

**GENERATOR DATA****(AT400240)-ENGINE (BAA126422A)-CEM****SEPTEMBER 26, 2020**For Help Desk Phone Numbers [Click here](#)**Selected Model**

<b>Engine:</b> 3412	<b>Generator Frame:</b> 594	<b>Genset Rating (kW):</b> 375.0	<b>Line Voltage:</b> 480
<b>Fuel:</b> Diesel	<b>Generator Arrangement:</b> 1366617	<b>Genset Rating (kVA):</b> 468.0	<b>Phase Voltage:</b> 277
<b>Frequency:</b> 60	<b>Excitation Type:</b> Permanent Magnet	<b>Pwr. Factor:</b> 0.8	<b>Rated Current:</b> 562.9
<b>Duty:</b> CONTINUOUS	<b>Connection:</b> SERIES STAR	<b>Application:</b> EPG	<b>Status:</b> Current

Version: 39094 /38915 /39511 /13795

**Spec Information**

<b>Generator Specification</b>		<b>Generator Efficiency</b>			
<b>Frame:</b> 594	<b>Type:</b> SR4B	<b>No. of Bearings:</b> 1	<b>Per Unit Load</b>	<b>kW</b>	<b>Efficiency %</b>
<b>Winding Type:</b> RANDOM WOUND	<b>Flywheel:</b> 18.0		0.25	93.8	92.1
<b>Connection:</b> SERIES STAR	<b>Housing:</b> 0		0.5	187.5	94.4
<b>Phases:</b> 3	<b>No. of Leads:</b> 12		0.75	281.3	95.4
<b>Poles:</b> 4	<b>Wires per Lead:</b> 2		1.0	375.0	95.6
<b>Sync Speed:</b> 1800	<b>Generator Pitch:</b> 0.7333		1.1	412.5	95.6
<b>Reactances</b>			<b>Per Unit</b>	<b>Ohms</b>	
SUBTRANSIENT - DIRECT AXIS $X''_d$			0.0948	0.0466	
SUBTRANSIENT - QUADRATURE AXIS $X''_q$			0.0948	0.0466	
TRANSIENT - SATURATED $X'_d$			0.1375	0.0676	
SYNCHRONOUS - DIRECT AXIS $X_d$			1.8516	0.9101	
SYNCHRONOUS - QUADRATURE AXIS $X_q$			0.9414	0.4627	
NEGATIVE SEQUENCE $X_2$			0.0948	0.0466	
ZERO SEQUENCE $X_0$			0.0273	0.0134	
<b>Time Constants</b>				<b>Seconds</b>	
OPEN CIRCUIT TRANSIENT - DIRECT AXIS $T'_{d0}$				2.6440	
SHORT CIRCUIT TRANSIENT - DIRECT AXIS $T'_d$				0.1963	
OPEN CIRCUIT SUBTRANSIENT - DIRECT AXIS $T''_{d0}$				0.0094	
SHORT CIRCUIT SUBTRANSIENT - DIRECT AXIS $T''_d$				0.0072	
OPEN CIRCUIT SUBTRANSIENT - QUADRATURE AXIS $T''_{q0}$				0.0082	
SHORT CIRCUIT SUBTRANSIENT - QUADRATURE AXIS $T''_q$				0.0065	
EXCITER TIME CONSTANT $T_e$				0.1400	
ARMATURE SHORT CIRCUIT $T_a$				0.0303	

Short Circuit Ratio: 0.87		Stator Resistance = 0.0088 Ohms		Field Resistance = 1.5 Ohms	
<b>Voltage Regulation</b>			<b>Generator Excitation</b>		
<b>Voltage level adjustment: +/-</b>	5.0%	<b>No Load</b>	<b>Full Load, (rated) pf</b>		
<b>Voltage regulation, steady state: +/-</b>	0.5%		<b>Series</b>	<b>Parallel</b>	
<b>Voltage regulation with 3% speed change: +/-</b>	0.5%	<b>Excitation voltage:</b>	10.24 Volts	29.17 Volts	Volts
<b>Waveform deviation line - line, no load: less than</b>	5.0%	<b>Excitation current</b>	2.27 Amps	5.32 Amps	Amps
<b>Telephone influence factor: less than</b>	50				

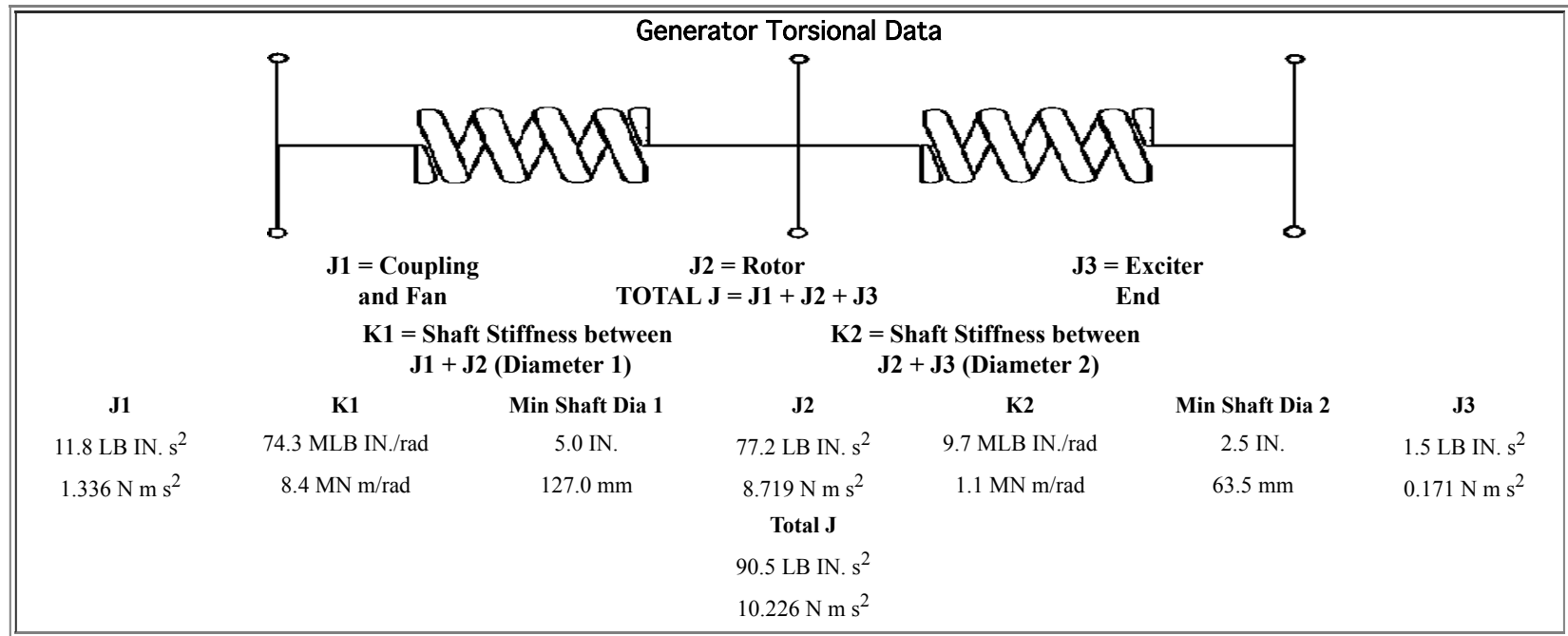
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**Generator Mechanical Information**

<b>Center of Gravity</b>		
Dimension X	-714.0 mm	-28.1 IN.
Dimension Y	0.0 mm	0.0 IN.
Dimension Z	0.0 mm	0.0 IN.
<ul style="list-style-type: none"> <li>• "X" is measured from driven end of generator and parallel to rotor. Towards engine fan is positive. See General Information for details</li> <li>• "Y" is measured vertically from rotor center line. Up is positive.</li> <li>• "Z" is measured to left and right of rotor center line. To the right is positive.</li> </ul>		
Generator WT = 1714 kg   * Rotor WT = 597 kg   * Stator WT = 1117 kg 3,779 LB                      1,316 LB                      2,463 LB		
Rotor Balance = 0.0508 mm deflection PTP Overspeed Capacity = 150% of synchronous speed		



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<b>Generator Cooling Requirements - Temperature - Insulation Data</b>	
<b>Cooling Requirements:</b>	<b>Temperature Data: (Ambient 40 °C)</b>
<b>Heat Dissipated:</b> 17.3 kW	<b>Stator Rise:</b> 80.0 °C
<b>Air Flow:</b> 112.2 m <sup>3</sup> /min	<b>Rotor Rise:</b> 80.0 °C
<b>Insulation Class: H</b>	
<b>Insulation Reg. as shipped: 100.0 MΩ minimum at 40 °C</b>	
<b>Thermal Limits of Generator</b>	
<b>Frequency:</b>	60 Hz
<b>Line to Line Voltage:</b>	480 Volts
<b>B BR 80/40</b>	613.0 kVA
<b>F BR -105/40</b>	739.0 kVA
<b>H BR - 125/40</b>	813.0 kVA
<b>F PR - 130/40</b>	813.0 kVA

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#### Selected Model

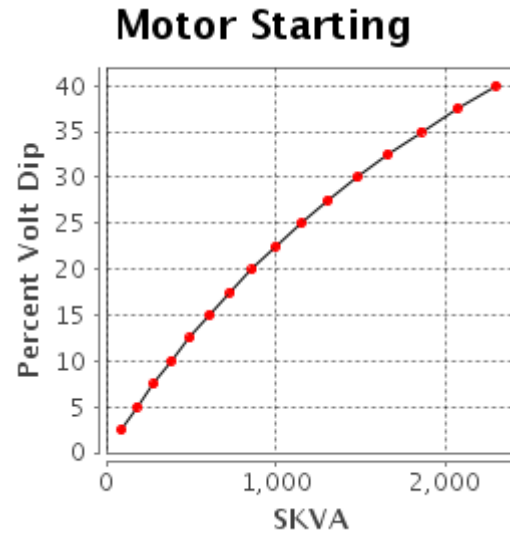
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#### Starting Capability & Current Decrement

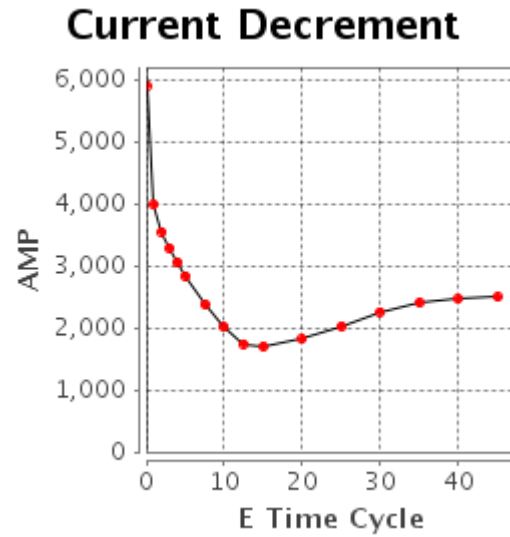
**Motor Starting Capability (0.4 pf)**

SKVA	Percent Volt Dip
89	2.5
182	5.0
280	7.5
384	10.0
493	12.5
610	15.0
733	17.5
863	20.0
1,003	22.5
1,151	25.0
1,310	27.5
1,480	30.0
1,663	32.5
1,860	35.0
2,072	37.5
2,303	40.0



**Current Decrement Data**

E Time Cycle	AMP
0.0	5,899
1.0	3,985
2.0	3,548
3.0	3,280
4.0	3,048
5.0	2,836
7.5	2,379
10.0	2,009
12.5	1,738
15.0	1,696
20.0	1,819
25.0	2,023
30.0	2,258
35.0	2,405
40.0	2,464
45.0	2,494



**Instantaneous 3 Phase Fault Current: 5899 Amps**

**Instantaneous Line - Line Fault Current: 5109 Amps**

**Instantaneous Line - Neutral Fault Current: 7736 Amps**

**Selected Model**

**Engine:** 3412  
**Fuel:** Diesel  
**Frequency:** 60  
**Duty:** CONTINUOUS

**Generator Frame:** 594  
**Generator Arrangement:** 1366617  
**Excitation Type:** Permanent Magnet  
**Connection:** SERIES STAR

**Genset Rating (kW):** 375.0  
**Genset Rating (kVA):** 468.0  
**Pwr. Factor:** 0.8  
**Application:** EPG

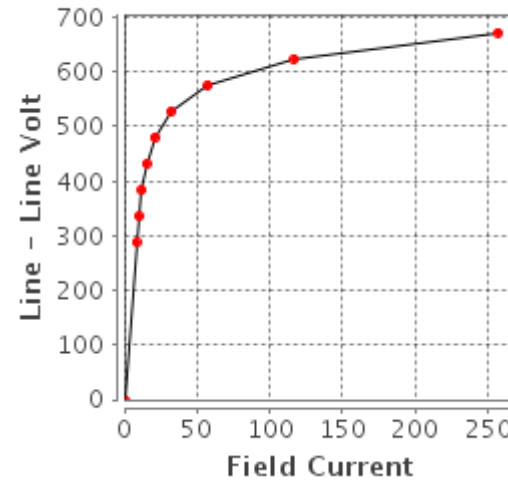
**Line Voltage:** 480  
**Phase Voltage:** 277  
**Rated Current:** 562.9  
**Status:** Current

Version: 39094 /38915 /39511 /13795

**Generator Output Characteristic Curves  
 Open Circuit Curve**

**Open Circuit**

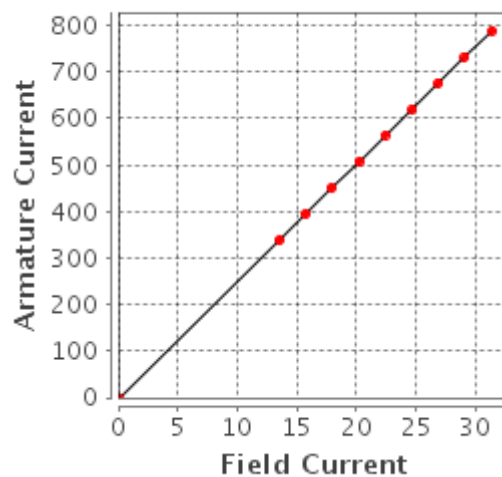
Field Current	Line - Line Volt
0.0	0
8.3	288
10.0	336
12.1	384
15.2	432
20.8	480
32.2	528
57.7	576
117.0	624
257.1	672



Short Circuit Curve

Short Circuit

Field Current	Armature Current
0.0	0
13.5	338
15.7	395
17.9	451
20.2	507
22.4	564
24.7	620
26.9	677
29.1	733
31.4	789



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**Line Voltage:** 480

**Fuel:** Diesel

**Generator Arrangement:** 1366617

**Genset Rating (kVA):** 468.0

**Phase Voltage:** 277

**Frequency:** 60

**Excitation Type:** Permanent Magnet

**Pwr. Factor:** 0.8

**Rated Current:** 562.9

**Duty:** CONTINUOUS

**Connection:** SERIES STAR

**Application:** EPG

**Status:** Current

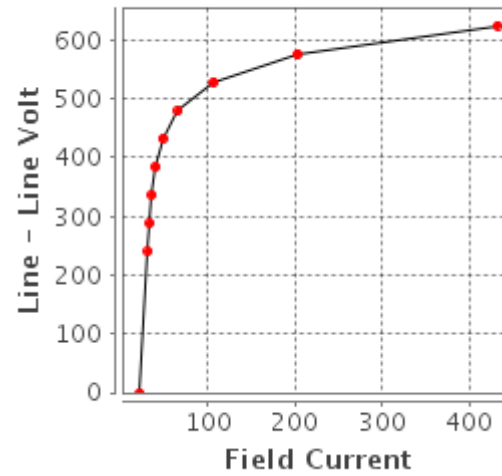
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Generator Output Characteristic Curves

Zero Power Factor Curve

Zero Power

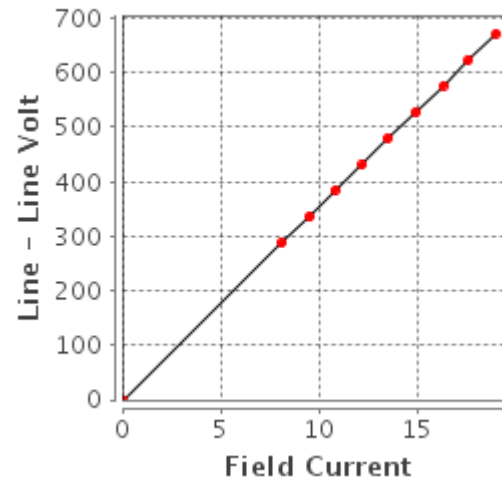
Field Current	Line - Line Volt
22.4	0
31.5	240
33.4	288
35.9	336
40.2	384
48.4	432
66.2	480
107.1	528
203.2	576
431.6	624



Air Gap Curve

Air Gap

Field Current	Line - Line Volt
0.0	0
8.1	288
9.5	336
10.8	384
12.2	432
13.5	480
14.9	528
16.3	576
17.6	624
19.0	672





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**Frequency:** 60  
**Duty:** CONTINUOUS

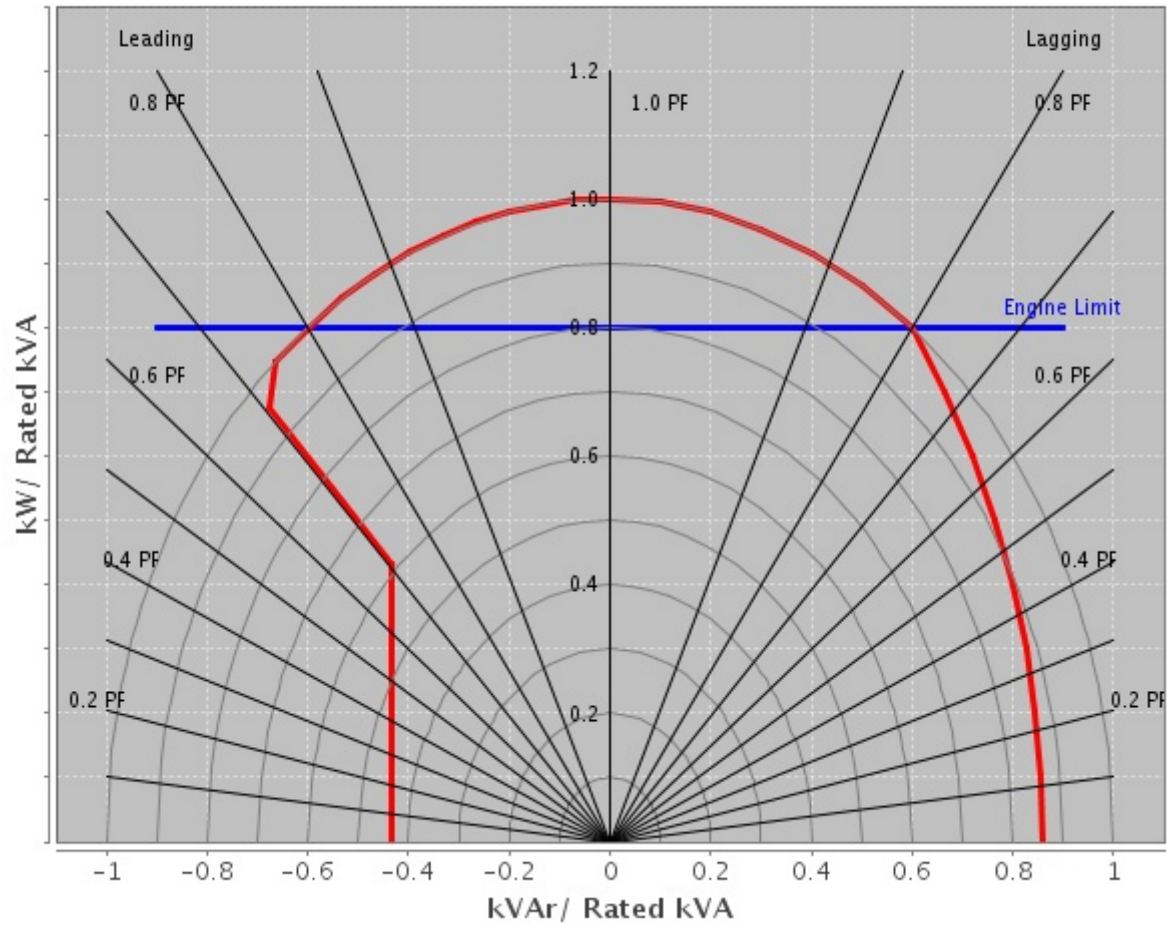
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**Reactive Capability Curve  
 Operating Chart**



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## 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 PERCENT 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 1.25).  
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 SKVA1, 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 CALCULATED 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 interface and from the centerline of the rotor shaft.

For two bearing, standalone generators, the center of gravity is measured from the end of the rotor shaft and from the centerline of the rotor shaft.

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#### 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.

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