

**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 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

**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. 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. 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
<b>F17C 2227/00</b>		<b>Transfer of fluids, i.e. method or means for transferring the fluid; Heat exchange with the fluid</b>
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 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**

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 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