

**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	<ul style="list-style-type: none"> <li>by vacuum spaces, e.g. Dewar flask (<a href="#">for household use A47J 41/02</a>)</li> </ul>
F17C 3/085	<ul style="list-style-type: none"> <li><a href="#">{Cryostats}</a></li> </ul>
F17C 3/10	<ul style="list-style-type: none"> <li>by liquid-circulating or vapour-circulating jackets</li> </ul>
F17C 3/12	<ul style="list-style-type: none"> <li>with provision for protection against corrosion, e.g. due to gaseous acid (<a href="#">protection against corrosion in general C23F</a>)</li> </ul>
<b>F17C 5/00</b>	<b>Methods or apparatus for filling containers with liquefied, solidified, or compressed gases under pressures</b> ( <a href="#">adding propellants to aerosol containers B65B 31/00</a> )
	<b><u>NOTE</u></b>
	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> .
F17C 5/002	<ul style="list-style-type: none"> <li><a href="#">{Automated filling apparatus}</a></li> </ul>
F17C 5/005	<ul style="list-style-type: none"> <li><a href="#">{for gas bottles, such as on a continuous belt or on a merry-go-round}</a></li> </ul>
F17C 5/007	<ul style="list-style-type: none"> <li><a href="#">{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>)}</a></li> </ul>
F17C 5/02	<ul style="list-style-type: none"> <li>for filling with liquefied gases</li> </ul>
F17C 5/04	<ul style="list-style-type: none"> <li>requiring the use of refrigeration, e.g. filling with helium or hydrogen</li> </ul>
F17C 5/06	<ul style="list-style-type: none"> <li>for filling with compressed gases</li> </ul>
<b>F17C 6/00</b>	<b>Methods and apparatus for filling vessels not under pressure with liquefied or solidified gases</b>
<b>F17C 7/00</b>	<b>Methods or apparatus for discharging liquefied, solidified, or compressed gases from pressure vessels, not covered by another subclass</b>
F17C 7/02	<ul style="list-style-type: none"> <li>Discharging liquefied gases</li> </ul>
F17C 7/04	<ul style="list-style-type: none"> <li>with change of state, e.g. vaporisation</li> </ul>
<b>F17C 9/00</b>	<b>Methods or apparatus for discharging liquefied or solidified gases from vessels not under pressure</b>
F17C 9/02	<ul style="list-style-type: none"> <li>with change of state, e.g. vaporisation</li> </ul>
F17C 9/04	<ul style="list-style-type: none"> <li>Recovery of thermal energy</li> </ul>
<b>F17C 11/00</b>	<b>Use of gas-solvents or gas-sorbents in vessels</b> <a href="#">{(absorbing compositions for acetylene C10L 3/04; absorbing compositions for hydrogen C01B 3/0005)}</a>
F17C 11/002	<ul style="list-style-type: none"> <li><a href="#">{for acetylene}</a></li> </ul>
F17C 11/005	<ul style="list-style-type: none"> <li><a href="#">{for hydrogen}</a></li> </ul>
F17C 11/007	<ul style="list-style-type: none"> <li><a href="#">{for hydrocarbon gases, such as methane or natural gas, propane, butane or mixtures thereof [LPG]}</a></li> </ul>
<b>F17C 13/00</b>	<b>Details of vessels or of the filling or discharging of vessels</b>
F17C 13/001	<ul style="list-style-type: none"> <li><a href="#">{Thermal insulation specially adapted for cryogenic vessels (vessels not under pressure with insulation F17C 3/02; thermal insulation in general F16L 59/00)}</a></li> </ul>
F17C 13/002	<ul style="list-style-type: none"> <li><a href="#">{for vessels under pressure (F17C 13/008 and F17C 13/02 to F17C 13/12 take precedence)}</a></li> </ul>

- 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 m<sup>3</sup>)
- F17C 2201/054 . . medium (>1 m<sup>3</sup>)
- F17C 2201/056 . . Small (<1 m<sup>3</sup>)
- 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
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
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**

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
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**

- 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
- 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**

- 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<sub>2</sub>S, Cl
- F17C 2221/038 . . Refrigerants
- F17C 2221/05 . Ultrapure fluid
- F17C 2221/07 . Hyperpolarised gases
- F17C 2221/08 . Ergols, e.g. hydrazine

**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. CO <sub>2</sub> 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
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. CO <sub>2</sub> 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
- 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 jauges

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

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**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

### **Purposes or effects**

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

- 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**

- 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
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 botteling, 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. CO <sub>2</sub>
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