

CPC**COOPERATIVE PATENT CLASSIFICATION****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](#))

F17C 1/00

Pressure vessels, e.g. gas cylinder, gas tank, replaceable cartridge (pressurised apparatus for purposes other than storage, see the relevant subclasses such as [A62C](#), [B05B](#); associated with vehicles, see the appropriate subclass of classes [B60](#) to [B64](#); pressure vessels in general [F16J 12/00](#); { autoclaves [B01J 3/04](#); tank vehicles [B60P 3/22](#); railway tank wagons for carrying fluent materials [B61D 5/00](#); accumulators for supplying fluid under pressure [F15B 1/04](#); liquified gas stoves [F24C 3/00](#) }

F17C 1/002

- . { Storage in barges or on ships }

F17C 1/005

- . { Storage of gas or gaseous mixture at high pressure and at high density condition, e.g. in the single state phase }

F17C 1/007

- . { Underground or underwater storage }

F17C 1/02

- . involving reinforcing arrangements { [F17C 1/14](#), [F17C 1/16](#) take precedence }

F17C 1/04

- .. Protecting sheathings

F17C 1/06

- ... Built-up from wound-on bands or filamentary material, e.g. wires

F17C 1/08

- .. Integral reinforcements, e.g. ribs

F17C 1/10

- . with provision for protection against corrosion e.g. due to gaseous acid ({ [F17C 1/14](#), [F17C 1/16](#) take precedence }; inhibiting corrosion of metallic material or incrustation in general [C23F](#))

F17C 1/12

- . with provision for thermal insulation ({ [F17C 1/14](#), [F17C 1/16](#) take precedence }; thermal insulation in general [F16L 59/00](#))

F17C 1/14

- . constructed of aluminium; constructed of non-magnetic steel

F17C 1/16

- . constructed of plastics materials { (shaping of plastics [B29C](#)) }

F17C 3/00**Vessels not under pressure****F17C 3/005**

- . { Underground or underwater containers or vessels (storing in natural or artificial cavities in the earth in general [B65G 5/00](#)) }

F17C 3/02

- . with provision for thermal insulation (thermal insulation in general [F16L 59/00](#)) { refrigerators [F25D](#); insulation specially adapted for cryogenic vessels [F17C 13/001](#); tank vehicles [B60P 3/22](#); railway tank wagons [B61D 5/00](#) }

- F17C 3/022 . . { Land-based bulk storage containers (civil engineering aspects [E04H 7/00](#))}
- F17C 3/025 . . { Bulk storage in barges or on ships (constructive aspects [B63B 25/16](#))}
- F17C 3/027 . . . { Wallpanels for so-called membrane tanks }
- F17C 3/04 . . by insulating layers ([F17C 3/08](#) takes precedence)
- F17C 3/06 . . . on the inner surface, i.e. in contact with the stored fluid
- F17C 3/08 . . by vacuum spaces, e.g. Dewar flask (for household use [A47J 41/02](#))
- F17C 3/085 . . . { Cryostats }
- F17C 3/10 . . by liquid-circulating or vapour-circulating jackets

- F17C 3/12 . with provision for protection against corrosion, e.g. due to gaseous acid (protection against corrosion in general [C23F](#))

- F17C 5/00** **Methods or apparatus for filling containers with liquefied, solidified, or compressed gases under pressures (adding propellants to aerosol containers [B65B 31/00](#))**
- NOTE**
- 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. [A62C](#), [B05B](#).

- F17C 5/002 . { Automated filling apparatus }
- F17C 5/005 . . { for gas bottles, such as on a continuous belt or on a merry-go-round }
- F17C 5/007 . . { for individual gas tanks or containers, e.g. in vehicles (filling with liquid fuel not under pressure, [B60S 5/02](#), [B67D 5/00](#))}

- F17C 5/02 . for filling with liquefied gases
- F17C 5/04 . . requiring the use of refrigeration, e.g. filling with helium or hydrogen

- F17C 5/06 . for filling with compressed gases

- F17C 6/00** **Methods and apparatus for filling vessels not under pressure with liquefied or solidified gases**

- F17C 7/00** **Methods or apparatus for discharging liquefied, solidified, or compressed gases from pressure vessels, not covered by another subclass**

- F17C 7/02 . Discharging liquefied gases
- F17C 7/04 . . with change of state, e.g. vaporisation

- F17C 9/00** **Methods or apparatus for discharging liquefied or solidified gases from vessels not under pressure**

- F17C 9/02 . with change of state, e.g. vaporisation
- F17C 9/04 . . Recovery of thermal energy

- F17C 11/00** **Use of gas-solvents or gas-sorbents in vessels {(absorbing compositions for acetylene [C10L 3/04](#); absorbing compositions for hydrogen [C01B 3/0005](#))}**

- F17C 11/002 . { for acetylene }
- F17C 11/005 . { for hydrogen }
- F17C 11/007 . { for hydrocarbon gases, such as methane or natural gas, propane, butane or mixtures thereof (LPG) }
- F17C 13/00 Details of vessels or of the filling or discharging of vessels**
- F17C 13/001 . { Thermal insulation specially adapted for cryogenic vessels (vessels not under pressure with insulation [F17C 3/02](#); thermal insulation in general [F16L 59/00](#)) }
- F17C 13/002 . { for vessels under pressure ([F17C 13/008](#) and [F17C 13/02](#) to [F17C 13/12](#) take precedence) }
- F17C 13/003 . . { Means for coding or identifying them and/or their contents }
- F17C 13/004 . { for large storage vessels not under pressure ([F17C 13/008](#) and [F17C 13/02](#) to [F17C 13/12](#) take precedence) }
- F17C 13/005 . { for medium-size and small storage vessels not under pressure ([F17C 13/008](#) and [F17C 13/02](#) to [F17C 13/12](#) take precedence) }
- F17C 13/006 . . { for Dewar vessels or cryostats }
- F17C 13/007 . . . { used for superconducting phenomena (investigating by nuclear magnetic resonance [G01N 24/08](#); magnets having superconductive winding [H01F 6/00](#)) }
- F17C 13/008 . { for use under microgravity conditions }
- F17C 13/02 . Special adaptations of indicating, measuring, or monitoring equipment (measuring in general [G01](#))
- F17C 13/021 . . { having the height as the parameter }
- F17C 13/023 . . { having the mass as the parameter }
- F17C 13/025 . . { having the pressure as the parameter }
- F17C 13/026 . . { having the temperature as the parameter }
- F17C 13/028 . . { having the volume as the parameter }
- F17C 13/04 . Arrangement or mounting of valves (valves per se [F16K](#); { snap-coupling of nipples [F16L 37/00](#) })
- F17C 13/045 . . { Automatic change-over switching assembly for bottled gas systems with two (or more) gas containers }
- F17C 13/06 . Closures, e.g. cap, breakable member ({ for autoclaves [B01J 3/03](#) }; closures for { large } containers in general [B65D](#) { [B65D 90/54](#) }; { for pressure vessels in general [F16J 13/00](#) })
- F17C 13/08 . Mounting arrangements for vessels
- F17C 13/081 . . { for large land-based storage vessels (supports for large containers in general [B65D 90/12](#)) }
- F17C 13/082 . . { for large sea-borne storage vessels (load-accomodating arrangements for ships or waterborne vessels [B63B 25/12](#)) }

- F17C 13/083 .. { for medium-sized mobile storage vessels, e.g. tank vehicles or railway tank vehicles }
- F17C 13/084 .. { for small-sized storage vessels, e.g. compressed gas cylinders or bottles, disposable gas vessels, vessels adapted for automotive use }
- F17C 13/085 ... { on wheels (hand carts [B62B](#)) }
- F17C 13/086 .. { for Dewar vessels or cryostats }
- F17C 13/087 ... { used for superconducting phenomena }
- F17C 13/088 .. { for use under microgravity conditions }
- F17C 13/10 . Arrangements for preventing freezing
- F17C 13/12 . Arrangements or mounting of devices for preventing or minimising the effect of explosion (flame traps [A62C 4/00](#)); { Other safety measures }
- F17C 13/123 .. { for gas bottles, cylinders or reservoirs for tank vehicles or for railway tank wagons }
- F17C 13/126 .. { for large storage containers for liquefied gas (for large containers in general [B65D 90/22](#)) }

F17C 2201/00 Vessel construction, in particular geometry, arrangement or size

- F17C 2201/01 . Shape
- F17C 2201/0104 .. cylindrical
- F17C 2201/0109 ... with exteriorly curved end-piece
- F17C 2201/0114 ... with interiorly curved end-piece
- F17C 2201/0119 ... with flat end-piece
- F17C 2201/0123 ... with variable thickness or diameter
- F17C 2201/0128 .. spherical or elliptical
- F17C 2201/0133 .. toroidal
- F17C 2201/0138 .. tubular
- F17C 2201/0142 .. conical
- F17C 2201/0147 .. complex
- F17C 2201/0152 ... Lobes
- F17C 2201/0157 ... Polygonal
- F17C 2201/0161 ... Honeycomb
- F17C 2201/0166 ... divided in several chambers
- F17C 2201/0171 ... comprising a communication hole between chambers
- F17C 2201/0176 .. variable
- F17C 2201/018 ... with bladders
- F17C 2201/0185 ... with separating membrane
- F17C 2201/019 ... with pistons
- F17C 2201/0195 ... with bellows
- F17C 2201/03 . Orientation
- F17C 2201/032 .. with substantially vertical main axis
- F17C 2201/035 .. with substantially horizontal main axis

- F17C 2201/037 .. with sloping main axis
- F17C 2201/05 . Size
- F17C 2201/052 .. large (>1000 m3)
- F17C 2201/054 .. medium (>1 m3)
- F17C 2201/056 .. Small (<1 m3)
- F17C 2201/058 .. portable (<30 l)
- F17C 2201/06 . Vessel construction using filling material in contact with the handled fluid

F17C 2203/00 Vessel construction, in particular walls or details thereof

- F17C 2203/01 . Reinforcing or suspension means
- F17C 2203/011 .. Reinforcing means
 - F17C 2203/012 ... on or in the wall, e.g. ribs
 - F17C 2203/013 ... in the vessel, e.g. columns
- F17C 2203/014 .. Suspension means
 - F17C 2203/015 ... Bars
 - F17C 2203/016 ... Cords
 - F17C 2203/017 ... Magnetic means
 - F17C 2203/018 ... by attachment at the neck
- F17C 2203/03 . Thermal insulations
 - F17C 2203/0304 .. by solid means
 - F17C 2203/0308 ... Radiation shield
 - F17C 2203/0312 cooled by external means
 - F17C 2203/0316 cooled by vaporised gas from the interior
 - F17C 2203/032 Multi-sheet layers
 - F17C 2203/0325 ... Aerogel
 - F17C 2203/0329 ... Foam
 - F17C 2203/0333 Polyurethane
 - F17C 2203/0337 ... Granular
 - F17C 2203/0341 Perlite
 - F17C 2203/0345 ... Fibres
 - F17C 2203/035 Glass wool
 - F17C 2203/0354 ... Wood
 - F17C 2203/0358 ... in form of panels
 - F17C 2203/0362 .. by liquid means
 - F17C 2203/0366 ... Cryogen
 - F17C 2203/037 ... Water
 - F17C 2203/0375 .. by gas
 - F17C 2203/0379 ... Inert
 - F17C 2203/0383 ... Air

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|----------------|-------|---|
| F17C 2203/0387 | ... | Cryogen |
| F17C 2203/0391 | .. | by vacuum |
| F17C 2203/0395 | ... | Getter |
| F17C 2203/06 | . | Materials for walls or layers thereof; Properties or structures of walls or their materials |
| F17C 2203/0602 | .. | Wall structures; Special features thereof |
| F17C 2203/0604 | ... | Liners |
| F17C 2203/0607 | ... | Coatings |
| F17C 2203/0609 | ... | Straps, bands or ribbons |
| F17C 2203/0612 | ... | Wall structures |
| F17C 2203/0614 | .... | Single wall |
| F17C 2203/0617 | ..... | with one layer |
| F17C 2203/0619 | ..... | with two layers |
| F17C 2203/0621 | ..... | with three layers |
| F17C 2203/0624 | ..... | with four or more layers |
| F17C 2203/0626 | .... | Multiple walls |
| F17C 2203/0629 | ..... | Two walls |
| F17C 2203/0631 | ..... | Three or more walls |
| F17C 2203/0634 | .. | Materials for walls or layers thereof |
| F17C 2203/0636 | ... | Metals |
| F17C 2203/0639 | .... | Steels |
| F17C 2203/0641 | ..... | Non-magnetic steels |
| F17C 2203/0643 | ..... | Stainless steels |
| F17C 2203/0646 | .... | Aluminium |
| F17C 2203/0648 | .... | Alloys or compositions of metals |
| F17C 2203/0651 | ..... | Invar |
| F17C 2203/0653 | .... | Lead |
| F17C 2203/0656 | .... | in form of filaments |
| F17C 2203/0658 | ... | Synthetics |
| F17C 2203/066 | .... | Plastics |
| F17C 2203/0663 | .... | in form of fibers or filaments |
| F17C 2203/0665 | ..... | radially wound |
| F17C 2203/0668 | ..... | axially wound |
| F17C 2203/067 | ..... | helically wound |
| F17C 2203/0673 | ..... | Polymers |
| F17C 2203/0675 | .... | with details of composition |
| F17C 2203/0678 | ... | Concrete |
| F17C 2203/068 | .. | Special properties of materials for vessel walls |
| F17C 2203/0682 | ... | with liquid or gas layer |
| F17C 2203/0685 | ... | flexible |
| F17C 2203/0687 | ... | superconducting |
| F17C 2203/069 | ... | Break point in the wall |

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|----------------|-----|--------------------------|
| F17C 2203/0692 | ... | transparent |
| F17C 2203/0695 | ... | pre-constrained |
| F17C 2203/0697 | ... | comprising nanoparticles |

F17C 2205/00 **Vessel construction, in particular mounting arrangements, attachments or identifications means**

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|----------------|-------|--|
| F17C 2205/01 | . | Mounting arrangements |
| F17C 2205/0103 | .. | Exterior arrangements |
| F17C 2205/0107 | ... | Frames |
| F17C 2205/0111 | ... | Boxes |
| F17C 2205/0115 | ... | Dismountable protective hulls |
| F17C 2205/0119 | ... | Vessel walls form part of another structure |
| F17C 2205/0123 | .. | characterised by number of vessels |
| F17C 2205/0126 | ... | One vessel |
| F17C 2205/013 | ... | Two or more vessels |
| F17C 2205/0134 | .... | characterised by the presence of fluid connection between vessels |
| F17C 2205/0138 | ..... | bundled in series |
| F17C 2205/0142 | ..... | bundled in parallel |
| F17C 2205/0146 | ..... | with details of the manifold |
| F17C 2205/0149 | .... | Vessel mounted inside another one |
| F17C 2205/0153 | .. | Details of mounting arrangements |
| F17C 2205/0157 | ... | for transport |
| F17C 2205/0161 | .... | with wheels |
| F17C 2205/0165 | .... | with handgrip |
| F17C 2205/0169 | ... | stackable |
| F17C 2205/0173 | ... | lockable |
| F17C 2205/0176 | ... | with ventilation |
| F17C 2205/018 | ... | Supporting feet |
| F17C 2205/0184 | ... | Attachments to the ground, e.g. mooring or anchoring |
| F17C 2205/0188 | ... | Hanging up devices |
| F17C 2205/0192 | ... | with external bearing means |
| F17C 2205/0196 | ... | with shock absorbing means |
| F17C 2205/03 | . | Fluid connections, filters, valves, closure means or other attachments |
| F17C 2205/0302 | .. | Fittings, valves, filters, or components in connection with the gas storage device |
| F17C 2205/0305 | ... | Bosses, e.g. boss collars |
| F17C 2205/0308 | ... | Protective caps |
| F17C 2205/0311 | ... | Closure means |
| F17C 2205/0314 | .... | breakable, e.g. with burst discs |
| F17C 2205/0317 | | fusing or melting |
| F17C 2205/032 | | pierceable |
| F17C 2205/0323 | ... | Valves |

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|----------------|------|--|
| F17C 2205/0326 | | electrically actuated |
| F17C 2205/0329 | | manually actuated |
| F17C 2205/0332 | | Safety valves or pressure relief valves |
| F17C 2205/0335 | .... | Check-valves or non-return valves |
| F17C 2205/0338 | ... | Pressure regulators |
| F17C 2205/0341 | ... | Filters |
| F17C 2205/0344 | .... | Sinter type |
| F17C 2205/0347 | .... | Active charcoal type |
| F17C 2205/035 | ... | Flow reducers |
| F17C 2205/0352 | ... | Pipes |
| F17C 2205/0355 | .... | Insulation thereof |
| F17C 2205/0358 | .... | coaxial |
| F17C 2205/0361 | .... | corrugated |
| F17C 2205/0364 | .... | flexible or articulated, e.g. a hose |
| F17C 2205/0367 | .... | Arrangements in parallel |
| F17C 2205/037 | ... | Quick connecting means, e.g. couplings |
| F17C 2205/0373 | .... | Adapters |
| F17C 2205/0376 | ... | Dispensing pistols |
| F17C 2205/0379 | ... | Manholes or access openings for human beings |
| F17C 2205/0382 | ... | Constructional details of valves, regulators |
| F17C 2205/0385 | .... | in blocks or units |
| F17C 2205/0388 | .. | Arrangement of valves, regulators, filters |
| F17C 2205/0391 | ... | inside the pressure vessel |
| F17C 2205/0394 | ... | in direct contact with the pressure vessel |
| F17C 2205/0397 | .... | on both sides of the pressure vessel |
| F17C 2205/05 | . | Vessel or content identifications, e.g. labels |
| F17C 2205/051 | .. | by coating |
| F17C 2205/052 | .. | by stickers |
| F17C 2205/054 | .. | by bar codes |
| F17C 2205/055 | .. | by magnetic means |
| F17C 2205/057 | .. | by chips |
| F17C 2205/058 | .. | by Radio Frequency Identification |

F17C 2209/00 Vessel construction, in particular methods of manufacturing

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|----------------|-----|-------------------|
| F17C 2209/21 | . | Shaping processes |
| F17C 2209/2109 | .. | Moulding |
| F17C 2209/2118 | ... | by injection |
| F17C 2209/2127 | ... | by blowing |
| F17C 2209/2136 | ... | using wax moulds |
| F17C 2209/2145 | ... | by rotation |
| F17C 2209/2154 | .. | Winding |

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| F17C 2209/2163 | ... | with a mandrel |
| F17C 2209/2172 | .. | Polishing |
| F17C 2209/2181 | .. | Metal working processes, e.g. deep drawing, stamping or cutting |
| F17C 2209/219 | .. | Working processes for non metal materials, e.g. extruding |
| F17C 2209/22 | . | Assembling processes |
| F17C 2209/221 | .. | Welding |
| F17C 2209/222 | ... | by friction |
| F17C 2209/224 | .. | Press-fitting; Shrink-fitting |
| F17C 2209/225 | .. | Spraying |
| F17C 2209/227 | .. | by adhesive means |
| F17C 2209/228 | .. | by screws, bolts or rivets |
| F17C 2209/23 | . | Manufacturing of particular parts or at special locations |
| F17C 2209/232 | .. | of walls |
| F17C 2209/234 | .. | of closing end pieces, e.g. caps |
| F17C 2209/236 | ... | Apparatus therefore |
| F17C 2209/238 | .. | Filling of insulants |

F17C 2221/00 Handled fluid, in particular type of fluid

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|---------------|-----|---|
| F17C 2221/01 | . | Pure fluids |
| F17C 2221/011 | .. | Oxygen |
| F17C 2221/012 | .. | Hydrogen |
| F17C 2221/013 | .. | Carbone dioxide |
| F17C 2221/014 | .. | Nitrogen |
| F17C 2221/015 | .. | Carbon monoxide |
| F17C 2221/016 | .. | Noble gases (Ar, Kr, Xe) |
| F17C 2221/017 | ... | Helium |
| F17C 2221/018 | .. | Acetylene |
| F17C 2221/03 | . | Mixtures |
| F17C 2221/031 | .. | Air |
| F17C 2221/032 | .. | Hydrocarbons |
| F17C 2221/033 | ... | Methane, e.g. natural gas, CNG, LNG, GNL, GNC, PLNG |
| F17C 2221/035 | ... | Propane butane, e.g. LPG, GPL |
| F17C 2221/036 | ... | Hydrates |
| F17C 2221/037 | .. | Containing pollutant, e.g. H ₂ S, Cl |
| F17C 2221/038 | .. | Refrigerants |
| F17C 2221/05 | . | Ultrapure fluid |
| F17C 2221/07 | . | Hyperpolarised gases |
| F17C 2221/08 | . | Ergols, e.g. hydrazine |

Guidance heading: Fluid contained in the vessel; Filling and discharging the fluid**F17C 2223/00 Handled fluid before transfer, i.e. state of fluid when stored in the vessel or before transfer from the vessel**

- F17C 2223/01 . characterised by the phase
- F17C 2223/0107 .. Single phase
- F17C 2223/0115 ... dense or supercritical, i.e. at high pressure and high density
- F17C 2223/0123 ... gaseous, e.g. CNG, GNC
- F17C 2223/013 ... liquid
- F17C 2223/0138 ... solid
- F17C 2223/0146 .. Two-phase
- F17C 2223/0153 ... Liquefied gas, e.g. LPG, GPL
- F17C 2223/0161 cryogenic, e.g. LNG, GNL, PLNG
- F17C 2223/0169 subcooled
- F17C 2223/0176 ... Solids and gas
- F17C 2223/0184 ... Liquids and solids
- F17C 2223/0192 .. Three-phase, e.g. CO₂ at triple point

- F17C 2223/03 . characterised by the pressure level
- F17C 2223/031 .. Not under pressure, i.e. containing liquids or solids only
- F17C 2223/033 .. Small pressure, e.g. for liquefied gas
- F17C 2223/035 .. High pressure (>10 bar)
- F17C 2223/036 .. Very high pressure (>80 bar)
- F17C 2223/038 .. Subatmospheric pressure

- F17C 2223/04 . characterised by other properties of handled fluid before transfer
- F17C 2223/041 .. Stratification
- F17C 2223/042 .. Localisation of the removal point
- F17C 2223/043 ... in the gas
- F17C 2223/045 with a dip tube
- F17C 2223/046 ... in the liquid
- F17C 2223/047 with a dip tube
- F17C 2223/048 ... in the solid

F17C 2225/00 Handled fluid after transfer, i.e. state of fluid after transfer from the vessel

- F17C 2225/01 . characterised by the phase
- F17C 2225/0107 .. Single phase
- F17C 2225/0115 ... dense or supercritical, i.e. at high pressure and high density
- F17C 2225/0123 ... gaseous, e.g. CNG, GNC
- F17C 2225/013 ... liquid

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|---------------------|------|--|
| F17C 2225/0138 | ... | solid |
| F17C 2225/0146 | .. | Two-phase |
| F17C 2225/0153 | ... | Liquefied gas, e.g. LPG, GPL |
| F17C 2225/0161 | .... | cryogenic, e.g. LNG, GNL, PLNG |
| F17C 2225/0169 | .... | subcooled |
| F17C 2225/0176 | ... | Solids and gas |
| F17C 2225/0184 | ... | Liquids and solids |
| F17C 2225/0192 | .. | Three-phase, e.g. CO2 at triple point |
| F17C 2225/03 | . | characterised by the pressure level |
| F17C 2225/031 | .. | Not under pressure, i.e. containing liquids or solids only |
| F17C 2225/033 | .. | Small pressure, e.g. for liquefied gas |
| F17C 2225/035 | .. | High pressure, i.e. between 10 and 80 bars |
| F17C 2225/036 | .. | Very high pressure, i.e. above 80 bars |
| F17C 2225/038 | .. | Subatmospheric pressure |
| F17C 2225/04 | . | characterised by other properties of handled fluid after transfer |
| F17C 2225/041 | .. | Stratification |
| F17C 2225/042 | .. | Localisation of the filling point |
| F17C 2225/043 | ... | in the gas |
| F17C 2225/044 | .... | at several points, e.g. with a device for recondensing gas |
| F17C 2225/045 | .... | with a dip tube |
| F17C 2225/046 | ... | in the liquid |
| F17C 2225/047 | .... | with a dip tube |
| F17C 2225/048 | ... | in the solid |
| F17C 2227/00 | | Transfer of fluids, i.e. method or means for transferring the fluid; Heat exchange with the fluid |
| F17C 2227/01 | . | Propulsion of the fluid |
| F17C 2227/0107 | .. | by pressurising the ullage |
| F17C 2227/0114 | .. | with vacuum injectors, e.g. venturi |
| F17C 2227/0121 | .. | by gravity |
| F17C 2227/0128 | .. | with pumps or compressors |
| F17C 2227/0135 | ... | Pumps |
| F17C 2227/0142 | .... | with specified pump type, e.g. piston or impulsive type |
| F17C 2227/015 | .... | with cooling of the pump |
| F17C 2227/0157 | ... | Compressors |
| F17C 2227/0164 | .... | with specified compressor type, e.g. piston or impulsive type |
| F17C 2227/0171 | ... | Arrangement |
| F17C 2227/0178 | .... | in the vessel |
| F17C 2227/0185 | | comprising several pumps or compressors |
| F17C 2227/0192 | .. | by using a working fluid |

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|----------------|--|
| F17C 2227/03 | . Heat exchange with the fluid |
| F17C 2227/0302 | .. by heating |
| F17C 2227/0304 | ... using an electric heater |
| F17C 2227/0306 | ... using the same fluid |
| F17C 2227/0309 | ... using another fluid |
| F17C 2227/0311 | Air heating |
| F17C 2227/0313 | by forced circulation, e.g. using a fan |
| F17C 2227/0316 | Water heating |
| F17C 2227/0318 | using seawater |
| F17C 2227/032 | using geothermal water |
| F17C 2227/0323 | in a closed loop |
| F17C 2227/0325 | ... by expansion using "Joule-Thompson" effect |
| F17C 2227/0327 | ... with recovery of heat |
| F17C 2227/033 | ... using solar energy |
| F17C 2227/0332 | ... by burning a combustible |
| F17C 2227/0334 | ... by radiation means |
| F17C 2227/0337 | .. by cooling |
| F17C 2227/0339 | ... using the same fluid |
| F17C 2227/0341 | ... using another fluid |
| F17C 2227/0344 | Air cooling |
| F17C 2227/0346 | by forced circulation, e.g. using a fan |
| F17C 2227/0348 | Water cooling |
| F17C 2227/0351 | using seawater |
| F17C 2227/0353 | using cryocooler |
| F17C 2227/0355 | in a closed loop |
| F17C 2227/0358 | ... by expansion |
| F17C 2227/036 | "Joule-Thompson" effect |
| F17C 2227/0362 | in a turbine |
| F17C 2227/0365 | ... with recovery of heat |
| F17C 2227/0367 | .. Localisation of heat exchange |
| F17C 2227/0369 | ... in or on a vessel |
| F17C 2227/0372 | in the gas |
| F17C 2227/0374 | in the liquid |
| F17C 2227/0376 | in wall contact |
| F17C 2227/0379 | inside the vessel |
| F17C 2227/0381 | integrated in the wall |
| F17C 2227/0383 | outside the vessel |
| F17C 2227/0386 | with a jacket |
| F17C 2227/0388 | ... separate |
| F17C 2227/039 | on the pipes |
| F17C 2227/0393 | using a vaporiser |

F17C 2227/0395 using a submerged heat exchanger
 F17C 2227/0397 . . . characterised by fins

F17C 2227/04 . Methods for emptying or filling
 F17C 2227/041 . . vessel by vessel
 F17C 2227/042 . . . with change-over from one vessel to another
 F17C 2227/043 . . by pressure cascade
 F17C 2227/044 . . by purging
 F17C 2227/045 . . by vacuum
 F17C 2227/046 . . by even emptying or filling
 F17C 2227/047 . . by repeating a process cycle
 F17C 2227/048 . . by maintaining residual pressure

F17C 2250/00 Accessories; Control means; Indicating, measuring or monitoring of parameters

F17C 2250/01 . Intermediate tanks

F17C 2250/03 . Control means
 F17C 2250/032 . . using computers
 F17C 2250/034 . . using wireless transmissions
 F17C 2250/036 . . using alarms
 F17C 2250/038 . . using cameras

F17C 2250/04 . Indicating or measuring of parameters as input values
 F17C 2250/0404 . . Parameters indicated or measured
 F17C 2250/0408 . . . Level of content in the vessel
 F17C 2250/0413 with floats
 F17C 2250/0417 with electrical means
 F17C 2250/0421 . . . Mass or weight of the content of the vessel
 F17C 2250/0426 . . . Volume
 F17C 2250/043 . . . Pressure
 F17C 2250/0434 Pressure difference
 F17C 2250/0439 . . . Temperature
 F17C 2250/0443 . . . Flow or movement of content
 F17C 2250/0447 . . . Composition; Humidity
 F17C 2250/0452 Concentration of a product
 F17C 2250/0456 Calorific or heating value
 F17C 2250/046 Humidity
 F17C 2250/0465 . . . Vibrations, e.g. of acoustic type
 F17C 2250/0469 . . . Constraints, e.g. by gauges
 F17C 2250/0473 . . . Time or time periods
 F17C 2250/0478 . . . Position or presence
 F17C 2250/0482 . . . Acceleration

- F17C 2250/0486 . . Indicating or measuring characterised by the location
- F17C 2250/0491 . . . Parameters measured at or inside the vessel
- F17C 2250/0495 . . . the indicated parameter is a converted measured parameter

- F17C 2250/06 . Controlling or regulating of parameters as output values
- F17C 2250/0605 . . Parameters
- F17C 2250/061 . . . Level of content in the vessel
- F17C 2250/0615 . . . Mass or weight of the content of the vessel
- F17C 2250/0621 . . . Volume
- F17C 2250/0626 . . . Pressure
- F17C 2250/0631 . . . Temperature
- F17C 2250/0636 . . . Flow or movement of content
- F17C 2250/0642 . . . Composition; Humidity
- F17C 2250/0647 Concentration of a product
- F17C 2250/0652 Calorific or heating value
- F17C 2250/0657 Humidity
- F17C 2250/0663 . . . Vibrations, e.g. of acoustic type
- F17C 2250/0668 . . . Constraints, e.g. by gauges
- F17C 2250/0673 . . . Time or time periods
- F17C 2250/0678 . . . Position or presence
- F17C 2250/0684 . . . Acceleration
- F17C 2250/0689 . . Methods for controlling or regulating
- F17C 2250/0694 . . . with calculations

- F17C 2250/07 . Actions triggered by measured parameters
- F17C 2250/072 . . Action when predefined value is reached
- F17C 2250/075 . . . when full
- F17C 2250/077 . . . when empty

F17C 2260/00 Purposes of gas storage and gas handling

- F17C 2260/01 . Improving mechanical properties or manufacturing
- F17C 2260/011 . . Improving strength
- F17C 2260/012 . . Reducing weight
- F17C 2260/013 . . Reducing manufacturing time or effort
- F17C 2260/015 . . Facilitating maintenance
- F17C 2260/016 . . Preventing slosh
- F17C 2260/017 . . by calculation
- F17C 2260/018 . . Adapting dimensions

- F17C 2260/02 . Improving properties related to fluid or fluid transfer
- F17C 2260/021 . . Avoiding over pressurising
- F17C 2260/022 . . Avoiding overfilling

| | | |
|---------------|-----|---|
| F17C 2260/023 | .. | Avoiding overheating |
| F17C 2260/024 | .. | Improving metering |
| F17C 2260/025 | .. | Reducing transfer time |
| F17C 2260/026 | .. | by calculation |
| F17C 2260/027 | .. | Making transfer independent of vessel orientation |
| F17C 2260/028 | .. | Avoiding unauthorised transfer |
| F17C 2260/03 | . | Dealing with losses |
| F17C 2260/031 | .. | due to heat transfer |
| F17C 2260/032 | ... | Avoiding freezing or defrosting |
| F17C 2260/033 | ... | by enhancing insulation |
| F17C 2260/035 | .. | of fluid |
| F17C 2260/036 | ... | Avoiding leaks |
| F17C 2260/037 | ... | Handling leaked fluid |
| F17C 2260/038 | ... | Detecting leaked fluid |
| F17C 2260/04 | . | Reducing risks and environmental impact |
| F17C 2260/042 | .. | Reducing risk of explosion |
| F17C 2260/044 | .. | Avoiding pollution or contamination |
| F17C 2260/046 | .. | Enhancing energy recovery |
| F17C 2260/048 | .. | Refurbishing |
| F17C 2260/05 | . | Improving chemical properties |
| F17C 2260/053 | .. | Reducing corrosion |
| F17C 2260/056 | .. | Improving fluid characteristics |

Guidance heading: Purposes or effects

F17C 2265/00 Effects achieved by gas storage or gas handling

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|---------------|-----|----------------------------------|
| F17C 2265/01 | . | Purifying the fluid |
| F17C 2265/012 | .. | by filtering |
| F17C 2265/015 | .. | by separating |
| F17C 2265/017 | ... | different phases of a same fluid |
| F17C 2265/02 | . | Mixing fluids |
| F17C 2265/022 | .. | identical fluid |
| F17C 2265/025 | .. | different fluids |
| F17C 2265/027 | ... | with odorizing |
| F17C 2265/03 | . | Treating the boil-off |
| F17C 2265/031 | .. | by discharge |
| F17C 2265/032 | .. | by recovery |
| F17C 2265/033 | ... | with cooling |

| | | |
|---------------|------|--|
| F17C 2265/034 | .... | with condensing the gas phase |
| F17C 2265/035 | .... | with subcooling the liquid phase |
| F17C 2265/036 | ... | with heating |
| F17C 2265/037 | ... | with pressurising |
| F17C 2265/038 | ... | with expanding |
| F17C 2265/04 | . | using an independent energy source, e.g. battery |
| F17C 2265/05 | . | Regasification |
| F17C 2265/06 | . | Fluid distribution |
| F17C 2265/061 | .. | for supply of supplying vehicles |
| F17C 2265/063 | .. | for supply of refueling stations |
| F17C 2265/065 | .. | for refueling vehicle fuel tanks |
| F17C 2265/066 | .. | for feeding engines for propulsion |
| F17C 2265/068 | .. | Distribution pipeline networks |
| F17C 2265/07 | . | Generating electrical power as side effect |

F17C 2270/00**Applications**

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|----------------|-------|--------------------------------|
| F17C 2270/01 | . | for fluid transport or storage |
| F17C 2270/0102 | .. | on or in the water |
| F17C 2270/0105 | ... | Ships |
| F17C 2270/0107 | .... | Wall panels |
| F17C 2270/011 | ... | Barges |
| F17C 2270/0113 | .... | floating |
| F17C 2270/0115 | .... | immersed |
| F17C 2270/0118 | ... | Offshore |
| F17C 2270/0121 | .... | Platforms |
| F17C 2270/0123 | .... | Terminals |
| F17C 2270/0126 | .... | Buoys |
| F17C 2270/0128 | .... | Storage in depth |
| F17C 2270/0131 | ... | Submarines |
| F17C 2270/0134 | .. | placed above the ground |
| F17C 2270/0136 | ... | Terminals |
| F17C 2270/0139 | ... | Fuel stations |
| F17C 2270/0142 | .. | placed underground |
| F17C 2270/0144 | ... | Type of cavity |
| F17C 2270/0147 | .... | by burying vessels |
| F17C 2270/0149 | .... | by digging cavities |
| F17C 2270/0152 | ..... | Salt caverns |
| F17C 2270/0155 | | by using natural cavities |
| F17C 2270/0157 | ... | Location of cavity |

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|----------------|------|---|
| F17C 2270/016 | | onshore |
| F17C 2270/0163 | | offshore |
| F17C 2270/0165 | .. | on the road |
| F17C 2270/0168 | ... | by vehicles |
| F17C 2270/0171 | .... | Trucks |
| F17C 2270/0173 | .... | Railways |
| F17C 2270/0176 | .... | Buses |
| F17C 2270/0178 | .... | Cars |
| F17C 2270/0181 | ... | Airbags |
| F17C 2270/0184 | ... | Fuel cells |
| F17C 2270/0186 | .. | in the air or in space |
| F17C 2270/0189 | ... | Planes |
| F17C 2270/0192 | ... | Hot air balloons |
| F17C 2270/0194 | ... | for use under microgravity conditions, e.g. space |
| F17C 2270/0197 | ... | Rockets |
| F17C 2270/02 | . | for medical applications |
| F17C 2270/025 | .. | Breathing |
| F17C 2270/05 | . | for industrial use |
| F17C 2270/0509 | .. | "Dewar" vessels |
| F17C 2270/0518 | .. | Semiconductors |
| F17C 2270/0527 | .. | Supra-conductors |
| F17C 2270/0536 | ... | Magnetic resonance imaging |
| F17C 2270/0545 | .. | Tools |
| F17C 2270/0554 | .. | Hydraulic applications |
| F17C 2270/0563 | .. | Pneumatic applications |
| F17C 2270/0572 | .. | Isostatic presses |
| F17C 2270/0581 | .. | Power plants |
| F17C 2270/059 | .. | Mass bottling, e.g. merry belts |
| F17C 2270/07 | . | for household use |
| F17C 2270/0709 | .. | Camping gas |
| F17C 2270/0718 | .. | Aerosols |
| F17C 2270/0727 | .. | Thermos flasks |
| F17C 2270/0736 | .. | Capsules, e.g. CO2 |
| F17C 2270/0745 | .. | Gas bottles |
| F17C 2270/0754 | .. | Fire extinguishers |
| F17C 2270/0763 | .. | Fuel cells |
| F17C 2270/0772 | .. | Inflation devices, e.g. for rescue vests or tyres |
| F17C 2270/0781 | .. | Diving equipments |
| F17C 2270/079 | .. | Respiration devices for rescuing |