

**ECLA****EUROPEAN CLASSIFICATION****G21C**

**NUCLEAR REACTORS** (analogue computers therefor [G06G7/54](#); fusion reactors, hybrid fission-fusion reactors G21B; nuclear explosives G21J)

[N: **WARNING** [C1010]

The following IPC groups are not used in the internal ECLA classification scheme:

- [G21C1/01](#) covered by all other groups of G21C

- [G21C19/33](#) covered by all other subgroups of [G21C19/34](#)

]

**G21C1/00****Reactors**

- G21C1/02 . Fast fission reactors, i.e. reactors not using a moderator; [N: Metal cooled reactors; Fast breeders]
- G21C1/02B . . [N: Characterised by the concept and properties of the core]
- G21C1/02B2 . . . [N: where the core is divided in zones with fuel and zones with breeding material]
- G21C1/02B4 . . . [N: Reactors not needing refueling, i.e. reactors of the type breed-and-burn, e.g. travelling or deflagration wave reactors or seed-blanket reactors] [N1204]
- G21C1/02F . . [N: cooled by a pressurised coolant (cooling arrangements [G21C15/00](#))]
- G21C1/03 . . cooled by a coolant not essentially pressurised, e.g. pool-type reactors
- G21C1/04 . Thermal reactors; [N: Epithermal reactors]
- G21C1/06 . . Heterogeneous reactors, i.e. in which fuel and moderator are separated
- G21C1/07 . . . Pebble-bed reactors; Reactors with granular fuel
- G21C1/08 . . . moderator being highly pressurised, e.g. boiling water reactor, integral super-heat reactor, pressurised water reactor ([G21C1/22](#) takes precedence)
- G21C1/08D . . . . [N: Reactors where the coolant is overheated]
- G21C1/08E . . . . [N: Boiling water reactors]
- G21C1/08F . . . . [N: Pressurised water reactors]
- G21C1/09 . . . . Pressure regulating arrangements, i.e. pressurisers
- G21C1/10 . . . . moderator and coolant being different or separated
- G21C1/12 . . . . . moderator being solid, e.g. Magnox reactor [N: gas-graphite reactor]
- G21C1/14 . . . . moderator being substantially not pressurised, e.g. swimming-pool reactor ([G21C1/22](#) takes precedence)
- G21C1/16 . . . . . moderator and coolant being different or separated, e.g. sodium-graphite reactor [N: sodium-heavy water reactor, organic coolant-heavy water reactor]
- G21C1/18 . . . . . coolant being pressurised
- G21C1/20 . . . . . moderator being liquid, e.g. pressure-tube reactor [N: also the construction of the pressure-tubes]
- G21C1/22 . . . using liquid or gaseous fuel
- G21C1/24 . . Homogeneous reactors, i.e. in which the fuel and moderator present an effectively homogeneous medium to the neutrons
- G21C1/26 . . . Single-region reactors
- G21C1/28 . . . Two-region reactors

- G21C1/30 . Subcritical reactors; [N: Experimental reactors with exception of swimming-pool reactors or zero-energy reactors]
- G21C1/30B . . [N: Experimental and irradiation arrangements inside the reactor (irradiation loops [G21C1/30D](#); material testing by neutrons [G01N23/00B](#))]
- G21C1/30D . . [N: Irradiation loops]
- G21C1/32 . 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 ([G21C1/02](#) to [G21C1/30](#) take precedence) [N0802]
- G21C1/32A . . [N: wherein the heat exchanger is disposed above the core] [N0802]
- G21C1/32B . . [N: wherein the heat exchanger is disposed beneath the core] [N0802]
- G21C1/32N . . [N: wherein the heat exchanger is disposed next to or beside the core] [N0802]
- G21C1/32P . . [N: wherein the prime mover is also disposed in the vessel] [N0802]
  
- G21C3/00** **Reactor fuel elements and their assemblies; Selection of substances for use as reactor fuel elements**
  
- G21C3/02 . Fuel elements [N: (manufacture thereof [G21C21/02](#))]
- G21C3/04 . . Constructional details
- G21C3/04B . . . [N: Means for removal of gases from fuel elements]
- G21C3/04C . . . [N: Fuel elements comprising casings with a mass of granular fuel with coolant passages through them]
- G21C3/04D . . . [N: Fuel elements with porous or capillary structure]
- G21C3/06 . . . Casings; Jackets
- G21C3/07 . . . . characterised by their material, e.g. alloys
- G21C3/08 . . . . provided with external means to promote heat-transfer, e.g. fins, baffles
- G21C3/10 . . . . End closures; [N: Means for tight mounting therefor]
- G21C3/10B . . . . . [N: Flattened end-closures]
- G21C3/12 . . . . Means forming part of the element for locating it within the reactor core [N: means not forming part of the element [G21C5/06](#)]
- G21C3/14 . . . . Means forming part of the element for inserting it into, or removing it from, the core; Means for coupling adjacent elements, [N: e.g. to form a stringer]
- G21C3/16 . . . Details of the construction within the casing
- G21C3/17 . . . . Means for storage or immobilisation of gases in fuel elements
- G21C3/18 . . . . Internal spacers or other non-active material within the casing, e.g. compensating for expansion of fuel rods or for compensating excess reactivity ([interlayers](#) [G21C3/20](#))
- G21C3/20 . . . . with coating on fuel or on inside of casing; with non-active interlayer between casing and active material [N: with multiple casings or multiple active layers]
- G21C3/22 . . with fissile or breeder material in contact with coolant
- G21C3/24 . . with fissile or breeder material in fluid form within a non-active casing
- G21C3/26 . . with fissile or breeder material in powder form within a non-active casing
- G21C3/28 . . with fissile or breeder material in solid form within a non-active casing
  
- G21C3/30 . Assemblies of a number of fuel elements in the form of a rigid unit
- G21C3/32 . . Bundles of parallel pin-, rod-, or tube-shaped fuel elements

G21C3/32F	. . .	[N: Means associated with the fuel bundle for filtering the coolant, e.g. nozzles, grids]
G21C3/32K	. . .	[N: Means for the storage or removal of fission gases (means for the storage of fission gases in the elements <a href="#">G21C3/16</a> ; means for the removal of fission gases from elements <a href="#">G21C3/04</a> )]
G21C3/322	. . .	Means to influence the coolant flow through or around the bundles
G21C3/324	. . .	Coats or envelopes for the bundles
G21C3/324M	. . . .	[N: made of moderator material]
G21C3/326	. . .	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
G21C3/328	. . . .	Relative disposition of the elements in the bundle lattice
G21C3/33	. . .	Supporting or hanging of elements in the bundle ( <a href="#">spacer grids G21C3/34</a> ); Means forming part of the bundle for inserting it into, or removing it from, the core; Means for coupling adjacent bundles
G21C3/33L	. . . .	[N: Lower nozzle] [N1010]
G21C3/33S	. . . .	[N: Comprising hold-down means, e.g. springs] [N1010]
G21C3/33U	. . . .	[N: Upper nozzle] [N1010]
G21C3/332	. . . .	Supports for spacer grids
G21C3/334	. . .	Assembling [N: , maintenance or repair of] the bundles [N: (assembling, maintenance or repair of other reactor components <a href="#">G21C19/20C</a> )] [C1204]
G21C3/335	. . .	Exchanging elements in irradiated bundles
G21C3/336	. . .	Spacer elements for fuel rods in the bundle ( <a href="#">spacer grids G21C3/34</a> )
G21C3/338	. . . .	Helicoidal spacer elements
G21C3/34	. . .	Spacer grids
G21C3/34A	. . . .	[N: Compact spacer grids, e.g. made of a plate or a blade]
G21C3/34E	. . . .	[N: Spacer grids formed by metallic wires, e.g. springs]
G21C3/34F	. . . .	[N: Fabrication of spacer grids]
G21C3/344	. . . .	formed of assembled tubular elements
G21C3/348	. . . .	formed of assembled non-intersecting strips
G21C3/352	. . . .	formed of assembled intersecting strips
G21C3/356	. . . .	being provided with fuel element supporting members
G21C3/356D	. . . . .	[N: Supporting members formed only by deformations in the strips]
G21C3/356F	. . . . .	[N: Supporting members formed only of elements fixed on the strips]
G21C3/36	. .	Assemblies of plate-shaped fuel elements or coaxial tubes
G21C3/38	. .	Fuel units consisting of a single fuel element in a supporting sleeve [N: or in another supporting element]
G21C3/40	. .	Structural combination of fuel element with thermoelectric element for direct production of electric energy from fission heat ( <a href="#">for temperature measurement G21C17/10</a> ) [N: or with another arrangement for direct production of electric energy, e.g. a thermionic device (combination with thermoelements for temperature measurements <a href="#">G21C17/10S</a> )]
G21C3/42	. .	Selection of substances for use as reactor fuel
G21C3/44	. .	Fluid or fluent reactor fuel

- G21C3/46 . . . Aqueous compositions
- G21C3/48 . . . . True or colloidal solutions of the active constituent
- G21C3/50 . . . . Suspensions of the active constituent; Slurries
- G21C3/52 . . . Liquid metal compositions
- G21C3/54 . . . Fused salt, oxide or hydroxide compositions
- G21C3/56 . . . Gaseous compositions; Suspensions in a gaseous carrier
- G21C3/58 . . Solid reactor fuel [N: Pellets made of fissile material]
- G21C3/60 . . . Metallic fuel; Intermetallic dispersions
- G21C3/62 . . . Ceramic fuel
- G21C3/62B . . . . [N: Oxide fuels]
- G21C3/62J . . . . [N: Coated fuel particles]
- G21C3/64 . . . . Ceramic dispersion fuel, e.g. cermet

## **G21C5/00 Moderator or core structure; Selection of materials for use as moderator**

- G21C5/02 . Details
- G21C5/04 . . Spatial arrangements allowing for Wigner growth
- G21C5/06 . . Means for locating or supporting fuel elements [N: (means forming part of the element [G21C3/12](#))]
- G21C5/08 . . Means for preventing undesired asymmetric expansion of the complete structure; [N: Stretching devices, pins]
- G21C5/10 . . Means for supporting the complete structure [N: (arrangements for supporting vessels and core-structures [G21C13/024](#))]
- G21C5/12 . characterised by composition, e.g. the moderator containing additional substances which ensure improved heat resistance of the moderator [N: (purification of fluid moderators during the operation of the reactor [G21C19/30](#))]
- G21C5/12B . . [N: Moderators made of organic materials]
- G21C5/12G . . [N: Carbonic moderators (carbon and graphite in general [C01B31/00](#); refractory carbon-bulbs [C04B35/00](#); carbon electrodes [C25B](#))]
- G21C5/14 . characterised by shape
- G21C5/16 . . Shape of its constituent parts
- G21C5/18 . characterised by the provision of more than one active zone
- G21C5/20 . . wherein one zone contains fissile material and another zone contains breeder material
- G21C5/22 . . wherein one zone is a superheating zone

## **G21C7/00 Control of nuclear reaction**

- G21C7/00B . [N: Flux flattening]
- G21C7/02 . by using self-regulating properties of reactor materials, [N: e.g. Doppler effect] ([arrangements that involve temperature stability G21C7/32](#))
- G21C7/04 . . of burnable poisons ([burnable poisons in fuel rods G21C3/326](#))

- G21C7/06 . by application of neutron-absorbing material, i.e. material with absorption cross-section very much in excess of reflection cross-section
- G21C7/08 . . by displacement of solid control elements, e.g. control rods
- G21C7/10 . . . Construction of control elements
- G21C7/103 . . . . Control assemblies containing one or more absorbants as well as other elements, e.g. fuel or moderator elements
- G21C7/107 . . . . Control elements adapted for pebble-bed reactors
- G21C7/11 . . . . Deformable control elements, e.g. flexible, telescopic, articulated
- G21C7/113 . . . . Control elements made of flat elements; Control elements having cruciform cross-section
- G21C7/117 . . . . Clusters of control rods; Spider construction
- G21C7/12 . . . Means for moving control elements to desired position ([dropping rods in an emergency G21C9/02](#))
- G21C7/14 . . . . Mechanical drive arrangements
- G21C7/16 . . . . Hydraulic or pneumatic drive
- G21C7/18 . . . Means for obtaining differential movement of control elements
- G21C7/20 . . . Disposition of shock-absorbing devices ([shock-absorbers in general F16F](#)) [N: [Braking arrangements](#)]
- G21C7/22 . . by displacement of a fluid or fluent neutron-absorbing material, [N: e.g. by adding [neutron-absorbing material to the coolant](#)]
- G21C7/24 . . Selection of substances for use as neutron-absorbing material
- G21C7/26 . by displacement of the moderator or parts thereof [N: [by changing the moderator concentration](#)]
- G21C7/27 . . Spectral shift control
- G21C7/28 . by displacement of the reflector or parts thereof
- G21C7/30 . by displacement of the reactor fuel or fuel elements
- G21C7/32 . by varying flow of coolant through the core [N: [by adjusting the coolant or moderator temperature](#)]
- G21C7/34 . by utilisation of a primary neutron source
- G21C7/36 . Control circuits
- G21C9/00** **Emergency protection arrangements structurally associated with the reactor** [N: [e.g. safety valves provided with pressure equalisation devices](#)] ([emergency cooling arrangements G21C15/18](#))
- G21C9/00F . [N: [against explosions e.g. blast shields](#)]
- G21C9/00I . [N: [against Na- or Ka- reactions](#)]
- G21C9/004 . Pressure suppression
- G21C9/008 . . by rupture-discs or -diaphragms
- G21C9/012 . . by thermal accumulation or by steam condensation, e.g. ice condensers

- G21C9/016 . Core catchers
- G21C9/02 . Means for effecting very rapid reduction of the reactivity factor under fault conditions, e.g. reactor fuse; [N: [Control elements having arrangements activated in an emergency](#)] ([control elements per se G21C7/00](#))
- G21C9/02F . . [N: Reactor fuses]
- G21C9/02H . . [N: Rupture diaphragms]
- G21C9/027 . . by fast movement of a solid, e.g. pebbles
- G21C9/033 . . by an absorbent fluid
- G21C9/04 . Means for suppressing fires [N: [Earthquake protection](#)]
- G21C9/06 . . Means for preventing accumulation of explosives gases, e.g. recombiners [N: [\(no documents\)](#)]

### **G21C11/00      Shielding structurally associated with the reactor**

- G21C11/02 . Biological shielding ([in general G21F](#)) [N: [Neutron or gamma shielding](#)]
- G21C11/02B . . [N: [inside the reactor vessel](#)]
- G21C11/02B2 . . . [N: [structurally combined with the casing](#)]
- G21C11/02D . . [N: [in apertures or channels through a wall](#)]
- G21C11/02F . . [N: [characterised by the form or by the material](#)]
- G21C11/04 . . on waterborne craft
- G21C11/06 . Reflecting shields, i.e. for minimising loss of neutrons
- G21C11/08 . Thermal shields; Thermal linings, i.e. for dissipating heat from gamma radiation which would otherwise heat an outer biological shield [N: [Thermal insulation](#)]
- G21C11/08B . . [N: [consisting of a non-metallic layer of insulating material](#)]
- G21C11/08D . . [N: [consisting of one or more metallic layers](#)]
- G21C11/08D2 . . . [N: [consisting exclusively of several metallic layers](#)]
- G21C11/08E . . [N: [consisting of a combination of non-metallic and metallic layers, e.g. metal-sand-metal-concrete](#)]
- G21C11/08F . . [N: [consisting of a stagnant or a circulating fluid](#)]

### **G21C13/00      Pressure vessels; Containment vessels; Containment in general ([for chemical or physical processes B01J3/00](#); [pressure vessels in general F16J12/00](#))**

- G21C13/02 . Details
- G21C13/02G . . [N: [Ventilating arrangements](#)]
- G21C13/024 . . Supporting constructions for pressure vessels or containment vessels
- G21C13/028 . . Seals, e.g. for pressure vessels or containment vessels
- G21C13/028B . . . [N: [for container apertures](#)]
- G21C13/032 . . Joints between tubes and vessel walls, e.g. taking into account thermal stresses
- G21C13/036 . . . the tube passing through the vessel wall, i.e. continuing on both sides of the wall

G21C13/04	<ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li>Arrangements for expansion and contraction</li> </ul> </li> </ul>
G21C13/06	<ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li>Sealing-plugs (for pressure vessels in general <a href="#">F16J13/00</a>)</li> </ul> </li> </ul>
G21C13/067	<ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li>for tubes, e.g. standpipes; Locking devices for plugs</li> </ul> </li> </ul> </li> </ul>
G21C13/067B	<ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li>[N: Seals for the plugs]</li> </ul> </li> </ul> </li> </ul>
G21C13/073	<ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li>Closures for reactor-vessels, e.g. rotatable</li> </ul> </li> </ul> </li> </ul>
G21C13/073B	<ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li>[N: Seals for closures or for rotatable closures] <a href="#">[N9507]</a></li> </ul> </li> </ul> </li> </ul>
G21C13/08	<ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li>Vessels characterised by the material; Selection of materials for pressure vessels</li> </ul> </li> </ul>
G21C13/087	<ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li>Metallic vessels</li> </ul> </li> </ul> </li> </ul>
G21C13/087T	<ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li>[N: Tube-type vessels, e.g. for not essentially pressurised coolants]</li> </ul> </li> </ul> </li> </ul>
G21C13/093	<ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li>Concrete vessels</li> </ul> </li> </ul> </li> </ul>
G21C13/093P	<ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li>[N: made of prestressed concrete]</li> </ul> </li> </ul> </li> </ul>
G21C13/093P2	<ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li>[N: Particulars concerning prestressing devices and cables]</li> </ul> </li> </ul> </li> </ul>
G21C13/10	<ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li>Means for preventing contamination in the event of leakage, <a href="#">[N: e.g. double wall]</a></li> </ul> </li> </ul>
<b>G21C15/00</b>	<b>Cooling arrangements within the pressure vessel containing the core; Selection of specific coolants</b>
G21C15/02	<ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li>Arrangements or disposition of passages in which heat is transferred to the coolant; <a href="#">[N: Coolant flow control devices (G21C19/04 takes precedence; coolant flow control through fuel assemblies, e.g. flow restrictors G21C3/322)]</a></li> </ul> </li> </ul>
G21C15/04	<ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li>from fissile or breeder material <a href="#">[N: (G21C3/32 takes precedence)]</a></li> </ul> </li> </ul> </li> </ul>
G21C15/06	<ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li>in fuel elements</li> </ul> </li> </ul> </li> </ul>
G21C15/08	<ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li>from moderating material</li> </ul> </li> </ul> </li> </ul>
G21C15/10	<ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li>from reflector or thermal shield</li> </ul> </li> </ul> </li> </ul>
G21C15/12	<ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li>from pressure vessel; from containment vessel</li> </ul> </li> </ul> </li> </ul>
G21C15/14	<ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li>from headers; from joints in ducts</li> </ul> </li> </ul> </li> </ul>
G21C15/16	<ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li>comprising means for separating liquid and steam (separating in general <a href="#">B01D</a>; steam traps <a href="#">F16D</a>)</li> </ul> </li> </ul>
G21C15/18	<ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li>Emergency cooling arrangements; Removing shut-down heat</li> </ul> </li> </ul>
G21C15/18P	<ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li><a href="#">[N: comprising powered means, e.g. pumps]</a></li> </ul> </li> </ul> </li> </ul>
G21C15/20	<ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li>Partitions or thermal insulation between fuel channel and moderator</li> </ul> </li> </ul>
G21C15/22	<ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li>Structural association of coolant tubes with headers (joints of tubes in general <a href="#">F16L</a>)</li> </ul> </li> </ul>
G21C15/24	<ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li>Promoting flow of the coolant (electrodynamic pumps <a href="#">H02K44/02</a>)</li> </ul> </li> </ul>
G21C15/243	<ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li>for liquids</li> </ul> </li> </ul> </li> </ul>
G21C15/247	<ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li>for liquid metals</li> </ul> </li> </ul> </li> </ul>
G21C15/25	<ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li>using jet pumps</li> </ul> </li> </ul> </li> </ul>
G21C15/253	<ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li>for gases, e.g. blowers</li> </ul> </li> </ul> </li> </ul>
G21C15/257	<ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li>using heat-pipes <a href="#">[N: (in general F28D, F28F)]</a></li> </ul> </li> </ul> </li> </ul>
G21C15/26	<ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li>by convection, e.g. using chimneys, using divergent channels</li> </ul> </li> </ul> </li> </ul>



- G21C15/28
  - . Selection of specific coolants (if serving as the moderator [G21C5/12](#); compositions per se [C09K5/00](#); [N: organic coolants [G21C5/12B](#)]); [N: Additions to the reactor coolants, e.g. against moderator corrosion (purification and regeneration of the reactor coolants [G21C19/30](#))]
- G21C17/00**
  - Monitoring; Testing (measuring in general G01); [N: Maintaining]**
- G21C17/00B
  - . [N: Mechanical simulators (electrical or magnetic simulators [G06G7/54](#))]
- G21C17/00C
  - . [N: Detection of leaks (by testing the coolant or the moderator [G21C17/04](#))]
- G21C17/003
  - . Remote inspection of vessels, e.g. pressure vessels
- G21C17/007
  - . . Inspection of the outer surfaces of vessels
- G21C17/01
  - . . Inspection of the inner surfaces of vessels
- G21C17/013
  - . . Inspection vehicles
- G21C17/017
  - . Inspection or maintenance of pipe-lines or tubes in nuclear installations
- G21C17/02
  - . Devices or arrangements for monitoring coolant or moderator
- G21C17/02F
  - . . [N: Solid moderators testing, e.g. graphite]
- G21C17/022
  - . . for monitoring liquid coolants or moderators
- G21C17/022C
  - . . . [N: Chemical surface treatment, e.g. corrosion (corrosion prevention in presence of water from scale removal or by modification of the properties of the liquid [C02F5/00](#); inhibiting corrosion by adding corrosion inhibitors [C23F11/00](#)) [N1010]
- G21C17/025
  - . . . for monitoring liquid metal coolants [N: (molten metal sampling in general [G01N1/12B](#))]
- G21C17/025D
  - . . . . [N: Liquid metal leaks detection (detecting leaks in pipe-line systems in general [F17D5/00](#))]
- G21C17/028
  - . . for monitoring gaseous coolants
- G21C17/032
  - . . Reactor-coolant flow measuring or monitoring [N: (measuring volume or mass flow in general [G01F](#))]
- G21C17/035
  - . . Moderator- or coolant-level detecting devices [N: (indicating or measuring liquid level in general [G01F23/00](#))]
- G21C17/038
  - . . Boiling detection in moderator or coolant
- G21C17/04
  - . . Detecting burst slugs
- G21C17/04B
  - . . . [N: characterised by systems for checking the coolant channels, e.g. matrix systems]
- G21C17/04D
  - . . . [N: Devices for selective sampling, e.g. valves, shutters, rotatable selector valves]
- G21C17/04F
  - . . . [N: Detectors and metering devices for the detection of fission products]
- G21C17/04F2
  - . . . . [N: Precipitation chambers]
- G21C17/04F4
  - . . . . [N: Detection and metering circuits]
- G21C17/04H
  - . . . [N: characterised by a special construction of fuel elements, e.g. by a confined "tracer"]
- G21C17/06
  - . Devices or arrangements for monitoring or testing fuel or fuel elements outside the reactor core, e.g. for burn-up, for contamination ([G21C17/08](#), [G21C17/10](#) take precedence; detecting leaking fuel elements during reactor operation [G21C17/04](#))



G21C17/06D	. . [N: Burn-up control ( <a href="#">G21C17/06F</a> takes precedence)]
G21C17/06F	. . [N: Control of spherical elements]
G21C17/07	. . Leak testing
G21C17/08	. Structural combination of reactor core or moderator structure with viewing means, e.g. with television camera, periscope, window
G21C17/10	. Structural combination of fuel element, control rod, reactor core, or moderator structure with sensitive instruments, e.g. for measuring radioactivity, strain
G21C17/10S	. . [N: 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 <a href="#">G21C3/40</a> )]
G21C17/104	. . Measuring reactivity
G21C17/108	. . Measuring reactor flux
G21C17/112	. . Measuring temperature
G21C17/116	. . Passages or insulators, e.g. for electric cables
G21C17/12	. . Sensitive element forming part of control element
G21C17/14	. Period meters
<b>G21C19/00</b>	<b>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</b>
G21C19/02	. Details of handling arrangements
G21C19/04	. . Means for controlling flow of coolant over objects being handled; Means for controlling flow of coolant through channel being serviced, [N: e.g. for preventing "blow-out"]
G21C19/06	. . Magazines for holding fuel elements or control elements
G21C19/06D	. . . [N: Rotatable magazines]
G21C19/07	. . . Storage racks; Storage pools
G21C19/08	. . Means for heating fuel elements before introduction into the core; Means for heating or cooling fuel elements after removal from the core
G21C19/10	. . Lifting devices or pulling devices adapted for co-operation with fuel elements or with control elements ( <a href="#">manipulators B25J</a> )
G21C19/10S	. . . with grasping or spreading coupling elements
G21C19/11	. . . with revolving coupling elements, e.g. socket coupling
G21C19/11S	. . . with latching devices and ball couplings
G21C19/12	. . Arrangements for exerting direct hydraulic or pneumatic force on fuel element or on control element
G21C19/14	. characterised by their adaptation for use with horizontal channels in the reactor core
G21C19/16	. Articulated or telescopic chutes or tubes for connection to channels in the reactor core
G21C19/18	. Apparatus for bringing fuel elements to the reactor charge area, e.g. from a storage place
G21C19/19	. Reactor parts specifically adapted to facilitate handling, e.g. to facilitate charging or discharging of fuel elements [ <a href="#">N1010</a> ]

- G21C19/20
  - Arrangements for introducing objects into the pressure vessel; Arrangements for handling objects within the pressure vessel; Arrangements for removing objects from the pressure vessel
- G21C19/20A
  - • [N: Arrangements for handling ball-form, i.e. pebble fuel]
- G21C19/20B
  - • [N: Interchanging of fuel elements in the core, i.e. fuel shuffling]
- G21C19/20C
  - • [N: Assembling, maintenance or repair of reactor components ([G21C3/334](#) takes precedence)] [N1204]
- G21C19/22
  - • Arrangements for obtaining access to the interior of a pressure vessel whilst the reactor is operating
- G21C19/24
  - • • by using an auxiliary vessel which is temporarily sealed to the pressure vessel
- G21C19/26
  - Arrangements for removing jammed or damaged fuel elements or control elements; Arrangements for moving broken parts thereof
- G21C19/28
  - Arrangements for introducing fluent material into the reactor core; Arrangements for removing fluent material from the reactor core ([pumping coolant G21D](#))
- G21C19/30
  - • with continuous purification of circulating fluent material, e.g. by extraction of fission products [N: deterioration or corrosion products, impurities, e.g. by cold traps ([purification of circulating fluid fuels G21C19/50](#); [separation in general B01D](#))]
- G21C19/303
  - • • specially adapted for gases ([decontamination of gases G21F9/02](#))
- G21C19/307
  - • • specially adapted for liquids ([decontamination of liquids G21F9/04](#))
- G21C19/31
  - • • • for molten metals
- G21C19/313
  - • • • • using cold traps
- G21C19/317
  - • • Recombination devices for radiolytic dissociation products
- G21C19/32
  - 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 G21F9/00](#))
- G21C19/34
  - Apparatus or processes for dismantling nuclear fuel, e.g. before reprocessing; [N: Apparatus or processes for dismantling strings of spent fuel elements] ([shielded cells G21F7/00](#)) [C0802]
- G21C19/36
  - • Mechanical means only
- G21C19/365
  - • • Removing cannings or casings from fuel
- G21C19/37
  - • • • by separating into pieces both the canning or the casing and the fuel element, e.g. by cutting or shearing
- G21C19/375
  - • • Compacting devices, e.g. for fuel assemblies
- G21C19/38
  - • Chemical means only
- G21C19/40
  - Arrangements for preventing occurrence of critical conditions, e.g. during storage
- G21C19/42
  - Reprocessing of irradiated fuel
- G21C19/44
  - • of irradiated solid fuel
- G21C19/46
  - • • Aqueous processes, [N: e.g. by using organic extraction means, including the regeneration of these means]
- G21C19/48
  - • • Non-aqueous processes
- G21C19/50
  - • of irradiated fluid fuel, [N: e.g. regeneration of fuels while the reactor is in operation]

**G21C21/00**

**Apparatus or processes specially adapted to the manufacture of reactors or parts thereof (in general section B, e.g. B23)**

**G21C21/02**

- . Manufacture of fuel elements or breeder elements contained in non-active casings

**G21C21/04**

- . . by vibrational compaction or tamping [N: of fuel in the jacket]

**G21C21/06**

- . . by [N: rotatable] swaging [N: of the jacket around the fuel]

**G21C21/08**

- . . by a slip-fit cladding process [N: by crimping the jacket around the fuel]

**G21C21/10**

- . . by extrusion, drawing, or stretching [N: by rolling, e.g. "picture frame" technique]

**G21C21/12**

- . . by hydrostatic or thermo-pneumatic canning [N: in general by pressing without lengthening, e.g. explosive coating]

**G21C21/14**

- . . by plating [N: the fuel] in a fluid

**G21C21/16**

- . . by casting or dipping techniques

**G21C21/18**

- . . Manufacture of control elements covered by group [G21C7/00](#)

**G21C23/00**

**Adaptations of reactors to facilitate experimentation or irradiation [N1010]**