

ZHEJIANG FRIENDSHIP SHIPYARD

Hull No. : HYDM-001/002/003/004

50000DWT MULTI-PURPOSE DRY CARGO SHIP SHORT CIRCUIT CURRENT CALCULATION

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CHECKED BY	卜华章	DATE	2008-6-23



TERASAKI
Ensuring Service, Maintaining Quality

TERASAKI ELECTRIC (CHINA) CO., LTD.

COMPUTATION OF MAX. SHORT CIRCUIT CURRENTS IN ELECTRICAL SHIP MAINS

A. BASE AND PARAMETER OF CALCULATION

base :	IEC Pub. 61363
modification of time constants due to passive components :	No
preload condition of single motors included :	No

B. INPUT DATA - GENERAL

name of vessel	50000DWT MULTI-PURPOSE DRY CARGO SHIP
Yard	ZHEJIANG FRIENDSHIP SHIPYARD
hull no.	HYDM001~004
register no.	***
Project	***
file name	50000DWT
Operator	LYL
date of calc.	2008/6/23

INPUT DATA - MAINS FREQUENCY AND VOLTAGE AT MAIN BUS

voltage at main bus (V)	450.000
frequency (Hz)	60.000

INPUT DATA - MAIN GENERATORS

marking of generator	DG 1	DG 2	DG 3	
power (kVA)	894.0000	894.0000	894.0000	
voltage (V)	450.0000	450.0000	450.0000	
Power factor (/)	0.8000	0.8000	0.8000	
xd" (%)	13.2000	13.2000	13.2000	
xd' (%)	25.1000	25.1000	25.1000	
xd (%)	278.0000	278.0000	278.0000	
Ra (%)	1.6600	1.6600	1.6600	
Td" (ms)	2.6000	2.6000	2.6000	
Td' (ms)	85.7000	85.7000	85.7000	
tdc (ms)	22.7000	22.7000	22.7000	
lkd/ln (/)	3.0000	3.0000	3.0000	
cross section of cable (sqmm)	120.0000	120.0000	120.0000	
length of cable (m)	20.0000	20.0000	20.0000	
no. of conductors per phase	7.0000	7.0000	7.0000	
L specific r (ohm/km)	0.1640	0.1640	0.1640	
specific x (ohm/km)	0.0864	0.0864	0.0864	

INPUT DATA - SINGLE MOTOR

marking of motor	1CSR	2CSR	3CSR	4CSR
power (kW)	200.0000	200.0000	200.0000	200.0000
voltage (V)	450.0000	450.0000	450.0000	450.0000
power factor (/)	0.8000	0.8000	0.8000	0.8000
efficiency (/)	0.9000	0.9000	0.9000	0.9000
stator resistance R_s (%)	3.4000	3.4000	3.4000	3.4000
rotor resistance R_r (%)	2.1000	2.1000	2.1000	2.1000
stator impedance X_s (%)	0.0000	0.0000	0.0000	0.0000
rotor impedance X_r (%)	0.0000	0.0000	0.0000	0.0000
Total impedance $X_m=X_s+X_r$ (%)	15.0000	15.0000	15.0000	15.0000
cable from main bus				
cross section of cable (sqmm)	95.0000	95.0000	95.0000	95.0000
length of cable (m)	84.0000	120.0000	157.0000	195.0000
no. of conductors per phase	2.0000	2.0000	2.0000	2.0000
specific r (ohm/km)	0.2060	0.2060	0.2060	0.2060
specific x (ohm/km)	0.0900	0.0900	0.0900	0.0900
power of transformer	0.0000	0.0000	0.0000	0.0000
voltage at mb side (V)	0.0000	0.0000	0.0000	0.0000
voltage at db side (V)	0.0000	0.0000	0.0000	0.0000
short circuit voltage (%)	0.0000	0.0000	0.0000	0.0000
copper losses (kW)	0.0000	0.0000	0.0000	0.0000
cable to db				
cross section of cable (sqmm)	0.0000	0.0000	0.0000	0.0000
length of cable (m)	0.0000	0.0000	0.0000	0.0000
no. of conductors per phase	0.0000	0.0000	0.0000	0.0000
specific r (ohm/km)	0.0000	0.0000	0.0000	0.0000
specific x (ohm/km)	0.0000	0.0000	0.0000	0.0000

INPUT DATA - EQUIVALENT MOTOR

power of motor (kW)	630.00000
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INPUT DATA - DISTRIBUTIONS

marking of db	CHP1	CHP2	PDB1	PDB2
cable from main bus				
cross section of cable (sqmm)	2.5000	2.5000	35.0000	25.0000
length of cable (m)	50.0000	20.0000	41.0000	36.0000
no. of conductors per phase	1.0000	1.0000	1.0000	2.0000
specific r (ohm/km)	7.8600	7.8600	0.5600	0.7860
specific x (ohm/km)	0.1404	0.1404	0.0984	0.0984
power of transformer	0.0000	0.0000	0.0000	0.0000
voltage at mb side (V)	0.0000	0.0000	0.0000	0.0000
voltage at db side (V)	0.0000	0.0000	0.0000	0.0000
short circuit voltage (%)	0.0000	0.0000	0.0000	0.0000
copper losses (kW)	0.0000	0.0000	0.0000	0.0000
cable to db				
cross section of cable (sqmm)	0.0000	0.0000	0.0000	0.0000
length of cable (m)	0.0000	0.0000	0.0000	0.0000
no. of conductors per phase	0.0000	0.0000	0.0000	0.0000
specific r (ohm/km)	0.0000	0.0000	0.0000	0.0000
specific x (ohm/km)	0.0000	0.0000	0.0000	0.0000

marking of db	PDB3	PDB4	PDB5	PDB6
cable from main bus				
cross section of cable (sqmm)	25.0000	25.0000	35.0000	25.0000
length of cable (m)	15.0000	16.0000	40.0000	45.0000
no. of conductors per phase	1.0000	1.0000	1.0000	1.0000
specific r (ohm/km)	0.7860	0.7860	0.5600	0.7860
specific x (ohm/km)	0.0984	0.0984	0.0984	0.0984
power of transformer	0.0000	0.0000	0.0000	0.0000
voltage at mb side (V)	0.0000	0.0000	0.0000	0.0000
voltage at db side (V)	0.0000	0.0000	0.0000	0.0000
short circuit voltage (%)	0.0000	0.0000	0.0000	0.0000
copper losses (kW)	0.0000	0.0000	0.0000	0.0000
cable to db				
cross section of cable (sqmm)	0.0000	0.0000	0.0000	0.0000
length of cable (m)	0.0000	0.0000	0.0000	0.0000
no. of conductors per phase	0.0000	0.0000	0.0000	0.0000
specific r (ohm/km)	0.0000	0.0000	0.0000	0.0000
specific x (ohm/km)	0.0000	0.0000	0.0000	0.0000

marking of db	PDB7	PDB8	3GSP	4GSP
cable from main bus				
cross section of cable (sqmm)	50.0000	25.0000	16.0000	10.0000
length of cable (m)	24.0000	24.0000	10.0000	10.0000
no. of conductors per phase	1.0000	1.0000	1.0000	1.0000
specific r (ohm/km)	0.3930	0.7860	1.2300	1.9650
specific x (ohm/km)	0.0900	0.0984	0.1092	0.1176
power of transformer	0.0000	0.0000	0.0000	0.0000
voltage at mb side (V)	0.0000	0.0000	0.0000	0.0000
voltage at db side (V)	0.0000	0.0000	0.0000	0.0000
short circuit voltage (%)	0.0000	0.0000	0.0000	0.0000
copper losses (kW)	0.0000	0.0000	0.0000	0.0000
cable to db				
cross section of cable (sqmm)	0.0000	0.0000	0.0000	0.0000
length of cable (m)	0.0000	0.0000	0.0000	0.0000
no. of conductors per phase	0.0000	0.0000	0.0000	0.0000
specific r (ohm/km)	0.0000	0.0000	0.0000	0.0000
specific x (ohm/km)	0.0000	0.0000	0.0000	0.0000

marking of db	5GSP	6GSP	7GSP	220V MSB
cable from main bus				
cross section of cable (sqmm)	70.0000	50.0000	10.0000	70.0000
length of cable (m)	24.0000	24.0000	45.0000	15.0000
no. of conductors per phase	1.0000	1.0000	1.0000	1.0000
specific r (ohm/km)	0.2800	0.3930	1.9650	0.2800
specific x (ohm/km)	0.0900	0.0900	0.1176	0.0900
power of transformer	0.0000	0.0000	0.0000	99.0000
voltage at mb side (V)	0.0000	0.0000	0.0000	450.0000
voltage at db side (V)	0.0000	0.0000	0.0000	230.0000
short circuit voltage (%)	0.0000	0.0000	0.0000	3.1800
copper losses (kW)	0.0000	0.0000	0.0000	1.8400
cable to db				
cross section of cable (sqmm)	0.0000	0.0000	0.0000	70.0000
length of cable (m)	0.0000	0.0000	0.0000	17.0000
no. of conductors per phase	0.0000	0.0000	0.0000	2.0000
specific r (ohm/km)	0.0000	0.0000	0.0000	0.2800
specific x (ohm/km)	0.0000	0.0000	0.0000	0.0900

marking of db	ESB	PLDB4	PLDB5	
cable from main bus				
cross section of cable (sqmm)	95.0000	10.0000	10.0000	
length of cable (m)	44.0000	18.0000	18.0000	
no. of conductors per phase	2.0000	1.0000	1.0000	
specific r (ohm/km)	0.2060	1.9650	1.9650	
specific x (ohm/km)	0.0900	0.1176	0.1176	
power of transformer	0.0000	25.0000	25.0000	
voltage at mb side (V)	0.0000	450.0000	450.0000	
voltage at db side (V)	0.0000	230.0000	230.0000	
short circuit voltage (%)	0.0000	2.8100	2.8100	
copper losses (kW)	0.0000	0.5280	0.5280	
cable to db				
cross section of cable (sqmm)	0.0000	25.0000	25.0000	
length of cable (m)	0.0000	10.0000	10.0000	
no. of conductors per phase	0.0000	1.0000	1.0000	
specific r (ohm/km)	0.0000	0.7860	0.7860	
specific x (ohm/km)	0.0000	0.0984	0.0984	

INPUT DATA - SUBDISTRIBUTION

connected to db	PLDB2	PLDB7	PLDB8	3L
marking of sdb	220VMSB	220VMSB	220VMSB	220VMSB
cable from main bus				
cross section of cable (sqmm)	6.0000	2.5000	50.0000	10.0000
length of cable (m)	24.0000	24.0000	24.0000	64.0000
no. of conductors per phase	1.0000	1.0000	1.0000	1.0000
specific r (ohm/km)	3.2800	7.8600	0.3930	1.9650
specific x (ohm/km)	0.1200	0.1404	0.0900	0.1176
power of transformer	0.0000	0.0000	0.0000	0.0000
voltage at mb side (V)	0.0000	0.0000	0.0000	0.0000
voltage at db side (V)	0.0000	0.0000	0.0000	0.0000
short circuit voltage (%)	0.0000	0.0000	0.0000	0.0000
copper losses (kW)	0.0000	0.0000	0.0000	0.0000
cable to db				
cross section of cable (sqmm)	0.0000	0.0000	0.0000	0.0000
length of cable (m)	0.0000	0.0000	0.0000	0.0000
no. of conductors per phase	0.0000	0.0000	0.0000	0.0000
specific r (ohm/km)	0.0000	0.0000	0.0000	0.0000
specific x (ohm/km)	0.0000	0.0000	0.0000	0.0000

connected to db	8L	220VESB	EST1	EST2
marking of sdb	220V MSB	ESB	ESB	ESB
cable from main bus				
cross section of cable (sqmm)	6.0000	25.0000	1.5000	1.5000
length of cable (m)	52.0000	12.0000	25.0000	200.0000
no. of conductors per phase	1.0000	1.0000	1.0000	1.0000
specific r (ohm/km)	3.2800	0.7860	13.1	13.1000
specific x (ohm/km)	0.1200	0.0984	0.1512	0.1512
power of transformer	0.0000	45.0000	0.0000	0.0000
voltage at mb side (V)	0.0000	450.0000	0.0000	0.0000
voltage at db side (V)	0.0000	230.0000	0.0000	0.0000
short circuit voltage (%)	0.0000	3.1000	0.0000	0.0000
copper losses (kW)	0.0000	1.3000	0.0000	0.0000
cable to db				
cross section of cable (sqmm)	0.0000	70.0000	0.0000	0.0000
length of cable (m)	0.0000	12.0000	0.0000	0.0000
no. of conductors per phase	0.0000	1.0000	0.0000	0.0000
specific r (ohm/km)	0.0000	0.2800	0.0000	0.0000
specific x (ohm/km)	0.0000	0.0900	0.0000	0.0000

connected to db	EST4			
marking of sdb	ESB			
cable from main bus				
cross section of cable (sqmm)	16.0000			
length of cable (m)	197.0000			
no. of conductors per phase	1.0000			
specific r (ohm/km)	1.2300			
specific x (ohm/km)	0.1092			
power of transformer	0.0000			
voltage at mb side (V)	0.0000			
voltage at db side (V)	0.0000			
short circuit voltage (%)	0.0000			
copper losses (kW)	0.0000			
cable to db				
cross section of cable (sqmm)	0.0000			
length of cable (m)	0.0000			
no. of conductors per phase	0.0000			
specific r (ohm/km)	0.0000			
specific x (ohm/km)	0.0000			

C. CONTRIBUTION OF COMPONENTS (dimension of currents: kA)

	Ip	Iac(0.5T)	Inom
DG 1	16.320	5.057	1.147
DG 2	16.294	5.051	1.147
DG 3	16.268	5.046	1.147
1CSR	3.375	1.350	0.356
2CSR	3.295	1.318	0.356
3CSR	3.215	1.286	0.356
4CSR	3.136	1.254	0.356
equ. motor	8.981	3.592	

D. FAULT POINTS (dimension of currents: kA)

p.f.: power factor / brk.:breaker / term.: terminals

	Ik''	Ip	Iac(0.5T)	p.f.
main bus	41.772	70.884	23.954	0.147
brk. of DG 1	32.413	54.563	18.897	0.147
brk. of DG 2	32.432	54.590	18.902	0.147
brk. of DG 3	32.451	54.616	18.908	0.147
brk. of 1CSR	39.663	67.509	22.604	0.144
brk. of 2CSR	39.713	67.589	22.636	0.144
brk. of 3CSR	39.763	67.669	22.668	0.144
brk. of 4CSR	39.813	67.748	22.700	0.144
trm. of 1CSR	18.494	35.291	13.236	0.683
trm. of 2CSR	14.571	28.776	11.117	0.746
trm. of 3CSR	11.910	24.147	9.532	0.784
trm. of 4CSR	10.007	20.705	8.305	0.810
CHP1	0.659	1.515	0.658	0.999
CHP2	1.641	3.761	1.632	0.998
PDB1	10.009	21.003	8.581	0.920
PDB2	15.265	30.432	11.956	0.885
PDB3	17.531	34.212	13.209	0.857
PDB4	16.711	32.857	12.765	0.868
PDB5	10.227	21.408	8.731	0.918
PDB6	6.874	14.996	6.298	0.960
PDB7	19.575	37.318	14.125	0.780
PDB8	12.065	24.859	10.020	0.919
3GSP	17.239	33.818	13.113	0.877
4GSP	11.900	24.707	10.015	0.942
5GSP	23.019	42.636	15.727	0.677
6GSP	19.575	37.318	14.125	0.780
7GSP	2.884	6.558	2.830	0.992
220V MSB	6.199	13.616	5.745	0.637

ESB	24.610	44.994	16.398	0.594
PLDB4	1.768	4.024	1.738	0.826
PLDB5	1.768	4.024	1.738	0.826
PLDB2	1.407	3.226	1.400	0.979
PLDB7	0.653	1.502	0.653	0.995
PLDB8	1.473	9.997	4.267	0.777
3L	0.939	2.155	0.936	0.985
8L	0.715	1.644	0.714	0.992
220V ESB	2.970	6.748	2.911	0.926
EST1	0.778	1.788	0.777	0.999
EST2	0.099	0.228	0.099	1.000
EST4	1.038	2.379	1.032	0.993

Short circuit calculation					Yard :ZHEJIANG FRIENDSHIP SHIPYARD					
					Hull-No. HYDM-001/002/003/004			Department		
					Ship-mode:			Treatment		
Nominal voltage: 450V/60Hz					Class :DNV			Date		
SHORT CIRCUIT VALUES					CHARACTERISTICS OF BREAKING DEVICES					
SHORT CIRCUIT CASE	SHEET	INITIAL SYMMETRICAL SHORT CIRCUIT CURRENT Ik’’ (kA)	PEAK SHORT CIRCUIT CURRENT Is (kA)	AC COMPONENT OF THE SHORT CIRCUIT CURRENT Iac (kA)	MANUFACTURER	TYPE	RATED CURRENT (kA)	BREAKING CAPACITY Ia (kA)	MAKING CAPACITY Iein (kA)	
Three diesel generators in parallel operation:										
F1.0		41.772	70.884	23.954	TERASAKI	XH		42	88.2	
F2.1		32.413	54.563	18.897	TERASAKI	AR216S		65	143	
F2.2		32.432	54.590	18.902	TERASAKI	AR216S		65	143	
F2.3		32.451	54.616	18.908	TERASAKI	AR216S		65	143	
F2.4		39.663	67.509	22.604	TERASAKI	XS400NE		42	88.2	
F2.4		39.713	67.589	22.636	TERASAKI	XS400NE		42	88.2	
F2.4		39.763	67.669	22.668	TERASAKI	XS400NE		42	88.2	
F2.4		39.813	67.748	22.700	TERASAKI	XS400NE		42	88.2	
F2.6		0.659	1.515	0.658	TERASAKI	XS		25	52.5	
F2.6		1.641	3.761	1.632	TERASAKI	XS		25	52.5	
F2.6		10.009	21.003	8.581	TERASAKI	XS		25	52.5	
F2.6		15.265	30.432	11.956	TERASAKI	XS		25	52.5	
F2.6		17.531	34.212	13.209	TERASAKI	XS		25	52.5	
F2.6		16.711	32.857	12.765	TERASAKI	XS		25	52.5	
F2.6		10.227	21.408	8.731	TERASAKI	XS		25	52.5	

F2.6		6.874	14.996	6.298	TERASAKI	XS		25	52.5
F2.6		19.575	37.318	14.125	TERASAKI	XS		25	52.5
F2.6		12.065	24.859	10.020	TERASAKI	XS		25	52.5
F2.6		17.239	33.818	13.113	TERASAKI	XS		25	52.5
F2.6		11.900	24.707	10.015	TERASAKI	XS		25	52.5
F2.6		23.019	42.636	15.727	TERASAKI	XS		25	52.5
F2.6		19.575	37.318	14.125	TERASAKI	XS		25	52.5
F2.6		2.884	6.558	2.830	TERASAKI	XS		25	52.5
F2.7		1.768	4.024	1.738	TERASAKI	XE		10	17
F2.7		1.768	4.024	1.738	TERASAKI	XE		10	17
F3.0		6.199	13.616	5.745	TERASAKI	XE		10	17
F3.1		1.407	3.226	1.400	TERASAKI	XE		10	17
F3.1		0.653	1.502	0.653	TERASAKI	XE		10	17
F3.1		4.473	9.997	4.267	TERASAKI	XE		10	17
F3.1		0.939	2.155	0.936	TERASAKI	TB-5P		2.5	4.1
F3.1		0.715	1.644	0.714	TERASAKI	TB-5P		2.5	4.1
F4.0		24.610	44.994	16.398	TERASAKI	XS		25	52.5
F4.1		0.778	1.788	0.777	TERASAKI	XS		25	52.5
F4.1		0.099	0.228	0.099	TERASAKI	XS		25	52.5
F4.1		1.038	2.379	1.032	TERASAKI	XS		25	52.5
F5.0		2.970	6.748	2.911	TERASAKI	XE		10	17

