

**CPC****COOPERATIVE PATENT CLASSIFICATION****C23F**

**NON-MECHANICAL REMOVAL OF METALLIC MATERIAL FROM SURFACE** (working metal by laser beams [B23K 26/00](#); desurfacing by applying flames [B23K 7/00](#); working of metal by electro-erosion [B23H](#); producing decorative effects by removing surface material, e.g. by engraving, by etching, [B44C 1/22](#); electrolytic etching or polishing [C25F](#)); **INHIBITING CORROSION OF METALLIC MATERIAL OR INCRUSTATION IN GENERAL; MULTI-STEP PROCESSES FOR SURFACE TREATMENT OF METALLIC MATERIAL INVOLVING AT LEAST ONE PROCESS PROVIDED FOR IN CLASS [C23](#) AND AT LEAST ONE PROCESS COVERED BY SUBCLASS [C21D](#) OR [C22F](#) OR CLASS [C25](#).**

**NOTES**

1. protective layers or coating compositions or methods of applying them; these are classified in the appropriate places, e.g. [B05](#), [B44](#), [C09D](#), [C23C](#).
2. mechanical devices or constructional features of particular articles for inhibiting incrustation; these are classified in the appropriate places, e.g. in pipes or pipe fittings [F16L 58/00](#).
3. articles characterised by being made of materials selected for their properties of resistance to corrosion or incrustation; these are classified in the appropriate places, e.g. turbine blades [F01D 5/28](#).

**C23F 1/00**

**Etching metallic material by chemical means** (manufacture of printing surfaces [B41C](#); manufacture of printed circuits [H05K](#))

**C23F 1/02**

- . Local etching

**C23F 1/04**

- . . Chemical milling

**C23F 1/06**

- . Sharpening files

**C23F 1/08**

- . Apparatus, e.g. for photomechanical printing surfaces (photo- mechanical reproduction [G03F](#))

**C23F 1/10**

- . Etching compositions ([C23F 1/44](#) takes precedence)

**C23F 1/12**

- . . Gaseous compositions

**C23F 1/14**

- . . Aqueous compositions

**C23F 1/16**

- . . . Acidic compositions ([C23F 1/42](#) takes precedence)

**C23F 1/18**

- . . . . for etching copper or alloys thereof

**C23F 1/20**

- . . . . for etching aluminium or alloys thereof

**C23F 1/22**

- . . . . for etching magnesium or alloys thereof

**C23F 1/26**

- . . . . for etching refractory metals

**C23F 1/28**

- . . . . for etching iron group metals

**C23F 1/30**

- . . . . for etching other metallic material

**C23F 1/32**

- . . . Alkaline compositions ([C23F 1/42](#) takes precedence)

**C23F 1/34**

- . . . . for etching copper or alloys thereof

**C23F 1/36**

- . . . . for etching aluminium or alloys thereof

**C23F 1/38**

- . . . . for etching refractory metals

- C23F 1/40 . . . . for etching other metallic material
- C23F 1/42 . . . . containing a dispersed water-immiscible liquid
- C23F 1/44 . Compositions for etching metallic material from a metallic material substrate of different composition
- C23F 1/46 . Regeneration of etching compositions

**C23F 3/00 Brightening metals by chemical means**

- C23F 3/02 . Light metals
- C23F 3/03 . . with acidic solutions
- C23F 3/04 . Heavy metals
- C23F 3/06 . . with acidic solutions

**C23F 4/00 Processes for removing metallic material from surfaces, not provided for in group [C23F 1/00](#) or [C23F 3/00](#)**

- C23F 4/02 . by evaporation
- C23F 4/04 . by physical dissolution

**C23F 11/00 Inhibiting corrosion of metallic material by applying inhibitors to the surface in danger of corrosion or adding them to the corrosive agent (adding inhibitors to mineral oil, fuels, or lubricants [C10](#); adding inhibitors to pickling solutions [C23G](#))**

- C23F 11/02 . in air or gases by adding vapour phase inhibitors
- C23F 11/04 . in markedly acid liquids
- C23F 11/06 . in markedly alkaline liquids
- C23F 11/08 . in other liquids
- C23F 11/10 . . using organic inhibitors

**NOTES**

1. A compound is classified in the last appropriate place.
2. Esters or anhydrides of organic acids are classified as the relevant acid unless otherwise indicated. Salts of a compound with an inorganic compound are classified as that compound unless specifically provided for.

- C23F 11/12 . . . Oxygen-containing compounds
- C23F 11/122 . . . . Alcohols; Aldehydes; Ketones
- C23F 11/124 . . . . Carboxylic acids
- C23F 11/126 . . . . . Aliphatic acids
- C23F 11/128 . . . . Esters of carboxylic acids
- C23F 11/14 . . . Nitrogen containing compounds
- C23F 11/141 . . . . Amines; Quaternary ammonium compounds
- C23F 11/142 . . . . . Hydroxy amines
- C23F 11/143 . . . . . Salts of amines
- C23F 11/144 . . . . Aminocarboxylic acids
- C23F 11/145 . . . . Amides; N-substituted amides
- C23F 11/146 . . . . containing a multiple nitrogen-to-carbon bond

C23F 11/147	. . . . containing a nitrogen-to-oxygen bond
C23F 11/148	. . . . containing a nitrogen-to-nitrogen bond
C23F 11/149	. . . . Heterocyclic compounds containing nitrogen as hetero atom
C23F 11/16	. . . Sulfur containing compounds
C23F 11/161	. . . . Mercaptans
C23F 11/162	. . . . Thioaldehydes; Thioketones
C23F 11/163	. . . . Sulfonic acids
C23F 11/164	. . . . containing a -SO <sub>2</sub> -N group
C23F 11/165	. . . . Heterocyclic compounds containing sulfur as hetero atom
C23F 11/167	. . . Phosphorus-containing compounds
C23F 11/1673	. . . . Esters of phosphoric or thiophosphoric acids
C23F 11/1676	. . . . Phosphonic acids
C23F 11/173	. . . Macromolecular compounds
C23F 11/18	. . using inorganic inhibitors
C23F 11/181	. . . Nitrogen containing compounds
C23F 11/182	. . . Sulfur, boron or silicon containing compounds
C23F 11/184	. . . Phosphorous, arsenic, antimony or bismuth containing compound
C23F 11/185	. . . Refractory metal-containing compounds
C23F 11/187	. . . Mixtures of inorganic inhibitors
C23F 11/188	. . . . containing phosphates
<b>C23F 13/00</b>	<b>Inhibiting corrosion of metals by anodic or cathodic protection</b>
C23F 13/005	. {Anodic protection}
C23F 13/02	. cathodic; Selection of conditions, parameters or procedures for cathodic protection, e.g. of electrical conditions
C23F 13/04	. . Controlling or regulating desired parameters
C23F 13/06	. . Constructional parts, or assemblies of cathodic-protection apparatus
C23F 13/08	. . . Electrodes specially adapted for inhibiting corrosion by cathodic protection; Manufacture thereof; Conducting electric current thereto
C23F 13/10	. . . . Electrodes characterised by the structure ( <a href="#">C23F 13/16 takes precedence</a> )
C23F 13/12	. . . . Electrodes characterised by the material ( <a href="#">C23F 13/16 takes precedence</a> )
C23F 13/14	. . . . . Material for sacrificial anodes
C23F 13/16	. . . . Electrodes characterised by the combination of the structure and the material
C23F 13/18	. . . . Means for supporting electrodes
C23F 13/20	. . . . Conducting electric current to electrodes
C23F 13/22	. . . . Monitoring arrangements therefor
<b>C23F 14/00</b>	<b>Inhibiting incrustation in apparatus for heating liquids for physical or chemical purposes</b> ( <a href="#">adding scale preventives or removers to water C02F 5/00</a> { <a href="#">inhibiting incrustation in polymerisation reactors C23F 15/005</a> })

C23F 14/02	<ul style="list-style-type: none"> <li>by chemical means</li> </ul>
<b>C23F 15/00</b>	<b>Other methods of preventing corrosion or incrustation</b>
C23F 15/005	<ul style="list-style-type: none"> <li>{Inhibiting incrustation}</li> </ul>
<b>C23F 17/00</b>	<b>Multi-step processes for surface treatment of metallic material involving at least one process provided for in class <a href="#">C23</a> and at least one process covered by subclass <a href="#">C21D</a> or <a href="#">C22F</a> or class <a href="#">C25</a> (<a href="#">C23C 28/00</a> takes precedence)</b>
<b>C23F 2201/00</b>	<b>Type of materials to be protected by cathodic protection</b>
C23F 2201/02	<ul style="list-style-type: none"> <li>Concrete, e.g. reinforced</li> </ul>
<b>C23F 2213/00</b>	<b>Aspects of inhibiting corrosion of metals by anodic or cathodic protection</b>
C23F 2213/10	<ul style="list-style-type: none"> <li>Controlling or regulating parameters</li> </ul>
C23F 2213/11	<ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li>for structures subject to stray currents</li> </ul> </li> </ul>
C23F 2213/20	<ul style="list-style-type: none"> <li>Constructional parts or assemblies of the anodic or cathodic protection apparatus</li> </ul>
C23F 2213/21	<ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li>combining at least two types of anodic or cathodic protection</li> </ul> </li> </ul>
C23F 2213/22	<ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li>characterized by the ionic conductor, e.g. humectant, hydratant or backfill</li> </ul> </li> </ul>
C23F 2213/30	<ul style="list-style-type: none"> <li>Anodic or cathodic protection specially adapted for a specific object</li> </ul>
C23F 2213/31	<ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li>Immersed structures, e.g. submarine structures</li> </ul> </li> </ul>
C23F 2213/32	<ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li>Pipes</li> </ul> </li> </ul>