

## G21C

### NUCLEAR REACTORS (fusion reactors, hybrid fission-fusion reactors [G21B](#); nuclear explosives [G21J](#))

#### Definition statement

*This place covers:*

All aspects related to nuclear fission reactors and their components, i.e. all aspects related to the reactors per se, in particular all parts strictly related to the primary cooling circuit of the reactor, as well as monitoring or testing of nuclear fission reactor parameters and components, arrangements for handling nuclear fission reactor components or material and apparatuses and processes adapted to manufacture nuclear fission reactors.

#### References

##### Limiting references

*This place does not cover:*

Nuclear fusion reactors	<a href="#">G21B</a>
Nuclear explosives and their application	<a href="#">G21J</a>

##### Application-oriented references

*Examples of places where the subject matter of this place is covered when specially adapted, used for a particular purpose, or incorporated in a larger system:*

Arrangements of nuclear propulsion power plant or units on marine vessels, including submarines; adaptations to nuclear propulsion power plant or units for facilitating their arrangement on marine vessels	<a href="#">B63H 21/18</a>
Nuclear spacecraft propulsion	<a href="#">B64G 1/408</a> , <a href="#">B64G 1/422</a>
Water treatment using waste heat from other processes	<a href="#">C02F 1/16</a>
Methods and apparatus for obtaining oil, gas, water, soluble or meltable materials by means of nuclear energy	<a href="#">E21B 43/2403</a>
Aspects related to nuclear power plants in general, other than the reactor per se	<a href="#">G21D</a>
Control of nuclear power plant	<a href="#">G21D 3/00</a>
Arrangements of reactor and engine in which reactor-produced heat is converted into mechanical energy	<a href="#">G21D 5/00</a>
Arrangements to provide heat for purposes other than conversion into power, e.g. heating buildings	<a href="#">G21D 9/00</a>

##### Informative references

*Attention is drawn to the following places, which may be of interest for search:*

Pressure or containment vessels utilizing sub- or super-atmospheric pressure to effect chemical or physical change of matter	<a href="#">B01J 3/00</a>
Cleaning pipes or tubes using methods or apparatus specially adapted thereto	<a href="#">B08B 9/02</a>
Manipulators	<a href="#">B25J</a>
Heat-transfer or heat-exchange or heat-storage materials	<a href="#">C09K 5/00</a>

Shock-absorbers in general	<a href="#">F16F</a>
Pressure vessels in general	<a href="#">F16J 12/00</a>
Tube joints in general	<a href="#">F16L</a>
Cleaning of internal or external surfaces of heat-exchange or heat-transfer conduits, e.g. water tubes of boilers	<a href="#">F28G</a>
Measurement of nuclear radiation	<a href="#">G01T</a>
Electric or magnetic analogue computers, e.g. simulators, for nuclear physics	<a href="#">G06G 7/54</a>
Pumping arrangements for reactor coolant not otherwise covered by <a href="#">G21C 15/24</a>	<a href="#">G21D</a>
Shielded cells or rooms	<a href="#">G21F 7/00</a>
Treating radioactively contaminated materials; Decontamination arrangements therefor	<a href="#">G21F 9/00</a>

### Special rules of classification

Classification of both important (invention) information and additional information is obligatory.

### Glossary of terms

*In this place, the following terms or expressions are used with the meaning indicated:*

Core	The central region of a reactor containing fuel and moderator elements, where nuclear fission occurs.
Moderator	Material used in a thermal nuclear reactor to reduce the velocity of neutrons produced by nuclear fission in order to facilitate chain reaction.
Shield	Means surrounding a reactor to prevent radiation damage to operators etc.

### Synonyms and Keywords

*In patent documents, the following abbreviations are often used:*

LWR	Light Water Reactor
BWR	Boiling Water Reactor
ABWR	Advanced Boiling Water Reactor
PWR	Pressurized/Pressure Water Reactor
PHWR	Pressurized Heavy Water Reactor
RBMK	High Power Channel Reactor
GCR	Gas Cooled Reactor
HTGCR	High Temperature Gas Cooled Reactor
FBR	Fast Breeder Reactor
LMFBR	Liquid Metal Fast Breeder Reactor
PBR	Pebble Bed Reactor
IFR	Integral Fast Reactor
RPV	Reactor Pressure Vessel

CRDM	Control Rod Drive Mechanism
PCI	Pellet-Clad Interaction
LOCA	LOss of Coolant Accident

*In patent documents, the following words/expressions are often used as synonyms:*

- "breed and burn reactor", "travelling wave reactor" and "deflagration wave reactor"

## G21C 1/00

### Reactor types

#### Definition statement

*This place covers:*

Nuclear fission reactors characterized by their type.

Main division is made between fast neutron driven fission and moderated neutron drive fission reactors, the reactors being either critical or subcritical, loop-type or integral.

Dedicated sections are defined for subcritical and integral reactors.

#### Relationships with other classification places

Classification is usually directed to main groups [G21C 3/00](#) - [G21C 23/00](#).

Classification is also made in this group for subject-matter related to new reactor concepts or for subject-matter in which the type of reactor plays a crucial role.

## G21C 1/20

### moderator being liquid, e.g. pressure-tube reactor

#### Definition statement

*This place covers:*

Reactors in which the moderator is liquid, such as pressure-tube reactors. This group also covers constructional details of pressure tubes in pressure-tube reactors.

## G21C 1/303

{Experimental or irradiation arrangements inside the reactor (irradiation loops [G21C 1/306](#))}

### References

#### Limiting references

*This place does not cover:*

Irradiation loops	<a href="#">G21C 1/306</a>
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#### Informative references

*Attention is drawn to the following places, which may be of interest for search:*

Material testing by neutrons	<a href="#">G01N 23/005</a>
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## G21C 3/00

### Reactor fuel elements and their assemblies; Selection of substances for use as reactor fuel elements

#### References

##### Limiting references

*This place does not cover:*

Core structures characterised by the provision of more than one active zone in which the core does not comprise fuel assemblies	<a href="#">G21C 5/18</a>
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#### Glossary of terms

*In this place, the following terms or expressions are used with the meaning indicated:*

Fuel rod, fuel pin, fuel element	Single fuel rod being part of bundle of fuel rods comprised in a fuel assembly
Fuel bundle	Fuel assembly
Fuel element	In some patent documents, in particular in those with German origin, this expression is sometimes used as meaning "fuel assembly"

## G21C 3/42

### Selection of substances for use as reactor fuel

#### Definition statement

*This place covers:*

This group covers all substances which are used as nuclear reactor fuel, either liquid or fluent nuclear fuel, gaseous compositions or solid nuclear reactor fuel.

#### References

##### Limiting references

*This place does not cover:*

Nuclear fuel elements	<a href="#">G21C 3/02</a>
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##### Informative references

*Attention is drawn to the following places, which may be of interest for search:*

Obtaining metals with atomic number greater than 87	<a href="#">C22B 60/00</a>
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#### Synonyms and Keywords

*In patent documents, the following abbreviations are often used:*

MOX	Mixed Oxide Fuel
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## G21C 5/00

### Moderator or core structure; Selection of materials for use as moderator

#### References

##### *Informative references*

*Attention is drawn to the following places, which may be of interest for search:*

Active zone in which the core comprises fuel assemblies	<a href="#">G21C 3/326</a>
Shock absorbers per se	<a href="#">F16F</a>

## G21C 5/06

### Means for locating or supporting fuel elements {(means forming part of the element [G21C 3/12](#))}

#### Glossary of terms

*In this place, the following terms or expressions are used with the meaning indicated:*

Fuel element	fuel assembly
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## G21C 7/00

### Control of nuclear reaction

#### References

##### *Limiting references*

*This place does not cover:*

Control of nuclear power plant in general	<a href="#">G21D 3/00</a>
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##### *Informative references*

*Attention is drawn to the following places, which may be of interest for search:*

Boron and boron compounds per se	<a href="#">C01B 35/00</a>
Ceramic materials per se	<a href="#">C04B 35/00</a>
Alloys per se	<a href="#">C22C</a>
Gearing in general	<a href="#">F16H</a>
Safety arrangements for control of regulating systems in general	<a href="#">G05B 9/00</a>
Control and regulating systems in general	<a href="#">G05B 23/00</a>
Safety systems for the nuclear power plant in general	<a href="#">G21D 3/04</a>
Neutron sources per se	<a href="#">G21G 4/02</a>
Emergency protective circuit arrangements in general	<a href="#">H02H</a>
Dynamo electric machines in general	<a href="#">H02K</a>
Pulse techniques	<a href="#">H03K</a>

## 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](#))

### References

#### Limiting references

*This place does not cover:*

Emergency cooling arrangements; removing shut-down heat	<a href="#">G21C 15/18</a>
Safety systems of the nuclear power plant in general	<a href="#">G21D 3/04</a>

#### Informative references

*Attention is drawn to the following places, which may be of interest for search:*

Recombiners in nuclear installations	<a href="#">G21C 19/317</a>
Processes and reactors using catalytically active bodies for gas/gas reactions	<a href="#">B01J 12/007</a>
Blast shield in general	<a href="#">F42D 5/00</a>

## G21C 11/00

Shielding structurally associated with the reactor

### References

#### Informative references

*Attention is drawn to the following places, which may be of interest for search:*

Thermal insulation of pipes in general	<a href="#">F16L 59/00</a>
Shielding in general	<a href="#">G21F</a>

## G21C 13/036

the tube passing through the vessel wall, i.e. continuing on both sides of the wall

### Definition statement

*This place covers:*

Repairing means and methods thereof.

### References

#### Limiting references

*This place does not cover:*

Processes of utilising sub-atmospheric or super-atmospheric pressure to effect chemical or physical change of matter and apparatus thereof, i.e. vessels for chemical or physical process	<a href="#">B01J 3/00</a>
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Pressure vessels in general	<a href="#">F16J 12/00</a>
Vessels for storing gases	<a href="#">F17C</a>

### **Informative references**

Attention is drawn to the following places, which may be of interest for search:

Joints for pipes in general	<a href="#">F16L</a>
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## **G21C 15/00**

**Cooling arrangements within the pressure vessel containing the core;  
Selection of specific coolants**

### **References**

#### **Informative references**

Attention is drawn to the following places, which may be of interest for search:

Emergency protection arrangements strictly associated with the reactor, other than cooling	<a href="#">G21C 9/00</a>
Pumps in general	<a href="#">F04</a>
Jet pumps per se	<a href="#">F04F 5/00</a>
Ventilation means per se	<a href="#">F24F</a>
Safety arrangements of the nuclear power plant in general	<a href="#">G21D 3/04</a>

## **G21C 15/18**

**Emergency cooling arrangements; Removing shut-down heat**

### **Definition statement**

*This place covers:*

Using passive systems, i.e. systems not requiring the use of active means such as pumps; examples: natural circulation; gravity.

## **G21C 15/182**

**{comprising powered means, e.g. pumps}**

### **Definition statement**

*This place covers:*

Using active means such as pumps.

## G21C 17/00

### Monitoring; Testing (measuring in general [G01](#)); {Maintaining}

#### Definition statement

*This place covers:*

Monitoring/measuring/testing devices and methods strictly associated to nuclear fission reactors and their components.

Further information:

The subgroup [G21C 17/06](#) also covers devices and methods for maintaining (e.g. cleaning) fuel elements or fuel assemblies.

#### References

##### Limiting references

*This place does not cover:*

Safety arrangements for control of regulating systems in general	<a href="#">G05B 9/00</a>
Monitoring or testing of control or regulating systems in general	<a href="#">G05B 23/00</a>
Electrical digital data processing	<a href="#">G06F</a>
Systems and methods, specially adapted for business purposes and their data processing	<a href="#">G06Q</a>
Time or attendance register; registering or indicating the working of machines	<a href="#">G07C</a>

##### Informative references

*Attention is drawn to the following places, which may be of interest for search:*

Pipes in general	<a href="#">F16L</a>
Pipes in steam generators	<a href="#">F22B 37/002</a>
Arrangements for sealing leaking tubes and conduits in general	<a href="#">F28F 11/00</a>
Measuring in general	<a href="#">G01</a>
Measuring linear dimensions, angles, areas, irregularities of surfaces or contours	<a href="#">G01B</a>
Investigating fluid tightness of structures	<a href="#">G01M 3/00</a>
Investigating or analysing materials by determining their chemical or physical properties	<a href="#">G01N</a>
Material analysis/investigation with ultrasonic, sonic or infrasonic waves	<a href="#">G01N 29/00</a>
Measuring neutron radiation per se	<a href="#">G01T 3/00</a>
Computer implemented systems and methods of testing, simulating and designing nuclear fission reactors or parts thereof	<a href="#">G21D 3/001</a>



## G21C 19/10

**Lifting devices or pulling devices adapted for co-operation with fuel elements or with control elements (manipulators [B25J](#))**

### Definition statement

*This place covers:*

Loading and unloading of fuel assemblies to and from the reactor core.

### References

#### Informative references

*Attention is drawn to the following places, which may be of interest for search:*

Reprocessing of irradiated fuel	<a href="#">G21C 19/42</a>
Storage rack for spent fuel casks	<a href="#">G21F 5/012</a>
Treating/decontaminating radioactively contaminated materials	<a href="#">G21F 9/00</a>

## G21C 19/42

**Reprocessing of irradiated fuel**

### Definition statement

*This place covers:*

All aspects of the reprocessing of irradiated nuclear fuel, either aqueous or non-aqueous processes.

### References

#### Limiting references

*This place does not cover:*

Decommissioning of reactors	<a href="#">G21D 1/003</a>
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#### Informative references

*Attention is drawn to the following places, which may be of interest for search:*

Treating radioactively contaminated material	<a href="#">G21F 9/00</a>
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### Synonyms and Keywords

*In patent documents, the following abbreviations are often used:*

PUREX	Plutonium Uranium Refining by Extraction
COEX	Coextraction of Plutonium together with Uranium

## G21C 21/00

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

### References

#### Limiting references

*This place does not cover:*

Manufacture of spacer grids	<a href="#">G21C 3/3424</a>
Apparatus or processes for manufacturing in general	Section <a href="#">B</a> , e.g. <a href="#">B23</a>

## G21C 23/00

Adaptations of reactors to facilitate experimentation or irradiation

### References

#### Informative references

*Attention is drawn to the following places, which may be of interest for search:*

Irradiation loops in subcritical reactors	<a href="#">G21C 1/306</a>
Arrangements for converting chemical elements by electromagnetic radiation in nuclear reactors	<a href="#">G21G 1/02</a>