NSV Energy LLC
35 Hickory Springs Industrial Drive
Canton GA 30115

50,000 KW UNUSED CONDENSING STEAM TURBINE GENERATOR SET

Manufacturer: Siemens Axial Exhaust
Rating: 50,000 kw
Inlet steam Pressure: 600 to 900 psig
Inlet steam temperature: 750 to 900 Deg F
Maximum inlet steam: 483,340 lbs/hr
Exhaust pressure : 1.5" HgA
Generator rating: 55,000 kva
Turbine speed: 5,143 rpm
Generator: 1,800 rpm
Generator Voltage: 13.8 kv/3 phase/ 60 hz, 0.95 pf
Generator type: TEWAC

Scope of supply:
Steam Turbine on skid
Gear reducer
Generator
Lube oil system
Gland steam system
Generator line side and neutral side terminal boxes
Generator control panel
Turbine control panel

Not included Condenser and circulating water pumps, air ejector

Unit built 2009 unused still in original shipping crates, stored inside weather-controlled warehouse.

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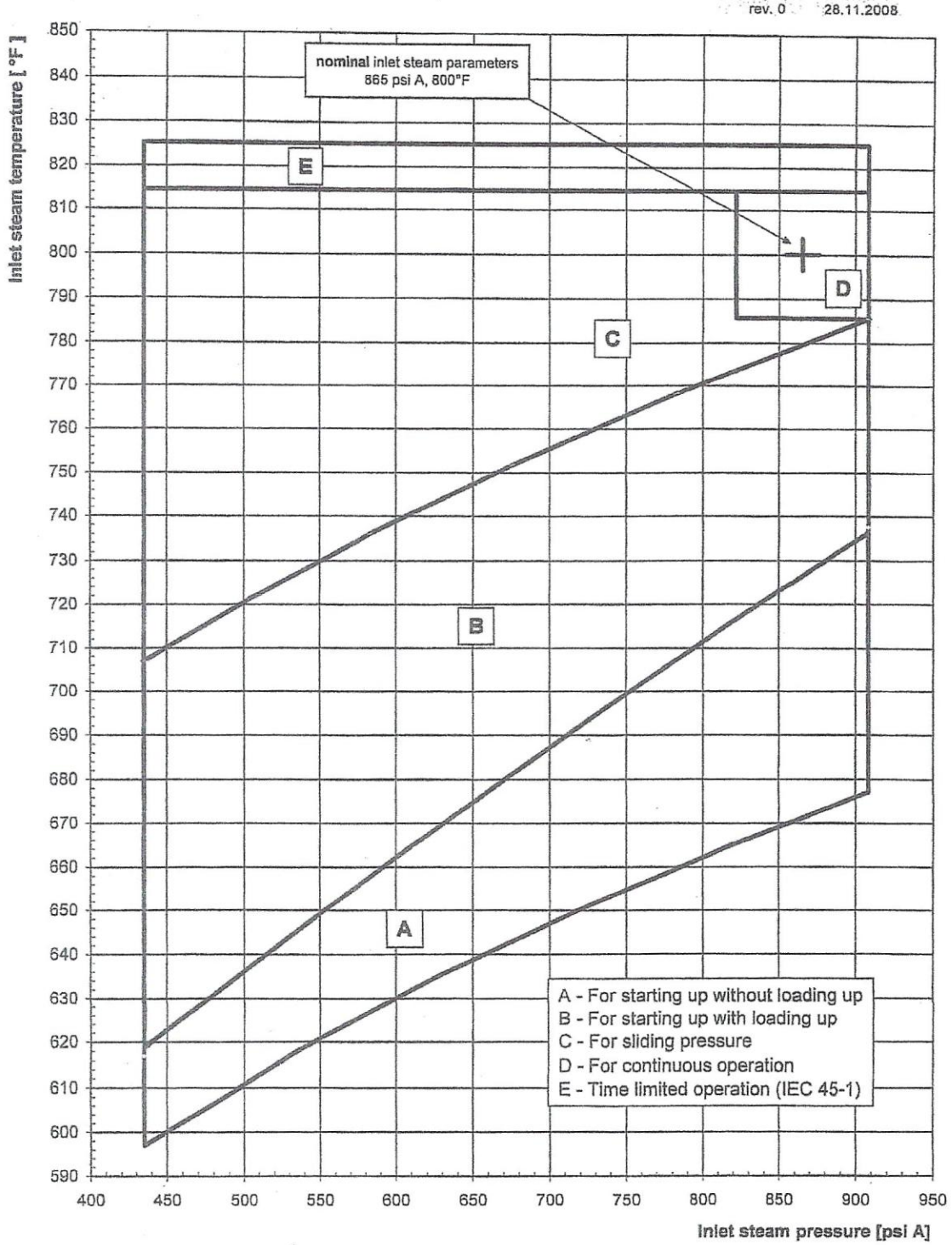
No.	KKS	Equipment Manufacturer	Additional information	Supplier No. of Dwg. Coordinate P+I	Rev.
1	MAA10	Steam turbine Siemens	x x	Siemens T1-8824-01865 G4	
2	MAK10	Gear unit	x x	Siemens T1-5000-01290 C4	
3	MAV10AT020	Oil vapour separator SIEMENS	x x 120.0 kg	Siemens T1-8824-01864 G2	
4	MAV10BB010	Oil tank SIEMENS	x x part of turboset frame	Siemens T1-8824-01864 K1	
5	MAV25AP110	Emergency oil pump Allweiler	x x 120.0 kg	Siemens T1-8824-01864 J5	
6	MAV30AC010	Oil cooler 1 lube oil G-MAR	x x 650.0 kg	Siemens T1-8824-01864 H10	
7	MAV30AC020	Oil cooler 2 lube oil G-MAR	x x 650.0 kg	Siemens T1-8824-01864 J10	
8	MAV35AT010	Oil filter 1 lube oil Boll & Kirch	x x 190.0 kg	Siemens T1-8824-01864 D11	
9	MAV35AT020	Oil filter 2 lube oil Boll & Kirch	x x 190.0 kg	Siemens T1-8824-01864 D12	
10	MAW30AC010	Gland steam condenser	x x	Siemens T1-5000-01292 J6	
11	MAX10AT010	Air vent filter	x x	Siemens T1-8824-01855 J2	
12	MAX10BB010	Oil tank	x x	Siemens T1-8824-01855 L1	
13	MAX21AP110	Oil pump control oil	x x	Siemens T1-8824-01855 J3	
14	MAX22AP110	Oil pump control oil	x x	Siemens T1-8824-01855 J5	
15	MAX35AT010	Oil filter control oil	x x	Siemens T1-8824-01855 G3	
16	MAX61AC010	Oil cooler control oil unit	x x	Siemens T1-8824-01855 F8	

SIEMENS
Industrial Turbine Brno

Admissible inlet steam conditions

5721 / DZ 2

rev. 0 28.11.2008

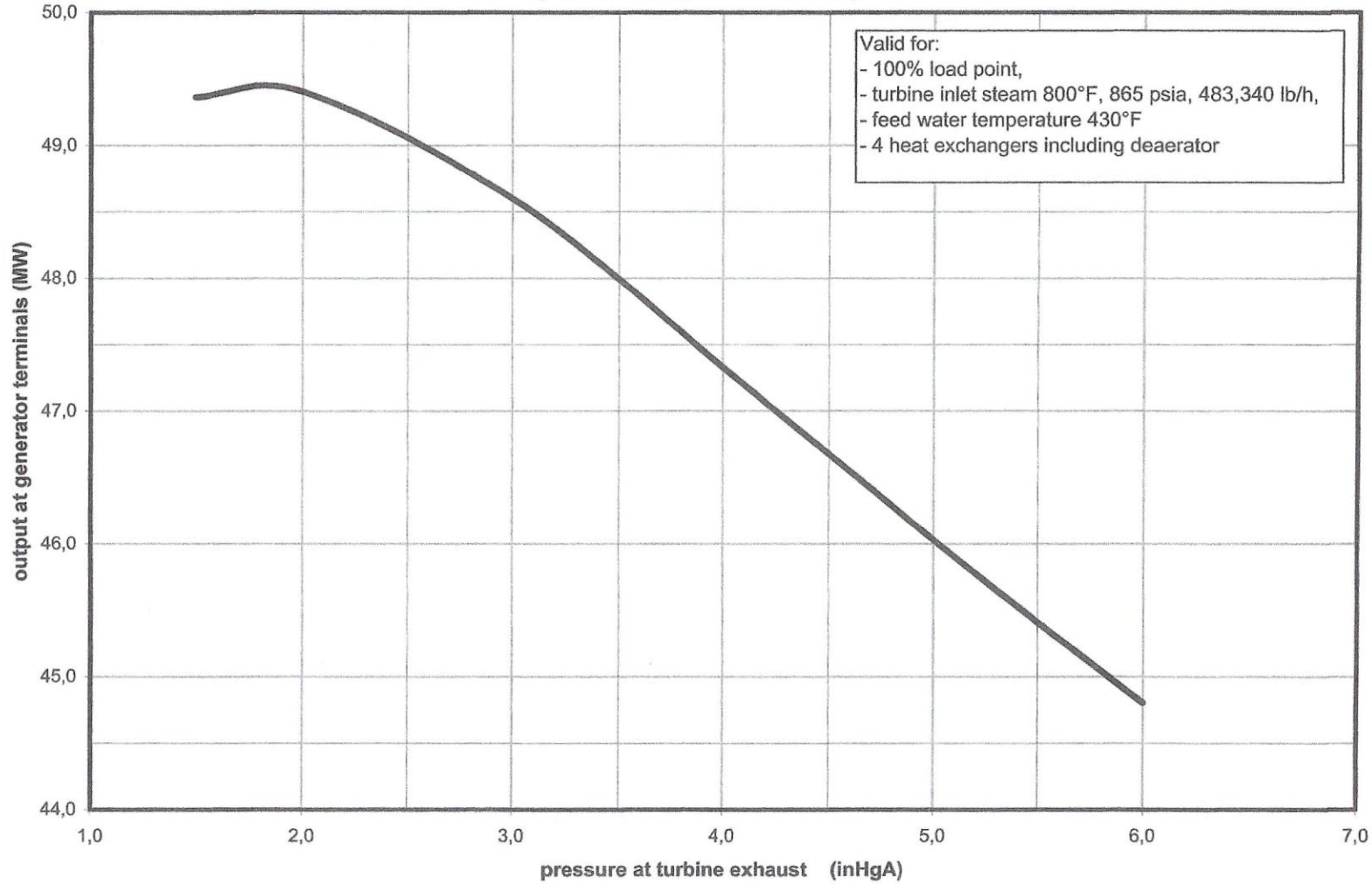


Vypracoval:	Jiří Bača		Schválil:		4.12.2008	I 2444

Siemens Industrial Turbomachinery s.r.o.

M-08.0266

Turbine exhaust pressure vs generator output - turbine SST400/C300 exh. blading
(FOR INFORMATION ONLY)



Date:
11.8.2008

Siemens Industrial Turbomachinery s.r.o.

M-08.0266

Turbine exhaust pressure vs generator output - turbine SST400/C300 exh. blading
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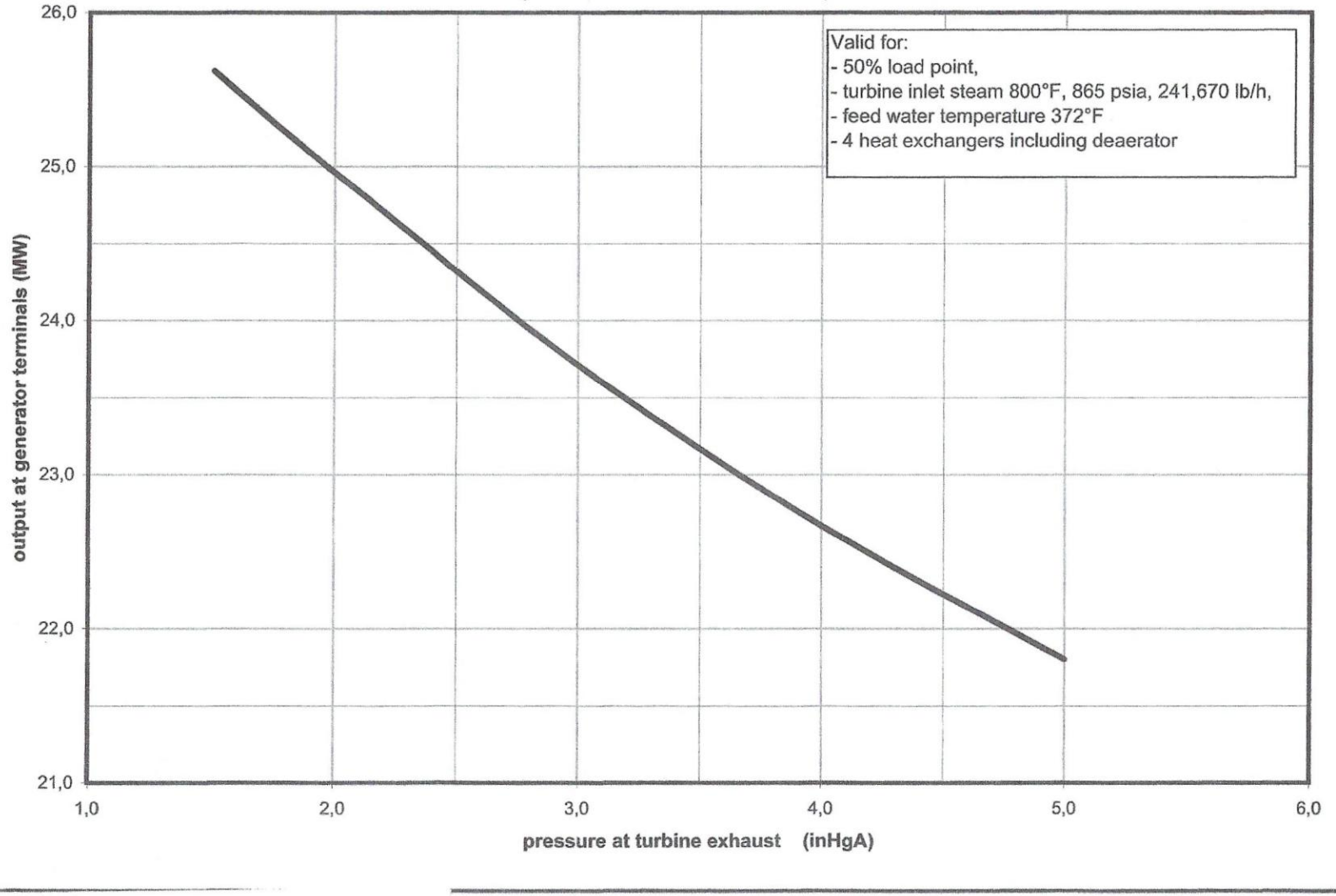

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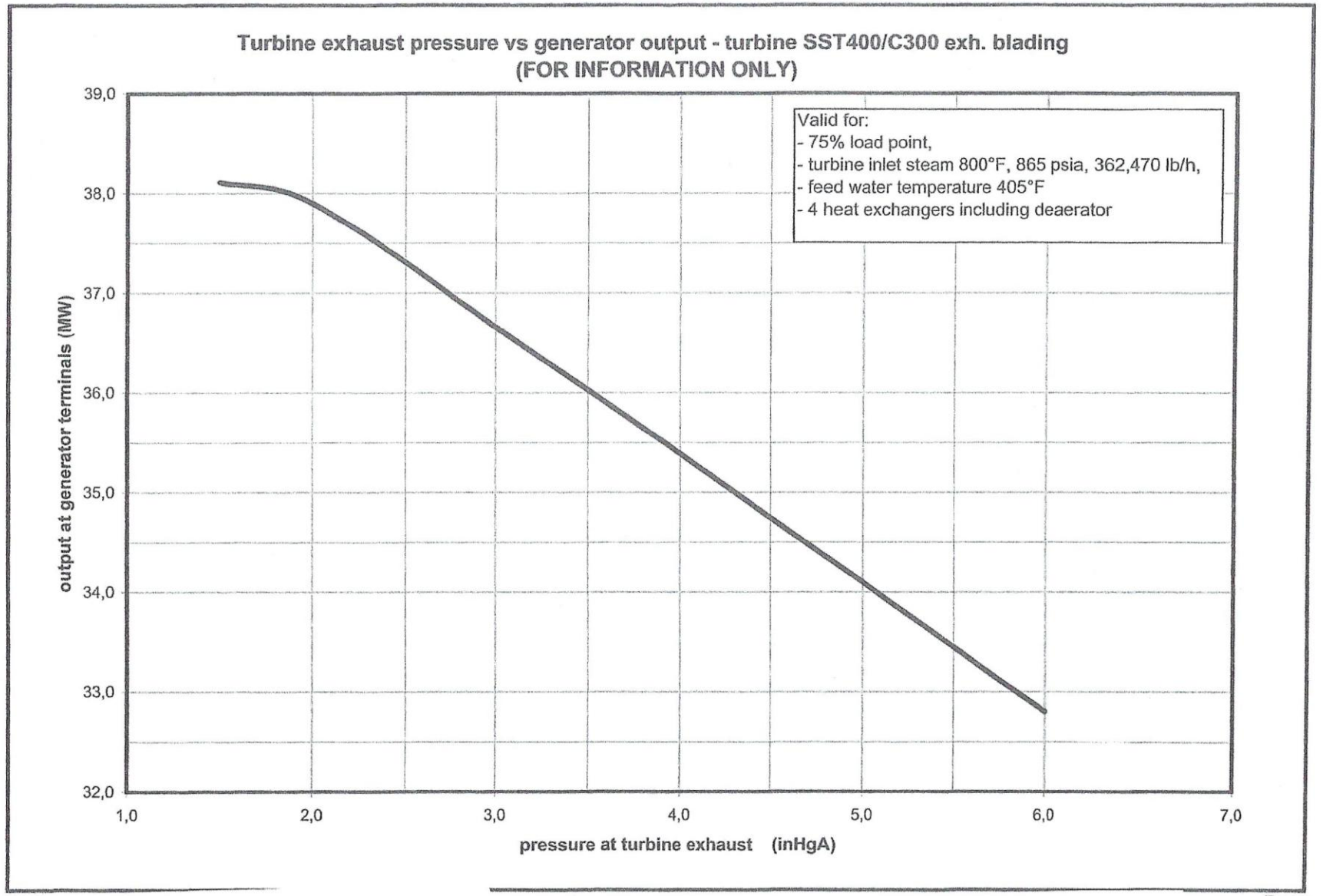
Date:
11.8.2008

Siemens Industrial Turbomachinery s.r.o.

M-08.0266



Date:
11.8.2008

A. RATED DATA

Output	kVA	:	55000
Power factor (overexcited)		:	0.90
Power factor (underexcited)		:	0.95
Voltage	V (±5%)	:	13800
Frequency	Hz (±2%)	:	60
Speed	r/min	:	1800
Current	A	:	2301
Exciter type		:	GLC 600
Excitation	V/A	:	104 / 7

B. STANDARDS

Applicable standards	:	NEMA MG 1
Insulation class stator and exciter	:	F
Insulation class main rotor	:	H
Temperature rise, stator within class	:	B
Temperature rise, rotor within class	:	B + 5 K

C. OTHER PERFORMANCE DATA

Efficiency at P.F. 0.90 and 100 / 75 / 50 / 25 % load	%	:	98.18	97.96	97.35	95.31
Efficiency at P.F. 1.00 and 100 / 75 / 50 / 25 % load	%	:	98.41	98.21	97.66	95.81

Reactances:

- X_d	(±15%) %	:	170
- X_d' unsat/sat	" %	:	23.3 / 20.0
- X_d'' unsat/sat	" %	:	14.2 / 12.1
- X_0	%	:	5.6
- X_2	%	:	14.2

Time constants:

- T_d'	s	:	0.98
- T_d''	s	:	0.023
- T_{d0}'	s	:	9.75
- T_a	s	:	0.16

F. INSTALLATION DATA

Protection form/cooling form		: IP55 TEWAC	
Cooler location/No of coolers		: Top / 2+2	
Water cooling:			
- Required cooling water flow	m^3/h	: 106.0	
- Cooling water temperature max.	°C	: 44	
- Temperature rise cooling water	K	: 6.3	
- Pressure drop cooling water	kPa	: 19	
- Fouling factor	$m^2°C/W$	: 0.0000900	
- Cooling water type		: Customer water analysis required	
Heat losses:			
- Cooling water	kW	: 793 (at rated load)	
- Lubrication oil	kW	: 65.3	
Arrangement form		: IM 1005	
Sleeve bearings:			
- Max. axial play towards D-end	mm	: 10.0	
- Max. axial play towards N-end	mm	: 10.0	
- Max. permissible axial thrust	kN	: 0	
- Min. barring speed	rpm	: 45	
- Required oil flow to bearings (Total)	l/min	: 67.9	
- Oil temperature range to bearings	°C	: 40 - 65	
- Required oil pressure at 40 °C	kPa	: 200	
At higher pressure an orifice should be used.			
- Type of oil		: ISO VG 46	
- Degree of purity for oil		: 17/15/12 acc. to ISO 4406:1999	
Weights:			
- Total (complete machine, excluding terminal box)	kg	: 73900	
- Stator	kg	: 37400	
- Rotor	kg	: 25050	A
Rotor inertia ($J=m*r_m^2$)	kgm^2	: 4187	A
Direction of rotation (at drive end, facing shaft end)		: CLOCKWISE	
First lateral critical speed (based on stiff foundation)	r/min	: 2070	
Noise level (at 1m acc.to ISO 3744)	dB(A)	: 85 , Tol. +3 dB(A)	
Static force on each machine foot	kN	: 91	
Dynamic force on each machine foot	kN	: ±558	

Sudden short circuit current (peak)	kA	:	54
Short circuit ratio	%	:	63
Max. field forcing for 10 seconds (percentage of rated excitation)	%	:	160
Sustained short circuit, stator current for 10 seconds at symetrical conditions	%	:	233
Max. permissible overspeed	r/min	:	2160 (120% for 2 minutes)
Output with one cooler element out of service	%	:	67

Allowed current harmonic content, with base 55000 kVA

Harmonic	Current content
5 th	2.0 %
7 th	1.7 %
11 th	1.2 %
13 th	1.1 %
17 th	1.0 %
19 th	1.0 %
23 th	0.9 %
25 th	0.6 %

If the current harmonic content is higher than above values,
the temperature of the machine may rise above the specified limits.

D. SITE CONDITIONS

Ambient temperature range	°C	:	-7 - +40
Altitude	m	:	< 1000
Location		:	Outdoors
Water temperature range	°C	:	26 - +44
Hazardous area classification		:	Non hazardous area

Auxiliary equipment power supply:
- Anticondensation heaters in the main machine W : 2400
- Anticondensation heater in the exciter W : 400

G. INCLUDED ACCESSORIES

Cooling arrangement IC8 A1W7
Self circulated inner air circuit cooled by built-on water-air heat exchanger.

Protection form IP55.

The cooler has following material:

Tube material	:	Stainless steel
Tube end plates	:	Stainless steel
Water box	:	Rilsan coated steel
Plate fins	:	Aluminium
Customer connection flange	:	ANSI B16.5 Cl.150
Flange location	:	Left hand
Design pressure	:	1.0 MPa
Test pressure	:	1.5 MPa

4 cooler elements. Two in series on each air side.

Exciter
Main brushless exciter type GLC for DC excitation complete with diode bridge, thyristors, RC-circuits and control box.

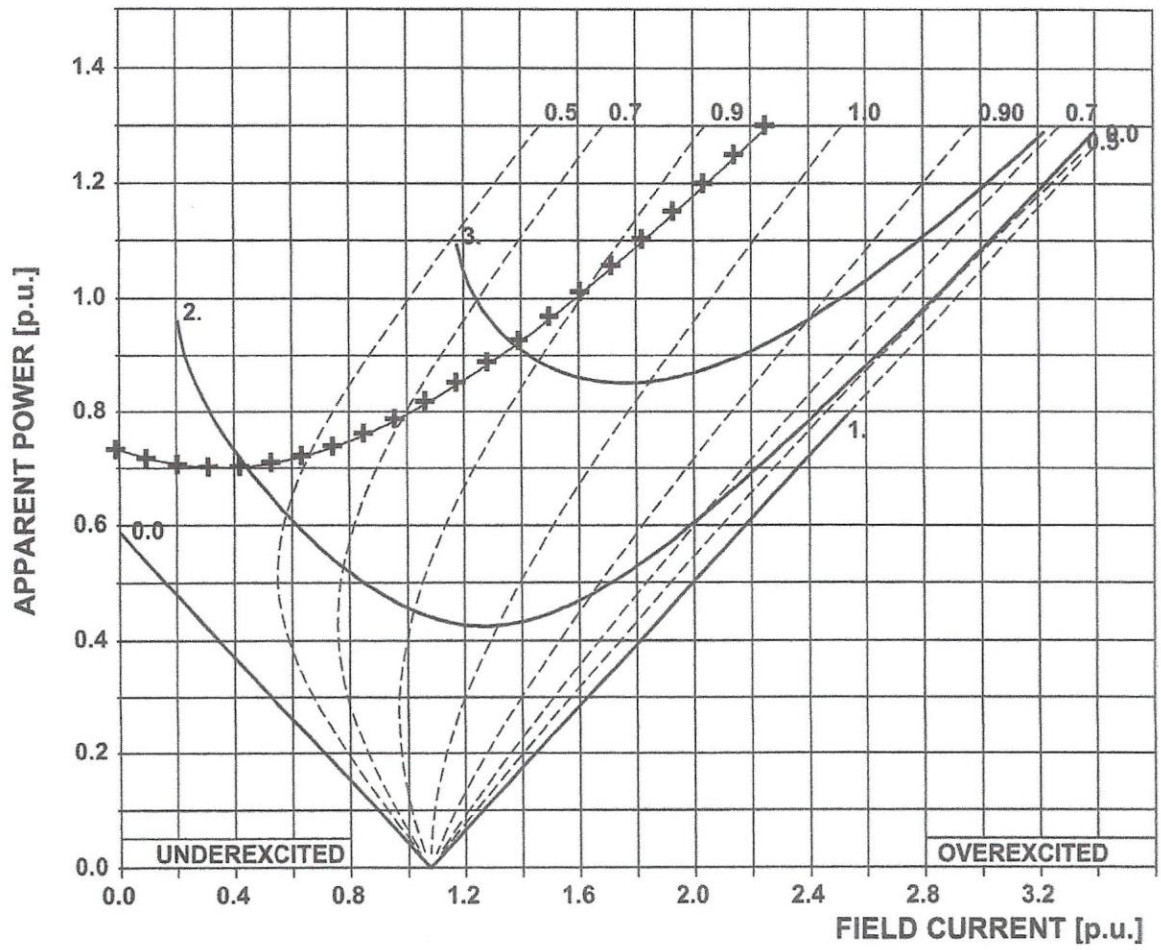
Pilot Exciter (PMG) single phase type.
MCB - PMG over current protection: 20 A.

Mounting arrangement IM 1005
Horizontal machine with two bearings, one shaft extension.

DE shaft end forged flange.

V-CURVES

AMS 1250A LK 55000 kVA 60 Hz 0.90 PF 13800 V 2301 A 1800 rpm



1. ACTIVE OUTPUT [p.u.] = 0.00
2. ACTIVE OUTPUT [p.u.] = 0.43
3. ACTIVE OUTPUT [p.u.] = 0.85

GENERATOR OUTPUT 1 p.u. = 55000 kVA
FIELD CURRENT 1 p.u. = 186 A

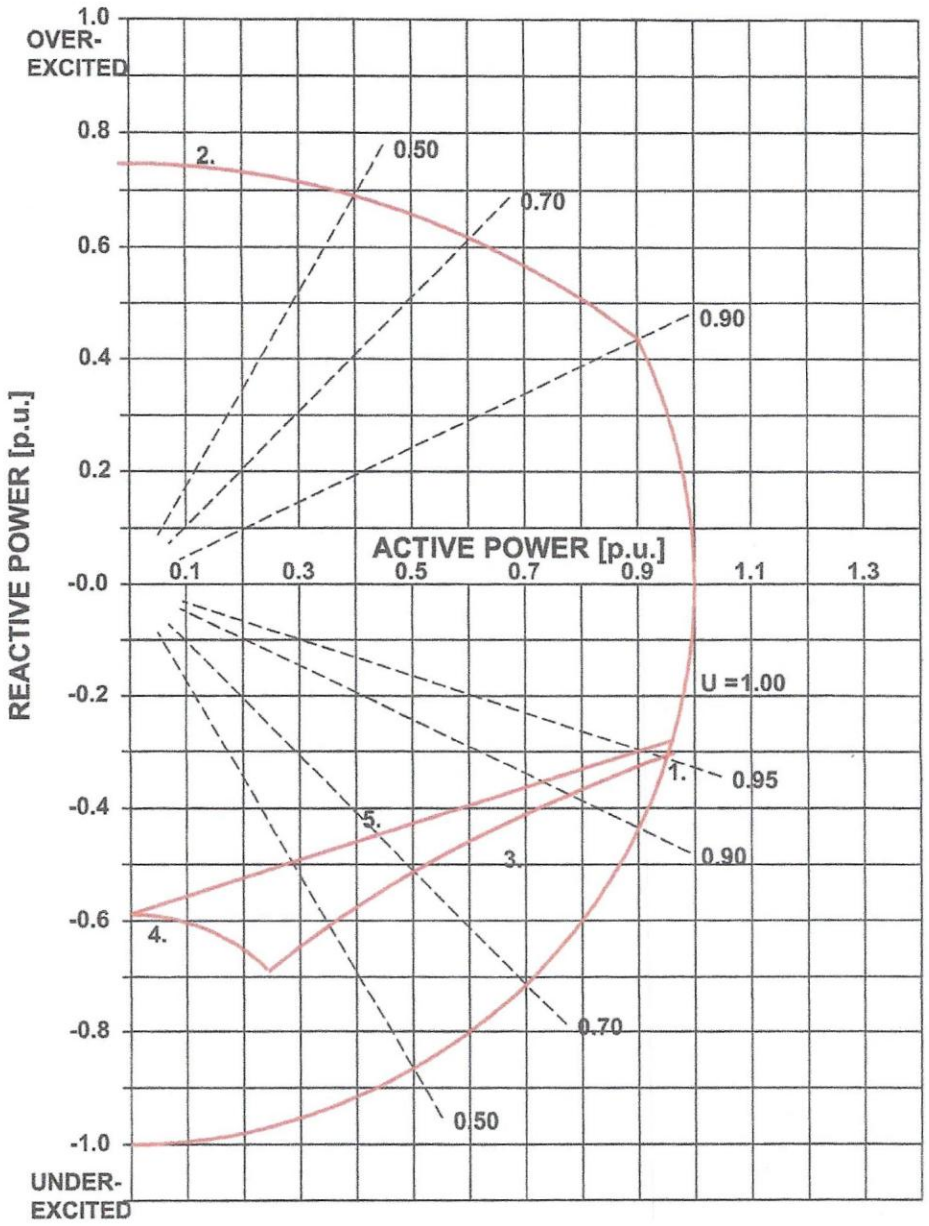
+++ PRACTICAL STABILITY LIMIT
- - - POWER FACTOR
—— ACTIVE OUTPUT

NOTE: $\frac{P}{P_N}$ = 1 IS EQUAL TO p.u. = 0.90

P_N = Nominal active output

CAPABILITY DIAGRAM AT COOLING WATER TEMPERATURE OF 44.0°C

AMS 1250A LK 55000 kVA 60 Hz 0.90 PF 13800 V 2301 A 1800 rpm

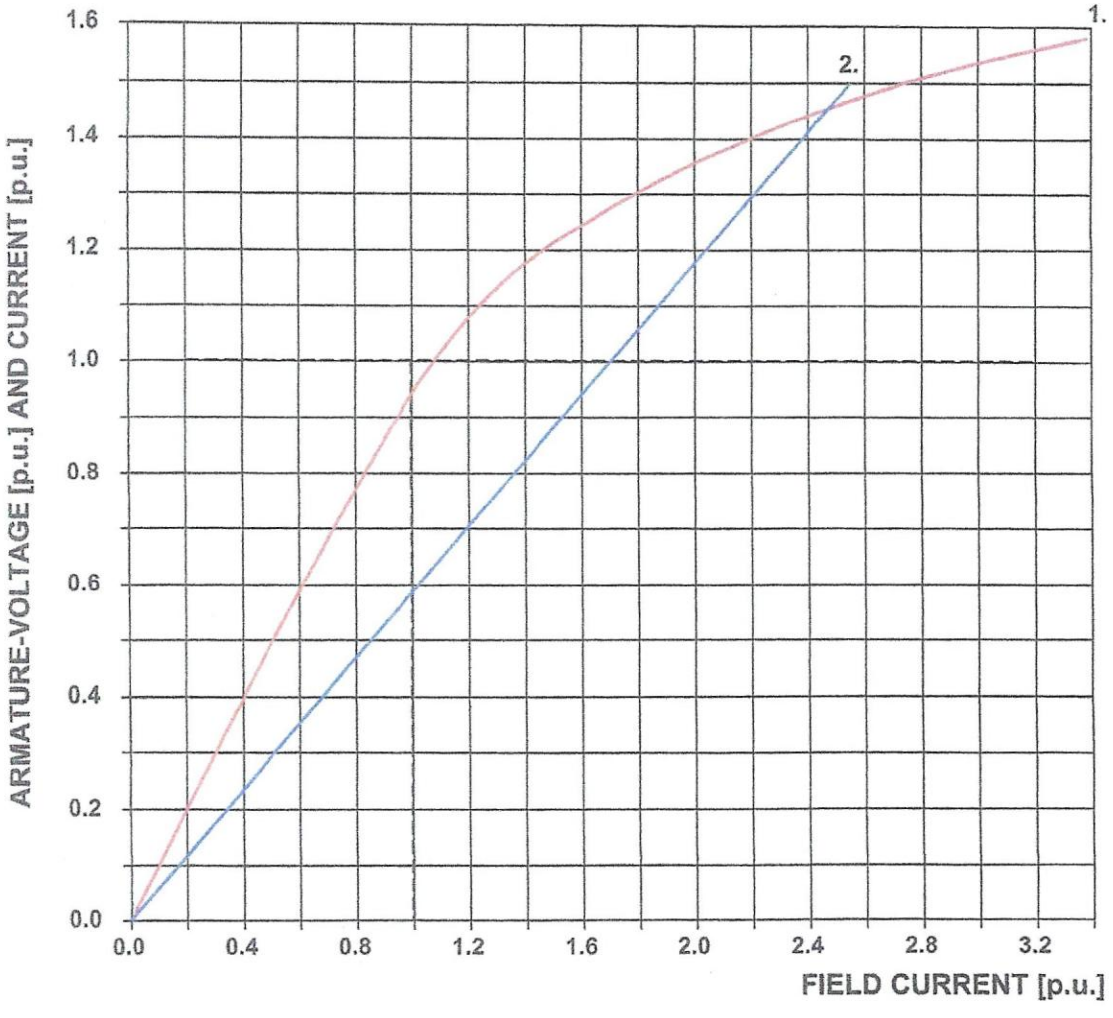


BASE APPARENT POWER 1 p.u. = 55000 kVA

1. STATOR HEATING LIMIT
2. ROTOR HEATING LIMIT
3. PRACTICAL STABILITY LIMIT
4. ZERO FIELD-CURRENT LIMIT
5. CORE END HEATING LIMIT

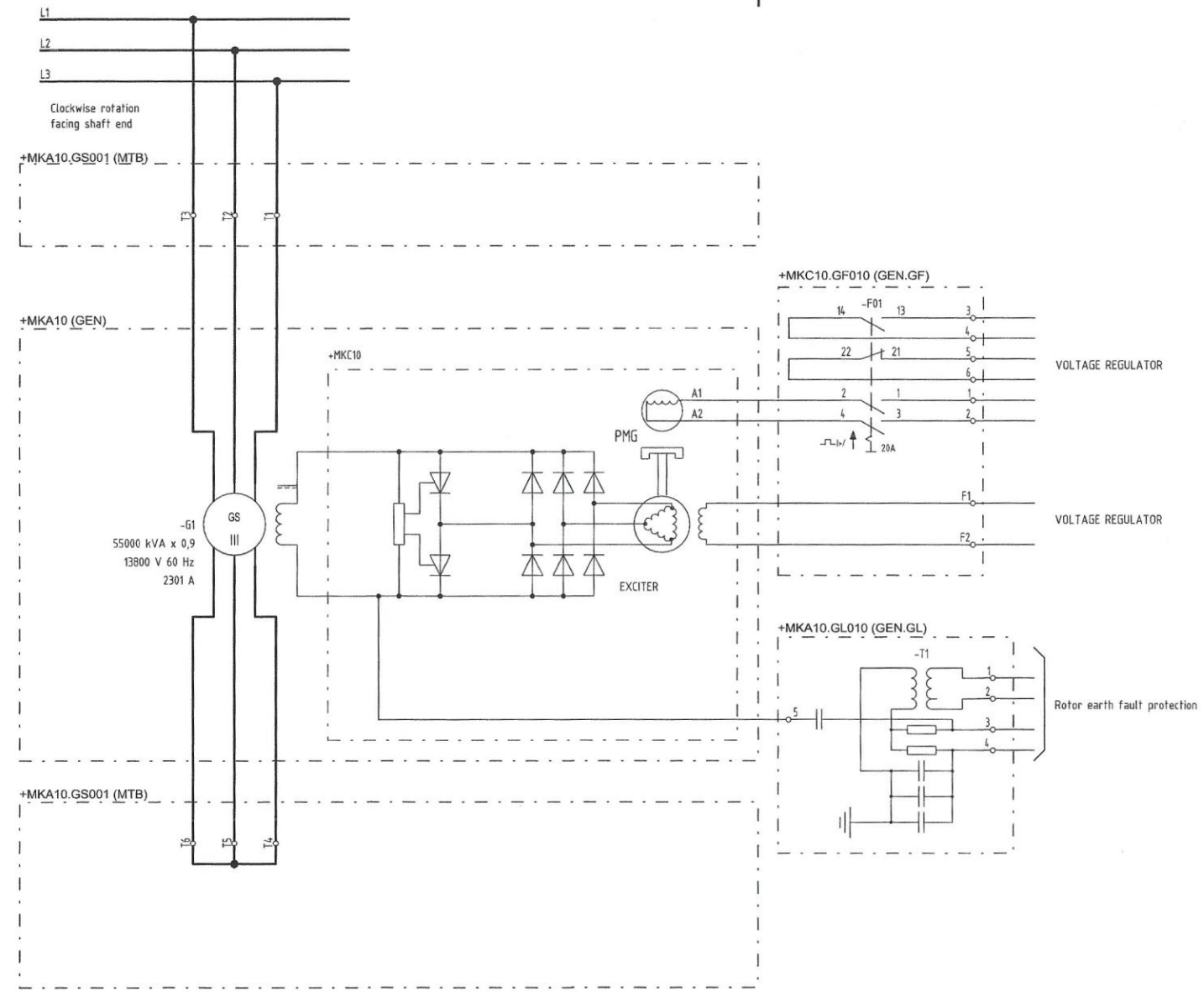
SATURATION CURVES - A

AMS 1250A LK 55000 kVA 60 Hz 0.90 PF 13800 V 2301 A 1800 rpm



1. OPEN -CIRCUIT SATURATION
2. SHORT-CIRCUIT SATURATION

ARMATURE VOLTAGE	1 p.u. =	13800 V
ARMATURE CURRENT	1 p.u. =	2301 A
FIELD CURRENT	1 p.u. =	186 A



Based on		Prepared 2009-01-22	B Gothilander	Title Line connection, Generator		External doc. id.					
Customer Siemens Industrial Turbomachinary s.r.o.		Approved 2009-09-10	A Sarajlic			Ref. designation					
Project no. L001320		Work order id. L001320-A	Resp. (division/department) MAE	Released	ABB	Document kind Circuit diagram	Document id. XYK 214 100-FRR	Rev. B	Lang. en	Page 2	Conf. 3

D041_A3

Siemens Industrial Turbomachinery s.r.o.
Olomoucka 7/9, 618 00 Brno, Czech Republic

			Packing	Stockable	length (cm)	width (cm)	high (cm)	m^2	volume m3	net (kg)	tara (kg)	gross (kg)
1	1	Steam Turbine on the base frame	Tarpaulin	No	612	384	387	23.50	90.95	59,800	200	60,000
1	2	Base frame with oil system and gearbox	Tarpaulin	No	646	364	339	23.51	79.71	35,800	200	36,000
1	3	Base plates, bolts and fixing elements	Plywood box	No	210	50	74	1.05	0.78	1,102	90	1,192
1	4	Turbine accessories	Plywood box	No	459	216	217	9.91	21.51	4,100	500	4,600
1	5A	Oil cooler I.	Plywood box	No	489	164	148	8.02	11.87	3,200	500	3,700
1	5B	Oil cooler II.	Plywood box	No	489	164	162	8.02	12.99	3,300	500	3,800
1	6	Piping I.	Plywood box	Yes	320	70	70	2.24	1.57	398	123	521
1	7	Piping II.	Plywood box	No	716	133	168	9.52	16.00	2,300	700	3,000
1	8	Turbine valves I.	Plywood box	No	271	138	143	3.74	5.35	740	300	1,040
1	9	Flap valves I.	Plywood box	No	250	138	130	3.45	4.49	1,700	250	1,950
1	10	Spare parts	Plywood box	Yes	46	46	25	0.21	0.05	10	4	14
1	11	Flap valves II.	Plywood box	Yes	260	104	100	2.70	2.70	350	180	530
1	12	Flap valves III.	Plywood box	No	270	104	100	2.81	2.81	1,400	190	1,590
1	13	Turbine valves II.	Plywood box	Yes	220	133	107	2.93	3.13	460	190	650
1	14	Oil purifier	Plywood box	Yes	98	98	235	0.96	2.26	225	150	375
1	15	Control oil hydraulic unit	Plywood box	No	218	173	228	3.77	8.60	1,200	400	1,600
1	16	Main terminal box	Plywood box	No	346	173	312	5.99	18.68	2,050	750	2,800
1	17	Electrical cubicles	Plywood box	No	181	143	248	2.59	6.42	720	300	1,020
1	18	Electrical cubicles - accessories	Plywood box	No	321	173	250	5.55	13.88	650	500	1,150

Baucomex a.s., Czech Republic

			Packing	Stock	length (cm)	width (cm)	high (cm)	m^2	volume m3	net (kg)	tara (kg)	gross (kg)
1	19	Noise hood 1.	Plywood box	No	661	233	155	15.40	23.87	950	820	1,770
1	20	Noise hood 2.	Plywood box	No	661	233	155	15.40	23.87	1,850	820	2,670
1	21	Noise hood 3.	Plywood box	No	488	230	154	11.22	17.28	750	630	1,380
1	22	Noise hood 4.	Plywood box	No	468	230	154	10.76	16.58	550	610	1,160
1	23	Noise hood 5.	Plywood box	No	468	230	154	10.76	16.58	600	610	1,210
1	24	Noise hood 6.	Plywood box	No	468	230	154	10.76	16.58	600	610	1,210
1	25	Noise hood 7.	Plywood box	No	468	230	154	10.76	16.58	500	570	1,070
1	26	Noise hood 8.	Plywood box	Yes	308	230	152	7.08	10.77	353	477	830
1	27	Noise hood 9.	Plywood box	No	338	250	224	8.45	18.93	700	605	1,305
1	28	Noise hood 10.	Plywood box	No	1,260	236	160	29.74	47.58	7,000	1470	8,470
1	29	Noise hood 11.	Plywood box	No	511	236	158	12.06	19.05	5,000	655	5,655
1	30	Noise hood 12.	Plywood box	No	348	240	224	8.35	18.71	400	610	1,010
1	31	Noise hood 13.	Plywood box	No	550	242	224	13.31	29.81	1,300	905	2,205

ABB Västerås

			Packing	Stock	length (cm)	width (cm)	high (cm)	m^2	volume m3	net (kg)	tara (kg)	gross (kg)
1	32	Generator	Wooden crate	No	617	383	340	23.63	80.35	75,030	4,170	79,200
1	33	Generator cooler	Wooden crate	No	413	302	224	12.47	27.94	1,602	1,998	3,600
1	34	Rotor withdrawel tool - sliding plate	Wooden crate	Yes	306	65	27	1.99	0.54	70	30	100
1	35	Rotor withdrawel tool - package	Wooden crate	Yes	90	80	68	0.72	0.49	110	50	160
1	36	Generator - spare parts	Wooden crate	Yes	80	60	63	0.48	0.30	50	13	63

Siemens AG, Germany

			Packing	Stock	length (cm)	width (cm)	high (cm)	m^2	volume m3	net (kg)	tara (kg)	gross (kg)
1	37	Control system - Cabinet 1CJJ10	Plywood box	No	150	90	255	1.35	3.44	395	254	649
1	39	Control system - accessorries	Plywood box	No	150	80	120	1.20	1.44	78	135.00	213

API Basco, United States

			Packing	Stock	length (cm)	width (cm)	high (cm)	m^2	volume m3	net (kg)	tara (kg)	gross (kg)
0	38	Gland Steam Condenser	Plywood box		281	148	211	4.16	8.78	1,050	370	1,420

39		:TOTAL COLLIES								218,443		240,882