

# CPC COOPERATIVE PATENT CLASSIFICATION

## F MECHANICAL ENGINEERING; LIGHTING; HEATING; WEAPONS; BLASTING (NOTE omitted)

### ENGINEERING IN GENERAL

#### F17 STORING OR DISTRIBUTING GASES OR LIQUIDS

#### F17C VESSELS FOR CONTAINING OR STORING COMPRESSED, LIQUEFIED OR SOLIDIFIED GASES; FIXED-CAPACITY GAS-HOLDERS; FILLING VESSELS WITH, OR DISCHARGING FROM VESSELS, COMPRESSED, LIQUEFIED, OR SOLIDIFIED GASES (storing fluids in natural or artificial cavities or chambers in the earth [B65G 5/00](#); construction or assembling of bulk storage containers employing civil-engineering techniques [E04H 7/00](#); variable-capacity gas-holders [F17B](#); liquefaction or refrigeration machines, plants, or systems [F25](#))

##### WARNING

In this subclass non-limiting references (in the sense of paragraph 39 of the Guide to the IPC) may still be displayed in the scheme.

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| <p><b>1/00</b> Pressure vessels, e.g. gas cylinder, gas tank, replaceable cartridge (pressurised apparatus for purposes other than storage, <a href="#">see</a> the relevant subclasses such as <a href="#">A62C</a>, <a href="#">B05B</a>; associated with vehicles, <a href="#">see</a> the appropriate subclass of classes <a href="#">B60 - B64</a>; pressure vessels in general <a href="#">F16J 12/00</a> {; autoclaves <a href="#">B01J 3/04</a>; tank vehicles <a href="#">B60P 3/22</a>; railway tank wagons for carrying fluent materials <a href="#">B61D 5/00</a>; accumulators for supplying fluid under pressure <a href="#">F15B 1/04</a>; liquefied gas stoves <a href="#">F24C 3/00</a>})</p> <p>1/002 . {Storage in barges or on ships}</p> <p>1/005 . {Storage of gas or gaseous mixture at high pressure and at high density condition, e.g. in the single state phase}</p> <p>1/007 . {Underground or underwater storage}</p> <p>1/02 . involving reinforcing arrangements {(<a href="#">F17C 1/14</a>, <a href="#">F17C 1/16</a> take precedence)}</p> <p>1/04 . . Protecting sheathings</p> <p>1/06 . . . built-up from wound-on bands or filamentary material, e.g. wires</p> <p>1/08 . . Integral reinforcements, e.g. ribs</p> <p>1/10 . with provision for protection against corrosion, e.g. due to gaseous acid ({<a href="#">F17C 1/14</a>, <a href="#">F17C 1/16</a> take precedence}; inhibiting corrosion of metallic material or incrustation in general <a href="#">C23F</a>)</p> <p>1/12 . with provision for thermal insulation ({<a href="#">F17C 1/14</a>, <a href="#">F17C 1/16</a> take precedence}; thermal insulation in general <a href="#">F16L 59/00</a>)</p> <p>1/14 . constructed of aluminium; constructed of non-magnetic steel</p> <p>1/16 . constructed of plastics materials {(shaping of plastics <a href="#">B29C</a>)}</p> <p><b>3/00</b> Vessels not under pressure</p> <p>3/005 . {Underground or underwater containers or vessels (storing in natural or artificial cavities in the earth in general <a href="#">B65G 5/00</a>)}</p> | <p>3/02 . with provision for thermal insulation (thermal insulation in general <a href="#">F16L 59/00</a> {; refrigerators <a href="#">F25D</a>; insulation specially adapted for cryogenic vessels <a href="#">F17C 13/001</a>; tank vehicles <a href="#">B60P 3/22</a>; railway tank wagons <a href="#">B61D 5/00</a>})</p> <p>3/022 . . {Land-based bulk storage containers (civil engineering aspects <a href="#">E04H 7/00</a>)}</p> <p>3/025 . . {Bulk storage in barges or on ships (constructive aspects <a href="#">B63B 25/16</a>)}</p> <p>3/027 . . . {Wallpanels for so-called membrane tanks}</p> <p>3/04 . . by insulating layers (<a href="#">F17C 3/08</a> takes precedence)</p> <p>3/06 . . . on the inner surface, i.e. in contact with the stored fluid</p> <p>3/08 . . by vacuum spaces, e.g. Dewar flask (for household use <a href="#">A47J 41/02</a>)</p> <p>3/085 . . . {Cryostats}</p> <p>3/10 . . by liquid-circulating or vapour-circulating jackets</p> <p>3/12 . with provision for protection against corrosion, e.g. due to gaseous acid (protection against corrosion in general <a href="#">C23F</a>)</p> <p><b>5/00</b> Methods or apparatus for filling containers with liquefied, solidified, or compressed gases under pressures (adding propellants to aerosol containers <a href="#">B65B 31/00</a>)</p> <p><b>NOTE</b></p> <p>This group includes not only the filling of vessels for storage of compressed or liquefied gases, but also the filling of pressurised apparatus insofar as it is not covered by a single other subclass, e.g. <a href="#">A62C</a>, <a href="#">B05B</a>.</p> <p>5/002 . {Automated filling apparatus}</p> <p>5/005 . . {for gas bottles, such as on a continuous belt or on a merry-go-round}</p> <p>5/007 . . {for individual gas tanks or containers, e.g. in vehicles (filling with liquid fuel not under pressure, <a href="#">B60S 5/02</a>, <a href="#">B67D 7/00</a>)}</p> |
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|--------------|---|----------------|--|
| 5/02         | . for filling with liquefied gases  | 13/081         | . . {for large land-based storage vessels (supports for large containers in general <a href="#">B65D 90/12</a> )}  |
| 5/04         | . . requiring the use of refrigeration, e.g. filling with helium or hydrogen  | 13/082         | . . {for large sea-borne storage vessels (load-accommodating arrangements for ships or waterborne vessels <a href="#">B63B 25/12</a> )}                      |
| 5/06         | . for filling with compressed gases   | 13/083         | . . {for medium-sized mobile storage vessels, e.g. tank vehicles or railway tank vehicles}   |
| <b>6/00</b>  | <b>Methods and apparatus for filling vessels not under pressure with liquefied or solidified gases</b>  | 13/084         | . . {for small-sized storage vessels, e.g. compressed gas cylinders or bottles, disposable gas vessels, vessels adapted for automotive use}                  |
| <b>7/00</b>  | <b>Methods or apparatus for discharging liquefied, solidified, or compressed gases from pressure vessels, not covered by another subclass</b>   | 13/085         | . . . {on wheels ( <a href="#">hand carts B62B</a> )}  |
| 7/02         | . Discharging liquefied gases   | 13/086         | . . {for Dewar vessels or cryostats}   |
| 7/04         | . . with change of state, e.g. vaporisation   | 13/087         | . . . {used for superconducting phenomena}   |
| <b>9/00</b>  | <b>Methods or apparatus for discharging liquefied or solidified gases from vessels not under pressure</b>   | 13/088         | . . {for use under microgravity conditions}  |
| 9/02         | . with change of state, e.g. vaporisation   | 13/10          | . Arrangements for preventing freezing   |
| 9/04         | . . Recovery of thermal energy  | 13/12          | . Arrangements or mounting of devices for preventing or minimising the effect of explosion ( <a href="#">flame traps A62C 4/00</a> ) ; Other safety measures |
| <b>11/00</b> | <b>Use of gas-solvents or gas-sorbents in vessels</b><br>{(absorbing compositions for acetylene <a href="#">C10L 3/04</a> ; absorbing compositions for hydrogen <a href="#">C01B 3/0005</a> )}  | 13/123         | . . {for gas bottles, cylinders or reservoirs for tank vehicles or for railway tank wagons}  |
| 11/002       | . {for acetylene}   | 13/126         | . . {for large storage containers for liquefied gas (for large containers in general <a href="#">B65D 90/22</a> )}   |
| 11/005       | . {for hydrogen}  |                |  |
| 11/007       | . {for hydrocarbon gases, such as methane or natural gas, propane, butane or mixtures thereof [LPG]}  | <b>2201/00</b> | <b>Vessel construction, in particular geometry, arrangement or size</b>  |
| <b>13/00</b> | <b>Details of vessels or of the filling or discharging of vessels</b>   | 2201/01        | . Shape  |
| 13/001       | . {Thermal insulation specially adapted for cryogenic vessels (vessels not under pressure with insulation <a href="#">F17C 3/02</a> ; thermal insulation in general <a href="#">F16L 59/00</a> )}   | 2201/0104      | . . cylindrical  |
| 13/002       | . {for vessels under pressure ( <a href="#">F17C 13/008</a> and <a href="#">F17C 13/02</a> - <a href="#">F17C 13/12</a> take precedence)}   | 2201/0109      | . . . with exteriorly curved end-piece   |
| 13/003       | . . {Means for coding or identifying them and/or their contents}  | 2201/0114      | . . . with interiorly curved end-piece   |
| 13/004       | . {for large storage vessels not under pressure ( <a href="#">F17C 13/008</a> and <a href="#">F17C 13/02</a> - <a href="#">F17C 13/12</a> take precedence)}   | 2201/0119      | . . . with flat end-piece  |
| 13/005       | . {for medium-size and small storage vessels not under pressure ( <a href="#">F17C 13/008</a> and <a href="#">F17C 13/02</a> - <a href="#">F17C 13/12</a> take precedence)}   | 2201/0123      | . . . with variable thickness or diameter  |
| 13/006       | . . {for Dewar vessels or cryostats}  | 2201/0128      | . . spherical or elliptical  |
| 13/007       | . . . {used for superconducting phenomena (investigating by nuclear magnetic resonance <a href="#">G01N 24/08</a> ; magnets having superconductive winding <a href="#">H01F 6/00</a> )}   | 2201/0133      | . . toroidal   |
| 13/008       | . {for use under microgravity conditions}   | 2201/0138      | . . tubular  |
| 13/02        | . Special adaptations of indicating, measuring, or monitoring equipment ( <a href="#">measuring in general G01</a> )  | 2201/0142      | . . conical  |
| 13/021       | . . {having the height as the parameter}  | 2201/0147      | . . complex  |
| 13/023       | . . {having the mass as the parameter}  | 2201/0152      | . . . Lobes  |
| 13/025       | . . {having the pressure as the parameter}  | 2201/0157      | . . . Polygonal  |
| 13/026       | . . {having the temperature as the parameter}   | 2201/0161      | . . . Honeycomb  |
| 13/028       | . . {having the volume as the parameter}  | 2201/0166      | . . . divided in several chambers  |
| 13/04        | . Arrangement or mounting of valves ( <a href="#">valves per se F16K</a> ; <a href="#">snap-coupling of nipples F16L 37/00</a> )  | 2201/0171      | . . . comprising a communication hole between chambers   |
| 13/045       | . . {Automatic change-over switching assembly for bottled gas systems with two (or more) gas containers}  | 2201/0176      | . . variable   |
| 13/06        | . Closures, e.g. cap, breakable member ({for autoclaves <a href="#">B01J 3/03</a> }; closures for {large} containers in general <a href="#">B65D</a> { <a href="#">B65D 90/54</a> }; {for pressure vessels in general <a href="#">F16J 13/00</a> }) | 2201/018       | . . . with bladders  |
| 13/08        | . Mounting arrangements for vessels   | 2201/0185      | . . . with separating membrane   |
|              |   | 2201/019       | . . . with pistons   |
|              |   | 2201/0195      | . . . with bellows   |
|              |   | 2201/03        | . Orientation  |
|              |   | 2201/032       | . . with substantially vertical main axis  |
|              |   | 2201/035       | . . with substantially horizontal main axis  |
|              |   | 2201/037       | . . with sloping main axis   |
|              |   | 2201/05        | . Size   |
|              |   | 2201/052       | . . large (>1000 m3)   |
|              |   | 2201/054       | . . medium (>1 m3)   |
|              |   | 2201/056       | . . Small (<1 m3)  |
|              |   | 2201/058       | . . portable (<30 l)   |
|              |   | 2201/06        | . Vessel construction using filling material in contact with the handled fluid   |
|              |   | <b>2203/00</b> | <b>Vessel construction, in particular walls or details thereof</b>   |
|              |   | 2203/01        | . Reinforcing or suspension means  |
|              |   | 2203/011       | . . Reinforcing means  |

|           |   |                |   |
|-----------|---|----------------|---|
| 2203/012  | . . . on or in the wall, e.g. ribs  | 2203/067       | . . . . . helically wound   |
| 2203/013  | . . . in the vessel, e.g. columns   | 2203/0673      | . . . . . Polymers  |
| 2203/014  | . . Suspension means  | 2203/0675      | . . . . with details of composition   |
| 2203/015  | . . . Bars  | 2203/0678      | . . . Concrete  |
| 2203/016  | . . . Cords   | 2203/068       | . . Special properties of materials for vessel walls  |
| 2203/017  | . . . Magnetic means  | 2203/0682      | . . . with liquid or gas layer  |
| 2203/018  | . . . by attachment at the neck   | 2203/0685      | . . . flexible  |
| 2203/03   | . Thermal insulations   | 2203/0687      | . . . superconducting   |
| 2203/0304 | . . by solid means  | 2203/069       | . . . Break point in the wall   |
| 2203/0308 | . . . Radiation shield  | 2203/0692      | . . . transparent   |
| 2203/0312 | . . . . cooled by external means  | 2203/0695      | . . . pre-constrained   |
| 2203/0316 | . . . . cooled by vaporised gas from the interior   | 2203/0697      | . . . comprising nanoparticles  |
| 2203/032  | . . . . Multi-sheet layers  |                |   |
| 2203/0325 | . . . Aerogel   | <b>2205/00</b> | <b>Vessel construction, in particular mounting arrangements, attachments or identifications means</b> |
| 2203/0329 | . . . Foam  | 2205/01        | . Mounting arrangements   |
| 2203/0333 | . . . . Polyurethane  | 2205/0103      | . . Exterior arrangements   |
| 2203/0337 | . . . Granular  | 2205/0107      | . . . Frames  |
| 2203/0341 | . . . . Perlite   | 2205/0111      | . . . Boxes   |
| 2203/0345 | . . . Fibres  | 2205/0115      | . . . Dismountable protective hulls   |
| 2203/035  | . . . . Glass wool  | 2205/0119      | . . . Vessel walls form part of another structure   |
| 2203/0354 | . . . Wood  | 2205/0123      | . . characterised by number of vessels  |
| 2203/0358 | . . . in form of panels   | 2205/0126      | . . . One vessel  |
| 2203/0362 | . . by liquid means   | 2205/013       | . . . Two or more vessels   |
| 2203/0366 | . . . Cryogen   | 2205/0134      | . . . . characterised by the presence of fluid connection between vessels                             |
| 2203/037  | . . . Water   | 2205/0138      | . . . . . bundled in series   |
| 2203/0375 | . . by gas  | 2205/0142      | . . . . . bundled in parallel   |
| 2203/0379 | . . . Inert   | 2205/0146      | . . . . . with details of the manifold  |
| 2203/0383 | . . . Air   | 2205/0149      | . . . . Vessel mounted inside another one   |
| 2203/0387 | . . . Cryogen   | 2205/0153      | . . Details of mounting arrangements  |
| 2203/0391 | . . by vacuum   | 2205/0157      | . . . for transport   |
| 2203/0395 | . . . Getter  | 2205/0161      | . . . . with wheels   |
| 2203/06   | . Materials for walls or layers thereof; Properties or structures of walls or their materials | 2205/0165      | . . . . with handgrip   |
| 2203/0602 | . . Wall structures; Special features thereof   | 2205/0169      | . . . stackable   |
| 2203/0604 | . . . Liners  | 2205/0173      | . . . lockable  |
| 2203/0607 | . . . Coatings  | 2205/0176      | . . . with ventilation  |
| 2203/0609 | . . . Straps, bands or ribbons  | 2205/018       | . . . Supporting feet   |
| 2203/0612 | . . . Wall structures   | 2205/0184      | . . . Attachments to the ground, e.g. mooring or anchoring  |
| 2203/0614 | . . . . Single wall   | 2205/0188      | . . . Hanging up devices  |
| 2203/0617 | . . . . . with one layer  | 2205/0192      | . . . with external bearing means   |
| 2203/0619 | . . . . . with two layers   | 2205/0196      | . . . with shock absorbing means  |
| 2203/0621 | . . . . . with three layers   | 2205/03        | . Fluid connections, filters, valves, closure means or other attachments                              |
| 2203/0624 | . . . . . with four or more layers  | 2205/0302      | . . Fittings, valves, filters, or components in connection with the gas storage device                |
| 2203/0626 | . . . . Multiple walls  | 2205/0305      | . . . Bosses, e.g. boss collars   |
| 2203/0629 | . . . . . Two walls   | 2205/0308      | . . . Protective caps   |
| 2203/0631 | . . . . . Three or more walls   | 2205/0311      | . . . Closure means   |
| 2203/0634 | . . Materials for walls or layers thereof   | 2205/0314      | . . . . breakable, e.g. with burst discs  |
| 2203/0636 | . . . Metals  | 2205/0317      | . . . . fusing or melting   |
| 2203/0639 | . . . . Steels  | 2205/032       | . . . . pierceable  |
| 2203/0641 | . . . . . Non-magnetic steels   | 2205/0323      | . . . Valves  |
| 2203/0643 | . . . . . Stainless steels  | 2205/0326      | . . . . electrically actuated   |
| 2203/0646 | . . . . . Aluminium   | 2205/0329      | . . . . manually actuated   |
| 2203/0648 | . . . . Alloys or compositions of metals  | 2205/0332      | . . . . Safety valves or pressure relief valves   |
| 2203/0651 | . . . . . Invar   | 2205/0335      | . . . . Check-valves or non-return valves   |
| 2203/0653 | . . . . . Lead  | 2205/0338      | . . . Pressure regulators   |
| 2203/0656 | . . . . in form of filaments  | 2205/0341      | . . . Filters   |
| 2203/0658 | . . . Synthetics  | 2205/0344      | . . . . Sinter type   |
| 2203/066  | . . . . Plastics  |                |   |
| 2203/0663 | . . . . in form of fibers or filaments  |                |   |
| 2203/0665 | . . . . . radially wound  |                |   |
| 2203/0668 | . . . . . axially wound   |                |   |

|           |  |
|-----------|--|
| 2205/0347 | . . . . Active charcoal type                       |
| 2205/035  | . . . Flow reducers                                |
| 2205/0352 | . . . Pipes  |
| 2205/0355 | . . . . Insulation thereof                         |
| 2205/0358 | . . . . coaxial                                    |
| 2205/0361 | . . . . corrugated                                 |
| 2205/0364 | . . . . flexible or articulated, e.g. a hose       |
| 2205/0367 | . . . . Arrangements in parallel                   |
| 2205/037  | . . . Quick connecting means, e.g. couplings       |
| 2205/0373 | . . . . Adapters                                   |
| 2205/0376 | . . . Dispensing pistols                           |
| 2205/0379 | . . . Manholes or access openings for human beings |
| 2205/0382 | . . . Constructional details of valves, regulators |
| 2205/0385 | . . . . in blocks or units                         |
| 2205/0388 | . . Arrangement of valves, regulators, filters     |
| 2205/0391 | . . . inside the pressure vessel                   |
| 2205/0394 | . . . in direct contact with the pressure vessel   |
| 2205/0397 | . . . . on both sides of the pressure vessel       |
| 2205/05   | . Vessel or content identifications, e.g. labels   |
| 2205/051  | . . by coating                                     |
| 2205/052  | . . by stickers                                    |
| 2205/054  | . . by bar codes                                   |
| 2205/055  | . . by magnetic means                              |
| 2205/057  | . . by chips                                       |
| 2205/058  | . . by Radio Frequency Identification              |

#### **2209/00 Vessel construction, in particular methods of manufacturing**

|           |   |
|-----------|---|
| 2209/21   | . Shaping processes   |
| 2209/2109 | . . Moulding  |
| 2209/2118 | . . . by injection  |
| 2209/2127 | . . . by blowing  |
| 2209/2136 | . . . using wax moulds  |
| 2209/2145 | . . . by rotation   |
| 2209/2154 | . . Winding   |
| 2209/2163 | . . . with a mandrel  |
| 2209/2172 | . . Polishing   |
| 2209/2181 | . . Metal working processes, e.g. deep drawing, stamping or cutting |
| 2209/219  | . . Working processes for non metal materials, e.g. extruding       |
| 2209/22   | . Assembling processes  |
| 2209/221  | . . Welding   |
| 2209/222  | . . . by friction   |
| 2209/224  | . . Press-fitting; Shrink-fitting                                   |
| 2209/225  | . . Spraying  |
| 2209/227  | . . by adhesive means   |
| 2209/228  | . . by screws, bolts or rivets                                      |
| 2209/23   | . Manufacturing of particular parts or at special locations         |
| 2209/232  | . . of walls  |
| 2209/234  | . . of closing end pieces, e.g. caps                                |
| 2209/236  | . . . Apparatus therefore   |
| 2209/238  | . . Filling of insulants  |

#### **2221/00 Handled fluid, in particular type of fluid**

|          |                              |
|----------|------------------------------|
| 2221/01  | . Pure fluids                |
| 2221/011 | . . Oxygen                   |
| 2221/012 | . . Hydrogen                 |
| 2221/013 | . . Carbene dioxide          |
| 2221/014 | . . Nitrogen                 |
| 2221/015 | . . Carbon monoxide          |
| 2221/016 | . . Noble gases (Ar, Kr, Xe) |

|          |   |
|----------|---|
| 2221/017 | . . . Helium  |
| 2221/018 | . . Acetylene   |
| 2221/03  | . Mixtures  |
| 2221/031 | . . Air   |
| 2221/032 | . . Hydrocarbons  |
| 2221/033 | . . . Methane, e.g. natural gas, CNG, LNG, GNL, GNC, PLNG |
| 2221/035 | . . . Propane butane, e.g. LPG, GPL                       |
| 2221/036 | . . . Hydrates  |
| 2221/037 | . . Containing pollutant, e.g. H <sub>2</sub> S, Cl       |
| 2221/038 | . . Refrigerants  |
| 2221/05  | . Ultrapure fluid   |
| 2221/07  | . Hyperpolarised gases                                    |
| 2221/08  | . Ergols, e.g. hydrazine                                  |

#### **Fluid contained in the vessel; Filling and discharging the fluid**

##### **2223/00 Handled fluid before transfer, i.e. state of fluid when stored in the vessel or before transfer from the vessel**

|           |  |
|-----------|--|
| 2223/01   | . characterised by the phase   |
| 2223/0107 | . . Single phase   |
| 2223/0115 | . . . dense or supercritical, i.e. at high pressure and high density |
| 2223/0123 | . . . gaseous, e.g. CNG, GNC   |
| 2223/013  | . . . liquid   |
| 2223/0138 | . . . solid  |
| 2223/0146 | . . Two-phase  |
| 2223/0153 | . . . Liquefied gas, e.g. LPG, GPL                                   |
| 2223/0161 | . . . . cryogenic, e.g. LNG, GNL, PLNG                               |
| 2223/0169 | . . . . subcooled  |
| 2223/0176 | . . . Solids and gas   |
| 2223/0184 | . . . Liquids and solids   |
| 2223/0192 | . . Three-phase, e.g. CO <sub>2</sub> at triple point                |
| 2223/03   | . characterised by the pressure level                                |
| 2223/031  | . . Not under pressure, i.e. containing liquids or solids only       |
| 2223/033  | . . Small pressure, e.g. for liquefied gas                           |
| 2223/035  | . . High pressure (>10 bar)  |
| 2223/036  | . . Very high pressure (>80 bar)                                     |
| 2223/038  | . . Subatmospheric pressure  |
| 2223/04   | . characterised by other properties of handled fluid before transfer |
| 2223/041  | . . Stratification   |
| 2223/042  | . . Localisation of the removal point                                |
| 2223/043  | . . . in the gas   |
| 2223/045  | . . . . with a dip tube  |
| 2223/046  | . . . in the liquid  |
| 2223/047  | . . . . with a dip tube  |
| 2223/048  | . . . in the solid   |

##### **2225/00 Handled fluid after transfer, i.e. state of fluid after transfer from the vessel**

|           |  |
|-----------|--|
| 2225/01   | . characterised by the phase   |
| 2225/0107 | . . Single phase   |
| 2225/0115 | . . . dense or supercritical, i.e. at high pressure and high density |
| 2225/0123 | . . . gaseous, e.g. CNG, GNC   |
| 2225/013  | . . . liquid   |
| 2225/0138 | . . . solid  |
| 2225/0146 | . . Two-phase  |
| 2225/0153 | . . . Liquefied gas, e.g. LPG, GPL                                   |
| 2225/0161 | . . . . cryogenic, e.g. LNG, GNL, PLNG                               |

|                |  |                |  |
|----------------|--|----------------|--|
| 2225/0169      | . . . . subcooled  | 2227/0346      | . . . . by forced circulation, e.g. using a fan                                      |
| 2225/0176      | . . . Solids and gas   | 2227/0348      | . . . . Water cooling  |
| 2225/0184      | . . . Liquids and solids   | 2227/0351      | . . . . using seawater   |
| 2225/0192      | . . Three-phase, e.g. CO <sub>2</sub> at triple point  | 2227/0353      | . . . . using cryocooler   |
| 2225/03        | . characterised by the pressure level  | 2227/0355      | . . . . in a closed loop   |
| 2225/031       | . . Not under pressure, i.e. containing liquids or solids only   | 2227/0358      | . . . by expansion   |
| 2225/033       | . . Small pressure, e.g. for liquefied gas   | 2227/036       | . . . . "Joule-Thompson" effect  |
| 2225/035       | . . High pressure, i.e. between 10 and 80 bars   | 2227/0362      | . . . . in a turbine   |
| 2225/036       | . . Very high pressure, i.e. above 80 bars   | 2227/0365      | . . . with recovery of heat  |
| 2225/038       | . . Subatmospheric pressure  | 2227/0367      | . . Localisation of heat exchange  |
| 2225/04        | . characterised by other properties of handled fluid after transfer                                      | 2227/0369      | . . . in or on a vessel  |
| 2225/041       | . . Stratification   | 2227/0372      | . . . . in the gas   |
| 2225/042       | . . Localisation of the filling point  | 2227/0374      | . . . . in the liquid  |
| 2225/043       | . . . in the gas   | 2227/0376      | . . . . in wall contact  |
| 2225/044       | . . . . at several points, e.g. with a device for recondensing gas                                       | 2227/0379      | . . . . . inside the vessel  |
| 2225/045       | . . . . with a dip tube  | 2227/0381      | . . . . . integrated in the wall   |
| 2225/046       | . . . in the liquid  | 2227/0383      | . . . . . outside the vessel   |
| 2225/047       | . . . . with a dip tube  | 2227/0386      | . . . . . with a jacket  |
| 2225/048       | . . . in the solid   | 2227/0388      | . . . separate   |
| <b>2227/00</b> | <b>Transfer of fluids, i.e. method or means for transferring the fluid; Heat exchange with the fluid</b> | 2227/039       | . . . . on the pipes   |
| 2227/01        | . Propulsion of the fluid  | 2227/0393      | . . . . using a vaporiser  |
| 2227/0107      | . . by pressurising the ullage   | 2227/0395      | . . . . using a submerged heat exchanger   |
| 2227/0114      | . . with vacuum injectors, e.g. venturi  | 2227/0397      | . . . characterised by fins  |
| 2227/0121      | . . by gravity   | 2227/04        | . Methods for emptying or filling  |
| 2227/0128      | . . with pumps or compressors  | 2227/041       | . . vessel by vessel   |
| 2227/0135      | . . . Pumps  | 2227/042       | . . . with change-over from one vessel to another                                    |
| 2227/0142      | . . . . with specified pump type, e.g. piston or impulsive type  | 2227/043       | . . by pressure cascade  |
| 2227/015       | . . . . with cooling of the pump   | 2227/044       | . . by purging   |
| 2227/0157      | . . . Compressors  | 2227/045       | . . by vacuum  |
| 2227/0164      | . . . . with specified compressor type, e.g. piston or impulsive type                                    | 2227/046       | . . by even emptying or filling  |
| 2227/0171      | . . . Arrangement  | 2227/047       | . . by repeating a process cycle   |
| 2227/0178      | . . . . in the vessel  | 2227/048       | . . by maintaining residual pressure   |
| 2227/0185      | . . . . comprising several pumps or compressors  | <b>2250/00</b> | <b>Accessories; Control means; Indicating, measuring or monitoring of parameters</b> |
| 2227/0192      | . . by using a working fluid   | 2250/01        | . Intermediate tanks   |
| 2227/03        | . Heat exchange with the fluid   | 2250/03        | . Control means  |
| 2227/0302      | . . by heating   | 2250/032       | . . using computers  |
| 2227/0304      | . . . using an electric heater   | 2250/034       | . . using wireless transmissions   |
| 2227/0306      | . . . using the same fluid   | 2250/036       | . . using alarms   |
| 2227/0309      | . . . using another fluid  | 2250/038       | . . using cameras  |
| 2227/0311      | . . . . Air heating  | 2250/04        | . Indicating or measuring of parameters as input values                              |
| 2227/0313      | . . . . . by forced circulation, e.g. using a fan  | 2250/0404      | . . Parameters indicated or measured   |
| 2227/0316      | . . . . . Water heating  | 2250/0408      | . . . Level of content in the vessel   |
| 2227/0318      | . . . . . using seawater   | 2250/0413      | . . . . with floats  |
| 2227/032       | . . . . . using geothermal water   | 2250/0417      | . . . . with electrical means  |
| 2227/0323      | . . . . in a closed loop   | 2250/0421      | . . . Mass or weight of the content of the vessel                                    |
| 2227/0325      | . . . by expansion using "Joule-Thompson" effect   | 2250/0426      | . . . Volume   |
| 2227/0327      | . . . with recovery of heat  | 2250/043       | . . . Pressure   |
| 2227/033       | . . . using solar energy   | 2250/0434      | . . . . Pressure difference  |
| 2227/0332      | . . . by burning a combustible   | 2250/0439      | . . . Temperature  |
| 2227/0334      | . . . by radiation means   | 2250/0443      | . . . Flow or movement of content  |
| 2227/0337      | . . by cooling   | 2250/0447      | . . . Composition; Humidity  |
| 2227/0339      | . . . using the same fluid   | 2250/0452      | . . . . Concentration of a product   |
| 2227/0341      | . . . using another fluid  | 2250/0456      | . . . . Calorific or heating value   |
| 2227/0344      | . . . . Air cooling  | 2250/046       | . . . . Humidity   |
|                |  | 2250/0465      | . . . Vibrations, e.g. of acoustic type  |
|                |  | 2250/0469      | . . . Constraints, e.g. by gauges  |
|                |  | 2250/0473      | . . . Time or time periods   |
|                |  | 2250/0478      | . . . Position or presence   |
|                |  | 2250/0482      | . . . Acceleration   |

|           |         |   |
|-----------|---------|---|
| 2250/0486 | . .     | Indicating or measuring characterised by the location     |
| 2250/0491 | . . .   | Parameters measured at or inside the vessel               |
| 2250/0495 | . . .   | the indicated parameter is a converted measured parameter |
| 2250/06   | . .     | Controlling or regulating of parameters as output values  |
| 2250/0605 | . .     | Parameters  |
| 2250/061  | . . .   | Level of content in the vessel                            |
| 2250/0615 | . . .   | Mass or weight of the content of the vessel               |
| 2250/0621 | . . .   | Volume  |
| 2250/0626 | . . .   | Pressure  |
| 2250/0631 | . . .   | Temperature   |
| 2250/0636 | . . .   | Flow or movement of content                               |
| 2250/0642 | . . .   | Composition; Humidity                                     |
| 2250/0647 | . . . . | Concentration of a product                                |
| 2250/0652 | . . . . | Calorific or heating value                                |
| 2250/0657 | . . . . | Humidity  |
| 2250/0663 | . . .   | Vibrations, e.g. of acoustic type                         |
| 2250/0668 | . . .   | Constraints, e.g. by gauges                               |
| 2250/0673 | . . .   | Time or time periods                                      |
| 2250/0678 | . . .   | Position or presence                                      |
| 2250/0684 | . . .   | Acceleration  |
| 2250/0689 | . .     | Methods for controlling or regulating                     |
| 2250/0694 | . . .   | with calculations   |
| 2250/07   | . .     | Actions triggered by measured parameters                  |
| 2250/072  | . .     | Action when predefined value is reached                   |
| 2250/075  | . . .   | when full   |
| 2250/077  | . . .   | when empty  |

|                |   |
|----------------|---|
| <b>2260/00</b> | <b>Purposes of gas storage and gas handling</b>           |
| 2260/01        | . Improving mechanical properties or manufacturing        |
| 2260/011       | . . Improving strength                                    |
| 2260/012       | . . Reducing weight                                       |
| 2260/013       | . . Reducing manufacturing time or effort                 |
| 2260/015       | . . Facilitating maintenance                              |
| 2260/016       | . . Preventing slosh                                      |
| 2260/017       | . . by calculation  |
| 2260/018       | . . Adapting dimensions                                   |
| 2260/02        | . Improving properties related to fluid or fluid transfer |
| 2260/021       | . . Avoiding over pressurising                            |
| 2260/022       | . . Avoiding overfilling                                  |
| 2260/023       | . . Avoiding overheating                                  |
| 2260/024       | . . Improving metering                                    |
| 2260/025       | . . Reducing transfer time                                |
| 2260/026       | . . by calculation  |
| 2260/027       | . . Making transfer independent of vessel orientation     |
| 2260/028       | . . Avoiding unauthorised transfer                        |
| 2260/03        | . Dealing with losses                                     |
| 2260/031       | . . due to heat transfer                                  |
| 2260/032       | . . . Avoiding freezing or defrosting                     |
| 2260/033       | . . . by enhancing insulation                             |
| 2260/035       | . . of fluid  |
| 2260/036       | . . . Avoiding leaks                                      |
| 2260/037       | . . . Handling leaked fluid                               |
| 2260/038       | . . . Detecting leaked fluid                              |
| 2260/04        | . Reducing risks and environmental impact                 |
| 2260/042       | . . Reducing risk of explosion                            |
| 2260/044       | . . Avoiding pollution or contamination                   |

|          |     |                                 |
|----------|-----|---------------------------------|
| 2260/046 | . . | Enhancing energy recovery       |
| 2260/048 | . . | Refurbishing                    |
| 2260/05  | . . | Improving chemical properties   |
| 2260/053 | . . | Reducing corrosion              |
| 2260/056 | . . | Improving fluid characteristics |

**Purposes or effects**

|                |  |
|----------------|--|
| <b>2265/00</b> | <b>Effects achieved by gas storage or gas handling</b> |
| 2265/01        | . Purifying the fluid                                  |
| 2265/012       | . . by filtering                                       |
| 2265/015       | . . by separating                                      |
| 2265/017       | . . . different phases of a same fluid                 |
| 2265/02        | . Mixing fluids  |
| 2265/022       | . . identical fluid                                    |
| 2265/025       | . . different fluids                                   |
| 2265/027       | . . . with odorizing                                   |
| 2265/03        | . Treating the boil-off                                |
| 2265/031       | . . by discharge                                       |
| 2265/032       | . . by recovery  |
| 2265/033       | . . . with cooling                                     |
| 2265/034       | . . . . with condensing the gas phase                  |
| 2265/035       | . . . . with subcooling the liquid phase               |
| 2265/036       | . . . with heating                                     |
| 2265/037       | . . . with pressurising                                |
| 2265/038       | . . . with expanding                                   |
| 2265/04        | . using an independent energy source, e.g. battery     |
| 2265/05        | . Regasification                                       |
| 2265/06        | . Fluid distribution                                   |
| 2265/061       | . . for supply of supplying vehicles                   |
| 2265/063       | . . for supply of refueling stations                   |
| 2265/065       | . . for refueling vehicle fuel tanks                   |
| 2265/066       | . . for feeding engines for propulsion                 |
| 2265/068       | . . Distribution pipeline networks                     |
| 2265/07        | . Generating electrical power as side effect           |

|                |                                   |
|----------------|-----------------------------------|
| <b>2270/00</b> | <b>Applications</b>               |
| 2270/01        | . for fluid transport or storage  |
| 2270/0102      | . . on or in the water            |
| 2270/0105      | . . . Ships                       |
| 2270/0107      | . . . . Wall panels               |
| 2270/011       | . . . Barges                      |
| 2270/0113      | . . . . floating                  |
| 2270/0115      | . . . . immersed                  |
| 2270/0118      | . . . Offshore                    |
| 2270/0121      | . . . . Platforms                 |
| 2270/0123      | . . . . Terminals                 |
| 2270/0126      | . . . . Buoys                     |
| 2270/0128      | . . . . Storage in depth          |
| 2270/0131      | . . . Submarines                  |
| 2270/0134      | . . placed above the ground       |
| 2270/0136      | . . . Terminals                   |
| 2270/0139      | . . . Fuel stations               |
| 2270/0142      | . . placed underground            |
| 2270/0144      | . . . Type of cavity              |
| 2270/0147      | . . . . by burying vessels        |
| 2270/0149      | . . . . by digging cavities       |
| 2270/0152      | . . . . . Salt caverns            |
| 2270/0155      | . . . . by using natural cavities |
| 2270/0157      | . . . Location of cavity          |
| 2270/016       | . . . . onshore                   |
| 2270/0163      | . . . . offshore                  |

|           |         |  |
|-----------|---------|--|
| 2270/0165 | . .     | on the road  |
| 2270/0168 | . . .   | by vehicles  |
| 2270/0171 | . . . . | Trucks   |
| 2270/0173 | . . . . | Railways   |
| 2270/0176 | . . . . | Buses  |
| 2270/0178 | . . . . | Cars   |
| 2270/0181 | . . .   | Airbags  |
| 2270/0184 | . . .   | Fuel cells   |
| 2270/0186 | . .     | in the air or in space                               |
| 2270/0189 | . . .   | Planes   |
| 2270/0192 | . . .   | Hot air balloons                                     |
| 2270/0194 | . . .   | for use under microgravity conditions, e.g.<br>space |
| 2270/0197 | . . .   | Rockets  |
| 2270/02   | .       | for medical applications                             |
| 2270/025  | . .     | Breathing  |
| 2270/05   | .       | for industrial use                                   |
| 2270/0509 | . .     | "Dewar" vessels                                      |
| 2270/0518 | . .     | Semiconductors                                       |
| 2270/0527 | . .     | Superconductors                                      |
| 2270/0536 | . . .   | Magnetic resonance imaging                           |
| 2270/0545 | . .     | Tools  |
| 2270/0554 | . .     | Hydraulic applications                               |
| 2270/0563 | . .     | Pneumatic applications                               |
| 2270/0572 | . .     | Isostatic presses                                    |
| 2270/0581 | . .     | Power plants   |
| 2270/059  | . .     | Mass bottling, e.g. merry belts                      |
| 2270/07   | .       | for household use                                    |
| 2270/0709 | . .     | Camping gas  |
| 2270/0718 | . .     | Aerosols   |
| 2270/0727 | . .     | Thermos flasks                                       |
| 2270/0736 | . .     | Capsules, e.g. CO <sub>2</sub>                       |
| 2270/0745 | . .     | Gas bottles  |
| 2270/0754 | . .     | Fire extinguishers                                   |
| 2270/0763 | . .     | Fuel cells   |
| 2270/0772 | . .     | Inflation devices, e.g. for rescue vests or tyres    |
| 2270/0781 | . .     | Diving equipments                                    |
| 2270/079  | . .     | Respiration devices for rescuing                     |