

GENERATOR DATA**JUNE 17, 2015**For Help Desk Phone Numbers [Click here](#)**Selected Model**

Engine: 3412	Generator Frame: 596	Genset Rating (kW): 700.0	Line Voltage: 480
Fuel: Diesel	Generator Arrangement: 1366598	Genset Rating (kVA): 875.0	Phase Voltage: 277
Frequency: 60	Excitation Type: Permanent Magnet	Pwr. Factor: 0.8	Rated Current: 1052.5
Duty: STANDBY	Connection: SERIES STAR	Application: EPG	Status: Current

Version: 39094 /39321 /38261 /1642

Spec Information

Generator Specification		Generator Efficiency		
Frame: 596	Type: SR4B	No. of Bearings: 1	Per Unit Load	kW
Winding Type: RANDOM WOUND	Flywheel: 18.0			Efficiency %
Connection: SERIES STAR	Housing: 0		0.25	175.0
Phases: 3	No. of Leads: 12		0.5	350.0
Poles: 4	Wires per Lead: 4		0.75	525.0
Sync Speed: 1800	Generator Pitch: 0.8667		1.0	700.0
				92.4
				95.1
				95.7
				95.7

Reactances	Per Unit	Ohms
SUBTRANSIENT - DIRECT AXIS X''_d	0.1249	0.0329
SUBTRANSIENT - QUADRATURE AXIS X''_q	0.1280	0.0337
TRANSIENT - SATURATED X'_d	0.1868	0.0492
SYNCHRONOUS - DIRECT AXIS X_d	2.6402	0.6952
SYNCHRONOUS - QUADRATURE AXIS X_q	1.3395	0.3527
NEGATIVE SEQUENCE X_2	0.1265	0.0333
ZERO SEQUENCE X_0	0.0824	0.0217

Time Constants	Seconds
OPEN CIRCUIT TRANSIENT - DIRECT AXIS T'_{d0}	3.1050
SHORT CIRCUIT TRANSIENT - DIRECT AXIS T'_d	0.2197
OPEN CIRCUIT SUBTRANSIENT - DIRECT AXIS T''_{d0}	0.0093
SHORT CIRCUIT SUBTRANSIENT - DIRECT AXIS T''_d	0.0071
OPEN CIRCUIT SUBTRANSIENT - QUADRATURE AXIS T''_{q0}	0.0085
SHORT CIRCUIT SUBTRANSIENT - QUADRATURE AXIS T''_q	0.0067
EXCITER TIME CONSTANT T_e	0.1400
ARMATURE SHORT CIRCUIT T_a	0.0306

Short Circuit Ratio: 0.51	Stator Resistance = 0.0071 Ohms	Field Resistance = 1.855 Ohms
---------------------------	---------------------------------	-------------------------------

Voltage Regulation		Generator Excitation		
Voltage level adjustment: +/-	5.0%	No Load	Full Load, (rated) pf	
Voltage regulation, steady state: +/-	0.5%		Series	Parallel
Voltage regulation with 3% speed change: +/-	0.5%	Excitation voltage:	8.57 Volts	36.58 Volts
Waveform deviation line - line, no load: less than	5.0%	Excitation current	1.9 Amps	6.67 Amps
Telephone influence factor: less than	50			

Selected Model

Engine: 3412	Generator Frame: 596	Genset Rating (kW): 700.0	Line Voltage: 480
Fuel: Diesel	Generator Arrangement: 1366598	Genset Rating (kVA): 875.0	Phase Voltage: 277
Frequency: 60	Excitation Type: Permanent Magnet	Pwr. Factor: 0.8	Rated Current: 1052.5
Duty: STANDBY	Connection: SERIES STAR	Application: EPG	Status: Current

Version: 39094 /39321 /38261 /1642

Generator Mechanical Information

Center of Gravity

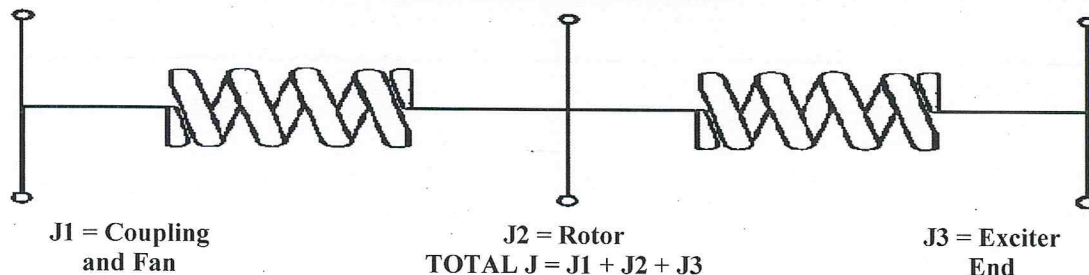
Dimension X	-766.6 mm	-30.2 IN.
Dimension Y	0.0 mm	0.0 IN.
Dimension Z	0.0 mm	0.0 IN.

- "X" is measured from driven end of generator and parallel to rotor. Towards engine fan is positive. See General Information for details
- "Y" is measured vertically from rotor center line. Up is positive.
- "Z" is measured to left and right of rotor center line. To the right is positive.

Generator WT = 2129 kg * Rotor WT = 768 kg * Stator WT = 1360 kg
 4,694 LB 1,693 LB 2,998 LB

Rotor Balance = 0.0508 mm deflection PTP
 Overspeed Capacity = 150% of synchronous speed

Generator Torsional Data



K1 = Shaft Stiffness between J1 + J2 (Diameter 1)

K2 = Shaft Stiffness between J2 + J3 (Diameter 2)

J1	K1	Min Shaft Dia 1	J2	K2	Min Shaft Dia 2	J3
11.8 LB IN. s ²	124.8 MLB IN./rad	5.0 IN.	101.2 LB IN. s ²	22.1 MLB IN./rad	3.3 IN.	1.5 LB IN. s ²
1.336 N m s ²	14.1 MN m/rad	127.0 mm	11.437 N m s ²	2.5 MN m/rad	83.8 mm	0.171 N m s ²
			Total J			
			114.6 LB IN. s ²			
			12.944 N m s ²			

Selected Model

Engine: 3412	Generator Frame: 596	Genset Rating (kW): 700.0	Line Voltage: 480
Fuel: Diesel	Generator Arrangement: 1366598	Genset Rating (kVA): 875.0	Phase Voltage: 277
Frequency: 60	Excitation Type: Permanent Magnet	Pwr. Factor: 0.8	Rated Current: 1052.5
Duty: STANDBY	Connection: SERIES STAR	Application: EPG	Status: Current

Version: 39094 /39321 /38261 /1642**Generator Cooling Requirements -
Temperature - Insulation Data**

Cooling Requirements:	Temperature Data: (Ambient 40 °C)
Heat Dissipated: 31.5 kW	Stator Rise: 130.0 °C
Air Flow: 112.2 m ³ /min	Rotor Rise: 130.0 °C

Insulation Class: H**Insulation Reg. as shipped:** 100.0 MΩ minimum at 40 °C**Thermal Limits of Generator**

Frequency:	60 Hz
Line to Line Voltage:	480 Volts
B BR 80/40	706.0 kVA
F BR -105/40	850.0 kVA
H BR - 125/40	938.0 kVA
F PR - 130/40	938.0 kVA

Selected Model

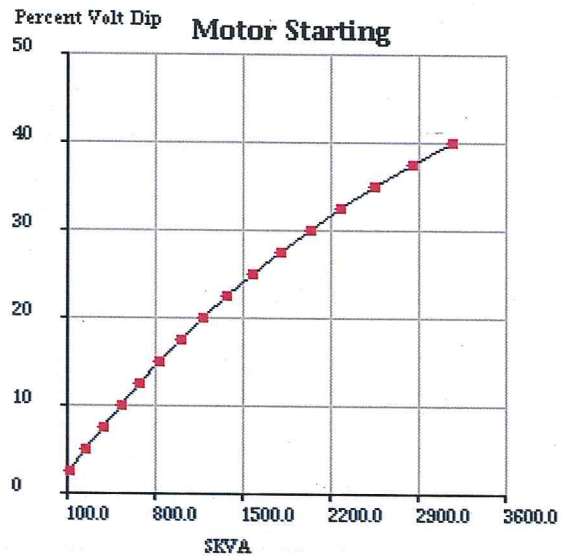
Engine: 3412	Generator Frame: 596	Genset Rating (kW): 700.0	Line Voltage: 480
Fuel: Diesel	Generator Arrangement: 1366598	Genset Rating (kVA): 875.0	Phase Voltage: 277
Frequency: 60	Excitation Type: Permanent Magnet	Pwr. Factor: 0.8	Rated Current: 1052.5
Duty: STANDBY	Connection: SERIES STAR	Application: EPG	Status: Current

Version: 39094 /39321 /38261 /1642

Starting Capability & Current Decrement

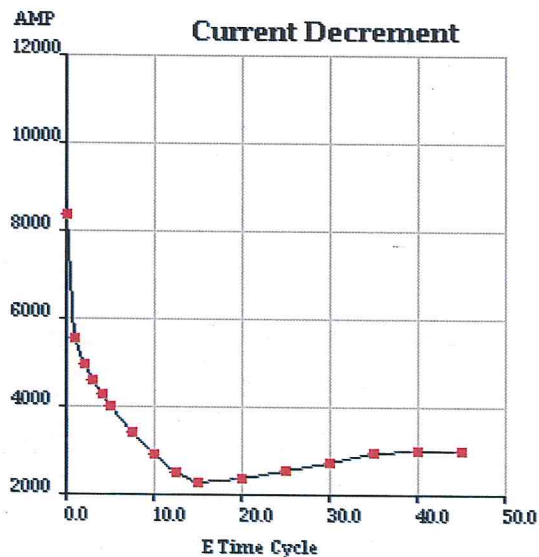
Motor Starting Capability (0.4 pf)

SKVA	Percent Volt Dip
122	2.5
250	5.0
385	7.5
527	10.0
678	12.5
838	15.0
1,007	17.5
1,187	20.0
1,378	22.5
1,582	25.0
1,800	27.5
2,034	30.0
2,285	32.5
2,556	35.0
2,848	37.5
3,164	40.0



Current Decrement Data

E Time Cycle	AMP
0.0	8,349
1.0	5,524
2.0	4,935
3.0	4,589
4.0	4,287
5.0	4,009
7.5	3,401
10.0	2,897
12.5	2,481
15.0	2,276
20.0	2,346
25.0	2,534
30.0	2,739
35.0	2,937
40.0	3,007
45.0	3,011



Instantaneous 3 Phase Fault Current: 8349 Amps

Instantaneous Line - Line Fault Current: 7190 Amps

Instantaneous Line - Neutral Fault Current: 9382 Amps

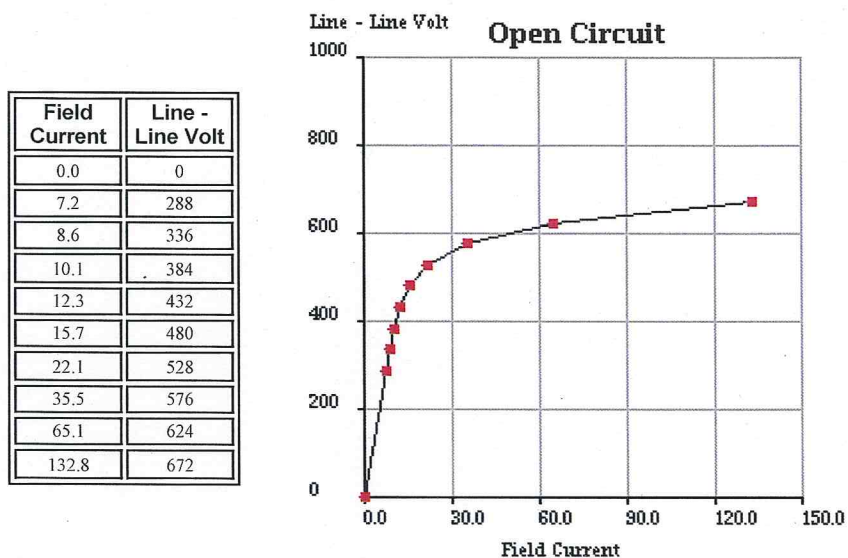
Selected Model

Engine: 3412	Generator Frame: 596	Genset Rating (kW): 700.0	Line Voltage: 480
Fuel: Diesel	Generator Arrangement: 1366598	Genset Rating (kVA): 875.0	Phase Voltage: 277
Frequency: 60	Excitation Type: Permanent Magnet	Pwr. Factor: 0.8	Rated Current: 1052.5
Duty: STANDBY	Connection: SERIES STAR	Application: EPG	Status: Current

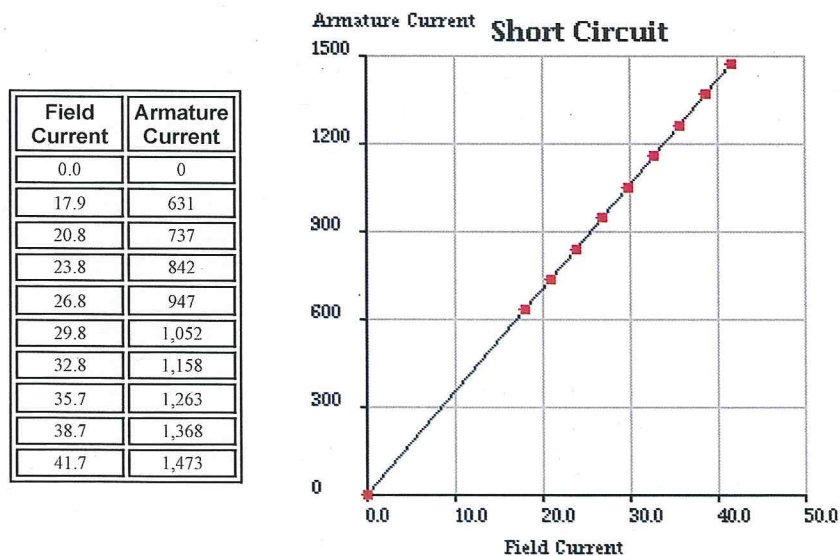
Version: 39094 /39321 /38261 /1642

Generator Output Characteristic Curves

Open Circuit Curve



Short Circuit Curve



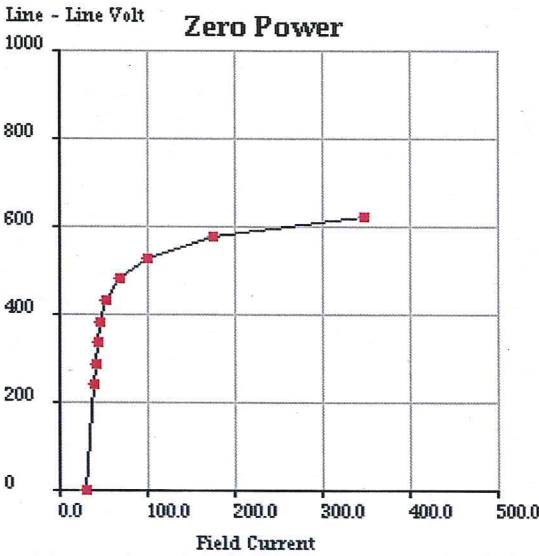
Selected Model

Engine: 3412	Generator Frame: 596	Genset Rating (kW): 700.0	Line Voltage: 480
Fuel: Diesel	Generator Arrangement: 1366598	Genset Rating (kVA): 875.0	Phase Voltage: 277
Frequency: 60	Excitation Type: Permanent Magnet	Pwr. Factor: 0.8	Rated Current: 1052.5
Duty: STANDBY	Connection: SERIES STAR	Application: EPG	Status: Current
Version: 39094 /39321 /38261 /1642			

Generator Output Characteristic Curves

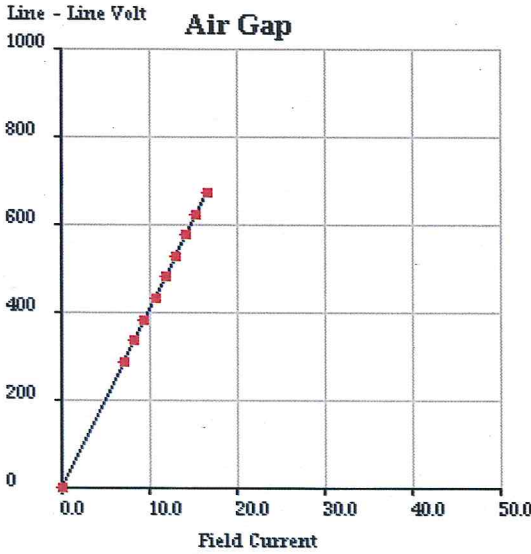
Zero Power Factor Curve

Field Current	Line - Line Volt
29.8	0
38.2	240
39.9	288
42.2	336
45.8	384
52.8	432
67.5	480
100.2	528
175.2	576
348.8	624



Air Gap Curve

Field Current	Line - Line Volt
0.0	0
7.1	288
8.2	336
9.4	384
10.6	432
11.8	480
13.0	528
14.1	576
15.3	624
16.5	672



Selected Model

Engine: 3412	Generator Frame: 596	Genset Rating (kW): 700.0	Line Voltage: 480
Fuel: Diesel	Generator Arrangement: 1366598	Genset Rating (kVA): 875.0	Phase Voltage: 277
Frequency: 60	Excitation Type: Permanent Magnet	Pwr. Factor: 0.8	Rated Current: 1052.5
Duty: STANDBY	Connection: SERIES STAR	Application: EPG	Status: Current
			Version: 39094 /39321 /38261 /1642

Reactive Capability Curve

[Click to view Chart](#)

Selected Model

Engine: 3412	Generator Frame: 596	Genset Rating (kW): 700.0	Line Voltage: 480
Fuel: Diesel	Generator Arrangement: 1366598	Genset Rating (kVA): 875.0	Phase Voltage: 277
Frequency: 60	Excitation Type: Permanent Magnet	Pwr. Factor: 0.8	Rated Current: 1052.5
Duty: STANDBY	Connection: SERIES STAR	Application: EPG	Status: Current

Version: 39094 /39321 /38261 /1642
General Information

DM7802

GENERATOR GENERAL INFORMATION**I. GENERATOR MOTOR STARTING CAPABILITY CURVES**

A. THE MOTOR STARTING CURVES ARE REPRESENTATIVE OF THE DATA OBTAINED BY THE FOLLOWING PROCEDURE:

1. THE CATERPILLAR GENERATOR IS DRIVEN BY A SYNCHRONOUS DRIVER.
2. VARIOUS SIZE THREE PHASE INDUCTION MOTORS (NEMA CODE F) ARE STARTED ACROSS THE LINE LEADS OF THE UNLOADED GENERATOR.
3. THE RESULTING VOLTAGE DIPS ARE RECORDED WITH AN OSCILLOSCOPE.
4. MOTOR HORSEPOWER HAS BEEN CONVERTED TO STARTING KILOVOLT AMPERES (SKVA).
5. RECORDED VOLTAGE DIPS HAVE BEEN EXPRESSED AS A OF GENERATOR RATED VOLTAGE.

II. USE OF THE MOTOR STARTING CAPABILITY CURVES.

A. CALCULATE THE SKVA REQUIRED BY THE MOTOR FOR FULL VOLTAGE STARTING ACROSS THE LINE IF THE VALUE IS NOT LISTED ON THE MOTOR DATA PLATE.

1. MOTORS CONFORMING TO NEMA STANDARDS

MULTIPLY THE MOTOR HORSEPOWER BY THE NEMA SKVA/HP FIGURE. FOR NEMA CODE F, USE 5.3 SKVA/HP; FOR NEMA CODE G, USE 6.0 SKVA/HP.

2. ALL OTHER MOTORS:

MULTIPLY THE RATED VOLTAGE BY THE LOCKED ROTOR AMPERE AND BY 0.001732. (IF THE LOCKED ROTOR AMPERES ARE NOT LISTED, MULTIPLY THE FULL LOAD (RUNNING) AMPERES BY B. USE THE ABOVE SKVA WITH THE MOTOR STARTING TABLE.

1. ACROSS LINE STARTING:

READ ACROSS THE ROW OF "ACROSS THE LINE STARTING SKVA IF THE DESIRED VALUE OF SKVA IS NOT GIVEN, CALCULATE THE DIP BY FINDING THE PROPER SKVA INTERVAL AND INTERPOLATING AS FOLLOWS:

SKVA1 IS THE SKVA TABLE ENTRY JUST SMALLER THAN THE DESIRED SKVA, DIP1 IS THE DIP FOR SKVA2, AND SKVA2 IS THE SKVA TABLE ENTRY JUST GREATER THAN THE DESIRED SKVA. THE DIP (IN PERCENT) AT THE DESIRED SKVA IS:

$$\text{DIP} = \text{DIP1} + (\text{SKVA} - \text{SKVA1}) * 2.5 / (\text{SKVA2} - \text{SKVA1})$$

NOTE: VOLTAGE DIPS GREATER THAN 35% MAY CAUSE MAGNETIC CONTACTORS TO DROP OUT.

2. REDUCED VOLTAGE STARTING:

REFER TO THE FOLLOWING TABLE. MULTIPLY THE CALCULATE ACROSS LINE SKVA BY THE MULTIPLIER LISTED FOR THE SPECIFIC STARTING METHOD. APPLY THE RESULT TO THE STARTING TABLE AS IN II A, TO CALCULATE THE EXPECTED VOLTAGE DIP:

TYPE OF REDUCED VOLTAGE STARTING	MULTIPLY LINE SKVA BY
80% TAP	.80
65% TAP	.65
50% TAP	.50

45% TAP .45
Wye start,delta run .33

AUTOTRANSFORMER

80% TAP .68
65% TAP .46
50% TAP .29

NOTE: REDUCE VOLTAGE STARTING LOWERS THE MAXIMUM
REQUIRED MOTOR skVA.

3. Part winding starting:

Most common is half-winding start, full-winding run.

Multiply the full motor, across line starting skVA
by 0.6. Apply the result to the selected curve as
in ii. A above. Read the expected voltage dip, for
the required skVA.

III.DEFINITION:

A. GENERATOR TERMS

MODEL: Engine Sales model

ENG TYPE: DI = Direct Injection,

NA = Naturally aspirated, etc

HZ: Running frequency, hertz

RATING TYPE: PP, SB (prime power or standby)

KW: Base rating electrical kilowatts (ekW)

VOLTS: Rating terminal, line to line

GEN ARR: Cat generator arrangement part number

GEN FRAME: Generator frame size designation

CONN: Generator output connection
(star, wye, delta, ect.)

POLES: Number of pole pieces on rotor.

(eg. A 4 pole generator run at 1800)

RPM will produce 60 Hz alternating current. A 6 pole
generator run at 1200 RPM will produce 60 Hz alternating
current.)

B. GENERATOR TEMPERATURE RISE:

The indicated temperature rise indicated the NEMA limits
for standby or prime power applications. These rises are
used for calculating the losses and efficiencies and are
not necessarily indicative of the actual temperature rise
of a given machine.

C. CENTER OF GRAVITY

The specified center of gravity is for the generator only.

For single bearing, and two bearing close coupled generators, the cent
er of gravity is measured from the generator/engine flywheel housing i
nterface and from the centerline of the rotor shaft.

For two bearing, standalone generators, the center of gravity is measu
red from the end of the rotor shaft and from the centerline of the rot
or shaft.

For two bearing, standalone generators, the center of gravity is measu
red from the end of the rotor shaft and from the centerline of the rot
or shaft.

D. GENERATOR DECREMENT CURRENT CURVES

The generator decrement current curve gives the
symmetrical current supplied by the generator for a three
phase bolted fault at the generator terminals. Generators
equipped with the series boost attachment or generators
with PM excitation system will supply 300% of rated current
for at least 10 seconds.

E. GENERATOR EFFICIENCY CURVES

The efficiency curve is representative of the overall
generator efficiency over the normal range of the

electrical load and at the specified parameters. This is not the overall engine generator set efficiency curve.

Caterpillar Confidential: **Green**

Content Owner: Commercial Processes Division

Web Master(s): [PSG Web Based Systems Support](#)

Current Date: Wednesday, June 17, 2015 7:03:24 AM

© Caterpillar Inc. 2015 All Rights Reserved.

[Data Privacy Statement](#).