm2  from 0 to 4.0 kgf / cm2  from 0 to 6.0 kgf / cm2  from 0 to 10.0 kgf / cm2  from 0 to 16.0 kgf / cm2  from 0 to 25.0 kgf / cm2  from 0 to 40.0 kgf / cm2  from 0 to 400.0 kgf / cm2 | 0,015 %  0,06 %  0,09 %  0,15 %  0,24 %  0,375 %  0,6 %  6,0 % |  |
| 203. | Overpressure measurement (pressure transmitters) | from 0 to 2500 kPa | margin of permissible basic error  ± 0.5% |  |
| 204. | Mass measurement | from 0.02 to 260 g  from 0.5 to 1500 g  from 0 to 220 g  from 0 to 2100 g | ± 0,1 % |  |
| 205. | Optical density measurement | from 250 to 900 Nm  from 315 to 990 Nm  from 325 to 1000 Nm  from 190 to 1100 Nm | ± 0,5 % |  |
| 206. | Measurement of hydrogen pH | from 0 to 14 units. pH  from 0 to 14 units pH  from 0 to 14 units pH | ± 0,05 pH unit |  |
| 207. | Electrical conductivity measurement | from 10-4 to 10 cm / m | ± 1 % |  |
| 208. | Humidity measurement | from 0 to 110%  from 0 to 210% | ± 0,02 % |  |
| 209. | Temperature measurement  Humidity measurement | from 16 to 40 0С  from 20 to 90% | ± 0,2 % |  |
| 210. | Dissolved oxygen measurement | from 0.1  up to 20.0 mg | - |  |
| 211. | Measurement of particle size composition | from 0.25 to 1 mm | - |  |
| 212. | Measurement of organohalogen and inorganic impurities in water | Detecting process 4·10-14 g/s according to Lindane | ± 2,8 % |  |
| 213. | Measurement of mass concentrations of heavy metals in water | from 185 to 900 nm  from 190 to 600 nm | ± 3,0 %  ± 6,0 % |  |
| 214. | Measurement of mass concentration of anions and cations in water | from 0 to 15000 mS / cm  from 190 to 380 nm | ± 0,5 %  ± 5 % |  |
| In the field of geology and subsoil use | | | | |
| 215. | Measurement of elastic wave velocity | from 2 to 100 Hz | Relative accuracy ± 10 % |  |
| 216. | Measurement of acceleration of gravity at the exploration site | from 0 to 50 m/s2 | Relative accuracy ± 7 % |  |
| 217. | Measurement of the characteristics of the magnetic field in the exploration site | 1-100 mt | Relative accuracy ± 5 % |  |
| 218. | Measurement of the electromagnetic field at the exploration site | from 1 to 1000 | Relative accuracy ± 5 % |  |
| 219. | Measurement of natural rock radioactivity along the wellbore | from 0 to 250 mR / h | Relative accuracy ± 7 % |  |
| 220. | Measurement of the angle of deviation of the well from the vertical, azimuth | 1) from the zenith angle (0-180) °  2) from azimuth (0-360) ° | ± 7 % |  |
| 221. | Measurement of the change in borehole diameter to depth | (100 – 600) mm | ± 0,5 |  |
| 222. | Measurement of fluid inflow or absorption in a well | (10 – 150) m/s2 | ± 1 % |  |
| 223. | Measurement of water temperature in the wellbore | (0 – 150) °С | from 0,1 to 0,5 °С |  |

      Note:

      mm - millimeter;

      cm - centimeter;

      km - kilometer;

      m - meter;

      g - gram;

      mg - milligrammm;

      ml - milliliter;

      s - the second;

      m / s2 - square meter per second;

      ms - millisecond;

      ms - microsecond;

      min - minute;

      h - hour;

      hPa - hectopascal;

      MPa - megapascal;

      cd / m2 - candela per square meter;

      lx - lux;

      Hz - hertz;

      kHz - kilohertz;

      MHz - megahertz;

      GHz - gigahertz;

      dB - the decibel;

      MTR - a measure of hardness;

      HRC - the Rockwell hardness number;

      HB - the Brinell hardness number;

      HV - the Vickers hardness number;

      HSD – the Shore hardness number scale D;

      A - ampere;

      mA - micromper;

      V - volt;

      mV - millivolt;

      Megohms - Megaohm;

      GOhm - hygoohm;

      kOhm - kilo-ohm;

      ALSN - automatic locomotive alarm;

      ACB - (alarm, centralization, blocking);

      N - Newton;

      N m - Newton - meter;

      kN - kilonewton;

      mVB - microweber;

      nF - nanofarad;

      microfarad - microfarad;

      LWLi (LWL) - the largest weighing limit;

      SWLi - the smallest weighing limit;

      e - the price of calibration;

      kg - kilogrammm;

      t - a ton;

      tf - the ton of force;

      t / m3 - ton per cubic meter;

      rpm - revolution per minute;

      mm Hg - millimeter of mercury;

      mm WG - millimeter of water;

      W - watt;

      W / m² - watts per square meter;

      kgf / cm2 – kilogram-force per square centimeter;

      MPa · s - millipascal per second;

      kcal / kg - kilocalories per kilogram;

      pH unit - the unit of hydrogen;

      mt - millitesla;

      mR / h - microroentgen per hour;

      mS - microsiemens;

      ° С - degree.

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