

Melting Experiment on Concrete Waste using a Hollow Type Plasma Torch mounted on Furnace

150

가 200kW
가 10kg 20 가
가 가

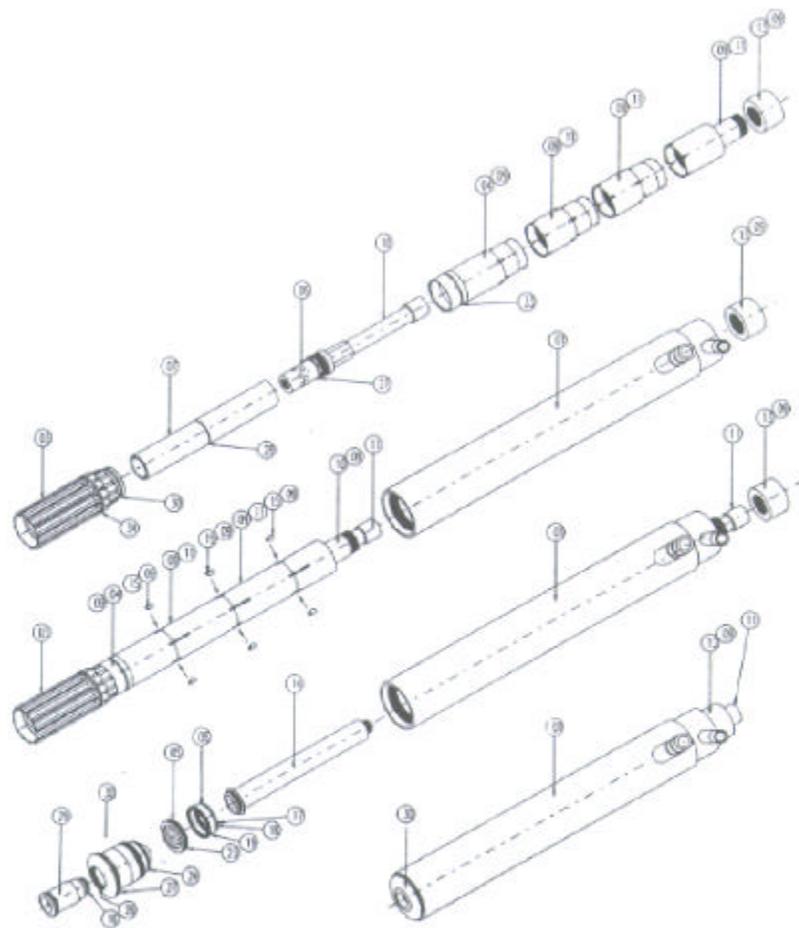
Abstract

A furnace coupled with a hollow type plasma torch was manufactured and installed in order to develop a volume reduction technology for non-combustible radioactive waste using plasma. A melting test with 10 kg of concrete waste was carried out for the evaluation of melting characteristics in the non-transferred operation mode for 20 minutes with the melter. Fedded concrete was completely melted. However, the molten bath was not easily discharged because of its high viscosity. It was found that some molten slag spat from the molten bath was coated on the surface of torch which was mounted vertically inside furnace.

1.

가 가 가 가

가 , 가 (+DC), , PT - 150C 가 가 ; (+DC); (-DC) 가 PLC (programable logic controller) . [1.]



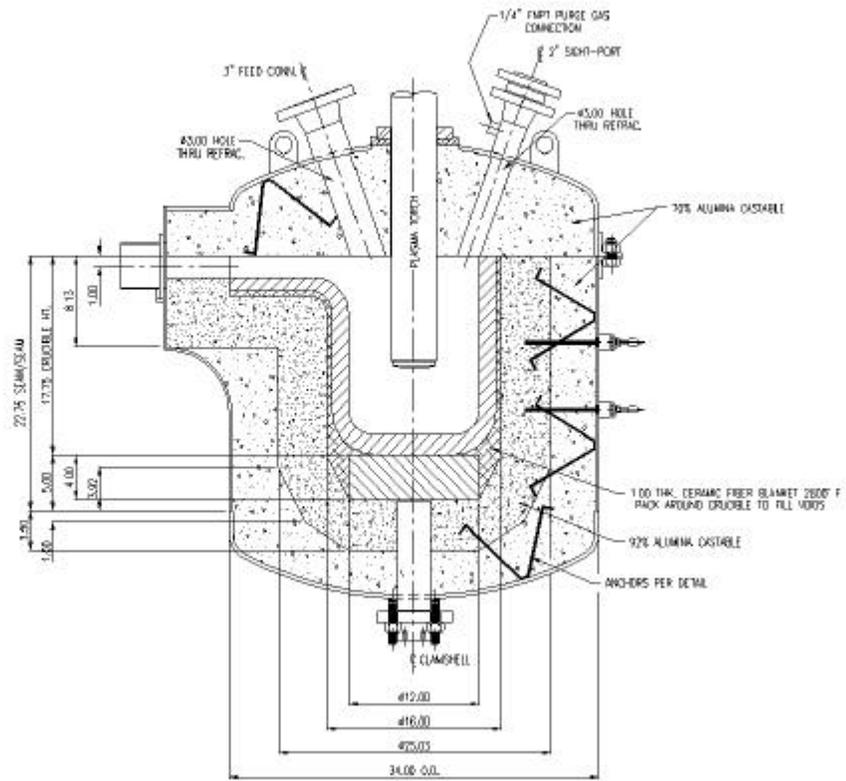
ITEM	QTY	DESCRIPTION
01	1	SHROUD ASSEMBLY
02	-	----
03	1	TORCH BODY
04	1	REAR SLEEVE
05	1	GAP INSULATOR
06	1	REAR ELECTRODE HOLDER
07	1	WATER GUIDE- REAR ELECTRODE
08	1	VORTEX GENERATOR
09	1	INSULATOR ASSEMBLY
10	1	REAR INSULATOR
11	1	INPUT WATER/POWER PIPE ASSEMBLY
12	2	INTERMEDIATE INSULATOR
13	1	LOCKING BUSHING
14	1	REAR ELECTRODE
15	12	WOODRUFF KEYS #905

ITEM	QTY	DESCRIPTION
16	1	O-RING
17	1	O-RING
18	1	O-RING
19	1	O-RING
20	1	O-RING
21	1	O-RING
22	1	O-RING
23	1	O-RING
24	1	O-RING
25	1	O-RING
26	1	O-RING
27	1	O-RING
28	1	O-RING
29	1	FRONT ELECTRODE
30	1	FRONT ELECTRODE HOLDER

2.1.2.

clam shell 24kg
 76.2mm 50.8mm 가
 가
 4 가
 가 102mm 115mm
 가 92%
 가 70% 가
 가 가 370 가 가

[2.]



2. CLAMSHHELL DETAIL

2.1.3.

300kW 380 3 480 3
 500

가

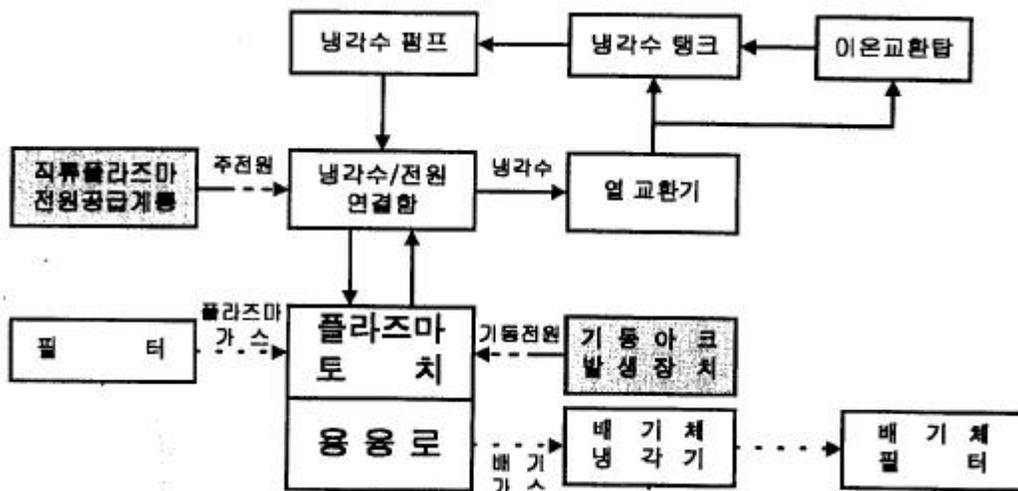
가

[1.]

1.

Input Voltage	380Vac, 3 , 60Hz(transformer)
Output(Supply)	300kW, 3kHz 250Vdc, 1200Adc(maximum)
Output Regulation	±1% of full scale max. for a ±10% line/load variation or a ±25 temperature variation
Current Control	Manual(local) : local 10 turn potentiometer Automatic(remote) : 4-20mA signal from an external source
Temperature, Ambient	1 to 40
Cabinet Dimensions (H × W × D)	Choke & Regulator - 91.5" × 48' × 24" Transformer - 54"H × 60"W × 40"D
Cabinet Type	NEMA 1

2.1.4. 가



3.

(water/power junction box),

10,046 rpm

75gpm

가 700feet

30

가

가

가

[3.]

2.2

2.2.1.

10kg

[2.]

2.

(wt%)						(g/cm ³)
SiO ₂	Al ₂ O ₃	CaO	Fe ₂ O ₃	MgO		
42.11	10.59	1.83	23.33	2.39	10.87	1.25

2.2.2.

가

4

가

(silicon photocell)

가 600 3000

(TR-630)

(pint)

2m

2.2.3.

PT - 150C

가

150kW

20

2.2.4.

가

가

가

3.

(PNL 900)	Torch gas pressure	70 kpa
	Torch gas flow	73 lpm
	Torch cooling water flow	125 lpm
	Torch cooling water supply temp.	8.9
	Torch cooling water return temp.	12.0
	DC arc power	150 kW
	DC arc voltage	480 V
	DC arc current	290 A
(PPS)	Arc voltage(AC)	395 V
	Arc current(AC)	300 A

2.3.3.

가 , 가
 [4] Microwave Digestion
 가
 가
 가

4.

(wt%)							
SiO ₂	Al ₂ O ₃	CaO	Fe ₂ O ₃	MgO			(g/cm ³)
52.68	10.59	1.83	23.33	2.39	4.52	1.72	1.37

4.

가

가

가

가

150kW 20 가

가

가

Heating Microscope

5.

- [1] " " " CIWAM, 1998, , p46
- [2] " " " 1991, p291
- [3] " " : 1991, p21, p220
- [4] " " (I)" , , 1997
- [5] Handbook "Vitrification Technologies for Treatment of Hazardous and Radioactive Waste" Office of R&D U.S Environmental Protection Agency, Cincinnati, OH 45268. 1992, p3
- [6] J. Bradley Mason "Vitrification Advances for Low Level Radioactive and Mixed Wastes" Proceedings, EPRI International LLW Conference, 1995, p4-9
- [7] Camacho, S.L. "Industrial-Worthy Plasma Torches : State of the Art," Pure&Applied Chemistry, Vol. 60, 1988, p619-632
- [8] Eschenbach, R.C., "Glass slag from Rotary Hearth Vitrification," presented at the ACS Engineering Technologies in Hazardous Waste Management , Retech Atlanta, Georgia, USA, 1995
- [9] Jong-Kil Park, et.al., Technical and Economical Assessment for Vitrification of Low level Radioactive Waste from Nuclear Power Plants in Korea, Proceedings in Waste Management '96, Tucson, Arizona, USA, Feb. 25-29,1996.
- [10] Louis J.C. "Final Report for Destruction of Asbestos-Containing Materials Using Plasma Arc Technology", Georgia Institute of Technology, Atlanta, Georgia, USA, 1995