

MN-7
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THIS COLLECTOR SERVICES THE MELTING FURNACE (TABLE 1-A), HOLDING FURNACE (TABLE 1-B) PRESSURE POUR (TABLE 1-C) TREATMENT (TABLE 3), AND POURING AND COOLING (TABLE 9)

Grede Foundries, Inc.
Project No. CMXX-96-0638
September 26, 1996
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Table 3: Meltor (SV001) Results

PLANT: Grede Foundries, Inc. St. Cloud
TEST DATE: August 27, 1996

SAMPLE LOCATION: Meltor Dust Collector
SAMPLE METHODS: EPA 1-5 & 9, 7011.0725

	Run 1	Run 2	Run 3	Avg
Run Times :	10:20-11:27	11:58-13:05	13:26-14:30	
PROCESS CONDITIONS,				
Average Temperature (°F) :	99	103	107	103
Average Velocity (ft/s) :	51.3	52.2	51.4	51.6
Moisture Content (%vol.) :	1.2	1.3	1.2	1.2
Wet Molecular Weight (g/gmole) :	28.71	28.70	28.71	28.71
Volume Flow Rate (ACFM) :	118,500	120,600	118,800	119,300
Volume Flow Rate (SCFM) :	112,200	113,400	110,900	112,200
Volume Flow Rate (DSCFM) :	110,900	111,900	109,600	110,800
PRODUCTION DATA				
Heat (Tons per Hour) :	7.55	7.55	7.55	7.55
SAMPLE VOLUME (SDCF) :	47.767	35.746	46.917	43.477
PARTICULATE CONCENTRATION				
Filterable (gr/dscf) :	0.0008	0.0003	0.0014	0.0008
Aqueous Condensable (gr/dscf) :	0.0002	0.0003	0.0000	0.0002
Organic Condensable (gr/dscf) :	0.0002	0.0004	0.0001	0.0002
Total (gr/dscf) :	0.0013	0.0010	0.0015	0.0013
PARTICULATE EMISSION RATE				
Filterable (lb/hr) :	0.80	0.29	1.30	0.80
Aqueous Condensable (lb/hr) :	0.21	0.29	0.03	0.18
Organic Condensable (lb/hr) :	0.18	0.37	0.12	0.22
Total (lb/hr) :	1.20	0.95	1.45	1.20
% of Isokinetic Sample Rate :	100.8	100.6	101.8	
Opacity, highest six minute avg. (%) :	0.0			
Opacity, One hour avg (%) :	0.0			
Concurrent with Run # 1				



National Emission Standards for Hazardous Air Pollutants (NESHAP) for Iron and Steel Foundries - Background Information for Proposed Standards

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National Emission Standards for Hazardous Air Pollutants (NESHAP) for
Iron and Steel Foundries--
Background Information for Proposed Standards

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U.S. Environmental Protection Agency
Office of Air Quality Planning and Standards
Emission Standards Division
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APPENDIX E

**SOURCE TEST PARTICULATE MATTER DATA
FOR ELECTRIC INDUCTION FURNACE FILTERS**

E.1 INTRODUCTION

This appendix presents the individual sampling run data for the source tests available to characterize the control performance for fabric and cartridge filters applied to EIF (Chapter 4). Summary test data are given in Table E-1 along with information on furnace melting rates and capacities and a description of the filters and the processes they serve.

The data in Table E-1 represent a range of furnace sizes and types of filters. The design furnace melting rates range from 0.8 to 15 tons per hour, and ventilation rates range from 6,500 to 225,000 acfm. All of the foundries produce iron in the furnaces tested. The filters include both negative and positive pressure operating modes and employ both shaker and pulse jet cleaning systems. Some were installed about 20 to 25 years ago, and some are relatively new (rebuilt). The design air-to-cloth ratios cover a range of 1.7 to 11.8 ft/min. No information is available on the ages of the bags in service when the tests were conducted.

The reported results were checked to ensure the weights of PM from the filter and the probe catch were above detection limits. When the reported catch was less than 3 mg, a detection limit value of 3 mg and the sample volume were used to estimate the detection limit in gr/dscf. Values calculated in this manner are reported as “less than” (<).

TABLE E-1. PM TEST RESULTS FOR FILTERS SERVING EIF AND SCRAP PREHEATERS

Foundry MI-04 (tested August 1994)								
Run	PM* (gr/dscf)	PM* (lb/hr)	Flow (dscfm)	Flow (acfm)	Temp (°F)	Air-cloth ratio (ft/min)	Melt rate (tph)	Baghouse design and service data
1	<0.0006	<0.027					4.1	Negative pressure, pulse jet cleaning Fabric: polyester Design gas flow rate: 50,000 acfm Design operating temperature: 80°F Design air-to-cloth ratio: 6 ft/min Serves 3 EIF, 1.5 tons/hr design melt rate for each
2	<0.0006	<0.027						
3	<0.0006	<0.027						
Avg	<0.0006	<0.027						
* The results were reported as <0.0002 gr/dscf and were adjusted to <0.0006 gr.dscf based on the best estimate of the detection limit.								
Foundry CA-01 (tested March 1996)								
Run	PM (gr/dscf)	PM (lb/hr)	Flow (dscfm)	Flow (acfm)	Temp (°F)	Air-cloth ratio (ft/min)	Melt rate (tph)	Baghouse design and service data
1	<0.0002	<0.05	41,000	43,110	90	2.56	1.3	Positive pressure, shaker cleaning; in series with 2 prefilters and a HEPA filter Fabric: polyester Design gas flow rate: 49,600 acfm Design operating temperature: 81°F Design air-to-cloth ratio: 2.95 ft/min Serves 8 EIF, (0.5 to 1.75 tons/hr design melt rate), 4 casting stations, 4 mold spray/coating stations, 1 Hawley system

Foundry IN-13 (tested October 1996)								
Run	PM (gr/dscf)	PM (lb/hr)	Flow (dscfm)	Flow (acfm)	Temp (°F)	Air-cloth ratio (ft/min)	Melt rate (tph)	Baghouse design and service data
1	<0.0006	<0.34	66,943	71,590	95	2.91	33.8	Negative pressure, pulse jet cleaning Fabric: polyester Design gas flow rate: 72,500 acfm Design operating temperature: 150°F Design air-to-cloth ratio: 2.95 ft/min Installed 1995 Serves 3 EIF, 10.7 tons/hr design melt rate for each; controls charging, melting, holding furnaces, ladle metallurgy
2	<0.0006	<0.34	66,453	72,190	102	2.94		
3	<0.0006	<0.34	67,590	73,100	100	2.97		
Avg	<0.0006	<0.34	66,995	72,290	99	2.94		
Foundry WI-43 (tested November 1997)								
Run	PM (gr/dscf)	PM (lb/hr)	Flow (dscfm)	Flow (acfm)	Temp (°F)	Air-cloth ratio (ft/min)	Melt rate (tph)	Baghouse design and service data
1	<0.0010	<0.6	60,236	66,964	111	4.0	112	Negative pressure, pulse jet cleaning Fabric: polyester Design gas flow rate: 110,000 acfm Design operating temperature: 100°F Design air-to-cloth ratio: 6.5 ft/min Installed 1995 Serves 10 EIF, 11 tons/hr design melt rate each; controls charging, melting, magnesium treatment
2	<0.0011	<0.6	59,491	66,543	115	3.9	114	
3	<0.0011	<0.6	58,117	65,870	122	3.9	137	
Avg	<0.0011	<0.6	59,281	66,459	116	3.9	121	

Foundry WI-43: scrap preheater only (tested November 1997)								
Run	PM (gr/dscf)	PM (lb/hr)	Flow (dscfm)	Flow (acfm)	Temp (°F)	Air-cloth ratio (ft/min)	Preheat rate (tph)	Baghouse design and service data
1	<0.0007	<0.4	71,594	88,045	169	7.8	56	Negative pressure, pulse jet cleaning Fabric: fiberglass Design gas flow rate: 80,000 acfm Design operating temperature: 310°F Design air-to-cloth ratio: 7.1 ft/min Installed 1995 Serves 3 scrap preheaters, 33 tons/hr design rate each
2	<0.0007	<0.4	72,303	88,649	167	7.9	69	
3	<0.0007	<0.4	73,230	87,282	149	7.7	58	
Avg	<0.0007	<0.4	72,376	87,992	162	7.8	61	
Foundry MN-7 (tested August 1996)								
Run	PM (gr/dscf)	PM (lb/hr)	Flow (dscfm)	Flow (acfm)	Temp (°F)	Air-cloth ratio (ft/min)	Melt rate (tph)	Baghouse design and service data
1	<0.0010	<1.0	110,900	118,500	99	3.9	7.55	Negative pressure, pulse jet cleaning Fabric: polyester (Dacron) felt (16 oz) singed finish Design gas flow rate: 119,300 acfm Design operating temperature: 103°F Design air-to-cloth ratio: 3.9 ft/min Installed 1991; Serves one EIF, 15.2 tons/hr design melt rate; controls charging, melting, tapping, holding furnaces, ladle metallurgy, pouring/cooling
2	<0.0013	<1.2	111,900	120,600	103	3.9		
3	0.0014	1.3	109,600	118,800	107	3.9		
Avg	<0.0012	<1.2	110,800	119,300	103	3.9		

Foundry WI-47 (tests of 3 systems)								
Run	PM (gr/dscf)	PM (lb/hr)	Flow (dscfm)	Flow (acfm)	Temp (°F)	Air-cloth ratio (ft/min)	Melt rate (tph)	Design and service data
Avg	0.0011	0.4	44,052				3.0	Negative pressure, pulse jet cleaning Fabric: polyester Design gas flow rate: 50,000 acfm Design air-to-cloth ratio: 7 ft/min Installed 1991 Serves preheater and one EIF, 3.5 tons/hr design melt rate; controls charging, melting
Avg	0.0006	0.22	46,032				2.8	Negative pressure, pulse jet cartridge cleaning Fabric: cartridge collector Design gas flow rate: 40,000 acfm Design air-to-cloth ratio: 1.3 ft/min Installed 1991 Serves two EIFs, 5 tons/hr design melt rate for each; controls charging, melting; also controls inoculation and cast cooling
Avg	0.0052	2.92	65,132				4.4	Venturi scrubber with <13 in water pressure drop; 73,500 acfm Serves two EIF for melting (5 tph each); also pouring and cooling

Foundry IN-24 (tested December 1996)								
Run	PM (gr/dscf)	PM (lb/hr)	Flow (dscfm)	Flow (acfm)	Temp (°F)	Air-cloth ratio (ft/min)	Melt rate (tph)	Cartridge filter design and service data
1	0.0017	0.34	23,050	23,111	62	1.55	4.4	Negative pressure, pulse jet cartridge cleaning Fabric: cellulose cartridge Design gas flow rate: 25,000 acfm Design operating temperature: 180°F Design air-to-cloth ratio: 1.68 ft/min Installed 1996 Serves two EIF, 4.5 tons/hr design melt rate controls charging, melting, tapping
2	0.0014	0.28	23,171	23,074	59	1.55		
3	0.0026	0.50	22,909	22,842	60	1.53		
Avg	0.0019	0.37	23,043	23,009	61	1.55		
Foundry CA-09 (tested October 1987)								
Run	PM (gr/dscf)	PM (lb/hr)	Flow (dscfm)	Flow (acfm)	Temp (°F)	Air-cloth ratio (ft/min)	Melt rate (tph)	Baghouse design and service data
1	0.0015	0.076	5,906	6,503	102	1.4	0.8	Negative pressure, shaker cleaning Fabric: polyester Design gas flow rate: 9,600 acfm Design operating temperature: 130°F Design air-to-cloth ratio: 2 ft/min Installed 1997 Serves three EIFs, two at 0.8 tph and one at 1.5 tph design melt rate each; controls melting, charging, preheater, and sand reclaimer
2	0.0023	0.113	5,727	6,427	113	1.3		
3	0.003	0.145	5,630	6,426	121	1.3		
Avg	0.0023	0.11	5,754	6,452	112	1.3		

Foundry MN-12 (tested March 1995 and May 1996)								
Run	PM (gr/dscf)	PM (lb/hr)	Flow (dscfm)	Flow (acfm)	Temp (°F)	Air-cloth ratio (ft/min)	Melt rate (tph)	Baghouse design and service data
1	0.0034	0.38	13,200	13,500	86	2.54	5.8	Positive pressure, shaker cleaning Fabric: felt Design gas flow rate: 29,800 acfm Design operating temperature: 100°F Design air-to-cloth ratio: 2.8 ft/min Installed 1980 Serves two EIF, 4.7 tons/hr design melt rate each; controls charging, melting, tapping, ladle metallurgy; two stacks on baghouse
2	0.0014	0.14	11,700	12,200	90	2.29	6.0	
3	0.0024	0.21	10,300	11,000	78	2.07	6.3	
4	0.0022	0.24	12,700	13,100	86	2.46	5.8	
5	0.0026	0.31	13,700	14,100	82	2.65	6.4	
6	0.0012	0.14	13,800	14,200	84	2.67	6.4	
Avg	0.0022	0.47 *	25,100 *	26,000 *	84	2.45	6.1	
1	0.0009	0.11	14,700	15,600	105	2.93	5.2	
2	0.0016	0.19	14,000	14,900	104	2.80	5.3	
3	0.0028	0.35	14,400	15,500	111	2.91	5.3	
4	0.0005	0.06	13,800	14,700	105	2.76	5.1	
5	0.0006	0.07	14,200	14,700	89	2.76	5.3	
6	0.0019	0.22	13,500	14,200	95	2.67	5.3	
Avg	0.0014	0.33 *	28,200 *	29,900 *	102	2.80	5.2	

* The baghouse has two stacks; Runs 1-3 are for one stack and Runs 4-6 are for the other stack.

Foundry PA-06 (tested July 1995; one of two baghouses in parallel)								
Run	PM (gr/dscf)	PM (lb/hr)	Flow (dscfm)	Flow (acfm)	Temp (°F)	Air-cloth ratio (ft/min)	Melt rate (tph)	Baghouse design and service data
1	0.0022	0.71	37,936	41,151	106		8.0	Negative pressure, reverse pulse cleaning (two baghouses in parallel) Fabric: polyester Design gas flow rate: 95,094acfm for two baghouses Design operating temperature: 120°F Design air-to-cloth ratio: 4.38 ft/min Installed 1996 Serves one EIF at 10 tons/hr design melt rate each; also controls inoculation and carbon/silicon adjustment
2	0.00124	0.39	36,578	40,150	108			
3	0.00064	0.2	36,267	39,414	104			
Avg	0.0014	0.43	36,927	40,238	106			
Foundry PA-06 (tested July 1995; one of two stacks; doubled flow and emission rate to estimate for both stacks)								
Run	PM (gr/dscf)	PM (lb/hr)	Flow (dscfm)	Flow (acfm)	Temp (°F)	Air-cloth ratio (ft/min)	Melt rate (tph)	Baghouse design and service data
1	0.00225	1.32	68,464	75,040	97		8.0	Negative pressure, reverse pulse cleaning (two baghouses in parallel) Fabric: polyester Design gas flow rate: 95,094acfm for two baghouses Design operating temperature: 120°F Design air-to-cloth ratio: 4.57 ft/min Installed 1996 Serves one EIF at 10 tons/hr design melt rate each; also controls inoculation and carbon/silicon adjustment
2	0.00116	0.68	68,402	75,204	95			
3	0.00117	0.68	68,094	74,434	93			
Avg	0.0015	0.89	68,320	74,893	95			

Foundry OH-43 (tested October 1997)								
Run	PM (gr/dscf)	PM (lb/hr)	Flow (dscfm)	Flow (acfm)	Temp (°F)	Air-cloth ratio (ft/min)	Melt rate (tph) ²	Baghouse design and service data
1	0.0038	2.25	69,695	74,979	83	6.04	9.4	Negative pressure, pulse jet cleaning Fabric: polyester Design gas flow rate: 65,000 acfm Design operating temperature: 90-110°F Design air-to-cloth ratio: 5.24 ft/min Installed 1996 Serves two EIF, 15 tons/hr design melt rate each; controls melting, grinding, shot blasting, pouring
2	0.0013	0.81	71,174	76,590	83	6.17	5.9	
3	0.0018	1.09	71,568	78,190	93	6.30	12.2	
Avg	0.0023	1.38	70,812	76,586	86	6.34	9.2	
² Tons per hour transferred; both furnaces were operating, but there was only one charge during the test. Test includes both melting and holding.								
Foundry TX-11 (tested October 1993)								
Run	PM (gr/dscf)	PM (lb/hr)	Flow (dscfm)	Flow (acfm)	Temp (°F)	Air-cloth ratio (ft/min)	Melt rate (tph)	Baghouse design and service data
1	0.0030	2.29	81,362	93,159	95	3.11	3.85	Negative pressure, shaker cleaning Fabric: Nomex Design gas flow rate: 90,000 acfm Design operating temperature: 100°F Design air-to-cloth ratio: 3 ft/min Installed 1977 Serves one EIF, 3.75 tons/hr design melt rate; controls charging, melting, tapping, ladle metallurgy
2	0.0021	1.74	77,351	90,950	111	3.03		
3	0.0020	1.71	76,379	90,057	112	3.00		
Avg	0.0024	1.91	78,364	91,389	106	3.05		

Foundry MI-28 (tested March 1996)								
Run	PM (gr/dscf)	PM (lb/hr)	Flow (dscfm)	Flow (acfm)	Temp (°F)	Air-cloth ratio (ft/min)	Melt rate (tph)	Baghouse design and service data
1	0.0031	1.03	38,480			2.10	5.20	Negative pressure, pulse jet cleaning Fabric: Polyester Design gas flow rate: 70,000 acfm Design operating temperature: 135°F Design air-to-cloth ratio: 3.9 ft/min Installed 1995 Serves 3 EIFs, 9 tons/hr design melt rate and 2 scrap preheaters; controls charging, melting, tapping
2	0.0028	0.94	39,512			2.20		
3	0.0027	0.96	41,190			2.30		
Avg	0.0029	1.03	39,728			2.20		
Foundry IN-11 (tested September 1990)								
Run	PM (gr/dscf)	PM (lb/hr)	Flow (dscfm)	Flow (acfm)	Temp (°F)	Air-cloth ratio (ft/min)	Melt rate (tph)	Baghouse design and service data
1	0.0032	1.435	52,383	61,842	143	2.14	Unknown	Negative pressure, pulse jet cleaning Fabric: polyester (Dacron) Design gas flow rate: 100,000 acfm Design operating temperature: unknown Design air-to-cloth ratio: 3.46 ft/min Installed 1990 Two identical baghouses serving three EIF each, 10 tons/hr design melt rate each; controls preheater, charging, melting, tapping
2	0.0050	2.217	52,200	62,017	143	2.15		
3	0.0026	1.140	52,100	61,534	142	2.13		
Avg	0.0036	1.597	52,228	61,798	143	2.14		
1	0.0019	1.456	89,280	103,143	135	3.57		
2	0.0037	2.827	88,683	102,427	136	3.54		
3	0.0017	1.303	89,633	104,083	139	3.60		
Avg	0.0024	1.862	89,199	103,218	137	3.57		

Foundry IN-29 (tested February 1997)								
Run	PM (gr/dscf)	PM (lb/hr)	Flow (dscfm)	Flow (acfm)	Temp (°F)	Air-cloth ratio (ft/min)	Melt rate (tph)	Baghouse design and service data
1	0.0025	0.85	40,367	42,354	86	12.5	24	Positive pressure, pulse jet cleaning Fabric: polyester felt Design gas flow rate: 40,000 acfm Design operating temperature: 175°F Design air-to-cloth ratio: 11.8 ft/min Installed 1996 Serves two EIF, 10.5 tons/hr design melt rate; controls preheating, melting
2	0.0017	0.59	39,694	41,609	85	12.3	20	
3	0.0076	2.56	39,033	41,037	86	12.1	23	
Avg	0.0039	1.33	39,698	41,667	86	12.3	23	
Foundry IN-12 (tested March 1990)								
Run	PM (gr/dscf)	PM (lb/hr)	Flow (dscfm)	Flow (acfm)	Temp (°F)	Air-cloth ratio (ft/min)	Melt rate (tph)	Baghouse design and service data
1	0.0056	2.38	49,122	51,817	99		15	Uncontrolled induction furnaces (3 at 5 tph)
2	0.0068	2.86	49,247	51,865	99			
Avg	0.0062	2.62	49,185	51,841	99			
Foundry PA-46 (tested October 1995)								
Run	PM (gr/dscf)	PM (lb/hr)	Flow (dscfm)	Flow (acfm)	Temp (°F)	Air-cloth ratio (ft/min)	Melt rate (tph)	Baghouse design and service data
1	0.008	10.76	155,000				15	Negative pressure, pulse jet cleaning Fabric: polyester Design gas flow rate: 225,000 acfm Design operating temperature: 100°F Design air-to-cloth ratio: 6.8 ft/min Installed 1995 Serves five EIF, 3.3, 3.3, 4.1, 6.8, and 12.7 tons/hr design melt rate; controls charging, melting, tapping
2	0.009	11.25	150,000					
3	0.008	10.55	155,000					
Avg	0.008	10.85	153,000					