



Marine & Offshore
Division

Certificate number: 888ITB15/1

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CERTIFICATE FOR FREQUENCY CONVERTER

Manufacturer	: Mak Plus Power System UG (Köln - DEU)		
Supplier	: GANZ Danubius Trading Co. (Budapest - HUN)		
Purchaser	: Mak Plus Power System UG (Köln - DEU)		
Purchaser's order N°	: 04.09.2015		
BV Register N°	: 23369D		
Requirements	: Bureau Veritas Rules for the Classification of Steel Ships (Jul. 2012)		
	Ship Name	: SUEZ FLOATING DOCK	
Product description	: 3 PHASE FREQUENCY CONVERTER (INVERTER & RECTIFIER)		
Design review	: Reference(s) : DEU/15/01505: 15-0051-0002/ (Rev.0) - 15-0051/ 300 kVA (Rev.0) - 300 kVA frequency converter (Rev.0)		
Quantity	: 1 pc.		
Type	: CONV-MAK		
Protection index	: IP44		
Piece / Serial number(s)	: FC153300440060003		
Power	: 300 kVA		
Input/Output Voltage	: 380 V / 440 V		
Input/Output Frequency	: 50 Hz / 60 Hz		
DC Bus	: 450 V		
Max. Internal Temperature	: 55° C (at 45° C ambient temperature)		
Forced Cooling Type	: Air		

Enclosures / Remarks : 1-Please see attached performance test report (3 pages).
2-Final acceptance will be granted on board.

This certificate is issued by Bureau Veritas as per the above Classification Rules and in compliance with the applicable technical requirements therein.

Marking : 888ITB15
Last survey : 10 Sep 2015
Surveyor : Gurcan Yilmaz

Issuance date : 09 Oct 2015
Office : BV ISTANBUL



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3 PHASE FREQUENCY CONVERTER (INVERTER & RECTIFIER) TEST REPORT

Job Description					
Model	CONV-MAK	Serial No	FC15330044060003	Date	10.09.2015
Project No	15-0051	Stock Code			

Nominal Values			
Power (kVA)	300	DC Bus (V)	450
Input Voltage (V)	380	Input Frequency (Hz)	50
Output Voltage (V)	440	Output Frequency (Hz)	60

Electronic Board Serials			
1001-Inverter DSP Board	AB053-11	IGBT Driver 1	H112-21
1006-Inverter Interface Board	V003-15	IGBT Driver 2	H087-21
1001-Rectifier DSP Board A	AB054-11	IGBT Driver 3	H108-21
1001-Rectifier DSP Board B	AB291-11	IGBT Driver 4	
1006-Rectifier Interface Board	V011-15	IGBT Driver 5	
1001-Monitor DSP Board	AB031-11	IGBT Driver 6	
1004-Alarm & Comm Interface	S182-31	1020-Power Supply Board A	C281-51C
1030-LCD Panel	S216-3	1020-Power Supply Board B	C048-51C
1057-Led Panel Board	D0170-2	1020-Power Supply Board C	
1032-PWM Distribution Board A	E021-21	1008-Thyristor Driver Board A	R237-3
1032-PWM Distribution Board B		1008-Thyristor Driver Board B	R247-3
1056-Conveyor Board	A020-70	1029-Thyristor Snubber Board A	R182-2A
		1029-Thyristor Snubber Board B	R180-2A

Specific Components (Brand and Model)			
IGBT		CM900DUC	
Thyristor		MCC200-16101	
Software Versions			
Inverter DSP	2.00	Inverter uP	2.00
Rectifier DSP	3.09	Rectifier uP	2.00
Monitor DSP	4.00	Monitor uP	2.00

Electronic Measurements					
Power Supply Board A	Input	V	304.1		
	Output	V	+17.90		-18.66
Power Supply Board B	Input	V	304.1		
	Output	V	+17.88		
Power Supply Board C	Input	V			
	Output	V			
Power Supply Board (IGBT Driver)	Output	V	14.99		

Measurements (24% Light Load)					
Input	Voltage	V	220.0	219.0	219.0
	Current	A	89.6	91.3	96.15
	Power	kW	13.93	12.70	15.33
	Power Factor	-	0.7	0.63	0.72
	Current THD	%	18	17	18
DC Bus	Voltage	V	450.4		
	Current	A	86		
Output	Voltage	V	254.4	254.4	254.4
	Voltage THD	%	47.6	47.7	46.4
	Cap. Filter Current	A	77.0	78.0	77.0

Measurements (93.7 %Loaded)					
Input	<i>Voltage</i>	V	215.5	219.4	214.8
	<i>Current</i>	A	414.0	412.0	425.0
	<i>Power</i>	kW	79.4	79.6	80.7
	<i>Power Factor</i>	-	0,87	0,89	0,88
	<i>Current THD</i>	%	8.5	8.9	8,6
	<i>Rectifier 1 Current</i>	A	220		
	<i>Rectifier 2 Current</i>	A	293		
DC Bus	<i>Voltage</i>	V	448.0		
	<i>Current</i>	A	513		
	<i>Ripple</i>	V	0,97		
Output	<i>Voltage (R,S,T)</i>	V	254,1	254,3	254,0
	<i>Current</i>	A	298.0	293.2	296.0
	<i>Power</i>	kW	75.5	74.3	75.3
	<i>Power Factor</i>	-	0,99	0,99	0,99
	<i>Voltage THD</i>	%	1,1	1,3	1,1
	<i>Efficiency</i>	%	93.9		
	<i>Frequency (Variation %)</i>	Hz	59.9 +- 5%		
Temperature Rise Measurement	<i>Ambient Temp.</i>	°C	34		
	<i>Max. Internal Temp.</i>		32		
Humidity		%	60		

Functional Checks	OK	N/A
<i>Input CB Monitoring</i>		X
<i>Output CB Monitoring</i>	X	
<i>Battery CB Monitoring</i>		X
<i>DC Too Low Disconnect</i>	X	
<i>Inverter OverTemperature</i>	X	
<i>Buzzer</i>	X	
<i>LCD Panel Leds</i>	X	
<i>Fan Operation</i>	X	
<i>Alarm Kontakları</i>	X	
<i>Communication</i>	X	
<i>Fan Fuse</i>	X	
<i>LCD Panel Calibrations</i>	X	
<i>Insulation test (500V)</i>	X	
<i>Dielectric Strength test (2500Vac)</i>	X	

Final Control	OK
<i>Earth Continuity Control</i>	X
<i>General view and cleanance (visual Inspection)</i>	X
<i>Warning labels</i>	X
<i>Model & Serial No Labels</i>	X
<i>Protection covers</i>	X

Alarm and warning messages are displayed timely on the LCD display. Audible alarm is also provided at the mean time.

Possible alarm and warning messages are listed below.

Message	Meaning of the message	Result
OUTPUT FAIL (OVER VOLTAGE)	Indicates that the output voltage is out of the tolerances (over voltage under voltage etc.). Normal, that this message is displayed during stop mode.	OK
LINE FAILURE	Indicates that the rectifier AC input voltage is low or failed.	OK
12 PULSE FAILURE	Indicated that the 12 pulse controller has detected an error. In this case, the rectifier will limit its current to the half of the nominal to not to overload the 6 pulse bridge. (Option)	OK
DC LOW	Indicates that the frequency converter DC Bus voltage is lower than the adjustable DC LOW value. System continues to operate.	OK
DC HIGH	Indicates that the frequency converter DC Bus voltage is higher than the adjustable DC HIGH value. System continues to operate. In this case, the equipment will stop generating DC to prevent any damage to batteries or load.	OK
DC TOO LOW	Indicates that the frequency converter DC Bus voltage is lower than the adjustable DC TOO LOW value. In this case, the equipment will stop generating AC to prevent any damage to the input source, possibly batteries. (battery deep discharge cutoff)	OK
OVER TEMPERATURE	Indicates that the inverter and / or rectifier bridge temperature has exceeded limits. The equipment will stop generating AC.	OK
IGBT / IPM FAULT (SHORT CIRCUIT)	Indicates that the current of IGBT or IPM transistor of 3 phase inverter bridge, has exceeded the limits.or inicates power supply failure.To protect the IGBT / IPM, the equipment will stop generating AC.	OK
OVER CURRENT	Indicates that the output current exceeded nominal capacity.	OK
OVERLOAD BLOCK	Indicates that the output of the system is blocked because of the over current.	OK
BREAKER OPEN	Indicates that one of the input or output circuit breakers are open. (Option depending on user requirement)	OK
EARTH FAULT	Indicates there is a leakage current from any of the AC outputs to ground.	OK
NO RESPONSE (NO CONNECTION)	Indicates that communication error occured between the DSP boards	OK

Note: Product elements are protected againts short circuit over current, over voltage and output distortion.

Tested by	Approved by
UFUK SISEL	GURCAN YILMAZ SUKUTUN Bureau Veritas Istanbul

