Freedom® Aluminum Shaft Melter

Patented Non-Oxidizing Holding Chamber

- Melt yield exceeding 99%
- Consistent K-mold ratings of Rank A (K value < 0.1)
- Hydrogen gas content of 0.2cc/ 100gAl or less

Licensed Technology of
Nippon Crucible

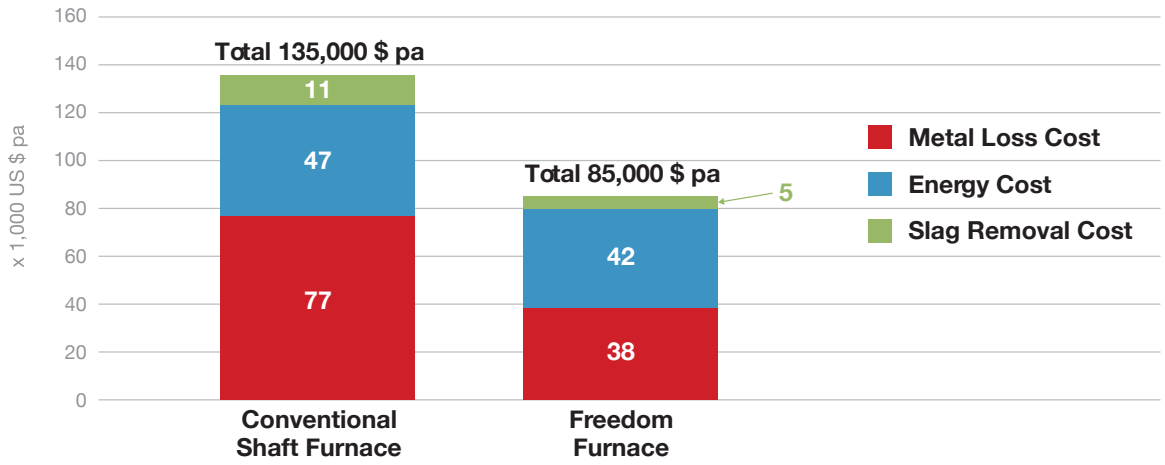
The Nippon Freedom® Aluminum Shaft Melter leads the industry in operating efficiency, lowest downtime, and best-in-class metal quality. Ideal for HPDC, LPDC, and Gravity Casting, the Freedom furnace controls oxygen in the holding chamber 2% or less. (Target 1%). Molten metal can be held at a consistently low temperature and lower chamber temperatures without the need for de-gassing or porous plugs.

Lower energy consumption, low metal loss from oxidation, cleaner metal and less scrap from inclusions is coupled with extended holding bath cleaning periods of 6 months or more. Crews spend less time raking metal dross.

Patented in 2015 by Nippon Crucible Corp, there are now more than 200 Freedom furnaces working worldwide.

Capacity Highlights

- Holding capacity (standard) – 1,600 – 9,600 kg (~3,525 – 21,170 lbs)
- Holding temperatures (standard) – 690 – 720°C (1,275 - 1,325°F)
- Melting capacity range – 500 – 3,000 kg/h (1,000 – 6,600 lbs/hr) (~1.3 – 7.9 million Btuh)
- Energy consumption (natural gas) - ~38 – 233 m³/h (~1,350 - 8,200 ft³/hr)
- Metal loss – holding at <= 720°C (<=1,325°F) - , < 0.02% Melting - < 1.5%'

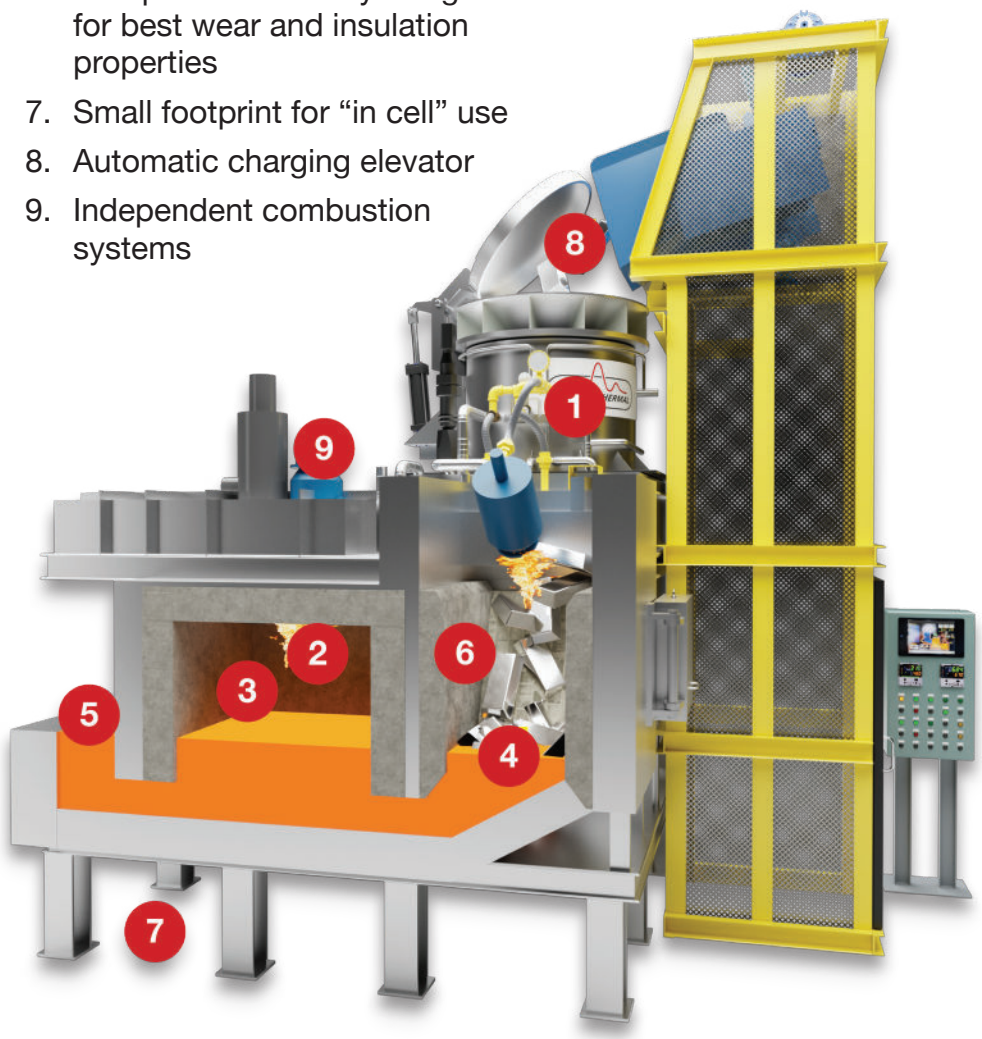


FURNACE MODEL			FD 200		FD
Furnace Dimensions - LxWxH	mm	feet	2840 x 1970 x 3433	9.3 x 6.5 x 11.3	3065 x 2493 x 3543
melting capacity (50% ingot + returns)	kg/h	lbs/hr	200	440	400
holding capacity (excl pocket)	kg	lbs	1,520	3,400	1,980
Std pocket size (square)	mm	ins	450 sq	17.7 sq	450 sq
Bail-out pocket capacity	kg	lbs	290	640	290
Melt burners	kWh	Btuh	1x 230	1x 800,000	1x 350
Hold burners	kWh	Btuh	1x 115	1x 400,000	1x 175
Total installed burner power	kWh	Btuh	345	1.2 million	525
Metal loss - Melting	%	%	< 1.50 %	< 1.50 %	< 1.50 %
Metal Loss - Holding	%	%	< 0.010 %	< 0.010 %	< 0.010 %
Estimated max gas consumption	m³/h	ft³/hr	35	1,219	53
Exhaust flue diameter	mm	ins	155.0	6.1	155.0
Charger lift capacity	kg	lbs	500	1,103	500
Lift speed	m/min	ft/min	6.8	22.4	6.8
Height	mm	ft	4,842	15.9	5,250
Charge cart LxWxH	mm	ins	600 X 400 x 740	23.6 X 15.7 x 29.1	600 X 400 x 740
Volume	m³	ft³	0.09	3.2	0.09

Patented Technology and Features

1. Shaft melting principles for continuous operation
2. Flat flame holding burner for reduced chamber turbulence (no impingement)
3. Separate sealed holding bath for reduced oxide formation
4. Separate melt chamber with submerged metal flow through
5. Bale out pockets with submerged flow through for cleaner metal
6. Composite refractory lining for best wear and insulation properties
7. Small footprint for “in cell” use
8. Automatic charging elevator
9. Independent combustion systems

SINC Thermal is the exclusive US manufacturer of Nippon Crucible’s patented Freedom Stack Melter allowing US companies to compete with world class casting quality.



400	FD 500		FD 600		FD 1000	
10.1 x 8.2 x 11.6	3248 x 2581 x 3565	10.7 x 8.5 x 11.7	3533 x 2425 x 3350	11.6 x 7.9 x 10.9	4536 x 3343 x 4200	14.9 x 10.9 x
880	500	1100	600	1300	1000	2200
4,400	2,300	5,100	2,864	6,300	4,700	10,400
17.7 sq	450 sq	17.7 sq	480 sq	18.9 sq	480 sq	18.9 sq
640	290	640	290	640	420	930
1x 1.2 million	1x 465	1x1.5 million	2x 230	2x 800,000	2x 350	2x 1.2 millio
1x 600,000	1x 230	1x 800,000	1x 230	1x 800,000	1x 465	1x 1.5 millio
1.8 million	695	2.3 million	690	2.4 million	1,165	3.9 million
< 1.50 %	< 1.50 %	< 1.50 %	< 1.50 %	< 1.50 %	< 1.50 %	< 1.50 %
< 0.010 %	< 0.010 %	< 0.010 %	< 0.010 %	< 0.010 %	< 0.010 %	< 0.010 %
1,854	70	2,455	69	2,437	117	4,115
6.1	155.0	6.1	155.0	6.1	180.0	7.1
1,103	500	1,103	1,000	2,205	1,000	2,205
22.4	6.8	22.4	6.8	22.4	6.8	22.4
17.2	5,004	16.4	5,004	16.4	6,420	21.1
23.6 X 15.7 x 29.1	750 X 500 x 594	29.5 X 19.7 x 23.4	750 X 500 x 594	29.5 X 19.7 x 23.4	1006 X 810 x 899	39.6 X 31.9 x
3.2	0.19	6.7	0.19	6.7	0.21	7.4

Independent Melting and Holding Burners for More Precise Control

- High efficiency burner(s) in the melting chamber ensures that oxidation loss is drastically reduced.
- Melting burners have separate combustion fans and quick release fittings for easier maintenance.
- Thermal efficiency of 50% or greater through an integrated heat exchanger, compared to 40% or less in conventional furnaces

More than 200 Freedom furnaces around the world.

Less dross, metal loss, and downtime.

Operating Benefits:

Reduced Holding Bath Cleaning

- Sealed bath zone restricts air ingress and reduces surface oxidation
- Average 6-month intervals

Reduced Metal Loss

- <0.004% in holding bath through reduced oxidation

Energy Savings for Holding Energy

- Sealed holding chamber reduces heat loss
- Exhaust recuperator for holding burner
- Composite refractory lining for best wear and insulation properties

Improved Metal Quality

- Reduced oxide contamination of melt
- High K-Mold results (B – AA)
- No flame impingement, no air ingress = lower gas levels

Holding Temperature Stability

- Positive chamber pressure avoid air ingress when burner cycles to low fire.

	FD 1500		FD 2000		FD 2500	
13.8	4730 x 3360 x 6305	15.5 x 11 x 20.7	4730 x 3360 x 6305	15.5 x 11 x 20.7	5453 x 3831 x 4485	17.9 x 12.6 x 14.7
	1500	3300	2000	4400	2500	5500
	5,500	12,100	7,000	15,400	8,450	18,600
	500 sq	19.7 sq	500 sq	19.7 sq	500 sq	19.7 sq
	420	930	420	930	420	930
on	2x 465	2x 1.5 million	2x 700	2x 2.4 million	2x 700	2x 2.4 million
on	1x 465	1x 1.5 million	1x 465	1x 1.5 million	1x 700	1x 2.4 million
	1,395	4.5 million	1,865	6.3 million	2,100	7.2 million
	< 1.50 %	< 1.50 %	< 1.50 %	< 1.50 %	< 1.50 %	< 1.50 %
%	< 0.010 %	< 0.010 %	< 0.010 %	< 0.010 %	< 0.010 %	< 0.010 %
	140	4,927	187	6,587	210	7,417
		0.0	350.0	13.8	400.0	15.7
	1,000	2,205	2,000	4,410	2,000	4,410
	6.8	22.4	6.8	22.4	6.8	22.4
	6,420	21.1	6,950	22.8	6,950	22.8
35.4	1006 X 810 x 899	39.6 X 31.9 x 35.4	1150 X 860 x 1129	45.3 X 33.9 x 44.5	1150 X 860 x 1129	45.3 X 33.9 x 44.5
	0.21	7.4	0.56	19.8	0.56	19.8

Virtually No Holding Bath Cleaning Required During 18 Months of Operation.

This series of images depicts a furnace holding bath that was not cleaned for 18 months. As illustrated, the patented non-oxidizing holding chamber virtually eliminates dross creation which leads to industry leading savings in energy, labor, and yield while maximizing quality. After 18 months of continuous operation, less than two small bins of dross were created (image lower left).

- Reduces operator time to clean the holding bath.
- Avoids excessive production downtime for cleaning
- Improves metal quality through reduced inclusions from cleaning
- Reduces metal loss from oxidation (dross) removed during cleaning.
- Better energy efficiency from closed holding chamber
- Reduces flux usage in cleaning the holding bath.

Minimal dross removed after 18 months

The SINC Advantage

SINC Thermal remains at the forefront of performance-based non-ferrous melting where our objective is to help you make the most from your metal. That means the purest, dross-free melt is delivered to your high pressure or low pressure die cast line.

SINC Thermal builds on 80+ years of experience supplying furnaces and processing equipment to the aluminum recycling and cast house industry. Together with old-world skills, SINC Thermal brings a fresh perspective born out of experience, engineering, and patented technology to the foundry and die-casting industry.

Your SINC Thermal Advantage

- Small company attention to customer needs.
- Large company experience and support.
- International foundry furnace experience.
- Fast reactions, customer-oriented.
- Forward-thinking built on established engineering.
- Service support from dedicated engineering teams.
- New and innovative foundry furnace technology.

Sizing from 400 to 6,600 lbs/hr (~200 – 3,000 kg/h)

Patented holding chamber design greatly reduces oxidation

Available in stationary or tilting versions

Comprehensive line of foundry systems

In Partnership with Gillespie & Powers

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