Symbol	Typ	Titel
F	**Sektion**	**SECTION F — MECHANICAL ENGINEERING; LIGHTING; HEATING; WEAPONS; BLASTING**
F22	**Klasse**	**STEAM GENERATION (chemical or physical apparatus for generating gases B01J; chemical generation of gas, e.g. under pressure, Section C; removal of combustion products or residues, e.g. cleaning of the combustion contaminated surfaces of tubes of boilers, F23J; generating combustion products of high pressure or high velocity F23R; water heaters not for steam generation F24H, F28; cleaning of internal or external surfaces of heat-transfer conduits, e.g. water tubes of boilers, F28G)**
F22B	**Unterklasse**	**METHODS OF STEAM GENERATION; STEAM BOILERS (steam engine plants where engine aspects predominate F01K; domestic central-heating systems using steam F24D; heat exchange or heat transfer in general F28; generation of vapour in the cores of nuclear reactors G21)**
		General aspects of, or methods for, steam generation
F22B 1/00	**Hauptgruppe**	**Methods of steam generation characterised by form of heating method (use of solar heat F24J 2/00; jackets or other cooling means in which steam is generated and which serve for cooling other apparatus, see the subclasses for such apparatus)**
F22B 1/02	1-Punkt Untergruppe	. by exploitation of the heat content of hot heat carriers
F22B 1/04	2-Punkt Untergruppe	. . the heat carrier being hot slag, hot residues, or heated blocks, e.g. iron blocks
F22B 1/06	2-Punkt Untergruppe	. . the heat carrier being molten; Use of molten metal, e.g. zinc, as heat transfer medium
F22B 1/08	2-Punkt Untergruppe	. . the heat carrier being steam
F22B 1/10	3-Punkt Untergruppe	. . . released from heat accumulators
F22B 1/12	3-Punkt Untergruppe	. . . produced by an indirect cyclic process
F22B 1/14	3-Punkt Untergruppe	. . . coming in direct contact with water in bulk or in sprays
F22B 1/16	2-Punkt Untergruppe	. . the heat carrier being hot liquid or hot vapour, e.g. waste liquid, waste vapour
F22B 1/18	2-Punkt Untergruppe	. . the heat carrier being a hot gas, e.g. waste gas such as exhaust gas of internal-combustion engines (use of waste heat of combustion engines, in general, F02)
F22B 1/20	1-Punkt Untergruppe	. using heat evolved in a solution absorbing steam; Soda steam boilers
F22B 1/22	1-Punkt Untergruppe	. using combustion under pressure substantially exceeding atmospheric pressure
F22B 1/24	2-Punkt Untergruppe	. . Pressure-fired steam boilers, e.g. using turbo air compressors actuated by hot gases from boiler furnace
F22B 1/26	2-Punkt Untergruppe	. . Steam boilers of submerged-flame type, i.e. the flame being surrounded by, or impinging on, the water to be vaporised
F22B 1/28	1-Punkt Untergruppe	. in boilers heated electrically
F22B 1/30	2-Punkt Untergruppe	. . Electrode boilers
F22B 3/00	**Hauptgruppe**	**Other methods of steam generation**
F22B 3/02	1-Punkt Untergruppe	. involving the use of working media other than water
F22B 3/04	1-Punkt Untergruppe	. by drop in pressure of high-pressure hot water within pressure-reducing chambers, e.g. in accumulators (steam accumulators per seF01K 1/00)
F22B 3/06	1-Punkt Untergruppe	. by transformation of mechanical, e.g. kinetic, energy into heat energy

Symbol	Typ	Titel
F22B 3/08	1-Punkt Untergruppe	. at critical or supercritical pressure values
		Kinds of steam boilers
F22B 5/00	**Hauptgruppe**	**Steam boilers of drum type, i.e. without internal furnace or fire tubes, the boiler body being contacted externally by flue gas**
F22B 5/02	1-Punkt Untergruppe	. with auxiliary water tubes outside the boiler body
F22B 5/04	1-Punkt Untergruppe	. Component parts thereof; Accessories therefor (covers or similar closure members for pressure vessels in general F16J 13/00)
F22B 7/00	**Hauptgruppe**	**Steam boilers of furnace-tube type, i.e. the combustion of fuel being performed inside one or more furnace tubes built-in in the boiler body**
F22B 7/02	1-Punkt Untergruppe	. without auxiliary water tubes
F22B 7/04	1-Punkt Untergruppe	. with auxiliary water tubes
F22B 7/06	2-Punkt Untergruppe	. . inside the furnace tube in transverse arrangement
F22B 7/08	2-Punkt Untergruppe	. . inside the furnace tube in longitudinal arrangement
F22B 7/10	2-Punkt Untergruppe	. . outside the boiler body
F22B 7/12	1-Punkt Untergruppe	. with auxiliary fire tubes; Arrangement of header boxes providing for return diversion of flue gas flow
F22B 7/14	1-Punkt Untergruppe	. with both auxiliary water tubes and auxiliary fire tubes
F22B 7/16	1-Punkt Untergruppe	. Component parts thereof; Accessories therefor, e.g. stay-bolt connections
F22B 7/18	2-Punkt Untergruppe	. . Walling of flues; Flue-gas header boxes
F22B 7/20	2-Punkt Untergruppe	. . Furnace tubes
F22B 9/00	**Hauptgruppe**	**Steam boilers of fire-tube type, i.e. the flue gas from a combustion chamber outside the boiler body flowing through tubes built-in in the boiler body**
F22B 9/02	1-Punkt Untergruppe	. the boiler body being disposed upright, e.g. above the combustion chamber
F22B 9/04	2-Punkt Untergruppe	. . the fire tubes being in upright arrangement
F22B 9/06	3-Punkt Untergruppe	. . . Arrangement of header boxes providing for return diversion of flue gas flow
F22B 9/08	2-Punkt Untergruppe	. . the fire tubes being in horizontal arrangement
F22B 9/10	1-Punkt Untergruppe	. the boiler body being disposed substantially horizontally, e.g. at the side of the combustion chamber
F22B 9/12	2-Punkt Untergruppe	. . the fire tubes being in substantially-horizontal arrangement
F22B 9/14	3-Punkt Untergruppe	. . . Arrangement of header boxes providing for return diversion of flue gas flow
F22B 9/16	1-Punkt Untergruppe	. the boiler body containing fire tubes disposed crosswise in inclined upward arrangement
F22B 9/18	1-Punkt Untergruppe	. Component parts thereof; Accessories therefor, e.g. stay-bolt connections
F22B 11/00	**Hauptgruppe**	**Steam boilers of combined fire-tube type and water-tube type, i.e. steam boilers of fire-tube type having auxiliary water tubes**
F22B 11/02	1-Punkt Untergruppe	. the fire tubes being in upright arrangement
F22B 11/04	1-Punkt Untergruppe	. the fire tubes being in horizontal arrangement
F22B 13/00	**Hauptgruppe**	**Steam boilers of fire-box type, i.e. the combustion of fuel being performed in a chamber or fire-box with subsequent flue(s) or fire tube(s), both chamber or fire-box and flues or fire tubes being built-in in the boiler body**
F22B 13/02	1-Punkt Untergruppe	. mounted in fixed position with the boiler body disposed upright

Symbol	Typ	Titel
F22B 13/04	1-Punkt Untergruppe	. mounted in fixed position with the boiler body disposed substantially horizontally
F22B 13/06	1-Punkt Untergruppe	. Locomobile, traction-engine, steam-roller, or locomotive boilers
F22B 13/08	2-Punkt Untergruppe	. . without auxiliary water tubes inside the fire-box
F22B 13/10	2-Punkt Untergruppe	. . with auxiliary water tubes inside the fire-box
F22B 13/12	3-Punkt Untergruppe	. . . the auxiliary water tubes lining the fire-box
F22B 13/14	1-Punkt Untergruppe	. Component parts thereof; Accessories therefor
F22B 13/16	2-Punkt Untergruppe	. . Stay-bolt connections, e.g. rigid connections
F22B 13/18	3-Punkt Untergruppe	. . . Flexible connections, e.g. of ball-and-socket type
F22B 15/00	**Hauptgruppe**	**Water-tube boilers of horizontal type, i.e. the water-tube sets being arranged horizontally**
F22B 17/00	**Hauptgruppe**	**Water-tube boilers of horizontally-inclined type, i.e. the water-tube sets being inclined slightly with respect to the horizontal plane**
F22B 17/02	1-Punkt Untergruppe	. built-up from water-tube sets in abutting connection with two header boxes in common for all sets, e.g. with flat header boxes
F22B 17/04	2-Punkt Untergruppe	. . the water-tube sets being inclined in opposite directions, e.g. crosswise
F22B 17/06	2-Punkt Untergruppe	. . the water-tube sets being bent angularly
F22B 17/08	2-Punkt Untergruppe	. . the water-tube sets being curved
F22B 17/10	1-Punkt Untergruppe	. built-up from water-tube sets in abutting connection with two sectional headers each for every set, i.e. with headers in a number of sections across the width or height of the boiler
F22B 17/12	2-Punkt Untergruppe	. . the sectional headers being in vertical or substantially-vertical arrangement
F22B 17/14	2-Punkt Untergruppe	. . the sectional headers being in horizontal or substantially-horizontal arrangement
F22B 17/16	1-Punkt Untergruppe	. Component parts thereof; Accessories therefor
F22B 17/18	2-Punkt Untergruppe	. . Header boxes; Sectional headers
F22B 19/00	**Hauptgruppe**	**Water-tube boilers of combined horizontally-inclined type and vertical type, i.e. water-tube boilers of horizontally-inclined type having auxiliary water-tube sets in vertical or substantially-vertical arrangement**
F22B 21/00	**Hauptgruppe**	**Water-tube boilers of vertical or steeply-inclined type, i.e. the water-tube sets being arranged vertically or substantially vertically**
F22B 21/02	1-Punkt Untergruppe	. built-up from substantially-straight water tubes
F22B 21/04	2-Punkt Untergruppe	. . involving a single upper drum and a single lower drum, e.g. the drums being arranged transversely
F22B 21/06	3-Punkt Untergruppe	. . . the water tubes being arranged annularly in sets, e.g. in abutting connection with drums of annular shape
F22B 21/08	3-Punkt Untergruppe	. . . the water tubes being arranged sectionally in groups or in banks, e.g. bent over at their ends
F22B 21/10	3-Punkt Untergruppe	. . . the water tubes being arranged in staggered rows
F22B 21/12	2-Punkt Untergruppe	. . involving two or more upper drums and two or more lower drums, e.g. with crosswise-arranged water-tube sets in abutting connection with drums
F22B 21/14	2-Punkt Untergruppe	. . involving a single upper drum and two or more lower drums
F22B 21/16	3-Punkt Untergruppe	. . . the lower drums being interconnected by further water tubes
F22B 21/18	2-Punkt Untergruppe	. . involving two or more upper drums and a single lower drum

Symbol	Typ	Titel
F22B 21/20	2-Punkt Untergruppe	. . involving sectional or subdivided headers in separate arrangement for each water-tube set
F22B 21/22	1-Punkt Untergruppe	. built-up from water tubes of form other than straight or substantially straight
F22B 21/24	2-Punkt Untergruppe	. . bent in serpentine or sinuous form
F22B 21/26	2-Punkt Untergruppe	. . bent helically, i.e. coiled
F22B 21/28	2-Punkt Untergruppe	. . bent spirally
F22B 21/30	2-Punkt Untergruppe	. . bent in U-loop form
F22B 21/32	3-Punkt Untergruppe	. . . disposed horizontally in abutting connection with upright headers or rising water mains
F22B 21/34	1-Punkt Untergruppe	. built-up from water tubes grouped in panel form surrounding the combustion chamber, i.e. radiation boilers
F22B 21/36	2-Punkt Untergruppe	. . involving an upper drum or headers mounted at the top of the combustion chamber
F22B 21/38	2-Punkt Untergruppe	. . Component parts thereof, e.g. prefabricated panels
F22B 21/40	1-Punkt Untergruppe	. built-up from water tubes arranged in a comparatively long vertical shaft, i.e. tower boilers
F22B 23/00	**Hauptgruppe**	**Water-tube boilers built-up from sets of spaced double-walled water tubes of return type in unilaterial abutting connection with a boiler drum or with a header box, i.e. built-up from Field water tubes comprising an inner tube arranged within an outer unilaterally-closed tube**
F22B 23/02	1-Punkt Untergruppe	. the water-tube, i.e. Field-tube, sets being horizontal or substantially horizontal
F22B 23/04	1-Punkt Untergruppe	. the water-tube, i.e. Field-tube, sets being vertical or substantially vertical
F22B 23/06	1-Punkt Untergruppe	. Component parts thereof, e.g. Field water tubes (heat-exchange tubes in general F28F)
F22B 25/00	**Hauptgruppe**	**Water-tube boilers built-up from sets of water tubes with internally-arranged flue tubes, or fire tubes, extending through the water tubes**
F22B 27/00	**Hauptgruppe**	**Instantaneous or flash steam boilers**
F22B 27/02	1-Punkt Untergruppe	. built-up from fire tubes
F22B 27/04	1-Punkt Untergruppe	. built-up from water tubes (F22B 27/12-F22B 27/16 take precedence)
F22B 27/06	2-Punkt Untergruppe	. . bent in serpentine or sinuous form
F22B 27/08	2-Punkt Untergruppe	. . bent helically, i.e. coiled
F22B 27/10	2-Punkt Untergruppe	. . bent spirally
F22B 27/12	1-Punkt Untergruppe	. built-up from rotary heat-exchange elements, e.g. from tube assemblies
F22B 27/14	1-Punkt Untergruppe	. built-up from heat-exchange elements arranged within a confined chamber having heat-retaining walls
F22B 27/16	1-Punkt Untergruppe	. involving spray nozzles for sprinkling or injecting water particles on to or into hot heat-exchange elements, e.g. into tubes
F22B 29/00	**Hauptgruppe**	**Steam boilers of forced-flow type**
F22B 29/02	1-Punkt Untergruppe	. of forced-circulation type
F22B 29/04	1-Punkt Untergruppe	. of combined-circulation type, i.e. in which convection circulation due to the difference in specific gravity between cold and hot water is promoted by additional measures, e.g. by injecting pressure-water temporarily
F22B 29/06	1-Punkt Untergruppe	. of once-through type, i.e. built-up from tubes receiving water at one end and delivering superheated steam at the other end of the tubes (F22B 33/00 takes precedence)
F22B 29/08	2-Punkt Untergruppe	. . operating with fixed point of final state of complete evaporation

Symbol	Typ	Titel
F22B 29/10	2-Punkt Untergruppe	. . operating with sliding point of final state of complete evaporation
F22B 29/12	2-Punkt Untergruppe	. . operating with superimposed recirculation during starting and low-load periods, e.g. composite boilers
F22B 31/00	**Hauptgruppe**	**Modifications of boiler construction, or of tube systems, dependent on installation of combustion apparatus; Arrangements or dispositions of combustion apparatus (steam generation characterised by heating method F22B 1/00; combustion apparatus per seF23)**
F22B 31/02	1-Punkt Untergruppe	. Installation of water-tube boilers in chimneys, e.g. in converter chimneys
F22B 31/04	1-Punkt Untergruppe	. Heat supply by installation of two or more combustion apparatus, e.g. of separate combustion apparatus for the boiler and the superheater respectively
F22B 31/06	2-Punkt Untergruppe	. . Installation of emergency heat supply
F22B 31/08	1-Punkt Untergruppe	. Installation of heat-exchange apparatus or of means in boilers for heating air supplied for combustion
		Steam-generation plants; Control systems
F22B 33/00	**Hauptgruppe**	**Steam-generation plants, e.g. comprising steam boilers of different types in mutual association (arrangements or dispositions of steam-generation plants in marine vessels B63H 21/00)**
F22B 33/02	1-Punkt Untergruppe	. Combinations of boilers having a single combustion apparatus in common
F22B 33/04	2-Punkt Untergruppe	. . of boilers of furnace-tube type with boilers of water-tube type
F22B 33/06	2-Punkt Untergruppe	. . of boilers of furnace-tube type with boilers of fire-tube type
F22B 33/08	2-Punkt Untergruppe	. . of boilers of water-tube type with boilers of fire-tube type
F22B 33/10	2-Punkt Untergruppe	. . of two or more superposed boilers with separate water volumes and operating with two or more separate water levels
F22B 33/12	1-Punkt Untergruppe	. Self-contained steam boilers, i.e. comprising as a unit the steam boiler, the combustion apparatus, the fuel storage, accessory machines, and equipment
F22B 33/14	1-Punkt Untergruppe	. Combinations of low- and high-pressure boilers
F22B 33/16	2-Punkt Untergruppe	. . of forced-flow type
F22B 33/18	1-Punkt Untergruppe	. Combinations of steam boilers with other apparatus
F22B 35/00	**Hauptgruppe**	**Control systems for steam boilers (regulation or control of steam power plants F01K 7/00; for regulating feed-water supply F22D; for controlling superheat temperature F22G 5/00; control of combustion F23N)**
F22B 35/02	1-Punkt Untergruppe	. for steam boilers with natural convection circulation
F22B 35/04	2-Punkt Untergruppe	. . during starting-up periods, i.e. during the periods between the lighting of the furnaces and the attainment of the normal operating temperature of the steam boilers
F22B 35/06	1-Punkt Untergruppe	. for steam boilers of forced-flow type
F22B 35/08	2-Punkt Untergruppe	. . of forced-circulation type
F22B 35/10	2-Punkt Untergruppe	. . of once-through type
F22B 35/12	3-Punkt Untergruppe	. . . operating at critical or supercritical pressure
F22B 35/14	2-Punkt Untergruppe	. . during the starting-up periods, i.e. during the periods between the lighting of the furnaces and the attainment of the normal operating temperature of the steam boilers
F22B 35/16	2-Punkt Untergruppe	. . responsive to the percentage of steam in the mixture of steam and water
F22B 35/18	1-Punkt Untergruppe	. Applications of computers to steam-boiler control

Symbol	Typ	Titel
F22B 37/00	**Hauptgruppe**	**Component parts or details of steam boilers (venting devices F16K 24/00; steam traps or like apparatus F16T)**
F22B 37/02	1-Punkt Untergruppe	. applicable to more than one kind or type of steam boiler
F22B 37/04	2-Punkt Untergruppe	. . and characterised by material, e.g. use of special steel alloy
F22B 37/06	2-Punkt Untergruppe	. . Flue or fire tubes; Accessories therefor, e.g. fire-tube inserts
F22B 37/08	3-Punkt Untergruppe	. . . Fittings preventing burning-off of the tube edges
F22B 37/10	2-Punkt Untergruppe	. . Water tubes; Accessories therefor (working of metal tubes B21D; pipes in general F16L; repairing leaks in water tubes F16L 55/16, F28F 11/00; cleaning water tubes of boilers F23J, F28G; baffles, screens, or deflectors formed of water tubes F23M 9/10)
F22B 37/12	3-Punkt Untergruppe	. . . Forms of water tubes, e.g. of varying cross-section
F22B 37/14	3-Punkt Untergruppe	. . . Supply mains, e.g. rising mains, down-comers, in connection with water tubes
F22B 37/16	3-Punkt Untergruppe	. . . Return bends
F22B 37/18	3-Punkt Untergruppe	. . . Inserts, e.g. for receiving deposits from water
F22B 37/20	3-Punkt Untergruppe	. . . Supporting arrangements, e.g. for securing water-tube sets (construction of tube walls of furnaces including boiler furnaces F23M 5/08)
F22B 37/22	2-Punkt Untergruppe	. . Drums; Headers; Accessories therefor (making boilers from sheet metal B21D 51/24; pressure vessels in general F16J 12/00; covers or similar closure members for pressure vessels in general F16J 13/00)
F22B 37/24	2-Punkt Untergruppe	. . Supporting, suspending, or setting arrangements, e.g. heat shielding (frames, engine beds F16M)
F22B 37/26	2-Punkt Untergruppe	. . Steam-separating arrangements (vapour-liquid separators, e.g. for drying steam, B01D, B04)
F22B 37/28	3-Punkt Untergruppe	. . . involving reversal of direction of flow
F22B 37/30	3-Punkt Untergruppe	. . . using impingement against baffle separators
F22B 37/32	3-Punkt Untergruppe	. . . using centrifugal force
F22B 37/34	2-Punkt Untergruppe	. . Adaptations of boilers for promoting water circulation (auxiliary apparatus F22D 7/00)
F22B 37/36	2-Punkt Untergruppe	. . Arrangements for sheathing or casing boilers
F22B 37/38	2-Punkt Untergruppe	. . Determining or indicating operating conditions in steam boilers, e.g. monitoring direction or rate of water flow through water tubes (measuring or indicating instruments in general G01)
F22B 37/40	2-Punkt Untergruppe	. . Arrangements of partition walls in flues of steam boilers, e.g. built-up from baffles (in flues or chimneys F23J 13/00)
F22B 37/42	2-Punkt Untergruppe	. . Applications, arrangements, or dispositions of alarm or automatic safety devices (for feed-water heaters F22D 1/14; alarms responsive to undesired or abnormal conditions G08B)
F22B 37/44	3-Punkt Untergruppe	. . . of safety valves (safety valves per seF16K)
F22B 37/46	3-Punkt Untergruppe	. . . responsive to low or high water level, e.g. for checking, suppressing, extinguishing combustion in boilers (fire-fighting, fire extinction in general A62)
F22B 37/47	3-Punkt Untergruppe	. . . responsive to abnormal temperature, e.g. actuated by fusible plugs (such alarms or devices per seG08B)
F22B 37/48	2-Punkt Untergruppe	. . Devices or arrangements for removing water, minerals, or sludge from boilers (cleaning water tubes, furnace tubes, or the like of boilers F23J, F28G)
F22B 37/50	3-Punkt Untergruppe	. . . for draining or expelling water

Symbol	Typ	Titel
F22B 37/52	3-Punkt Untergruppe	. . . Washing-out devices
F22B 37/54	3-Punkt Untergruppe	. . . De-sludging or blow-down devices
F22B 37/56	2-Punkt Untergruppe	. . Boiler-cleaning control devices, e.g. for ascertaining proper duration of boiler blow-down
F22B 37/58	2-Punkt Untergruppe	. . Removing tubes from headers or drums; Extracting tools
F22B 37/60	1-Punkt Untergruppe	. specially adapted for steam boilers of instantaneous or flash type
F22B 37/62	1-Punkt Untergruppe	. specially adapted for steam boilers of forced-flow type
F22B 37/64	2-Punkt Untergruppe	. . Mounting of, or supporting arrangements for, tube units (construction of tube walls of furnaces, e.g. boiler furnaces F23M 5/08)
F22B 37/66	3-Punkt Untergruppe	. . . involving vertically-disposed water tubes
F22B 37/68	3-Punkt Untergruppe	. . . involving horizontally-disposed water tubes
F22B 37/70	2-Punkt Untergruppe	. . Arrangements for distributing water into water tubes
F22B 37/72	3-Punkt Untergruppe	. . . involving injection devices
F22B 37/74	3-Punkt Untergruppe	. . . Throttling arrangements for tubes or sets of tubes
F22B 37/76	1-Punkt Untergruppe	. Adaptations or mounting of devices for observing existence or direction of fluid flow (devices per seG01P)
F22B 37/78	1-Punkt Untergruppe	. Adaptations or mounting of level indicators (level indicators per seG01F)