

Symbol	Typ	Titel
C	Sektion	CHEMISTRY; METALLURGY
C21	Untersektion	METALLURGY
C21	Klasse	METALLURGY OF IRON
C21D	Unterklasse	MODIFYING THE PHYSICAL STRUCTURE OF FERROUS METALS; GENERAL DEVICES FOR HEAT TREATMENT OF FERROUS OR NON-FERROUS METALS OR ALLOYS; MAKING METAL MALLEABLE BY DECARBURISATION, TEMPERING, OR OTHER TREATMENTS (cementation by diffusion processes C23C; surface treatment of metallic material involving at least one process provided for in class C23 and at least one process covered by this subclass C23F 17/00; unidirectional solidification of eutectic materials or unidirectional demixing of eutectoid materials C30B)
C21D 1/00	Hauptgruppe	General methods or devices for heat treatment, e.g. annealing, hardening, quenching, tempering (furnaces in general F27; electric heating H05B)
C21D 1/02	1-Punkt Untergruppe	. Hardening articles or materials formed by forging or rolling, with no further heating beyond that required for the formation
C21D 1/04	1-Punkt Untergruppe	. with simultaneous application of supersonic waves, magnetic or electric fields
C21D 1/06	1-Punkt Untergruppe	. Surface hardening
C21D 1/08	2-Punkt Untergruppe	. . with flames
C21D 1/09	2-Punkt Untergruppe	. . by direct application of electrical or wave energy; by particle radiation [3]
C21D 1/10	3-Punkt Untergruppe	. . . by electric induction [3]
C21D 1/18	1-Punkt Untergruppe	. Hardening (C21D 1/02 takes precedence); Quenching with or without subsequent tempering (quenching devices C21D 1/62) [3]
C21D 1/19	2-Punkt Untergruppe	. . by interrupted quenching [3]
C21D 1/20	3-Punkt Untergruppe	. . . Isothermal quenching, e.g. bainitic hardening [3]
C21D 1/22	3-Punkt Untergruppe	. . . Martempering [3]
C21D 1/25	2-Punkt Untergruppe	. . Hardening, combined with annealing between 300 °C and 600 °C, i.e. heat refining ("Verg%\$ten") [3]
C21D 1/26	1-Punkt Untergruppe	. Methods of annealing
C21D 1/28	2-Punkt Untergruppe	. . Normalising
C21D 1/30	2-Punkt Untergruppe	. . Stress-relieving
C21D 1/32	2-Punkt Untergruppe	. . Soft annealing, e.g. spheroidising
C21D 1/34	1-Punkt Untergruppe	. Methods of heating (C21D 1/06 takes precedence)
C21D 1/38	2-Punkt Untergruppe	. . Heating by cathodic discharges
C21D 1/40	2-Punkt Untergruppe	. . Direct resistance heating
C21D 1/42	2-Punkt Untergruppe	. . Induction heating
C21D 1/44	2-Punkt Untergruppe	. . in heat-treatment baths
C21D 1/46	3-Punkt Untergruppe	. . . Salt baths
C21D 1/48	3-Punkt Untergruppe	. . . Metal baths

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C21D 1/50	3-Punkt Untergruppe	. . . Oil baths
C21D 1/52	2-Punkt Untergruppe	. . with flames
C21D 1/53	2-Punkt Untergruppe	. . Heating in fluidised beds [3]
C21D 1/54	1-Punkt Untergruppe	. Determining when the hardening temperature has been reached by measurement of magnetic or electrical properties
C21D 1/55	1-Punkt Untergruppe	. Hardenability tests, e.g. end-quench tests (investigating or analysing materials by determining their chemical or physical properties, in general G01N) [3]
C21D 1/56	1-Punkt Untergruppe	. characterised by the quenching agents
C21D 1/58	2-Punkt Untergruppe	. . Oils
C21D 1/60	2-Punkt Untergruppe	. . Aqueous agents
C21D 1/607	2-Punkt Untergruppe	. . Molten salts [3]
C21D 1/613	2-Punkt Untergruppe	. . Gases; Liquefied or solidified normally gaseous material [3]
C21D 1/62	1-Punkt Untergruppe	. Quenching devices
C21D 1/63	2-Punkt Untergruppe	. . for bath quenching [3]
C21D 1/64	3-Punkt Untergruppe	. . . with circulating liquids (in general F28D) [3]
C21D 1/667	2-Punkt Untergruppe	. . for spray quenching [3]
C21D 1/673	2-Punkt Untergruppe	. . for die quenching [3]
C21D 1/68	1-Punkt Untergruppe	. Temporary coatings or embedding materials applied before or during heat treatment
C21D 1/70	2-Punkt Untergruppe	. . while heating or quenching
C21D 1/72	2-Punkt Untergruppe	. . during chemical change of surfaces
C21D 1/74	1-Punkt Untergruppe	. Methods of treatment in inert gas, controlled atmosphere, vacuum, or pulverulent material (production of gases C01 , C10)
C21D 1/76	2-Punkt Untergruppe	. . Adjusting the composition of the atmosphere
C21D 1/767	2-Punkt Untergruppe	. . with forced gas circulation; Reheating thereof [3]
C21D 1/773	2-Punkt Untergruppe	. . under reduced pressure or vacuum [3]
C21D 1/78	1-Punkt Untergruppe	. Combined heat-treatments not provided for above
C21D 1/82	1-Punkt Untergruppe	. Descaling by thermal stresses (mechanically B21 , B23 , chemically C23 , electrolytically C25F)
C21D 1/84	1-Punkt Untergruppe	. Controlled slow cooling (cooling-beds for metal rolling B21B 43/00) [3]
C21D 3/00	Hauptgruppe	Diffusion processes for extraction of non-metals; Furnaces therefor (local protective coatings C21D 1/72; furnaces in general F27)
C21D 3/02	1-Punkt Untergruppe	. Extraction of non-metals
C21D 3/04	2-Punkt Untergruppe	. . Decarburising
C21D 3/06	2-Punkt Untergruppe	. . Extraction of hydrogen
C21D 3/08	2-Punkt Untergruppe	. . Extraction of nitrogen

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C21D 3/10	1-Punkt Untergruppe	. Furnaces therefor
C21D 5/00	Hauptgruppe	Heat treatment of cast-iron
C21D 5/02	1-Punkt Untergruppe	. improving the malleability of grey cast-iron
C21D 5/04	1-Punkt Untergruppe	. of white cast-iron
C21D 5/06	2-Punkt Untergruppe	. . Malleabilising
C21D 5/08	3-Punkt Untergruppe	. . . with oxidation of carbon
C21D 5/10	4-Punkt Untergruppe	 in gaseous agents
C21D 5/12	4-Punkt Untergruppe	 in solid agents
C21D 5/14	3-Punkt Untergruppe	. . . Graphitising
C21D 5/16	4-Punkt Untergruppe	 Packing agents
C21D 6/00	Hauptgruppe	Heat treatment of ferrous alloys [2]
C21D 6/02	1-Punkt Untergruppe	. Hardening by precipitation [2]
C21D 6/04	1-Punkt Untergruppe	. Hardening by cooling below 00 C [2]
C21D 7/00	Hauptgruppe	Modifying the physical properties of iron or steel by deformation (apparatus for mechanical working of metal B21 , B23 , B24)
C21D 7/02	1-Punkt Untergruppe	. by cold working
C21D 7/04	2-Punkt Untergruppe	. . of the surface
C21D 7/06	3-Punkt Untergruppe	. . . by shot-peening or the like
C21D 7/08	3-Punkt Untergruppe	. . . by burnishing or the like
C21D 7/10	2-Punkt Untergruppe	. . of the whole cross-section, e.g. of concrete reinforcing bars
C21D 7/12	3-Punkt Untergruppe	. . . by expanding tubular bodies
C21D 7/13	1-Punkt Untergruppe	. by hot working
C21D 8/00	Hauptgruppe	Modifying the physical properties by deformation combined with, or followed by, heat treatment (hardening articles or materials formed by forging or rolling with no further heating beyond that required for the formation C21D 1/02) [3]
C21D 8/02	1-Punkt Untergruppe	. during manufacturing of plates or strips (C21D 8/12 takes precedence) [3]
C21D 8/04	2-Punkt Untergruppe	. . to produce plates or strips for deep-drawing [3]
C21D 8/06	1-Punkt Untergruppe	. during manufacturing of rods or wires [3]
C21D 8/08	2-Punkt Untergruppe	. . for concrete reinforcement [3]
C21D 8/10	1-Punkt Untergruppe	. during manufacturing of tubular bodies [3]
C21D 8/12	1-Punkt Untergruppe	. during manufacturing of articles with special electromagnetic properties [3]
C21D 9/00	Hauptgruppe	Heat treatment, e.g. annealing, hardening, quenching, tempering, adapted for particular articles; Furnaces therefor (furnaces in general F27)
C21D 9/02	1-Punkt Untergruppe	. for springs
C21D 9/04	1-Punkt Untergruppe	. for rails (apparatus for heat treatment of railway rails on the spot E01B 31/18)
C21D 9/06	2-Punkt Untergruppe	. . with diminished tendency to become wavy

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C21D 9/08	1-Punkt Untergruppe	. for tubular bodies or pipes
C21D 9/10	2-Punkt Untergruppe	. . shotgun barrels
C21D 9/12	2-Punkt Untergruppe	. . barrels for ordnance
C21D 9/14	2-Punkt Untergruppe	. . wear- or pressure-resistant pipes
C21D 9/16	1-Punkt Untergruppe	. for explosive shells
C21D 9/18	1-Punkt Untergruppe	. for knives, scythes, scissors, or like hand cutting tools
C21D 9/20	1-Punkt Untergruppe	. for blades for skates
C21D 9/22	1-Punkt Untergruppe	. for drills; for milling cutters; for machine cutting tools
C21D 9/24	1-Punkt Untergruppe	. for saw blades
C21D 9/26	1-Punkt Untergruppe	. for needles; for teeth for card-clothing
C21D 9/28	1-Punkt Untergruppe	. for plain shafts
C21D 9/30	1-Punkt Untergruppe	. for crankshafts; for camshafts
C21D 9/32	1-Punkt Untergruppe	. for gear wheels, worm wheels, or the like
C21D 9/34	1-Punkt Untergruppe	. for tyres; for rims
C21D 9/36	1-Punkt Untergruppe	. for balls; for rollers
C21D 9/38	1-Punkt Untergruppe	. for roll bodies
C21D 9/40	1-Punkt Untergruppe	. for rings; for bearing races
C21D 9/42	1-Punkt Untergruppe	. for armour plate
C21D 9/44	1-Punkt Untergruppe	. for equipment for lining mine shafts, e.g. segments, rings, props
C21D 9/46	1-Punkt Untergruppe	. for sheet metals
C21D 9/48	2-Punkt Untergruppe	. . deep-drawing sheets
C21D 9/50	1-Punkt Untergruppe	. for welded joints
C21D 9/52	1-Punkt Untergruppe	. for wires; for strips
C21D 9/54	2-Punkt Untergruppe	. . Furnaces for treating strips or wire
C21D 9/56	3-Punkt Untergruppe	. . . Continuous furnaces for strip or wire
C21D 9/567	4-Punkt Untergruppe	 with heating in fluidised beds [3]
C21D 9/573	4-Punkt Untergruppe	 with cooling [3]
C21D 9/58	4-Punkt Untergruppe	 with heating by baths
C21D 9/60	4-Punkt Untergruppe	 with induction heating
C21D 9/62	4-Punkt Untergruppe	 with direct resistance heating
C21D 9/63	4-Punkt Untergruppe	 the strip being supported by a cushion of gas [3]
C21D 9/64	3-Punkt Untergruppe	. . . Patenting furnaces

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C21D 9/66	3-Punkt Untergruppe	. . . Tower-type furnaces
C21D 9/663	3-Punkt Untergruppe	. . . Bell-type furnaces [3]
C21D 9/665	4-Punkt Untergruppe	 inverted or side-facing [3]
C21D 9/667	4-Punkt Untergruppe	 Multi-station furnaces [3]
C21D 9/67	5-Punkt Untergruppe	 adapted for treating the charge in vacuum or special atmosphere [3]
C21D 9/673	4-Punkt Untergruppe	 Details, accessories, or equipment peculiar to bell-type furnaces [3]
C21D 9/675	4-Punkt Untergruppe	 Arrangements of charging or discharging devices [3]
C21D 9/677	4-Punkt Untergruppe	 Arrangements of heating devices [3]
C21D 9/68	3-Punkt Untergruppe	. . . Furnace coilers; Hot coilers (cold coilers B21C)
C21D 9/70	1-Punkt Untergruppe	. Furnaces for ingots, i.e. soaking pits
C21D 10/00	Hauptgruppe	Modifying the physical properties by methods other than heat treatment or deformation [3]
C21D 11/00	Hauptgruppe	Process control or regulation for heat treatments (controlling or regulating in general G05) [2]