NITRIDED FERROALLOYS

Description
Nitrided foundry alloys are intended for the addition of nitrogen to steel. Nitrided chromium and ferrochrome are used predominantly to dope high-chromium stainless steels. Nitrided manganese and ferrovanadium are used in the manufacture of low-alloy high-strength steels. Nitrided ferrosilicon is intended predominantly for doping electric and other grades of steels containing silicon.

SHS-nitrided ferroalloys manufactured at the Department of Structural Macrokinetics of the Tomsk Research Center of the SB RAS

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<th>Alloy</th>
<th>Basic elements, min. %</th>
<th>Element content, %</th>
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<td>Minimum</td>
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<td>N</td>
<td>C</td>
<td>Si</td>
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<tr>
<td>Chromium nitride</td>
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<tr>
<td>Nitrided manganese</td>
<td>Mn 85</td>
<td>10</td>
<td>0.10</td>
<td>0.8</td>
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<td>0.10</td>
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<td>0.01</td>
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<tr>
<td>Nitrided ferroniobium</td>
<td>Nb 50</td>
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<td>3.0</td>
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<tr>
<td>Nitrided ferrovanadium</td>
<td>V 40</td>
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<td>0.3</td>
<td>2.0</td>
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<td>0.1</td>
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<tr>
<td>Nitrided ferrosilicon</td>
<td>Si-50-60</td>
<td>25-30</td>
<td>0.1</td>
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Technical appraisal and economic benefits
The designed technology does not employ electric power. This is an environmentally appropriate, short-time, single-stage process, which completely eliminates both material loss and contamination (no sewage and gas emissions, a 8-36 % nitrogen content in ferroalloys, an electric power expenditure of 0.1 kW·h/ton). The new technology is suitable for nitriding all types of traditional ferroalloys used to dope steels with nitrogen. The nitriding facilities do not incorporate heating devices, have a simple design, and are easy to operate. The factor of utilization of a nitrogen-containing alloy increases by a factor of 3-5.

Application areas
- Doping of stainless, heat-resistant, electric, low-alloyed steels with nitrogen;
- manufacture of welding and alloying electrodes;
- manufacture of film heaters, etc.;
- production of protective and wear-resistant coatings;
- catalyst manufacture

Development stage
The technology is completely ready for production. Commercial implementation of the
technology requires: design and fabrication of a production plant, equipment installation, starting-up and adjustment, production and marketing of pilot runs of products, attaining the rated capacity, launching batch production. The payback period is 1.5-2 years.

**Patent situation**
Three patents were granted.

**Commercial offers**
Sale of licenses, ready delivery of 100-500 tons per year, joint production in Russia, Germany or other countries.

**Estimated cost**
The cost of 1 kg of nitrogen-containing foundry alloys is US$ 4-12, depending on composition.

**Contacts**
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