

WTI AG

WTI-Classification



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3A Enterprises, management, economics, politics, legislation

3AA	Management planning, management strategies	
3AAK	Management information system, knowledge management	
	Reference to: Database management systems	3DFB
	Reference to: Communication networks/switching technology	3GN
3AAP	Project management	
3AB	Project engineering and planning of plants, equipment construction	
	e.g.: Plant location planning (from starting of new plants to plant shutdown)	
	Reference to: Biotechnological apparatuses, plants and reactors	3PZO
	Reference to: Chemical apparatuses and plants	3PLL
	Reference to: Power plants, nuclear reactors	3EE
3ABC	Plant safety	
	e.g.: Power station, safety, chemical plant safety, incident defense planning	
	Reference to: Power plants, nuclear reactors	3EE
3ABZ	Security for business	
	Reference to: Control technology, monitoring	3IT
3AD	Costs, finance, investment	
3ADA	Balance (corporate), reporting	
3ADB	Enterprise valuation, controlling	
3AE	Marketing, product research, sales promotion, distribution	
3AEN	New product development	
3AI	Production planning and control, operational research	
3AIB	Computer integrated manufacturing (CIM), virtual production	
	e.g. Think tanks, digital factories	
	Reference to: Simulation methods, simulation models	3BAS
	Reference to: Assembling lines and assembly systems	3LZ
	Reference to: Rapid Prototyping, Rapid Tooling	3LD
3AIX	Logistics, material management/control	
	Reference to: Hoisting and transportation technology, storage	3ML
3AK	Maintenance, servicing	
	Reference to: Vehicle safety/testing/maintenance	3NRX
	Reference to: Software engineering/maintenance, application software	3DG
3AL	Quality assurance/management, certification	
	Note: Quality inspection, quality assurance, lifetime or products reliability do allocate to the corresponding products,	
	e.g. reliability of soldered connections at electronics	3FU
	Reference to: Control technology, monitoring	3IT
	Reference to: Wiring, connecting, plug-in units, housings	3FU
3AM	Occupational safety, accident prevention	
	e.g.: Protective gears, accident statistics, accident prevention rules, occupational safety, damage prevention, ear protection	
	Reference to: Noise sources/injury/abatement	3UMR
	Reference to: Mathematical methods	3BA
	Reference to: Legislation, product liability, data protection	3AR
	Reference to: Clothing (apparel), functional wear, protective clothing	3TML



3AMB	Ergonomics, occupational health e.g.: Health protection, industrial diseases	
3AR	Legislation, product liability, data protection Reference to: Occupational safety, accident prevention	3AM
3ARA	Industrial law Reference to: Personnel management, wage plans, training, career	3AS
3ARD	Data privacy protection Reference to: Computer hardware, computer operation	3DD
3AS	Personnel management, wage plans, training, career Reference to: Industrial law	3ARA
3AT	Technical development, technology transfer	
3ATB	Technology assessment	
3ATH	Technical history, archaeology	
3AU	Design methodology, merchandise technology, technical standards and rules	
3AX	Economic research and policy	
3AXB	Environmental policy, ecology, ecosystems e.g.: Environmental audit Reference to: Biosciences , life sciences Reference to: Environmental engineering, environmental pollution	3BZ 3U
3AXF	Research and development	

3B Natural sciences (fundamentals, basic methods, models)

Note: Since almost all technical special branches do serve on natural science and technological fundamentals, methods or models, these „fundamentals“ are only allowed to use if they are indeed in the main focus and give a broad-based discussion with the paper’s content. Inadequate are important facts or factors only.

3BA	Mathematical methods e.g.: Analysis, group theory, function theory, mathematical logics, numerical methods, optimizing calculation, statistics, topology, probability calculation Reference to: Occupational safety, accident prevention	3AM
3BAS	Simulation methods, simulation models e.g.: MATLAB, FEM, CFD, statistical simulation (economics) Reference to: Computer software (technical-scientific) Reference to: Computer integrated manufacturing (CIM), virtual production	3DL 3AIB
3BB	Mechanics of solids, liquids and gases e.g.: science of elasticity, science of material strength, hydrodynamics, continuum mechanics, science of vibrations, fracture mechanics, dynamics/kinematics of solids/liquids/gases Reference to: Mechanical properties of materials Reference to: Tribology	3KXM 3MD
3BBB	Acoustics of solids, liquids and gases e.g.: Aeroacoustics, room acoustics, noise properties, infrasound, ultrasound Reference to: Acoustic properties of materials	3KXA
3BBS	Fluid dynamics e.g.: Aerodynamics, flow fields, single-/multiphase systems, rheology, non-newtonian fluids	



	Reference to: Fluidics (hydraulics, pneumatics)	3ME
3BF	Optical engineering e.g.: Holography, optical components, infrared/ultraviolet radiation	
	Reference to: Optoelectronic devices, integrated optics	3FX
3BFB	Laser science, quantum optics	
3BFX	Nonlinear optics e.g.: Kerr cells, optical transistors, stimulated Raman scattering, Brillouin scattering, superfluorescence	
3BG	Electricity and magnetism, electrical engineering (theory) e.g.: Dielectricity, electrodynamics, electrostatics, photo/magnetolectric/magneto-optical/superconductivity effects, electric/magnetic fields	
	Reference to: Electrical/magnetic properties of materials	3KXE
	Reference to: Electric/magnetic/electromagnetic fields effects on living beings	3UMZ
	Reference to: Semiconductor properties of materials	3KXH
3BN	Thermodynamics, statistical physics, heat flow e.g.: Heat transfer, chaotic systems	
	Reference to: Phase diagrams of materials	3KWR
	Reference to: Physical chemistry	3BXP
3BR	Solid state physics, semiconductor theory e.g.: Electronic structure, thin-film physics, ordered states, spin glass, polymer physics, tunnel effects	
	Reference to: Semiconductor properties of materials	3KXH
3BU	Atomic and molecular physics e.g.: Atomic/molecular excitation/interaction/spectrum	
	Reference to: Materials properties	3KX
3BUB	Physics of plasmas and electric discharges e.g.: Electrical processes in gases, gas discharges, plasma production/diagnostics/interactions, magnetohydrodynamics	
3BUX	Nuclear physics, physics of elementary particles e.g.: Atomic energy/matter/fission, radioactivity, electromagnetic transition, particle sources	
3BW	Geosciences, geophysics e.g.: Geology, prospecting science, mineralogy, meteorology, ocean science, geological/rocks/soil mechanics, hydrology and geological technology	
	Reference to: Geotextiles	3TMP
	Reference to: Raw materials (natural/secondary)	3KB
	Reference to: Mining, tunneling, petroleum/natural gas production, deep well drilling	3MZ
3BX	Fundamentals of chemistry Reference to: Chemical engineering, chemical reaction engineering	3PL
3BXA	Inorganic chemistry (fundamentals) Reference to: Inorganic nonmetallic materials	3KG
3BXC	Organic chemistry (fundamentals) Reference to: Organic materials, polymers	3KK
3BXE	Colloid chemistry, radiochemistry Reference to: Particle chemistry, disperse systems, emulsions, colloids, suspensions	3PLK
3BXP	Physical chemistry	



e.g.: Electrochemistry, photochemistry
 Reference to: Thermodynamics, statistical physics, heat flow 3BN

3BZ	Biosciences , life sciences	
	e.g.: Anatomy, biocybernetics, biology, microbiology, radiobiology	
	Reference to: Biomedical engineering	3R
	Reference to: Bioprocess engineering, biotechnology	3PZ
	Reference to: Wood science and engineering	3SK
	Reference to: Environmental pollution and engineering	3UX
	Reference to: Environmental policy, ecology, ecosystems	3AXB
	Reference to: Environmental pollutants and toxicology	3UM

3BZA	Biophysics (fundamentals)	
	e.g.: Biophysical technique, biomechanics, biomechanical models	
	Reference to: Electric/magnetic/electromagnetic fields effects on living beings	3UMZ

3BZB	Pharmacology, pharmaceutical fundamentals, toxicology	
	Reference to: Biomedical engineering 3R, Environmental pollutants and toxicology	3UM
	Reference to: Biomedical/biochemical properties of materials	3KXZ
	Reference to: Production of pharmaceutical products	3PP

3BZG	Fundamentals of genetic engineering and molecular biology	
	e.g.: Proteomics, DNA/RNA functions	
	Reference to: Biocomputing, neurocomputing	3DBC

3BZH	Biochemistry (fundamentals)	
	Reference to: Biomedical/biochemical properties of materials 3KXZ	

3D Data processing and data systems technology

3DB	Information theory (fundamentals), informatics	
	e.g.: Algorithm/automata/computer theories, combinatory circuit theories, cybernetics, parallel computing, transputers, computer architecture (theory)	

3DBC	Artificial intelligence, neural networks, expert systems, fuzzy logic	
	e.g.: AI influence, learning systems, biocomputing, neurocomputing	
	Reference to: Fundamentals of genetic engineering and molecular biology	3BZG
	Reference to: Biochips, DNA chips (gene chips)	3PZX

3DD	Computer hardware, computer operation	
	e.g.: Computing centres, multicomputers, hardware security (reliability), data back-up, data security	
	Reference to: Data privacy protection	3ARD

3DDB	Mainframe computers, super computers	
	e.g.: High-speed/ high-performance/optical/massively parallel computers	

3DDG	Peripheral computer equipment, mass storage, data carriers	
	e.g.: Monitors (computer displays), chip cards, CD-ROMs, discs (computer), cassettes (magnetic tape),	
	Reference to: Printing machines/processes, reproduction techniques	3MIK

3DDR	Workstations, minicomputers, microcomputers	
	e.g.: PCs (personal computers), laptops, notebooks, pentops, add-on cards, graphic cards, PC plug-in cards	

3DDX	Central processing units (CPUs)	
	Reference to: Microprocessors	3FTR



3DF	Systems architecture/software, programming languages e.g.: Utility software, program translators, editors (data processing), software library, compilers, file	
3DFB	Database management systems e.g.: Database software, database management systems, online databases, online information systems Reference to: Communication media/services Reference to: Management information system, knowledge management	3GL 3AAK
3DG	Software engineering/maintenance, application software e.g.: Projecting of software development, software engineering, software project management, human-computer interfaces, menu-driven navigation, program generators, programming theories/methods, automatic programming, CASE (computer-aided software engineering) Note: This classification only is allowed to use if „software“ is indeed in the main focus and gives a broad-based discussion with the paper's content. Inadequate are facts or factors only. Reference to: Maintenance, servicing	3AK
3DK	Office software, electronic publishing e.g.: Software for text processing and document mangement, desktop publishing, software for project Note: Branches software additional must be classified to the belonging branch, e.g. energy management Reference to: Printing machines/processes, reproduction techniques Reference to: Graphic data processing, virtual reality	3E 3MIK 3DR
3DL	Computer software (technical-scientific) Reference to: Simulation methods, simulation models	3BAS
3DLB	CAD/CAE/CAM/CIM systems Reference to: Rapid Prototyping, Rapid Tooling	3LD
3DR	Graphic data processing, virtual reality e.g.: Graphics software, presentation graphics Reference to: Office software, electronic publishing Reference to: Printing machines/processes, reproduction techniques Reference to: Multimedia Reference to: Rapid Prototyping, Rapid Tooling	3DK 3MIK 3GG 3LD
3DU	Process data processing e.g.: Process software Reference to: Control technology, monitoring	3IT
3DX	Computer networks, distributed data processing e.g.: Data teleprocessing, data transmission, communication software, PC mainframe communication, network software, network concentrators, network interconnectors (bridges, routers, hubs) Reference to: Communication networks/switching technology Reference to: Network theory (concentrated circuits)	3GN 3FAB
3DXA	Internet-based systems e.g.: Internetworking, internet remote maintenance, internet diagnostics, LANs (local-area networks), WANs Reference to: Communication networks/switching technology	3GN



	Reference to: Communication protocols/procedures	3GRP
3E	Power engineering and energy management	
3EB	Energy industry, energy management e.g.: Primary energy reserves/sources (natural gas, crude oil, biomass), energy demand/saving/balance	
	Reference to: Biotechnologically manufactured products	3PZS
3EBB	Electricity supply industry e.g.: Current demand/tariffs/importation/exportation	
3ED	Fuel	
3EE	Power plants, nuclear reactors e.g.: Power plant components, power plant cooling systems, cogeneration, tidal power plants	
	Reference to: Project engineering and planning of plants, equipment construction	3AB
	Reference to: Plant safety	3ABC
	Reference to: Turbogenerators	3EU
3EEB	Power plant control engineering	
3EI	Thermal engineering, refrigeration and cold storage	
3EIB	Heat pumps	
3EIC	Heat transfer engineering, heat exchangers e.g.: Recuperators, thermal solar-energy use, heat recovery	
	Reference to: Fluidics (hydraulics, pneumatics)	3ME
	Reference to: Electric energy storage devices, direct energy conversion	3ELB
3EIF	Heating plants, industrial burners and furnaces e.g.: Steam generators, long-distance heating	
	Reference to: Electric heat	3EK
3EIH	Heating, ventilation, air conditioning, clean room technology Reference to: Vehicle components	3NRN
3EIK	Refrigeration and cold storage e.g.: Refrigerant, antifreezes, air liquefaction	
	Reference to: Electric household appliances	3EX
	Reference to: Cooling vehicles	3NDG
3EK	Electric heat e.g.: electron-beam/spark/high-frequency/induction/capacitive/laser-ray/electric-arc/microwave/plasma-jet/ Note: This classification only is allowed to use if electric heat generation, electric heat influence or electric	
	Reference to: Coating processes (thin/thick films)	3LX
	Reference to: Chemical/electrochemical machining	3LKG
	Reference to: Heating plants, industrial burners and furnaces	3EIF
	Reference to: Microwave engineering/devices	3GX
	Reference to: Welding, soldering	3LNB
3EL	Direct energy conversion, energy storage	



3ELB	Electric energy storage devices, direct energy conversion e.g.: Solar cells, photovoltaics, isotope batteries, thermoelectric generators, galvanic elements, MHD Reference to: Heat transfer engineering, heat exchangers	3EIC
3ELX	Thermal, chemical and mechanical energy storage devices	
3EM	Electric power transmission and systems e.g.: Medium/high/extra-high voltage-transmission, power-system networking, reactive-power Reference to: Network theory (concentrated circuits)	3FAB
3EN	Power switching devices e.g.: Circuit breakers, on-load/disconnecting switches, busbars, circuit-breaking arcs, arc quenching, Medium/high/extra-high voltage switchboard plants/devices	
3EP	Low-voltage installations, lighting engineering e.g.: Electric light sources, lightings, luminaries Reference to: Electric and electronic equipment of vehicles	3NRT
3ER	Electrical protective measures and devices e.g.: Lightning protection, fault current limiting	
3ES	Power electronics, current converters e.g.: Static-current/electrical rectifiers, rectifier inverters, current convertors, uninterruptible power supply, stationary standby power-systems, power units, battery chargers, electronics current-supply	
3ET	Power transformers, reactive power compensation e.g.: Transductors	
3EU	Electrical machines and drives e.g.: Electrical motors/generators, turbogenerators, induction linear motors, direct-current/ Reference to: Power plants, nuclear reactors Reference to: Hand tools Reference to: Drives for electrical road vehicles	3EE 3MN 3NRF
3EW	Nonstationary and emergency power supplies e.g.: Mobile standby power-systems, Diesel-electric generators	
3EX	Electric household appliances e.g.: Electrical refrigerators/freezers, vacuum cleaners, domestic cookers, washing machines, clothes dryers Reference to: Refrigeration and cold storage	3EIK
3EZ	Electro-physical laboratory equipment e.g.: Particle accelerators, irradiation devices, large-magnets systems, extra-high voltage/current Reference to: Laboratory techniques	3IU
3F	Electronics and microelectronics Reference to: Electric and electronic equipment of vehicles Reference to: Semiconductor properties of materials	3NRT 3KXH
3FA	Basic circuits (analogue, digital)	
3FAB	Network theory (concentrated circuits)	



	e.g.:	Quadrupole/filter theories, network analysis/synthesis, equivalent-circuit diagrams	
	Note:	Network in this classification must be used within the meaning of concentrated circuits. Not meant are computer/communication/electrical networks.	
	Reference to:	Computer networks, distributed data processing	3DX
	Reference to:	Electric power transmission and systems	3EM
	Reference to:	Communication networks/switching technology	3GN
3FAG		Signal/frequency filters, equalisers	
	e.g.:	Digital/debugging/sampling/RLC-active/RC-active/CCD filters, NICs (negative-impedance converters),	
	Reference to:	Microwave engineering/devices	3GX
3FAR		Amplifiers, signal converters/generators, oscillators	
	e.g.:	Operational amplifiers, signal inverters, A/D convertors, D/A convertors, frequency convertors, frequency/function generators, pulse discriminators, pulse formers, PLL systems (phase-locked loops)	
	Reference to:	Communication devices and techniques	3GR
	Reference to:	Microwave engineering/devices	3GX
3FAX		Digital basic circuits	
	e.g.:	Digital adders/multipliers, flip-flops, logic gates, serializers, deserializers	
3FE		Processing of semiconductor materials	
	e.g.:	Doping (semiconductor), diffusional doping, epitaxy (semiconductor technology), ion implantation	
	Reference to:	Semiconductor properties of materials	3KXH
	Reference to:	Manufacturing technology	3L
	Reference to:	Nucleation, crystal growth, vitrification, epitaxy	3KWB
3FF		Components and circuits fabrication	
	e.g.:	E-beam/X-ray lithography, photolithography, MOS technology (CMOS, COSMOS, BICMOS, HCMOS, NMOS), unipolar/bipolar technology	
	Note:	This classification includes testing, reliability, lifetime, quality assurance and production monitoring.	
	Reference to:	Chemical/electrochemical machining	3LKG
	Reference to:	Semiconductor/microelectronics components	3FT
	Reference to:	Micro-electro-mechanical components	3QBE
	Reference to:	Welding, soldering	3LNB
3FK		Passive/electromechanical components	
	e.g.:	Resistors, varistors, capacitive components, capacitors, inductive components, electric coils, magnetic	
	Reference to:	Micro-electro-mechanical components	3QBE
	Reference to:	Sensor technology, actuator, sensors and actuators	3IL
3FKB		Electronic tubes/valves	
	e.g.:	Television/cathode-ray/colour-picture/travelling-wave tubes	
	Reference to:	Audio, video, photography, cinematography, radio, tv	3GG
3FKG		Displays	
	e.g.:	LCDs (liquid-crystal displays), LEDs (light-emitting diodes), PDPs (plasma display panels)	
3FKR		Superconducting devices and magnets	
3FR		Circuit development/design	



	e.g.:	Developing of application-specific integrated circuits (ASICs), computer-assisted circuits/systems	
3FT	Semiconductor/microelectronics components		
	Reference to:	Components and circuits fabrication	3FF
	Reference to:	Micro-electro-mechanical components	3QBE
	Reference to:	Microwave engineering/devices	3GX
	Reference to:	Biochips, DNA chips (gene chips)	3PZX
3FTB	Discrete semiconductor components		
	e.g.:	Semiconductor diodes, transistors, thyristors	
	Reference to:	Optoelectronic devices, integrated optics	3FX
	Reference to:	Microwave engineering/devices	3GX
	Reference to:	Semiconductor properties of materials	3KXH
3FTG	Integrated analogue/digital/hybrid/thin/thick film circuits		
	e.g.:	Integrated voltage regulators, intelligent power ICs (smart-power ICs), LSI (large scale integration),	
	Reference to:	Microwave engineering/devices	3GX
	Reference to:	Optoelectronic devices, integrated optics	3FX
3FTR	Microprocessors		
	e.g.:	CISC-/RISC-/numeric processors, coproc., DSPs (digital signal proc.), micro controllers, controller components	
	Reference to:	Central processing units (CPUs)	3DDX
3FTX	Memory devices		
	e.g.:	Semiconductor memories (RAMs, DRAMs, SRAMs, PROMs, EPROMs, EEPROMs), magnetic bubble memories, memory cards	
3FU	Wiring, connecting, plug-in units, housings		
	e.g.:	Circuit boards, electrical components, contacting (joining), semiconductor packages, plug-and-socket connection, SMD/SMT (surface mounting technology), soldered/welded/solderless wiring-technique, circuitcomponents insertion	
	Reference to:	Welding, soldering	3LNB
	Reference to:	Quality assurance/management, certification	3AL
3FX	Optoelectronic devices, integrated optics		
	e.g.:	Laser/luminescence diodes, photodiodes, photovoltaic devices, photothyristors, phototransistors, photoresistors, optical-fibre couplers, optocouplers, optoelectronic couplers	
	Reference to:	Integrated analogue/digital/hybrid/thin/thick film circuits	3FTG
	Reference to:	Discrete semiconductor components	3FTB
	Reference to:	Microsystems technology	3QB
	Reference to:	Optical engineering	3BF



3G Communications and telecommunication engineering

3GA	Fundamentals of telecommunications engineering e.g.: Communication traffic theory, queueing theory (waiting line theory), information theory, systems theory	
3GE	Electromagnetic interference of circuits e.g.: EMC (electromagnetic compatibility EMI (electromagnetic interference), EMP (electromagnetic pulse), electrosmog (EMC) Reference to: Electric/magnetic/electromagnetic fields effects on living beings	3UMZ
3GF	Signal recognition/processing e.g.: Character recognition, pattern recognition (signal recognition), signal noise (signal recognition) Reference to: Medical measurement, bioelectrical signal processing	3RBB
3GFB	Pattern recognition/processing, image processing	
3GFX	Speech analysis/synthesis/processing	
3GG	Audio, video, photography, cinematography, radio, tv e.g.: Multimedia, phonotechnique, sound/image recording, sound/image rendition, Hi-Fi technique, Reference to: Electronic tubes/valves 3FKB Reference to: Printing machines/processes, reproduction techniques 3MIK Reference to: Graphic data processing, virtual reality 3DR	
3GL	Communication media/services e.g.: Telefax, telephones, office communication systems, mailbox systems, video conferencing Reference to: Database management systems	3DFB
3GN	Communication networks/switching technology e.g.: ISDN (integrated services digital networks), local telephone networks, private branch switching Reference to: Internet-based systems, LANs, WANs Reference to: Management information system, knowledge management Reference to: Network theory (concentrated circuits) Reference to: Computer networks, distributed data processing	3DXA 3AAK 3FAB 3DX
3GR	Communication devices and techniques e.g.: Modulation, encoding, digitalization of signals, multiplexing, transmission band conversion, clock regenerators, modems, intermediate repeaters, digital/synchronous/asynchronous transmission Reference to: Microwave engineering/devices Reference to: Amplifiers, signal converters/generators, oscillators	3GX 3FAR
3GRP	Communication protocols/procedures e.g.: EDI (electronic data interchange), HDLC (high-level data link control), communication protocols, OSI Reference to: Internet-based systems	3DXA
3GS	Communication cables/lines e.g.: telecommunication cables, coaxial cables Reference to: Microwave engineering/devices	3GX
3GSB	Optical waveguides, fibreglass cables	
3GU	Optical communications, fibreglass networks e.g.: optical transmission systems, infrared transmission	



3GW	Radio communication/transmission e.g.: free space propagation, radio antennas/transmitters/receivers, directional/mobile radio, satellite	
3GX	Microwave engineering/devices e.g.: Millimetre/submillimetre wave technique, microwave amplifiers/guides Reference to: Discrete semiconductor components Reference to: Amplifiers, signal converters/generators, oscillators Reference to: Semiconductor/microelectronics components Reference to: Integrated analogue/digital/hybrid/thin/thick film circuits Reference to: Electric heat Reference to: Electrical, magnetic measuring methods Reference to: Communication cables/lines Reference to: Communication devices and techniques Reference to: Signal/frequency filters, equalisers	3FTB 3FAR 3FT 3FTG 3EK 3IDE 3GS 3GR 3FAG
3GZ	Radar, position/direction finding, navigation e.g.: Echo sounding, sonar, missiles controllers, radio beacons, ILS (instrument-landing systems), aerial Reference to: Acoustic measuring methods	3IDA
3I	Measurement, testing and control Reference to: Environmental engineering, environmental pollution	3U
3IB	Measuring units/systems e.g.: Legal calibration, general calibration	
3ID	Measuring/testing methods/devices Note: All sub classifications of 3ID* include measurement/test devices/equipments/methods. Note: Analytical measuring technique must be classified to the belonging process, e.g.: Clinical laboratories diagnosis 3RBX, Physico-chemical measuring methods 3IDC, Particle	
3IDA	Acoustic measuring methods e.g.: Ultrasound microscopy, ultrasonic inspection Reference to: Radar, position/direction finding, navigation	3GZ
3IDB	Biological-biochemical measuring methods e.g.: Biosensoric measurement Reference to: Biochips, DNA chips (gene chips) Reference to: Biosensors	3PZX 3IL
3IDC	Physico-chemical measuring methods e.g.: AAS (atomic absorption spectrometry), chromatography, electrophoretic measurement, particle	
3IDE	Electrical, magnetic measuring methods e.g.: Resistance thermometers, magnetometers, high-voltage/extra-high voltage/communication/microwave measurement technique Reference to: Microwave engineering/devices 3GX	
3IDM	Mechanical measuring methods e.g.: Barometers, mechanical force sensors, weighers	
3IDO	Optical measuring methods	



	e.g.:	Ellipsometry, interferometry, Raman-/infrared measuring, photometry, optical Doppler effecting, optical microscopy, thermography	
3IDT	Thermal measuring methods		
	e.g.:	Calorimetry, DTA (differential thermal analysis), TG (thermogravimetry)	
3IDX	Particle spectroscopy/microscopy		
	e.g.:	AES (Auger electron spectrometry), atomic force microscopy, EXAFS-process (Extended X-ray)	
3IF	Measuring variables		
3IFA	Measuring/testing of acoustical variables		
	e.g.:	Sound-intensity/sound-velocity measurement	
3IFC	Measuring/testing of chemical variables, chemical analysis		
	e.g.:	pH value measurement, CSB value measurement, detection/verification of organic/inorganic	
	Reference to:	Clinical laboratories diagnosis	3RBX
3IFE	Measuring/testing of electric/magnetic variables		
	e.g.:	Magnetic susceptibility measurement, inductance/capacitance/impedance measurement, I-V	
3IFF	Measuring/testing of frequency and time		
	e.g.:	Event number measurement, frequency counters, clock systems	
3IFM	Measuring/testing of mechanical/geometrical variables/mass/density		
	e.g.:	Pressure/range/torque/acceleration/stress measurement, mechanical vibration measurement, surface roughness measurement	
3IFO	Measuring/testing of optical variables		
	e.g.:	Measuring of optical absorbency/refractivity, colour measurement	
3IFS	Measuring/testing of fluid flow variables		
	e.g.:	Viscosimetry, flow velocity measurement, flow-rate measurement	
3IFT	Measuring/testing of thermal variables/humidity		
	e.g.:	Thermometry, thermal transmittance testing, dew-point measuring	
3IFX	Nuclear radiation measurement, particle detection		
	e.g.:	Radioactivity measurement	
3IG	Materials testing/inspection		
	Note:	Additional the belonging test method must be classified.	
	Reference to:	Manufacturing technology	3L
	Reference to:	Materials and material properties	3K
3IGB	Destructive materials testing		
	e.g.:	Compression/bending/hardness/fatigue testing, impact strength test	
3IGK	Corrosion testing		
	Reference to:	Chemical properties of materials, corrosion/erosion behaviour	3KXU
3IGT	Fibre, yarn and textile testing		
	e.g.:	Testing of textile fabrics and textile products, wear trials, textile field trials	
	Reference to:	Sensory material properties	3KXP
	Reference to:	Textiles, garment, textile machinery	3T
3IGX	Non-destructive testing/inspection of materials/components		
	e.g.:	X-ray determination (materials testing), ultrasonic testing (materials testing), acoustic emission testing, magnetic particle testing, eddy current testing, crack detection, computer tomography (materials testing)	



3IK	Measured data processing and display e.g.: Measurement registration, measured-value transducing, measured-data transmission, multigauging	
3IL	Sensor technology, actoric, sensors and actuators e.g.: Sensing elements, wire strain gauges, magnetic field probes, image sensors, biosensors, piezoelectric Reference to: Biochips, DNA chips (gene chips) Reference to: Biological-biochemical measuring methods Reference to: Passive/electromechanical components	3PZX 3IDB 3FK
3IN	Control theory, cybernetics e.g.: Adaptive systems, decision theory, systems theory (control engineering)	
3IR	Control and control systems Reference to: Chemical process-development, -modelling, -performance and -optimization Reference to: Biotechnological process development	3PLD 3PZP
3IRB	Electric/electronic control systems e.g.: Electric and electronic actuators (correcting elements)	
3IRG	Hydraulic/pneumatic control systems	
3IRR	Programmed/programmable controllers e.g.: SPC (stored-program control), numerical control (NC, CNC, DNC)	
3IT	Control technology, monitoring e.g.: Process controlling, remote monitoring, building automation systems, control station, signaling Reference to: Fire safety and fire fighting technology Reference to: Process data processing Reference to: Quality assurance/management, certification Reference to: Traffic control systems/signalling installations Reference to: Security for business	3MX 3DU 3AL 3NAB 3ABZ
3IU	Laboratory techniques e.g.: laboratory equipment, laboratory instruments Reference to: Electro-physical laboratory equipment Reference to: Clinical laboratories diagnosis	3EZ 3RBX
3K	Materials and material properties Reference to: Manufacturing technology Reference to: Raw material processing Reference to: Materials testing/inspection	3L 3PA 3IG
3KB	Raw materials (natural/secondary) e.g.: Crude ores, clay mineral, scraps (waste), scrap glass, cinder (ash) Reference to: Geosciences, geophysics Reference to: Garbage, waste treatment/avoidance/management Reference to: Mining, tunneling, petroleum/natural gas production, deep well drilling	3BW 3UMB 3MZ
3KE	Metallic materials	
3KEB	Steels, cast steel e.g.: Simple steel, microalloyed steel, low alloy steel, high alloy steel	
3KEE	Pure iron, iron alloys	
3KEG	Cast iron	



3KEM	Nonferrous metals/alloys/casting materials e.g.: Intermetallic compounds, light/heavy/noble metals	
3KER	Superalloys	
3KET	Metallic glasses, amorphous metals/pure metals and alloys	
3KEX	Cemented carbides, cermets	
3KG	Inorganic nonmetallic materials Reference to: Inorganic chemistry (fundamentals)	3BXA
3KGB	Minerals, natural/synthetic crystals, rocks e.g.: Rubies (corundum), garnets (gem), sapphires, quartz materials, diamonds (precious stone), graphite, natural stones & sand	
3KGG	Ceramic/refractory materials, glass ceramics e.g.: oxide ceramics, non oxide ceramics, silica ceramics, clay ceramics Reference to: Organic-inorganic composites	3KMD
3KGR	Glass e.g.: Special glass, oxide glass, oxygen free glass	
3KGU	Binders, construction materials e.g.: Cement, lime, plaster (gypsum), concrete, asphalt, bitumen	
3KH	Fibres, microfibrils, nanofibres Reference to: Fibre extraction, fibre production, yarn technology Reference to: Nanotechnology Reference to: Fibre-reinforced composites	3TC 3QN 3KMB
3KHB	Natural fibres e.g.: Animal fibres, vegetable fibres, asbestos fibres, rock fibres	
3KHX	Chemical/glass/carbon/metal fibres	
3KK	Organic materials, polymers e.g.: Leather, elastomers, rubbers Reference to: Fibre extraction, fibre production, yarn technology Reference to: Organic chemistry (fundamentals)	3TC 3BXC
3KKB	Plastics Reference to: Smart textiles, industrial textiles	3TMP
3KKC	Cellulose Reference to: Wood Reference to: Paper	3SL 3SV
3KM	Composites	
3KMA	Particle-reinforced composites Reference to: Particle chemistry	3PLK
3KMB	Fibre-reinforced composites Reference to: Fibres, microfibrils, nanofibres	3KH



	Reference to: Fibre extraction, fibre production, yarn technology	3TC
	Reference to: Smart textiles, industrial textiles	3TMP
3KMC	Laminated materials, laminates, gradient materials	
3KMD	Organic-inorganic composites e.g.: Organic modified ceramics (ORMOCER)	
	Reference to: Ceramic/refractory materials, glass ceramics	3KGG
3KMF	Metal-matrix composites (MMCs)	
3KMK	Ceramics/glass-matrix composites (CMCs)	
3KMN	Polymer-matrix composites (PMCs)	
3KMZ	Additives	
3KP	Powders, granular solids Reference to: Production of basic chemicals and chemical intermediate products	3PLE
	Reference to: Mechanical properties of materials	3KXM
	Reference to: Powder metallurgy	3LEK
	Reference to: Materials exploitation/extracting/master forming technology	3LE
3KS	Foam materials e.g.: Foamed plastics, ceramic foams, metal foams	
3KU	Coatings, thin films Reference to: Wood coatings	3SM
3KUF	Film sheets	
3KW	Materials science	
3KWB	Nucleation, crystal growth, vitrification, epitaxy Reference to: Processing of semiconductor materials	3FE
3KWG	Crystal structure, material structure/textures e.g.: Lattice defects, structure of amorphous substances, structure of melts, quasicrystals, irradiation effects Reference to: Nanotechnology, nanotubes	3QN
3KWR	Phase diagrams of materials e.g.: Heterogeneous equilibrium, recrystallization, eutectics, peritectics, microstructural changes Reference to: Thermodynamics, statistical physics, heat flow	3BN
3KX	Materials properties Reference to: Atomic and molecular physics	3BU
3KXA	Acoustic properties of materials e.g.: Ultrasonic attenuation, sound conductivity, optoacoustic material properties Reference to: Acoustics of solids, liquids and gases	3BBB
3KXE	Electrical/magnetic properties of materials e.g.: Dielectric permeability, photoconductivity, piezoelectricity, thermoelectric voltage; magnetization, magnetoresistance, Hall constant, magnetic inductivity; transition temperature, critical field intensity Reference to: Electricity and magnetism, electrical engineering (theory) Reference to: Material behaviour under radiation exposure	3BG 3KXS
3KXH	Semiconductor properties of materials e.g.: Bandgap/dark/intrinsic/extrinsic conductivity, Schottky barrier	



	Reference to: Electronics and microelectronics	3F
	Reference to: Electricity and magnetism, electrical engineering (theory)	3BG
	Reference to: Solid state physics, semiconductor theory	3BR
	Reference to: Discrete semiconductor components	3FTB
	Reference to: Processing of semiconductor materials	3FE
3KXM	Mechanical properties of materials	
	e.g.: Bending/compression/tensile/shearing strength, elasticity, fracture toughness, plasticity, creep (materials), ductility, hardness, stress strain diagrams	
	Reference to: Mechanics of solids, liquids and gases	3BB
	Reference to: Powders, granular solids	3KP
3KX0	Optical properties of materials	
	e.g.: Optical absorption, transparency, optical reflectivity/refractivity	
	Reference to: Material behaviour under radiation exposure	3KXS
3KXP	Sensory material properties	
	e.g.: Comfort properties, breathability	
	Reference to: Fibre, yarn and textile testing	3IGT
	Reference to: Finishing, pretreatment, bleaching, resin finishing, coating of textiles	3TK
3KXS	Material behaviour under radiation exposure	
	e.g.: Radiation resistance	
	Reference to: Electric/magnetic/electromagnetic fields effects on living beings	3UMZ
	Reference to: Electrical/magnetic properties of materials	3KXE
	Reference to: Optical properties of materials	3KX0
	Reference to: Radioactive radiation sources/damage/protection	3UMX
	Reference to: Thermal/thermomechanical properties of materials	3KXT
3KXT	Thermal/thermomechanical properties of materials	
	e.g.: Refractivity, thermal shock resistance, thermal expansion, thermal conductivity, thermal shock	
	Reference to: Material behaviour under radiation exposure	3KXS
3KXU	Chemical properties of materials, corrosion/erosion behaviour	
	e.g.: Acid/lye resistance, slag action resistance, bacterial corrosion, stress corrosion cracking, fatigue crack	
	Reference to: Fermentation, cell culture	3PZA
	Reference to: Corrosion testing	3IGK
3KXW	Surface properties	
	e.g.: Roughness, wettability, surface tension, hydrophobicity	
3KXZ	Biomedical/biochemical properties of materials	
	e.g.: Biocompatibility	
	Reference to: Biochemistry (fundamentals)	3BZH
	Reference to: Biomedical engineering	3R
	Reference to: Bioprocess engineering, biotechnology	3PZ
	Reference to: Pharmacology, pharmaceutical fundamentals, toxicology	3BZB

3L Manufacturing technology

Note: The manufacturing technology includes the belonging processes, plants, machines and tools.

Reference to: Processing of semiconductor materials 3FE



	Reference to: Raw material processing	3PA
	Reference to: Materials and material properties	3K
	Reference to: Materials testing/inspection	3IG
3LD	Rapid Prototyping, Rapid Tooling e.g.: Selective laser sintering, fused deposition modeling	
	Reference to: CAD/CAE/CAM/CIM systems	3DLB
	Reference to: Graphic data processing, virtual reality	3DR
	Reference to: Computer integrated manufacturing (CIM), virtual production	3AIB
3LE	Materials exploitation/extracting/master forming technology Reference to: Powders, granular solids	3KP
3LEB	Iron and steel making e.g.: Direct/melting reduction process, pig iron production (blast furnace), continuous casting (steel), secondary metallurgy	
3LEE	Nonferrous metal production e.g.: Electrolytic aluminium production, copper converters, continuous casting (non-ferrous metal)	
3LEG	Foundry e.g.: Foundry melt technique, sand mould technique, moulding materials, pressure/chill castings, rheocasting, foundry patternmaking, cast aftertreatment	
3LEK	Powder metallurgy e.g.: Sintered/hard metals production Reference to: Powders, granular solids	3KP
3LEM	Production/processing of non-metallic inorganic materials e.g.: Ceramics/glass/cement production, design of ceramics/glass; ceramics/glass products	
3LER	Production/processing of minerals e.g.: Diamond/ruby synthesis, YAG/YIG production, crystal growing	
3LET	Production/processing of plastics/rubbers e.g.: Plastics foaming, polymerization, polycondensation, vulcanization, calendaring process, blow	
3LEX	Production/processing of composite materials e.g.: Laminates winding process, impregnation technique, in-situ deposition Reference to: Wood manufacturing technology, composite materials with wood	3SN
3LF	Mechanical working e.g.: Magnetic forming	
3LFB	Press forming e.g.: Compressive/explosive forming, cold massive forming, forging process, extruding, tube extrusion	
3LFG	Rolling e.g.: Metal sheet rolling, profile contour rolling, wire rolling	
3LFR	Deformation by tension/tension-compression stresses e.g.: Forming under tensile and compressive condition, deep/wire drawing, elongation (forming),	
3LFX	Deformation by bending and shear stresses e.g.: Forming by bending, forming under shearing condition, stamping, cylindrical bending, torsional straining	



3LK	Material removal processes	
3LKB	Machining (chip-type), cutting e.g.: Turning, milling, drilling, water jet cutting, whetting, polishing, lapping, broaching, honing Reference to: Woodworking machinery	3SP
3LKG	Chemical/ electrochem- ical machin- ing e.g.: Etching process, spark erosion machining, LIGA process, electropolishing Reference to: Components and circuits fabrication Reference to: Electric heat	3FF 3EK
3LKR	Surface cleaning (mechanical and chemical) e.g.: High-pressure cleaning, sandblasting, descaling, unrusting, deburring, acid cleaning Note: Cleaning of materials (e.g. zone melting) must be classified with the belonging materials. Reference to: Thermal separation (molding)	3LNX
3LN	Joining, thermal cutting	
3LNB	Welding, soldering e.g.: Metal fusion/pressure welding, gas-shielded arc welding, hard/soft soldering, filler materials, brazing Reference to: Electric heat Reference to: Components and circuits fabrication Reference to: Wiring, connecting, plug-in units, housings	3EK 3FF 3FU
3LNG	Adhesive bonding e.g.: Adhesive materials, adhesive bonding of metals/plastics	
3LNR	Positive and negative joining e.g.: Forming joining, screwing, riveting, folding and creasing, bordering (crimping), clasping, tucking,	
3LNX	Thermal separation (molding) e.g.: Plasma jet cutting, laser cutting, laser engraving, oxygen cutting, flame planing Reference to: Surface cleaning (mechanical and chemical) Reference to: Separation of solid, liquid and gaseous matters, disperse systems	3LKR 3PH
3LR	Processes for changing properties of materials Reference to: Drying of solid, liquid and gaseous matters	3PF
3LRB	Heat treatment for changing properties of materials e.g.: Quench hardening, annealing, laser hardening, quenching and tempering, artificial aging (metallurgy)	
3LRG	Thermochemical processes to change surface properties e.g.: Carbonization, nitriding, carbonitriding, boriding, aluminizing, surface alloying, plasma pretreatment	
3LRR	Mechanical surface treatment e.g.: Shot peening, surface rolling, strengthening/polish/precision rolling	
3LX	Coating processes (thin/thick films) Reference to: Electric heat	3EK



3LXB	Metal deposition e.g.: Roll cladding, ion plating, electroplating, chemical metallization, hot dip galvanizing, electrolytic Reference to: Metal spraying	3LXX
3LXG	Nonmetal deposition e.g.: Chromating, enamelling, glazing (coating process), plastics coating, varnishing, phosphating Reference to: Wood coatings Reference to: Varnishes (chemical products) Reference to: Production of basic chemicals and chemical intermediate products	3SM 3PLE 3PLE
3LXR	Atomizing, sputtering, vapour deposition e.g.: PVD (physical vapour deposition), radiofrequency/magnetron/direct-current/ultrasound/reactive sputtering, CVD (chemical vapour deposition), MOCVD (metalorganic CVD), LPCVD (low-pressure CVD)	
3LXX	Thermal spraying e.g.: Metal/ceramic/plastics/plasma/powder/electric-arc/flame spraying, spray coating Reference to: Metal deposition	3LXB
3LZ	Assembling lines and assembly systems Reference to: Computer integrated manufacturing (CIM), virtual production	3AIB
3M	Mechanical engineering	
3MB	Machine components	
3MBB	Detachable joints e.g.: Screws, threads, lock rings, dowel pins, feather keys	
3MBE	Springs, absorbers, machine foundations/casings e.g.: Liquid/air/metal springs, vibration/shock absorbers	
3MBK	Power transmission units, brakes e.g.: Shaft hub joints, mechanical joints/couplings/chains/shafts, ropes, friction linings, gearwheels	
3MBL	Tubes, pipe joints, tubings Reference to: Water and gas supply, sanitary engineering	3MR
3MBM	Seals and gaskets e.g.: Contact seals, non-contact seals	
3MBR	Valves and fittings e.g.: Gate valves, regulating valves, ball valves	
3MBX	Bearings e.g.: Friction bearings, antifriction bearings, magnetic bearings, slideways, antifriction guideways	
3MD	Tribology e.g.: Friction, wastage, lubrication, lubricants, cutting fluids, antiadhesive agents Reference to: Mechanics of solids, liquids and gases	3BB
3ME	Fluidics (hydraulics, pneumatics) e.g.: Hydraulic/compressed-air motors, hydraulic/pneumatic valves, hydraulic cylinders, compressed-air Reference to: Fluid dynamics Reference to: Heat transfer engineering, heat exchangers	3BBS 3EIC



3MF	Gears and linkages e.g.: Friction gears	
3MFB	Gear drives, flexible drive mechanisms e.g.: Planetary gears, belt drives, CVT gearboxes	
3MFL	Link mechanisms, crank mechanisms e.g.: Cam mechanisms, maltese cross transmissions, cam type drives, eccentric/linear gears	
3MFR	Hydraulic and electric transmission	
3MG	Turbomachinery and piston engines	
3MGB	Steam turbines	
3MGD	Hydraulic turbines, marine propellers	
3MGF	Gas turbines, jet engines, rocket engines	
3MGG	Wind turbines, windmills	
3MGK	Pumps e.g.: Rotary/turbo/rotary-piston/diaphragm/hose/vacuum/displacement pumps Reference to: Vacuum technology	3MU
3MGL	Compressors, fans e.g.: Blower/turbo/screw/piston compressors	
3MGN	Piston-driven engines e.g.: Otto-/Diesel-/ rotary-piston/gas/marine engines, Stirling motors Reference to: Special drives for vehicles	3NRB
3MGR	Turbomachinery: carburation/combustion e.g.: Carburetors, turbochargers, burnables injection, fuel tanks, valves for combustion engines, sparking	
3MGT	Cooling systems for turbomachinery/piston-driven engines	
3MI	Processing and processing machines Reference to: Woodworking machinery Reference to: Paper making machines	3SP 3SY
3MIB	Civil engineering, construction (building) machinery e.g.: Building/underground/bridge construction/engineering, damming (engineering), dredgers, earthmoving equipment, building components, industrial floors Reference to: Mining, tunneling, petroleum/natural gas production, deep well drilling	3MZ
3MIK	Printing machines/ processes, reproduction techniques e.g.: Offset printing machines, printing processing machines, printing inks, serigraphy machines, microfilms, mikrofiches, letterpress/flexographic/planographic/continuous-form printing, serigraphy, duplicating Reference to: Peripheral computer equipment, mass storage, data carriers Reference to: Office software, electronic publishing Reference to: Multimedia Reference to: Graphic data processing	3DDG 3DK 3GG 3DR
3MIM	Packaging machines/technology/materials	
3MIR	Food and beverages processing machines	



	Reference to: Biotechnologically manufactured products	3PZS
	Reference to: Food technology	3PN
	Reference to: Chemical apparatuses and plants	3PLL
	Reference to: Biotechnological apparatuses, plants and reactors	3PZO
3MIT	Agricultural and forestry machinery	
	Reference to: Commercial vehicles	3NDG
3ML	Hoisting and transportation technology, storage	
	e.g.: Cranes, trackbound/wire-rope/flow/continuous conveyors, mine hoists, elevators, industrial trucks,	
	Reference to: Mining: mining, tunneling, shaft construction	3MZB
	Reference to: Logistics, material management/control	3AIX
3MLB	Tanks, silos	
	e.g.: Bulk materials bunkers, pressureless vessels	
	Reference to: Oil/gas underground storages	3NT
3MM	Robots, industrial handling	
3MN	Hand tools	
	e.g.: Electric/pneumatic hand tools	
	Reference to: Electrical machines and drives	3EU
3MR	Water and gas supply, sanitary engineering	
	Reference to: Tubes, pipe joints, tubings	3MBL
	Reference to: Pipelines	3NT
3MU	Vacuum technology	
	Reference to: Vacuum pumps	3MGK
3MX	Fire safety and fire fighting technology	
	e.g.: Fire engines, fire-suppression agents, fire-alarm systems, fire fighting	
	Reference to: Commercial vehicles	3NDG
	Reference to: Control technology, monitoring	3IT
3MZ	Mining, tunneling, petroleum/natural gas production, deep well drilling	
	Reference to: Civil engineering, construction (building) machinery	3MIB
	Reference to: Biological degradation and bioremediation	3PZI
	Reference to: Geosciences, geophysics	3BW
	Reference to: Raw material processing	3PA
	Reference to: Raw materials (natural/secondary)	3KB
3MZB	Mining: mining, tunneling, shaft construction	
	e.g.: Surface mining, underground mining, trepanning, roadheading method, extraction (mining), mine	
	Reference to: Explosives, blasting agents	3MZC
	Reference to: Mine railways	3NF
	Reference to: Mine hoists	3ML
3MZC	Explosives, blasting agents	
	e.g.: Explosion/blasting technique	
	Reference to: Mining: mining, tunneling, shaft construction	3MZB
3MZE	Oil & Gas: Drilling, production, process equipment	
	e.g.: Oil/natural-gas well-drilling plants, oil/natural-gas mining	
	Reference to: Marine engineering, Ocean and coastal structures	3NX



	Reference to: Oil/gas underground storages	3NT
3N	Traffic, transportation, vehicles	
3NA	Traffic systems e.g.: Metropolitan/urban/highway/rail/maritime/air traffic, fleet management	
3NAB	Traffic control systems/signalling installations e.g.: Tolage Reference to: Control technology, monitoring	3IT
3ND	Road vehicles	
3NDB	Passenger cars, two-wheeled vehicles e.g.: Station wagons, estate cars, racers	
3NDG	Commercial vehicles e.g.: Motorbuses, caravans, truck tractors, snow removers, commercial/cooling/road-cleaning vehicles, tank/garbage trucks Reference to: Garbage, waste treatment/avoidance/management Reference to: fire-fighting vehicles Reference to: Refrigeration and cold storage Reference to: Agricultural and forestry machinery	3UMB 3MX 3EIK 3MIT
3NF	Rail vehicles, suspended railways and ropeways e.g.: Locomotives, railway passenger vehicles, railway wagons, smeltery transportations, rail laying, maglev Reference to: Mining: mining, tunneling, shaft construction	3MZB
3NK	Ships, watercraft, shipbuilding e.g.: Shipbuilding market/companytechnology, types of ships, ship theory/propulsion/equipments	
3NN	Aircraft, space vehicles/stations	
3NR	Automotive engineering	
3NRB	Special drives for vehicles e.g.: Methanol/hydrogen drives, hybrid propulsions Reference to: Otto-/Diesel-/piston-driven engines	3MGN
3NRF	Drives for electrical road vehicles Reference to: Electrical machines and drives	3EU
3NRK	Chassis, mechanics/dynamics of vehicle movement, vehicle body e.g.: Bogies, wheel suspensions, vehicle steering	
3NRN	Vehicle components e.g.: Automotive air-conditioning systems, vehicle seats, safety belts, trailer couplings Reference to: Heating, ventilation, air conditioning, clean room technology	3EIH
3NRT	Electric and electronic equipment of vehicles Reference to: Electronics and microelectronics Reference to: Low-voltage installations, lighting engineering	3F 3EP
3NRX	Vehicle safety/testing/maintenance e.g.: Accident mechanics, side-crash security, collision dynamics, vehicles testbeds, carwashes Reference to: Maintenance, servicing	3AK
3NT	Pipelines	



e.g.: Gas/petroleum pipelines, gas pressure reservoir, petroleum reservoir, underground/storage tanks

Reference to: Oil & Gas: Drilling, production, process equipment 3MZE

Reference to: Tanks, silos 3MLB

Reference to: Water and gas supply, sanitary engineering 3MR

3NX Marine engineering, Ocean and coastal structures

e.g.: Offshore structures, fishing/diving/deep-sea/ocean technique/engineering, deep-sea mining

Reference to: Oil & Gas: Drilling, production, process equipment 3MZE

3NZ Military engineering

3P Process engineering, bioprocess engineering, downstream processing, reaction engineering

Note: includes the relevant processes, plants, products and chemicals

3PA Raw material processing

Reference to: Mining, tunneling, petroleum/natural gas production, deep well drilling 3MZ

Reference to: Manufacturing technology 3L

Reference to: Materials and material properties 3K

3PAB Processing of anorganic, mineral raw materials

e.g.: Ore-, clay-, stone processing, coal processing

Reference to: Biological degradation and bioremediation 3PZI

3PAD Processing of organic raw materials

e.g.: Cellulose processing, biomass processing

Reference to: Fibre extraction, fibre production, yarn technology 3TC

Reference to: Biotechnologically manufactured products 3PZS

3PB Size reduction

e.g.: Crushing, grinding, shredding, mashing, and squeezing

3PD Material combination, mixing

e.g.: Granulating, agglomerating, pelletizing, briquetting, kneading, homogenizing, emulsifying

3PF Drying of solid, liquid and gaseous matters

e.g.: Freeze-, contact-, radiation-, spray drying, calcination, roasting

Reference to: Processes for changing properties of materials 3LR

3PH Separation of solid, liquid and gaseous matters, disperse systems

e.g.: Sieving, classifying, dewatering, membrane separation processes, electrostatic filter, biofilter, ion exchanger, desalination, extraction systems, condensation processes

Reference to: Thermal separation (molding) 3LNX

3PHB Sorption technology

e.g.: Absorption technology, adsorption technology

3PHC Membrane and diffusion separation processes

e.g.: Dialysis, electrodialysis, electrophoresis, osmosis, reverse osmosis, electroosmosis, thermodiffusion, pressure diffusion

3PHD Distillation, rectification technology

3PJ Sterilization and disinfection processes

3PL Chemical engineering, chemical reaction engineering

Reference to: Fundamentals of chemistry 3BX



3PLA	Chemical equilibrium, kinetics, catalysis, chemical solutions	
3PLC	Chemical reactions, chemical reaction engineering	
	Reference to: Biotechnological reaction technology and processing	3PZM
	Reference to: Chemical apparatuses, plants and reactors	3PLL
3PLD	Chemical process-development, -modelling, -performance and -optimization	
	Reference to: Biotechnological process development	3PZP
	Reference to: Control and control systems	3IR
3PLE	Production of basic chemicals and chemical intermediate products	
	e.g.: Production of chemical semi-products	
	Reference to: Biotechnologically manufactured products	3PZS
	Reference to: Nonmetal deposition	3LXG
	Reference to: Powders, granular solids	3KP
3PLF	Production of inorganic chemical final products	
	e.g.: Production of potash salt	
	Reference to: Biotechnologically manufactured products	3PZS
3PLG	Production of organic chemical final products	
	e.g.: Production of methanol	
	Reference to: Biotechnologically manufactured products	3PZS
	Reference to: Wood coatings	3SM
3PLK	Particle chemistry, disperse systems, emulsions, colloids, suspensions	
	Reference to: Colloid chemistry	3BXE
	Reference to: Nanotechnology, nanotubes	3QN
	Reference to: Particle-reinforced composites	3KMA
3PLL	Chemical apparatuses, plants and reactors	
	e.g.: Reaction apparatuses	
	Reference to: Biotechnological apparatuses, plants and reactors	3PZO
	Reference to: Chemical reactions, chemical reaction engineering	3PLC
	Reference to: Food and beverages processing machines	3MIR
	Reference to: Project engineering and planning of plants, equipment construction	3AB
3PLM	Chemical micro process engineering	
	Reference to: Micro technology	3Q
3PN	Food technology	
	Reference to: Biotechnologically manufactured products	3PZS
	Reference to: Food and beverages processing machines	3MIR
	Reference to: food exposure	3UXR
3PP	Production of pharmaceutical products	
	Reference to: Pharmaceutical fundamentals, toxicology	3BZB
3PZ	Bioprocess engineering, biotechnology	
	Reference to: Biomedical/biochemical properties of materials	3KXZ
	Reference to: Life sciences	3BZ
3PZA	Fermentation, cell culture	
	e.g.: Algae, bacteria, yeasts, fungi	
	Reference to: bacterial corrosion	3KXU
3PZC	Biotransformation and enzymatic processes	
3PZE	Molecular biotechnology	



	e.g.: Strain development	
3PZG	Tissue Engineering	
	e.g.: Cultivation of cells, tissues and organs	
3PZI	Biological degradation and bioremediation	
	e.g.: Biological leaching procedures, wastewater treatment, biofilters	
	Reference to: Processing of inorganic, mineral raw materials	3PAB
	Reference to: Mining, tunneling, petroleum/natural gas production, deep well drilling	3MZ
	Reference to: Water pollution, wastewater	3UXX
3PZK	Agrobiotechnology	
	e.g.: Transgenic plants	
3PZM	Biotechnological reaction technology and processing	
	e.g.: Biotechnological material-, impulse-, and energy-transfer in bioreactors, biotechnological reaction	
	Reference to: Chemical reactions, chemical reaction engineering	3PLC
3PZO	Biotechnological apparatuses, plants and reactors	
	Reference to: Chemical apparatuses and plants	3PLL
	Reference to: Project engineering and planning of plants, equipment construction	3AB
	Reference to: Food and beverages processing machines	3MIR
3PZP	Biotechnological process-development, -modelling, -performance and -optimization	
	Reference to: Chemical process-development, -modelling, -performance and -optimization	3PLD
	Reference to: Control and control systems	3IR
3PZS	Biotechnologically manufactured products	
	e.g.: Microbial biomass, biogas	
	Reference to: Energy industry	3EB
	Reference to: Food technology	3PN
	Reference to: Food and beverages processing machines	3MIR
	Reference to: Production of basic chemicals and chemical intermediate products	3PLE
	Reference to: Production of inorganic chemical final products	3PLF
	Reference to: Production of organic chemical final products	3PLG
	Reference to: Processing of organic raw materials	3PAD
3PZU	Downstream processing in biotechnology	
	e.g.: Biological disintegration, cell disintegration, product separation/remediation in biotechnology	
3PZX	Biochips, DNA chips (gene chips)	
	Reference to: Biocomputing, neurocomputing	3DBC
	Reference to: Biological-biochemical measuring methods	3IDB
	Reference to: Semiconductor/microelectronics components	3FT
	Reference to: Sensor technology, actinic	3IL
3Q	Microtechnology, nanotechnology	
	Reference to: Chemical micro process engineering	3PLM
3QB	Microsystems technology	
	Reference to: Optoelectronic devices, integrated optics	3FX
3QBD	Micromechanical components	
3QBE	Micro-electro-mechanical components	
	e.g.: MEMS (microelectromechanical systems), microreactors	



	Reference to: Components and circuits fabrication	3FF
	Reference to: Semiconductor/microelectronics components	3FT
	Reference to: Passive/electromechanical components	3FK
3QN	Nanotechnology, nanotubes	
	Reference to: Fibres, microfibres, nanofibres	3KH
	Reference to: Crystal structure, material structure/textures	3KWG
	Reference to: Particle chemistry, disperse systems, emulsions, colloids, suspensions	3PLG
3R	Biomedical engineering	
	Reference to: Biomedical/biochemical properties of materials	3KXZ
	Reference to: Biosciences , life sciences	3BZ
	Reference to: Pharmacology, pharmaceutical fundamentals, toxicology	3BZB
3RB	Medical diagnosis and diagnostic systems	
	e.g.: Electrodiagnostics	
3RBB	Medical measurement, bioelectrical signal processing	
	e.g.: Biomagnetic measurement, measuring of physiological parameters, audiometry, organ-function	
	Reference to: Signal recognition/processing	3GF
3RBX	Clinical laboratories diagnosis	
	e.g.: Blood analysis, cytometry, enzyme diagnostics, immunoassays	
	Reference to: Laboratory techniques	3IU
	Reference to: Measuring/testing of chemical variables, chemical analysis	3IFC
3RF	Diagnostic medical imaging	
	e.g.: Thermography (medical diagnosis), diaphanoscopy	
3RFB	Computer-aided tomography, magnetic resonance imaging	
	e.g.: MR angiography, Cine MRI (medical diagnosis), emission CT (medical diagnosis), electrical impedance tomography (medical diagnosis), X-ray CT (medical diagnosis), microwave tomography (medical diagnosis)	
3RFF	Medical endoscopic diagnosis	
	e.g.: Laparoscopy, video endoscopy (medical diagnosis)	
3RFK	Nuclear medicine diagnosis	
	e.g.: Scintigraphy (medical diagnosis), radionuclide ventriculography	
3RFN	Medical X-ray diagnostics	
	e.g.: Digital radiography (medical diagnosis), film screen combination	
3RFT	Medical ultrasonic diagnostics	
	e.g.: Echocardiography, endoscopic ultrasonography	
3RI	Optometry, physiological optics, vision aids	
	e.g.: Spectacles, contact lenses, eye refractometry	
3RK	Medical treatment	
	e.g.: Chemotherapy, gene therapy, infusions	
3RKB	Surgery	
	e.g.: High-frequency surgery, minimally invasive surgery, endoscopic therapy, microwave/catheter/laser	



3RKG	Electro therapy, light therapy, climate therapy e.g.: Therapeutical electrical stimulation, cardiac pacemakers, high-frequency/low-temperature therapy, therapy)	
3RKR	Radiation therapy e.g.: Gamma-ray therapy, X-ray therapy, nuclear-medical therapy	
3RKX	Acute medical care e.g.: Anaesthesia, ventilation (respiration), reanimation	
3RN	Rehabilitation engineering, prostheses, artificial organs e.g.: Blood pumps system, dialyzers, artificial heart, artificial pancreas, oxygenators	
3RNB	Passive endoprostheses e.g.: Artificial eye lenses, heart valve prothesis, orthopaedic implants, dental prothesis	
3RNX	Technical aids for rehabilitation e.g.: Myoelectric controlled prosthesis, exoprosthesis, blind person aids, hearing aids, communication aids	
3RT	Hospital management/information systems, doctor's practice management e.g.: Hospital engineering, medical picture-archiving systems, medical communication systems,	
3S	Wood and paper	
3SK	Wood science and engineering e.g.: Wood anatomy/chemistry/physics/preservation Reference to: Biosciences , life sciences	3BZ
3SL	Wood e.g.: Raw/laminated wood, sawn timbers, wood fibre boards, wood composites, cork Reference to: Cellulose	3KKC
3SM	Wood coatings e.g.: Varnishes/foils for wood, wood preservatives Reference to: Production of organic chemical final products Reference to: Nonmetal deposition Reference to: Coatings, thin films	3PLG 3LXG 3KU
3SN	Wood manufacturing technology, composite materials with wood e.g.: Wood fibre-board manufacturing, formed wood-parts manufacturing, wood composites manufacturing Reference to: Production/processing of composite materials	3LEX
3SP	Woodworking machinery e.g.: Mechanical/noncutting wood processing, sawing/milling/drilling/cutting machines (woodworking), Reference to: Machining (chip-type), cutting Reference to: Processing and processing machines	3LKB 3MI
3SQ	Wood finished products e.g.: Wood furnitures, wood components, wood packing agents, wood toys, wood sports devices	
3SV	Paper Reference to: Cellulose	3KKC
3SY	Paper making machines, paper technology, paper pulp processing Reference to: Processing and processing machines	3MI



3T Textiles, garment, textile machinery

Note: Textile machines must be classified to the belonging sub classifications (in technological connection).

Reference to: Fibre, yarn and textile testing 3IGT

3TC	Fibre extraction, fibre production, yarn technology	
	Reference to: Processing of organic raw materials	3PAD
	Reference to: Fibre-reinforced composites	3KMB
	Reference to: Fibres, microfibres, nanofibres	3KH
	Reference to: Organic materials, polymers	3KK

3TCE	Spinning, winding, twisting, texturing of yarn	
	e.g.: Spinning (textile process), spooling (winding), doubling (shedding), twisting/texturing (yarn),	

3TG	Warping, beaming, sizing, braiding, tufting, lace manufacturing	
	e.g.: Sectional warping, warping (weaving), beaming (textile process), warp preparation, warp	

3TGB	Weaving	
	e.g.: Woven fabrics	

3TGG	Knitting	
	e.g.: Meshing (knitting), knitted goods, hosiery	

3TGR	Nonwoven manufacturing	
	e.g.: Spunbondeds, needle-punched nonwoven fabrics, melt blowing (textiles)	

3TK	Finishing, pretreatment, bleaching, resin finishing, coating of textiles	
	e.g.: Textiles pretreatment/bleaching/coating/drying, singeing, desizing	
	Reference to: Sensory material properties	3KXP

3TKB	Dyeing and printing of textiles	
	e.g.: Pigment printing, vat dyeing, prints (substrate), colour kitchen	

3TM	Textiles, textile goods	
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3TMB	Making-up, embroidering of textiles	
	e.g.: Sewing, cloth cutting, zippers, garment design	

3TML	Clothing (apparel), functional wear, protective clothing	
	e.g.: Outerwears, tailored size, underwear, career apparel, smart clothes	
	Reference to: Occupational safety, accident prevention	3AM

3TMP	Smart textiles, industrial textiles	
	e.g.: Geotextiles, medical/mobile/industrial textiles, building fabrics	
	Reference to: Fibre-reinforced composites	3KMB
	Reference to: Geosciences, geophysics	3BW
	Reference to: Plastics	3KKB

3TMW	Home and household textiles, carpets	
	e.g.: Curtains (limpid), furnishing fabrics, bedclothes, textile wall papers	

3TT	Textile care, care labelling	
	e.g.: Ironing, rental linen, dry cleaning solvents, spot removal (textiles)	

3U Environmental engineering, environmental pollution

Reference to: Environmental policy, ecology, ecosystems 3AXB

Reference to: Measurement, testing and control 3I

3UM	Environmental pollutants and toxicology	
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	Reference to: Biosciences , life sciences	3BZ
	Reference to: Pharmacology, pharmaceutical fundamentals, toxicology	3BZB
3UMB	Garbage, waste treatment/avoidance/management e.g.: Garbage depository, landfill covering, waste incinerator plants, waste recycling, used oil removal,	
	Reference to: refuse collection vehicles	3NDG
	Reference to: Raw materials (natural/secondary)	3KB
3UMG	Environmental chemicals, chemical pollutants/avoidance	
3UMR	Noise sources/injury/abatement e.g.: Machinery/traffic noises, sound insulation	
	Reference to: Occupational safety, accident prevention	3AM
3UMX	Radioactive radiation sources/damage/protection e.g.: Radioactive wastes, radioactive-waste disposal, reprocessing of reactor fuels	
	Reference to: Material behaviour under radiation exposure	3KXS
3UMZ	Electric/magnetic/electromagnetic fields effects on living beings e.g.: Electro-smog	
	Reference to: Biophysics (fundamentals)	3BZA
	Reference to: Electricity and magnetism, electrical engineering (theory)	3BG
	Reference to: 3GE Electromagnetic interference of circuits	3GE
	Reference to: Material behaviour under radiation exposure	3KXS
3UX	Environmental pollution and engineering Reference to: Biosciences , life sciences	3BZ
3UXB	Soil contamination/protection/cleanliness e.g.: Soil decontamination, contaminated soils	
3UXG	Air pollution e.g.: Pollutant emission, industrial gas purification, motor-vehicle exhaust detoxication, flue gas	
3UXR	Earth biosphere pollution e.g.: Noxious nuisance of forestry/agriculture/fishery/foods	
	Reference to: Food technology	3PN
3UXX	Water pollution, wastewater e.g.: Wastewater treatment/prevention, drain channel systems, potable water treatment/cleanliness, water	
	Reference to: Biological degradation and bioremediation	3PZI

