## 89 Sugar and starch production

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>89a</td>
<td>Washing, conveying and storage devices for beets and potatoes</td>
</tr>
<tr>
<td>89b</td>
<td>Comminution of sugar beets and sugar cane; treatment of extracted beet pulp</td>
</tr>
<tr>
<td></td>
<td>(IPC: C13C) Cutting mills; Shredding knives; Pulp presses</td>
</tr>
<tr>
<td>89c</td>
<td>Extraction of juice from sugar beets, sugar cane, and the like; purification of sugar juices and solutions</td>
</tr>
<tr>
<td></td>
<td>(IPC: C13D) Production and purification of sugar juices</td>
</tr>
<tr>
<td>89d</td>
<td>Processing of raw and refined sugar, including evaporation and boiling</td>
</tr>
<tr>
<td></td>
<td>(IPC: C13F) Preparation and processing of raw sugar, sugar, and syrup</td>
</tr>
<tr>
<td>89e</td>
<td>Evaporators and boilers</td>
</tr>
<tr>
<td></td>
<td>(IPC: C13G) Evaporation apparatus; Boiling pans</td>
</tr>
<tr>
<td>89g</td>
<td>Machines for cutting and chopping sugar</td>
</tr>
<tr>
<td></td>
<td>(IPC: C13H) Cutting machines for sugar; Combined cutting, sorting and packing machines for sugar</td>
</tr>
<tr>
<td>89h</td>
<td>Desugarisation of molasses</td>
</tr>
<tr>
<td></td>
<td>(IPC: C13J) Extraction of sugar from molasses</td>
</tr>
<tr>
<td>89i</td>
<td>Glucose, invert sugar, milk sugar and maltose</td>
</tr>
<tr>
<td></td>
<td>(IPC: C13K) Glucose; Invert sugar; Lactose; Maltose; Other sugars</td>
</tr>
<tr>
<td>89k</td>
<td>Starch and dextrin</td>
</tr>
<tr>
<td></td>
<td>(IPC: C13L) Starch; Dextrine; Similar carbohydrates</td>
</tr>
</tbody>
</table>

### 89a Washing, conveying and storage devices for beets and potatoes

- 89a-1 Machines for washing sugar beets and potatoes for sugar and starch extraction (machines for washing beets for animal feed 45e-22/01, 45e-27/00; for grain 50a-2/01)
- 89a-2 Stone, mud and weed traps for sugar beet washers and flumes
- 89a-3 Conveying devices for sugar beets and potatoes, especially flumes (45e-30/06)
- 89a-4 Storage facilities for sugar beets (53g-5/02; 45e-29/01 – 45e-29/09; 45e-25/00)
- 89a-1/00 Machines for washing sugar beets and potatoes for sugar and starch extraction (machines for washing beets for animal feed 45e-22/01, 45e-27/00; for grain 50a-2/01)
- 89a-2/00 Stone, mud and weed traps for sugar beet washers and flumes
- 89a-3/00 Conveying devices for sugar beets and potatoes, especially flumes (45e-30/06)
- 89a-4/00 Storage facilities for sugar beets (53g-5/02; 45e-29/01 – 45e-29/09; 45e-25/00)

### 89b Comminution of sugar beets and sugar cane; treatment of extracted beet pulp

- 89b-1 Sugar beet slicing machines (cutting machines for beets for animal feed 45e-35 – 45e-38, 45e-33/00 – 45e-35/10)
- 89b-2 Cutting machines for sugar cane (presses for sugar cane 89c-8)
89b-3 Other comminuting devices for sugar beets, e.g. graters and presses (juice presses for sugar beets 89c-8)
89b-4 Slicing knives and vats for slicing machines
89b-5 Screw and cone presses for extracted sugar pulp
89b-6 Other devices for the treatment of extracted sugar beet pulp, e.g. endless-belt presses

89b (IPC: C13C) Cutting mills; Shredding knives; Pulp presses

89b-1/00 Reducing the size of material from which sugar, or like carbohydrate is to be extracted (for extraction of starch 89k-1/02)
89b-1/02 . Cutting sugar cane
89b-1/04 . Shredding sugar cane
89b-1/06 . Slicing sugar beet
89b-1/08 . Knives; Adjustment or maintenance thereof

89b-3/00 Pressing water from material from which sugar, starch or like carbohydrate has been extracted
89b-3/02 . between perforated moving belts

89c Extraction of juice from sugar beets, sugar cane, and the like; purification of sugar juices and solutions

89c-1 Methods for the extraction of juice
89c-2 Use of chemicals in the extraction of juice; beet extraction with alcohol and the like
89c-3 Juice-extracting apparatus, intermittently fed
89c-4 Juice-extracting apparatus, continuously fed
89c-5 Valves for juice-extracting apparatus and pipes
89c-6 Closures for juice-extracting apparatus
89c-7 Screens, screen tubes and the like, for juice-extracting apparatus
89c-8 Presses for sugar beets and sugar cane
89c-9 Accessories for juice-extracting apparatus
89c-10 Separation of sugar juice by means of lime and the like
89c-11 Sugar-juice purification by mechanical or thermal treatment
89c-12 Sugar-juice purification by means of chemicals in general
89c-13 Sugar-juice purification by means of reducing or oxidising agents
89c-14 Sugar-juice purification by means of bone black and filtering powder
89c-15 Sugar-juice purification by electrolysis
89c-16 Saturation of sugar juice: by means of carbon dioxide or sulphurous acid
89c-17 Sampling, measuring and operation testing in connection with sugar extraction

89c (IPC: C13D) Production and purification of sugar juices

89c-1/00 Production of sugar, i.e. saccharose, juices
89c-1/02 . Expressing juice from sugar cane or similar material, e.g. sorghum saccharatum
89c-1/04 . combined with inhibition
89c-1/06 . Sugar-cane crushers
89c-1/08 . Extraction of sugar from sugar beet with water
89c-1/10 . continuous processes
89c-1/12 . Details of extraction apparatus, e.g. arrangements of pipes or valves
89c-1/14 . using extracting agents other than water, e.g. alcohol or salt solutions

89c-3/00 Purification of sugar juices (mechanical separation of solids from liquids 12d)
89c-3/02 . using alkaline earth compounds
89c-3/04 . followed by saturation
89c-3/06 . with carbon dioxide or sulphur dioxide
89c-3/08 . by oxidation or reduction
89c-3/10 . using sulphur dioxide or sulphonites
89c-3/12 . using adsorption agents, e.g. active carbon
89c-3/14 . using ion-exchange materials
89c-3/16 . by physical means, e.g. osmosis
89c-3/18 . by electrical means

89c-17 Sampling, measuring and operation testing in connection with sugar extraction

89d Processing of raw and refined sugar, including evaporation and boiling (evaporators, boilers 89e; centrifuges 82b)
89d-1 Evaporation and boiling of sugar juice (boiling processes for chemical purposes 12a; evaporators, boilers 12a, 89e)
89d-2 Crystallisation of sugar juice (rock candy 89d-3; crystallisation in general 12c-2)
89d-3 Manufacture of rock candy
89d-4 Miscellaneous apparatus for the processing of raw sugar
89d-5 Sugar purging processes using centrifuges (purging centrifuges 82b-3/03)
89d-6 Sugar purging by means other than centrifuges
89d-7 Washing loose sugar crystals by means of chemicals
89d-8 Production of refined sugar in the form of loaves (centrifugal moulds 82b-1)
89d-9 Sugar pressing
89d-10 Runoff recycling and re-dissolving of raw sugar
89d-11 Sugar drying and storing (82a)

89d (IPC: C13F) Preparation and processing of raw sugar, sugar, and syrup
89d-1/00 Thickening, evaporating, or boiling sugar juice (boiling apparatus 12a; evaporators 12a; centrifuges 82b)
89d-1/02 . Crystallisation; Crystallising apparatus
89d-1/04 . Separating crystals from mother liquors
89d-1/06 . by centrifugal force
89d-1/08 . Washing residual mother liquor from crystals
89d-1/10 . . . in centrifuges
89d-1/12 . . Recycling mother liquor or wash liquors
89d-1/14 . . Dissolving and refining raw sugar
89d-3/00 Miscellaneous sugar products (sucrose syrups 53k-1/20; glucose-containing syrups 89i-1/00)
89d-3/02 . formed by moulding sugar
89d-5/00 Drying sugar (storing sugar 81e)

89e Evaporators and boilers (evaporation and boiling processes 89d)
89e-1 Surface evaporators: spray-type evaporators, plate-shaped evaporators, evaporator with rotating heating elements (12a)
89e-2 Circulation evaporators and boilers (12a)
89e-3 Multiple element evaporators (12a)
89e-4 Heating elements for evaporators (12a)
89e-5 Miscellaneous auxiliary devices for evaporators: foam steamers, pipe cleaners, juice traps, condensers, and the like (12a-1; 12a-2; 14g-12; 14g-13)

89e (IPC: C13G) Evaporation apparatus; Boiling pans
89e-1/00 Evaporators or boiling pans adapted to be specially applicable for sugar solutions
89e-1/02 . Heating equipment
89e-1/04 . Other details, e.g. for preventing foaming for catching juice
89e-1/06 . combined with measuring instruments for effecting control of the process
89g Machines for cutting and chipping sugar
89g-1 Sugar cutting and chipping machines (cutting of sugar goods 53l-10)
89g-2 Sugar cutting and chipping machines in connection with sugar sorting and packing devices

89g (IPC: C13H) Cutting machines for sugar; Combined cutting, sorting and packing machines for sugar
89g-1/00 Combined cutting, sorting and packing machines for sugar
89g-3/00 Cutting machines for sugar

89h Desugarisation of molasses
89h-1 Desugarisation of molasses
89h-2 by precipitation of sugar lime - separation methods
89h-3 with lime by washing the sugar lime - elution methods
89h-4 by means of strontium compounds
89h-5 by means of barium compounds
89h-6 by means of lead oxide
89h-7 Miscellaneous processes for the processing of molasses, except 89h-1 – 89h-6

89h (IPC: C13J) Extraction of sugar from molasses
89h-1/00 Production of saccharose from final molasses
89h-1/02 . by chemical means
89h-1/04 . . by precipitation as alkaline earth metal saccharates
89h-1/06 . . using ion exchange
89h-1/08 . . by physical means, e.g. osmosis

89i Glucose, invert sugar, milk sugar and maltose (biological saccharification of starch and cellulose-containing substances 6b-3/01)
89i-1/01 Extraction of sugar [grape sugar] from starch
89i-1/02 Extraction of sugar and sugar solutions from wood, peat and the like (53g-4/01)
89i-2 Extraction of invert sugar, also in the production of artificial honey, milk sugar, and maltose

89i (IPC: C13K) Glucose; Invert sugar; Lactose; Maltose; Other sugars (chemical synthesis of sugars 12o)
89i-1/00 Glucose; Glucose-containing syrups
89i-1/02 . by saccharification of cellulosic materials (manufacture of fodder 53g)
89i-1/04 . . Purifying
89i-1/06 . . by saccharification of starch or raw materials containing starch
89i-1/08 . . Purifying
89i-1/10 . . Crystallisation
89i-3/00 Invert sugar
89i-5/00 Lactose
89i-7/00 Maltose
89i-9/00 Other sugars, e.g. fructose, mannose

89k Starch and dextrin (22i)
89k-1 Comminution of starch raw materials
89k-2 Extraction and purification of starch (centrifuges 82b)
89k-3 Moulding and drying of starch
89k-4 Treatment of the starch extraction wastes
### 89k

**Soluble starch and dextrin, and adhesives prepared therefrom (other adhesives 22i)**

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>89k</strong></td>
<td>(IPC: C13L) Starch; Dextrine; Similar carbohydrates (biological synthesis of starch or dextran 6b; compositions based on starch or its derivatives or its degradation products, e.g. dextrine, 39b1-25/02)</td>
</tr>
<tr>
<td><strong>89k-1/00</strong></td>
<td>Extraction and purification of starch, including concentration of starch suspensions</td>
</tr>
<tr>
<td>89k-1/02</td>
<td>. Preparatory treatment, e.g. crushing of raw materials (machines for preliminary washing 89a)</td>
</tr>
<tr>
<td>89k-1/04</td>
<td>. Drying; Forming</td>
</tr>
<tr>
<td>89k-1/06</td>
<td>. Working-up residues from the starch extraction</td>
</tr>
<tr>
<td>89k-1/08</td>
<td>. Modified or degraded starch; Bleaching of starch (starch derivatives 39b1)</td>
</tr>
<tr>
<td>89k-1/10</td>
<td>. Dextrin</td>
</tr>
<tr>
<td><strong>89k-3/00</strong></td>
<td>Extraction and purification of other reserve carbohydrates, e.g. glycogen, inulin, laminarin</td>
</tr>
</tbody>
</table>