

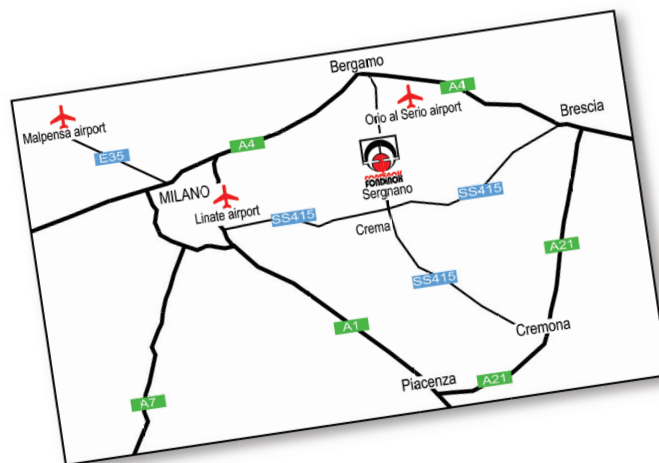
PRODUCTION RANGE

Fondinox SpA is a job foundry, specialized in the production of cast products in stainless alloys, ranging from martensitic 13% Cr grades up to all high temperature resistant nickel and cobalt base alloys. In Avesta Outokumpu Oy 253MA and 353MA castings ranging from 0.5 Kg up to 6000 Kgs single finished weight can be produced. Centrispun tubes with OD up to 1500 mm, length up to 5.5 mts, thickness up to 150 mm are also produced. Vertically shaped centricast products are also produced, with max OD up to 1400 mm and max length up to 880 mm. Centricast products can be considered for many applications in the furnace industry as ideal substitutes either of sand castings, or hot finished products, due to their outstanding properties. The utilization of various high frequency induction furnaces, also with small capacities, confers to this special alloy production the highest flexibility, without problems of minimum melting quantities. Our technical and metallurgical department is at continuous full disposition of customers for consulting and project development.

All production steps are executed according to a QA System ISO 9002 qualification (Lloyd's Register accreditation No. 160085).



Fabricated assembly for mining industry



Sales offices all around Europe;
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Stainless steel and nickel base alloys



AVESTA
253MA/353MA

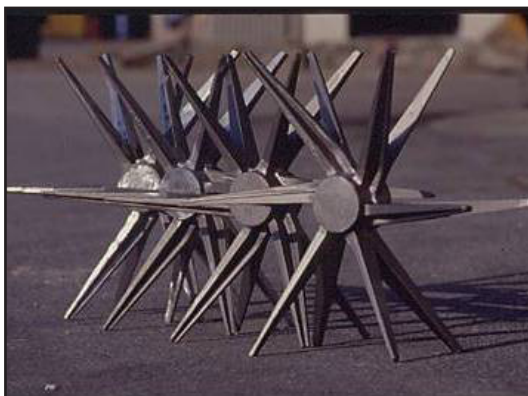
CAST AND CENTRICAST PRODUCTS
FOR HIGH TEMPERATURE SERVICES IN
INDUSTRIAL APPLICATIONS

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■ Cast alloys 253MA\353MA produced by Fondinox SpA under licence of Avesta Outokumpu Oy, constitute one of the last developments in the field of high temperature resistant cast alloys. Both sand static castings and centricast products can be realized.

The exceptional compromise between creep values and corrosion resistance at high temperatures makes such alloys as viable solution in many applications:

- sintering plants
- blast furnaces
- furnaces for rolling mills
- heat treatment furnaces (bell type, pit, box type, continuous, with fluidised beds)
- furnace components (radiant tubes, fans, thermocouple sheatings, trays and baskets, anchor bolts and fasteners)
- cement industry
- glass and ceramics industry
- power generation



Fans for heat treatment furnaces

CHEMICAL COMPOSITION		
	253MA	353MA
UNS	S30815	S35315
EN	1.4835	1.4854
C	0.09	0.10
Cr	21	25
Ni	11	35
Others	Si, N, Ce	Si, N, Ce

MECHANICAL PROPERTIES AT 20°C					
		Cast 253MA		Cast 353MA	
		min.	typical	min.	typical
0.2% Yield stress	MPa	240	270	235	260
1% Yield stress	MPa	260	310	260	280
U.T.S.	MPa	515	550	430	460
Elongation	%	10	25	7	15

MECHANICAL PROPERTIES AT HIGH TEMPERATURES					
1% creep limit at 10,000 hours in MPa					
	700°C	800°C	900°C	1000°C	1100°C
253MA	55	28	16	7	1.5
353MA	62	43	28	14	2.5
Creep strength at 100,000 hours in MPa					
	700°C	800°C	900°C	1000°C	1100°C
253MA	50	26	14	6.0	-
353MA	65	44	26	12	3.0

PHYSICAL PROPERTIES		
	253MA	353MA
Density at 20°C	7.8 Kg/dm ³	7.9 Kg/dm ³
Modulus of elasticity at 1000°C	125 GPa	125 GPa
Thermal expansion at 1000°C	19.5*10 ⁻⁶ °C ⁻¹	18.0*10 ⁻⁶ °C ⁻¹
Thermal conductivity at 1000°C	29 W/m°C	26 W/m°C
Thermal capacity at 1000°C	660 J/Kg°C	660 J/Kg°C
Electrical resistivity at 20°C	0.85 µΩm	1.00 µΩm
Patternmaker's shrinkage	2.5%	2.5%

■ HIGH TEMPERATURE RESISTANCE

Two basic requirements are applicable to cast or hot finished alloys, to enhance their high temperature resistance: high mechanical values (generally creep values for long term tests or thermal fatigue resistance) and notable refractoriness against all types of high temperature chemical attacks, that are oxidation, carburization, metal dusting, nitridation, sulfidation, molten salts corrosion). Both 253MA and 353MA show appreciable creep strength at high temperature, in relation with respective nickel content; complete creep curves can be supplied upon request. Surface refractoriness towards chemical reactions is enhanced by additions of silicon and rare earths (mostly cerium), which provide a dense, impervious and adherent oxide scale, increasing high temperature chemical resistance. Final result can be summarized in optimal overall properties, coupled with a relatively low cost, due to low amounts of more expensive alloy elements, like chromium or nickel.

■ WELDABILITY

Proprietary Avesta Outokumpu Oy filler metal is used to weld 253MA and 353MA castings. Suitable weld qualification procedures are also available. Pre and postweld heat treatments are not generally required, due to the good welding characteristics of both alloys.

■ MACHINABILITY

All machining operations can be easily applied on 253MA and 353MA cast material. Proper advices can be obtained by Fondinox machining department. In line of principle high temperature resistant materials show lower machining performances than standard stainless steels. Taking as unitary the machining aptitude of standard cast austenitic 304 or 316, 253MA shows machinability index at 0.7 with cemented carbide tools and 0.65 with high speed steel tools, 353MA 0.6 and 0.55 respectively.