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**UDC 53 Physics**

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## Foreword

The English version of the Universal Decimal Classification (UDC) is being prepared and published as BS 1000 by the British Standards Institution (BSI) at the original joint request of the British Society for International Bibliography (BSIB) and the Association of Special Libraries and Information Bureaux (ASLIB), now amalgamated as Aslib. It has the approval of the Education Foundation, Lake Placid Club, New York, proprietors of the Dewey Decimal Classification, from which the UDC derives. The English Full Edition of the UDC is authorized by the Fédération Internationale de Documentation (FID), The Hague, Netherlands.

This section is part of the English Full Edition. It should be used in conjunction with the Abridged English Edition, BS 1000A, which refers to many other subjects of interest not listed in this schedule, and provides a conspectus of the whole scheme, together with an introduction to its use. For further practical information about the principles, application and utilization of the scheme, users should refer to BS 1000C.

This edition of UDC 53, which replaces the 1943 edition published as part of BS 1000:Vol. 2, part 1:1943 (later known as BS 1000 [50/53]:1943), includes modifications authorized in “Extensions and Corrections to the UDC” up to and including Series 10, No. 1, dated June 1978. Subsequent issues of “Extensions and Corrections to the UDC” should be consulted to keep the schedules up to date. Further information about this and other UDC publications is given on page 90. British Standards related to this part of BS 1000 are listed on the inside back cover.

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### Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, pages 1 to 90, an inside back cover and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

## Scope

Under 53 is classed information about the theoretical aspects of the physical properties of matter and energy and their measurement, together with some applications of these properties. In general, however, the main applications of physics come in Class 6, Applied sciences and technology, some of the more important subdivisions of which are given under “Related subjects” on page 1.

The chemical properties of matter and the composition of substances come under 54.

## Related subjects

|            |                                                                                            |
|------------|--------------------------------------------------------------------------------------------|
| 159.937.51 | Perception of colours. Colour as a visual sensation. Psychological theory of colour        |
| 389        | Metrology. Weights and measures                                                            |
| 51         | Mathematics                                                                                |
| 52         | Astronomy. Astrophysics. Space research. Geodesy.                                          |
| 54         | Chemistry. Crystallography. Mineralogy                                                     |
| 55         | Geology. Geophysics                                                                        |
| 612.84     | Physiological optics. Vision                                                               |
| 612.85     | Hearing — Physiology                                                                       |
| 620.1      | Materials testing. Defects of materials. Protection of materials                           |
| 621.039    | Applied nuclear science. Atomic energy and atomic industry. Nuclear engineering in general |
| 621.3      | Electrical engineering                                                                     |
| 623.5      | Ballistics. Gunnery. Theoretical and experimental problems — Military engineering          |
| 624.04     | Structural design, calculations and (graphical) statics — Civil and structural engineering |
| 624.131.5  | Soil statics and dynamics                                                                  |
| 628.9      | Lighting. Illuminating engineering                                                         |
| 629        | Transport vehicle engineering                                                              |
| 66.0       | Process technology. Chemical engineering                                                   |
| 667        | Colour industries (dyes, inks, paints etc)                                                 |
| 669        | Metallurgy                                                                                 |
| 681.11     | Horology. Watch and clock making                                                           |
| 681.12     | Reckoners of consumption. Industrial gauges, flowmeters, counters etc                      |
| 681.17     | Registering, recording and control devices                                                 |
| 681.2      | Instrument making. Instrumentation. Measuring instruments and their manufacture            |

|         |                                                                                               |
|---------|-----------------------------------------------------------------------------------------------|
| 681.3   | Data processing machines and equipment. Automatic data processing. Computers. Calculators etc |
| 681.7   | Optical instruments                                                                           |
| 681.8   | Technical acoustics. Musical instruments                                                      |
| 7.017.4 | Colour effects — The arts                                                                     |
| 77      | Photography                                                                                   |
| 786/789 | Music for individual instruments                                                              |

## Auxiliary signs and subdivisions

Full information about the common and special auxiliary signs and subdivisions (often abbreviated to “common and special auxiliaries”) will be found in BS 1000A and BS 1000C.

**Colon sign of relation.** For the classification of information for the public, as in abstracts and bibliographies, maximum use of colon combinations rather than of common or special auxiliaries is recommended. The use of the colon sign of relation is preferable for multiple entry systems, as it will help prevent the concealment of information. This usually results in longer notation, however, and for information for more restricted use, the application of auxiliaries, where available, may be simpler and more convenient provided that there is an adequate alphabetical subject index.

**Common auxiliaries.** The common auxiliaries of language = . . ., form (0. . .), place (1/9), race and nationality (= . . .), time “. . .”, point of view .00. . ., materials -03. . . and persons -05. . . are applicable throughout the UDC. However, they should be used mainly to express concepts not otherwise provided for in the schedules.

**Special auxiliaries.** The .01/.09 special auxiliary subdivisions listed at 53 are applicable throughout the schedule where relevant, but they are developed further at various main subdivisions, *e.g.* 533.6. The -1/-9 special auxiliary subdivisions occurring at 531, 532, 534, 535, 536 and 537 are applicable only to the number under which they appear, and to its subdivisions.

## Typographic presentation

Small type is used for cancelled numbers and text.

The arrow → means either “see” or “see also” according to the context.

The symbol  $\cong$  “subdivide as” means that the number preceding it may be subdivided in the same way as, and with meanings analogous to the subdivisions of, the number which follows it.

## SCHEDULE

## UDC 53 Physics

## Special auxiliary subdivisions

The special auxiliary subdivisions given below are developed further under the subdivisions of 53

|        |                                                                                                                |        |                                                                         |
|--------|----------------------------------------------------------------------------------------------------------------|--------|-------------------------------------------------------------------------|
| 53.01  | <b>THEORY AND NATURE OF PHENOMENA</b>                                                                          | 53.082 | <b>PRINCIPLES OF MEASUREMENT AND OF THE CONSTRUCTION OF INSTRUMENTS</b> |
| 53.02  | <b>GENERAL LAWS OF PHENOMENA</b>                                                                               |        | <b>Use of mechanical phenomena</b>                                      |
| .023   | Empirical formulae                                                                                             | .1     | Weight. Static forces                                                   |
| 53.03  | <b>PRODUCTION AND CAUSES OF PHENOMENA</b>                                                                      | .12    | Dynamic phenomena                                                       |
| 53.04  | <b>EFFECTS OF PHENOMENA</b>                                                                                    | .13    | Pendulums. Balance wheels                                               |
| .043   | Physical effects                                                                                               | .14    | Centrifugal force                                                       |
| .044   | Chemical effects                                                                                               | .15    | Gyroscopic devices                                                      |
| .047   | Biological effects                                                                                             | .16    | Elasticity. Torsion                                                     |
| 53.05  | <b>OBSERVATION AND RECORDING OF PHENOMENA. VISUAL INDICATION OF PHENOMENA</b>                                  | .17    | Friction                                                                |
| 53.06  | <b>APPLICATION AND UTILIZATION OF PHENOMENA</b>                                                                | .18    | <b>Use of hydrostatic and hydrodynamic phenomena</b>                    |
| 53.07  | <b>APPARATUS FOR THE PRODUCTION AND STUDY OF PHENOMENA</b>                                                     | .2     | Hydrostatic phenomena                                                   |
| 53.072 | <b>MODELS</b>                                                                                                  | .22    | Hydrodynamic phenomena                                                  |
| .1     | Types of model                                                                                                 | .25    | <b>Use of aerostatic and aerodynamic phenomena</b>                      |
| .11    | Static models                                                                                                  | .3     | Aerostatic phenomena                                                    |
| .12    | Hydraulic models                                                                                               | .32    | Aerodynamic phenomena                                                   |
| .121   | With fixed, rigid boundaries                                                                                   | .36    | <b>Use of acoustic phenomena, e.g. sound waves</b>                      |
| .122   | With semi-rigid boundaries                                                                                     | .4     | <b>Use of optical phenomena</b>                                         |
| .123   | With variable boundaries                                                                                       | .5     | Photoelectric phenomena. Optoelectronic measurements                    |
| .127   | Tidal models                                                                                                   | .52    | Reflection. Refraction. Absorption                                      |
| .13    | Analogous electrical models                                                                                    | .53    | Reflection                                                              |
| .14    | Photoelastic models                                                                                            | .531   | Refraction                                                              |
| .2     | Similarity                                                                                                     | .532   | Absorption                                                              |
| .21    | Geometric                                                                                                      | .534   | Interference                                                            |
| .22    | Kinematic                                                                                                      | .54    | Polarization. Birefringence. Dispersion in anisotropic substances       |
| .23    | Dynamic                                                                                                        | .55    | Colour                                                                  |
| .24    | Tidal models (with unspecified dimensions)                                                                     | .56    | <b>Use of thermal phenomena</b>                                         |
| .3     | Scales. Distortion                                                                                             | .61    | Thermodynamic changes. Hot wires                                        |
| .31    | Linear scale                                                                                                   | .62    | Thermoelectric phenomena                                                |
| .32    | Productivity scale                                                                                             | .63    | Calorimetric phenomena                                                  |
| .33    | Time scale                                                                                                     | .64    | Variation of resistance due to heat changes                             |
| .34    | Velocity indicators                                                                                            | .7     | <b>Use of electrical, magnetic and nuclear phenomena</b>                |
| .35    | Vertical distortion                                                                                            | .72    | Electrostatic phenomena (electrostatic force, capacitance)              |
| .39    | Inclination                                                                                                    | .722   | Variation of capacitance due to the measured quantity                   |
| .4     | Suspensions (in the liquid sense)                                                                              | .4     | With measurement of capacitance by electrostatic methods                |
| .41    | Light suspensions                                                                                              | .5     | With measurement of capacitance by electrodynamic methods               |
| .42    | Heavy suspensions                                                                                              | .55    | Bridge methods                                                          |
| .5     | Adjustment of models                                                                                           | .56    | Resonance methods                                                       |
| .8     | Prototype models. Comparison of results                                                                        | .57    | Beat methods                                                            |
| 53.08  | <b>GENERAL PRINCIPLES AND THEORY OF MEASUREMENT AND THE DESIGN OF MEASURING APPARATUS. MEASUREMENT METHODS</b> | .73    | Electrokinetic, e.g. piezoelectric, phenomena                           |
| →681.2 | Instrument making.                                                                                             | .731   | Variation of resistance due to the measured quantity                    |
|        | Instrumentation. Measuring instruments and their manufacture                                                   | .3     | Actuation of contacts due to the measured quantity                      |
| 53.081 | <b>UNITS. CONSTANTS</b>                                                                                        | .74    | Electromagnetic and electrodynamic phenomena                            |
| .1     | Units in general                                                                                               | .742   | Dynamometric effects. Moving coils etc                                  |
| .3     | Absolute units                                                                                                 | .743   | Change in inductance                                                    |
| .4     | Relative and practical units                                                                                   | .3     | Self-inductance                                                         |
| .5     | Dimensions of units                                                                                            | .4     | Mutual inductance                                                       |
| .6     | Constants                                                                                                      | .744   | Inductive phenomena (other than moving coils)                           |
| .7     | Constants for specific substances                                                                              | .75    | Electrolytic and electrochemical phenomena                              |
|        |                                                                                                                | .76    | Perturbation phenomena                                                  |
|        |                                                                                                                | .77    | Discharge phenomena                                                     |
|        |                                                                                                                | .78    | Magnetic phenomena                                                      |
|        |                                                                                                                | .781   | Magnetic needles                                                        |
|        |                                                                                                                | .782   | Variation of reluctance due to the measured quantity                    |

|           |                                                                                                     |            |                                                                   |
|-----------|-----------------------------------------------------------------------------------------------------|------------|-------------------------------------------------------------------|
| 53.082.79 | Nuclear phenomena                                                                                   | 53.084.885 | Regulation of field strength                                      |
| .8        | <b>Use of chemical phenomena</b>                                                                    | .89        | Radioactive substances. Ionized substances                        |
| .9        | <b>Use of biological phenomena</b>                                                                  | 53.085     | INDICATING APPARATUS. SCALES ETC                                  |
| 53.083    | METHODS OF MEASUREMENT.                                                                             | .1         | Braking, damping devices                                          |
|           | INSTRUMENTS FROM THE POINT OF VIEW                                                                  | .2         | Zero point. Zero adjustment. Adjusting devices                    |
|           | OF THE METHOD OF MEASUREMENT                                                                        | .3         | <b>Indicating devices</b>                                         |
| .1        | Direct measurements                                                                                 | .31        | Mechanized                                                        |
| .2        | Resonance methods                                                                                   | .311       | Parts. Needles. Pointers                                          |
| .3        | Ballistic methods                                                                                   | .312       | Dual elements                                                     |
| .4        | Null methods. Bridge methods                                                                        | .1         | Systems with thread and groove, wire and slot etc                 |
| .5        | Compensation methods                                                                                | .2         | Double aperture systems                                           |
| .6        | Differential methods                                                                                | .313       | Combined pointers and scales                                      |
| .62       | Using devices for measuring and indicating small differences                                        | .32        | Indicators. Fibres. Crosswires                                    |
| .64       | Using devices for measuring and indicating maxima and minima                                        | .321       | With a single element, e.g. points, lines                         |
| .7        | Remote methods. Telemetering                                                                        | .322       | With two elements, e.g. crosswires, parallel lines                |
|           | →621.398 Telemetering. Remote indication — Electrical engineering                                   | .323       | With several elements                                             |
|           | 654.94 Remote indication of various phenomena — Communication services                              | .1         | Verniers                                                          |
| .71       | Intensity methods                                                                                   | .2         | Transversals                                                      |
| .72       | Impulse methods                                                                                     | .3         | Grids                                                             |
| .721      | Time methods                                                                                        | .33        | Optical devices for reading scales                                |
| .722      | Counting methods                                                                                    | .331       | Telescopes                                                        |
| .8        | Summation methods                                                                                   | .332       | Microscopes                                                       |
| .9        | Other methods                                                                                       | .5         | With micrometer attachment                                        |
| .91       | Mixed methods                                                                                       | .34        | indicating devices using a light beam                             |
| .92       | Methods with intermittent indication                                                                | .341       | Light beams                                                       |
| .94       | Methods with continuous indication                                                                  | .342       | Light source                                                      |
| .98       | Micromasurement methods                                                                             | .343       | Condensing of light beams                                         |
|           |                                                                                                     | .344       | Reflection of light beams                                         |
|           |                                                                                                     | .345       | Diaphragms. Apertures. Screens                                    |
|           |                                                                                                     | .35        | Optical devices for reading liquid levels (menisci)               |
|           |                                                                                                     | .353       | Avoidance of parallax by the use of reflecting scales             |
| 53.084    | CONSTRUCTION OF INSTRUMENTS. PRIMARY COMPONENTS                                                     | .354       | Marked backgrounds, e.g. Schellbach stripes on burettes           |
|           | <i>Further particulars may be denoted by the -1/ -9 special auxiliary subdivisions listed at 62</i> | .355       | Reading by observing contact between the liquid level and a point |
| .2        | Receivers. Parts in contact with phenomena measured                                                 | .39        | Accessories                                                       |
| .4        | Taring. Tare pans                                                                                   | .391       | Magnifying lenses                                                 |
| .42       | Tare pans                                                                                           | .392       | Prism systems. Mirror systems                                     |
| .6        | Devices for amplification of the measured quantity                                                  | .4         | <b>Scales</b>                                                     |
| .8        | <b>Storage, supply, transmission and discharge of energy or matter</b>                              | .41        | Rectilinear scales                                                |
| .81       | Containers for powders, granular substances                                                         | .411       | With equal divisions                                              |
| .82       | Liquids                                                                                             | .412       | With sine divisions                                               |
| .821      | Containers. Reservoirs etc                                                                          | .413       | With tangent divisions                                            |
| .822      | Supply                                                                                              | .414       | With logarithmic divisions                                        |
| .823      | Transference. Conveyance                                                                            | .42        | Circular scales. Curved scales. Cylindrical scales etc            |
| .826      | Discharge                                                                                           | .421       | Circular scales. Curved scales                                    |
| .827      | Control                                                                                             | .1         | With angular degree divisions                                     |
| .83       | Gases                                                                                               | .2         | With centesimal angular divisions                                 |
|           | 53.084.83 $\cong$ 53.084.82                                                                         | .3         | With other equal divisions                                        |
| .84       | Sound waves                                                                                         | .4         | With unequal divisions                                            |
| .842      | Sources                                                                                             | .422       | Cylindrical scales                                                |
| .844      | Distribution                                                                                        |            | 53.085.422 $\cong$ 53.085.421                                     |
| .845      | Reflection. Refraction                                                                              | .49        | Illumination of scales                                            |
| .846      | Damping. Attenuation                                                                                | .491       | Transparent scales                                                |
| .85       | Light                                                                                               | .492       | Translucent scales                                                |
| .852      | Sources                                                                                             | .493       | Opaque scales                                                     |
| .853      | Distribution                                                                                        | .5         | Pens                                                              |
| .855      | Reflection. Refraction                                                                              | .6         | Casings. Housings                                                 |
| .856      | Extinction                                                                                          | 53.087     | OBSERVATION. RECORDING                                            |
| .86       | Heat                                                                                                | .2         | <b>Subjective observation</b>                                     |
| .862      | Production. Sources                                                                                 | .21        | At normal distance                                                |
| .863      | Distribution                                                                                        | .22        | At small distances. Microscopic observation                       |
| .865      | Reflection. Refraction                                                                              | .23        | At great distance. Telescopic observation                         |
| .866      | Cooling. Removal of heat                                                                            | .24        | Stereoscopic                                                      |
| .87       | Electricity                                                                                         | .25        | Observation of variable phenomena                                 |
| .872      | Supply. Batteries. Cells etc                                                                        | .251       | Cinematographic                                                   |
| .873      | Distribution                                                                                        | .252       | Stroboscopic                                                      |
| .875      | Regulating apparatus                                                                                | .3         | <b>Apparatus for subjective observation</b>                       |
| .876      | Discharge                                                                                           | .35        | Apparatus for observation of various phenomena                    |
| .88       | Magnetism                                                                                           |            |                                                                   |

|            |                                                                                    |           |                                                                                 |
|------------|------------------------------------------------------------------------------------|-----------|---------------------------------------------------------------------------------|
| 53.087.351 | Illuminating apparatus                                                             | 53.088.22 | Due to the instruments                                                          |
| .352       | Optical projection systems                                                         | .222      | Wear                                                                            |
| .353       | Projection screens                                                                 | .228      | Various influences. Temperature errors                                          |
| .354       | Apparatus for controlling the position of the image                                |           | <i>The type of influence may be denoted by colon combination</i>                |
| .355       | Apparatus for controlling the time or duration of phenomena                        | .23       | Due to the article or substance being observed                                  |
|            | →53.087.5 Photographic recording                                                   | .24       | Due to other agents                                                             |
| .4         | <b>Objective observation. Automatic recording</b>                                  |           | <i>The agents may be denoted by colon combination</i>                           |
| .42        | Recording of maxima and minima                                                     | .3        | Mean errors. Accuracy of measurement.                                           |
| .44        | Continuous recording of a single variable                                          |           | Sensitivity. Correction of non-linear inaccuracies by calibration curves        |
| .45        | Continuous recording of more than one variable                                     | .4        | Limits within which an instrument may be used                                   |
| .47        | Intermittent recording                                                             | .6        | Correction of errors                                                            |
| .5         | <b>Photographic recording</b>                                                      | .7        | Automatic correction of errors. Automatic compensation                          |
|            | →528.7 Photogrammetry (aerial and terrestrial)                                     | 53.089    | <b>VARIOUS QUESTIONS</b>                                                        |
| .51        | Illumination                                                                       | .2        | Coupling of instruments with each other and with other apparatus                |
| .52        | Optical projection systems                                                         | .4        | Instruments according to the form or shape of the article or substance observed |
| .53        | Plates. Film. Paper                                                                |           | 53.089.4 $\cong$ 62-4                                                           |
| .54        | Control of the position of the image                                               | .5        | Characteristics of instruments                                                  |
| .55        | Control of the exposure time                                                       | .52       | Sensitivity. Slowness                                                           |
| .56        | Developing. Fixing                                                                 | .6        | Calibration and testing of instruments                                          |
| .563       | Of negatives                                                                       | .62       | Accessories. Calibration equipment. Calibration rigs, tables etc                |
| .564       | Of positives                                                                       | .68       | Standard parts, devices etc for the testing and calibration of instruments      |
| .6         | <b>Graphic recording. Recording on drums etc</b>                                   | 53.09     | <b>THE ACTION OF CERTAIN FUNDAMENTAL PHYSICAL EFFECTS UPON PHENOMENA</b>        |
| .61        | Writing systems. Writing instruments. Recording devices. Ink pens, styli etc       | .091      | Mechanical effects (other than pressure)                                        |
| .62        | Transmission mechanisms                                                            | .092      | Pressure                                                                        |
| .63        | Strip charts. Graduated drums, discs etc                                           | .093      | Humidity                                                                        |
| .64        | Devices for controlling the marker (stylus etc)                                    | .096      | Temperature                                                                     |
| .65        | Devices for controlling the recording time and duration                            | .097      | Electrical effects                                                              |
| .7         | <b>Coded recording, e.g. by punched tape</b>                                       | .098      | Magnetic effects                                                                |
| .9         | <b>Devices for converting, calculating, counting, printing</b>                     |           |                                                                                 |
| .92        | Measuring transducers                                                              |           |                                                                                 |
| 53.088     | <b>ERRORS. CORRECTION OF ERRORS. EVALUATION AND INTERPRETATION OF MEASUREMENTS</b> |           |                                                                                 |
| .2         | Errors                                                                             |           |                                                                                 |
| .21        | Due to the observer                                                                |           |                                                                                 |

## Principal divisions

### 530.1 General principles of physics

|        |                                                                      |        |                                                                               |
|--------|----------------------------------------------------------------------|--------|-------------------------------------------------------------------------------|
| 530.11 | THE ABSOLUTE IN INDIVIDUAL PHENOMENA                                 | 530.14 | SYNTHESIS OF THE PRINCIPLES OF CONSTANCY AND VARIABILITY. ATOMISM IN GENERAL. |
| .112   | The ether. Theories of the ether. Ether models                       |        | →539.18 Physics of single atoms                                               |
| 530.12 | RELATIVITY PRINCIPLE                                                 | .145   | <b>Quantum theory</b>                                                         |
|        | <i>Further particulars may be denoted by colon combination, e.g.</i> |        | →535.14 Quantum theory of light. Photons                                      |
|        | 530.12:531.18 Special relativity theory                              | .1     | Fundamental problems                                                          |
|        | 530.12:531.51 Relativity theory of universal attraction              | .3     | Quantum rules                                                                 |
| 530.13 | PRINCIPLES OF CONSTANCY AND VARIABILITY                              | .5     | Determination of $h$                                                          |
| .131   | Principle of constancy                                               | .6     | Wave mechanics. Corpuscular waves. Matrices                                   |
|        | <i>Further particulars may be denoted by colon combination, e.g.</i> | .61    | Wave mechanics (Schrödinger)                                                  |
|        | 530.131:531.62 Law of conservation of energy                         | .63    | Matrices. $q$ -numbers (Heisenberg, Dirac)                                    |
| .132   | Principle of variability                                             | .65    | Corpuscular waves (de Broglie)                                                |
| .1     | Principle of continuous variability                                  | .7     | Perturbation theory                                                           |
| .2     | Principle of discontinuous variability                               |        |                                                                               |

|        |                                                                                        |            |                                                                                                             |
|--------|----------------------------------------------------------------------------------------|------------|-------------------------------------------------------------------------------------------------------------|
| 530.15 | PRINCIPLE OF ACTION AND REACTION                                                       | 530.16.162 | Principle of disordered phenomena. Brownian movement. Reversibility. Indeterminacy principle                |
| .151   | Action                                                                                 |            |                                                                                                             |
| .152   | Reaction                                                                               |            |                                                                                                             |
| .1     | Resistance. Persistence. Inertia. Hysteresis                                           |            | <i>Reversibility may be denoted by the common auxiliary of time "761"</i>                                   |
| .15    | Hysteresis                                                                             |            |                                                                                                             |
|        | →537.623 Magnetic hysteresis. Hysteresis loss. Other energy losses in a magnetic field | 530.17     | PRINCIPLE OF SIMILARITY.                                                                                    |
| .2     | Susceptibility                                                                         |            | ANALOGIES                                                                                                   |
|        | →537.621.4 Magnetic susceptibility                                                     | 530.18     | LINEARITY                                                                                                   |
| 530.16 | CAUSALITY AND PROBABILITY                                                              | .181       | Linear phenomena                                                                                            |
| .161   | Principle of order in the succession of phenomena. Irreversibility. Heat death         | .182       | Non-linear phenomena                                                                                        |
|        | <i>Irreversibility may also be denoted by the common auxiliary of time "762"</i>       | 530.19     | GENERALITIES ON FUNDAMENTAL FUNCTIONS SUCH AS POTENTIAL, GRADIENT, INTENSITY, CAPACITY, DISTRIBUTION FACTOR |

## 531/534 Mechanics

### 531 General mechanics. Mechanics of solid bodies. Mechanics of rigid bodies

|                                                                       |                                                                                                  |                                                                                       |
|-----------------------------------------------------------------------|--------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
|                                                                       | .132                                                                                             | Motion of two-dimensional figures. Moving planes                                      |
| →532                                                                  | Mechanics of fluids in general.                                                                  | <i>Further particulars may be denoted by special auxiliaries, e.g.</i>                |
|                                                                       | Mechanics of liquids                                                                             | 531.132-2 Planes moving in their own plane                                            |
| 533                                                                   | Mechanics of gases. Aeromechanics.                                                               | -3 Planes moving in space                                                             |
|                                                                       | Plasma physics                                                                                   |                                                                                       |
| 534                                                                   | Acoustics. Vibrations                                                                            |                                                                                       |
| <i>Further particulars may be denoted by common auxiliaries, e.g.</i> |                                                                                                  | .1 Motion of rigid figures                                                            |
| 531.001.362                                                           | Mechanics of similitude                                                                          | .2 Motion of deformable figures                                                       |
| <b>Special auxiliary subdivisions for 531</b>                         |                                                                                                  |                                                                                       |
| 531-1                                                                 | Lines                                                                                            | 531.133                                                                               |
| -14                                                                   | Lines whose equation contains time                                                               | .1 Motion of rigid figures                                                            |
| -2                                                                    | Surfaces. Planes                                                                                 | .2 Motion of deformable figures                                                       |
| -24                                                                   | Surfaces whose equation contains time                                                            | .3 Motion of deformable systems composed of rigid elements. Articulated systems       |
| -3                                                                    | Euclidean space                                                                                  | Inversors                                                                             |
| -4                                                                    | Multidimensional space                                                                           | .32 Articulated quadrilaterals                                                        |
| -9                                                                    | Non-Euclidean space                                                                              | .33 Approximately rectilinear motion                                                  |
| 531.01                                                                | MATHEMATICAL THEORY OF MECHANICS                                                                 | .34 Motion of poly-dimensional figures (more than three dimensions)                   |
|                                                                       | <i>Further particulars may be denoted by colon combination with the subdivisions of 51 or 53</i> | .134                                                                                  |
| .011                                                                  | Analytical theory of mechanics                                                                   | .14                                                                                   |
| .012                                                                  | Geometrical theory of mechanics                                                                  | .15                                                                                   |
| <b>Principal divisions (continued)</b>                                |                                                                                                  |                                                                                       |
| 531.1                                                                 | KINEMATICS. GEOMETRY OF MOTION                                                                   | .16                                                                                   |
| .11                                                                   | <b>Principles. Definitions</b>                                                                   | .17                                                                                   |
| .111                                                                  | Dimensions. Space and time                                                                       | .18                                                                                   |
| .4                                                                    | Continuum of space and time                                                                      |                                                                                       |
| .5                                                                    | Symmetry of space and time                                                                       |                                                                                       |
| .6                                                                    | Kinematics in continuous and discontinuous space                                                 |                                                                                       |
| .112                                                                  | Velocity                                                                                         | .19                                                                                   |
| .1                                                                    | <b>In general</b>                                                                                |                                                                                       |
| .2                                                                    | Angular velocity                                                                                 | 531.2                                                                                 |
| .8                                                                    | Relative velocity                                                                                | STATICS. FORCES. EQUILIBRIUM.                                                         |
| .113                                                                  | Acceleration                                                                                     | ATTRACTION                                                                            |
| .1                                                                    | In general                                                                                       | →531.35 Motion under the action of central forces. Central forces                     |
| .11                                                                   | Tangential component                                                                             | 531.42 Weight. Mass. Relative density (specific gravity). Density                     |
| .12                                                                   | Normal component                                                                                 |                                                                                       |
| .2                                                                    | Angular acceleration                                                                             | <b>Generalities on statics. Laws</b>                                                  |
| .8                                                                    | Relative acceleration                                                                            | Forces                                                                                |
| .114                                                                  | Accelerations of high degrees, e.g. Coriolis accelerations                                       | .21 Lines of force. Force fields                                                      |
| .115                                                                  | Initial conditions                                                                               | .211 Principle of virtual displacement. Laws of Clapeyron, Maxwell, Bett, Castigliano |
| .12                                                                   | <b>Motion of points</b>                                                                          | .213 Generalities on the geometry of masses                                           |
| .13                                                                   | <b>Motion of figures</b>                                                                         | .215 Generalities on the geometry of segments                                         |
| .131                                                                  | Motion of one-dimensional figures                                                                | .216 Ball's screw                                                                     |
| .1                                                                    | Motion of rigid figures                                                                          | .2 Experiments [cancelled] use 531.21.05 or 531.21.07                                 |
| .2                                                                    | Motion of deformable figures                                                                     |                                                                                       |

|           |                                                                                                                                                                     |                |         |                                                                                                                   |
|-----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|---------|-------------------------------------------------------------------------------------------------------------------|
| 531.22    | <b>Composition and resolution of forces</b>                                                                                                                         | 531.26 (con'd) | 530.19  | Generalities on fundamental functions such as potential, gradient, intensity, capacity, distribution factor       |
| .221      | Equilibrium. Parallelogram of forces. Equilibrium of external and internal forces. Parallel and non-parallel forces. Funicular polygons. Force polygons. Catenaries |                | 531.35  | Motion under the action of central forces. Central forces                                                         |
| .1        | Theory of couples                                                                                                                                                   |                | 531.5   | Gravity. Gravitation. Pendulums. Ballistics                                                                       |
| .2        | Degrees of freedom                                                                                                                                                  |                | 537.213 | Potential. Potential fields                                                                                       |
| .3        | Stable, unstable and neutral equilibrium                                                                                                                            |                | 537.612 | Magnetic field. Magnetic potential                                                                                |
| .6        | Astatic equilibrium                                                                                                                                                 |                | .261    | Newtonian attraction. Potential. Equipotential. Equipotential lines and surfaces                                  |
| .7        | Bodies under constraint                                                                                                                                             |                | .1      | Attraction of lines                                                                                               |
| .8        | Theory of hanging chains. Equilibrium of chains                                                                                                                     |                | .15     | Attraction of cylinders. Logarithmic potential                                                                    |
| .222      | Tensions                                                                                                                                                            |                | .2      | Attraction of surfaces, particularly single shells                                                                |
| .223      | Forces of compression                                                                                                                                               |                | .25     | Attraction of double shells                                                                                       |
| .224      | Bending stresses                                                                                                                                                    |                | .3      | Attraction of homogeneous bodies, volumes                                                                         |
| 531.224.2 | Horizontal stresses                                                                                                                                                 |                | .35     | Attraction of ellipsoids                                                                                          |
| .3        | Oblique stresses                                                                                                                                                    |                | .4      | Attraction of non-homogeneously distributed bodies                                                                |
| .4        | Vertical stresses. Euler's formula. Buckling. Simultaneous action of a load and a lateral force. Axial compression                                                  |                | .5      | Attraction of bodies distributed inside irregular boundaries                                                      |
| .5        | Forces in wires                                                                                                                                                     |                | .262    | Solution of Neumann's and Dirichlet's problems                                                                    |
| .6        | Forces in articulated systems                                                                                                                                       | .266           | .266    | Various generalizations of attraction and potential                                                               |
| .7        | Forces in flexible surfaces                                                                                                                                         |                | .2      | For Euclidean spaces of more than three dimensions                                                                |
| .8        | Statics of bodies deformable in all directions                                                                                                                      |                | .3      | For non-Euclidean spaces                                                                                          |
| .225      | Torsional stresses                                                                                                                                                  |                | .269    | Other laws of attraction                                                                                          |
| .226      | Shear stresses                                                                                                                                                      | 531.3          | .31     | <b>DYNAMICS. KINETICS</b>                                                                                         |
| .228      | Secondary stresses                                                                                                                                                  | .311           | .311    | <b>Fundamental principles</b>                                                                                     |
| .23       | <b>Moments</b>                                                                                                                                                      | .312           |         | Relationships between force, mass and acceleration                                                                |
| .231      | Generalities. Determination of moments of inertia. Axes of inertia. Centrifugal moments                                                                             | .1             | .312    | D'Alembert's principle and derived principles                                                                     |
| .232      | Torque. Turning moments                                                                                                                                             | .2             | .1      | D'Alembert's principle                                                                                            |
| .233      | Moments of various orders with reference to a plane                                                                                                                 | .3             | .2      | Principle of kinetic energy                                                                                       |
| .234      | Static moments. Moments of a force                                                                                                                                  | .4             | .3      | Principle of areas                                                                                                |
| .235      | Properties of the product of inertia $\Sigma mxy$ and analogous expressions                                                                                         | .5             | .4      | Principle of movement of the centre of gravity                                                                    |
| .24       | <b>Centre of gravity</b>                                                                                                                                            | .313           | .5      | Principle of homogeneity. Mechanical similarity                                                                   |
|           | <i>Further particulars may be denoted by special auxiliaries, e.g.</i>                                                                                              | .314           |         | Principle of virtual velocities                                                                                   |
|           | 531.24-1 of lines                                                                                                                                                   | .1             |         | Principle of least action. Hamilton's principle                                                                   |
|           | -2 of planes                                                                                                                                                        | .2             |         | Generalities                                                                                                      |
|           | -3 of volumes                                                                                                                                                       | .3             |         | Lagrange's equations                                                                                              |
| .25       | <b>Graphical statics</b>                                                                                                                                            | .4             |         | Hamilton's equations                                                                                              |
|           | <i>Further particulars may be denoted by colon combination, e.g.</i>                                                                                                | .5             |         | Jacobi's equations                                                                                                |
|           | 531.25:531.22 Graphical composition and equilibrium of forces. Polygon of forces                                                                                    | .6             |         | Lagrange's and Jacobi's equations in instances where friction and resistance of the medium are taken into account |
|           | :531.23 Graphical determination of moments                                                                                                                          | .315           |         | Geometrical applications of the principle of least action                                                         |
|           | :531.24 Graphical determination of centres of gravity                                                                                                               | .32            |         | Principle of least constraint                                                                                     |
|           | <i>For static investigation and calculation of building structures →624.04</i>                                                                                      | .33            |         | <b>Generalities on the motion of a point mass</b>                                                                 |
| .252      | Specific stresses                                                                                                                                                   | .331           |         | <b>Problems of tautochronism.</b>                                                                                 |
| .2        | Stress in plane surfaces. Stress ellipses                                                                                                                           | .1             |         | <b>Brachistochronism. Isochronism</b>                                                                             |
| .3        | Stress in bodies. Stress ellipsoids                                                                                                                                 | .2             |         | Problems of tautochronism                                                                                         |
| .255      | One-dimensional bodies                                                                                                                                              | .3             |         | Including friction                                                                                                |
| .258      | Plane bodies. Two-dimensional bodies                                                                                                                                | .332           |         | Under the action of a central force                                                                               |
| .259      | Three-dimensional bodies                                                                                                                                            | .1             |         | Under the action of gravity                                                                                       |
| .1        | Solid bodies                                                                                                                                                        | .2             |         | Generalities on brachistochronism                                                                                 |
| .2        | Hollow bodies                                                                                                                                                       | .3             |         | Including friction                                                                                                |
| .22       | Under fluid pressure                                                                                                                                                | .333           |         | Under the action of a central force, when passive resistance is included                                          |
| .222      | External pressure                                                                                                                                                   | .1             |         | Under the action of gravity                                                                                       |
| .223      | Internal pressure                                                                                                                                                   | .2             |         | Problems of isochronism                                                                                           |
| .26       | <b>Attraction. Laws and applications of potential. Specific solutions of integration problems</b>                                                                   | .35            |         | Of the lemniscate                                                                                                 |
|           | →530.12 Relativity principle                                                                                                                                        | .351           |         | Synchronic curves                                                                                                 |
|           |                                                                                                                                                                     |                |         | <b>Motion under the action of central forces. Central forces</b>                                                  |
|           |                                                                                                                                                                     |                |         | Centripetal forces. Centrifugal forces                                                                            |
|           |                                                                                                                                                                     |                |         | →531.113.12 Normal component of acceleration                                                                      |

|         |                                                                                                                               |             |                                                                                                                         |
|---------|-------------------------------------------------------------------------------------------------------------------------------|-------------|-------------------------------------------------------------------------------------------------------------------------|
| 531.352 | Motion about a centre of gravity                                                                                              | .537        | Pendulum in a resistant medium                                                                                          |
|         | →521.1 Celestial mechanics                                                                                                    | .538        | Compound pendulum                                                                                                       |
| .353    | Motion under particular laws of force.                                                                                        | .539        | Other matters                                                                                                           |
|         | Investigation of forces causing motion                                                                                        | .2          | Coupled pendulums                                                                                                       |
|         | satisfying certain given conditions                                                                                           | .55         | <b>External ballistics. Path and motion of projectiles. Trajectory</b>                                                  |
| .355    | Motion taking into account the resistance of the medium                                                                       |             | →623.5 Ballistics. Gunnery. Theoretical and experimental problems — Military engineering                                |
| .36     | <b>Generalities on motion of a solid body or of a system of rigid solid bodies. Small motions. Stability. Poinot's theory</b> |             |                                                                                                                         |
| .37     | <b>Motion of a solid body unaffected by force. Free motion</b>                                                                |             | <b>Special auxiliary subdivisions for 531.55</b>                                                                        |
| .38     | <b>Other motions of a solid body</b>                                                                                          | 531.55.011  | Abscissa (range)                                                                                                        |
| .381    | Bodies movable about a fixed point                                                                                            | .012        | Ordinate (rise)                                                                                                         |
| .382    | Bodies movable about an axis. Solids of revolution                                                                            | .013        | Fall                                                                                                                    |
| .383    | Application to the gyroscope, the top                                                                                         | .014        | Flight duration                                                                                                         |
| .384    | Bodies on a fixed plane                                                                                                       | .015        | Inclination of the tangent                                                                                              |
| .39     | <b>Other problems of dynamics</b>                                                                                             | .016        | Final velocity                                                                                                          |
| .391    | Dynamics of material systems                                                                                                  | .017        | Asymptote [ <i>cancelled</i> ]                                                                                          |
| .1      | Motion of cables, cords, strings etc                                                                                          | .018        | Radius of curvature                                                                                                     |
| .2      | Motion of flexible surfaces. Motion of membranes                                                                              | .019        | Other elements                                                                                                          |
| .3      | Small motions about a position of stable equilibrium                                                                          |             | <b>Principle divisions (continued)</b>                                                                                  |
| .4      | Tautochronic motion. Brachistochronic motion                                                                                  | 531.551     | Motion in a vacuum. Equation, co-ordinates and geometrical properties of the trajectory                                 |
| .5      | Stability of motion                                                                                                           | .1          | Equation of the trajectory                                                                                              |
| 531.392 | Integrals common to various problems of dynamics                                                                              | .2          | Co-ordinates of a given point                                                                                           |
| .2      | Problems admitting of algebraic integration with regard to velocity                                                           | .3          | Co-ordinates of the point of impact                                                                                     |
| .394    | Methods of transformation in mechanics                                                                                        | .4          | Co-ordinates of the highest point                                                                                       |
| .395    | Dynamics of systems subjected to conditions varying with time                                                                 | .5          | Geometrical properties of the trajectory in a vacuum. Parabola of safety                                                |
| .396    | Relative motion of systems of solid bodies                                                                                    | .552        | Motion in a resisting medium                                                                                            |
| 531.4   | <b>WORK. WEIGHT. MASS. FRICTION. PASSIVE RESISTANCE</b>                                                                       |             | →532.582 Resistance of immersed (sub-merged) bodies                                                                     |
| .41     | Work. Efficiency                                                                                                              | .553        | Differential equations of movement. Transformations. Hodographs                                                         |
| .42     | Weight. Mass. Relative density (specific gravity). Density                                                                    | .554        | Inverse ballistic problem                                                                                               |
|         | →531.75 Measurement of mass and density                                                                                       | .555        | Elements of the trajectory. Laws of air resistance                                                                      |
| .421    | Weight as a measure of quantity of material                                                                                   |             | →532.582 Resistance of immersed (sub-merged) bodies                                                                     |
| .422    | Mass as a measure of quantity of material. Heavy masses                                                                       | 623.546     | Trajectory measurement. Air resistance to the projectile — Military engineering                                         |
| .423    | Relative density (specific gravity). Mass of unit volume                                                                      | .556/.556.3 | Experimental laws of air resistance [ <i>cancelled</i> ] →623.546                                                       |
| .424    | Density                                                                                                                       | .557        | Study of rectilinear, horizontal and vertical motions                                                                   |
|         | →532.14 Density — Mechanics of fluids                                                                                         | .558        | Calculation of firing tables. Various other tables                                                                      |
|         | 533.12 Density — Mechanics of gases                                                                                           | .56         | <b>Secondary motions in the air. Effect of spin of the projectile and of variation of the ballistic elements</b>        |
| .43     | Generalities on friction                                                                                                      | .561/.565   | Unilateral deviations [ <i>cancelled</i> ]                                                                              |
|         | →539.62 Friction — Intermolecular forces                                                                                      | .561        | Laws of spin of projectiles. Nutation. Yaw. Drift                                                                       |
| .44     | Sliding friction                                                                                                              | .562        | Influence of density variations in the resisting medium                                                                 |
| .45     | Rolling friction                                                                                                              | .564        | Influence of the motion of the air in the atmosphere. Deviations due to wind                                            |
| .46     | Combination of sliding friction and rolling friction                                                                          | .565        | Influence of projectile characteristics, e.g. weight, centre of gravity, stability                                      |
| .47     | Resistance of an axis of rotation                                                                                             |             | →525.37 Deviation of falling bodies and projectiles due to the rotation of the earth's axis                             |
| .49     | Other passive resistances                                                                                                     | .566/.567   | Accidental deviations [ <i>cancelled</i> ]                                                                              |
| 531.5   | <b>GRAVITY. GRAVITATION. PENDULUMS. BALLISTICS</b>                                                                            | .566        | Experimental study of misfirings, failures, stray shots etc                                                             |
| .51     | <b>Laws of universal attraction</b>                                                                                           | .567        | Probability of hitting the target. Distribution of projectiles                                                          |
|         | →526.7 Measurement of gravity and its results                                                                                 | .57         | <b>Internal ballistics. Motion in the barrel</b>                                                                        |
|         | 531.26 Attraction. Laws and applications of potential etc                                                                     | .571        | Laws of combustion of powders in a closed vessel without entry of air. Velocities of combustion, Pressure relationships |
|         | 550.312 Gravity and isostasy. Distribution of density. Distribution of gravity — Geophysics                                   | .572        | Laws of combustion of powders in firearms                                                                               |
| .52     | <b>Laws of falling bodies</b>                                                                                                 | .573        | Development of pressure at the breech. Resistance of the gun                                                            |
| .53     | <b>Pendulum theory</b>                                                                                                        |             |                                                                                                                         |
| .532    | Mathematical pendulum                                                                                                         |             |                                                                                                                         |
| .533    | Cycloidal pendulum                                                                                                            |             |                                                                                                                         |
| .535    | Physical pendulum                                                                                                             |             |                                                                                                                         |
| 531.536 | Reversible pendulum                                                                                                           |             |                                                                                                                         |

- 531.575 Rotation in the barrel, Effect and resistance of the rifling  
 .576 Velocities at or near the muzzle  
 .577/.578 Penetration of projectiles [*cancelled*] →531.58  
 .58 **Terminal ballistics. Penetration into the target**  
*The target material may be denoted by colon combination with the subdivisions of 66/67*  
 →623.56 Effect of projectiles. Disruptive effect. Blast effect. Firing tests — Military engineering
- 531.6 MECHANICAL ENERGY. CONSERVATION OF MECHANICAL ENERGY  
 .61 Energy. Momentum  
 .611 Mechanical energy in the strict sense  
 .612 Momentum  
 .62 Law of conservation of energy in mechanics  
 .64 Potential energy  
 .65 Kinetic energy  
 .652 Kinetic energy in an enclosed system  
 .653 Kinetic energy in relative motion  
 .66 Collision of bodies. Impact  
 .661 Collision of perfectly inelastic bodies  
 .662 Collision of perfectly elastic bodies  
 .663 Collision of imperfectly elastic bodies
- 531.7 MEASUREMENT OF GEOMETRICAL AND MECHANICAL QUANTITIES. INSTRUMENTS. METHODS. UNITS  
 →389.1 Weights and measures. The metric system  
 621.317 Electrical measurement (methods and apparatus)  
 681.2 Instrument making. Instrumentation. Measuring instruments and their manufacture  
*For general principles and theories of measurements and construction of measuring apparatus* →53.08  
 53.08  
 .7.07 Verniers [*cancelled*] →53.085.323.1  
 .71 **Linear measurement**  
 →621.753.2 Limits and fits  
 621.753.3 Gauges. Gauge making  
 .711 Reference lengths. Standard lengths, measures. End standards. End measuring bars and rods  
 .1 Line standards  
 .15 Standard measuring tapes, wires etc  
 .5 End standards. End measuring bars and rods  
 .51 Flat-ended standards. Parallel-ended standards. Slip (block) gauges  
 .52 Low-accuracy end standards, *e.g.* thickness gauges (feeler gauges)  
 .55 Spherical-ended standards  
 .57 Cylindrical standards. Roller gauges  
 .712 Measurement of datum lines  
 .713 Comparators and cathetometers for line standards and scales  
 .8 Measuring microscopes with micrometer eye-piece or graticule  
 .714 Measuring instruments. Micrometers  
 .1 Sensitive comparators for end standards  
 .2 Other measuring instruments for general high-accuracy work. Travelling microscopes  
 .7 Micrometers  
 .71 Micrometer heads  
 .72 External micrometers  
 .73 External micrometers with a ratchet stop  
 .75 Internal micrometers  
 .77 Depth micrometers  
 .8 Vernier calipers. Slide gauges  
 .9 Spiral line plates
- 531.715 Optical precision methods and apparatus  
 .1 Interferometry  
 →535.41 Interference  
 681.787 Interferometric apparatus  
 .2 Optical methods not using interferometers  
 .27 Methods and apparatus using optical projection  
 .716 Industrial measuring apparatus. Apparatus used in everyday life  
 .1 Rigid rules  
 .2 Folding rules  
 .3 Tape measures  
 .4 Measuring chains  
 .5 Apparatus for measuring ropes, cords etc  
*Further particulars may be denoted by colon combination, e.g.*  
 531.716.5:531.791 Footage, yardage etc counters  
 .6 Measuring compasses. Dividers  
 .717 Measurement of thickness, diameter, height, depth, length, distance, inclination, flatness, parallelism  
 .1 Methods and apparatus for measurement of thickness, diameter, length, distance  
 .11 External measurement. Thickness measurement  
 .12 Internal measurement. Measurement of bore diameter  
 .14 Measurement of length, distance, separation  
 .15 Measurements on screw threads  
 .2 Measurement of outlines, profiles etc  
 .3 Measurement of height, depth, pitch  
 →531.719.3/.4 Measurement of depth, height, altitude
- 531.717.31 Measurement of height. Scribing blocks  
 .32 Measurement of depth  
 .321 Depth gauges  
 .35 Measurement of pitch  
 .351 Measurement of screw pitches. Measurement of annular grooves  
 .5 Indicators. Pointers. Dial gauges  
 .51 Dial gauges  
 .511 Conventional dial gauges  
 .512 Dial gauges with micron graduations  
 .513 Dial gauge contact points for external measurement  
 .515 Dial gauges with attachment for internal measurement  
 .516 Dial gauge contact points for internal measurement  
 .517 Depth dial gauges  
 .52 Precision indicators with mechanical indication  
 .521 For external measurement  
 .525 For internal measurement  
 .527 For depth measurement  
 .53 Precision indicators with optical indication  
 531.717.53  $\cong$  531.717.52  
 .55 Precision indicators with electrical indication  
 .7 Measurement of spheres. Spherometers  
 .8 Flatness testing. Straightness testing  
 .81 Flatness testing  
 .82 Flatness testing apparatus  
 .85 Straightness testing  
 .86 Straightness testing apparatus  
 .861 Knife-edge straightedges  
 .862 Straightedges with rectangular cross-section  
 .88 Parallelism testing  
 .718 Gauges. Templates. Limit gauges etc. Gauging in general  
 .1 Simple gauges  
 .2 Caliper gauges. Plug gauges. Ring gauges. Profile gauges. Wire gauges etc  
 .4 Displacement gauges  
 .41 Height gauges  
 .45 Pitch gauges  
 .451 For screw threads and annular grooves  
 .5 Angle gauges

|         |                                                                                                                                                            |         |                                                                                                                                                                                     |
|---------|------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 531.719 | Other apparatus for the measurement of length                                                                                                              | 531.742 | Other direct measurements. Angular end standards                                                                                                                                    |
| .1      | Curvimeters                                                                                                                                                |         |                                                                                                                                                                                     |
| .2      | Measurement of distances. Range finding                                                                                                                    | .743    | Measurement by reflection. Reflection goniometry                                                                                                                                    |
|         | →526 Geodesy. Surveying                                                                                                                                    |         | For goniometers → 681.786.3                                                                                                                                                         |
| .21     | Apparatus for a datum line and two observation points (also for parallel displacement of one of the observation points)                                    | .1      | Single circle                                                                                                                                                                       |
| .22     | Apparatus for a datum line and one observation point                                                                                                       | .2      | Double circle                                                                                                                                                                       |
| .23     | Apparatus characterized by the datum line being at the observed object                                                                                     | .3      | Triple circle. Multiple circle                                                                                                                                                      |
| .24     | Optical apparatus for measuring distance. Stereoscopic distance measurement. Split-field coincidence (inverted coincidence) and stereoscopic range finders | .744    | Graduated scales for mirror instruments                                                                                                                                             |
| .25     | Apparatus with micrometers or other accessories                                                                                                            | .745    | Indirect measurements. Sine-bars. Surface and angle plates                                                                                                                          |
| .27     | Special apparatus for measuring the distance of moving objects                                                                                             | .746    | Clinometers                                                                                                                                                                         |
| .28     | Electrical range-finders (telemeters)                                                                                                                      | .747    | Standard angles                                                                                                                                                                     |
| .3      | Measurement of depth                                                                                                                                       | .1      | Set squares                                                                                                                                                                         |
| .31     | Plummets                                                                                                                                                   | .748    | Photographic goniometry. Photogoniometry                                                                                                                                            |
| .32     | Sounding machines                                                                                                                                          | .749    | Other methods of measuring angles                                                                                                                                                   |
| .33     | Electrical apparatus                                                                                                                                       | .1      | Solid angle measurement                                                                                                                                                             |
| .34     | Manometric apparatus                                                                                                                                       | .75     | <b>Measurement of mass and density</b>                                                                                                                                              |
| .35     | Echo sounding                                                                                                                                              |         | →542.3 Measurement of mass, volume, density etc — Laboratory chemistry                                                                                                              |
| .39     | Other apparatus for measuring depth                                                                                                                        | .751    | Measurement of mass. Standards of mass                                                                                                                                              |
| .4      | Measurement of height, altitude, e.g. of aircraft                                                                                                          |         | Standards of mass                                                                                                                                                                   |
|         | →551.508.762 Instruments for measuring the upper and lower limit of clouds                                                                                 | .3      | Measurement of mass                                                                                                                                                                 |
|         |                                                                                                                                                            | .752    | Types of balance                                                                                                                                                                    |
| .72     | <b>Measurement of surfaces and sections</b>                                                                                                                |         | →681.26 Weighing machines. Balances — Instrument making                                                                                                                             |
| .721    | Planimeters. Integrators                                                                                                                                   | .753    | Methods of weighing                                                                                                                                                                 |
| .722    | Special compasses for measuring areas                                                                                                                      | .754    | Measurement of density in general. Density of solids. Determination of relative density (specific gravity)                                                                          |
| .724    | Measurement of specific surface of granular materials                                                                                                      | .1      | Determination of density by combination of measurements of mass and volume                                                                                                          |
|         | →531.731.4 Measurement of the volume of loose matter                                                                                                       | .2      | Determination of density of powders                                                                                                                                                 |
| .728    | Measurement of surfaces with the aid of a microscope                                                                                                       | .3      | Determination of density using a hydrometer                                                                                                                                         |
| .729    | Calipers                                                                                                                                                   | .4      | Determination of density using a pyknometer                                                                                                                                         |
| .1      | Simple calipers. Rigid calipers                                                                                                                            | .5      | Determination of density using a hydrostatic balance                                                                                                                                |
| .2      | Adjustable calipers                                                                                                                                        | .6      | Determination of density by suspension in a liquid                                                                                                                                  |
| .3      | For external measurement. External gauges                                                                                                                  | .7      | Determination of density by substitution of a gas                                                                                                                                   |
| .4      | For internal measurement                                                                                                                                   | .755    | Measurement of density or relative density of lumpy, granular or finely-divided materials                                                                                           |
| .5      | For measuring screw threads                                                                                                                                | .1      | Apparent density or relative density in general. Approximate density, relative density, of porous materials in particular                                                           |
| .7      | Limit gauges                                                                                                                                               |         |                                                                                                                                                                                     |
| .73     | <b>Measurement of volumes</b>                                                                                                                              | .2      | Determination of relative density of heaped, bulk materials                                                                                                                         |
|         | →542.3 Measurement of mass, volume, density etc — Laboratory chemistry                                                                                     | .22     | Determination of bulk density                                                                                                                                                       |
|         | 681.121 Fluid meters. Measuring devices for liquids, gases, vapours                                                                                        | .23     | Determination of shaken bulk density                                                                                                                                                |
| .731    | Volumes of common geometrical shapes                                                                                                                       | .24     | Determination of compacted density                                                                                                                                                  |
| .1      | Standard of volume. Standard measures                                                                                                                      | .756    | Measurement of density of liquids                                                                                                                                                   |
| .2      | Measurement of the volume of solids                                                                                                                        | .1      | Determination of density by combination of measurements of mass and volume                                                                                                          |
| .3      | Measurement of the volume of hollow bodies                                                                                                                 | .3      | Determination of density using a hydrometer                                                                                                                                         |
| .4      | Measurement of the volume of loose matter                                                                                                                  | .4      | Determination of density using a pyknometer                                                                                                                                         |
| .43     | Measurement of the volume of matter and of the interstitial space                                                                                          | .5      | Determination of density using a hydrostatic balance                                                                                                                                |
| .732    | Measurement of the volume of liquids                                                                                                                       | .758    | Measurement of density of gases                                                                                                                                                     |
| .733    | Measurement of the volume of gases                                                                                                                         | .1      | Determination of density by weighing a given volume of gas after weighing the same volume of air. Lux method. Dumas method. Gay-Lussac method. Viktor Meyer method. Regnault method |
| .74     | <b>Measurement of angles</b>                                                                                                                               | .4      | Pyknetric method (Chancel)                                                                                                                                                          |
|         | →513.101.5 Measurement of angles. Systems of dividing circles — Mathematics                                                                                | .6      | Determination by streaming (Bunsen)                                                                                                                                                 |
| .741    | Protractors. Contact goniometers                                                                                                                           | .76     | <b>Measurement of time, velocity and acceleration</b>                                                                                                                               |
| .1      | Single circle                                                                                                                                              | .761    | Measurement of time                                                                                                                                                                 |
| .2      | Double circle                                                                                                                                              |         | →529.7 Horology. Measurement of time                                                                                                                                                |
|         |                                                                                                                                                            | .763    | Second counters. Stopwatches etc                                                                                                                                                    |

|           |                                                                                                                                                                                                                       |        |                                                                                                                                                              |
|-----------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|--------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 531.764   | Hour counters. Pendulum clocks. Balance wheel clocks                                                                                                                                                                  | .1     | Liquid micromanometers in which the reservoir is stationary and the level of the liquid is read                                                              |
| .5        | Quartz clocks                                                                                                                                                                                                         | .13    | Liquid micromanometers with diagonal limb                                                                                                                    |
| .765      | Chronographs                                                                                                                                                                                                          | .132   | With stationary diagonal limb                                                                                                                                |
| .766      | Ballistic chronographs [ <i>cancelled</i> ] use 531.765:623.54                                                                                                                                                        | .133   | With movable diagonal limb                                                                                                                                   |
| .767      | Velocity meters                                                                                                                                                                                                       | .2     | Liquid micromanometers in which the liquid level remains the same and the position of the reservoir is read                                                  |
| .768      | Accelerometers                                                                                                                                                                                                        | .612   | With more than one liquid                                                                                                                                    |
| .5        | Measurement of the irregularity of machines                                                                                                                                                                           | .7     | Differential pressure gauges                                                                                                                                 |
| .77       | <b>Measurement of angular velocity</b>                                                                                                                                                                                | .9     | Other methods of measuring pressure                                                                                                                          |
| .771      | Counters of revolutions per second                                                                                                                                                                                    | .91    | Electrical methods                                                                                                                                           |
| .772      | Revolution counters other than counters of revolutions per second                                                                                                                                                     | .913   | Piezoelectric methods                                                                                                                                        |
| .773      | Gear counters                                                                                                                                                                                                         | .916   | Resistance manometers                                                                                                                                        |
| .775      | Mechanical velocity indicators. Tachometers                                                                                                                                                                           |        |                                                                                                                                                              |
| .776      | Optical velocity indicators<br><i>Further particulars may be denoted by special auxiliaries, e.g.</i><br>531.776.087.252 Stroboscopic velocity indicators                                                             | .95    | Other types of barometer depending upon gravity                                                                                                              |
| .78       | <b>Measurement of force, work and pressure</b><br>→621.1.018.8 Devices for determining efficiency and power output — Steam engines<br>621.43.018.8 Devices for determining efficiency and power output — Heat engines | .788   | Measurement of vacuums. Vacuum meters, gauges                                                                                                                |
| .781      | Measurement of force. Measurement of torque, twisting moment                                                                                                                                                          | .1     | Mechanical vacuum gauges                                                                                                                                     |
| .2        | Tension measurement                                                                                                                                                                                                   | .12    | McLeod vacuum gauges                                                                                                                                         |
| .782      | Testing machines. Tensile testing machines. Machines for measuring pressure<br>→620.1 Materials testing. Defects of materials. Protection of materials                                                                | .13    | Gas-kinetic vacuum gauges. Radiometer gauges                                                                                                                 |
| .783      | Measurement of work in general                                                                                                                                                                                        | .132   | Attenuation vacuum gauges. Quartz filament vacuum gauges                                                                                                     |
| .784      | Dynamometric indicators                                                                                                                                                                                               | .2     | With one quartz filament                                                                                                                                     |
| .785      | Dynamometric brakes. Prony brakes                                                                                                                                                                                     | .3     | With more than one quartz filament or with one or more quartz strips                                                                                         |
| .786      | Transmission dynamometers                                                                                                                                                                                             | .32    | With special stabilizers                                                                                                                                     |
| .787      | Pressure measurement. Manometers. Pressure cells. Barometers<br><i>Further particulars may be denoted by special auxiliaries, e.g.</i><br>531.787.085 Recording apparatus                                             | .4     | Quartz filament vacuum meters in which the oscillation is confined to one plane                                                                              |
| .1        | With flexible tubes. Bourdon tubes                                                                                                                                                                                    | .42    | With special stabilizers                                                                                                                                     |
| .11       | Of metal                                                                                                                                                                                                              | .133   | Radiometer vacuum gauges                                                                                                                                     |
| .12       | Of glass, quartz glass                                                                                                                                                                                                | .2     | Absolute vacuum gauges (Knudsen)                                                                                                                             |
| .13       | Of other non-metallic materials                                                                                                                                                                                       | .5     | Optical vacuum gauges. Discharge tubes. Colour in discharge tubes                                                                                            |
| .2        | With diaphragms. Pressure cells. Metal barometers. Aneroid barometers. Hypsometers. Hypsometric barometers                                                                                                            | .6     | Thermal vacuum gauges. Thermal conductivity vacuum gauges. Pirani gauges                                                                                     |
| .21       | With metal diaphragm                                                                                                                                                                                                  | .63    | Thermal conductivity vacuum gauges with resistance thermometer                                                                                               |
| .22       | Of glass, quartz glass                                                                                                                                                                                                | .64    | Thermal conductivity vacuum gauges with vacuum thermocouple                                                                                                  |
| .23       | Of other non-metallic materials                                                                                                                                                                                       | .7     | Electrical vacuum gauges. Ionization gauges                                                                                                                  |
| .3        | With piston. Piston manometers                                                                                                                                                                                        | .73    | Electrical vacuum gauges with separate gas discharge. Discharge tubes                                                                                        |
| 531.787.4 | With liquid, air, float. Liquid barometers. Mercury barometers                                                                                                                                                        | .732   | With separate gas discharge in a magnetic field                                                                                                              |
| .43       | Ring balance manometers                                                                                                                                                                                               | .74    | Electrical vacuum gauges with integral gas discharge. Ionization gauges                                                                                      |
| .45       | Liquid barometers. Mercury barometers<br><i>Further particulars may be denoted by special auxiliaries, e.g.</i><br>531.787.45.088.6 Correction of errors                                                              | .789.1 | Torsion meters                                                                                                                                               |
| .5        | Optical manometers. Pressure measurement by observation of pressure-responsive phenomena                                                                                                                              | .79    | <b>Other measuring apparatus</b>                                                                                                                             |
| .53       | Use of refractive index. Interference refractometers used for measuring pressure                                                                                                                                      | .791   | Methods of counting or estimating a number of units                                                                                                          |
| .6        | Micromanometers                                                                                                                                                                                                       | .792   | Dividing methods. Dividing apparatus                                                                                                                         |
| .61       | Liquid micromanometers                                                                                                                                                                                                | .1     | Parallel dividing                                                                                                                                            |
| .611      | With only one liquid                                                                                                                                                                                                  | .2     | Dividing angles. Dividing circles<br>→513.101.5 Measurement of angles. Systems of dividing circles — Mathematics                                             |
|           |                                                                                                                                                                                                                       | .3     | Other methods                                                                                                                                                |
|           |                                                                                                                                                                                                                       | .793   | Measurement of degree of curvature                                                                                                                           |
|           |                                                                                                                                                                                                                       | 531.8  | <b>THEORY OF MACHINES. GENERALITIES ON TECHNICAL MECHANICS</b><br><i>Further particulars may be denoted by colon combination with the subdivisions of 62</i> |

## 532 Mechanics of fluids in general mechanics of liquids

Information about fluids in general, i.e. both liquids and gases, should be classed here, as well as information about liquids in particular. Information about only gases should be classed under 533. To denote specific properties of gases not provided for under 533 it may be necessary to use colon combination with the subdivisions of 532

|                                                 |                                                                                             |                                                                                                                   |
|-------------------------------------------------|---------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------|
| 532.1                                           | HYDROSTATICS IN GENERAL.<br>PRESSURE. INTERNAL FRICTION.<br>VISCOSITY. COMPRESSIBILITY      | <b>Special auxiliary subdivisions for 532.5</b>                                                                   |
| <b>Special auxiliary subdivisions for 532.1</b> |                                                                                             | 532.5–1/–9 Liquid motion in lines, surfaces, space<br>532.5–1/–9 $\cong$ 531–1/–9                                 |
| 532.1–1                                         | One-dimensional. Lines.                                                                     | 532.5.0 <i>The special auxiliary subdivisions listed at 533.6 may be used throughout 532.5</i>                    |
| –2                                              | Two-dimensional. Surfaces. Planes                                                           | .011.1 Dimensional analysis. Scale effect                                                                         |
| –3                                              | Three-dimensional. Bodies                                                                   | .11 Froude number. Effects of gravity                                                                             |
| –4                                              | Multidimensional space                                                                      | .12 Reynolds number. Effects of viscosity                                                                         |
| –9                                              | Non-Euclidean space                                                                         | .17 Shape of boundaries. Effects of shape                                                                         |
| <b>Principal divisions (continued)</b>          |                                                                                             | .18 Relative smoothness. Effects of roughness of boundaries                                                       |
| 532.11                                          | Pressure                                                                                    | .182 Smooth surfaces                                                                                              |
|                                                 | <i>For pressure measurement</i> → 531.787                                                   | .013 Dynamics                                                                                                     |
| .111                                            | Pressure on a surface. Hydrostatic pressure<br>[cancelled] use 532.11–2                     | .12 Drag<br>→532.58 Pressures induced by relative motion of bodies and fluids.<br>Resistance to motion            |
| .112                                            | Pressure on a body [cancelled] use 532.11–3                                                 | .13 Lift                                                                                                          |
| .12                                             | Compressibility. Elasticity                                                                 | .2 Unsteady motion                                                                                                |
| .122/.123                                       | Compressibility. Elasticity [cancelled]<br>→532.12                                          | .3 Steady motion                                                                                                  |
| .13                                             | Internal friction. Viscosity                                                                | .4 Dynamic stability                                                                                              |
| .132                                            | Fluidity. Superfluidity                                                                     | .5 Uniform flow                                                                                                   |
| .133                                            | Viscosity coefficients. Relationships between viscosity and other constants of state        | .031 Hydrodynamics of frictionless liquids. Potential flow                                                        |
| .135                                            | Rheology. Non-Newtonian viscosity.<br>Viscoelasticity<br>→541.182.025 Thixotropy — Colloids | .032 Hydrodynamics of liquids with friction                                                                       |
| .137                                            | Viscometers. Consistometers                                                                 | .07 Characteristics of testing apparatus                                                                          |
| .2                                              | Viscometers using Poiseuille motion in capillary tubes                                      | .071.4 Wall interference, turbulence, calibrations, corrections                                                   |
| .3                                              | Viscometers using the viscous damping of vibrating bodies in the fluid                      | .073 Water tunnels. Cavitation tunnels                                                                            |
| .4                                              | Viscometers using Couette motion between rotating cylinders or cones                        | .074 Water tanks. Towing tanks                                                                                    |
| .7                                              | Jet viscometers, e.g. Redwood, Saybolt, Engler types                                        | .076 Tanks (electrolytic) for solving potential flow problems                                                     |
| .14                                             | Density                                                                                     | <b>Principal divisions (continued)</b>                                                                            |
| 532.2                                           | EQUILIBRIUM OF LIQUIDS                                                                      | 532.51 <b>Generalities on liquid motion.</b>                                                                      |
| .21                                             | Surface level. Surfaces                                                                     | <b>Hydrodynamics in the strict sense</b>                                                                          |
| .217                                            | Measurement of surface level                                                                | .511 Dynamic equations of motion. Euler's and Lagrange's equations. Equation of continuity                        |
| .2                                              | Direct reading. Water depth gauges                                                          | .513 Pressure distributions deduced from Bernoulli's equation                                                     |
| .3                                              | Remote measurement                                                                          | .1 Hydrodynamic pressure                                                                                          |
| .5                                              | Constant-level tanks                                                                        | .514 Uniform motion [cancelled] →532.5.013.4                                                                      |
| .22                                             | Free surfaces                                                                               | .516 Classical theories of viscous liquids. Friction in lubricants. Navier-Stokes equation. Approximation methods |
| .23                                             | Equilibrium of several superposed liquids                                                   | .5 Theory of viscous lubrication. Fluid wedge theories                                                            |
| .24                                             | Relative equilibrium                                                                        | .517 Motion of fluids from the point of view of the type of flow                                                  |
| .25                                             | Equilibrium of a heavy liquid rotating about an axis                                        | .2 Laminar flow                                                                                                   |
| .251                                            | Horizontal axis                                                                             | .3 Transition region between laminar flow and turbulent flow                                                      |
| .252                                            | Inclined axis                                                                               | .4 Turbulent flow<br>→532.542.4 Turbulent flow in pipes                                                           |
| .253                                            | Vertical axis                                                                               | .42 Momentum theories                                                                                             |
| .29                                             | Levels. Spirit levels. Communicating vessels                                                | .43 Vorticity theories                                                                                            |
| .291                                            | Air-bubble levels. Spirit levels                                                            | .45 Statistical theories                                                                                          |
| .292                                            | Communicating vessels and tubes                                                             |                                                                                                                   |
| 532.3                                           | IMMERSED (SUBMERGED) BODIES.<br>FLOATING BODIES                                             |                                                                                                                   |
| .31                                             | Conditions of equilibrium                                                                   |                                                                                                                   |
| .32                                             | Stability                                                                                   |                                                                                                                   |
| .321                                            | Stable equilibrium of immersed bodies                                                       |                                                                                                                   |
| .322                                            | Stability of equilibrium of floating bodies. Metacentre. Theory of floating vessels         |                                                                                                                   |
| .33                                             | Equilibrium of bodies of particular shapes, e.g. right prisms                               |                                                                                                                   |
| 532.5                                           | LIQUID MOTION. HYDRODYNAMICS                                                                |                                                                                                                   |

|           |                                                                                                                                           |          |                                                                                                                |
|-----------|-------------------------------------------------------------------------------------------------------------------------------------------|----------|----------------------------------------------------------------------------------------------------------------|
| 532.517.6 | Pulsating flow                                                                                                                            | 532.542  | In tubes, pipes. Closed conduits running full                                                                  |
| .518      | Surfaces of discontinuity. Helmholtz free streamlines                                                                                     | .1       | Flow through pipes in general                                                                                  |
| .52       | <b>Conditions of fluid motion</b>                                                                                                         | .2       | Laminar flow in pipes                                                                                          |
| .521      | Theory of liquid filaments                                                                                                                | .3       | Transition region between laminar flow and turbulent flow                                                      |
| .1        | Air inclusions                                                                                                                            | .4       | Turbulent flow in pipes                                                                                        |
| .522      | Orifices. Flow through orifices                                                                                                           | .7       | Siphons                                                                                                        |
| .2        | Liquid streams                                                                                                                            | .8       | Closed conductors of various kinds, <i>e.g.</i> pipes inside turbines [ <i>cancelled</i> ] use 532.542:621.224 |
| .525      | Nozzles                                                                                                                                   | .9       | Transition to open conduits                                                                                    |
| .2        | Jets: dynamics and kinematics                                                                                                             | .543     | In open conduits. Canals. Rivers                                                                               |
| .3        | Spray nozzles. Atomizers. Atomization of liquid jets                                                                                      | .1       | Flow as a function of periphery and gradient                                                                   |
| .6        | Impact of a jet on surfaces                                                                                                               | .11      | Shape of periphery                                                                                             |
| .526      | Boundary layers. Skin friction                                                                                                            | .12      | Length of periphery                                                                                            |
| .2        | Laminar boundary layers                                                                                                                   | .14      | Cross-sectional area                                                                                           |
| .3        | Transition of boundary layer from laminar to turbulent                                                                                    | .18      | Gradient                                                                                                       |
| .4        | Turbulent boundary layers                                                                                                                 | .2       | With low gradient                                                                                              |
| .5        | Boundary layer separation                                                                                                                 | .3       | With high gradient                                                                                             |
| .7        | Skin friction                                                                                                                             | .4       | Flow as a function of discharge                                                                                |
| .72       | Flat plates                                                                                                                               | .5       | Flow as a function of suspension                                                                               |
| .74       | Curved surfaces                                                                                                                           | .51      | Quantity                                                                                                       |
| .75       | Rotating discs. Disc friction                                                                                                             | .52      | Quality                                                                                                        |
| .527      | Rotational motion. Vortices. Helmholtz's theory. Elasticity of liquids in rotation                                                        | .6       | Obstructions to flow                                                                                           |
| .2        | Flow between concentric rotating cylinders                                                                                                | .7       | Variations in flow                                                                                             |
| .528      | Cavitation. Formation of hollow spaces                                                                                                    | .546     | Fluid flow through porous media, <i>e.g.</i> in packed towers                                                  |
| .1        | Tensile strength of liquids                                                                                                               |          | <i>For gas flow see under applications, e.g.</i>                                                               |
| .2        | Effect of air content and contaminants on cavitation                                                                                      |          | 533.6.071.1 Wind tunnel walls                                                                                  |
| .5        | Venturi throat methods of experimentation                                                                                                 |          | <i>For moisture movement</i> →532.685                                                                          |
| .6        | Vibratory methods of testing                                                                                                              |          | →539.217 Porosity. Permeability.                                                                               |
| .529      | Flow of mixtures of gases and liquids                                                                                                     |          | Impermeability                                                                                                 |
| .2        | Mixing of fluids of different density. Density currents. Convection phenomena                                                             |          | 551.495 Ground water                                                                                           |
|           | →536.25 Heat convection in the absence of boundary action                                                                                 | .2       | Porous media consisting of simple-shaped particles                                                             |
| .3        | Diffusion of a jet in the surrounding fluid                                                                                               | .3       | Porous media consisting of irregular-shaped particles                                                          |
| .5        | Bulk motion of gas-liquid (or other two-phase) mixtures. Motion of foams, emulsions                                                       | .6       | Porous media of uniform grain size                                                                             |
|           | →532.694 Properties of gas-liquid systems                                                                                                 | .7       | Porous media of non-uniform grain size                                                                         |
|           | 541.182 Disperse systems. Colloids in the true sense                                                                                      | .55      | <b>Energy and pressure losses</b>                                                                              |
| .6        | Motion of gas bubbles and liquid drops considered individually                                                                            |          | <i>Further particulars may be denoted by colon combination, e.g.</i>                                           |
| .7        | Motion of mixed gases and liquids with respect to each other and to the walls of the containing vessel [ <i>cancelled</i> ] →532.529.2/.6 |          | 532.55:533.697 Gas energy losses                                                                               |
| .53       | <b>Open channel phenomena, e.g. falls, weirs, jumps</b>                                                                                   | .551     | Flow in straight pipes                                                                                         |
| .531      | Waterfalls. Profile of nappes in general                                                                                                  | .552     | Around bends                                                                                                   |
| .532      | Weirs. Notches                                                                                                                            | .553     | In sluices                                                                                                     |
| .2        | Sharp-crested weirs                                                                                                                       | .555     | At constrictions                                                                                               |
| .3        | Broad-crested weirs                                                                                                                       | .2       | Sudden constrictions                                                                                           |
| .7        | Notches (sharp-crested weirs with side concentrations)                                                                                    | .4       | Gradual constrictions                                                                                          |
| .8        | Venturi flumes                                                                                                                            |          | →532.525 Nozzles                                                                                               |
| .533      | Overflows. Spillways                                                                                                                      | .556     | At widenings. Diffusers                                                                                        |
|           | <i>For constructional aspects</i> →627.831                                                                                                |          | <i>For gas or air flow in diffusers</i> →533.697.3                                                             |
| .5        | Energy dissipators for open channels or free surface flows                                                                                |          | <i>For wind tunnel diffusers</i> →533.6.071.1                                                                  |
| .535      | Critical flow in open channels. Jumps. Standing waves                                                                                     | .2       | Sudden expansions of flow area                                                                                 |
| .537      | Inlet and outlet channels. Backwaters. Drop-down curves                                                                                   | .4       | Gradual expansions. Diffusers                                                                                  |
|           | →532.532.8 Venturi flumes                                                                                                                 | .42      | Axial flow diffusers                                                                                           |
| .54       | <b>Motion of fluids in various systems</b>                                                                                                | .43      | Radial flow diffusers                                                                                          |
|           |                                                                                                                                           | .557     | Carnot's loss by impact [ <i>cancelled</i> ] use 532.517.42                                                    |
|           |                                                                                                                                           | .559.2   | Energy losses at places where the flows unite                                                                  |
|           |                                                                                                                                           | .3       | Energy losses at places where the flows divide                                                                 |
|           |                                                                                                                                           | .5       | Entry and exit losses                                                                                          |
|           |                                                                                                                                           | .8       | Energy losses caused by screens, gauzes, honeycombs etc                                                        |
|           |                                                                                                                                           | .56/.561 | Non-steady motion [ <i>cancelled</i> ] use 532.5.013.2                                                         |
|           |                                                                                                                                           | .562     | High water. Velocity of propagation of flood. Formulae for prediction of floods                                |
|           |                                                                                                                                           |          | [ <i>cancelled</i> ] →532.592.7                                                                                |

- 532.57 **Measurement of velocity and quantity rate of fluid flow**  
*Further particulars may be denoted by special auxiliaries, e.g.*  
532.57.08 Methods of measuring quantity rate of flow  
.082.22 By measuring a head of water and using a flow coefficient  
.25 By measuring velocity in various positions of the flow area and integrating approximately over the whole area  
.570.2/.83 Calculation of the quantity of flow by means of the measured velocity. Methods of determining the quantity of flow [*cancelled*] →532.57.08  
.572 Gauging by weirs  
.573 Measurement of the surface velocity  
.1 By floats and velocity rods  
.2 By tachometers [*cancelled*] →532.573.1 and 532.574.4  
.7 Photographically  
.8 By use of capillary ripples or other surface wave phenomena  
532.574 Measurement of the internal velocity  
.1 By submerged floats or velocity rods  
.2 By Pitot tubes and other dynamic methods  
.22 Pitot tubes  
.23 Pitot static tubes  
.24 Pitot yaw meters. Pitot spheres  
.27 Measuring the drag on suspended bodies. Hydrometric pendulum  
.3 By tachometer's [*cancelled*] →532.574.4  
.4 By current meters  
.5 By hydrodynamic methods, e.g. Gibson pressure surge method  
.6 By electrical methods  
.7 By optical and photographic methods. Use of birefringent sols  
.8 By chemical or physicochemical methods  
.82 Salt dilution methods  
.87 By injecting dyes etc, e.g. Allen salt velocity method  
.575 Direct measurement of quantity rate of flow  
→681.121 Fluid meters. Measuring devices for liquids, gases, vapours  
.2 Volumetric and positive displacement methods  
*The type of meter may be denoted by colon combination with the subdivisions of 681.121*  
.5 Hydrodynamic methods  
.52 Orifices in pipelines  
.53 Metering nozzles in pipelines  
.54 Venturi meters  
.56 Vane (or screw propeller) current meters in pipelines  
.57 Variable area meters. Rotameters  
.6 Thermal or calorimetric methods, e.g. Thomas, Callendar gas meters  
.9 Other direct methods  
.576 Measurement of loss of head  
→531.787 Pressure measurement. Manometers. Pressure cells. Barometers  
.58 **Pressures induced by relative motion of bodies and fluids. Resistance to motion**  
→532.5.013.12 Drag  
.581 Fundamental equations. Hypothesis of a perfect fluid. D'Alembert's paradox  
.582 Immersed (submerged) bodies  
.2 Plane bodies. Plates  
.22 Discs  
.24 Rectangular or square plates  
532.582.3 Simple bodies. Cubes. Prisms. Cones. Pyramids etc  
.31 Cylinders  
.32 Streamlined bodies  
.33 Bodies of revolution  
.34 Bluff bodies. Cubes. Prisms etc  
.4 Boats. Hulls  
.5 Bodies of special shape, e.g. screws  
.6 Influence of shape, fore and aft. Influence of length  
.7 Small particles. Suspended matter  
.8 Other matters  
.81 Spheres. Bjerknes's theorem  
.82 Cylindrical rotating bodies. Magnus effect  
.92 Sinking velocity of submerged bodies  
.583 Floating bodies  
532.583 ≅ 532.582, e.g.  
532.583.4 Hulls. Resistance of boats  
.8 Influence of resistance on the unwetted parts  
*The influence of waves may be denoted by colon combination of 532.583. with the subdivisions of 532.59*  
.584 Suspensions considered as liquids  
→532.582.7 Small particles. Suspended matter  
.1 Light suspensions  
.12 Analysis of light, floating suspensions  
→620.168.33 Separation processes based on differences of density  
.2 Heavy suspensions  
.22 Analysis of heavy suspensions  
.585 Influence of the shape of the cross-section of the stream. Wall (interference) effects  
.59 **Wave motion**  
*Only hydrodynamic matters dealing with water waves are classed here*  
→534 Acoustics. Vibrations  
.591 Translational waves and their velocity of propagation  
.592 Single waves. Propagation of waves in a moving liquid  
*For oceanography and hydrography*  
→551.46/.48  
.2 Propagation of solitary waves in a moving liquid  
.7 Flood waves. Flood routing  
.593 Billows. Shallow waves. Theory of sea waves. Deep waves. Ground swell  
Shallow waves  
.2 Breaking waves on beaches or walls  
.4 Deep ocean waves. Long waves. Ground swell  
.5 Refraction of waves  
.7 Methods of ameliorating wave action  
.594 Capillarity ripples. Effect of capillarity on other wave phenomena. Ripple tanks  
.595 Oscillating columns of liquid. Oscillation of water in tubes. Propagation of liquid waves in elastic pipes  
.2 Pressure surges ("water hammer") in pipes. Explosion waves in liquids  
→621.646.94 Energy dissipating devices. Shock reducing devices — Fluids handling  
.7 Oscillation of liquids in pipes  
.596 Classical theory of tides  
→ 521.16 Theories of tidal interaction and other dissipative forces — Astronomy  
523.31-423.3 Tides on the Earth — Astronomy  
532.6 **SURFACE PHENOMENA. SURFACE TENSION. CAPILLARITY**  
.61 Surface tension. Interfacial tension  
**Special auxiliary subdivisions for 532.61**  
532.61.04 Static tension. Dynamic tension  
.041 Static tension

|                                        |                                                                                                                                                 |
|----------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------|
| 532.61.042                             | Dynamic tension                                                                                                                                 |
| .08                                    | Measurement of surface tension and interfacial tension                                                                                          |
| .092                                   | Influence of pressure                                                                                                                           |
| .093                                   | Influence of temperature                                                                                                                        |
| <b>Principal divisions (continued)</b> |                                                                                                                                                 |
| 532.612                                | Surface tension                                                                                                                                 |
| .3                                     | In solids                                                                                                                                       |
|                                        | <i>Further particulars may be denoted by colon combination, e.g.</i>                                                                            |
|                                        | 532.612.3:548 In crystals                                                                                                                       |
| .4                                     | In liquids                                                                                                                                      |
|                                        | <i>Further particulars may be denoted by special auxiliaries, e.g.</i>                                                                          |
|                                        | 532.612.4.07 Stalagmometers                                                                                                                     |
| .613                                   | Interfacial tension                                                                                                                             |
| .1                                     | Solid-solid                                                                                                                                     |
| .2                                     | Solid-liquid                                                                                                                                    |
| .3                                     | Solid-gas                                                                                                                                       |
| .4                                     | Liquid-liquid                                                                                                                                   |
| .5                                     | Liquid-gas                                                                                                                                      |
| .614                                   | Surface energy. Contact surface energy                                                                                                          |
| .2                                     | Surface energy                                                                                                                                  |
| .3                                     | Contact surface energy                                                                                                                          |
| .615                                   | Contact surface activity of dissolved substances                                                                                                |
| .62                                    | Properties of liquid thin films. Soap bubbles. Minimum surfaces. Plateau's figures                                                              |
| .623                                   | Soap bubbles                                                                                                                                    |
| .63                                    | Capillarity                                                                                                                                     |
| .631                                   | Capillary pressure                                                                                                                              |
| .632                                   | Capillary energy                                                                                                                                |
| .635                                   | Surface tenacity. Surface rigidity                                                                                                              |
| .64                                    | Contact angle. Wetting angle                                                                                                                    |
|                                        | <i>Further particulars may be denoted by special auxiliaries, e.g.</i>                                                                          |
|                                        | 532.64.08 Measurement of contact angle                                                                                                          |
| .65                                    | Free surface under the action of capillary forces. Rayleigh phenomena of the break-up of jets by surface tension effects and formation of drops |
| .66                                    | Capillary tubes                                                                                                                                 |
| .68                                    | Motion due to capillary forces                                                                                                                  |
| .685                                   | Moisture movement in porous bodies, e.g. in porous stones, ceramics, metals                                                                     |
|                                        | <i>For flow through porous media →532.546</i>                                                                                                   |
| .69                                    | Various properties depending on surface tension                                                                                                 |
| .691                                   | Surface activity in general                                                                                                                     |
| .692                                   | Power of forming thin films. Oiliness                                                                                                           |
| .694                                   | Properties of gas-liquid systems                                                                                                                |
| .1                                     | Foam formation. Frothiness                                                                                                                      |
| .4                                     | Fluffiness                                                                                                                                      |
| .695                                   | Behaviour relating to the formation of emulsions                                                                                                |
| .1                                     | Emulsifying capacity                                                                                                                            |
| .2                                     | Emulsifiability                                                                                                                                 |
| .696                                   | Behaviour relating to solids                                                                                                                    |
| .1                                     | Wetting capacity                                                                                                                                |
| .2                                     | Washing capacity                                                                                                                                |
| .22                                    | Dispersing capacity                                                                                                                             |
| .24                                    | Dirt-carrying capacity                                                                                                                          |
| .5                                     | Retention of liquids in solid-liquid systems                                                                                                    |
| .52                                    | Water absorption                                                                                                                                |
| 532.7                                  | KINETIC THEORY OF LIQUIDS. OSMOSIS. SOLUTION AND SOLUTIONS                                                                                      |
|                                        | →541.8 Solutions and solubility — Chemistry                                                                                                     |
| .71                                    | Osmosis                                                                                                                                         |
| .711                                   | Semi-permeability                                                                                                                               |
| .7                                     | Semi-permeable membranes                                                                                                                        |
| .712                                   | Osmotic pressure                                                                                                                                |
| .713                                   | Osmotic energy. Heat of solution                                                                                                                |
| .72                                    | Diffusion                                                                                                                                       |

532.73 Solution. Solution phenomena. Physical solution. Solution kinetics

**Special auxiliary subdivisions for 532.73**

532.73-1 Solution of gases in liquids  
 -2 Solution of liquids in liquids  
 -3 Solution of solids in liquids

**Principal divisions (continued)**

532.731 Velocity of solution  
 .733 Influence of dissolved substances on solubility  
 .739 Other phenomena  
 .2 Solvent power  
 .74 Molecular state. Association. Structure  
 .77 Physical properties of solutions. Influence of the equilibrium pressure on the melting point and freezing point. Cryoscopic constants  
*The influence of the solute on the properties of the solvent may be denoted by colon combination, e.g.*  
 532.77:532.612.4 Surface tension of solutions  
*The -1/-3 special auxiliaries listed at 532.73 are also applicable here*  
 .771 Dilute solutions  
 .772 Concentration with reference to the quantities of the constituents  
 .773 Concentrated solutions  
 .78 Crystallization of liquids. Crystallization from solutions  
 →536.421.4 Transformation of liquids into solids. Solidification. Freezing. Freezing point  
 548.5 Formation, growth and solution of crystals  
 532.781 Crystallization of pure liquids  
 .782 Metastable, supercooled liquids. Solid solutions  
 532.785 Crystallization from solutions  
 → 536.425 Phase transformation in heterogenous bodies. Devitrification  
 666.266.6 Devitrified glass. Vitroceramics  
 .787 Supersaturated solutions

## 533 Mechanics of gases. Aeromechanics. Plasma physics

Under 533 are classed only works referring exclusively to gases. Those referring to liquids and gases are preferably classed under 532. If necessary such works may be classed under both 532 and 533 using colon combination

|           |                                                                                                   |                                                 |                                                                                                                                                 |
|-----------|---------------------------------------------------------------------------------------------------|-------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------|
| 533.1     | PROPERTIES OF GASES                                                                               | 533.587                                         | Gas consumption ("clean-up")                                                                                                                    |
| .11       | Specific volume                                                                                   |                                                 | →621.528.6 Rarefaction by absorption of gases by ionization processes                                                                           |
| .12       | Density                                                                                           |                                                 |                                                                                                                                                 |
|           | →531.758 Measurement of density of gases                                                          | 533.59                                          | Experiments in a vacuum. Vacuum equipment                                                                                                       |
| .13       | Principle of Archimedes applied to gases. Weighing corrections. Upthrust                          | .599                                            | Vacuum equipment                                                                                                                                |
|           | →533.61 Theory of lighter-than-air air-craft (aerostats)                                          | .2                                              | Leak detection                                                                                                                                  |
| .15       | Diffusion and penetration of gases. Inflow                                                        | 533.6                                           | AERODYNAMICS                                                                                                                                    |
| .16       | Internal friction. Viscosity                                                                      |                                                 | <i>Further particulars may be denoted by colon combination with the subdivisions of 629.7</i>                                                   |
| .17       | Outflow                                                                                           |                                                 |                                                                                                                                                 |
| 533.2     | ELASTICITY. COMPRESSIBILITY. LIQUEFACTION. GAS MIXING. GAS MIXTURES                               | <b>Special auxiliary subdivisions for 533.6</b> |                                                                                                                                                 |
| .21       | Compressibility                                                                                   | 533.6.01                                        | AERODYNAMIC PRINCIPLES AND THEORY                                                                                                               |
| .22       | Approximate laws. Boyle's law (Mariotte's law)                                                    | .011                                            | <b>Motion of gases. Motion in gases. Flow</b>                                                                                                   |
| .23       | Limits of Boyle's law. Experiments of Pouillet, Dulong, Arago, Regnault                           |                                                 | <i>Further particulars may be denoted by colon combination, e.g.</i>                                                                            |
| .24       | Liquefaction and solidification of gases. Liquid air                                              |                                                 | 533.6.011:51 Mathematics of motion of gases and motion in gases                                                                                 |
|           | →621.592 Liquefaction of gases and gas mixtures which are not readily condensable — Refrigeration | .1                                              | Dimensional analysis applied to aerodynamics. Dimensional analysis of gas and air flow                                                          |
|           | 66.078 Compression and liquefaction Chemical technology                                           | .12                                             | Reynolds number. Scale effect                                                                                                                   |
| .27       | Gas mixtures. Properties of gas mixtures                                                          | .3                                              | Subsonic flow. Transonic flow                                                                                                                   |
| .273      | Partial pressure                                                                                  | .31/.312                                        | Flow at surfaces [ <i>cancelled</i> ] →532.526                                                                                                  |
| .275      | Humidity. Hygrometry                                                                              | .32                                             | Subsonic flow without compressibility effect (below M 0.8)                                                                                      |
|           | →543.27 Gas (and air) sampling and analysis                                                       | .33/335                                         | Cowling. Experiments[ <i>cancelled</i> ] →533.696,629.7.023.2. <i>For model experiments use the subdivisions of the common auxiliary .001.5</i> |
| .276      | Katathermometry. Katathermometers                                                                 | .34                                             | Subsonic flow with compressibility effect (M 0.8 to 1.0)                                                                                        |
| 533.4/.46 | Barometers [ <i>cancelled</i> ] →531.787.2                                                        | .35                                             | Transonic flow. Flow at sonic velocities (M 0.8 to 1.3)                                                                                         |
| 533.5     | RAREFIED GASES. VACUUM PHYSICS. VACUUM TECHNIQUE                                                  | .4                                              | Movement in and of gases at ultrasonic velocities [ <i>cancelled</i> ] →533.6.011.5                                                             |
|           | →531.788 Measurement of vacuums. Vacuum meters, gauges                                            | .5                                              | Flow at supersonic velocities (M 1.0 to 4.99)                                                                                                   |
| .51/.57   | Rarefaction by mechanical means. Air pumps                                                        | .55                                             | Flow at hypersonic velocities (M 5 +)                                                                                                           |
|           | →621.52 Rarefaction of air and other gases. Air pumps. Vacuum pumps — Pneumatic energy            | .6                                              | Heat transfer phenomena of moving bodies and gases. Aerothermodynamics                                                                          |
| .51       | Mechanical pumps, Oil pumps                                                                       | .7                                              | Compressibility. Compressibility effects                                                                                                        |
| .52       | Mercury pumps                                                                                     | .72                                             | Shock waves. Shock configurations                                                                                                               |
| .54       | Water jet pumps. Fluid jet pumps                                                                  | .8                                              | Superaerodynamics. Flow in rarefied gases. Non-equilibrium flow. Dissociation and recombination effects                                         |
| .55       | Mercury vapour jet pumps. Steam jet pumps                                                         | .013                                            | <b>Dynamics of aeronautical machines</b>                                                                                                        |
| .56       | Molecular pumps. Diffusion pumps                                                                  | .1                                              | Dynamic theory applied to aeronautical machines (aircraft)                                                                                      |
| .561      | Molecular pumps                                                                                   | .11                                             | Forces in general                                                                                                                               |
| .563      | Diffusion pumps                                                                                   | .12                                             | Drag                                                                                                                                            |
| .1        | Mercury diffusion pumps                                                                           | .122                                            | Form and pressure drag                                                                                                                          |
| .5        | Oil diffusion pumps                                                                               | .124                                            | Drag due to surface friction                                                                                                                    |
| .57       | Pump batteries. Combinations of the pumps given above. Pump controls                              | .125                                            | Drag reduction, e.g. maintenance of laminar flow. Area rule                                                                                     |
| .58       | Rarefaction by other physical and chemical means                                                  | .127                                            | Induced drag                                                                                                                                    |
| .581      | Use of low temperatures                                                                           | .128                                            | Wave resistance                                                                                                                                 |
| .582      | Ion pumps                                                                                         | .13                                             | Lift. Normal force                                                                                                                              |
| .583      | Use of absorbing and adsorbing substances. Charcoal. Silica gel. Getters                          | .14                                             | Lateral force, side force                                                                                                                       |
| .2        | Adsorption                                                                                        | .15                                             | Moments                                                                                                                                         |
|           | →541.183 Contact systems. Adsorption. Surface chemistry                                           | .152                                            | Pitching                                                                                                                                        |
| .5        | (Getters                                                                                          | .153                                            | Rolling                                                                                                                                         |
| .585      | Use of purely chemical means. Reducing agents                                                     | .154                                            | Yawing                                                                                                                                          |
|           | →539.23 Production of thin films                                                                  | .155                                            | Hinge                                                                                                                                           |
|           |                                                                                                   | .16                                             | Thrust                                                                                                                                          |
|           |                                                                                                   | .2                                              | Unsteady motion                                                                                                                                 |

|               |                                                                                                                                               |             |                                                                                                                                                                                                                                                                                        |
|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------|-------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 533.6.013.21  | Regular eddy motion [ <i>cancelled</i> ] →532.517.4                                                                                           | 533.6.07    | WIND TUNNEL, SHOCK TUBE, TANK AND OTHER GROUND TESTING TECHNIQUES AND APPARATUS                                                                                                                                                                                                        |
| .22           | Turbulence in air and in wind tunnels [ <i>cancelled</i> ]<br>→532.542.4 and 533.6.071.4                                                      | .071        | Wind tunnels. Design and construction. Equipment etc                                                                                                                                                                                                                                   |
| .3            | Steady motion                                                                                                                                 | .1          | Construction. Working section. Vanes. Cascades. Diffusers. Bulges. Contractions. Screens. Nozzles. Wave-makers etc. Walls (slotted, porous, flexible)                                                                                                                                  |
| .32           | Spinning of aeroplanes [ <i>cancelled</i> ] →533.6.013.7                                                                                      | .2          | Power plant. Fan, induced flow; injected flow types of power plant. Power plant controls                                                                                                                                                                                               |
| .4            | Stability                                                                                                                                     | 533.6.071.3 | Apparatus and instruments. Visualization equipment. Indicators etc<br><i>Further particulars may be denoted by colon combination, e.g.</i><br>533.6.071.3:531.787 Manometers<br>:681.26 Balances                                                                                       |
| .412          | Longitudinal stability                                                                                                                        | .4          | Flow problems (in tunnels). Interference. Turbulence etc. Calibration and correction. Use of gases other than air. Scale effect                                                                                                                                                        |
| 533.6.013.413 | Lateral stability                                                                                                                             | .5          | Tunnel conditions and their effect. Ventilation. Noise. Temperature. Humidity. Pressure etc                                                                                                                                                                                            |
| .415          | Directional stability                                                                                                                         | .7          | Spinning tunnels                                                                                                                                                                                                                                                                       |
| .416          | Neutral point (aerodynamic centre)                                                                                                            | .8          | Shock tubes                                                                                                                                                                                                                                                                            |
| .417          | Stability derivatives                                                                                                                         | .072        | Models and simulators. Analogies<br>533.6.072 ≅ 53.072                                                                                                                                                                                                                                 |
| .418          | Cross-coupling. Inertia coupling                                                                                                              | .074        | Water tanks. Water tunnels                                                                                                                                                                                                                                                             |
| .42           | Flutter. Aeroelasticity                                                                                                                       | .075        | Apparatus with rotating devices                                                                                                                                                                                                                                                        |
| .422          | Flutter                                                                                                                                       | .2          | Whirling arms                                                                                                                                                                                                                                                                          |
| .423          | Damping. Balances. Mass balances                                                                                                              | .5          | Spinning towers, e.g. for helicopter rotors                                                                                                                                                                                                                                            |
| .424          | Divergence. Increased oscillation                                                                                                             | .076        | Electrolytic tanks for solving potential flow problems                                                                                                                                                                                                                                 |
| .425          | Effect on controls. Reversal. Loss of effectiveness                                                                                           | .078        | Ballistic and other special testing apparatus and techniques                                                                                                                                                                                                                           |
| .43           | Buffeting                                                                                                                                     | .2          | Ballistic ranges                                                                                                                                                                                                                                                                       |
| .47           | Aircraft response                                                                                                                             | .5          | High-speed railways                                                                                                                                                                                                                                                                    |
| .6            | Conditions of flight. Stalling. Diving etc                                                                                                    | 533.6.08    | FLOW AND FLIGHT MEASUREMENT. ANEMOMETRY ETC<br>533.6.08 ≅ 53.08<br>→531.767 Velocity meters<br>532.57 Measurement of velocity and quantity rate of fluid flow<br>551.508.5 Anemometers. Anemographs. Wind vanes etc —<br>Meteorology<br>629.7.054'845 Air speed indicators in aircraft |
| .61           | Level flight                                                                                                                                  |             |                                                                                                                                                                                                                                                                                        |
| .62           | Blind flying                                                                                                                                  |             |                                                                                                                                                                                                                                                                                        |
| .622          | Pilotless flying                                                                                                                              |             |                                                                                                                                                                                                                                                                                        |
| .63           | Turning flight                                                                                                                                |             |                                                                                                                                                                                                                                                                                        |
| .64           | Diving. Climbing                                                                                                                              |             |                                                                                                                                                                                                                                                                                        |
| .642          | Diving                                                                                                                                        |             |                                                                                                                                                                                                                                                                                        |
| .644          | Climbing                                                                                                                                      |             |                                                                                                                                                                                                                                                                                        |
| .65           | Manoeuvring flight. Aerobatics                                                                                                                |             |                                                                                                                                                                                                                                                                                        |
| .66           | Stalling                                                                                                                                      |             |                                                                                                                                                                                                                                                                                        |
| .67           | Hovering. Low-speed flight                                                                                                                    |             |                                                                                                                                                                                                                                                                                        |
| .68           | Non-powered flight                                                                                                                            |             |                                                                                                                                                                                                                                                                                        |
| .682          | Gliding flight                                                                                                                                |             |                                                                                                                                                                                                                                                                                        |
| .685          | Towed flight                                                                                                                                  |             |                                                                                                                                                                                                                                                                                        |
| .686          | Parasitic flight                                                                                                                              |             |                                                                                                                                                                                                                                                                                        |
| .7            | Spinning                                                                                                                                      |             |                                                                                                                                                                                                                                                                                        |
| .8            | Acceleration stresses. Vg tests. Gust loads                                                                                                   |             |                                                                                                                                                                                                                                                                                        |
| .014/.014.5   | Dynamics of airships<br>[ <i>cancelled</i> ] →533.61, 533.64                                                                                  |             |                                                                                                                                                                                                                                                                                        |
| .015          | <b>Performance</b>                                                                                                                            |             |                                                                                                                                                                                                                                                                                        |
| .1            | Take-off                                                                                                                                      |             |                                                                                                                                                                                                                                                                                        |
| .2            | Landing                                                                                                                                       |             |                                                                                                                                                                                                                                                                                        |
| .3            | Speed. Rate of ascent and descent<br><i>Further particulars may be denoted by colon combination, e.g.</i><br>533.6.015.3:531.113 Acceleration |             |                                                                                                                                                                                                                                                                                        |
| .32           | Speed                                                                                                                                         |             |                                                                                                                                                                                                                                                                                        |
| .34           | Rate of ascent and descent                                                                                                                    |             |                                                                                                                                                                                                                                                                                        |
| .342          | Rate of ascent                                                                                                                                |             |                                                                                                                                                                                                                                                                                        |
| .343          | Rate of descent                                                                                                                               |             |                                                                                                                                                                                                                                                                                        |
| .345          | Ceiling (absolute and service)                                                                                                                |             |                                                                                                                                                                                                                                                                                        |
| .5            | Low-altitude and high-altitude flight                                                                                                         |             |                                                                                                                                                                                                                                                                                        |
| .51           | Low-altitude (other than ground effect)                                                                                                       |             |                                                                                                                                                                                                                                                                                        |
| .53           | High-altitude                                                                                                                                 |             |                                                                                                                                                                                                                                                                                        |
| .7            | Duration and distance flights                                                                                                                 |             |                                                                                                                                                                                                                                                                                        |
| .72           | Duration                                                                                                                                      |             |                                                                                                                                                                                                                                                                                        |
| .74           | Range. Radius of action. Air miles per gallon                                                                                                 |             |                                                                                                                                                                                                                                                                                        |
| .8            | Prediction of performance                                                                                                                     |             |                                                                                                                                                                                                                                                                                        |
| .84           | Reduction of observations to standard atmosphere conditions                                                                                   |             |                                                                                                                                                                                                                                                                                        |
| 533.6.04      | AEROFOIL CHARACTERISTICS AND VARIABLES<br><i>The subdivisions. 041/.048.5 listed at 533.69 may be used throughout 533.6</i>                   |             |                                                                                                                                                                                                                                                                                        |
| 533.6.05      | OPERATIONAL OBSERVATIONS. TESTING AND RECORDING IN SERVICE                                                                                    |             |                                                                                                                                                                                                                                                                                        |
| .052          | Ground testing (before take-off or after landing)<br><i>For wind tunnel testing</i> →533.6.071                                                | .651/.651.6 | Theory of seaplane hulls<br>[ <i>cancelled</i> ] →532.583.4 and 533.655                                                                                                                                                                                                                |
| .054          | Flight testing (full-scale, piloted)                                                                                                          | .652        | <b>Landplanes</b><br>→629.735.33 Landplanes — Transport vehicle engineering                                                                                                                                                                                                            |
| .055          | Model testing. Pilotless testing                                                                                                              | .1          | Monoplanes                                                                                                                                                                                                                                                                             |

**Principal divisions (continued)**

|             |                                                                                                                                                                                                                                        |
|-------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 533.61      | THEORY OF LIGHTER-THAN-AIR AIRCRAFT (AEROSTATS)                                                                                                                                                                                        |
| 533.62      | THEORY OF FREE BALLOONS, INCLUDING HOT AIR TYPES                                                                                                                                                                                       |
| 533.63      | THEORY OF CAPTIVE BALLOONS<br>→533.666.4 Kites                                                                                                                                                                                         |
| 533.64      | THEORY OF DIRIGIBLES. THEORY OF AIRSHIPS                                                                                                                                                                                               |
| 533.65      | THEORY OF HEAVIER-THAN-AIR AIRCRAFT (AERODYNES)<br><i>Further particulars may be denoted by special auxiliaries, e.g.</i><br>533.65.013.622 Theory of pilotless aircraft<br><i>For aircraft design principles</i> →629.7.01 and 629.73 |
| .651/.651.6 | Theory of seaplane hulls<br>[ <i>cancelled</i> ] →532.583.4 and 533.655                                                                                                                                                                |
| .652        | <b>Landplanes</b><br>→629.735.33 Landplanes — Transport vehicle engineering                                                                                                                                                            |
| .1          | Monoplanes                                                                                                                                                                                                                             |

|           |                                                                                                                                                                             |           |                                                                                                  |
|-----------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|--------------------------------------------------------------------------------------------------|
| 533.652.2 | Biplanes                                                                                                                                                                    |           | <b>Special auxiliary subdivisions for 533.69</b>                                                 |
| .3        | Multiplanes                                                                                                                                                                 | 533.69.01 | AEROFOIL THEORY AND PRINCIPLES. FORCES AND MOMENTS. STABILITY. CONDITIONS OF FLIGHT. PERFORMANCE |
| .5        | All-wing aircraft                                                                                                                                                           |           | 533.69.01 $\cong$ 533.6.01                                                                       |
| .6        | Vertical take-off and landing (VTOL) aircraft. Short take-off and landing (STOL) aircraft. Convertiplanes (other than rotorcraft). Tiltwing aircraft                        | 533.69.04 | AEROFOIL DESIGN AND DIMENSIONAL CHARACTERISTICS. AIR FLOW VARIABLES                              |
| .9        | Other types, including canard types                                                                                                                                         | .041      | Aspect ratio. Span-chord ratio                                                                   |
| .655      | <b>Seaplanes</b>                                                                                                                                                            | .043      | Chord line and related characteristics. Camber. Taper and twist                                  |
|           | →629.735.35 Seaplanes — Transport vehicle engineering                                                                                                                       | .1        | Camber                                                                                           |
| .2        | Float seaplanes                                                                                                                                                             | .2        | Taper and twist                                                                                  |
|           | 533.655.2 $\cong$ 533.652                                                                                                                                                   |           |                                                                                                  |
| .3        | Flying boats (boat seaplanes)                                                                                                                                               | .044      | Thickness distribution                                                                           |
|           | 533.655.3 $\cong$ 533.652                                                                                                                                                   | .045      | Dihedral. Anhedral (negative dihedral)                                                           |
| .4        | Ski seaplanes                                                                                                                                                               | .046      | Surface conditions. Unevenness etc                                                               |
|           | 533.655.4 $\cong$ 533.652                                                                                                                                                   | .047      | Other aerofoil characteristics, <i>e.g.</i> fineness ratio                                       |
| .657      | <b>Amphibians</b>                                                                                                                                                           | .048      | Air flow variables                                                                               |
|           | →629.7.014.17 Amphibious capabilities — Transport vehicle engineering                                                                                                       | .1        | Aerodynamic loading                                                                              |
| 533.66    | THEORY OF OTHER FLYING MACHINES                                                                                                                                             | .2        | Pressure distribution                                                                            |
| .661      | <b>Rotorcraft. Helicopters</b>                                                                                                                                              | .3        | Wake. Slipstream. Downwash                                                                       |
|           | <i>For aerodynamics of helicopter rotors</i>                                                                                                                                | .5        | Gust loads. Acceleration stresses. Vg tests                                                      |
|           | →533.662.6                                                                                                                                                                  |           | <b>Principal divisions (continued)</b>                                                           |
| .2        | Gyroplanes (autogyros)                                                                                                                                                      | 533.691   | Aerodynamics of wings [ <i>cancelled</i> ]→533.69.01, 533.69.04, 533.692/.694 and 533.696        |
| .662      | <b>Air screws</b>                                                                                                                                                           | .11       | Theory of wings [ <i>cancelled</i> ]→533.69.01                                                   |
| .2        | Driving screws. Propellers                                                                                                                                                  | .13       | Properties of the profile [ <i>cancelled</i> ]→533.69.04                                         |
| .21       | Single propellers                                                                                                                                                           | .15       | Increase and decrease of lift. Slotted wings, Flaps [ <i>cancelled</i> ]→533.694                 |
| .22       | Coaxial propellers. Contrarotating propellers. Tandem propellers                                                                                                            | .17       | Wings with ailerons [ <i>cancelled</i> ]→533.693                                                 |
| .3        | Fans                                                                                                                                                                        | .692      | <b>Wing sections</b>                                                                             |
| .5        | Tilting propellers. Tilting rotors                                                                                                                                          | .2        | Diamond and hexagonal                                                                            |
| .6        | Lifting air screws. Helicopter rotors                                                                                                                                       | .3        | Biconvex and circular arc                                                                        |
| .62       | Axially driven                                                                                                                                                              | .4        | Flat plate                                                                                       |
| .63       | Circumferentially driven                                                                                                                                                    | .5        | Wedge                                                                                            |
| .64       | Autorotating. Driven by the relative wind                                                                                                                                   | .6        | Section varying along span                                                                       |
| .7        | Windmill sails                                                                                                                                                              | .693      | <b>Complete wings. Planforms</b>                                                                 |
| .663      | Cyclogyros [ <i>cancelled</i> ]→533.662.6                                                                                                                                   | .1        | Swept wings generally                                                                            |
| .664      | <b>Ornithopters and similar aircraft with moving wings (other than helicopters)</b>                                                                                         | .2        | Unswep wings generally                                                                           |
|           | <b>Missiles. Re-entry configurations</b>                                                                                                                                    | .3        | Delta wings. Double-delta. Diamond. Arrow-head                                                   |
|           | <i>For ballistics</i> →531.5                                                                                                                                                | .4        | Sweep varying along the span. Crescent. Cranked etc                                              |
|           | <i>For ammunition</i> → 623.451                                                                                                                                             | .49       | Variable sweep                                                                                   |
|           | <i>Further particulars may be denoted by special auxiliaries, e.g.</i>                                                                                                      | .5        | Elliptic. Circular                                                                               |
|           | 533.665.013 Dynamics of guided missiles                                                                                                                                     | .6        | Rectangular                                                                                      |
| .666      | <b>Machines for non-powered flight</b>                                                                                                                                      | .7        | Trapezoidal                                                                                      |
| .2        | Parachutes                                                                                                                                                                  | .8        | Ring wings                                                                                       |
| .22       | Bellying or opening out process                                                                                                                                             | .9        | Other wings, <i>e.g.</i> aero-isoclinic, cruciform, parawings                                    |
| .24       | Impact after unfolding and opening out                                                                                                                                      | .694      | <b>High-lift devices. Controls</b>                                                               |
| .4        | Kites                                                                                                                                                                       | .2        | Flaps. Slots. Slats                                                                              |
| .6        | Gliders. Sailplanes                                                                                                                                                         | .21       | Split flaps                                                                                      |
| 533.68    | AERODYNAMIC STUDIES INCLUDING INTERFERENCE PROBLEMS OF BODIES MOVING ON OR NEAR THE GROUND, DECKS OR WATER                                                                  | .22       | Slotted flaps                                                                                    |
|           |                                                                                                                                                                             | .23       | Dive flaps. Brake flaps. Aerodynamic decelerators                                                |
| .682      | Aerodynamic studies of bodies moving on or near the ground. Aircraft-ground interference (ground effect). Ground taxiing. Forced landing. Hovercraft (air cushion vehicles) |           | →533.666.2 Parachutes                                                                            |
| .683      | Aerodynamic studies of bodies moving on or near decks                                                                                                                       | .24       | Other flaps                                                                                      |
| .685      | Aerodynamic studies of bodies moving on or near water                                                                                                                       | .25       | Leading-edge flaps. Chord extensions. Drooped leading edge                                       |
| 533.69    | AERODYNAMIC STUDIES OF AIRCRAFT ELEMENTS, INCLUDING AEROFOILS                                                                                                               | .26       | Slats                                                                                            |
|           |                                                                                                                                                                             | .27       | Spoilers                                                                                         |
|           |                                                                                                                                                                             | .5        | Control surfaces                                                                                 |
|           |                                                                                                                                                                             | .51       | Lateral controls. Ailerons                                                                       |
|           |                                                                                                                                                                             | .511      | Ailerons, trailing edge                                                                          |
|           |                                                                                                                                                                             | .512      | Ailerons, moving wingtip                                                                         |
|           |                                                                                                                                                                             | .513      | Other types of lateral control                                                                   |
|           |                                                                                                                                                                             |           | <i>For spoilers</i> →533.694.27                                                                  |
|           |                                                                                                                                                                             | .52       | Elevons                                                                                          |
|           |                                                                                                                                                                             | .53       | Longitudinal controls                                                                            |
|           |                                                                                                                                                                             | .531      | Fixed tail plane                                                                                 |

|             |                                                                                                                                                                            |           |                                                                                                                                                                                                             |
|-------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 533.694.532 | All-moving tail plane                                                                                                                                                      | 533.697.5 | Ejectors. Jet pumps. Outlets. Bleeds                                                                                                                                                                        |
| .533        | Elevators                                                                                                                                                                  | .6        | Bodies in ducts                                                                                                                                                                                             |
| .54         | Directional controls                                                                                                                                                       |           | <i>For ducted fans</i> →533.662.3                                                                                                                                                                           |
| .541        | Fins                                                                                                                                                                       | 533.7     | KINETIC THEORY OF GASES. CONTINUITY OF STATE                                                                                                                                                                |
| .542        | Rudders                                                                                                                                                                    |           | →539.1 Nuclear, atomic and molecular physics                                                                                                                                                                |
| .58         | Tabs                                                                                                                                                                       | 539.2     | Properties and structure of molecular systems. Solid state physics                                                                                                                                          |
| .59         | Other types of control                                                                                                                                                     | .72       | Kinetic phenomena                                                                                                                                                                                           |
| .6          | Jets used as high-lift devices or controls                                                                                                                                 | .722      | Discontinuity of the temperature at the surface of a rarefied gas. Smoluchowski effect. Accommodation coefficient                                                                                           |
|             | <i>For purely boundary layer control use</i>                                                                                                                               | .723      | Brownian movement                                                                                                                                                                                           |
|             | 533.694.72                                                                                                                                                                 | .73       | Kinetic energy. Mean velocity of molecules.                                                                                                                                                                 |
| .7          | Boundary layer control                                                                                                                                                     |           | Mean energy of molecules                                                                                                                                                                                    |
| .71         | Suction                                                                                                                                                                    | .735      | Thermodiffusion                                                                                                                                                                                             |
| .72         | Blowing                                                                                                                                                                    | .74       | Avogadro's number                                                                                                                                                                                           |
| .73         | Fences. Vortex generators. End plates                                                                                                                                      | 533.75    | Continuity of state. Van der Waals' equation and its corrections                                                                                                                                            |
| .695        | <b>Components in combination.</b>                                                                                                                                          |           | →539.196 Interactions, excitation and dissociation of molecules                                                                                                                                             |
|             | <b>Interference problems</b>                                                                                                                                               | .77       | Kinetic theory of the equilibrium of phases                                                                                                                                                                 |
|             | <i>For interference between aircraft and ground, decks or water</i> →533.68                                                                                                | 533.9     | PLASMA PHYSICS                                                                                                                                                                                              |
|             | <i>Interference between parts of an aircraft may be denoted by combining the subdivisions of 533.695 in ascending order, e.g.</i>                                          |           | <i>For plasma reactions, statistical behaviour and dynamics in controlled thermonuclear devices and fusion reactors</i> →621.039.61, the subdivisions of which may be colonned to the subdivisions of 533.9 |
|             | 533.695.14 Interference between wing and tailplane                                                                                                                         |           | <i>Further particulars may be denoted by special auxiliaries, e.g.</i>                                                                                                                                      |
|             | 533.695.48 Tailplane and airscrew interference                                                                                                                             | 533.9.01  | Theory and phenomena                                                                                                                                                                                        |
| 533.695.1   | Wing                                                                                                                                                                       | .02       | Fundamental laws and processes                                                                                                                                                                              |
| .2          | Body                                                                                                                                                                       | .03       | Formation and production of plasmas                                                                                                                                                                         |
| .3          | Interference between aircraft and ground [cancelled] →533.682                                                                                                              |           | →523.03 Astrophysics                                                                                                                                                                                        |
| .4          | Tail (vertical and horizontal)                                                                                                                                             | 537.5     | Electrical discharges and radiations                                                                                                                                                                        |
| .5          | Cascades. Multiplanes                                                                                                                                                      | 551.594   | Electrical phenomena in the atmosphere                                                                                                                                                                      |
| .6          | Interference between fuselage and wings [cancelled] →533.695.1/.9                                                                                                          | .07       | Apparatus for production and study of plasma phenomena                                                                                                                                                      |
| .7          | Jet or exhaust                                                                                                                                                             | .072      | Analogue equipment, models etc                                                                                                                                                                              |
| .8          | Propeller. Airscrew. Rotor                                                                                                                                                 | .08       | Measurements. Diagnostics                                                                                                                                                                                   |
| .9          | Other components, e.g. external equipment, landing gear, tanks, nacelles, pods, weapons, protuberances, recesses, doors, bays, heat shields (including extensible shields) | .082      | Diagnostics                                                                                                                                                                                                 |
| .696        | <b>Bodies</b>                                                                                                                                                              | .5        | Optical phenomena (including spectroscopic phenomena)                                                                                                                                                       |
|             | <i>Named types may be denoted by 533.696 A/Z</i>                                                                                                                           | .7        | Electrical, magnetic, nuclear phenomena                                                                                                                                                                     |
|             | <i>For flow studies of bodies in fluids generally</i> →532.582                                                                                                             | .74       | Electromagnetic, electrodynamic phenomena                                                                                                                                                                   |
|             | <i>For body shapes in combination, the subdivisions of 533.696 may be combined in ascending order, e.g.</i>                                                                | .76       | Perturbation methods (including probes)                                                                                                                                                                     |
|             | 533.696.34 Cylinder — cone                                                                                                                                                 | .79       | Use of nuclear phenomena, e.g. neutron production from plasmas                                                                                                                                              |
| .2          | Spheres                                                                                                                                                                    |           | <i>The state of plasma waves may be denoted by adding the following digits to the subdivisions of 533.9:</i>                                                                                                |
| .3          | Cylinders                                                                                                                                                                  | . . .1    | Plasma (and plasma waves) according to state                                                                                                                                                                |
| .4          | Cones. Nose cones                                                                                                                                                          | . . .12   | Electron state                                                                                                                                                                                              |
| .5          | Other bodies of circular cross-section. Bodies of revolution                                                                                                               | . . .13   | Ion state                                                                                                                                                                                                   |
| .6          | Bodies of non-circular cross-section                                                                                                                                       | . . .15   | Low-temperature plasmas (10 000 K to 100 000 K)                                                                                                                                                             |
| .7          | Fore bodies (general studies)                                                                                                                                              | . . .16   | High-temperature plasmas (over 100 000 K)                                                                                                                                                                   |
|             | <i>For specific shapes</i> →533.696.2/.6                                                                                                                                   |           |                                                                                                                                                                                                             |
| .8          | After bodies (general studies)                                                                                                                                             |           |                                                                                                                                                                                                             |
|             | <i>For specific shapes</i> →533.696.2/.6                                                                                                                                   |           |                                                                                                                                                                                                             |
| .697        | <b>Internal aerodynamics</b>                                                                                                                                               |           |                                                                                                                                                                                                             |
|             | <i>Further particulars may be denoted by colon combination, e.g.</i>                                                                                                       |           |                                                                                                                                                                                                             |
|             | 533.697:532.55 Gas energy losses                                                                                                                                           |           |                                                                                                                                                                                                             |
| .2          | Inlets                                                                                                                                                                     |           |                                                                                                                                                                                                             |
| .23         | Nose intakes                                                                                                                                                               |           |                                                                                                                                                                                                             |
| .24         | Side intakes                                                                                                                                                               |           |                                                                                                                                                                                                             |
| .242        | Scoops                                                                                                                                                                     |           |                                                                                                                                                                                                             |
| .246        | Submerged (side) intakes                                                                                                                                                   |           |                                                                                                                                                                                                             |
| .25         | Wing leading-edge intakes                                                                                                                                                  |           |                                                                                                                                                                                                             |
| .3          | Ducts. Passages. Bends. Diffusers. Vortex tubes                                                                                                                            |           |                                                                                                                                                                                                             |
| .           |                                                                                                                                                                            |           |                                                                                                                                                                                                             |
| .4          | Nozzles. Jets                                                                                                                                                              |           |                                                                                                                                                                                                             |
|             | <i>For wind tunnel nozzles</i> →533.6.071.1                                                                                                                                |           |                                                                                                                                                                                                             |

|        |                                                                   |      |                                                                |
|--------|-------------------------------------------------------------------|------|----------------------------------------------------------------|
| 533.92 | Plasma reactions, including atomic cross-sections, reaction rates | .951 | Plasma waves or oscillations. Plasma resonances. Shock waves   |
| .922   | Plasma interactions with charged particles                        |      | →533.6.011.72 Shock waves. Shock configurations — Aerodynamics |
| .924   | Plasma interactions with solids                                   |      |                                                                |
| .93    | Statistical behaviour of plasmas                                  |      |                                                                |
| .932   | Plasma transport (diffusion, conductivity, heat conduction)       | .2   | Plasma electron oscillations                                   |
| .933   | Plasma velocity distribution (energy distribution)                | .3   | Plasma ion oscillations                                        |
| .95    | Plasma dynamics                                                   | .7   | Plasma turbulence                                              |
|        |                                                                   | .8   | Plasma stability                                               |
|        |                                                                   | .952 | Pinch effect                                                   |
|        |                                                                   | .98  | Plasmoids                                                      |

## 534 Acoustics. Vibrations

*This section is primarily concerned with acoustic vibrations, and the system of classification and the wording of the text have been determined accordingly. The acoustics terms can be used, however, for other vibrations, in particular for:*

- (1) *vibratory analysis in general, e.g. from a purely mathematical point of view,*
- (2) *general matters concerning longitudinal waves, and*
- (3) *mechanical vibrations, e.g. of buildings, machines*

*Electromagnetic vibrations are classed at appropriate numbers in 535/537, especially 535–1/–3 and 537.86/.87*

|            |                                                                       |
|------------|-----------------------------------------------------------------------|
| →530.145.6 | Wave mechanics. Corpuscular waves. Matrices                           |
| 539.18     | Physics of single atoms                                               |
| 621.394    | Telegraphy                                                            |
| 621.395    | Telephony                                                             |
| 621.396    | Radiocommunications (for sound transmission and special applications) |

### Special auxiliary subdivisions for 534

|        |                                                                                                           |
|--------|-----------------------------------------------------------------------------------------------------------|
| 534–13 | In gases                                                                                                  |
| –14    | In fluids                                                                                                 |
| –141   | In perfect fluids                                                                                         |
| –143   | In water                                                                                                  |
| –16    | In solids                                                                                                 |
| –18    | In heterogeneous systems                                                                                  |
| –6/–8  | Mechanical and acoustic vibrations according to frequency and wavelength                                  |
| –6     | Low-frequency vibrations (long wavelength). Infrasonics                                                   |
| –7     | Audible-frequency vibrations. Sound waves (in the strict sense)                                           |
| –8     | High-frequency vibrations (short wavelength). Ultrasonics                                                 |
|        | →534.321.9 Ultrasonic vibrations                                                                          |
| –9     | In non-Euclidean space                                                                                    |
| 534.01 | ELEMENTARY THEORY OF VIBRATIONS                                                                           |
| .011   | Transverse waves                                                                                          |
| .012   | Longitudinal waves                                                                                        |
| .013   | Torsion waves                                                                                             |
| .014   | Oscillations of a mass-point                                                                              |
| .1     | Free oscillations. Natural vibrations                                                                     |
| .2     | Forced oscillations                                                                                       |
| .3     | Energy balance                                                                                            |
| .4     | In systems in which mass and elasticity are separated                                                     |
| .5     | Non-linear disturbing forces                                                                              |
| .015   | Coupling of systems of oscillating points                                                                 |
| .1     | Oscillations with two degrees of freedom                                                                  |
| .2     | Elastic coupling of two mass-points                                                                       |
| 534.8  | GENERAL PRINCIPLES AND THEORIES OF MEASUREMENT AND THE DESIGN OF MEASURING APPARATUS. MEASUREMENT METHODS |
|        | 534.08 ≅ 53.08                                                                                            |

### Principal divisions (continued)

|       |                                                                                    |
|-------|------------------------------------------------------------------------------------|
| 534.1 | VIBRATION OF BODIES. EXCITATION OF VIBRATIONS                                      |
| .11   | <b>Vibration of linear bodies</b>                                                  |
| .111  | General characteristics. Differential equations                                    |
| .112  | Vibration of strings                                                               |
|       | <i>Further particulars may be denoted by special auxiliaries, e.g.</i>             |
|       | 534.112.08 Monochord (sonometer)                                                   |
| .3    | Motion of a point of the string                                                    |
| .4    | Kinematics of the vibrating string                                                 |
| .113  | Straight rods. Hollow cylinders                                                    |
| .114  | Curved rods. Tuning forks                                                          |
|       | →534.321.71 Tuning forks                                                           |
| .115  | Liquid columns. Gas columns. Pipes                                                 |
| .12   | <b>Vibration of two-dimensional bodies</b>                                         |
| .121  | Theory of vibrations in two dimensions. Solid vibrating bodies                     |
| .1    | Plates                                                                             |
| .2    | Membranes                                                                          |
| .3    | Bells                                                                              |
| .122  | Liquid layers. Gas layers                                                          |
| .13   | <b>Vibration of three-dimensional bodies</b>                                       |
| .131  | Theory of vibrations in three-dimensional bodies                                   |
| .1    | Sounding stones and metal blocks                                                   |
| .2    | Vessels full of liquid                                                             |
| .132  | Within hollow (three-dimensional) bodies                                           |
| .133  | Quartz                                                                             |
|       | →621.373.5 Crystal-valve oscillators — Electrical engineering                      |
| .134  | Coupling of systems in which the distribution of mass and elasticity is continuous |
| .138  | Oscillations of small particles dispersed in a fluid                               |
| .14   | <b>Methods of exciting vibrations</b>                                              |

|                                                  |                                                                                                              |              |                                                                                                                      |
|--------------------------------------------------|--------------------------------------------------------------------------------------------------------------|--------------|----------------------------------------------------------------------------------------------------------------------|
| 534.141                                          | Mechanical methods                                                                                           | .292         | Effects on human beings, <i>e.g.</i> ultrasonic therapy                                                              |
| .1                                               | Plucking                                                                                                     | 534.3        | MUSICAL SOUNDS AND PERCEPTION                                                                                        |
| .2                                               | Striking                                                                                                     | →681.8       | Technical acoustics. Musical instruments                                                                             |
| .3                                               | Bowing                                                                                                       | 786/789      | Music for individual instruments                                                                                     |
| .4                                               | Blowing                                                                                                      | .31          | <b>Objective causes of the sensation of sound</b>                                                                    |
| .142                                             | Thermal methods                                                                                              | .32          | <b>Pitch and sound sensation</b>                                                                                     |
| .1                                               | Thermophones                                                                                                 | .321         | Pitch                                                                                                                |
| .2                                               | Singing arcs                                                                                                 | .1           | Limits of perception                                                                                                 |
| .3                                               | Spark waves                                                                                                  | .2           | Intervals                                                                                                            |
| .4                                               | Singing flames                                                                                               | .3           | Musical scales                                                                                                       |
| .5                                               | Gauze tones. Heat maintained oscillations                                                                    | .31          | Diatonic scale                                                                                                       |
| .143                                             | Electrical and magnetic methods                                                                              | .32          | Chromatic scale                                                                                                      |
| →621.395.623.7                                   | Loudspeakers                                                                                                 | .33          | Scale of equal temperament                                                                                           |
| .15/.154                                         | Observation and recording of vibrations [ <i>cancelled</i> ]<br><i>use</i> 534.1.087                         | .4           | Harmonic overtones. Subharmonic tones.                                                                               |
| .17                                              | <b>Various factors influencing vibrations</b>                                                                |              | Difference tones                                                                                                     |
| .171                                             | Relative motion between source and receiver.<br>Acoustic Doppler effect                                      | .5           | Assonance. Dissonance                                                                                                |
|                                                  | <i>For optical Doppler effect</i> →523.874 ( <i>Astronomy</i> )<br><i>and</i> 535.338.334 ( <i>Physics</i> ) | .6           | Chords from the acoustic point of view                                                                               |
|                                                  | <i>For electromagnetic Doppler effect</i> →538.871.7                                                         | .7           | Absolute pitch. Standard tuning forks                                                                                |
| 534.2                                            | PROPAGATION OF VIBRATIONS. PROCESSES<br>IN THE ACOUSTIC FIELD                                                |              | <i>Further particulars may be denoted by special<br/>auxiliaries, e.g.</i>                                           |
| .21                                              | <b>Propagation of vibrations</b>                                                                             | 534.321.7.08 | Concert pitch                                                                                                        |
| 534.211                                          | In one-dimensional bodies                                                                                    | .71          | Tuning forks                                                                                                         |
| .212                                             | In two-dimensional bodies                                                                                    | →534.114     | Curved rods. Tuning forks                                                                                            |
| .213                                             | In three-dimensional bodies                                                                                  | .8           | Subsonic vibrations                                                                                                  |
| .4                                               | In tubes                                                                                                     | →534.838     | Subsonic and ultrasonic vibrations in<br>buildings                                                                   |
| .22                                              | <b>Velocity of propagation</b>                                                                               | 534.321.9    | Ultrasonic vibrations                                                                                                |
| <b>Special auxiliary subdivisions for 534.22</b> |                                                                                                              | →534–8       | High frequency vibrations (short<br>wavelength). Ultrasonics                                                         |
| 534.22.093                                       | Effect of humidity and concentration                                                                         | .322         | Timbre of sounds. Amplitude of vibrations                                                                            |
| .2                                               | Humidity                                                                                                     | .1           | Timbre of musical sounds                                                                                             |
| .3                                               | Concentration                                                                                                | .2           | Timbre of vowels                                                                                                     |
| .094                                             | Effect of frequency and intensity                                                                            | .3           | Noise                                                                                                                |
| .1                                               | Frequency                                                                                                    | →534.77      | Defects of hearing                                                                                                   |
| .3                                               | Intensity                                                                                                    | 534.83       | Vibrations and their control. Control of<br>disturbing noise. Noise abatement                                        |
| <b>Principal divisions (continued)</b>           |                                                                                                              | 612.85       | Hearing — Physiology                                                                                                 |
| 534.221                                          | Uniform propagation velocity                                                                                 | 628.517      | Measures against noise and vibration<br>as nuisance — Public health<br>engineering                                   |
| .222                                             | Non-uniform propagation velocity                                                                             | 699.84       | Vibration-proof and sound-proof<br>construction — Building                                                           |
| .1                                               | Inhomogeneous medium                                                                                         | .323         | Subjective sensations of sound intensity. Loudness                                                                   |
| .2                                               | Explosion waves. Detonation waves. Detonation                                                                | .324         | Comparison and contrast between tone and timbre                                                                      |
| .23                                              | <b>Transmission of vibrations</b>                                                                            | .37/.39      | Physical effects on vibrations. Damping. Physical<br>effects of acoustic vibrations [ <i>cancelled</i> ] →534.28/.29 |
| .231                                             | Vibration field. Acoustic field                                                                              | 534.4        | ANALYSIS AND SYNTHESIS OF SOUNDS                                                                                     |
| .1                                               | Divergence of vibrations                                                                                     | .41          | <b>Qualitative analysis of sounds</b>                                                                                |
| .2                                               | Characteristic vibration constants of the field                                                              | .411         | Manometric capsules                                                                                                  |
| .3                                               | Impedance                                                                                                    | .412         | Phonautograph. Logograph [ <i>cancelled</i> ] <i>use</i><br>534.41.087.61                                            |
| .232                                             | Producers of vibrations. Acoustic radiators. Vibrators                                                       | .413         | Sensitive flames. Sensitive gas jets                                                                                 |
| .24                                              | <b>Reflection of waves</b>                                                                                   | .414         | Resonators                                                                                                           |
| .241                                             | Echo                                                                                                         | .415         | Stroboscopy [ <i>cancelled</i> ] <i>use</i> 534.41.087.252                                                           |
| .242                                             | Resonance. Associated phenomena                                                                              | .416         | Radiophones. Photophones                                                                                             |
| .25                                              | <b>Refraction of waves</b>                                                                                   | .417         | Hydrophones [ <i>cancelled</i> ] →654.927.2                                                                          |
| .26                                              | <b>Diffraction of waves</b>                                                                                  | .42          | <b>Synthesis of timbre</b>                                                                                           |
| .27                                              | <b>Polarization of waves</b>                                                                                 | .421         | Direct superposition of harmonics                                                                                    |
| .28                                              | <b>Physical effects on waves. Damping. Absorption</b>                                                        | .422         | Sirens                                                                                                               |
| .282                                             | Damping of mechanical vibrations in general                                                                  | .43          | Gramophones. Talking machines<br>[ <i>cancelled</i> ] →534.851 <i>and</i> 681.842                                    |
| .283                                             | Damping of acoustic vibrations                                                                               | .44          | <b>Quantitative analysis of sounds</b>                                                                               |
| .2                                               | Sound damping                                                                                                | .441         | Oscillograph records                                                                                                 |
| .284                                             | Vibration filters                                                                                            | .1           | Mechanical methods                                                                                                   |
| .286                                             | Absorption of acoustic vibrations                                                                            | .2           | Electrical methods                                                                                                   |
| .2                                               | Sound absorption                                                                                             | .3           | Harmonic analysers                                                                                                   |
| →534.833.53                                      | Sound attenuation by reflection.<br>Sound absorption                                                         | .442         | Electrical methods of analysis                                                                                       |
| .29                                              | <b>Physical effects produced by sound waves</b>                                                              | .1           | Resonance methods                                                                                                    |
| →541.12.033                                      | Effect of mechanical vibrations —<br>Chemical mechanics                                                      |              |                                                                                                                      |
| 66.084                                           | Application of vibrations — Chemical<br>technology                                                           |              |                                                                                                                      |

|           |                                                                                                                                                                                 |                   |                                                                                                                            |
|-----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|----------------------------------------------------------------------------------------------------------------------------|
| 534.442.2 | Search frequency methods                                                                                                                                                        | 534.755           | Secondary sound phenomena                                                                                                  |
| .3        | Octave filters                                                                                                                                                                  | .1                | Beats                                                                                                                      |
| .4        | Thirds filters. One-third octave filters                                                                                                                                        | .2                | Assonance. Dissonance                                                                                                      |
| .5        | Tunable filters                                                                                                                                                                 | →534.321.5        | Assonance. Dissonance — Musical sounds                                                                                     |
| .6        | Sound spectrographs                                                                                                                                                             | .3                | Combination tones                                                                                                          |
| 534.5     | COMPOSITION OF VIBRATIONS                                                                                                                                                       | .756              | Theories of hearing                                                                                                        |
| .51       | <b>Composition of parallel vibrations</b>                                                                                                                                       | .1                | Resonance theories                                                                                                         |
| .511      | Propagation of vibrations in the same direction                                                                                                                                 | .2                | Other theories                                                                                                             |
| .1        | Interference                                                                                                                                                                    | .76               | <b>Stereoaudition (stereophony, binaural hearing)</b>                                                                      |
| .2        | Beats                                                                                                                                                                           | .77               | <b>Defects of hearing</b>                                                                                                  |
| .3        | Resultant sounds                                                                                                                                                                | .771              | Measurement of hearing acuity                                                                                              |
| .4        | Progressive waves                                                                                                                                                               | .773              | Apparatus for the improvement of hearing. Hearing aids                                                                     |
| .512      | Interactions of vibrations in opposite directions                                                                                                                               | .1                | Purely acoustic                                                                                                            |
| .1        | Standing waves                                                                                                                                                                  | .2                | Electroacoustic                                                                                                            |
| .2        | Superposition of a standing and a progressive wave                                                                                                                              | →621.395.92       | Hearing aids — Electrical engineering                                                                                      |
| .52       | <b>Interactions of non-parallel vibrations</b>                                                                                                                                  | .78               | <b>Physics of speech sounds</b>                                                                                            |
| .521      | Mechanical investigations                                                                                                                                                       | .781              | Study of the sound field of the human voice                                                                                |
| .522      | Optical investigations                                                                                                                                                          | .782              | Synthesis of artificial speech sounds                                                                                      |
| .1        | Study of ultrasonic waves by diffraction of light through the pressure fronts                                                                                                   | .784              | Physical characteristics of speech sounds. Formants                                                                        |
| .5        | Lissajous figures                                                                                                                                                               | .785              | Production of speech. Physical theories                                                                                    |
| 534.6     | ACOUSTIC MEASUREMENTS                                                                                                                                                           | .79               | <b>Loudness. Concept of loudness</b>                                                                                       |
|           | <i>Further particulars may be denoted by the .08 special auxiliaries</i>                                                                                                        | .791              | Loudness measurement by aural comparison                                                                                   |
| .61       | <b>Measurement of intensity</b>                                                                                                                                                 | .792              | Loudness measurement by masking effect                                                                                     |
| .611      | Theoretical relationships in the acoustic field                                                                                                                                 | .793              | Objective loudness measurement                                                                                             |
|           | <i>Further particulars may be denoted by special auxiliaries, e.g.</i>                                                                                                          | 534.8             | APPLICATIONS OF ACOUSTICS                                                                                                  |
|           | 534.611.081.1 Units                                                                                                                                                             |                   | <i>Only matters of fundamental theory are classed here. The technical applications of instruments are classed at 681.8</i> |
| →534.511  | Propagation of vibrations in the same direction                                                                                                                                 |                   | →534.6 Acoustic measurements                                                                                               |
| 534.512   | Interactions of vibrations in opposite directions                                                                                                                               |                   | <i>Further particulars may be denoted by common and special auxiliaries, e.g.</i>                                          |
| .612      | Measurement of sound pressure                                                                                                                                                   |                   | 534.8(083.4) Synoptic and statistical tables of e.g. acoustic damping constants of materials                               |
| .1        | Wien's membrane manometer. Pressure measurement in shock waves in gases                                                                                                         |                   | 534.8.081.7 Constants for specific materials                                                                               |
| .2        | Measurements with the condenser microphone                                                                                                                                      | 534.83            | <b>Vibrations and their control. Control of disturbing noise. Noise abatement</b>                                          |
| .3        | Compensation methods                                                                                                                                                            |                   | <i>Acoustics of buildings may be denoted by colon combination with the subdivisions of 62 or 69</i>                        |
| .4        | Pressure calibration and field calibration of microphones                                                                                                                       | .831              | Unpleasantness of vibrations (noise, shocks)                                                                               |
| .5        | Calibration by the reciprocity method                                                                                                                                           |                   | <i>Further particulars may be denoted by colon combination, e.g.</i>                                                       |
| .613      | Sound radiation pressure                                                                                                                                                        | 534.831:331.043.4 | Physical effects on work                                                                                                   |
| .614      | Measurement of the velocity of sound                                                                                                                                            | :612.014.45       | Physiological action                                                                                                       |
| .615      | Measurement of the displacement, density variation and temperature variation in a sound wave                                                                                    | :612.858.76       | Influence of aural stimuli on living organisms                                                                             |
| .62       | <b>Sound absorbent chambers. Anechoic chambers (dead rooms). Free-field chambers. Reverberation rooms. Resonance chambers. Measurement of the total energy of sound sources</b> | :613.164          | Noise from the hygienic point of view                                                                                      |
| .63       | <b>Measurement of frequency</b>                                                                                                                                                 | :613.644          | Vibrations in industrial hygiene                                                                                           |
| .631      | <b>Mechanical-acoustical methods</b>                                                                                                                                            | :658.3.043.4      | Physical effects in industrial organization                                                                                |
| .632      | Electrical methods                                                                                                                                                              |                   | <i>Further particulars may be denoted also by special auxiliaries, e.g.</i>                                                |
| .64       | <b>Measurement of acoustical-mechanical impedance</b>                                                                                                                           | 534.831–7         | Disturbing effect of noise                                                                                                 |
| .641      | By electrical feedback                                                                                                                                                          | .2                | Permissible intensity                                                                                                      |
| .642      | By purely acoustical or mechanical methods                                                                                                                                      |                   | <i>Further particulars may be denoted by special auxiliaries, e.g.</i>                                                     |
|           | <i>Further particulars may be denoted by special auxiliaries, e.g.</i>                                                                                                          | 534.831.2–7       | Permissible noise levels                                                                                                   |
|           | 534.642.084 Air sounding. Echo sounding                                                                                                                                         |                   |                                                                                                                            |
| .647      | Measurement of shocks. Seismographs                                                                                                                                             |                   |                                                                                                                            |
| →550.34   | Seismology                                                                                                                                                                      |                   |                                                                                                                            |
| 534..7    | PHYSIOLOGICAL AND MEDICAL. ACOUSTICS                                                                                                                                            |                   |                                                                                                                            |
|           | <i>Further particulars may be denoted by colon combination with the subdivisions of 61</i>                                                                                      |                   |                                                                                                                            |
| .75       | <b>Hearing</b>                                                                                                                                                                  |                   |                                                                                                                            |
| →612.85   | Hearings — Physiology                                                                                                                                                           |                   |                                                                                                                            |

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| 534.832     | Prevention of vibrations at source. Application of suitable construction methods<br><i>Further particulars may be denoted by special auxiliaries, e.g.</i><br>534.832-7 Prevention of disturbing noise. Soundlessness. Noiselessness                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 534.833.532.2 Porous materials<br>.22 Rigid porous materials<br>.24 Elastic porous materials<br>.3 Non-porous materials<br>.534 Absorption by resonators<br>.536 Absorption by objects, persons<br>.6 Attenuation of subsonic and ultrasonic vibrations. Vibration damping<br>.834 Transmission of sound along pipes [cancelled] →534.833.522.2 and 534.833.524<br>.835 Noise in dwellings and other buildings<br>.2 Functional noise (noise which is not in itself undesirable) produced by speech, musical instruments, radio etc<br>.4 Secondary noise<br>.42 Noise produced by traffic (within buildings), e.g. from lifts<br>.44 Noise in pipes, conduit etc<br><i>The type of duct may be denoted by colon combination</i><br>.46 Noise from machines<br>.462 Domestic appliances<br>.463 Office machines<br>.464 Rigidly-mounted (heavy) machinery<br>.836 Noise outside buildings<br>.2 Traffic (and aircraft) noise<br>.837 Noise of building operations and of machines [cancelled] →534.835/.836<br>.838 Subsonic and ultrasonic vibrations in buildings<br>.1 Due to machinery [cancelled] →534.838.32<br>.2 Earth tremors [cancelled] →534.838.33<br>.3 Subsonic vibrations<br>.32 Produced by machines mounted within the building<br>.33 Produced by ground vibrations outside the building<br>.4 Ultrasonic vibrations<br>.839 Methods of measurement of noise [cancelled] use 534.83.08<br>.84 <b>Architectural acoustics. Sound level. Tone quality</b><br>.841 Output and range of tone of the original source of sound [cancelled] use 534.86:681.8<br>.842 General requirements for auditoriums and studios<br>.843 Acoustic phenomena in rooms and related matters<br>.1 In closed and open rooms<br>.12 Completely closed rooms<br>.13 Rooms not completely closed<br>.14 Completely open rooms<br>.2 Useful and disturbing reflections as acoustic phenomena in rooms<br>→534.24 Reflection of waves<br>534.833.53 Sound attenuation by reflection.<br>Sound absorption<br>.22 Shapes of auditoriums and studios with reference to the distribution of reflected sound |
| .833        | Attenuation of vibrations. Vibration damping<br>.1 Penetration through walls [cancelled] use →534.833.522.4:69.022<br>.2 Damping coefficient of airborne sounds [cancelled] →534.833.522.4<br>.3 Penetration through small openings [cancelled] →534.833.522.22<br>.4 Absorbing power of objects [cancelled] →534.833.536<br>.5 Attenuation of acoustic vibrations<br>→628.517 Measures against noise and vibration as nuisance — Public health engineering<br>699.84 Vibration-proof and sound-proof construction — Building<br>.52 Attenuation of sound during transmission<br>→534.23 Transmission of vibrations<br>.522 Attenuation of airborne sound<br>.2 By transmission through an airway<br><i>Transmission through pipes may be denoted by colon combination with the subdivisions of 621.643</i><br>.22 Transmission through small openings, e.g. slits<br>.4 By transmission through solid bodies, e.g. buildings (airborne sound insulation)<br><i>Further particulars of airborne sound insulation for particular parts of buildings may be denoted by colon combination, e.g.</i><br>534.833.522.4:69.022 Attenuation of airborne sound by walls<br><i>Further particulars may be denoted by special auxiliaries, e.g.</i><br>534.833.522.4.08 Measurement of airborne sound insulation<br>.42 Direct transmission<br>.44 Indirect transmission. Transmission through secondary paths (flanking transmission) |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| 534.833.524 | Attenuation of structure-borne sound and vibrations<br><i>Further particulars may be denoted by colon combination, e.g.</i><br>534.833.524:621.315.5 Transmission through electrical conductors<br>:621.643 Transmission through pipes<br>.2 By transmission through structures (structure-borne sound insulation)<br>.22 Direct transmission<br>.24 Indirect transmission. Transmission through secondary paths (flanking transmission)<br>.53 Sound attenuation by reflection. Sound absorption<br>→534.24 Reflection of waves<br>534.286 Absorption of acoustic vibrations<br>.532 Absorption by sound-absorbing materials                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |

- 534.843.222 Echoes  
     →534.241 Echo — Reflection of waves
- .224 Interference. Formation of focal points and lines
- .226 Position of the natural frequency. Frequency of natural (normal) modes. Eigentones
- .24 Compensating processes, especially with reference to auditoriums and studios
- .242 Reverberation  
     .2 Calculation of reverberation time  
     .4 Desired reverberation time  
     .6 Control of reverberation time
- .26 Application of special sound reflectors
- .3 Echo in closed rooms [*cancelled*]→534.843.222 and 534.843.242
- .4 Reception of sound directly, by reflection or by echo [*cancelled*]→534.843.22 and 534.843.6
- .5 Intelligibility as an acoustic phenomenon in auditoriums and studios  
     →534.86 Sound transmission (radio, television, films). Electroacoustics
- .6 Shapes of auditoriums with reference to the distribution of directly radiated sound
- .7 Matters related to the distribution of the total sound energy (direct plus reflected sound)
- .72 Limits for the size of auditoriums and studios
- .74 Relative placing of the sound source and the receiver
- .742 Of the sound source (loudspeaker etc) and the audience
- .744 Of the sound source (orchestra, speaker etc) and the microphone
- .844/.844.5 Echo. Reverberation [*cancelled*]→534.843.22 and 534.843.242
- .845/.845.2 Absorption of sound [*cancelled*]→534.833.53
- .846 Construction and improvement of auditoriums [*cancelled*]→534.843
- .1 Limit of size in the absence of amplifiers [*cancelled*]→534.843.7
- .2/.3 Shape of the room, Distribution of sound energy [*cancelled*]→534.843.22 and 534.843.6
- .4 Improvement of the sound distribution by changes in construction and installation of loudspeakers [*cancelled*] →534.843.22 and 534.868.3
- .5 Calculation of reverberation time [*cancelled*]→534.843.242
- .6 Model experiments [*cancelled*] use 534.84.001.57
- .85 **Sound recording and reproduction**
- .851 Mechanical recording. Gramophone records
- .1 Recording amplifier and distortion reduction systems
- .2 Cutting head
- .3 Reproduction amplifier and distortion reduction systems
- .4 Pick-up
- .5 Pick-up distortion
- .6 Disturbing noise. Needle scratch. Rattle. Static
- .7 Fluctuations of amplitude and pitch. Wow. Flutter
- .8 Properties of disc materials
- .852 Magnetic recording
- 534.843.852.1 Recording amplifier and distortion reduction systems
- .2 Erasing head. Recording head. Reproducing head
- .3 Reproduction amplifier and distortion reduction systems
- .5 Distortions
- 6 Disturbing noise. Static
- .7 Fluctuations of amplitude and pitch. Wow. Flutter
- .8 Properties of magnetic tape (mechanical and electroacoustic)
- .853 Optical recording
- .1 Recording amplifier and distortion reduction systems
- .2 Optical sound head for recording and reproduction
- .3 Reproduction amplifier and distortion reduction systems
- .5 Distortions
- .6 Disturbing noise. Static
- .7 Fluctuations of amplitude and pitch. Wow. Flutter
- .8 Electroacoustic properties of the sound track
- .86 **Sound transmission (radio, television, films). Electroacoustics**  
     →621.395 Telephony  
     621.396 Radio communication apparatus and methods  
     654.92 Acoustic signalling — Telecommunications
- .861 Studio techniques
- .1 Characteristics of the studio
- .2 Characteristics of the microphones
- .3 Functions of the sound engineer
- .4 Characteristics of reception rooms
- .862/.862.6 Sound film acoustics [*cancelled*]→534.853
- .863 Telephone acoustics  
     534.863  $\cong$  534.861
- .5 Intelligibility of syllables
- .864 Public address installations
- .87 **Acoustic signalling**
- .873 Range of acoustic signalling
- .874 Directional properties
- .1 Of radiators and groups of radiators as transmitters and receivers
- .2 Of radiators and groups of radiators in an infinite medium
- .3 Directional properties and energy of radiation in the neighbourhood of a reflecting surface
- .88 **Sound-ranging. Direction-finding**  
     →534.76 Stereoaudition  
     681.88 Acoustic detection. Location. Direction-finding. Ranging devices. Sound locators. Hydrophones. Sonar — Technical acoustics

## 535 Optics

→534 Acoustics. Vibrations

- 537.53 Emission of radiation or particles from discharges
- 537.86 Electromagnetic oscillations and waves in general. Radiophysics
- 539.122 Photons (including gamma-radiation)
- 539.166 Gamma-radioactivity

### Special auxiliary subdivisions for 535

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| <p>535-1/-3 RADIATION ACCORDING TO WAVE-LENGTH.<br/>HERTZIAN WAVES. LIGHT COLOURS</p> <p>535-1 LONG WAVES. INFRA-RED</p> <ul style="list-style-type: none"> <li>-11 Very long waves, above radio wavelengths (about 10 000 m)</li> <li>-12 Radio wavelengths           <ul style="list-style-type: none"> <li>→537.86 Electromagnetic oscillations and waves in general. Radiophysics</li> </ul> </li> <li>-14 Region between Hertzian waves and infra-red waves</li> <li>-15 True infra-red waves</li> </ul> <p>535-2 VISIBLE LIGHT. COLOURS</p> <p><i>The two-digit special auxiliaries -21/-28 denote the main spectral groups of visible light clearly distinguishable by the eye as well as the corresponding hues of surfaces, e.g. -21 Red, -26 Blue. Further subdivision is obtained by adding a third digit, e.g. -215 Cinnabar. -261 Ice blue</i></p> <p><i>To denote the saturation and brightness of a colour a fourth digit may be added:</i></p> <p>535-2. . . 1 Pure, strongly saturated</p> <p>    . . . 2 Moderately white saturated or light</p> <p>    . . . 3 Moderately black saturated or dark</p> <p>    . . . 4 Strongly white saturated, light</p> <p>    . . . 5 Grey-toned. Dull</p> <p>    . . . 6 Strongly black saturated, dark</p> <p><i>An unequivocal classification of colours can be obtained only by application of a color system, e.g. DIN, Munsell. The notations used by such systems may be added in parentheses to the special auxiliary as in the following example for a specific blue colour:</i></p> <p>535.6-26 (DIN 17:4:3)</p> <p>535.6-26 (Munsell 4PB 4/8)</p> <p>-201 <b>Colourless (clear transparent bodies)</b></p> <ul style="list-style-type: none"> <li>→535.345.1 Transparency in general.</li> <li>Transmission coefficient</li> </ul> <p>-202 <b>White</b></p> <ul style="list-style-type: none"> <li>.1 Pure white. Standard white</li> <li>.3 Daylight white (light sources)</li> <li>.4 Cold white (light sources)</li> <li>.5 Warm white (light sources)</li> </ul> <p>203 Grey</p> <ul style="list-style-type: none"> <li>.3 Neutral grey (aselective grey)</li> <li>.4 Selective grey</li> <li>.7 Colour-tinted grey</li> </ul> <p>-204 <b>Black</b></p> <ul style="list-style-type: none"> <li>.1 Perfect black</li> </ul> <p>-21 <b>Red colour group</b></p> <ul style="list-style-type: none"> <li>-211 Bluish red. Purple red. Carmine</li> <li>.4 Rose-coloured. <b>Pink</b></li> <li>-213 Deep red. Crimson. Scarlet</li> <li>-215 Cinnabar</li> <li>-217 Yellowish red</li> <li>.4 Yellowish pink</li> </ul> | <p>535-22 <b>Orange colour group</b></p> <ul style="list-style-type: none"> <li>-221 Reddish orange</li> <li>.5 Reddish brown</li> <li>-224 Orange</li> <li>.5 Brown</li> <li>-225 Reddish brown [<i>cancelled</i>]→535-221.5</li> <li>-227 Yellowish orange</li> <li>-23 <b>Yellow colour group</b></li> <li>-231 Reddish yellow. Golden yellow</li> <li>-233 Pure yellow</li> <li>.4 Cream</li> <li>.5 Yellowish brown</li> <li>-235 Brown, particularly golden brown [<i>cancelled</i>]→535-224.5</li> <li>535-233.5</li> <li>-236 Greenish yellow</li> <li>.6 Olive green</li> <li>-238 Yellow-green</li> <li>-24 <b>Green colour group</b></li> <li>-241 Yellowish green. Leaf green</li> <li>-243 Pure green</li> <li>-245 Olive green [<i>cancelled</i>]→535-236.6</li> <li>-247 Sea green. Bluish green</li> <li>-25 Sea green [<i>cancelled</i>]→535-247</li> <li>-255 Blue-green</li> <li>-26 <b>Blue colour group</b></li> <li>-261 Greenish blue. Ice blue</li> <li>.2 Turquoise</li> <li>-263 Pure blue</li> <li>.4 Sky blue. Azure</li> <li>-27 Ultramarine [<i>cancelled</i>]→535-263</li> <li>-275 Indigo blue</li> <li>-28 <b>Violet colour group</b></li> <li>-281 Bluish violet</li> <li>.4 Lilac</li> <li>-282 Violet</li> <li>-283 Bluish purple. Red-violet</li> <li>-285 Purple</li> <li>-287 Reddish purple</li> <li>-29 White. Grey. Black [<i>cancelled</i>]→535-202/-204</li> </ul> <p>535-3 <b>SHORT WAVES</b></p> <ul style="list-style-type: none"> <li>-31 Ultra-violet</li> <li>-32 Region between ultra-violet rays and X-rays</li> <li>-34 X-rays</li> <li>-36 Gamma-rays           <ul style="list-style-type: none"> <li>→539.166 Gamma-radioactivity</li> </ul> </li> </ul> <p>535-4 <b>POLARIZED LIGHT</b></p> <ul style="list-style-type: none"> <li>→535-6 Partially polarized light</li> <li>-45 Linearly polarized</li> <li>-46 Elliptically polarized</li> <li>-47 Circularly polarized</li> </ul> <p>535-5 <b>NATURAL LIGHT</b></p> <p>535-6 <b>PARTIALLY POLARIZED LIGHT</b></p> <p>535-7 <b>TOTALLY REFLECTED LIGHT</b></p> <ul style="list-style-type: none"> <li>-8 Crystalline reflection [<i>cancelled</i>]→535.516</li> <li>-92 Reflected light</li> <li>-94 Refracted light</li> </ul> |
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- 535.012 OPTICAL ISOTROPY AND ANISOTROPY
- .1 Isotropy
  - .2 Anisotropy
  - .21 Uniaxial
  - .22 Biaxial
  - .015 **Optical properties according to the number of system components (not including the surrounding air and cementing materials)**
  - .016 **Optical properties according to the number of effective boundary surfaces**
- 535.07 OPTICAL BENCHES AND FITTINGS
- Principal divisions (continued)**
- 535.1 **THEORY OF LIGHT**
- 535.23 Energy of radiation
  - .11 Emission theory (Newton)
  - .12 Wave theory (Huyghens, Fresnel). Wavelength. Frequency. Wave number  
*Further particulars may be denoted by special auxiliaries, e.g.*  
535.12.08 Measurement of wavelength
  - .13 Electromagnetic theory (Maxwell)  
→537.8 Electromagnetism. Electromagnetic field. Electrodynamics. Maxwell theory
  - .131 General theory
  - .135 Transparent media in the electromagnetic theory of light
  - .137 Metallic bodies in the electromagnetic theory of light
  - .14 Quantum theory of light. Photons  
→530.145 Quantum theory  
539.122 Photons (including gamma-radiation)  
539.184 Internal mechanics. Energy levels and their structure. Excited states of atoms
- 535.2 **PROPAGATION AND ENERGETICS OF RADIATION. PHOTOMETRY**
- 535.21 **EFFECTS OF LIGHT RADIATION**
- .211 Thermal effects
  - .212 Luminous effects
  - .214 Mechanical effects. Radiation pressure
  - .4 Radiometers. Actinometers
  - .6 Photophoresis
  - .215 Electrical effects. Photoelectric phenomena. Photoelectric effect  
→621.383 Photoelectric tubes and cells
  - .1 Photoelectric effects in general, e.g. internal and external effects
  - .2 Energetic relationships between emitted electrons, frequency of light etc
  - .3 Photoelectric potential
  - .4 Photoelectric sensitivity
  - .5 Various influences on the photoelectric effect
  - .6 Barrier layer effect
  - .9 Other electrical effects
  - .217 Chemical effects  
→535.247.1 Photometry using photographic or photochemical receivers. Radiation measurement using photographic films  
541.14 Photochemistry
  - .218 Magnetic effects
- 535.22 **VELOCITY OF PROPAGATION OF LIGHT**
- .221 Astronomical methods of measurement
  - .222 Terrestrial methods of measurement. Velocities in various media
- 535.223 Indirect methods of measurement
- .224 Influence of various factors on the velocity
  - .225 Influence of motion on the velocity  
→530.12 Relativity principle
- 535.23 **ENERGY OF RADIATION**
- .08 Measurement of radiant energy  
[cancelled]→535.231.6
  - .231 **Total radiation**
  - .1 Fundamental quantities
  - .11 Radiant flux. Radiation efficiency
  - .12 Radiant intensity
  - .13 Specific emission. Radiation related to the unit solid angle
  - .14 Radiation density
  - .15 Radiant energy
  - .16 Irradiance
  - .2 Relationship between absorption and emission. Kirchoff's laws
  - .22 Emission coefficient  
→535.341 Absorption coefficient, extinction coefficient and similar measures of absorption
  - .3 The Stefan-Boltzmann law of radiation  
[cancelled]→535.233.22
  - .4 Radiation from bodies other than black bodies  
[cancelled]→535.233.4
  - .6 Measurement of total radiation (with non-selective receivers)  
*The type of receiver may be denoted by colon combination, e.g.*  
535.231.6:621.362 Thermoelements
  - .62 Bolometers  
→621.317.794 Apparatus for measuring radiant energy. Bolometers
  - .63 Radiation standards  
→535.241.3 Standards representing the unit of light intensity. Standard lamps
  - .66 Auxiliary apparatus  
535.231.66 ≈ 535.241.6
- .232/.233 **Spectral distribution of energy**
- 535.243 Spectrophotometry
  - .232 Generalities
  - .1 Spectral density. Relative spectral distribution of radiation  
535.232.1 ≈ 535.231.1, e.g.  
535.232.14 Relative spectral density distribution
  - .5 Equal energy spectrum
  - .6 Properties of the radiation receiver. Radiation measurement (other than photometry and colour measurement)  
→535.243 Spectrophotometry  
535.247 Objective photometry etc
  - .61 Spectral sensitivity of the radiation receiver  
*The spectral range may be denoted by the -1/-3 special auxiliaries*  
*Further particulars may be denoted by colon combination, e.g.*  
535.232.61:616.5-001.15 Skin erythema curve  
→612.843.26 Luminance perception. Adaptation — Physiology
  - .65 Radiation measurement. Integrated radiation measurement using selective receivers (other than photometry and colour measurement)  
*The type of receiver may be denoted by colon combination, e.g.*  
535.232.65:621.383 Using photoelectric cells  
:771.534.232 Using orthochromatic photographic film