VOLVO PENTA GENSET ENGINE

TAD1642GE

536 kW (729 hp) at 1500 rpm, 585 kW (796 hp) at 1800 rpm, acc. ISO 3046

The TAD1642GE is a powerful, reliable and economical Generating Set Diesel Engine built on the dependable in-line six design.

Durability & low noise

Designed for easiest, fastest and most economical installation. Well-balanced to produce smooth and vibration-free operation with low noise level.

To maintain a controlled working temperature in cylinders and combustion chambers, the engine is equipped with piston cooling. The engine is also fitted with replaceable cylinder liners and valve seats/guides to ensure maximum durability and service life of the engine.

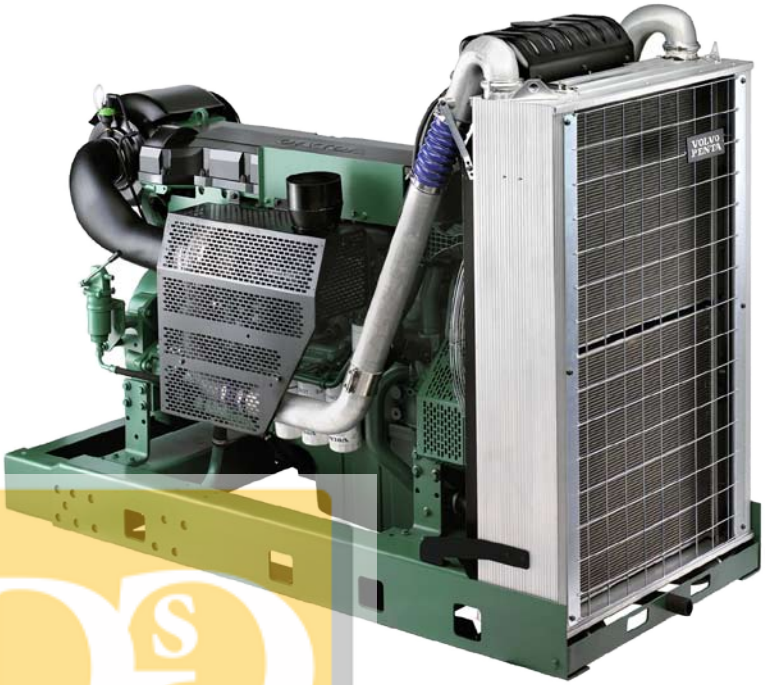
Low exhaust emission

The state of the art, high-tech injection and charging system with low internal losses contributes to excellent combustion and low fuel consumption.

The TAD1642GE complies with EU Stage 2 exhaust emission regulations.

Easy service & maintenance

Easily accessible service and maintenance points contribute to the ease of service of the engine.



Features

- Maintained performance, air temp 40°C
- Tropical cooling system (55°C)
- Fully electronic with Volvo Penta EMS 2
- Dual frequency switch (between 1500 rpm and 1800 rpm)
- High power density
- Emission compliant
- Low noise levels
- Gen Pac configuration

Technical description

Engine and block

- Optimized cast iron cylinder block with optimum distribution of forces without the block being unnessarily heavy.
- Wet, replaceable cylinder liners
- Piston cooling for low piston temperature and reduced ring temperature
- Tapered connecting rods for reduce risk of piston cracking
- Crankshaft induction hardened bearing surfaces and fillets with seven bearings for moderate load on main and high-end bearings
- Case hardened and Nitrocarburized transmission gears for heavy duty operation
- Keystone top compression rings for long service life
- Viscous type crankshaft vibration dampers to withstand single bearing alternator torsional vibrations
- Replaceable valve guides and valve seats
- Over head camshaft and four valves per cylinder

Lubrication system

- Full flow oil cooler
- Full flow disposable spin-on oil filter, for extra high filtration
- The lubricating oil level can be measured during operation
- Gear type lubricating oil pump, gear driven by the transmission

Fuel system

- Non-return fuel valve
- Electronic unit injectors
- Fuel prefilter with water separator and water-in-fuel indicator / alarm
- Gear driven low-pressure fuel pump
- Fine fuel filter with manual feed pump and fuel pressure switch
- Fuel shut-off valve, electrically operated

Cooling system

- Efficient cooling with accurate coolant control through a water distribution duct in the cylinder block. Reliable sleeve thermostat with minimum pressure drop
- Gear driven, maintenance-free coolant pump with high degree of efficiency
- Coolant filter as standard

Turbo charger

- Efficient and reliable turbo charger
- Extra oil filter for the turbo charger

Electrical system

- Engine Management System 2 (EMS 2), an electronically controlled processing system which optimizes engine performance. It also includes advanced facilities for diagnostics and fault tracing
- The instruments and controls connect to the engine via the CAN SAE J1939 interface, either through the Control Interface Unit (CIU) or the Digital Control Unit (DCU). The CIU converts the digital CAN bus signal to an anolog signal, making it possible to connect a variety of instruments. The DCU is a control panel with display, engine control, monitoring, alarm, parameter setting and diagnostic functions. The DCU also presents error codes in clear text.
- Sensors for oil pressure, oil temp, boost pressure, boost temp, coolant temp, fuel temp, water in fuel, fuel pressure and two speed sensors.

TAD1642GE

Technical Data

General

Engine designation	TAD1642GE
No. of cylinders and configuration	in-line 6
Method of operation	4-stroke
Bore, mm (in.)	144 (5.67)
Stroke, mm (in.)	165 (6.50)
Displacement, l (in³)	16.12 (983.7)
Compression ratio	16.5:1
Dry weight, kg (lb)	1480 (3263)
Dry weight with Gen Pac, kg (lb)	1910 (4211)
Wet weight, kg (lb)	1550 (3417)
Wet weight with Gen Pac, kg (lb)	2020 (4453)

Performance	**1500 rpm**	**1800 rpm**
with fan, kW (hp) at:		
Prime Power	485 (660)	532 (724)
Max Standby Power	536 (729)	585 (796)

Lubrication system	**1500 rpm**	**1800 rpm**
Oil consumption, liter/h (US gal/h) at:		
Prime Power	0.10 (0.026)	0.11 (0.029)
Max Standby Power	0.11 (0.029)	0.12 (0.032)
Oil system capacity incl filters, liter		42

Fuel system	**1500 rpm**	**1800 rpm**
Specific fuel consumption at:		
Prime Power, g/kWh (lb/hph)		
25 %	218 (0.353)	229 (0.371)
50 %	201 (0.326)	202 (0.327)
75 %	195 (0.316)	197 (0.319)
100 %	200 (0.324)	206 (0.334)
Max Standby Power, g/kWh (lb/hph)		
25 %	213 (0.345)	222 (0.360)
50 %	197 (0.319)	200 (0.324)
75 %	195 (0.316)	198 (0.321)
100 %	202 (0.327)	210 (0.340)

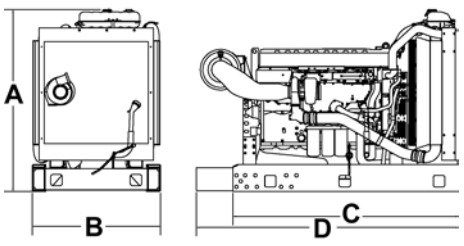
Intake and exhaust system	**1500 rpm**	**1800 rpm**
Air consumption, m³/min (cfm) at:		
Prime Power	37 (1307)	44 (1554)
Max Standby Power	39 (1377)	46 (1624)
Max allowable air intake restriction, kPa (In wc)	5 (20.1)	5 (20.1)
Heat rejection to exhaust, kW (BTU/min) at:		
Prime Power	375 (21326)	439 (24965)
Max Standby Power	426 (24226)	500 (28435)
Exhaust gas temperature after turbine, °C (°F) at:		
Prime Power	480 (896)	455 (851)
Max Standby Power	500 (932)	505 (941)
Max allowable back-pressure in exhaust line, kPa (In wc)	10 (40.2)	10 (40.2)
Exhaust gas flow, m³/min (cfm) at:		
Prime power	90.0 (3178)	105 (3708)
Max Standby Power	98.0 (3461)	115 (4061)

Cooling system	**1500 rpm**	**1800 rpm**
Heat rejection radiation from engine, kW (BTU/min) at:		
Prime Power	31 (1763)	33 (1877)
Max Standby Power	32 (1820)	34 (1934)
Heat rejection to coolant kW (BTU/min) at:		
Prime Power	184 (10464)	199 (11317)
Max Standby Power	190 (10805)	214 (12170)
Fan power consumption, kW (hp)	11 (15)	19 (26)

Standard equipment

	Engine	Gen Pac
Engine		
Automatic belt tensioner	•	•
Lift eyelets	•	•
Flywheel		
Flywheel housing with conn. acc. to SAE 1	•	•
Flywheel for 14" flex. plate and flexible coupling	•	•
Vibration dampers	•	•
Engine suspension		
Fixed front suspension	•	•
Lubrication system		
Oil dipstick	•	•
Full-flow oil filter of spin-on type	•	•
By-pass oil filter of spin-on type	•	•
Oil cooler, side mounted	•	•
Low noise oil sump	•	•
Fuel system		
Fuel filters of disposable type	•	•
Electronic unit injectors	•	•
Pre-filter with water separator	•	•
Intake and exhaust system		
Air filter with replaceable paper insert	•	•
Air restriction indicator	•	•
Air cooled exhaust manifold	•	•
Connecting flange for exhaust pipe	•	•
Exhaust flange with v-clamp	•	•
Turbo charger, low right side	•	•
Cooling system		
Tropical radiator incl intercooler	•[1]	•
Gear driven coolant pump	•	•
Fan hub	•	•
Thrust fan	•[1]	•
Fan guard	–	•
Belt guard	–	•
Control system		
Engine Management System (EMS) with CAN-bus interface SAE J1939	•	•
CIU, Control Interface Unit	–	–
Alternator		
Alternator 60A / 24 V	•	•
Starting system		
Starter motor, 7.0kW, 24 V	•	•
Connection facility for extra starter motor	•	•
Instruments and senders		
Temp.- and oil pressure for automatic stop/alarm 103°C	•	•
Other equipment		
Expandable base frame	–	•
Engine Packing		
Plastic warpping	•	•

[1] must be ordered, se order specification
– optional equipment or not applicable
• included in standard specification



A* = 1587 mm / 62.5 in
B* = 1120 mm / 44.1 in
C* = 1976 mm / 77.8 in
D = 2296 mm / 90.5 in (During transport)
D = Max 3311 mm / 130.5 in
* Including radiator and intercooler

Note! Not all models, standard equipment and accessories are available in all countries.
All specifications are subject to change without notice.
The engine illustrated may not be entirely identical to production standard engines.

Power Standards
The engine performance corresponds to ISO 3046, BS 5514 and DIN 6271. The technical data applies to an engine without cooling fan and operating on a fuel with calorific value of 42.7 MJ /kg (18360 BTU/lb) and a density of 0.84 kg/liter (7.01 lb/US gal), also where this involves a deviation from the standards. Power output guaranteed within 0 to +2% att rated ambient conditions at delivery. Ratings are based on ISO 8528. Engine speed governing in accordance with ISO 3046/IV, class A1 and ISO 8528-5 class G3

Exhaust emissions
The engine complies with EU stage 2 emission legislation according to the Non Road Directive EU 97/68/EEC. The engine also complies with TA-luft -50% exhaust emission regulations.

Rating Guidelines
PRIME POWER rating corresponds to ISO Standard Power for continuous operation. It is applicable for supplying electrical power at variable load for an unlimited number of hours instead of commercially purchased power. A10 % overload capability for govering purpose is available for this rating.
MAXIMUM STANDBY POWER rating corresponds to ISO Standard Fuel Stop Power. It is applicable for supplying standby electrical power at variable load in areas with well established electrical networks in the event of normal utility power failure. No overload capability is available for this rating.
1 hp = 1 kW x 1.36

Information
For more technical data and information, please look in the Generating Set Engines Sales Guide.

AB Volvo Penta
SE-405 08 Göteborg, Sweden
www.volvopenta.com

General

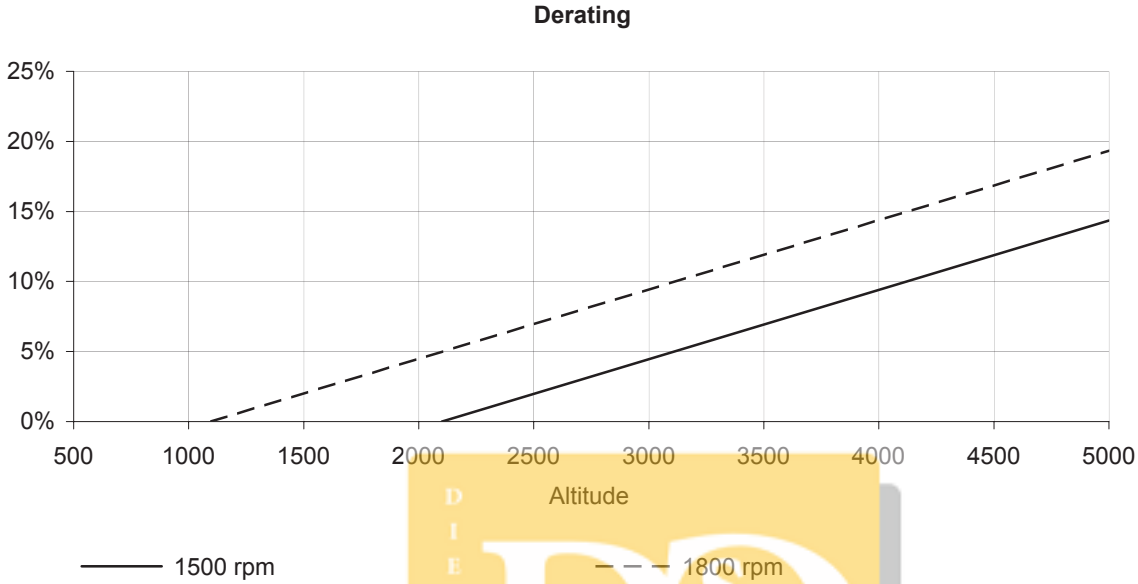
In-line four stroke diesel engine with direct injection. Rotation direction, anti-clockwise viewed towards flywheel. Turbocharged

Number of cylinders			6
Displacement, total		litre	16,12
		in³	983,7
Firing order			1-5-3-6-2-4
Bore		mm	144
		in	5,67
Stroke		mm	165
		in	6,50
Compression ratio			16,5:1
Dry weight	Engine only, excluding cooling system	kg	1480
		lb	3263
	GenPac	kg	1910
		lb	4211
Wet weight	Engine only, excluding cooling system	kg	1550
		lb	3417
	GenPac	kg	2020
		lb	4453

Performance		**r/min**	**1500**	**1800**
Prime Power	without fan	kW	496	551
		hp	675	749
	with fan	kW	485	532
		hp	660	724
Standby Power	without fan	kW	547	604
		hp	744	821
	with fan	kW	536	585
		hp	729	796
Torque at:	Prime Power	Nm	3158	2923
		lbft	2329	2156
	Standby Power	Nm	3482	3204
		lbft	2568	2363
Mean piston speed		m/s	8,3	9,9
		ft/sec	27,1	32,6
Effective mean pressure at:	Prime Power	MPa	2,5	2,3
		psi	357	331
Effective mean pressure at:	Standby Power	MPa	2,7	2,5
		psi	394	362
Max combustion pressure at:	Prime Power	MPa	17,5	18
		psi	2538	2611
Max combustion pressure at:	Standby Power	MPa	18,6	18,9
		psi	2698	2741
Total mass moment of inertia, J (mR2)		kgm²	4,20	
		lbft²	99,7	
Degree of irregularity at:	Prime Power		1:42	1:78
Friction Power		kW	36	53
		hp	48,96	72,08

Derating

The engine may be operated up to 2130 m altitude without derating at 1500rpm.
The engine may be operated up to 1130 m altitude without derating at 1800rpm.
For operation at higher altitudes the power will be derated according to the graph below.
There is no derating for ambient temperature or humidity.



Engine noise emission

Test Standards: ISO 3744-1981 (E) sound power (With fan & Radiator without intake and exhaust noise)

Tolerans ± 0.75 dB(A)

		r/min	1500	1800
Measured sound power Lw	No load	dB(A)	113	117
	Prime Power	dB(A)	117	118
	Standby Power	dB(A)	117	119
Calculated sound pressure Lp at 1 m	No load	dB(A)	101	105
	Prime Power	dB(A)	105	106
	Standby Power	dB(A)	105	107

Unsilenced exhaust noise

Data calculated as sound pressure Lp. (Without fan & radiator)
Assumed microphone distance 1 m

	r/min	1500	1800
Prime Power	dB(A)	116	120
Standby Power	dB(A)	116	120

Emission

547kW/1500rpm	TA-luft	mg/Nm3		
Load factor	NOx	CO	Soot	HC
55%	1758	156	10	35
83%	1752	575	20	21
110% stand by	1748	713	27	15
O_2-content 5%, without fan. For latest updated values, refer to “Sales Support” on Partner Network.				

Test conditions for load acceptance data

Warm engine.	Generator	Modell	Type of AVR
	Stamford	HCI 544 E1	SX 440

Load acceptance performance can vary due to actual alternator inertia, voltage regulator, type of load and local ambient conditions. UFRO: STD-setting 47 / 57 Hz.

Single step load performance at 1500 rpm

Load (%)	Speed diff (%)		Recovery time (s)		Remaining load	Speed diff (%)		Recovery time (s)	
	Prime	Standby	Prime	Standby	(%)	Prime	Standby	Prime	Standby
0-20	3,2	3,5	1,8	1,8	20-100	26,8	32,5	6,3	8,4
0-38		7,0		2,4	38-100		13,3		6,4
0-40	6,8	7,8	2,3	2,5	40-100	11,2	11,7	5,0	6,1
0-41	7,0		2,3		41-100	10,7		4,5	
0-48		10,0		3,9	48-100		9,5		4,0
0-53	10,0		3,2		53-100	8,0		4,1	
0-60	13,5	17,3	3,6	4,4	60-100	6,6	7,4	4,0	3,8
0-80	26,7	32,6	5,8	6,8	80-100	3,2	3,2	1,1	3,5
0-100	42,5	52,5	8,3	9,7					
100-0	9,6	10,4	1,6	1,7					

Single step load performance at 1800 rpm

Load (%)	Speed diff %		Recovery time (s)		Remaining load	Speed diff (%)		Recovery time (s)	
	Prime	Standby	Prime	Standby	(%)	Prime	Standby	Prime	Standby
0-20	2,2	2,4	1,8	2,0	20-100	9,9	11,4	3,0	3,6
0-40	4,6	5,1	2,0	2,0	40-100	6,3	7,3	2,3	3,0
0-52		7,0		2,0	52-100		6,2		2,7
0-57	7,0		2,0		57-100	4,5		2,1	
0-60	7,7	8,5	2,1	2,2	60-100	4,1	4,8	2,0	2,4
0-67		10,0		2,8	67-100		4,0		2,3
0-73	10		2,6		73-100	2,5		2	
0-80	11,7	15,2	2,8	3,6	80-100	1,9	2,2	1,9	2,0
0-100	19,4	22,9	3,9	5,6					
100-0	6,8	7,4	0,9	1,7					

Cold start performance			**r/min**	**1500**	**1800**
Time from start to stay within 0.5% of no load speed at ambient temperature:	°C	20	s	6,5	8,4
		5	s	6,7	8,7
		-15*	s	7,3	9,8
Time from start to stay within 0.8% of no load speed at ambient temperature:	°C	20	s	5,6	7,5
		5	s	6,2	8,2
		-15*	s	6,7	9,2

* With lubrication oil 10W/30, block heater and MK1 fuel.

Usage of manifold heater:	Time preheating, minutes	Time postheating, minutes
	0,5	1,7

Ambient temp. °C	Block heater type and Make	Power kW	Engaged hours	Cooling water temp engine block, °C
-15	External Volvo	2	12	17
-25	External Volvo	2	12	5

Technical data TAD1642GE

Lubrication system			r/min	1500	1800
Lubricating oil consumption	Prime Power		liter/h	0,10	0,11
			US gal/h	0,026	0,029
	Standby Power		liter/h	0,11	0,12
			US gal/h	0,029	0,032
Oil system capacity including filters			liter	48	
			US gal	12,7	
Oil sump capacity:		max	liter	42	
			US gal	11,1	
		min	liter	32	
			US gal	8,5	
Engine angularity limits:		front up	°	30	
		front down	°	30	
		side tilt	°	30	
Oil pressure at rated speed			kPa	300 - 650	
			psi	44 - 94	
Lubrication oil temperature in oil sump:		max	°C	130	
			°F	266	
Oil filter micron size			mm	0,040	

* See also general section in the sales guide

Fuel system			r/min	1500	1800
Prime Power	25%		g/kWh	213	227
Specific fuel consumption at:			lb/hph	0,345	0,367
	50%		g/kWh	198	204
			lb/hph	0,321	0,330
	75%		g/kWh	197	202
			lb/hph	0,320	0,328
	100%		g/kWh	201	209
			lb/hph	0,326	0,339
Standby Power	25%		g/kWh	208	220
Specific fuel consumption at:			lb/hph	0,337	0,357
	50%		g/kWh	197	203
			lb/hph	0,320	0,329
	75%		g/kWh	200	204
			lb/hph	0,323	0,330
	100%		g/kWh	204	212
			lb/hph	0,330	0,343

Fuel system			r/min	1500	1800
Fuel to conform to				ASTM-D975-No1 and 2-D JIS KK 2204, EN 590	
System return flow			liter/h	25	
			US gal/h	6,6	
System supply flow at rated speed			liter/h	180	200
			US gal/h	48	53
Fuel supply line max restriction			kPa	10,0	
			psi	1,5	
Fuel supply line max pressure, engine stopped			kPa	0,0	
			psi	0,0	
Fuel return line max restriction			kPa	20,0	
			psi	2,9	
Maximum allowable inlet fuel temp			°C	60	
			°F	140	
Prefilter / Water separator			mm	0,010	
Governor type/make, standard				Volvo / EMS 2	
Injection pump type/make				Delphi / E1	

Intake and exhaust system			r/min	1500	1800
Air consumption at:	Prime Power	25°C	m^3/min	38	45,4
		77°F	cfm	1342	1603
	Standby Power	25°C	m^3/min	40,6	46,6
		77°F	cfm	1434	1646
Air intake restriction, clean filter(s)			kPa	1,5	2
			in wc	6,0	8,0
Max allowable air intake restriction			kPa	5	5
			in wc	20,1	20,1
Air filter type				Single stage paper cartridge	
Air filter cleaning efficiency			%	99,85	
Heat rejection to exhaust at:		Prime Power	kW	375	439
			BTU/min	21326	24965
		Standby Power	kW	426	500
			BTU/min	24226	28435
Exhaust gas temperature after turbine at:		Prime Power	°C	471	468
			°F	880	874
		Standby Power	°C	494	512
			°F	920	954
Max allowable back pressure in exhaust line			kPa	10	10
			In wc	40,2	40,2
Exhaust gas flow at:		Prime Power	m^3/min	92,6	108,9
			cfm	3270	3846
		Standby Power	m^3/min	100,7	117,6
			cfm	3556	4153

Cooling system		r/min	1500	1800
Heat rejection radiation from engine at:	Prime Power	kW	18	20
		BTU/min	1024	1137
	Standby Power	kW	20	24
		BTU/min	1137	1365
Heat rejection to coolant at:	Prime Power	kW	187	218
		BTU/min	10635	12397
	Standby Power	kW	218	248
		BTU/min	12397	14104
Coolant	Volvo coolant with clean fresh water			
Radiator cooling system type		Closed circuit		
Standard radiator core area		m²	1,32	
		foot²	14,21	
Standard radiator core thickness		mm	52	
		in	2,05	
Fan diameter		mm	890	
		in	35,04	
Fan power consumption		kW	11	19
		hp	15	26
Fan drive ratio			1,04 : 1	
Coolant capacity,	engine	liter	33	
		US gal	8,72	
	std radiator with hoses	liter	60	
		US gal	15,85	
Coolant pump		drive/ ratio	Belt / 1,85:1	
Coolant flow with standard system		l/s	6,4	7,7
		US gal/s	1,69	2,04
Minimum coolant flow		l/s	6,4	7,7
		US gal/s	1,69	2,03
Maximum external coolant system restriction, including piping		kPa	40	60
		in wc	161	241
Thermostat	start to open	°C	86	
		°F	187	
	fully open	°C	96	
		°F	205	
Maximum static pressure head (expansion tank height + pressure cap setting)		kPa	100	
		in wc	401	
Minimum static pressure head (expansion tank height + pressure cap setting)		kPa	70	
		in wc	281	
Standard pressure cap setting		kPa	75	
		in wc	301	
Maximum top tank temperature		°C	103	
		°F	217	
Draw down capacity	4% of total cooling system capacity			

Intercooler system		r/min	1500	1800
Cooling power	Prime Power	kW	112	145
		BTU/min	6369	8246
	Standby Power	kW	131	159
		BTU/min	7450	9042
Combustion air inlet temp. (Charge air temp after turbo compressor)	Prime Power	°C	206	228
		°F	403	442
	Standby Power	°C	226	243
		°F	439	469
Max allowable Comb. Air temp after CAC at 25 degree ambient. (Charge air temp after intercooler)	Standby Power	°C	45	45
		°F	113	113
Maximum pressure droop over intercooler, incl. piping		kPa	11	19
		psi	1,60	2,76
Boost pressure		kPa	268	262
		psi	38,9	38,0
Standard intercooler core area		m²	1,3	
		foot²	13,99	
Standard intercooler core thickness		mm	68	
		in	2,68	

Cooling performance

Cooling air flow and external restriction at different radiator air temperatures based on 103°C TTT and 40% antifreeze (radiator and cooling fan, see optional equipment)

Engine speed rpm	Air on temp °C	PRIME POWER		STANDBY POWER	
		Air mass flow kg/s	External restriction Pa	Air mass flow kg/s	External restriction Pa
1500	40	5,9	835	6,5	736
	45	6,5	748	7,2	683
	50	7,4	697	8,2	616
	55	8,4	600	9,4	250
	57			10,0	0
	60	9,9	76		
	63	10,0	0		
1800	40	6,8	1313	7,6	1154
	45	7,6	1182	8,5	1055
	50	8,6	1078	9,7	956
	55	9,8	963	11,1	494
	58			12,3	0
	60	11,5	324		
	61	12,3	0		

Engine management system

Functionallity		Alternatives	Default setting
Governor mode		Isochronous/droop Switchable during operation	Isochronous
Governor droop		0-8%	4%
Dual speed		1500/1800	According to customer
Low Idle speed select		600-1200	900
Stop function		Energized to Run / Stop	Energized to stop
Lamp test		On / Off	On
Pre-heat on ignition		On / Off	Off

Engine protection	Alarm		Engine protection	
Parameter	Selectable span	Default setting	Protection at	Protective action Default / Alternative
Oil temperature C	120 - 130	125	Setting +5	Shut down / off *
Oil pressure kPa				
Low idle 900rpm	-	190	Default -30	Shut down / off *
1500 rpm	-	250	::	::
1800 rpm	-	300	::	::
Oil level	-	Min level	-	-
Piston cooling pressure kPa				
>1000rpm	-	150	150	Shut down / off *
Coolant temp	95 - 101	98	Setting +5	Shut down / off *
Coolant level	-	On	Low level	Shut down / off *
Fuel feed pressure kPa				
Low idle 900rpm	-	150	-	-
> 1400 rpm	-	300	-	-
Water in fuel	-	High level	-	-
Crank case pressure kPa	-	-	-	Shut down
Air filter diff pressure kPa	-	5,0	-	-
Altitude, above sea m	-	-	-	Automatic derating, see section derating
Charge air temp after cac	-	80	+5	Shut down
Charge air pressure kPa	-	290	300	Shut down
Overspeed	100 - 120% of rated speed	120% / off *	Alarm level	Shut down / on
Low voltage V	-	25,5	-	-

*Off means no shutdown , alarm only.

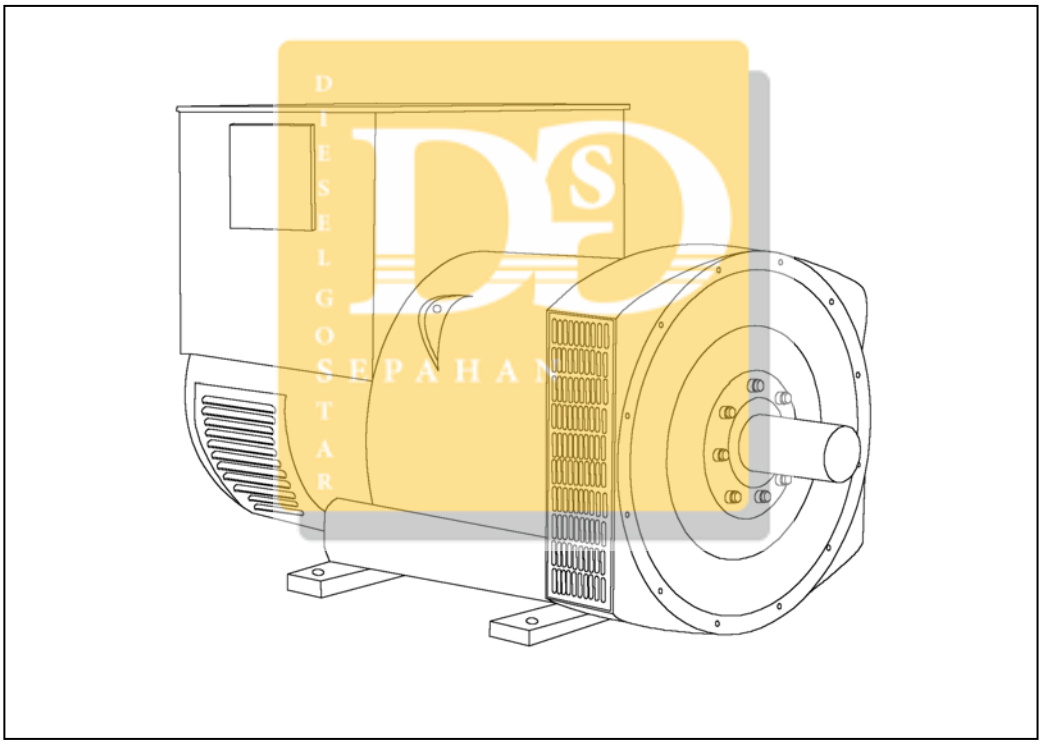
Electrical system		r/min	1500	1800
Voltage and type			24V / insulated from earth	
Alternator:	make/output	Amp	Bosch / 80	
	tacho output	Hz/alt. Rev	6	
	drive ratio		3,9 : 1	
Starter motor		make	Melco	
		type	105P70	
		kW	7,0	
Starter motor solenoid,	pull current	Amp	-	
	hold current	Amp	2,3	
Number of teeth on:	flywheel		153	
	starter motor		12	
Inrush current at +20°C		Amp	700	
Cranking current at +20°C		Amp	280	
Crank engine speed at 20°C		rpm	150	
Starter motor battery capacity:	max	Ah	2x 225	
	min at +5°C	Ah		
Inlet manifold heater (at 20 V)		kW	4,0	
Power relay for the manifold heater		Amp	1	

Power take off	r/min	1500	1800
Timing gear at compressor PTO max:	Nm	160	
	lbft	118	
Speed ratio direction of rotation viewed from flywheel side		1,31:1 / anti-clockwise	
Timing gear at servo pump PTO max:	Nm	100	
	lbft	74	
Max allowed bending moment in flywheel housing	Nm	15000	
	lbft	11063	
Max. rear main bearing load	N	5000	
	lbf	1124,0	

STAMFORD

power generation

HCI 534E/544E - Technical Data Sheet



STANDARDS
Newage Stamford industrial generators meet the requirements of BS EN 60034 and the relevant section of other international standards such as BS5000, VDE 0530, NEMA MG1-32, IEC34, CSA C22.2-100, AS1359. Other standards and certifications can be considered on request.

VOLTAGE REGULATORS

SX440 AVR - STANDARD
With this self-excited system the main stator provides power via the Automatic Voltage Regulator (AVR) to the exciter stator. The high efficiency semi-conductors of the AVR ensure positive build-up from initial low levels of residual voltage.
The exciter rotor output is fed to the main rotor through a three-phase full-wave bridge rectifier. The rectifier is protected by a surge suppressor against surges caused, for example, by short circuit or out-of-phase paralleling.
The SX440 will support a range of electronic accessories, including a 'droop' Current Transformer (CT) to permit parallel operation with other ac generators.
If 3-phase sensing is required with the self-excited system, the SX421 AVR must be used.

SX421 AVR
This AVR also operates in a self-excited system. It combines all the features of the SX440 with, additionally, three-phase rms sensing for improved regulation and performance. Over voltage protection is provided via a separate circuit breaker. An engine relief load acceptance feature is built in as standard.

MX341 AVR
This sophisticated AVR is incorporated into the Stamford Permanent Magnet Generator (PMG) control system.
The PMG provides power via the AVR to the main exciter, giving a source of constant excitation power independent of generator output. The main exciter output is then fed to the main rotor, through a full wave bridge, protected by a surge suppressor. The AVR has in-built protection against sustained over-excitation, caused by internal or external faults. This de-excites the machine after a minimum of 5 seconds.
An engine relief load acceptance feature can enable full load to be applied to the generator in a single step.
If three-phase sensing is required with the PMG system the MX321 AVR must be used.
We recommend three-phase sensing for applications with greatly unbalanced or highly non-linear loads.

MX321 AVR
The most sophisticated of all our AVRs combines all the features of the MX341 with, additionally, three-phase rms sensing, for improved regulation and performance.
Over voltage protection is built-in and short circuit current level adjustments is an optional facility.

WINDINGS & ELECTRICAL PERFORMANCE
All generator stators are wound to 2/3 pitch. This eliminates triplen (3rd, 9th, 15th …) harmonics on the voltage waveform and is found to be the optimum design for trouble-free supply of non-linear loads. The 2/3 pitch design avoids excessive neutral currents sometimes seen with higher winding pitches, when in parallel with the mains. A fully connected damper winding reduces oscillations during paralleling. This winding, with the 2/3 pitch and carefully selected pole and tooth designs, ensures very low waveform distortion.

TERMINALS & TERMINAL BOX
Standard generators are 3-phase reconnectable with 12 ends brought out to the terminals, which are mounted on a cover at the non-drive end of the generator. A sheet steel terminal box contains the AVR and provides ample space for the customers' wiring and gland arrangements. It has removable panels for easy access.

SHAFT & KEYS
All generator rotors are dynamically balanced to better than BS6861:Part 1 Grade 2.5 for minimum vibration in operation. Two bearing generators are balanced with a half key.

INSULATION/IMPREGNATION
The insulation system is class 'H'.
All wound components are impregnated with materials and processes designed specifically to provide the high build required for static windings and the high mechanical strength required for rotating components.

QUALITY ASSURANCE
Generators are manufactured using production procedures having a quality assurance level to BS EN ISO 9001.

The stated voltage regulation may not be maintained in the presence of certain radio transmitted signals. Any change in performance will fall within the limits of Criteria 'B' of EN 61000-6-2:2001. At no time will the steady-state voltage regulation exceed 2%.

NB Continuous development of our products entitles us to change specification details without notice, therefore they must not be regarded as binding.

Front cover drawing typical of product range.

STAMFORD
power generation

HCI534E/544E

WINDING 311

CONTROL SYSTEM	SEPARATELY EXCITED BY P.M.G.		
A.V.R.	MX321	MX341	
VOLTAGE REGULATION	± 0.5 %	± 1.0 %	With 4% ENGINE GOVERNING
SUSTAINED SHORT CIRCUIT	REFER TO SHORT CIRCUIT DECREMENT CURVES (page 7)		

CONTROL SYSTEM	SELF EXCITED		
A.V.R.	SX440	SX421	
VOLTAGE REGULATION	± 1.0 %	± 0.5 %	With 4% ENGINE GOVERNING
SUSTAINED SHORT CIRCUIT	SERIES 4 CONTROL DOES NOT SUSTAIN A SHORT CIRCUIT CURRENT		

INSULATION SYSTEM	CLASS H						
PROTECTION	IP23						
RATED POWER FACTOR	0.8						
STATOR WINDING	DOUBLE LAYER LAP						
WINDING PITCH	TWO THIRDS						
WINDING LEADS	12						
STATOR WDG. RESISTANCE	0.0043 Ohms PER PHASE AT 22°C SERIES STAR CONNECTED						
ROTOR WDG. RESISTANCE	1.96 Ohms at 22°C						
R.F.I. SUPPRESSION	BS EN 61000-6-2 & BS EN 61000-6-4,VDE 0875G, VDE 0875N. refer to factory for others						
WAVEFORM DISTORTION	NO LOAD < 1.5% NON-DISTORTING BALANCED LINEAR LOAD < 5.0%						
MAXIMUM OVERSPEED	2250 Rev/Min						
BEARING DRIVE END	BALL. 6220 (ISO)						
BEARING NON-DRIVE END	BALL. 6314 (ISO)						
	1 BEARING				2 BEARING		
WEIGHT COMP. GENERATOR	1543 kg				1535 kg		
WEIGHT WOUND STATOR	722 kg				722 kg		
WEIGHT WOUND ROTOR	617 kg				588 kg		
WR² INERTIA	8.9828 kgm^2				8.7049 kgm^2		
SHIPPING WEIGHTS in a crate	1635 kg				1625 kg		
PACKING CRATE SIZE	166 x 87 x 124(cm)				166 x 87 x 124(cm)		
	50 Hz				60 Hz		
TELEPHONE INTERFERENCE	THF<2%				TIF<50		
COOLING AIR	1.035 m³/sec 2202 cfm				1.312 m³/sec 2780 cfm		
VOLTAGE SERIES STAR	380/220	400/231	415/240	440/254	416/240	440/254	460/266	480/277
VOLTAGE PARALLEL STAR	190/110	200/115	208/120	220/127	208/120	220/127	230/133	240/138
VOLTAGE SERIES DELTA	220/110	230/115	240/120	254/127	240/120	254/127	266/133	277/138
kVA BASE RATING FOR REACTANCE VALUES	600	600	600	600	681	713	731	750
Xd DIR. AXIS SYNCHRONOUS	3.14	2.83	2.63	2.34	3.53	3.30	3.10	2.92
X'd DIR. AXIS TRANSIENT	0.17	0.15	0.14	0.12	0.17	0.16	0.15	0.14
X"d DIR. AXIS SUBTRANSIENT	0.12	0.11	0.10	0.09	0.12	0.11	0.11	0.10
Xq QUAD. AXIS REACTANCE	2.45	2.21	2.05	1.82	2.82	2.64	2.48	2.33
X"q QUAD. AXIS SUBTRANSIENT	0.26	0.24	0.22	0.20	0.34	0.32	0.30	0.28
X_L LEAKAGE REACTANCE	0.06	0.05	0.05	0.04	0.06	0.06	0.05	0.05
X_2 NEGATIVE SEQUENCE	0.18	0.16	0.15	0.13	0.23	0.22	0.20	0.19
X_0 ZERO SEQUENCE	0.08	0.08	0.07	0.06	0.10	0.09	0.09	0.08
REACTANCES ARE SATURATED	VALUES ARE PER UNIT AT RATING AND VOLTAGE INDICATED						
T'd TRANSIENT TIME CONST.	0.08s						
T"d SUB-TRANSTIME CONST.	0.012s						
T'do O.C. FIELD TIME CONST.	2.5s						
Ta ARMATURE TIME CONST.	0.019s						
SHORT CIRCUIT RATIO	1/Xd						

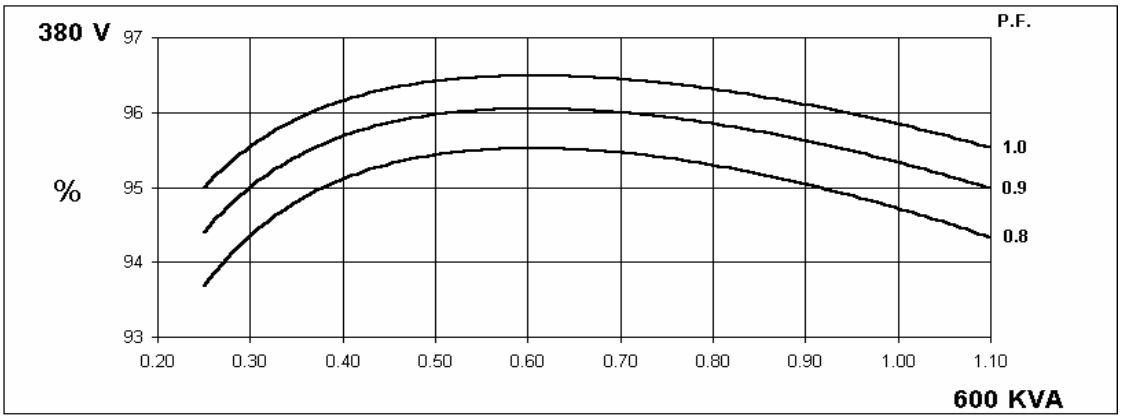
50 Hz

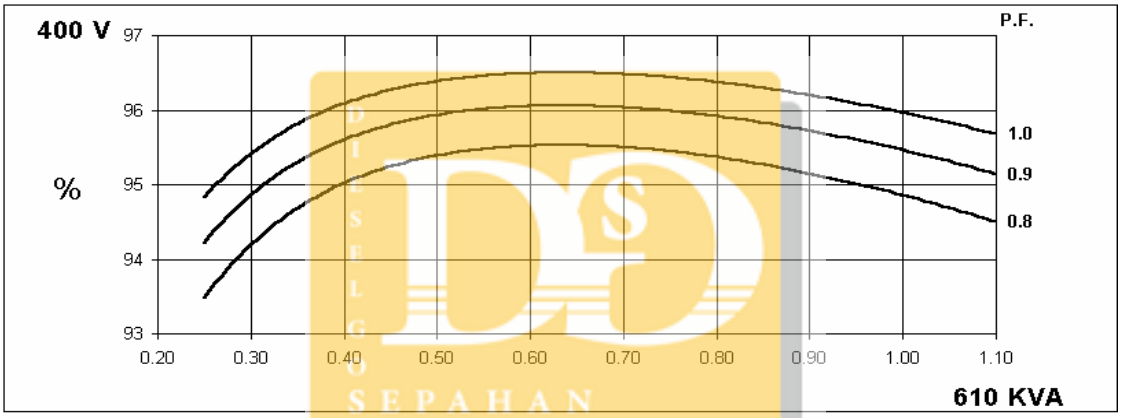
HCI534E/544E

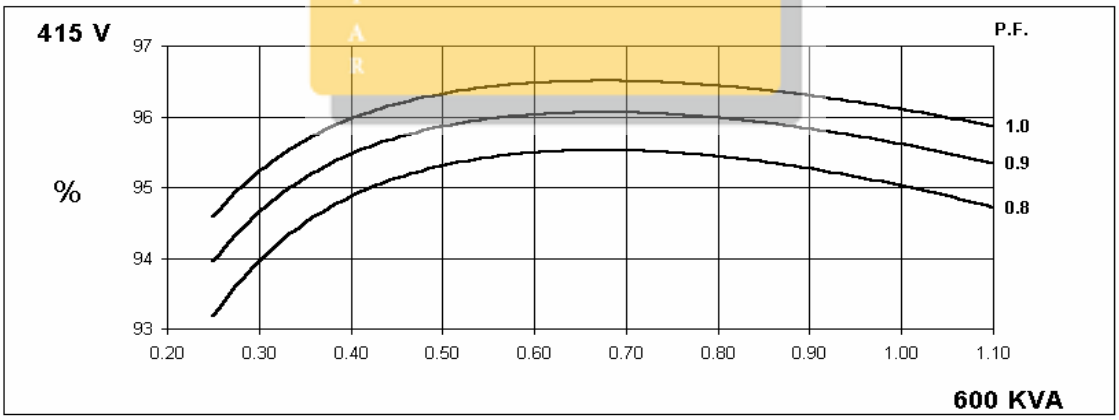
Winding 311

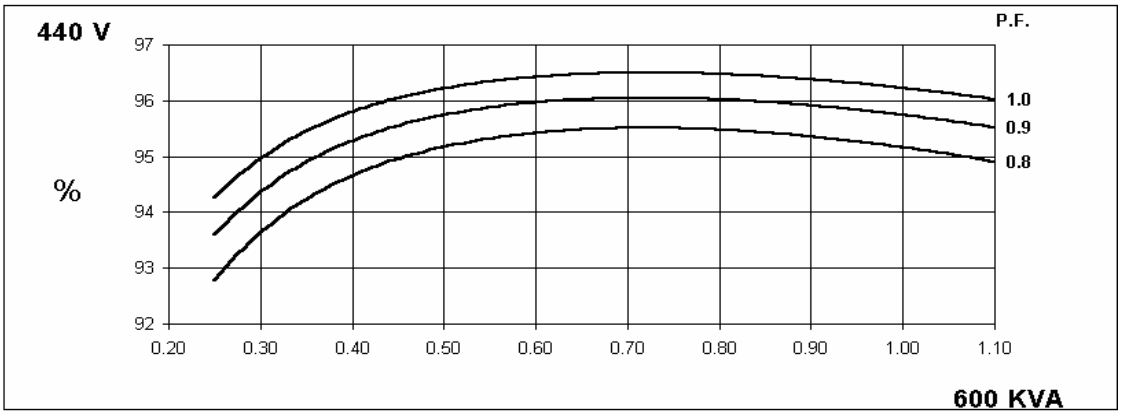
STAMFORD power generation

THREE PHASE EFFICIENCY CURVES









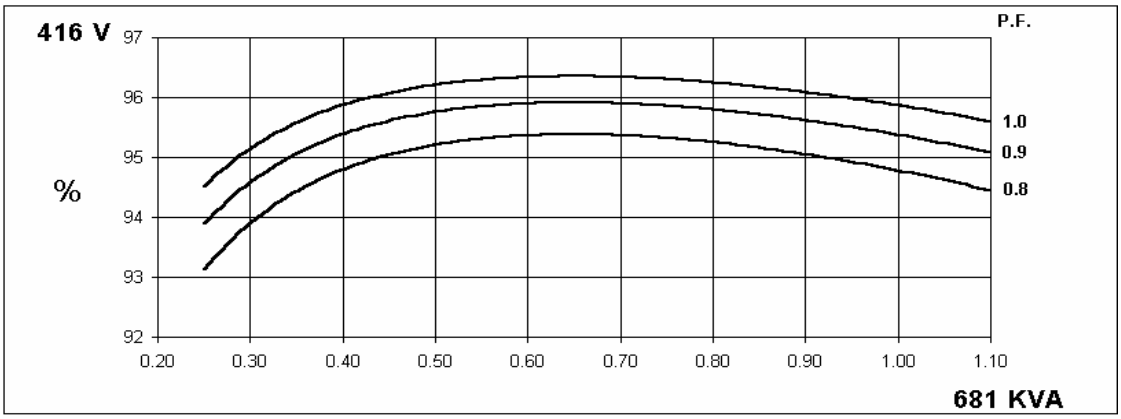
STAMFORD
power generation

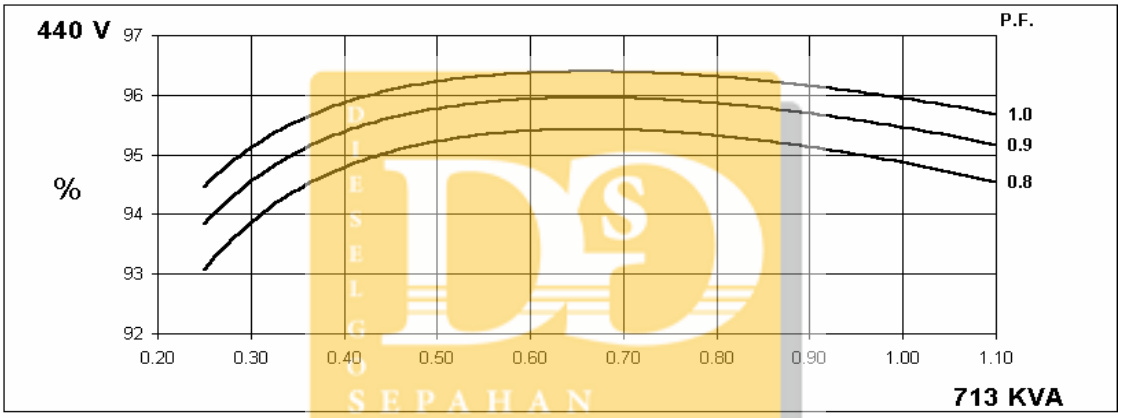
HCI534E/544E

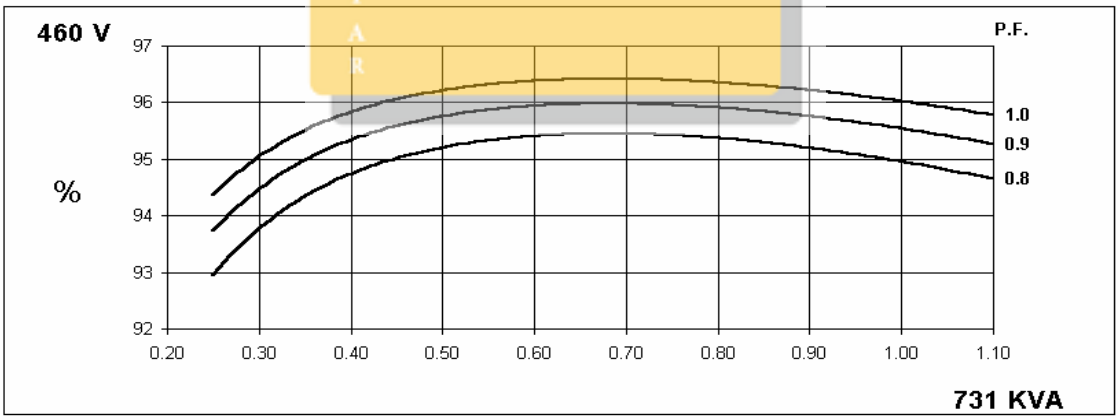
Winding 311

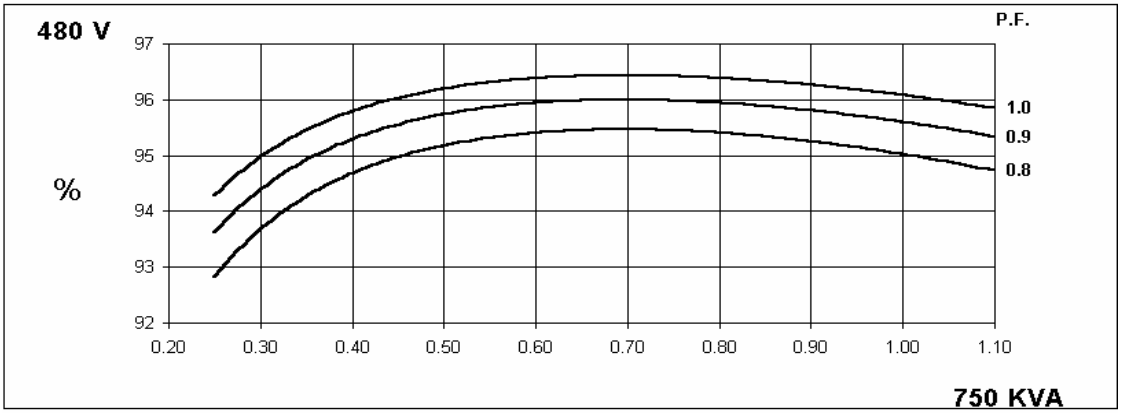
60 Hz

THREE PHASE EFFICIENCY CURVES









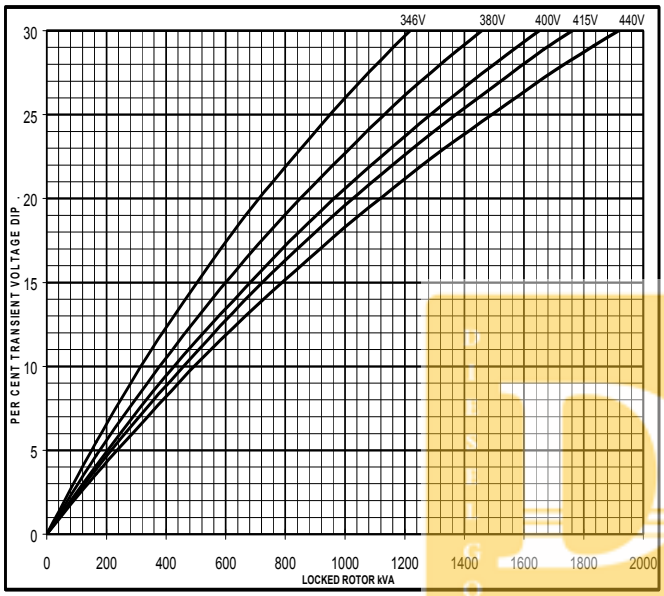
HCI534E/544E

Winding 311

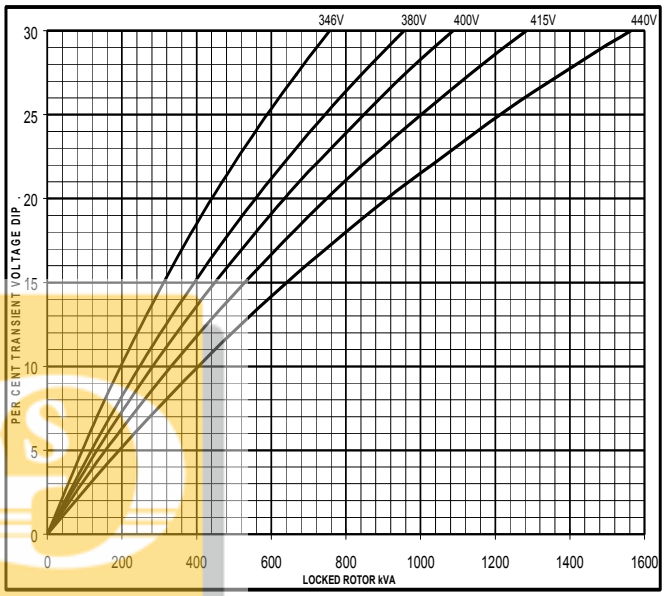
Locked Rotor Motor Starting Curve

50 Hz

MX

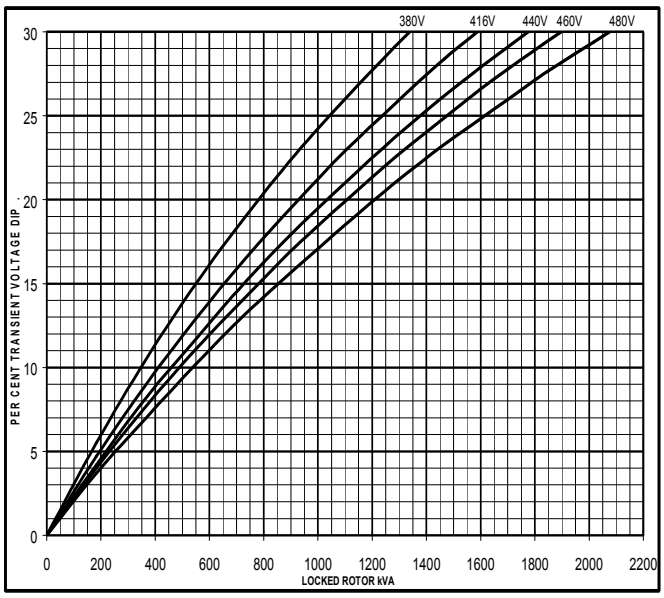


SX

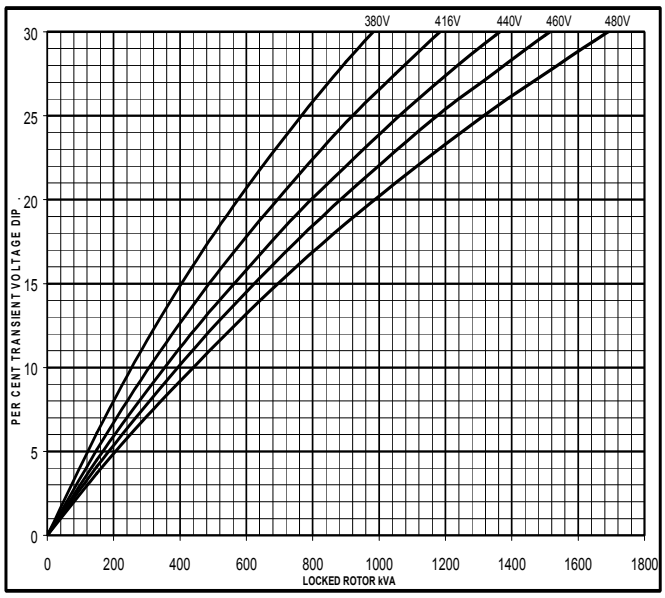


60 Hz

MX

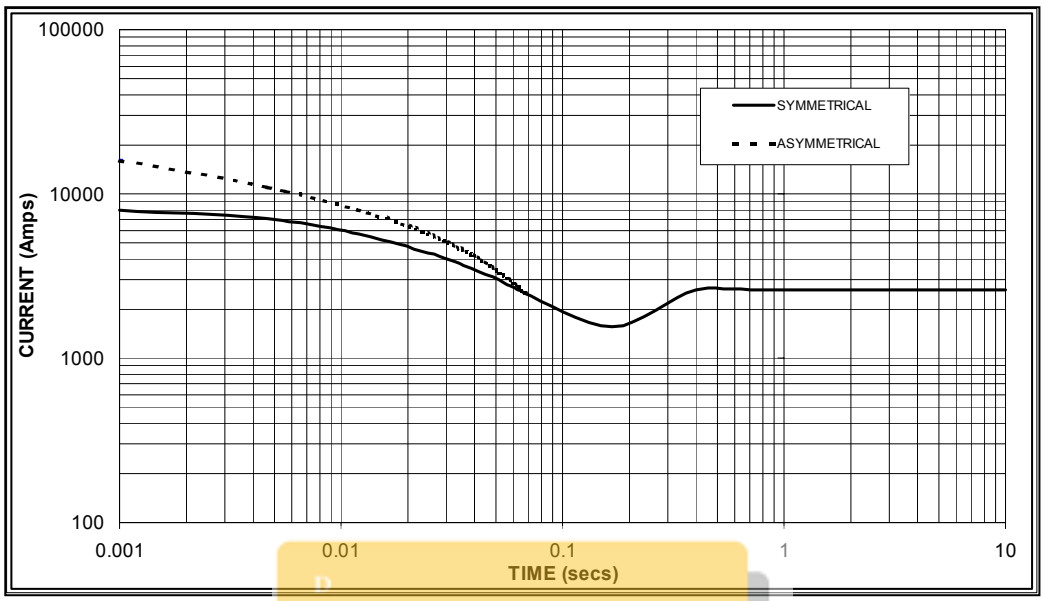


SX



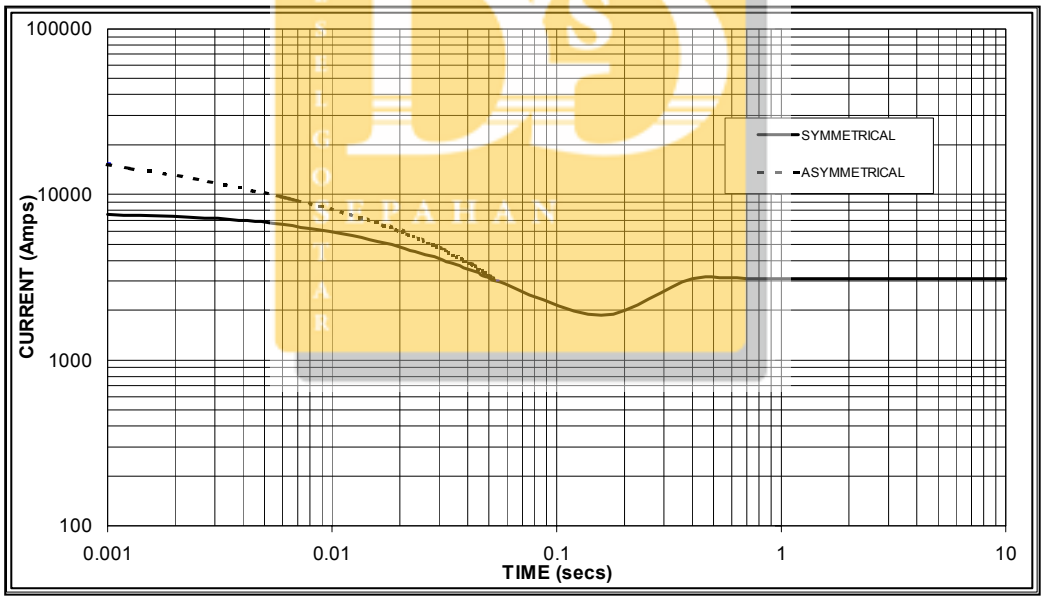
Three-phase Short Circuit Decrement Curve. No-load Excitation at Rated Speed Based on star (wye) connection.

50 Hz



Sustained Short Circuit = 2,600 Amps

60 Hz



Sustained Short Circuit = 3,100 Amps

Note 1

The following multiplication factors should be used to adjust the values from curve between time 0.001 seconds and the minimum current point in respect of nominal operating voltage :

50Hz		60Hz	
Voltage	Factor	Voltage	Factor
380v	X 1.00	416v	X 1.00
400v	X 1.06	440v	X 1.06
415v	X 1.09	460v	X 1.12
440v	X 1.12	480v	X 1.20

The sustained current value is constant irrespective of voltage level

Note 2

The following multiplication factor should be used to convert the values calculated in accordance with NOTE 1 to those applicable to the various types of short circuit :

	3-phase	2-phase L-L	1-phase L-N
Instantaneous	x 1.00	x 0.87	x 1.30
Minimum	x 1.00	x 1.80	x 3.20
Sustained	x 1.00	x 1.50	x 2.50
Max. sustained duration	10 sec.	5 sec.	2 sec.

All other times are unchanged

Note 3

Curves are drawn for Star (Wye) connected machines. For other connection the following multipliers should be applied to current values as shown :

Parallel Star = Curve current value X 2

Series Delta = Curve current value X 1.732

HCI534E/544E

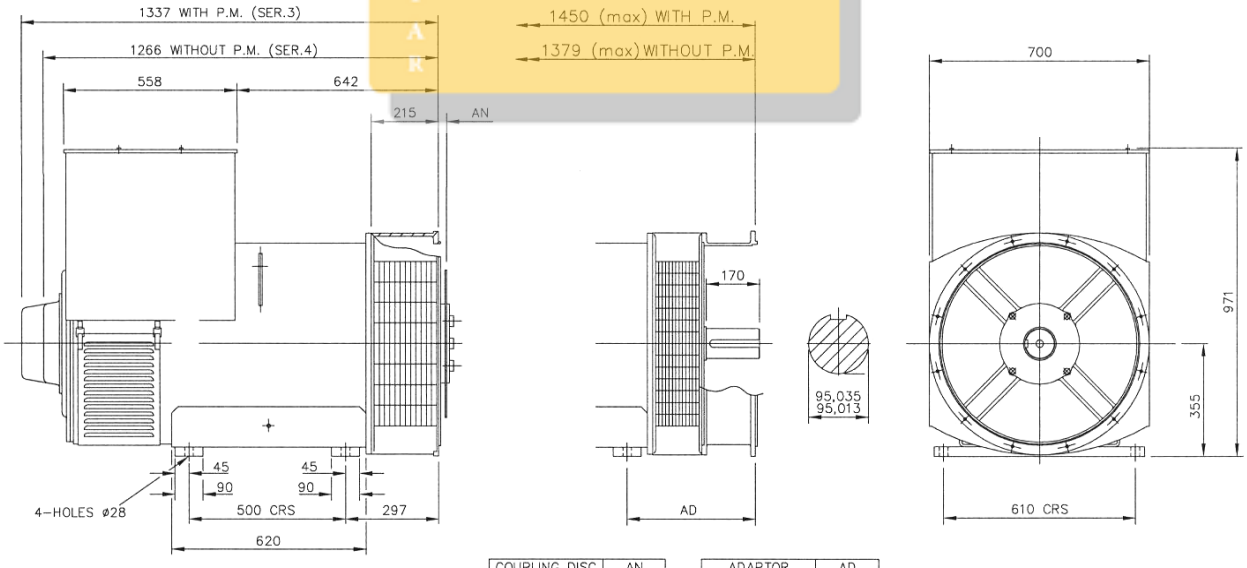
Winding 311 0.8 Power Factor

RATINGS

	Class - Temp Rise	Cont. F - 105/40°C				Cont. H - 125/40°C				Standby - 150/40°C				Standby - 163/27°C			
50 Hz	Series Star (V)	380	400	415	440	380	400	415	440	380	400	415	440	380	400	415	440
	Parallel Star (V)	190	200	208	220	190	200	208	220	190	200	208	220	190	200	208	220
	Series Delta (V)	220	230	240	254	220	230	240	254	220	230	240	254	220	230	240	254
	kVA	550	560	550	550	600	610	600	600	636	640	636	636	660	665	660	660
	kW	440	448	440	440	480	488	480	480	509	512	509	509	528	532	528	528
	Efficiency (%)	95.0	95.1	95.2	95.3	94.7	94.9	95.0	95.2	94.5	94.7	94.8	95.0	94.3	94.5	94.7	94.9
	kW Input	463	471	462	462	507	514	505	504	538	541	537	536	560	563	558	556

60 Hz	Series Star (V)	416	440	460	480	416	440	460	480	416	440	460	480	416	440	460	480
	Parallel Star (V)	208	220	230	240	208	220	230	240	208	220	230	240	208	220	230	240
	Delta (V)	240	254	266	277	240	254	266	277	240	254	266	277	240	254	266	277
	kVA	625	650	663	675	681	713	731	750	719	750	780	800	738	769	798	819
	kW	500	520	530	540	545	570	585	600	575	600	624	640	590	615	638	655
	Efficiency (%)	95.0	95.1	95.2	95.3	94.8	94.9	95.0	95.0	94.6	94.7	94.8	94.8	94.5	94.6	94.7	94.8
	kW Input	526	547	557	567	575	601	616	632	608	634	658	675	625	650	674	691

DIMENSIONS



COUPLING DISC	AN
SAE 14	25,4
SAE 18	15,87
SAE 21	0

ADAPTOR	AD
SAE 00	410
SAE 0	410
SAE 1/2	390
SAE 1	390

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