

## SECTION H — ELECTRICITY

### H01 BASIC ELECTRIC ELEMENTS

**H01G CAPACITORS; CAPACITORS, RECTIFIERS, DETECTORS, SWITCHING DEVICES, LIGHT-SENSITIVE OR TEMPERATURE-SENSITIVE DEVICES OF THE ELECTROLYTIC TYPE** (selection of specified materials as dielectric H01B 3/00; capacitors with potential-jump or surface barrier H01L 29/00)

#### Note(s) [2013.01]

*In this subclass, group H01G 11/00 takes precedence over groups H01G 4/00 and H01G 9/00.*

#### Subclass index

##### CAPACITORS

With fixed capacitance.....4/00  
 With variable capacitance: by mechanical means; by non-mechanical means.....5/00, 7/00  
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STRUCTURAL COMBINATIONS.....15/00, 17/00

MANUFACTURE.....4/00, 5/00, 7/00, 9/00, 13/00

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<b>2/00</b>	<b>Details of capacitors not covered by a single one of groups H01G 4/00-H01G 11/00 [6]</b>	4/14	• • • • Organic dielectrics [2, 6]
2/02	• Mountings [6]	4/16	• • • • • of fibrous material, e.g. paper [2, 6]
2/04	• • specially adapted for mounting on a chassis [6]	4/18	• • • • • of synthetic material, e.g. derivatives of cellulose (H01G 4/16 takes precedence) [2, 6]
2/06	• • specially adapted for mounting on a printed-circuit support [6]	4/20	• • • using combinations of dielectrics from more than one of groups H01G 4/02-H01G 4/06 (H01G 4/12 takes precedence) [2, 6]
2/08	• Cooling arrangements; Heating arrangements; Ventilating arrangements [6]	4/22	• • • • impregnated [2, 6]
2/10	• Housing; Encapsulation [6]	4/224	• • Housing; Encapsulation [6]
2/12	• Protection against corrosion (H01G 2/10 takes precedence) [6]	4/228	• • Terminals [6]
2/14	• Protection against electric or thermal overload (by cooling H01G 2/08) [6]	4/232	• • • electrically connecting two or more layers of a stacked or rolled capacitor [6]
2/16	• • with fusing elements [6]	4/236	• • • leading through the housing, i.e. lead-through [6]
2/18	• • with breakable contacts [6]	4/242	• • • the capacitive element surrounding the terminal [6]
2/20	• Arrangements for preventing discharge from edges of electrodes [6]	4/245	• • • • Tabs between the layers of a rolled electrode [6]
2/22	• Electrostatic or magnetic shielding [6]	4/248	• • • the terminals embracing or surrounding the capacitive element, e.g. caps (H01G 4/252 takes precedence) [6]
2/24	• Distinguishing marks, e.g. colour coding [6]	4/252	• • • the terminals being coated on the capacitive element (H01G 4/232 takes precedence) [6]
<b>4/00</b>	<b>Fixed capacitors; Processes of their manufacture (electrolytic capacitors H01G 9/00) [2]</b>	4/255	• • Means for correcting the capacitance value [6]
4/002	• Details [6]	4/258	• • Temperature compensation means [6]
4/005	• • Electrodes [6]	4/26	• Folded capacitors [2]
4/008	• • • Selection of materials [6]	4/28	• Tubular capacitors [2]
4/01	• • • Form of self-supporting electrodes [6]	4/30	• Stacked capacitors (H01G 4/33 takes precedence) [2, 6]
4/012	• • • Form of non-self-supporting electrodes [6]	4/32	• Wound capacitors [2]
4/015	• • • Special provisions for self-healing [6]	4/33	• Thin- or thick-film capacitors [6]
4/018	• • Dielectrics [6]	4/35	• Feed-through capacitors or anti-noise capacitors [6]
4/02	• • • Gas or vapour dielectrics [2, 6]	4/38	• Multiple capacitors, i.e. structural combinations of fixed capacitors [2]
4/04	• • • Liquid dielectrics [2, 6]		
4/06	• • • Solid dielectrics [2, 6]		
4/08	• • • • Inorganic dielectrics [2, 6]		
4/10	• • • • • Metal-oxide dielectrics [2, 6]		
4/12	• • • • • Ceramic dielectrics [2, 6]		

- 4/40 • Structural combinations of fixed capacitors with other electric elements not covered by this subclass, the structure mainly consisting of a capacitor, e.g. RC combinations [2]
- 5/00 Capacitors in which the capacitance is varied by mechanical means, e.g. by turning a shaft; Processes of their manufacture [2]**
  - 5/01 • Details
  - 5/011 • • Electrodes [6]
  - 5/012 • • • at least one of the electrodes being a displaceable liquid or powder [6]
  - 5/013 • • Dielectrics [6]
  - 5/014 • • Housing; Encapsulation [6]
  - 5/015 • • Current collectors
  - 5/017 • • Temperature compensation [6]
  - 5/019 • • Means for correcting the capacitance characteristics [6]
  - 5/04 • using variation of effective area of electrode [6]
  - 5/06 • • due to rotation of flat or substantially flat electrodes [6]
  - 5/08 • • • becoming active in succession [6]
  - 5/10 • • due to rotation of helical electrodes [6]
  - 5/12 • • due to rotation of part-cylindrical, conical, or spherical electrodes [6]
  - 5/14 • • due to longitudinal movement of electrodes [6]
  - 5/16 • using variation of distance between electrodes [6]
  - 5/18 • • due to change in inclination, e.g. by flexing, by spiral wrapping [6]
  - 5/38 • Multiple capacitors, e.g. ganged
  - 5/40 • Structural combinations of variable capacitors with other electric elements not covered by this subclass, the structure mainly consisting of a capacitor, e.g. RC combinations [6]
- 7/00 Capacitors in which the capacitance is varied by non-mechanical means; Processes of their manufacture [2]**
  - 7/02 • Electrets, i.e. having a permanently-polarised dielectric
  - 7/04 • having a dielectric selected for the variation of its permittivity with applied temperature
  - 7/06 • having a dielectric selected for the variation of its permittivity with applied voltage, i.e. ferroelectric capacitors (electrets H01G 7/02)
- 9/00 Electrolytic capacitors, rectifiers, detectors, switching devices, light-sensitive or temperature-sensitive devices; Processes of their manufacture [2]**
  - 9/004 • Details [6]
  - 9/008 • • Terminals [6]
  - 9/012 • • • specially adapted for solid capacitors [6]
  - 9/02 • • Diaphragms; Separators [6]
  - 9/022 • • Electrolytes; Absorbents [6]
  - 9/025 • • • Solid electrolytes (H01G 11/54 takes precedence) [6]
  - 9/028 • • • Organic semiconducting electrolytes, e.g. TCNQ [6]
  - 9/032 • • • Inorganic semiconducting electrolytes, e.g. MnO<sub>2</sub> [6]
  - 9/035 • • • Liquid electrolytes, e.g. impregnating materials (H01G 11/54 takes precedence) [6]
  - 9/04 • • Electrodes [6]
  - 9/042 • • • characterised by the material (H01G 11/22 takes precedence) [6]
  - 9/045 • • • based on aluminium [6]
- 9/048 • • • characterised by their structure (H01G 11/22 takes precedence) [6]
- 9/052 • • • Sintered electrodes [6]
- 9/055 • • • Etched foil electrodes [6]
- 9/06 • • Mounting in containers [6]
- 9/07 • • Dielectric layers [6]
- 9/08 • • Housing; Encapsulation [6]
- 9/10 • • • Sealing, e.g. of lead-in wires [6]
- 9/12 • • • Vents or other means allowing expansion [6]
- 9/14 • • Structural combinations for modifying, or compensating for, electric characteristics of electrolytic capacitors
- 9/145 • Liquid electrolytic capacitors (H01G 11/00 takes precedence) [6]
- 9/15 • Solid electrolytic capacitors (H01G 11/00 takes precedence) [6]
- 9/16 • specially adapted for use as rectifiers or detectors (H01G 9/22 takes precedence)
- 9/18 • Self-interrupters
- 9/20 • Light-sensitive devices
- 9/21 • Temperature-sensitive devices [6]
- 9/22 • *Devices using combined reduction and oxidation, e.g. redox arrangement or solion [1, 2013.01]*
- 9/26 • Structural combinations of electrolytic capacitors, rectifiers, detectors, switching devices, light-sensitive or temperature-sensitive devices with each other [6]
- 9/28 • Structural combinations of electrolytic capacitors, rectifiers, detectors, switching devices with other electric components not covered by this subclass [6]
- 11/00 Hybrid capacitors, i.e. capacitors having different positive and negative electrodes; Electric double-layer [EDL] capacitors; Processes for the manufacture thereof or of parts thereof [2013.01]**
  - Note(s) [2013.01]  
Group H01G 11/02 takes precedence over groups H01G 11/04-H01G 11/14.
  - 11/02 • using combined reduction-oxidation reactions, e.g. redox arrangement or solion [2013.01]
  - 11/04 • Hybrid capacitors [2013.01]
  - 11/06 • • with one of the electrodes allowing ions to be reversibly doped therein, e.g. lithium-ion capacitors [LICs] [2013.01]
  - 11/08 • Structural combinations, e.g. assembly or connection, of hybrid or EDL capacitors with other electric components, at least one hybrid or EDL capacitor being the main component [2013.01]
  - 11/10 • Multiple hybrid or EDL capacitors, e.g. arrays or modules ( housings, cases, encapsulations or mountings thereof H01G 11/78) [2013.01]
  - 11/12 • • Stacked hybrid or EDL capacitors [2013.01]
  - 11/14 • Arrangements or processes for adjusting or protecting hybrid or EDL capacitors (emergency protective circuit arrangements specially adapted for capacitors, and effecting automatic switching in the event of an undesired change from normal working conditions H02H 7/16; emergency protective circuit arrangements for limiting excess current or voltages without disconnection H02H 9/00) [2013.01]
  - 11/16 • • against electric overloads, e.g. including fuses [2013.01]
  - 11/18 • • against thermal overloads, e.g. heating, cooling or ventilating [2013.01]
  - 11/20 • • Reformation or processes for removal of impurities, e.g. scavenging [2013.01]
  - 11/22 • Electrodes [2013.01]

- 11/24 • • characterised by structural features of the materials making up or comprised in the electrodes, e.g. form, surface area or porosity; characterised by the structural features of powders or particles used therefor [2013.01]
- 11/26 • • characterised by their structure, e.g. multi-layered, porosity or surface features [2013.01]
- 11/28 • • • arranged or disposed on a current collector; Layers or phases between electrodes and current collectors, e.g. adhesives [2013.01]
- 11/30 • • characterised by their material [2013.01]
- 11/32 • • • Carbon-based [2013.01]
- 11/34 • • • • characterised by carbonisation or activation of carbon [2013.01]
- 11/36 • • • • Nanostructures, e.g. nanofibres, nanotubes or fullerenes [2013.01]
- 11/38 • • • • Carbon pastes or blends; Binders or additives therein [2013.01]
- 11/40 • • • • Fibres [2013.01]
- 11/42 • • • • Powders or particles, e.g. composition thereof [2013.01]
- 11/44 • • • • Raw materials therefor, e.g. resins or coal [2013.01]
- 11/46 • • • • Metal oxides [2013.01]
- 11/48 • • • • Conductive polymers [2013.01]
- 11/50 • • • specially adapted for lithium-ion capacitors, e.g. for lithium-doping or for intercalation [2013.01]
- 11/52 • Separators [2013.01]
- 11/54 • Electrolytes [2013.01]
- 11/56 • • Solid electrolytes, e.g. gels; Additives therein [2013.01]
- 11/58 • • Liquid electrolytes [2013.01]
- 11/60 • • • characterised by the solvent [2013.01]
- 11/62 • • • characterised by the solute, e.g. salts, anions or cations therein [2013.01]
- 11/64 • • • characterised by additives [2013.01]
- 11/66 • Current collectors [2013.01]
- 11/68 • • characterised by their material [2013.01]
- 11/70 • • characterised by their structure [2013.01]
- 11/72 • • specially adapted for integration in multiple or stacked hybrid or EDL capacitors [2013.01]
- 11/74 • Terminals, e.g. extensions of current collectors [2013.01]
- 11/76 • • specially adapted for integration in multiple or stacked hybrid or EDL capacitors [2013.01]
- 11/78 • Cases; Housings; Encapsulations; Mountings [2013.01]
- 11/80 • • Gaskets; Sealings [2013.01]
- 11/82 • • Fixing or assembling a capacitive element in a housing, e.g. mounting electrodes, current collectors or terminals in containers or encapsulations [2013.01]
- 11/84 • Processes for the manufacture of hybrid or EDL capacitors, or components thereof [2013.01]
- 11/86 • • specially adapted for electrodes (carbonisation or activation of carbon for the manufacture of electrodes H01G 11/34) [2013.01]
- 13/00 **Apparatus specially adapted for manufacturing capacitors; Processes specially adapted for manufacturing capacitors not provided for in groups H01G 4/00-H01G 11/00 [2, 2013.01]**
- 13/02 • Machines for winding capacitors [2]
- 13/04 • Drying; Impregnating [2]
- 13/06 • with provision for removing metal surfaces [2]
- 15/00 **Structural combinations of capacitors or other devices covered by at least two different main groups of this subclass with each other (involving at least one hybrid or electric double-layer [EDL] capacitor as the main component H01G 11/08) [6, 2013.01]**
- 17/00 **Structural combinations of capacitors or other devices covered by at least two different main groups of this subclass with other electric elements, not covered by this subclass, e.g. RC combinations [6]**