ENTRY NO. C37 **Date** August 1992

Name of Machine MINI-CYCLOTRON ILEC

Institution Eindhoven University of Technology

Address Cyclotron Laboratory, EUT, P.O. Box 513, 5600 MB EINDHOVEN, The Netherlands

Tel (40).47.40.46 **Telex** 51163 **Fax** 43.80.60 **EMAIL**

In Charge: J.A. van der Heide **Reported by:** J.A. van der Heide

HISTORY

MILESTONE DATES:
Design 1982 Model Tests 1986
Construction 1985-1988 First Beam 1989
DESIGN/CONSTRUCTION BY:
in house yes other no
COST: Accelerator DFL 400.000 Facility DFL 500.000
FUNDED BY: University

STATUS

STAFF: Machine
Scientists 1.5 Engineers 1
Technicians 1 Students 2
Research (in house/external)
Scientists / Engineers /
Technicians / Students /
BUDGET: Machine DFL 20.000 Funded by EUT
Research Funded by
TIME DISTRIBUTION:
Basic Research (in house/external) 100 % / %
Applied Program (in house/external) % / %
Development 100 % Maintenance %

MAGNET

POLE PARAMETERS:
Diameter 20 cm $R_{extract}$ 16.7 cm R_{inject} cm
HILL PARAMETERS: Gap (min) 3.3 cm B_{max} 1.8 T
(@ 50.000 AT) Gap (max) cm B_{min} T
VALLEY PARAMETERS: Gap (min) 5.0 cm B_{max} 1.2 T
(@ 50.000 AT) Gap (max) cm B_{min} T
AVERAGE FIELD: $< B >_{min}$ 1.43 T $< B >_{max}$ 1.43 T
NUMBER OF SECTORS: compact/separated 4 /
sector angle 40° hill deg. spiral (max) 0 deg.
FIELD TRIMMING: Trim Coils no circular
Harmonic Coils 4 sets
Other
CURRENT: Main Coils 140 Amps Stability 10^{-5}
Trim Coils 20 Amps Stability 10^{-4}
Stored Energy (cryogenic) MJ
WEIGHT: Iron 2.8 tons Conductor 0.25 ton
ION ENERGY: Bending Limit E/A = 3 q^2/A^2 MeV/u
Focussing Limit E/A = q/A MeV/u

ACCELERATION SYSTEM

FUNDAMENTAL ACCELERATION:
Description: 2nd harmonic dees
No. of Gaps/turn 4 dE/dn(max) 0.080 MeV/q
Voltage(max) 0.028 MV Harmonic f_{rf}/f_{ion} 2
Freq 43.5 MHz Power in(max) 0.014 MW
Stability: Phase 0.2° Voltage 10^{-4}
OTHER CAVITIES (Flattopping or otherwise):
Description: two 6th harmonic flattop dees
Region of Influence: R_{min} 5.5 cm R_{max} 16.7 cm
No. of Gaps/turn 4 dE/dn(max) 0.012 MeV/q
Voltage(max) 0.003 MV Harmonic f_{rf}/f_{ion} 6
Freq 130.5 MHz Power in(max) 0.0002 MW
Stability: Phase 0.7° Voltage 10^{-4}

VACUUM SYSTEM

OPERATING PRESSURE: 10^{-5} torr
PUMPS: No. and type 1 oil diffusion pump 3000 ls^{-1}

ION SOURCE(S)

	Type	Intensity (mA)	@	$\epsilon_n = \beta\gamma\epsilon$ (πmm mrad)	Ion Species
(a)	Internal	3			protons
(b)					
(c)					
(d)					

INJECTION SYSTEM

Efficiency %

EXTRACTION SYSTEM

electrostatic and passive magnetic Efficiency 40 %

CHARACTERISTIC BEAMS

	Accelerated Ions	E/A (MeV/u)	Current(part μA) Internal	External
(a)	protons	2.9	60	20
(b)				
(c)				
(d)				

	Secondary Particles	E (MeV)	part/sec
(a)			
(b)			
(c)			

EXTRACTED BEAM PROPERTIES:
For μA of MeV/u ions
$\Delta E/E$ % $\Delta\phi$ °rf
$\epsilon_n = \beta\gamma\epsilon$ x πmm mrad z πmm mrad

FACILITIES FOR RESEARCH

SHIELDED AREA: Fixed 30 m² Moveable 60 m²
Target Stations: 3 No. Served At Same Time: 1
MAGNETIC SPECTROMETERS:
OTHER FACILITIES:

REFERENCES/NOTES

(a) J.A. van der Heide, e.a. Nucl.Instr.& Meth. A240(1985)32-35
(b) J.A. van der Heide, e.a. Nucl.Instr.& Meth. B64(1992)336-341

PLAN VIEW OF FACILITY, COMMENTS

The pole faces are copper plated to form grounded parts of the RF circuit.