IDEAL ELECTRIC CO.

330 EAST FIRST STREET • MANSFIELD OHIO 44902 • USA
TELEPHONE (419) 522 - 3611 • FAX (419) 522 - 9386

GENERATOR TEST REPORT

GENERATOR NAMEPLATE RATING

KW	KVA	RPM	Hz	Volts	Amps	Frame
9500	11177	1800	60	13200	489	21520-38

Rated Temperature Rise:

Stator by Detector	80 °C
Rotor by Res.	80 °C
Insulation Class	F

BRUSHLESS EXCITER NAMEPLATE RATING

KW	DC Volts	DC Amps	Field Volts	Field Amps	Frame	Temp Rise
25	180	139	71	3.5	BE-13-3	80 °C

FACTORY TEST RESULTS

Field coil polarity: Polarity alternating between Plus and Minus around the entire rotor.
PASS

		Generator		Exciter		
		Stator	Rotor	Armature	Field	PMA
Winding Resistance Ohms at	22 °C	0.0103	1.259	0.0260	15.41	1.039
Insulation Resistance Megohms	38 °C	21000	6480	6480	51000	20300
High Potential Test Voltage		27400	2000	2000	1500	1500
Average Air Gap Measurement		0.502		0.040		0.047

Phase Sequence: T1, T3, T2 with CCW shaft rotation viewed from the exciter end.

No Load Exciter Field Current: 1.2 Amps.

Phase Balance:	T1	T2	T3
	13198 V	13201 V	13203 V

Tests Certified by: *Simon P. Ghazarian*
Report Date: 16-Nov-01 Simon Ghazarian, Electrical Engineer

Operation

Effects of Ambient Temperature

Generator output is normally limited by the temperature rise of the windings above a specified ambient air temperature. The sum of the temperature rise and the ambient is called the total winding temperature.

It is this total temperature which is the limiting factor in determining machine output. Thus, if a generator is operated in a lower than rated ambient, the maximum safe output may be increased.

For example, a generator is rated for an 80°C temperature rise above a 40°C ambient (120°C total temperature). If this generator is operated in a 30°C ambient, the temperature rise may be allowed to increase to 90°C (120°C total temperature) allowing an increase in output. Likewise, for ambient temperatures above the rated ambient, the allowable temperature rise and output are reduced.

Figure I-2 is a curve of output in percent of rated versus ambient temperature for a generator rated at 40°C ambient. Note that rated output (100%) occurs at 40°C ambient.

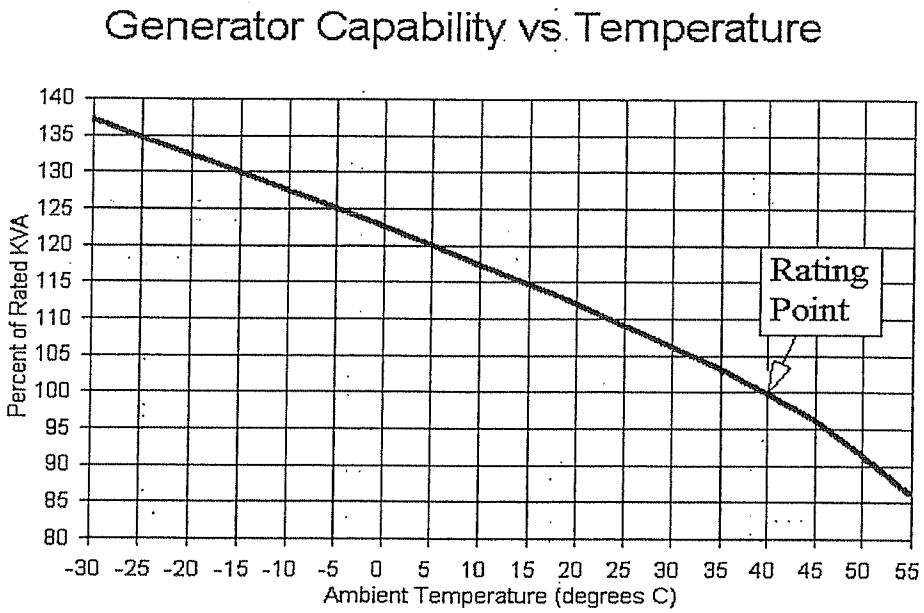

Figure I-2. Capability and Ambient Temperature Curve

Reactive Capability

The reactive capability curve (Fig. I-3) defines the limits of operation of a synchronous generator in terms of the kilowatt and kilovar output. The vertical or "Y" axis gives the reactive power output (kilovars) in percent of the rated KVA of the generator. The horizontal or "X" axis gives the real power output (kilowatts) in percent of the rated KVA of the generator

Power factor is represented by radial lines from the origin of the "X" and "Y" axes. Lagging or overexcited power factors are on the upper half of the graph and leading or underexcited power factors on the lower half.

The curve is composed of three distinct segments as described below:

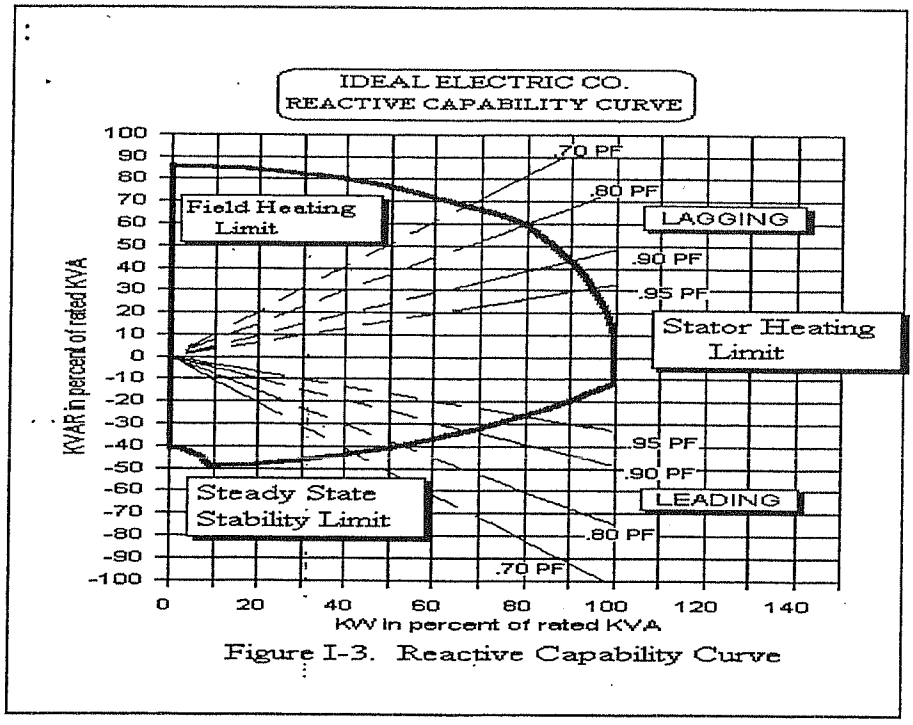

Figure I-3. Reactive Capability Curve

a) The **uppermost segment** from the "Y" axis to rated power factor curve represents the **field-heating** limit. This is the limit of operation based on operating at rated field current. The intersection of this segment with the "Y" axis gives the maximum KVAR output of the generator (in percent rated KVA) at zero power factor lagging as for synchronous condenser operation.

b) The **center segment** of the curve from rated power factor down to the next intersection point is the **stator-heating** limit. This segment is a curve of constant KVA; thus the stator current and also the stator heating are constant.

c) The **lower segment** is the **steady state stability** limit. Operation outside of this curve would result in pulling out of step with the connected system causing severe electrical and mechanical transients. For this reason, it is recommended that the generator be operated within this limit by a sufficient margin.

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GENERATOR TEST REPORT

Customer: Tuthill Energy Systems
Subject: Miller Brewery
Trenton, Ohio

Ideal S\N 011077-01
Cust. No. 4500181020

BEARING TEST

	Drive End Bearing	Exciter End Bearing
Oil in Temperature	45 °C	41 °C
Oil Flow	1.6 GPM	1.6 GPM
Pressure	20 PSI	20 PSI
Bearing Temperature	56 °C	57 °C
Acceptance Criteria	Maximum bearing temperature of 25°C over the oil in temperature	

Test oil viscosity: 150 SSU @ 100 °F
Ambient temperature during test: 23 °C

VIBRATION MEASUREMENTS
Test in inches per second (RMS) at 1800 RPM for 5 minutes.

	Drive End Brg. Housing	Exciter End Brg. Housing
Horizontal	0.021	0.009
Vertical	0.014	0.010
Axial	0.016	0.017

Tests Certified by: *Ken Steinman*
Report Date: 16-Nov-01 Ken Steinman, Mechanical Project Manager