

## 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

Alloy	Basic elements, min. %	Element content, %					
		minimum	Maximum				
		N	C	Si	Al	S	P
Chromium nitride –nitroxhrome	Cr 80	19	0.03	0.3	0.3	0.01	0.01
Nitrided manganese	Mn 85	10	0.10	0.8	-	0.10	0.05
Nitrided ferrochrome	Cr 65	13	0.05	0.5	0.5	0.01	0.01
Nitrided ferroniobium	Nb 50	8	0.1	1.0	3.0	0.03	0.03
Nitrided ferrovanadium	V 40	10	0.3	2.0	2.5	0.1	0.03
Nitrided ferrosilicon	Si-50-60	25-30	0.1	-	-	0.02	0.05

### *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***

Cand. Sc. Yuri M. Maksimov, Head of Department

Department of Structural Macrokinetics, Tomsk Research Center, Siberian Branch of the Russian Academy of Sciences

10/3, Akademichesky Prosp., Tomsk, 634021, Russia

Phone: (3822) 25-97-02

Phone/fax: (3822) 25-98-38

E-mail: [maks@fisman.tomsk.ru](mailto:maks@fisman.tomsk.ru)