周波数　１３００MHｚ±５MHｚ
挿入損失　０．２ｄB以下
耐電力　ピーク500kw　1.5ms　５Hz　全反射全位相
　　平均電力　３．７５ｋｗ
VSWR　１．２以下
アイソレーション　２０ｄB以上（SPAの規格表には規定がありません）
RFリーク　弊社規定はありません（SPAの規格　－９５ｄB）
方向性結合器　結合度　５０ｄB±２ｄB

冷却　流量　6リットル/min
　　耐水圧　１Mpaにて１０分間漏れなきこと
　　水温　２０～３０℃
　　水質　純水又は市水

導波管　WR-650
フランジ　CPR-650Fに適合

- Heat Table improvement! Oct 2007, but still incomplete

Oct 31 2007

WATER AND AIR HEAT LOAD (all LCW) and 9-8-9 ML

MAIN LINAC - ELECTRON & POSITRON

Components	Quantity Per 36m	Location	To Low Conductivity Water: Heat Load to Water (KW)	Max Allowable Temperature (c)	Supply Temp (variation) (C)	Supply Temp (C)	Delta Temperature (C delta)	Water Flow (l / min)	Maximum Allowable Pressure (Bar)	Typical (water) pressure drop Bar	Acceptable Temp Variation delta C	to Chilled Water: Heat Load to Water (KW)	keith Jobe load to air Nov 22 06: Power fraction to Tunnel Air (0-1)	Power to Tunnel Air (KW)		Max Space Temp (C)
Non-RF Components																
AC Pwr Transformer 34.5-.48 kV	0.25	Service Tunnel	1.50			35					None	0	0.25	0.50		
RF Components																
RF Charging Supply 34.5 Kv AC-8KV DC	1/36 m	Service Tunnel	2.8			40	40	1.17	18	5	10	0	0.3	1.2		85 F (a)
Switching power supply 4kV 50kW	1/36 m	Service Tunnel	4.5			35	8.50	7.6	13	5	10	0	0.4	3.0		
Modulator	1/36 m	Service Tunnel	4.5			35	3.23	20	10	5	n/a	0	0.4	3.0		
Pulse Transformer	1/36 m	Service Tunnel	0.7	60		35	0.50	20		1	n/a	0	0.3	0.3		
Klystron Socket Tank / Gun	1/36 m	Service Tunnel	0.8	60		35	1.15	10	15	1	n/a	0	0.2	0.2		
Klystron Focusing Coil (Solenoid)	1/36 m	Service Tunnel	5.5	80		55	8	10	15	1	n/a	0	0.1	0.4		
Klystron Collector	1/36 m	Service Tunnel	45.8	87		38 (inlet temp 25 to 63)	18	37	15	0.3	n/a	0	0.0	1.4		
Klystron Body & Windows	1/36 m	Service Tunnel	4.2	40		25 to 40C	6	10	15	4.5	+ - 2.5 C	0				
Relay Racks (Instrument Racks)	1/36 m	Service Tunnel	0	N/A		N/A	N/A		N/A	N/A	None	11.5	-0.2	-1.5		
Attenuators	2/36 m	Service Tunnel	0	N/A		N/A	N/A		N/A	N/A	None			0.0		
Waveguide (in service tunnel)	1/36 m	Service Tunnel	0											1.166		
Waveguide (in penetration)	1/36 m	Penetration	0.676													
Waveguide (in beam tunnel)	1/36 m	Beam Tunnel	0.0								+ - 2.5 C	0		5.9		
Circulators With loads (isolator)	26/36 m	Beam Tunnel	2.49			35	0.45 per load	3 per load			+ - 2.5 C	0		0.0		
Loads	24/36 m	Beam Tunnel	30.05			35	2.25 per load	8 per load			+ - 2.5 C			0.0		
Subtotal RF unit Only			102.0													
Total RF			103.5									11.5		21.4		

NOTE : Loads, Circulators and Klystron Body Supply Temperature is critical (should have very slow supply temp variat

Total Heat load to Air/Chilled water in service tunnel (per RF)	32.9 KW	cooled by chilled water
Total Heat load to LCW (per RF)	103.5 KW	cooled by low conductivity water
Total Heat load to air in beam tunnel (ignore rock contribution for now)	5.9 KW	pending

- Heat Table improvement! Oct 2007, but still incomplete

Oct 31 2007

WATER AND AIR HEAT LOAD (all LCW) and 9-8-9 ML

Shigeki (check min Flow?)

??

Cassell

Jensen

Shigeki

MAIN LINAC - ELECTRON & POSITRON

Components	Quantity Per 36m	Location	To Low Conductivity Water: Heat Load to Water (KW)	Max Allowable Temperature (c)	Supply Temp (variation) (C)	Supply Temp (C)	Delta Temperature (C delta)	Water Flow (l / min)	Maximum Allowable Pressure (Bar)	Typical (water) pressure drop Bar	Acceptable Temp Variation delta C	to Chilled Water: Heat Load to Water (KW)	keith Jobe load to air Nov 22 06: Power fraction to Tunnel Air (o-1)	Power to Tunnel Air (KW)	Max Space Temp (C)
Non-RF Components															
AC Pwr Transformer 34.5-.48 kV	0.25	Service Tunnel	1.50			35					None	o	0.25	0.50	
RF Components															
RF Charging Supply 34.5 Kv AC-8kV DC	1/36		2.8			40	40	1.17	18	5	10	o	0.3	1.2	85 F (a)
Switching power supply 4kV 50kW	1/36 m	Service Tunnel	4.5			35	8.50	7.6	18	5	10	o	0.4	3.0	
Modulator	1/36 m	Service Tunnel	4.5			35	3.23	20	10	5	n/a	o	0.4	3.0	
Pulse Transformer	1/36 m	Service Tunnel	0.7	60		35	0.50	20		1	n/a	o	0.3	0.3	
Klystron Socket Tank / Gun	1/36 m	Service Tunnel	0.8	60		35	1.15	10	15	1	n/a	o	0.2	0.2	
Klystron Focusing Coil (Solenoid)	1/36 m	Service Tunnel	5.5	80		55	8	10	15	1	n/a	o	0.1	0.4	
Klystron Collector	1/36 m	Service Tunnel	45.8	87		38 (inlet temp 25 to 63)	18	37	15	0.3	n/a	o	0.0	1.4	
Klystron Body & Windows	1/36 m	Service Tunnel	4.2	40		25 to 40C	6	10	15	4.5	+ - 2.5 C	o			
Relay Racks (Instrument Racks)	1/36 m	Service Tunnel	o	N/A		N/A	N/A		N/A	N/A	None	11.5	-0.2	-1.5	
Attenuators	2/36 m	Service Tunnel	o	N/A		N/A	N/A		N/A	N/A	None			0.0	
Waveguide (in service tunnel)	1/36 m	Service Tunnel	o											1.166	
Waveguide (in penetration)	1/36 m	Penetration	0.378												
Waveguide (in beam tunnel)	1/36 m	Beam Tunnel	0.0								+ - 2.5 C	o		5.9	
Circulators With loads (isolator)	**26/36 m**	**Beam Tunnel**	2.49			35	0.45 per load	3 per load			+ - 2.5 C	o		0.0	
Loads	**24/36 m**	**Beam Tunnel**	30.05			35	2.25 per load	8 per load			+ - 2.5 C			0.0	
Subtotal RF unit Only			102.0												
Total RF			103.5									11.5		21.4	

NOTE : Loads, Circulators and Klystron Body Supply Temperature is critical (should have very slow supply temp variat

Total Heat load to Air/Chilled water in service tunnel (per RF)	32.9 KW
Total Heat load to LCW (per RF)	103.5 KW
Total Heat load to air in beam tunnel (ignore rock contribution for now)	5.9 KW

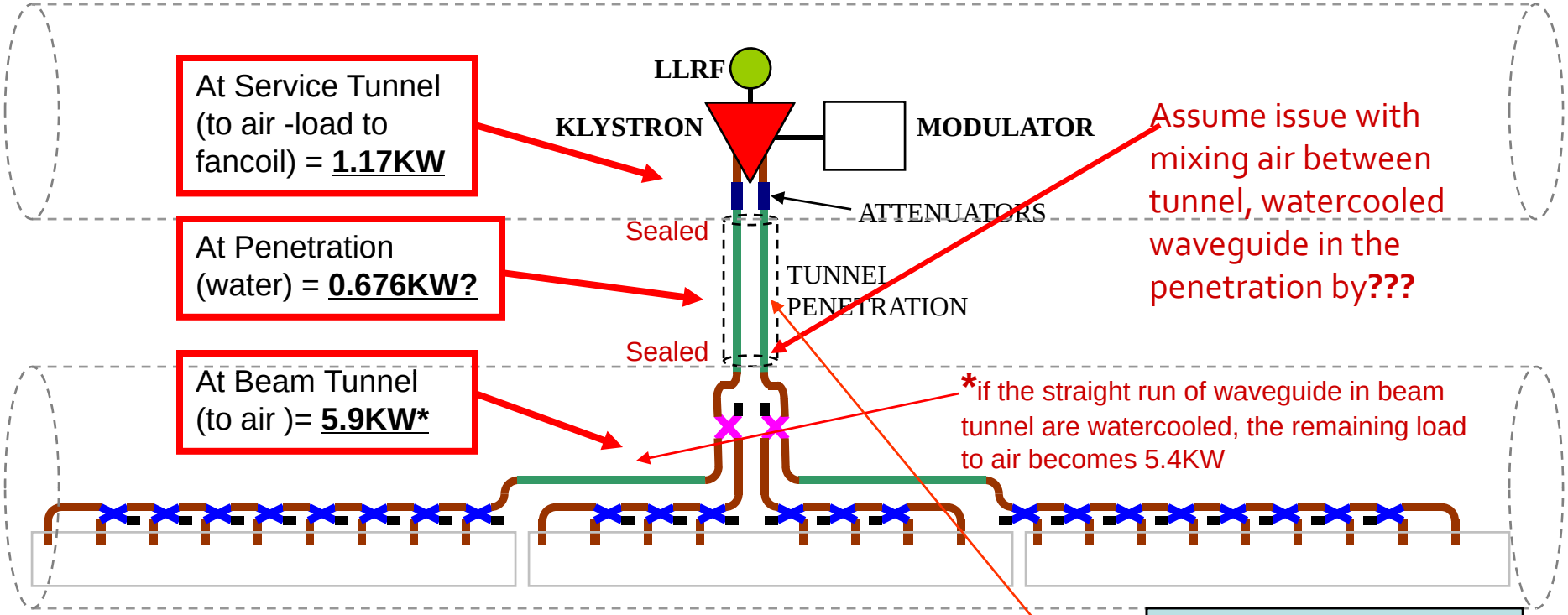
Chris and Keith?

Chris Nantista

Loads Increasing

Beam Tunnel Temperature?

Waveguide Heat of ONE RF UNIT (Oct 4 2007)



Heat Loss from Cryo ~5w/m (T.Peterson)	~(-0.18KW)
Heat Loss from RockWall	ignored
Heat Loss (Air) ~38 w/m *15F delta T air at 2.5Km	~(-1.3 KW)
Heat Gain (Waveguide) = 5.9 KW	~ +5.9 KW
----------	----------
NET LOAD to AIR (beam tunnel)	**+ 4.42 KW**

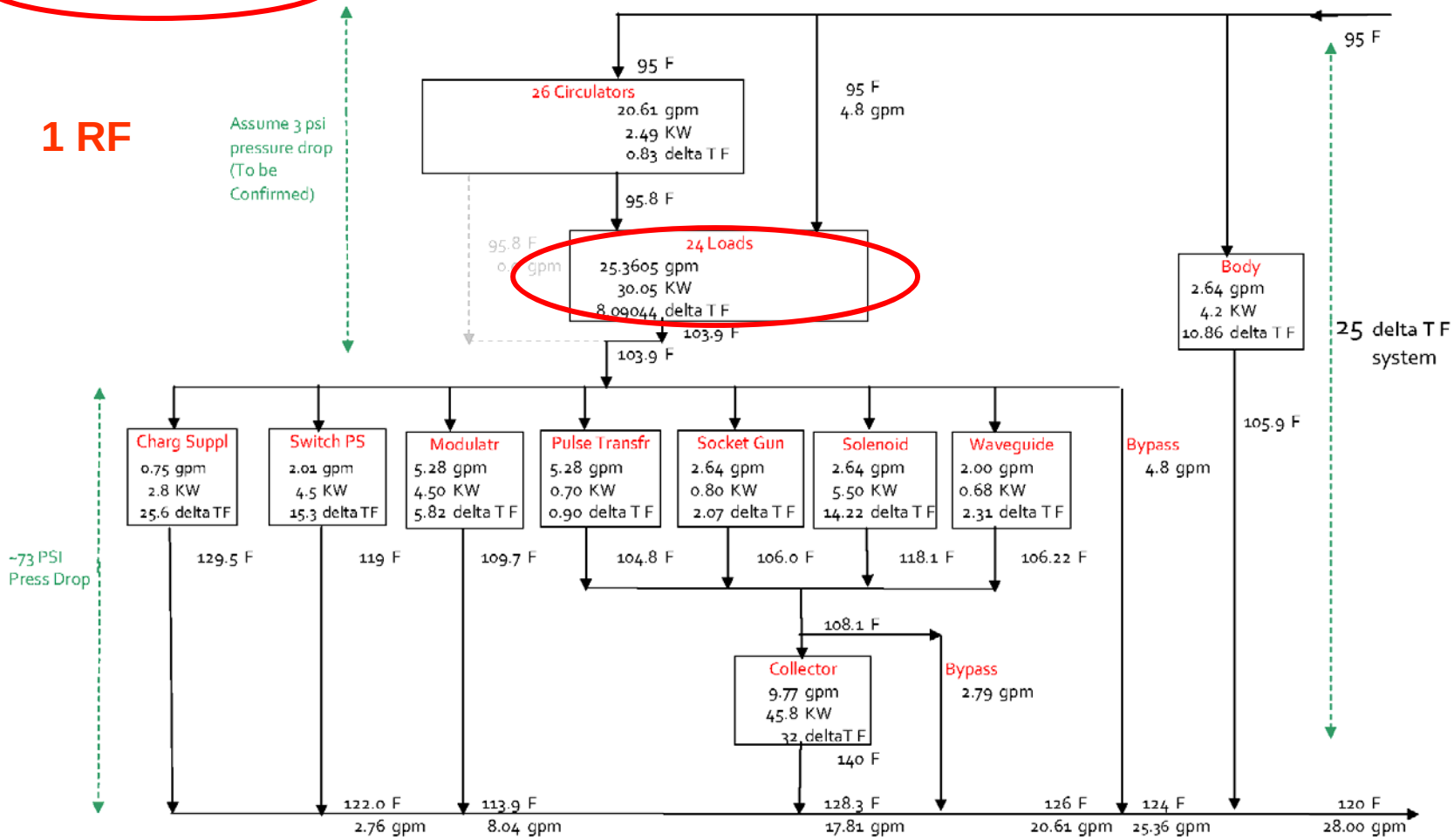
See HVAC slides later, for option of aircooled wavgd at penetration & about rock contrbtion

Stacking of Loads / High Delta T

MAIN LINAC RF WATER SYSTEM (based on incomplete heat table dated Oct 31 2007), excluding Transformer

4 liter /min per load flow

e. huedem 11/15/2007

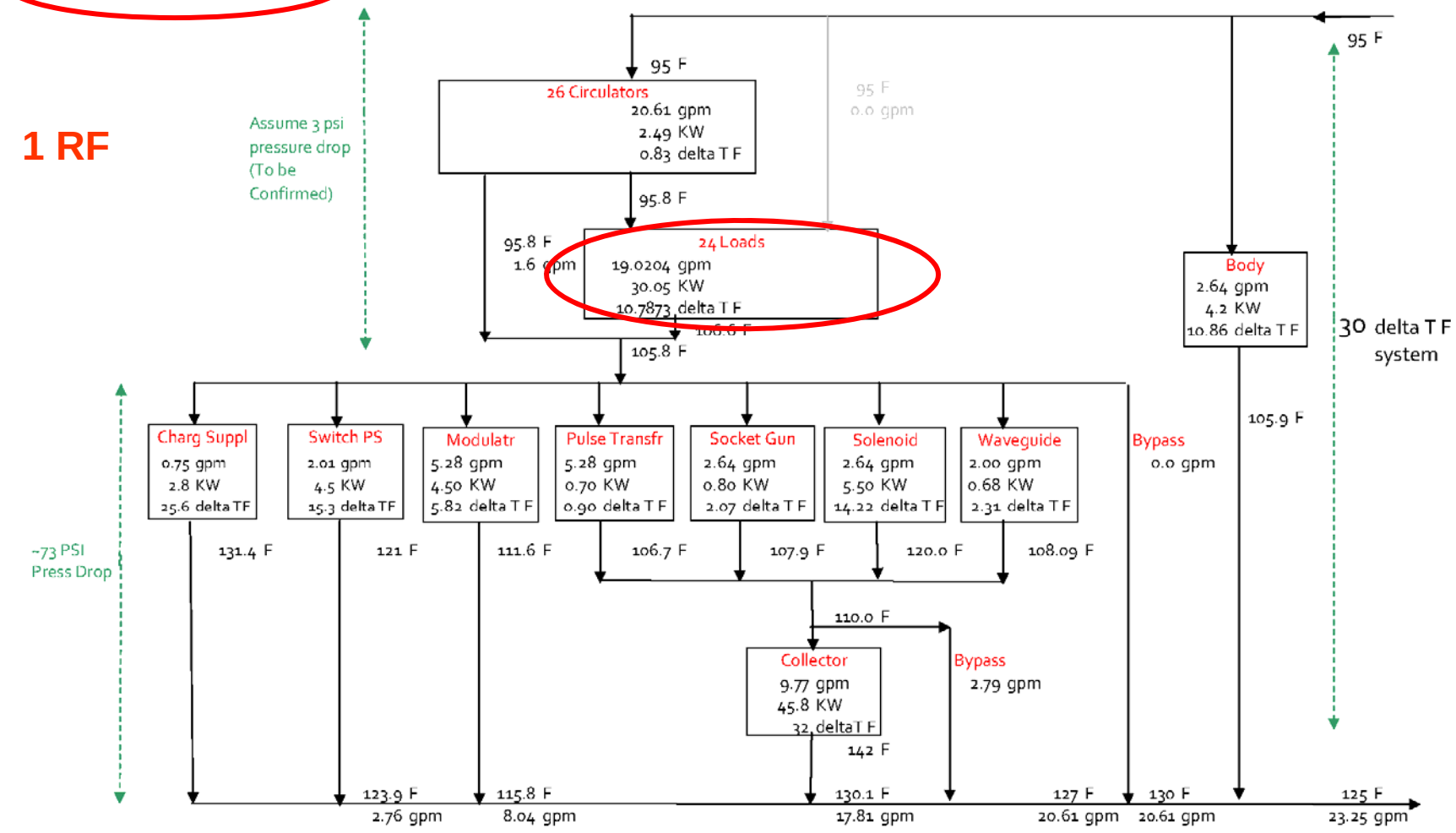


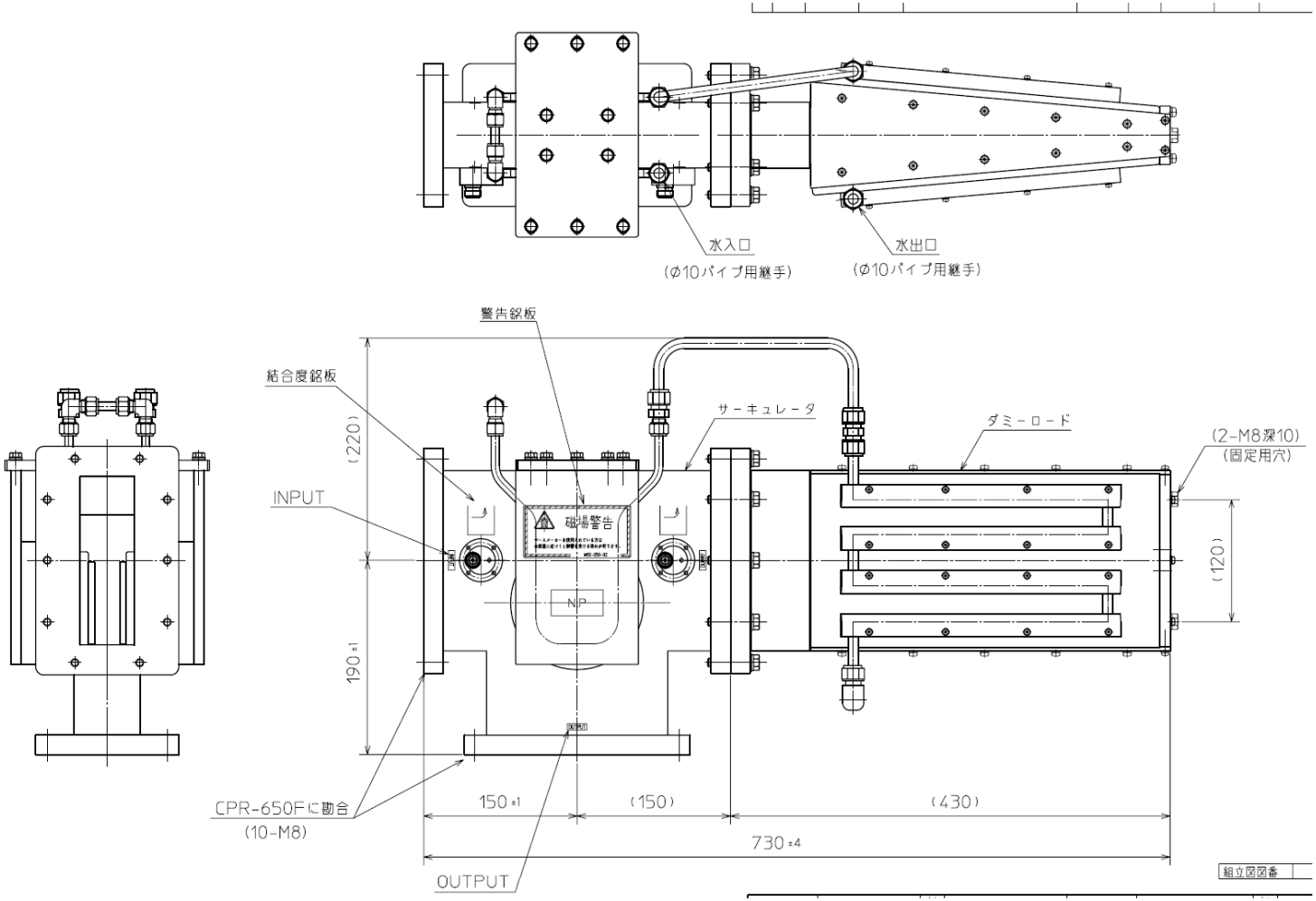
Stacking of Loads / High Delta T

MAIN LINAC RF WATER SYSTEM (based on incomplete heat table dated Oct 31 2007), excluding Transformer

3 liter /min per load flow

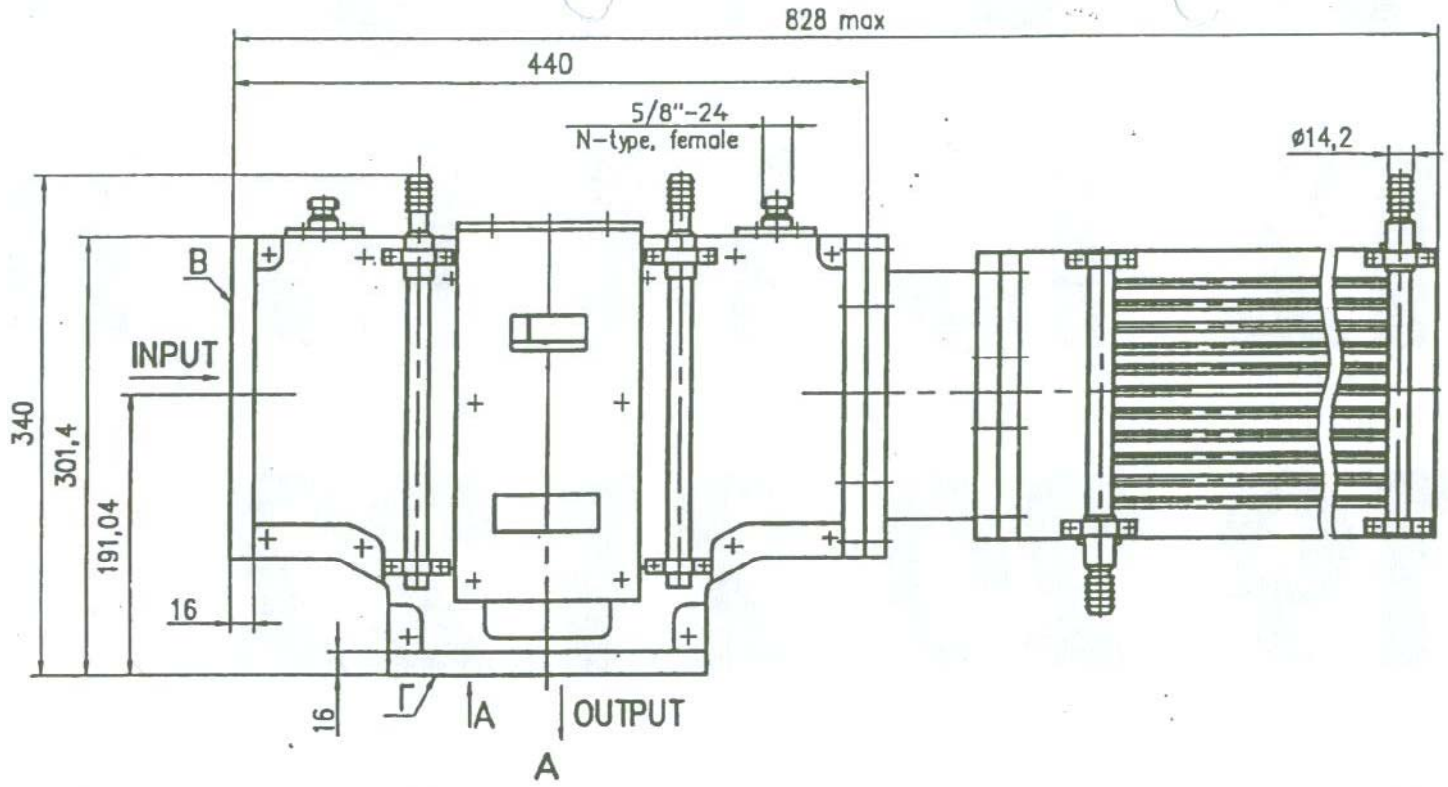
e. huedem 11/15/2007

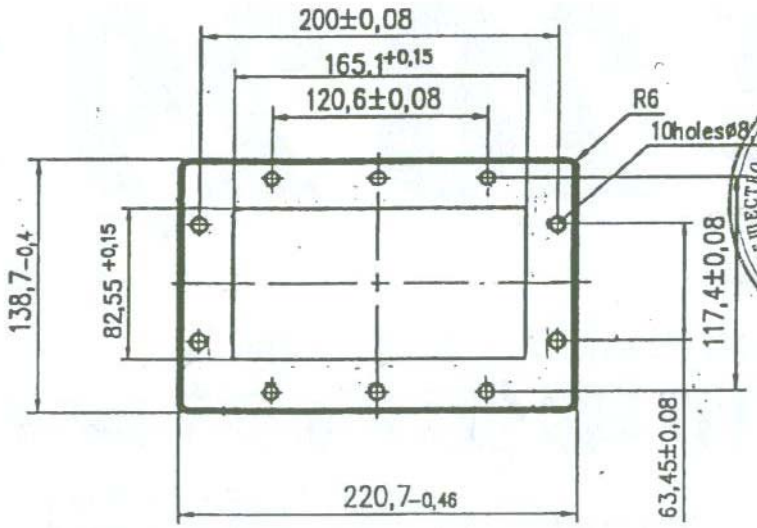



水入口
(φ10パイプ用継手)
水出口
(φ10パイプ用継手)
警告銘板
結合度銘板
サーキュレータ
ダミーロード
(2-M8深10)
(固定用穴)
INPUT
磁場警告
NP
(220)
190±1
(120)
CPR-650Fに勘合
(10-M8)
150±1
(150)
(430)
730±4
OUTPUT
組立図図番

Technical Specification of the IsolatorWFHI3-4
(Order RT-828)

Frequency -	1,3 GHz±5MHz
Insertion loss -	tip.<0,1 dB, max.<0,15 dB
Peak Power -	400 kW; (with full reflection at any phase)
Average Power -	8 kW
Pulse duration -	50 μs to 1,5ms
Repetition Rate -	1- 10 ms
Max input VSWR -	tip.<1,15, max.<1,18 (full reflection at any phase)
RF-leakage -	-95dB (flange leakage)
Coupling ratio for forward and reflection power -	50±2 dB
Principle of the load -	absorbing material solid
Cooling -	demineralized water, pressure<6 bar, test pressure 12bar, flow rate <7 l/min, water temperature +20 to +40 °C
Waveguide -	WR-650
Flange, dimensions -	CPR-650 (flat), according to the outline drawing.





COUPLING RATIO

E DIMENSIONS ARE THE SAME

"НПО "Феррит" S.P.A. FERRITE Ltd.

Contract No

WR-650; 1,3GHz

Изм.	Лист	N° докум.	Подп.	Дата
Разраб.		Ушакова		01.05
Провери		Дмитриев		01.05
Т. контр.				
Н. контр.				

ISOLATO

WFHI 3-

- Dear Dr. Fukuda,
- Today I came into my office from the trip to Moscow. For the second time our ways are very closed to each other. For the first time it was at DESY in Hamburg.
- S.P.A. FERRITE Ltd. is located in Saint-Petersburg on the beach of the Baltic Sea 700 km to the North-West from the Moscow (8, Chernigovskaya st., 196084 Saint-Petersburg, Russia). You are wellcomed to our very beautifull city in any time.
- About the matter.
- Your are right. One kW of dissipated average power at 1 l/mim water flow in the water cooling system gives the increasing of the output water temperature of 14.3 oC.
- The main value of the dissipated power in the isolator WFHI 3-4 will be located in the matched load. You see that when normal operation conditions in the system there will be full reflection (100%) into the output port of the isolator only for the pulse power while fitting the cavity by RF and 40-45% for the average power. I think even less. If we'll take some reserve and consider the total value of the dissipated average power in feriites, body of the circulator and matched load will be 4 kW than we'll have water delta T (Tuotput-Tinput) equal roughly 8 degrees.
- If there are any questions do not hesitate to contact me.
- Best reagards.
- A.Seliverstov
- Director
- S.P.A.FERRITE Ltd.

- Dear Dr. Seliverstov

- I will visit Dubna in Moskow region to join to the WS of ILC next
- week. Since we discuss about the cooling issues for RF system, I am
- happy if you answer to my question. I bought your circulators, big
- one and smaller one. For WFHI3-4, is it OK under the condition of ,
- say, average power of 8kW with the flow rate of 7l/min? In this case,
- delta T equal roughly 14 degrees.
- In ILC WS, water cooling system will be discussed and this kind of
- information is useful.
- I look forward to have your answer.
- Shigeki Fukuda

- PS. Where is your company? Near to Moskow?