

CPC**COOPERATIVE PATENT CLASSIFICATION****G21C**

NUCLEAR REACTORS (analogue computers therefor [G06G 7/54](#); fusion reactors, hybrid fission-fusion reactors [G21B](#); nuclear explosives [G21J](#))

WARNING

The following IPC groups are not used in the CPC scheme:

- [G21C 1/01](#) covered by all other groups of [G21C](#)
- [G21C 19/33](#) covered by all other subgroups of [G21C 19/34](#)

G21C 1/00**Reactors**[G21C 1/02](#)

- Fast fission reactors, i.e. reactors not using a moderator; {Metal cooled reactors; Fast breeders}

[G21C 1/022](#)

- • {Characterised by the concept and properties of the core}

[G21C 1/024](#)

- • • {where the core is divided in zones with fuel and zones with breeding material}

[G21C 1/026](#)

- • • {Reactors not needing refueling, i.e. reactors of the type breed-and-burn, e.g. travelling or deflagration wave reactors or seed-blanket reactors}

[G21C 1/028](#)

- • {cooled by a pressurised coolant (cooling arrangements [G21C 15/00](#))}

[G21C 1/03](#)

- • cooled by a coolant not essentially pressurised, e.g. pool-type reactors

[G21C 1/04](#)

- Thermal reactors; {Epithermal reactors}

[G21C 1/06](#)

- • Heterogeneous reactors, i.e. in which fuel and moderator are separated

[G21C 1/07](#)

- • • Pebble-bed reactors; Reactors with granular fuel

[G21C 1/08](#)

- • • moderator being highly pressurised, e.g. boiling water reactor, integral super-heat reactor, pressurised water reactor ([G21C 1/22](#) takes precedence)

[G21C 1/082](#)

- • • • {Reactors where the coolant is overheated}

[G21C 1/084](#)

- • • • {Boiling water reactors}

[G21C 1/086](#)

- • • • {Pressurised water reactors}

[G21C 2001/088](#)

- • • • {Inherently safe boiling water reactors}

[G21C 1/09](#)

- • • • Pressure regulating arrangements, i.e. pressurisers

[G21C 1/10](#)

- • • • moderator and coolant being different or separated

[G21C 1/12](#)

- • • • • moderator being solid, e.g. Magnox reactor {gas-graphite reactor}

[G21C 1/14](#)

- • • moderator being substantially not pressurised, e.g. swimming-pool reactor ([G21C 1/22](#) takes precedence)

[G21C 1/16](#)

- • • • moderator and coolant being different or separated, e.g. sodium-graphite reactor {sodium-heavy water reactor, organic coolant-heavy water reactor}

[G21C 1/18](#)

- • • • • coolant being pressurised

[G21C 1/20](#)

- • • • • moderator being liquid, e.g. pressure-tube reactor {also the construction of the pressure-tubes}

[G21C 1/22](#)

- • • using liquid or gaseous fuel

- G21C 1/24
 - • Homogeneous reactors, i.e. in which the fuel and moderator present an effectively homogeneous medium to the neutrons
- G21C 1/26
 - • • Single-region reactors
- G21C 1/28
 - • • Two-region reactors
- G21C 1/30
 - Subcritical reactors; {Experimental reactors with exception of swimming-pool reactors or zero-energy reactors}
- G21C 1/303
 - • {Experimental and irradiation arrangements inside the reactor (irradiation loops [G21C 1/306](#); material testing by neutrons [G01N 23/005](#))}
- G21C 1/306
 - • {Irradiation loops}
- G21C 1/32
 - Integral reactors, i.e. reactors wherein parts functionally associated with the reactor but not essential to the reaction, e.g. heat exchangers, are disposed inside the enclosure with the core ([G21C 1/02](#) - [G21C 1/30](#) take precedence)
- G21C 1/322
 - • {wherein the heat exchanger is disposed above the core}
- G21C 1/324
 - • {wherein the heat exchanger is disposed beneath the core}
- G21C 1/326
 - • {wherein the heat exchanger is disposed next to or beside the core}
- G21C 1/328
 - • {wherein the prime mover is also disposed in the vessel}
- G21C 3/00**
 - Reactor fuel elements and their assemblies; Selection of substances for use as reactor fuel elements**
- G21C 3/02
 - Fuel elements {(manufacture thereof [G21C 21/02](#))}
- G21C 3/04
 - • Constructional details
- G21C 3/041
 - • • {Means for removal of gases from fuel elements}
- G21C 3/042
 - • • {Fuel elements comprising casings with a mass of granular fuel with coolant passages through them}
- G21C 3/044
 - • • {Fuel elements with porous or capillary structure}
- G21C 2003/045
 - • • {Pellets}
- G21C 2003/047
 - • • • {Pellet-clad interaction}
- G21C 2003/048
 - • • • {Shape of pellets}
- G21C 3/06
 - • • Casings; Jackets
- G21C 3/07
 - • • • characterised by their material, e.g. alloys
- G21C 3/08
 - • • • provided with external means to promote heat-transfer, e.g. fins, baffles
- G21C 3/10
 - • • • End closures; {Means for tight mounting therefor}
- G21C 3/105
 - • • • • {Flattened end-closures}
- G21C 3/12
 - • • • Means forming part of the element for locating it within the reactor core {(means not forming part of the element [G21C 5/06](#))}
- G21C 3/14
 - • • • Means forming part of the element for inserting it into, or removing it from, the core; Means for coupling adjacent elements, {e.g. to form a stringer}
- G21C 3/16
 - • • Details of the construction within the casing
- G21C 3/17
 - • • • Means for storage or immobilisation of gases in fuel elements
- G21C 3/18
 - • • • Internal spacers or other non-active material within the casing, e.g. compensating for expansion of fuel rods or for compensating excess reactivity ([interlayers G21C 3/20](#))

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| G21C 3/20 | with coating on fuel or on inside of casing; with non-active interlayer between casing and active material {with multiple casings or multiple active layers} |
| G21C 3/22 | . . with fissile or breeder material in contact with coolant |
| G21C 3/24 | . . with fissile or breeder material in fluid form within a non-active casing |
| G21C 3/26 | . . with fissile or breeder material in powder form within a non-active casing |
| G21C 3/28 | . . with fissile or breeder material in solid form within a non-active casing |
| G21C 3/30 | . Assemblies of a number of fuel elements in the form of a rigid unit |
| G21C 3/32 | . . Bundles of parallel pin-, rod-, or tube-shaped fuel elements |
| G21C 3/3206 | . . . {Means associated with the fuel bundle for filtering the coolant, e.g. nozzles, grids} |
| G21C 3/3213 | . . . {Means for the storage or removal of fission gases (means for the storage of fission gases in the elements G21C 3/16 ; means for the removal of fission gases from elements G21C 3/04)} |
| G21C 3/322 | . . . Means to influence the coolant flow through or around the bundles |
| G21C 2003/3225 | {by waterrods} |
| G21C 3/324 | . . . Coats or envelopes for the bundles |
| G21C 3/3245 | {made of moderator material} |
| G21C 3/326 | . . . comprising fuel elements of different composition; comprising, in addition to the fuel elements, other pin-, rod-, or tube-shaped elements, e.g. control rods, grid support rods, fertile rods, poison rods or dummy rods |
| G21C 2003/3262 | {Enrichment distribution in zones} |
| G21C 2003/3265 | {Radial distribution} |
| G21C 2003/3267 | {Axial distribution} |
| G21C 3/328 | Relative disposition of the elements in the bundle lattice |
| G21C 3/33 | . . . Supporting or hanging of elements in the bundle (spacer grids G21C 3/34); Means forming part of the bundle for inserting it into, or removing it from, the core; Means for coupling adjacent bundles |
| G21C 3/3305 | {Lower nozzle} |
| G21C 3/331 | {Comprising hold-down means, e.g. springs} |
| G21C 3/3315 | {Upper nozzle} |
| G21C 3/332 | Supports for spacer grids |
| G21C 3/334 | . . . Assembling {, maintenance or repair of} the bundles {(assembling, maintenance or repair of other reactor components G21C 19/207)} |
| G21C 3/335 | . . . Exchanging elements in irradiated bundles |
| G21C 3/336 | . . . Spacer elements for fuel rods in the bundle (spacer grids G21C 3/34) |
| G21C 3/338 | Helicoidal spacer elements |
| G21C 3/34 | . . . Spacer grids |
| G21C 3/3408 | {Compact spacer grids, e.g. made of a plate or a blade} |
| G21C 3/3416 | {Spacer grids formed by metallic wires, e.g. springs} |
| G21C 3/3424 | {Fabrication of spacer grids} |
| G21C 2003/3432 | {Grids designed to influence the coolant, i.e. coolant mixing function} |
| G21C 3/344 | formed of assembled tubular elements |

- G21C 3/348 formed of assembled non-intersecting strips
- G21C 3/352 formed of assembled intersecting strips
- G21C 3/356 being provided with fuel element supporting members
- G21C 3/3563 {Supporting members formed only by deformations in the strips}
- G21C 3/3566 {Supporting members formed only of elements fixed on the strips}
- G21C 3/36 . . Assemblies of plate-shaped fuel elements or coaxial tubes
- G21C 3/38 . Fuel units consisting of a single fuel element in a supporting sleeve {or in another supporting element}
- G21C 3/40 . Structural combination of fuel element with thermoelectric element for direct production of electric energy from fission heat (for temperature measurement [G21C 17/10](#)) {or with another arrangement for direct production of electric energy, e.g. a thermionic device (combination with thermoelements for temperature measurements [G21C 17/102](#))}
- G21C 3/42 . Selection of substances for use as reactor fuel
- G21C 3/44 . . Fluid or fluent reactor fuel
- G21C 3/46 . . . Aqueous compositions
- G21C 3/48 True or colloidal solutions of the active constituent
- G21C 3/50 Suspensions of the active constituent; Slurries
- G21C 3/52 . . . Liquid metal compositions
- G21C 3/54 . . . Fused salt, oxide or hydroxide compositions
- G21C 3/56 . . . Gaseous compositions; Suspensions in a gaseous carrier
- G21C 3/58 . . Solid reactor fuel {Pellets made of fissile material}
- G21C 3/60 . . . Metallic fuel; Intermetallic dispersions
- G21C 3/62 . . . Ceramic fuel
- G21C 3/623 {Oxide fuels}
- G21C 3/626 {Coated fuel particles}
- G21C 3/64 Ceramic dispersion fuel, e.g. cermet

- G21C 5/00 Moderator or core structure; Selection of materials for use as moderator**
- G21C 5/02 . Details
- G21C 5/04 . . Spatial arrangements allowing for Wigner growth
- G21C 5/06 . . Means for locating or supporting fuel elements {(means forming part of the element [G21C 3/12](#))}
- G21C 5/08 . . Means for preventing undesired asymmetric expansion of the complete structure; {Stretching devices, pins}
- G21C 5/10 . . Means for supporting the complete structure {(arrangements for supporting vessels and core-structures [G21C 13/024](#))}
- G21C 5/12 . characterised by composition, e.g. the moderator containing additional substances which ensure improved heat resistance of the moderator {(purification of fluid moderators during the operation of the reactor [G21C 19/30](#))}
- G21C 5/123 . . {Moderators made of organic materials}
- G21C 5/126 . . {Carbonic moderators (carbon and graphite in general [C01B 31/00](#); refractory carbon-bulbs [C04B 35/00](#); carbon electrodes [C25B](#))}

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| G21C 5/14 | <ul style="list-style-type: none"> characterised by shape |
| G21C 5/16 | <ul style="list-style-type: none"> <ul style="list-style-type: none"> Shape of its constituent parts |
| G21C 5/18 | <ul style="list-style-type: none"> characterised by the provision of more than one active zone |
| G21C 5/20 | <ul style="list-style-type: none"> <ul style="list-style-type: none"> wherein one zone contains fissile material and another zone contains breeder material |
| G21C 5/22 | <ul style="list-style-type: none"> <ul style="list-style-type: none"> wherein one zone is a superheating zone |
| G21C 7/00 | Control of nuclear reaction |
| G21C 7/005 | <ul style="list-style-type: none"> {Flux flattening} |
| G21C 7/02 | <ul style="list-style-type: none"> by using self-regulating properties of reactor materials, {e.g. Doppler effect} (arrangements that involve temperature stability G21C 7/32) |
| G21C 7/04 | <ul style="list-style-type: none"> <ul style="list-style-type: none"> of burnable poisons (burnable poisons in fuel rods G21C 3/326) |
| G21C 7/06 | <ul style="list-style-type: none"> by application of neutron-absorbing material, i.e. material with absorption cross-section very much in excess of reflection cross-section |
| G21C 7/08 | <ul style="list-style-type: none"> <ul style="list-style-type: none"> by displacement of solid control elements, e.g. control rods |
| G21C 7/10 | <ul style="list-style-type: none"> <ul style="list-style-type: none"> <ul style="list-style-type: none"> Construction of control elements |
| G21C 7/103 | <ul style="list-style-type: none"> <ul style="list-style-type: none"> <ul style="list-style-type: none"> Control assemblies containing one or more absorbants as well as other elements, e.g. fuel or moderator elements |
| G21C 7/107 | <ul style="list-style-type: none"> <ul style="list-style-type: none"> <ul style="list-style-type: none"> Control elements adapted for pebble-bed reactors |
| G21C 7/11 | <ul style="list-style-type: none"> <ul style="list-style-type: none"> <ul style="list-style-type: none"> Deformable control elements, e.g. flexible, telescopic, articulated |
| G21C 7/113 | <ul style="list-style-type: none"> <ul style="list-style-type: none"> <ul style="list-style-type: none"> Control elements made of flat elements; Control elements having cruciform cross-section |
| G21C 7/117 | <ul style="list-style-type: none"> <ul style="list-style-type: none"> <ul style="list-style-type: none"> Clusters of control rods; Spider construction |
| G21C 7/12 | <ul style="list-style-type: none"> <ul style="list-style-type: none"> Means for moving control elements to desired position (dropping rods in an emergency G21C 9/02) |
| G21C 7/14 | <ul style="list-style-type: none"> <ul style="list-style-type: none"> <ul style="list-style-type: none"> Mechanical drive arrangements |
| G21C 7/16 | <ul style="list-style-type: none"> <ul style="list-style-type: none"> <ul style="list-style-type: none"> Hydraulic or pneumatic drive |
| G21C 7/18 | <ul style="list-style-type: none"> <ul style="list-style-type: none"> Means for obtaining differential movement of control elements |
| G21C 7/20 | <ul style="list-style-type: none"> <ul style="list-style-type: none"> Disposition of shock-absorbing devices (shock-absorbers in general F16F) {Braking arrangements} |
| G21C 7/22 | <ul style="list-style-type: none"> <ul style="list-style-type: none"> by displacement of a fluid or fluent neutron-absorbing material, {e.g. by adding neutron-absorbing material to the coolant} |
| G21C 7/24 | <ul style="list-style-type: none"> <ul style="list-style-type: none"> Selection of substances for use as neutron-absorbing material |
| G21C 7/26 | <ul style="list-style-type: none"> by displacement of the moderator or parts thereof {by changing the moderator concentration} |
| G21C 7/27 | <ul style="list-style-type: none"> <ul style="list-style-type: none"> Spectral shift control |
| G21C 7/28 | <ul style="list-style-type: none"> by displacement of the reflector or parts thereof |
| G21C 7/30 | <ul style="list-style-type: none"> by displacement of the reactor fuel or fuel elements |
| G21C 7/32 | <ul style="list-style-type: none"> by varying flow of coolant through the core {by adjusting the coolant or moderator temperature} |
| G21C 7/34 | <ul style="list-style-type: none"> by utilisation of a primary neutron source |
| G21C 7/36 | <ul style="list-style-type: none"> Control circuits |

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| G21C 9/00 | Emergency protection arrangements structurally associated with the reactor {e.g. safety valves provided with pressure equalisation devices} (emergency cooling arrangements G21C 15/18) |
| G21C 9/001 | <ul style="list-style-type: none"> • {against explosions e.g. blast shields} |
| G21C 9/002 | <ul style="list-style-type: none"> • {against Na- or Ka- reactions} |
| G21C 9/004 | <ul style="list-style-type: none"> • Pressure suppression |
| G21C 9/008 | <ul style="list-style-type: none"> • . by rupture-discs or -diaphragms |
| G21C 9/012 | <ul style="list-style-type: none"> • . by thermal accumulation or by steam condensation, e.g. ice condensers |
| G21C 9/016 | <ul style="list-style-type: none"> • Core catchers |
| G21C 9/02 | <ul style="list-style-type: none"> • Means for effecting very rapid reduction of the reactivity factor under fault conditions, e.g. reactor fuse; {Control elements having arrangements activated in an emergency} (control elements per se G21C 7/00) |
| G21C 9/022 | <ul style="list-style-type: none"> • . {Reactor fuses} |
| G21C 9/024 | <ul style="list-style-type: none"> • . {Rupture diaphragms} |
| G21C 9/027 | <ul style="list-style-type: none"> • . by fast movement of a solid, e.g. pebbles |
| G21C 9/033 | <ul style="list-style-type: none"> • . by an absorbent fluid |
| G21C 9/04 | <ul style="list-style-type: none"> • Means for suppressing fires {Earthquake protection} |
| G21C 9/06 | <ul style="list-style-type: none"> • . Means for preventing accumulation of explosives gases, e.g. recombiners |
| G21C 11/00 | Shielding structurally associated with the reactor |
| G21C 11/02 | <ul style="list-style-type: none"> • Biological shielding (in general G21F) {Neutron or gamma shielding} |
| G21C 11/022 | <ul style="list-style-type: none"> • . {inside the reactor vessel} |
| G21C 11/024 | <ul style="list-style-type: none"> • . . {structurally combined with the casing} |
| G21C 11/026 | <ul style="list-style-type: none"> • . {in apertures or channels through a wall} |
| G21C 11/028 | <ul style="list-style-type: none"> • . {characterised by the form or by the material} |
| G21C 11/04 | <ul style="list-style-type: none"> • . on waterborne craft |
| G21C 11/06 | <ul style="list-style-type: none"> • Reflecting shields, i.e. for minimising loss of neutrons |
| G21C 11/08 | <ul style="list-style-type: none"> • Thermal shields; Thermal linings, i.e. for dissipating heat from gamma radiation which would otherwise heat an outer biological shield {Thermal insulation} |
| G21C 11/081 | <ul style="list-style-type: none"> • . {consisting of a non-metallic layer of insulating material} |
| G21C 11/083 | <ul style="list-style-type: none"> • . {consisting of one or more metallic layers} |
| G21C 11/085 | <ul style="list-style-type: none"> • . . {consisting exclusively of several metallic layers} |
| G21C 11/086 | <ul style="list-style-type: none"> • . {consisting of a combination of non-metallic and metallic layers, e.g. metal-sand-metal-concrete} |
| G21C 11/088 | <ul style="list-style-type: none"> • . {consisting of a stagnant or a circulating fluid} |
| G21C 13/00 | Pressure vessels; Containment vessels; Containment in general (for chemical or physical processes B01J 3/00; pressure vessels in general F16J 12/00) |
| G21C 13/02 | <ul style="list-style-type: none"> • Details |
| G21C 13/022 | <ul style="list-style-type: none"> • . {Ventilating arrangements} |
| G21C 13/024 | <ul style="list-style-type: none"> • . Supporting constructions for pressure vessels or containment vessels |
| G21C 13/028 | <ul style="list-style-type: none"> • . Seals, e.g. for pressure vessels or containment vessels |

- G21C 13/0285 . . . {for container apertures}
- G21C 13/032 . . Joints between tubes and vessel walls, e.g. taking into account thermal stresses
- G21C 13/036 . . . the tube passing through the vessel wall, i.e. continuing on both sides of the wall
- G21C 13/04 . . Arrangements for expansion and contraction
- G21C 13/06 . . Sealing-plugs (for pressure vessels in general [F16J 13/00](#))
- G21C 2013/063 . . . {Seals for closures or for rotatable closures}
- G21C 13/067 . . . for tubes, e.g. standpipes; Locking devices for plugs
- G21C 13/0675 {Seals for the plugs}
- G21C 13/073 . . . Closures for reactor-vessels, e.g. rotatable
- G21C 13/0735 {Seals for closures or for rotatable closures}
- G21C 13/08 . Vessels characterised by the material; Selection of materials for pressure vessels
- G21C 13/087 . . Metallic vessels
- G21C 13/0875 . . . {Tube-type vessels, e.g. for not essentially pressurised coolants}
- G21C 13/093 . . Concrete vessels
- G21C 13/0933 . . . {made of prestressed concrete}
- G21C 13/0936 {Particulars concerning prestressing devices and cables}
- G21C 13/10 . Means for preventing contamination in the event of leakage, {e.g. double wall}

- G21C 15/00** **Cooling arrangements within the pressure vessel containing the core; Selection of specific coolants**
- G21C 15/02 . Arrangements or disposition of passages in which heat is transferred to the coolant; {Coolant flow control devices ([G21C 19/04](#) takes precedence; coolant flow control through fuel assemblies, e.g. flow restrictors [G21C 3/322](#))}
- G21C 15/04 . . from fissile or breeder material {([G21C 3/32](#) takes precedence)}
- G21C 15/06 . . . in fuel elements
- G21C 15/08 . . from moderating material
- G21C 15/10 . . from reflector or thermal shield
- G21C 15/12 . . from pressure vessel; from containment vessel
- G21C 15/14 . . from headers; from joints in ducts
- G21C 15/16 . comprising means for separating liquid and steam (separating in general [B01D](#); steam traps [F16D](#))
- G21C 15/18 . Emergency cooling arrangements; Removing shut-down heat
- G21C 15/182 . . {comprising powered means, e.g. pumps}
- G21C 2015/185 . . . {using energy stored in reactor system}
- G21C 2015/187 . . . {using energy from the electric grid}
- G21C 15/20 . Partitions or thermal insulation between fuel channel and moderator
- G21C 15/22 . Structural association of coolant tubes with headers (joints of tubes in general [F16L](#))
- G21C 15/24 . Promoting flow of the coolant (electrodynamic pumps [H02K 44/02](#))
- G21C 15/243 . . for liquids

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| G21C 15/247 | <ul style="list-style-type: none"> for liquid metals |
| G21C 15/25 | <ul style="list-style-type: none"> using jet pumps |
| G21C 15/253 | <ul style="list-style-type: none"> for gases, e.g. blowers |
| G21C 15/257 | <ul style="list-style-type: none"> using heat-pipes {(in general F28D, F28F)} |
| G21C 15/26 | <ul style="list-style-type: none"> by convection, e.g. using chimneys, using divergent channels |
| G21C 15/28 | <ul style="list-style-type: none"> Selection of specific coolants (if serving as the moderator G21C 5/12; compositions per se C09K 5/00; {organic coolants G21C 5/123}; {Additions to the reactor coolants, e.g. against moderator corrosion (purification and regeneration of the reactor coolants G21C 19/30)} |
| G21C 17/00 | Monitoring; Testing (measuring in general G01); {Maintaining} |
| G21C 17/001 | <ul style="list-style-type: none"> {Mechanical simulators (electrical or magnetic simulators G06G 7/54)} |
| G21C 17/002 | <ul style="list-style-type: none"> {Detection of leaks (by testing the coolant or the moderator G21C 17/04)} |
| G21C 17/003 | <ul style="list-style-type: none"> Remote inspection of vessels, e.g. pressure vessels |
| G21C 17/007 | <ul style="list-style-type: none"> Inspection of the outer surfaces of vessels |
| G21C 17/01 | <ul style="list-style-type: none"> Inspection of the inner surfaces of vessels |
| G21C 17/013 | <ul style="list-style-type: none"> Inspection vehicles |
| G21C 17/017 | <ul style="list-style-type: none"> Inspection or maintenance of pipe-lines or tubes in nuclear installations |
| G21C 17/02 | <ul style="list-style-type: none"> Devices or arrangements for monitoring coolant or moderator |
| G21C 17/021 | <ul style="list-style-type: none"> {Solid moderators testing, e.g. graphite} |
| G21C 17/022 | <ul style="list-style-type: none"> for monitoring liquid coolants or moderators |
| G21C 17/0225 | <ul style="list-style-type: none"> {Chemical surface treatment, e.g. corrosion (corrosion prevention in presence of water from scale removal or by modification of the properties of the liquid C02F 5/00; inhibiting corrosion by adding corrosion inhibitors C23F 11/00)} |
| G21C 17/025 | <ul style="list-style-type: none"> for monitoring liquid metal coolants {(molten metal sampling in general G01N 1/125)} |
| G21C 17/0255 | <ul style="list-style-type: none"> {Liquid metal leaks detection (detecting leaks in pipe-line systems in general F17D 5/00)} |
| G21C 17/028 | <ul style="list-style-type: none"> for monitoring gaseous coolants |
| G21C 17/032 | <ul style="list-style-type: none"> Reactor-coolant flow measuring or monitoring {(measuring volume or mass flow in general G01F)} |
| G21C 17/035 | <ul style="list-style-type: none"> Moderator- or coolant-level detecting devices {(indicating or measuring liquid level in general G01F 23/00)} |
| G21C 17/038 | <ul style="list-style-type: none"> Boiling detection in moderator or coolant |
| G21C 17/04 | <ul style="list-style-type: none"> Detecting burst slugs |
| G21C 17/041 | <ul style="list-style-type: none"> {characterised by systems for checking the coolant channels, e.g. matrix systems} |
| G21C 17/042 | <ul style="list-style-type: none"> {Devices for selective sampling, e.g. valves, shutters, rotatable selector valves} |
| G21C 17/044 | <ul style="list-style-type: none"> {Detectors and metering devices for the detection of fission products} |
| G21C 17/045 | <ul style="list-style-type: none"> {Precipitation chambers} |
| G21C 17/047 | <ul style="list-style-type: none"> {Detection and metering circuits} |

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| G21C 17/048 | <ul style="list-style-type: none"> <ul style="list-style-type: none"> <ul style="list-style-type: none"> {characterised by a special construction of fuel elements, e.g. by a confined "tracer"} |
| G21C 17/06 | <ul style="list-style-type: none"> Devices or arrangements for monitoring or testing fuel or fuel elements outside the reactor core, e.g. for burn-up, for contamination (G21C 17/08, G21C 17/10 take precedence; detecting leaking fuel elements during reactor operation G21C 17/04) |
| G21C 17/063 | <ul style="list-style-type: none"> <ul style="list-style-type: none"> {Burn-up control (G21C 17/066 takes precedence)} |
| G21C 17/066 | <ul style="list-style-type: none"> <ul style="list-style-type: none"> {Control of spherical elements} |
| G21C 17/07 | <ul style="list-style-type: none"> <ul style="list-style-type: none"> Leak testing |
| G21C 17/08 | <ul style="list-style-type: none"> Structural combination of reactor core or moderator structure with viewing means, e.g. with television camera, periscope, window |
| G21C 17/10 | <ul style="list-style-type: none"> Structural combination of fuel element, control rod, reactor core, or moderator structure with sensitive instruments, e.g. for measuring radioactivity, strain |
| G21C 17/102 | <ul style="list-style-type: none"> <ul style="list-style-type: none"> {the sensitive element being part of a fuel element or a fuel assembly (structural combination with a thermoelectric element for direct production of electrical energy G21C 3/40)} |
| G21C 17/104 | <ul style="list-style-type: none"> <ul style="list-style-type: none"> Measuring reactivity |
| G21C 17/108 | <ul style="list-style-type: none"> <ul style="list-style-type: none"> Measuring reactor flux |
| G21C 17/112 | <ul style="list-style-type: none"> <ul style="list-style-type: none"> Measuring temperature |
| G21C 17/116 | <ul style="list-style-type: none"> <ul style="list-style-type: none"> Passages or insulators, e.g. for electric cables |
| G21C 17/12 | <ul style="list-style-type: none"> <ul style="list-style-type: none"> Sensitive element forming part of control element |
| G21C 17/14 | <ul style="list-style-type: none"> Period meters |
| G21C 19/00 | Arrangements for treating, for handling, or for facilitating the handling of, fuel or other materials which are used within the reactor, e.g. within its pressure vessel |
| G21C 19/02 | <ul style="list-style-type: none"> Details of handling arrangements |
| G21C 19/04 | <ul style="list-style-type: none"> <ul style="list-style-type: none"> Means for controlling flow of coolant over objects being handled; Means for controlling flow of coolant through channel being serviced, {e.g. for preventing "blow-out"} |
| G21C 19/06 | <ul style="list-style-type: none"> <ul style="list-style-type: none"> Magazines for holding fuel elements or control elements |
| G21C 19/065 | <ul style="list-style-type: none"> <ul style="list-style-type: none"> <ul style="list-style-type: none"> {Rotatable magazines} |
| G21C 19/07 | <ul style="list-style-type: none"> <ul style="list-style-type: none"> Storage racks; Storage pools |
| G21C 19/08 | <ul style="list-style-type: none"> <ul style="list-style-type: none"> Means for heating fuel elements before introduction into the core; Means for heating or cooling fuel elements after removal from the core |
| G21C 19/10 | <ul style="list-style-type: none"> <ul style="list-style-type: none"> Lifting devices or pulling devices adapted for co-operation with fuel elements or with control elements (manipulators B25J) |
| G21C 19/105 | <ul style="list-style-type: none"> <ul style="list-style-type: none"> <ul style="list-style-type: none"> with grasping or spreading coupling elements |
| G21C 19/11 | <ul style="list-style-type: none"> <ul style="list-style-type: none"> <ul style="list-style-type: none"> with revolving coupling elements, e.g. socket coupling |
| G21C 19/115 | <ul style="list-style-type: none"> <ul style="list-style-type: none"> <ul style="list-style-type: none"> with latching devices and ball couplings |
| G21C 19/12 | <ul style="list-style-type: none"> <ul style="list-style-type: none"> Arrangements for exerting direct hydraulic or pneumatic force on fuel element or on control element |
| G21C 19/14 | <ul style="list-style-type: none"> characterised by their adaptation for use with horizontal channels in the reactor core |

- G21C 19/16 . Articulated or telescopic chutes or tubes for connection to channels in the reactor core
- G21C 19/18 . Apparatus for bringing fuel elements to the reactor charge area, e.g. from a storage place
- G21C 19/19 . Reactor parts specifically adapted to facilitate handling, e.g. to facilitate charging or discharging of fuel elements
- G21C 19/20 . Arrangements for introducing objects into the pressure vessel; Arrangements for handling objects within the pressure vessel; Arrangements for removing objects from the pressure vessel
- G21C 19/202 . . {Arrangements for handling ball-form, i.e. pebble fuel}
- G21C 19/205 . . {Interchanging of fuel elements in the core, i.e. fuel shuffling}
- G21C 19/207 . . {Assembling, maintenance or repair of reactor components ([G21C 3/334](#) takes precedence)}
- G21C 19/22 . . Arrangements for obtaining access to the interior of a pressure vessel whilst the reactor is operating
- G21C 19/24 . . . by using an auxiliary vessel which is temporarily sealed to the pressure vessel
- G21C 19/26 . Arrangements for removing jammed or damaged fuel elements or control elements; Arrangements for moving broken parts thereof
- G21C 19/28 . Arrangements for introducing fluent material into the reactor core; Arrangements for removing fluent material from the reactor core ([pumping coolant G21D](#))
- G21C 19/30 . . with continuous purification of circulating fluent material, e.g. by extraction of fission products {deterioration or corrosion products, impurities, e.g. by cold traps ([purification of circulating fluid fuels G21C 19/50](#); separation in general [B01D](#))}
- G21C 19/303 . . . specially adapted for gases ([decontamination of gases G21F 9/02](#))
- G21C 19/307 . . . specially adapted for liquids ([decontamination of liquids G21F 9/04](#))
- G21C 19/31 for molten metals
- G21C 19/313 using cold traps
- G21C 19/317 . . . Recombination devices for radiolytic dissociation products
- G21C 19/32 . Apparatus for removing radioactive objects or materials from the reactor discharge area, e.g. to a storage place; Apparatus for handling radioactive objects or materials within a storage place or removing them therefrom ([disposal of waste material G21F 9/00](#))
- G21C 19/34 . Apparatus or processes for dismantling nuclear fuel, e.g. before reprocessing; {Apparatus or processes for dismantling strings of spent fuel elements} ([shielded cells G21F 7/00](#))
- G21C 19/36 . . Mechanical means only
- G21C 19/365 . . . Removing cannings or casings from fuel
- G21C 19/37 by separating into pieces both the canning or the casing and the fuel element, e.g. by cutting or shearing
- G21C 19/375 . . . Compacting devices, e.g. for fuel assemblies
- G21C 19/38 . . Chemical means only
- G21C 19/40 . Arrangements for preventing occurrence of critical conditions, e.g. during storage

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| G21C 19/42 | • Reprocessing of irradiated fuel |
| G21C 19/44 | • • of irradiated solid fuel |
| G21C 19/46 | • • • Aqueous processes, {e.g. by using organic extraction means, including the regeneration of these means} |
| G21C 19/48 | • • • Non-aqueous processes |
| G21C 19/50 | • • of irradiated fluid fuel, {e.g. regeneration of fuels while the reactor is in operation} |
| G21C 21/00 | Apparatus or processes specially adapted to the manufacture of reactors or parts thereof (in general section B, e.g. B23) |
| G21C 21/02 | • Manufacture of fuel elements or breeder elements contained in non-active casings |
| G21C 21/04 | • • by vibrational compaction or tamping {of fuel in the jacket} |
| G21C 21/06 | • • by {rotatable} swaging {of the jacket around the fuel} |
| G21C 21/08 | • • by a slip-fit cladding process {by crimping the jacket around the fuel} |
| G21C 21/10 | • • by extrusion, drawing, or stretching {by rolling, e.g. "picture frame" technique} |
| G21C 21/12 | • • by hydrostatic or thermo-pneumatic canning {in general by pressing without lengthening, e.g. explosive coating} |
| G21C 21/14 | • • by plating {the fuel} in a fluid |
| G21C 21/16 | • • by casting or dipping techniques |
| G21C 21/18 | • Manufacture of control elements covered by group G21C 7/00 |
| G21C 23/00 | Adaptations of reactors to facilitate experimentation or irradiation |