ALTERNATOR TECHNICAL DESCRIPTION
LSA 53.2 VL10 / 4p

LS Reference: TDS-MVH-0527

Date: 18-05-2021

V5.01 - 05/2020

Project Manager : B G Kharvi
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Leroy-Somer
Electric Power Generation
Banglore

Main data C

Generator type:	**LSA 53.2 VL10 / 4p**			
Power:	2 500	kVA	2 000 kWe	2 072 kWm
Voltage:	6600	V	Star serial	
Rated voltage range:	+5/-5%			
Power factor - Lagging:	0,8			
Frequency:	50	Hz		
Speed:	1500	rpm		
Nominal current:	219	A		
Winding type:	p5/6			
Classes (Insulation / Temperature Rise):	H / H			
Ambient Temperature:	40	°C		
Altitude:	1000	m		

Installation Quantity 1

Prime mover:	Reciprocating engine
Manufacturer:	-
Type:	-
Duty:	Base Rating

Mechanical Construction IM1101

Type of construction:	Two bearing
Mounting arrangement:	Horizontal Axis
Direction of rotation:	Clockwise (seen when facing the drive end - DE)
Bearing type:	Anti-friction
Bearing Lubrication:	Regreasable
Bearing insulation:	Not insulated
Shaft end type:	Cylindrical with keyway
Balancing - Class (ISO 1940/1):	Half key - G2,5 (std)
Flange:	None / without
Shaft height:	500 mm
Width:	1150 mm

Additional specificities

Stabilized Runaway speed:	1800 rpm - 2 min.

Cooling Method IC01

Degree of protection:	IP23
Coolant:	Air / Temperature: 40 °C
Air quality:	Clean
Ventilation (internal):	Self-ventilated
Filters:	Without
Ducting for air inlet:	No
Ducting for air outlet:	No

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Connection, Excitation & Regulation

Parallel operation:	Between alternators (1F) - 1x //CT	1
Excitation:	Self-excited - Brushless - Type: AREP + PMI	1
Sustained 3-phase Isc:	> 3 x FLC for 10s.	1
AVR type:	Leroy Somer - D550 - Digital	1
AVR location:	In terminal box	1
Alternator Voltage sensing:	Terminal box mounted voltage sensing VTs	1
Additional features:		
	Three-phase sensing	1

Terminal box

Power connection:	4 connectors (brought out neutral)	1
Main Terminal box location:	1 terminal box on the top	1
Line side outlet:	Left hand side (seen when facing the drive end - D)	1
Gland plate:	Non magnetic - Cable gland plate not drilled	1
	-	1

Protection and measurement accessories

Temperature detection

Stator windings:	6 x 3-wire Pt100 RTDs	1
Combined guide and thrust bearing - DE:	1 x 3-wire Pt100 RTD	1
Guide bearing - NDE:	1 x 3-wire Pt100 RTD	1

Anti-condensation heating

	Voltage: 230 V - 1Ph / Power: 500 W	1

Various items

Paint:	PE - Primary - RAL 7032	1
Documentation:	PDF manual	1
Documentation Language:	English	1

Controls

QUAL/INES/006 001	Measurement of winding resistance	1
QUAL/INES/006 021	Insulation check on sensors (when fitted)	1
QUAL/INES/006 002	Voltage balance and phase order check	1
QUAL/INES/006 007	Overspeed test (according to test bench limitation)	1
QUAL/INES/006 009	High potential test	1
QUAL/INES/006 010	Insulation resistance measurement	1

ALTERNATOR ELECTRICAL DATA
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Voltage:	**6600**	V	Frequency:		**50**	Hz
Rated voltage range:	+5% / -5%		Speed:		1500	rpm
Power factor - Lagging:	0,8					
Nominal current:	219	A	Phases		3	
Insulation / Temperature rise:	H / H		Connexion		Star serial	
Cooling:	**IC01**		Winding type:		p5/6	
			Winding:		- 6 Wires	
Ambient Temperature:	40	°C				
Altitude:	1000	m	Overspeed (rpm)		1800	
Duty: Base Rating			Total Harmonic Distortion (THD) < 5%			

Efficiency (Base 2000 kWe) IEC

	25%	50%	75%	**100%**	110%
Power factor - Lagging: 0,8	94,17	96,22	96,57	**96,52**	96,45
Power factor - Lagging: 1	94,54	96,76	97,29	**97,41**	97,40

Reactances (%) - (Base 2500 kVA)

Unitary impedance (1 per unit) = 17,424 ohms

		Direct axis *Unsaturated*	Direct axis *Saturated*		Quadrature axis *Unsaturated*	Quadrature axis *Saturated*
Synchronous reactance	Xd	246	212	Xq	126	108
Transient reactance	X'd	25,8	21,9	X'q	126	108
Subtransient reactance	X"d	14,3	12,1	X"q	15,0	12,8
Negative sequence reactance	X2	14,6	12,4			

X0	10,0	Zero sequence reactance
Xl	7,1	Stator leakage reactance
Xr	20,3	Rotor leakage reactance
Kc	**0,47**	Short-circuit ratio

Time constants (s)

		Direct axis		Quadrature axis	
Open circuit transient time constant	T'do	3,15	T'qo	NA
Short-circuit transient time constant	T'd	0,330	T'q	NA
Open circuit subtransient time constant	T"do	0,038	T"qo	0,158
Subtransient time constant	T"d	0,021	T"q	0,019

Ta	0,039	Armature time constant

Resistances (%)

Ra	1,2	Armature resistance	R0	3,3	Zero sequence resistance
X/R	10,1	X/R ratio (without unit)	R2	2,9	Negative sequence resistance

Voltage accuracy: 0,25%
Maximum inrush current for a voltage dip of 15%: 1899 kVA
when starting an AC motor having a starting power factor between 0 and 0.4

rating is provided for the specified temperature rise, by resistance measurement according to IEC60034-1

According to: I.E.C. 60034.1 - 60034.2 - NEMA MG 1-32

ALTERNATOR MAIN CURVES
LSA 53.2 VL10 / 4P

LS Reference: TDS-MVH-0527

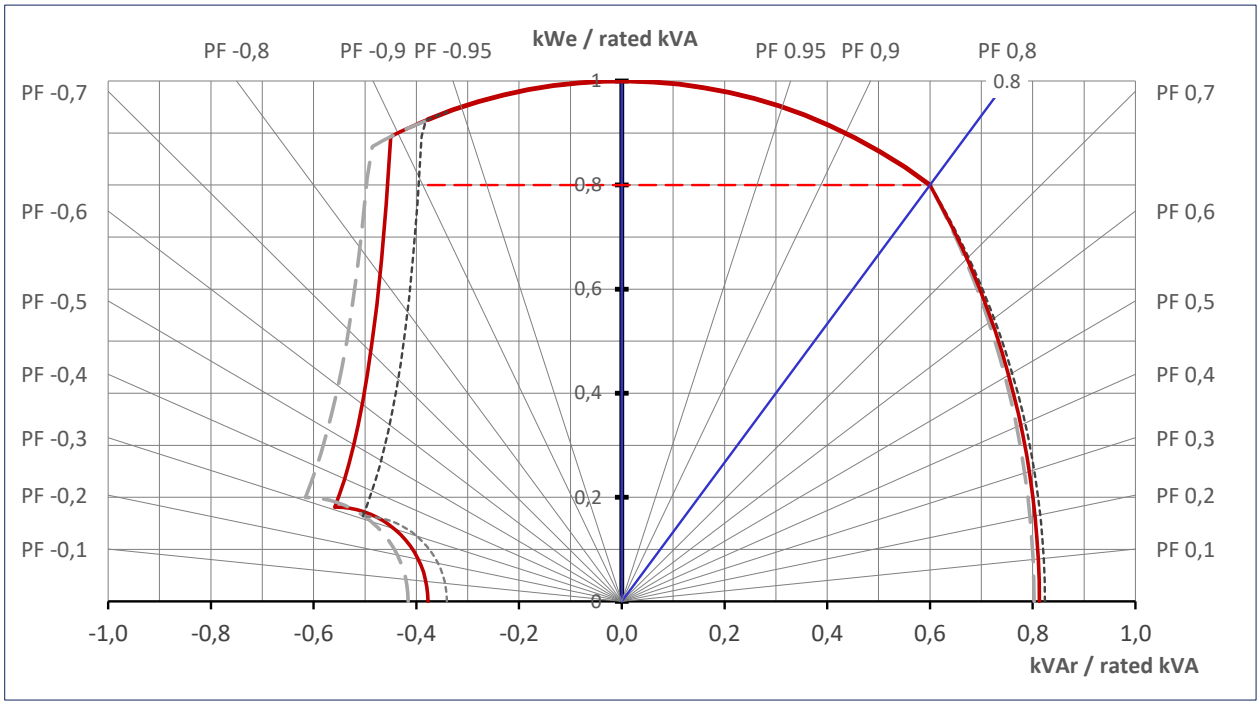
Date: 18-05-2021

2500kVA - 6600V - 50 Hz

V5.01 - 05/2020

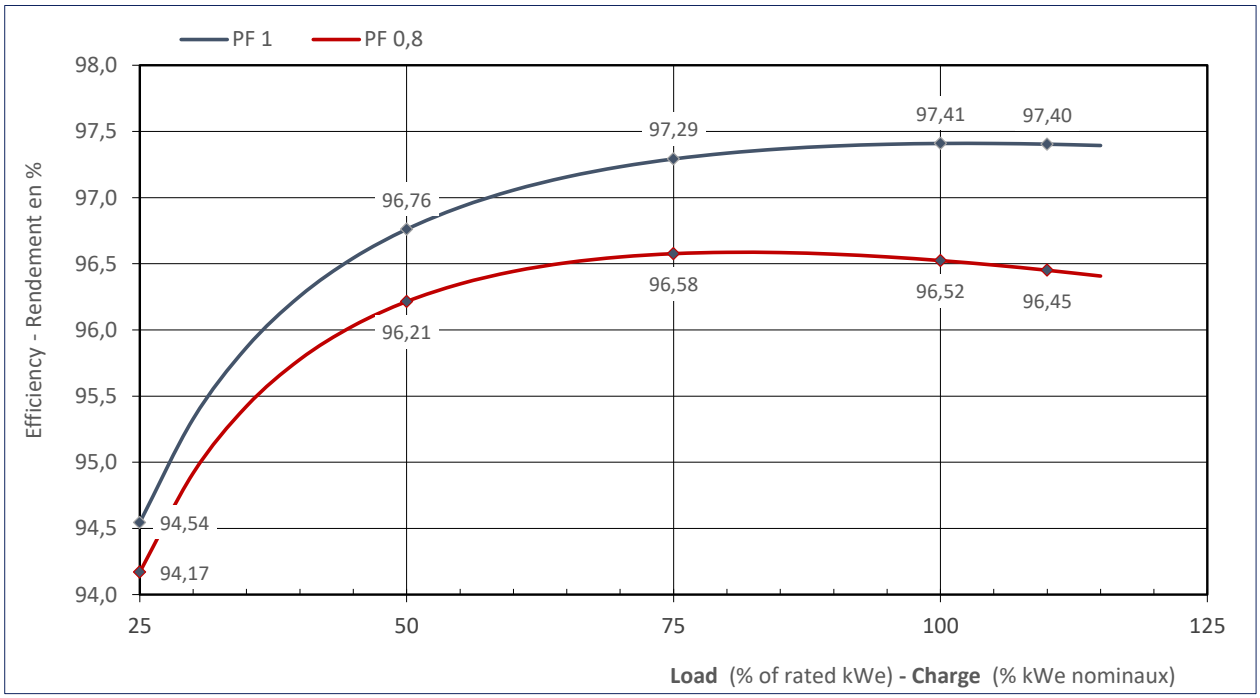
Capability Curve

Umax	+ 5%	6 930	V
Un		**6 600**	V
Umin	- 5%	6 270	V



Efficiency Curves

According to: IEC



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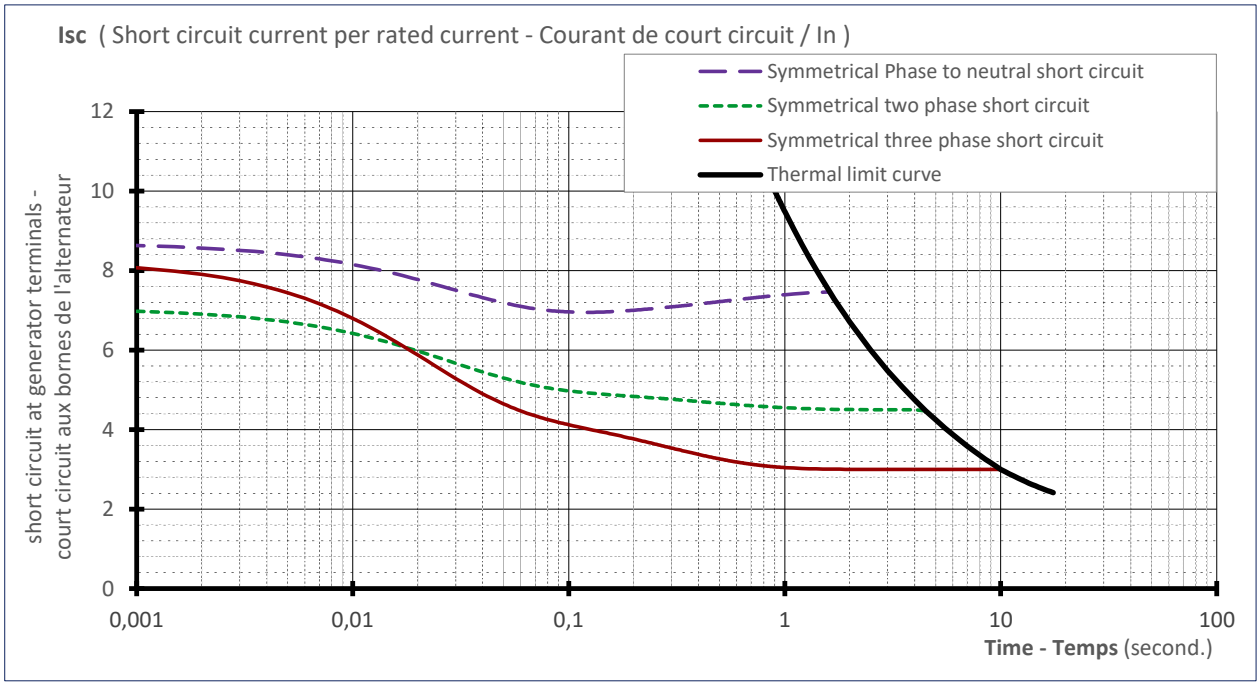
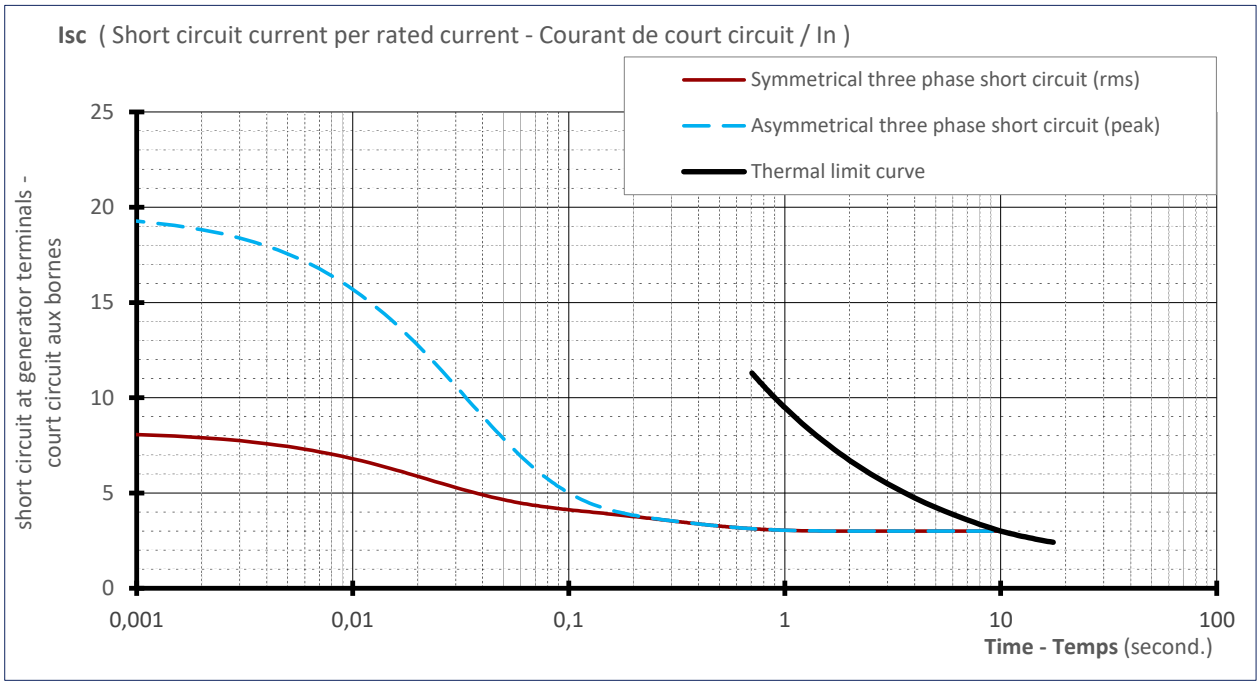
Stator Current decrement curves

Symmetrical phase to neutral short-circ	initial	1 890	A	8,6 x In		
Symmetrical two phase short-circuit	max	1 528	A	7 x In	In =	**219** A
Symmetrical three phase short-circuit	value	1 768	A	8,1 x In		
Thermal Limit						



Asymmetrical three phase short-circuit — IP — 4 181 A 19,1 x In



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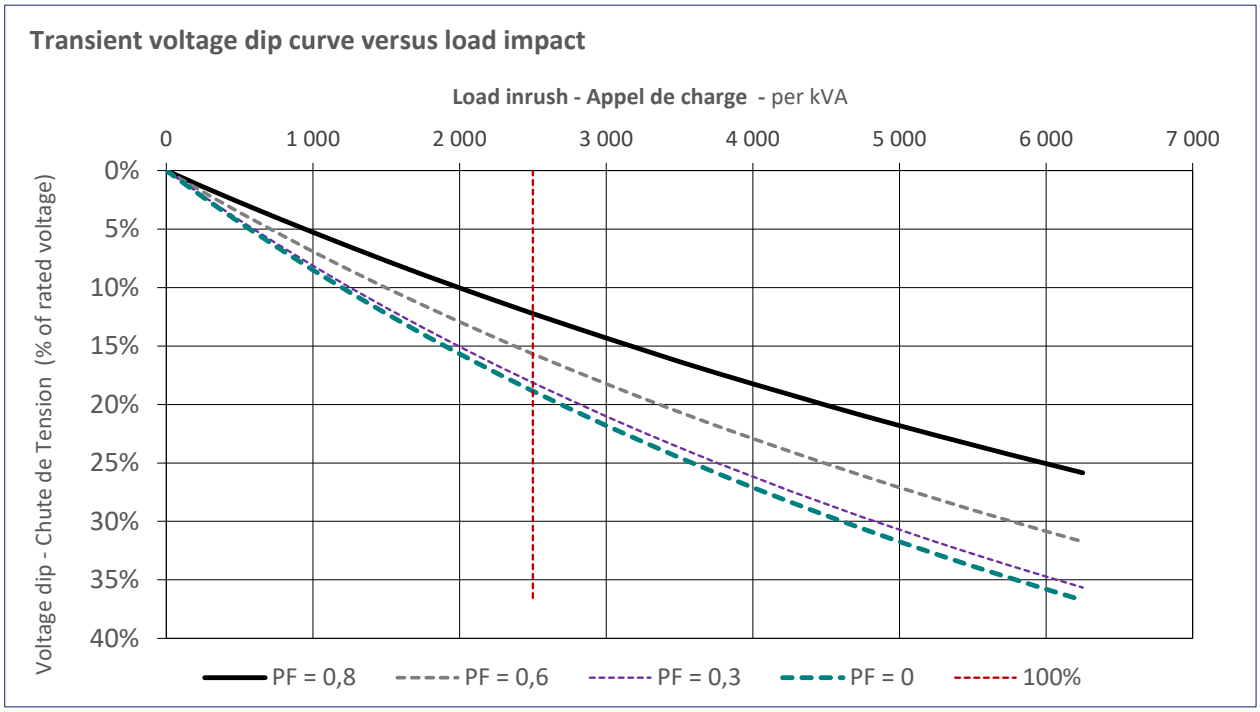
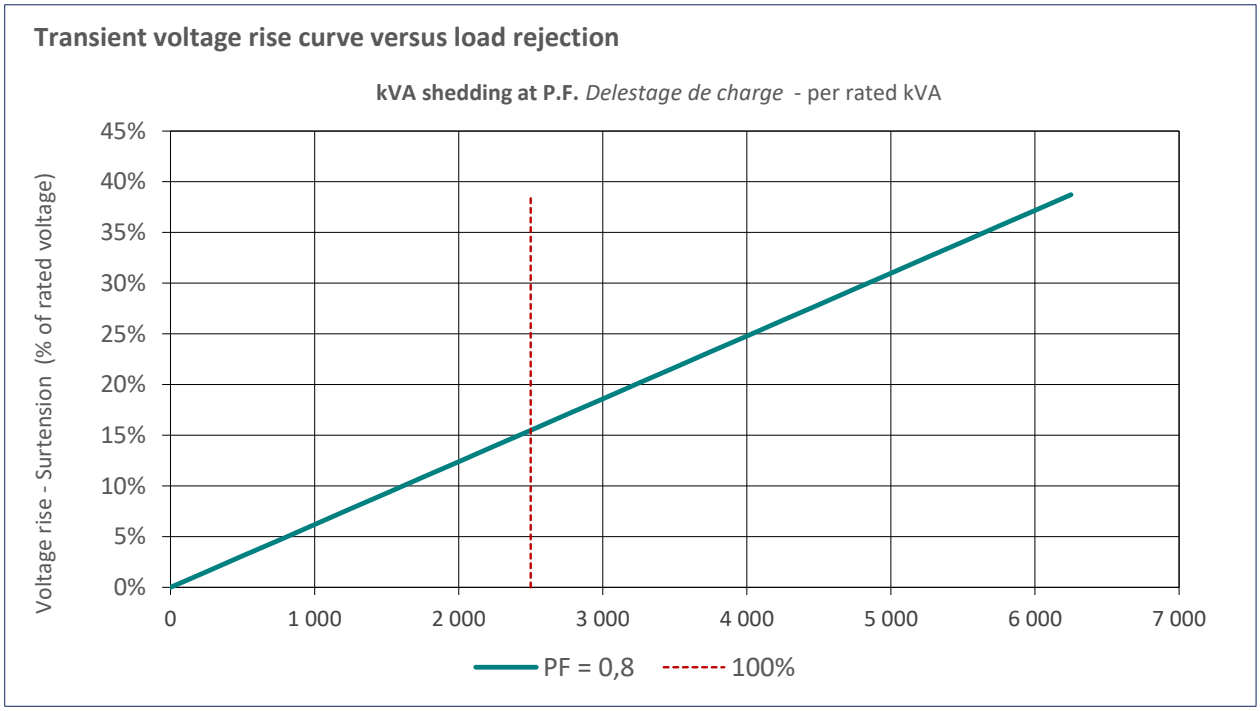
Transient Voltage Variation





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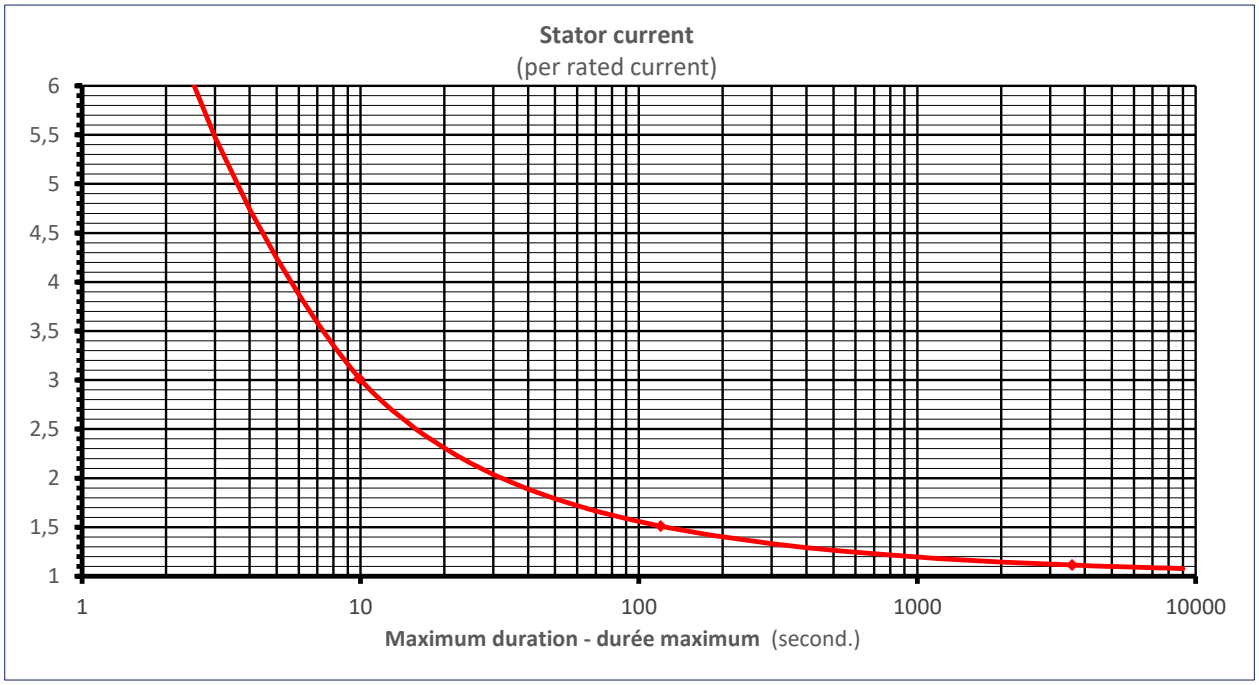
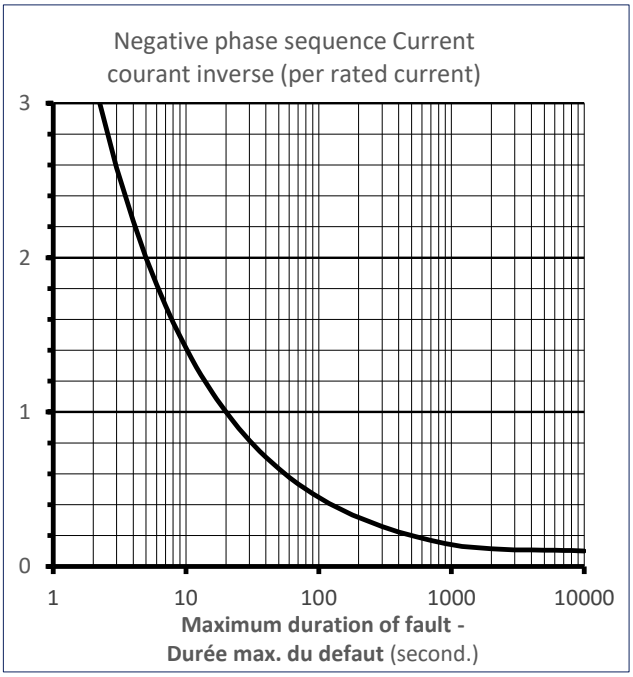
Thermal Damage Curve



Unbalance Load Curve



Stator Earth Fault Current