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| 1 | THERMAL CALIBRATION SYSTEM | 30 | .By differential temperature measurement along undisturbed thermal gradient |
| 2 | .By thermal radiation emitting device (e.g., blackbody cavity) | 31 | CALORIMETRY |
| 3 | .By immersion in liquid having controlled temperature | 32 | .Total radiant energy or power measurement |
| 4 | LEAK OR FLAW DETECTION | 33 | .With control of heat added to or lost from a sample container (e.g., isothermal calorimetry) |
| 5 | .With heating or cooling of specimen for test | 34 | ..With controlled adiabatic shield |
| 6 | DISTANCE OR ANGLE | 35 | .Heat absorbing heigh temperature gas probe (e.g., enthalpy or fluid cooled probe) |
| 7 | .Thickness, erosion, or deposition | 36 | .Heat value of combustion (e.g., 'calorific value') |
| 8 | FLAMMABILITY TESTING | 37 | ..Having specified control of input of mixture |
| 9 | EMISSIVITY DETERMINATION | 38 | ..Having bomb or cartridge ignition chamber |
| 10 | DIFFERENTIAL THERMAL ANALYSIS | 39 | .Gain or loss of heat by heat utilizing load in path of heat exchange fluid |
| 11 | .Detail of electrical heating control | 40 | ..Determined by combining flow rate and temperature signals of heat exchange fluid |
| 12 | .Detail of sample holder or support therefor | 41 | ...Signals combined electrically |
| 13 | ..Formed by thermoelectric element | 42 | .Throttling calorimeter (e.g., steam quality) |
| 14 | THERMAL GRAVIMETRIC ANALYSIS | 43 | DETERMINATION OF INHERENT THERMAL PROPERTY (E.G., HEAT FLOW COEFFICIENT) |
| 15 | BY APPLYING KNOWN THERMAL GRADIENT (E.G., INDICATION OF RESPONSE BY LOCATION) | 44 | .Thermal conductivity |
| 16 | TRANSFORMATION POINT DETERMINATION (E.G., DEW POINT, BOILING POINT) | 45 | THERMAL TESTING OF A NONTHERMAL QUANTITY |
| 17 | .By change in optical property (e.g., transmission) | 46 | .With loading of specimen (e.g., stress or strain) |
| 18 | ..By reflection (e.g., polished surface) | 47 | ..Cyclic |
| 19 | ...Sensed by instrument (e.g., photocell) | 48 | ...Torsional |
| 20 |Controlling heating or cooling | 49 | ..Tensile |
| 21 | .By electrical condition of specimen | 50 | ...With detail of heating or cooling structure |
| 22 | .By change in motion of movable element | 51 | ..Compressional |
| 23 | ..Driven element | 52 | ..Bending or flexing |
| 24 | .By change in pressure of flow rate | 53 | .Of cure or hardenability |
| 25 | .By thermal arrest (e.g., time-temperature curve) | 54 | .Of fluid volume |
| 26 | ..Of molten metal (e.g., carbon content) | 55 | .Expansion or contraction characteristics (e.g., dilatometry) |
| 27 | .Between gaseous and liquid states | 56 | ..Including electrical sensor |
| 28 | ..Dew point | 57 | .Of susceptibility to thermally induced deterioration, flaw, or failure |
| 29 | HEAT FLUX MEASUREMENT | | |

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| 100 | TEMPERATURE MEASUREMENT (E.G., THERMOMETER) | 127 | ...Having significant frequency limitation or relationship (e.g., peak, ratio) |
| 101 | .Composite temperature-related parameter | 128 | ...Having significant signal handling circuitry (e.g., linearizing, emissivity compensation) |
| 102 | ..Time-temperature relationship (e.g., integral, deterioration, change) | 129 | ...Comparison with radiation reference standard |
| 103 | ...Time-temperature integration performed by particular circuit arrangement | 130 | ...Optical system structure (e.g., lens) |
| 104 | ...Peak (maximum or minimum) with respect to time | 131 | ...With radiation conducting element |
| 105 | ...Indicating tube with sensing material return prevention | 132 | ...Sensor or mounting temperature control |
| 106 | ...Permanent visual indication (i.e., irreversible) | 133 | ...Ambient temperature compensated (e.g., dummy sensor) |
| 107 | ...Rate of change | 134 | ..Extrapolation (e.g., simulation, heat flow) |
| 108 | ...Degree-days | 135 | ..By fluid flow within or to sensor (e.g., convection, heat transfer, differential pressure) |
| 109 | ..Climate related (e.g., wind- chill factor, discomfort index) | 136 | .Geophysical (e.g., well bore, underwater) |
| 110 | ..Plural spaced temperature function | 137 | .Temperature distribution or profile |
| 111 | ..Highest or lowest of spaced temperatures | 138 | .With fluid flow deflector |
| 112 | ...Difference or gradient | 139 | .Of molten metal |
| 113 | ...By thermoelements connected in series opposition | 140 | ..Lance (e.g., consumable) |
| 114 | ...By current modifying elements in circuit (e.g., bridge) | 141 | .Combined with diverse art device |
| 115 | ...Space average | 142 | ..With other measuring device |
| 116 | ..By single sensor (e.g., elongate or with plural fluid intakes) | 143 | ...Pressure |
| 117 | ..By a vibratory effect (e.g., resonant frequency, acoustical) | 144 | ..With combustion engine |
| 118 | ..Resonant frequency by fluid flow | 145 | ...Cooling system |
| 119 | ..Vibration velocity (e.g., echo timing) | 146 | ...Radiator cap mounted thermometer |
| 120 | ..In spaced noncontact relationship to specimen | 147 | ..With fluid carrying conduit (e.g., shower pipe) |
| 121 | ..By thermally emitted radiation | 148 | ...Sensor within conduit |
| 122 | ...By microwave arrangement | 149 | ..With cooking compartment or door thereof (e.g., oven) |
| 123 | ...Transparent material measurement or compensation (e.g., spectral line, gas, particulate suspension) | 150 | ..With bottle (e.g., nursing) |
| 124 | ...With scanning or temperature distribution display | 151 | ..With confection or infant pacifier |
| 125 | ...With fluid flow purging device | 152 | ..With electrical component (e.g., transformer) |
| 126 | ...Having emissivity compensating or specified radiating surface | 153 | ..With roll or rotary specimen or support |
| | | 154 | ...With coupling between rotating sensor and stationary electrical circuitry |
| | | 155 | ..With percing element |

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| 156 | ..With float | 186 | .With specified recording arrangement |
| 157 | ..With sampling cup | 187 | .Mechanical (e.g., expansion or contraction of materials) |
| 158 | .With removable cover for sensor (e.g., disposable sheath) | 188 | ..Having electrical indication |
| 159 | .Nonelectrical, nonmagnetic, or nonmechanical temperature responsive property | 189 | ..Plural zones (e.g., indoor-outdoor) |
| 160 | ..Melting or softening | 190 | ..Indicating tube type |
| 161 | ..Change of optical property | 191 | ...With optical element (e.g., magnifying) |
| 162 | ...Color | 192 | ...With holder for shaking |
| 163 | .By electrical or magnetic heat sensor | 193 | ...Having specified cross section |
| 164 | ..With preheated sensing probe | 194 | ...With support or housing |
| 165 | ..With heat exchanger or conductor | 195 | ..With detail of motion transmitting mechanism |
| 166 | ..At plural zones | 196 | ..One sensing element within another |
| 167 | ...Scanning | 197 | ..With compensation |
| 168 | ..With self-rebalancing arrangement (e.g., servo-potentiometer, thermal link) | 198 | ..With adjustment |
| 169 | ..With thermal lag compensation | 199 | ...Mechanical loading of sensor |
| 170 | ..Digital output | 200 | ...Adjustment of limit stop |
| 171 | ...With digital linearizing circuitry | 201 | ..Expanding fluid |
| 172 | ..With compensation for sensor nonlinearity or lead impedance | 202 | ...With distinct pressure transmitting fluid |
| 173 | ..By feedback in amplifier circuit or with constant current source in circuit | 203 | ...Bourdon tube or bellows |
| 174 | ..By conductive fluid or work function within sensor (e.g., ionization) | 204 | ..Multiple distinct sensing elements |
| 175 | ..Thermal noise generated in conductor | 205 | ..Compound sensing element (e.g., bimetallic) |
| 176 | ..Including sensor having hysteresis or cryogenic property (e.g., ferromagnetism, superconductivity) | 206 | ...Coil |
| 177 | ...Ferroelectric | 207 | ...Helix |
| 178 | ..By barrier layer sensing element (e.g., semiconductor junction) | 208 | HOUSING, SUPPORT, OR ADJUNCT |
| 179 | ..By thermoelectric potential generator (e.g., thermocouple) | 209 | .Removable probe cover |
| 180 | ...Specimen is part of thermoelectric circuit | 210 | MISCELLANEOUS |
| 181 | ...Reference junction compensation | | |
| 182 | ...Reference junction temperature control | | |
| 183 | ..By current modifying sensor | | |
| 184 | ...Reactive element (e.g., capacitive) | | |
| 185 | ...Detail of resistive sensor | | |

E-SUBCLASSES

The following subclasses beginning with the letter E are E-subclasses. Each E-subclass corresponds in scope to a classification in a foreign classification system, for example, the European Classification system (ECLA). The foreign classification equivalent to an E-subclass is identified in the subclass definition. In addition to US documents classified in E-subclasses by US examiners, documents are regularly classified in E-subclasses according to the classification practices of any foreign Offices identified in parentheses at the end of the title. For example, "(EPO)" at the end of a title indicates both Euro-

pean and US patent documents, as classified by the EPO, are regularly added to the subclass. E-subclasses may contain subject matter outside the scope of this class. Consult their definitions, or the documents themselves to clarify or interpret titles.

E19.001 TESTING OR CALIBRATING

CALORIMETERS (EPO)

E17.001 MEASURING QUANTITY OF HEAT (EPO)

E17.002 .For measuring the power of light beams, e.g., laser beams, etc. (EPO)

E17.003 .Microcalorimeters, e.g., using silicon microstructures, etc. (EPO)

E17.004 .Calorimeters using transport of an indicating substances, e.g., evaporation calorimeters, etc. (EPO)

E17.005 ..Where evaporation, sublimation or condensation caused by heating or cooling, is measured (EPO)

E17.006 .Calorimeters using compensation methods (EPO)

E17.007 .Measuring quantity of heat conveyed by flowing mediums, e.g., in heating systems, etc. (EPO)

E17.008 ..Based upon measurement of temperature difference (EPO)

E17.009 ...Between an inlet and an outlet point, combined with measurement of rate of flow of the medium if such, by integration during a certain time-interval (EPO)

E17.01Indicating product of flow and temperature difference directly (EPO)

E17.011Using mechanical means for both measurements (EPO)

E17.012Using electrical or magnetic means for both measurements (EPO)

E17.013Using electrical or magnetic means for one measurement and mechanical means for the other (EPO)

E17.014Where the indicating-instrument is driven electrically or magnetically by the temperature-measurement device and mechanically by the flow-measurement device (EPO)

E17.015 ...Across a radiating surface, combined with ascertainment of the heat transmission coefficient (EPO)

E15.001 TESTING OR CALIBRATING OF THERMOMETERS (EPO)

E15.002 .Calibrated temperature sources, temperature standards therefor (EPO)

E7.001 MEASURING TEMPERATURE BASED ON THE USE OF ELECTRIC OR MAGNETIC ELEMENTS DIRECTLY SENSITIVE TO HEAT (EPO)

E7.002 .Using pyroelectric elements (EPO)

E7.003 .Using superconductive elements (EPO)

E7.004 .Using thermoelectric elements, e.g., thermocouples, etc. (EPO)

E7.005 ..Provided with specially adapted connectors (EPO)

E7.006 ..Expendable thermocouples (EPO)

E7.007 ..Arrangements for signaling rupture or disconnection of the thermocouple (EPO)

E7.008 ..Using microstructures, e.g., made of silicon, etc. (EPO)

E7.009 ..The object to be measured not forming one of the thermo-electric materials (EPO)

E7.01The thermo-electric materials being arranged one within the other with the junction at one end exposed to the object, e.g., sheathed type, etc. (EPO)

E7.011 ..The object to be measured forming one of the thermo-electric materials, e.g. pointed type, etc. (EPO)

E7.012 ..Arrangements for compensating for auxiliary variables, e.g., length of lead, etc. (EPO)

E7.013 ...Arrangements with respect to the cold junction, e.g., preventing influence of temperature of surrounding air, etc. (EPO)

- E7.014Circuits for cold-junction compensation (EPO)
- E7.015 ..Arrangements for modifying the output characteristic, e.g., linearizing, etc. (EPO)
- E7.016 ..Particular circuit arrangements (EPO)
- E7.017 ..Particular circuit arrangements (EPO)
- E7.018 .Using resistive elements (EPO)
- E7.019 ..The element being an electrolyte (EPO)
- E7.02 ...In a specially-adapted circuit, e.g., bridge circuit, etc. (EPO)
- E7.021 ..The element being a linear resistance, e.g., platinum resistance thermometer, etc. (EPO)
- E7.022 ...Characterized by the use of the resistive element (EPO)
- E7.023 ...Using microstructures (EPO)
- E7.024 ...In a specially-adapted circuit, e.g., bridge circuit, etc. (EPO)
- E7.025In an oscillator circuit (EPO)
- E7.026In a potentiometer circuit (EPO)
- E7.027For modifying the output characteristic, e.g., linearizing, etc. (EPO)
- E7.028 ..The element being a non-linear resistance, e.g., thermistor, etc. (EPO)
- E7.029 ...Characterized by the shape of the resistive element (EPO)
- E7.03 ...Using microstructures, e.g., silicon spreading resistance, etc. (EPO)
- E7.031 ...In a specially-adapted circuit, e.g., bridge circuit, etc. (EPO)
- E7.032In an oscillator circuit (EPO)
- E7.033For modifying the output characteristic, e.g., linearizing, etc. (EPO)
- E7.034 .Using thermal noise of resistances or conductors (EPO)
- E7.035 .Using semiconducting elements having PN junctions (EPO)
- E7.036 ..Using microstructures, e.g., made of silicon, etc. (EPO)
- E7.037 .Using capacitative elements (EPO)
- E7.038 ..The dielectric constant of which is temperature dependant (EPO)
- E7.039 .Using magnetic elements, e.g., magnets, coils, etc. (EPO)
- E7.04 ..The variations of temperature influencing the magnetic permeability (EPO)
- E7.041 .Using ionization of gases (EPO)
- E7.042 .Circuits for reducing thermal inertia; Circuits for predicting the stationary value of temperature (EPO)
- E7.043 ..Thermal management of integrated systems (EPO)
- E3.001 **THERMOMETERS GIVING RESULTS OTHER THAN MOMENTARY VALUE OF TEMPERATURE (EPO)**
- E3.002 .Circuits arrangements for indicating a predetermined temperature (EPO)
- E3.003 .Giving means values; giving integrated values (EPO)
- E3.004 ..In respect of time (EPO)
- E3.005 ..In respect of space (EPO)
- E3.006 .Giving differences of values; giving differentiated values (EPO)
- E3.007 ..In respect of time, e.g., reacting only to a quick change of temperature etc. (EPO)
- E3.008 ...Based upon expansion or contraction of materials (EPO)
- E3.009 ..In respect of space (EPO)
- E9.001 **MEASURING TEMPERATURE BASED ON MOVEMENTS CAUSED BY REDISTRIBUTION OF WEIGHT, E.G., TILTING THERMOMETER, ETC. (EPO)**
- E5.001 **MEASURING TEMPERATURE BASED ON THE EXPANSION OR CONTRACTION OF A MATERIAL (EPO)**
- E5.002 .The material being a liquid (EPO)
- E5.003 ..Manufacturing of this particular type of thermometer (EPO)
- E5.004 ..Details (EPO)
- E5.005 ...Arrangements for driving back the liquid column (EPO)
- E5.006 ...Capillary tubes (EPO)

- E5.007 ...Containers for the liquid (EPO)
- E5.008 ...Selection of liquid compositions (EPO)
- E5.009 ..The liquid displacing a further liquid column or a solid body (EPO)
- E5.01 ..With electric contacts (EPO)
- E5.011 ..With electric conversion means for final indication (EPO)
- E5.012 ..With provision for expansion indicating over not more than a few degrees, e.g., clinical thermometer, etc. (EPO)
- E5.013 ...With means for indicating a maximum, e.g., a constriction in the capillary tube, etc. (EPO)
- E5.014 ..With means for indicating a maximum or a minimum or both (EPO)
- E5.015 ..With provision for measuring the difference between two temperatures (EPO)
- E5.016 ..With provision for adjusting zero point of scale, e.g., Beckmann thermometer, etc. (EPO)
- E5.017 .The material being a gas (EPO)
- E5.018 ..The gas displacing a liquid column (EPO)
- E5.019 .The material being a fluid contained in a hollow body having parts which are deformable or displaceable under the pressure developed by the material (EPO)
- E5.02 ..Selection of fluid compositions (EPO)
- E5.021 ..Using a fluid container connected to the deformable body by means of a capillary tube (EPO)
- E5.022 ..The body being a tubular spring, e.g., Bourdon tube, etc. (EPO)
- E5.023 ...Of spiral formation (EPO)
- E5.024 ...Of helical formation (EPO)
- E5.025 ..The body being a bellows (EPO)
- E5.026 ..The body being a capsule (EPO)
- E5.027 ..The body being a cylinder and piston (EPO)
- E5.028 ..With electric conversion means for final indication (EPO)
- E5.029 ...Using electrical contact making or breaking devices (EPO)
- E5.03 .The material being a solid (EPO)
- E5.031 ..Using materials with a configuration memory e.g., Ni-Ti alloys, etc. (EPO)
- E5.032 ..Using microstructures, e.g., made of silicon, etc. (EPO)
- E5.033 ..Arranged for free expansion or contraction (EPO)
- E5.034 ...With electrical conversion means for final indication (EPO)
- E5.035 ..Consisting of pivotally-connected elements (EPO)
- E5.036 ..Constrained so that expansion or contraction causes a deformation of the solid (EPO)
- E5.037 ...The solid body being formed of compounded strips or plates, e.g., bimetallic strip, etc. (EPO)
- E5.038Details of the compounds system (EPO)
- E5.039Selection of composition of the components of the system (EPO)
- E5.04Shape of the system (EPO)
- E5.041Specially adapted for indicating or recording (EPO)
- E5.042With electric transmission means for final indication (EPO)
- E5.043 ...The solid body being constrained at more than one point, e.g., rod, plate, diaphragm, etc. (EPO)
- E5.044The body being a flexible wire or ribbon (EPO)
- E11.001 **MEASURING TEMPERATURE BASED UPON PHYSICAL OR CHEMICAL CHANGES NOT COVERED BY ANY OF THE PRECEDING SUBCLASSES (EPO)**
- E11.002 .Using absorption or generation of gas, e.g., hydrogen, etc. (EPO)
- E11.003 .Using measurement of the effect of a material on microwaves or longer electromagnetic waves, e.g., measuring temperature via microwaves emitted by the object, etc. (EPO)
- E11.004 .Using evaporation or sublimation, e.g., by observing boiling, etc. (EPO)

- E11.005 ..From material contained in a hollow body having parts which are deformable or displaceable under the pressure developed by the vapor (EPO)
- E11.006 .Using melting, freezing, or softening (EPO)
- E11.007 ..Of disposable test bodies, e.g., cone, etc. (EPO)
- E11.008 .Using sintering (EPO)
- E11.009 .Using measurement of acoustic effects (EPO)
- E11.01 ..Of the velocity of propagation of sound (EPO)
- E11.011 ..Of resonant frequencies (EPO)
- E11.012 ...Using surface acoustic wave (SAW) (EPO)
- E11.013 .Using measurements of density (EPO)
- E11.014 .Using measurement of the effect of a material on X-radiation, gamma radiation or particle radiation (EPO)
- E11.015 .Using changes in transmission, scattering or fluorescence in optical fibers (EPO)
- E11.016 ..At discrete locations in the fiber, e.g., by means of Bragg gratings, etc. (EPO)
- E11.017 ...Using changes in fluorescence, e.g., at the distal end of the fiber, etc. (EPO)
- E11.018 .Using change of color or translucency (EPO)
- E11.019 ..Using change in reflectance (EPO)
- E11.02 ..Of inorganic materials (EPO)
- E11.021 ..Of organic materials (EPO)
- E11.022 ...liquid crystals (EPO)
- E11.023 ..Of materials which change translucency (EPO)
- E11.024 .Using thermo-luminescent materials (EPO)
- E13.001 **ADAPTATIONS OF THERMOMETERS FOR SPECIFIC PURPOSES (EPO)**
- E13.002 .For measuring body temperature (EPO)
- E13.003 ..Infrared clinical thermometers, e.g., tympanic, etc. (EPO)
- E13.004 .For cryogenic purposes (EPO)
- E13.005 ..Using microstructures, e.g., made of silicon, etc. (EPO)
- E13.006 .For measuring temperature of moving fluids or granular materials capable of flow (EPO)
- E13.007 ..Suction thermometers (EPO)
- E13.008 .For measuring temperature of moving solid bodies (EPO)
- E13.009 ..In linear movement (EPO)
- E13.01 ..In rotary movement (EPO)
- E13.011 .For measuring temperature within piled or stacked materials (EPO)
- E13.012 .Combined with sampling devices for measuring temperatures of samples of materials (EPO)
- E13.013 ..For siderurgical purposes (EPO)
- E1.001 **DETAILS OF THERMOMETERS NOT SPECIALLY ADAPTED FOR PARTICULAR TYPES OF THERMOMETER (EPO)**
- E1.002 .Special applications of indicating or recording means, e.g., for remote indications, etc. (EPO)
- E1.003 ..Recording (EPO)
- E1.004 ..For remote (EPO)
- E1.005 ..Arrangements for monitoring a plurality of temperatures, e.g., by multiplexing, etc. (EPO)
- E1.006 ..Arrangements for numerical indication (EPO)
- E1.007 ..Scales (EPO)
- E1.008 ...Temperature indication combined with the indication of another variable (EPO)
- E1.009 ...Arrangements for facilitating reading, e.g., illumination, magnifying glass, etc. (EPO)
- E1.01 ...Of liquid column thermometers (EPO)
- E1.011 .Protective devices, e.g., casings, etc. (EPO)
- E1.012 ..For clinical thermometers, e.g., contamination preventing sleeves, etc. (EPO)
- E1.013 ...For tympanic thermometers (EPO)
- E1.014 ..For preventing chemical attack (EPO)
- E1.015 ...For siderurgical use (EPO)
- E1.016 ..For preventing damage due to heat overloading (EPO)
- E1.017 ...For siderurgical use (EPO)

- E1.018 .Supports; Fastening devices; mounting thermometers in particular locations (EPO)
- E1.019 ..For measuring surface temperatures, e.g., of pipe walls, etc. (EPO)
- E1.02 ..Arrangements for moving thermometers to or from a measuring position (EPO)
- E1.021 .Special arrangements for conducting heat from the object to the sensitive element (EPO)
- E1.022 ..For reducing thermal inertia (EPO)
- E1.023 .Compensating for effects of temperature changes other than those to be measured, e.g., changes in ambient temperature, etc. (EPO)
- E1.024 ..By means of fluid contained in a hollow body having parts which are deformable or displaceable under the pressure developed by the fluid (EPO)
- E1.025 ..By means of compounded strips or plates, e.g., by bimetallic strips, etc. (EPO)
- E1.026 .Compensating for effects of pressure changes (EPO)

FOREIGN ART COLLECTIONSFOR 000 **CLASS-RELATED FOREIGN DOCUMENTS**