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Table 1 – Voltage factor *c*

Nominal voltage U_n	Voltage factor *c* for the calculation of	
	maximum short-circuit currents c_{max} [1]	minimum short-circuit currents c_{min}
Low voltage		
100 V to 1 000 V	1,05[3]	0,95
(IEC 60038, table I)	1,10[4]	
Medium voltage		
>1 kV to 35 kV		
(IEC 60038, table III)	1,10	1,00
High voltage[2]		
>35 kV		
(IEC 60038, table IV)		

[1] $c_{max}U_n$ should not exceed the highest voltage U_m for equipment of power systems.

[2] If no nominal voltage is defined $c_{max}U_n = U_m$ or $c_{min}U_n = 0{,}90 \times U_m$ should be applied.

[3] For low-voltage systems with a tolerance of +6 %, for example systems renamed from 380 V to 400 V.

[4] For low-voltage systems with a tolerance of +10 %.

2.3.2 Application of symmetrical components

In three-phase a.c. systems the calculation of the current values resulting from balanced and unbalanced short circuits is simplified by the use of symmetrical components. This postulates that the electrical equipment has a balanced structure, for example in the case of transposed overhead lines. The results of the short-circuit current calculation have an acceptable accuracy also in the case of untransposed overhead lines.

Using this method, the currents in each line conductor are found by superposing the currents of the three symmetrical component systems:

- positive-sequence current $\underline{I}_{(1)}$;
- negative-sequence current $\underline{I}_{(2)}$;
- zero-sequence current $\underline{I}_{(0)}$.

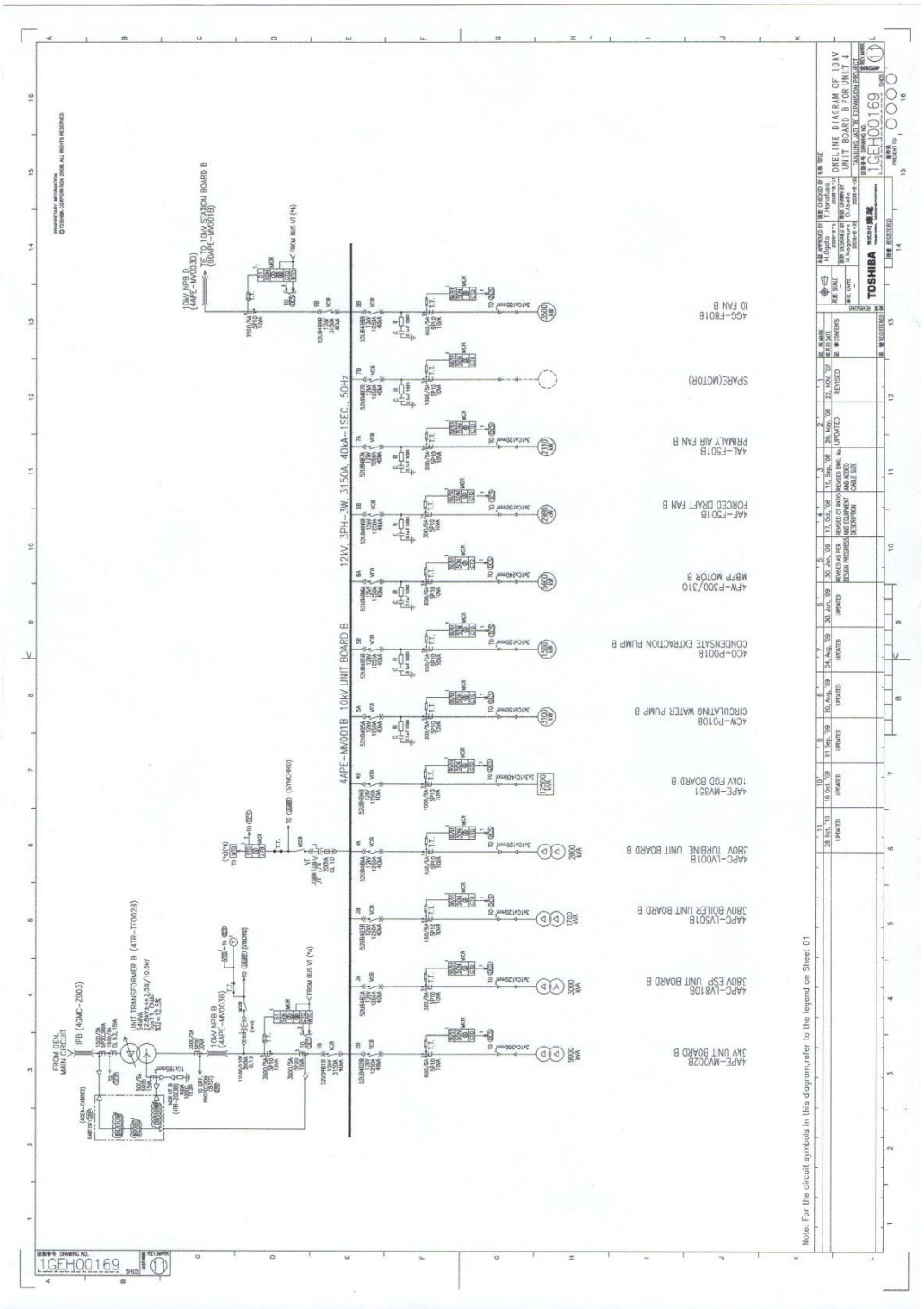
Taking the line conductor L1 as reference, the currents $\underline{I}_{L1}$, $\underline{I}_{L2}$, and $\underline{I}_{L3}$ are given by

$$\underline{I}_{L1} = \underline{I}_{(1)} + \underline{I}_{(2)} + \underline{I}_{(0)} \quad (1a)$$

$$\underline{I}_{L2} = \underline{a}^2\,\underline{I}_{(1)} + \underline{a}\,\underline{I}_{(2)} + \underline{I}_{(0)} \quad (1b)$$

$$\underline{I}_{L3} = \underline{a}\,\underline{I}_{(1)} + \underline{a}^2\,\underline{I}_{(2)} + \underline{I}_{(0)} \quad (1c)$$

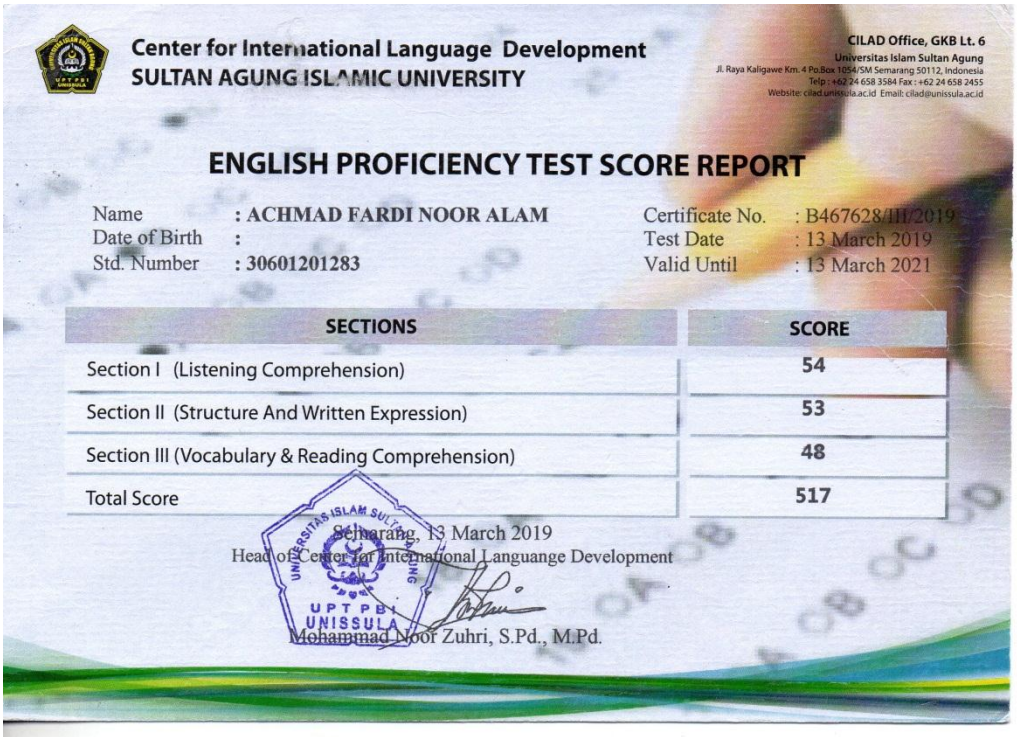
$$\underline{a} = -\frac{1}{2} + j\frac{1}{2}\sqrt{3}; \quad \underline{a}^2 = -\frac{1}{2} - j\frac{1}{2}\sqrt{3} \quad (2)$$


44PE-MV001B 10kV UNIT BOARD B
12kV, 3PH-3W, 3150A, 40kA-1SEC., 50Hz
FROM GEN. MAIN CIRCUIT
PB (4GMC-2003)
UNIT TRANSFORMER B (41R-1T0028)
10kV NPB B (44PE-MV0038)
TO 10kV STATION BOARD B (0DAPE-MV0018)
4GG-FB01B ID FAN B
SPARE(MOTOR)
4AL-F501B PRIMALY AIR FAN B
4AF-F501B FORCED DRAFT FAN B
4FM-P330/310 MBFP MOTOR B
4CO-P001B CONDENSATE EXTRACTION PUMP B
4CW-P010B CIRCULATING WATER PUMP B
10kV FOD BOARD B
380V TURBINE UNIT BOARD B
380V BOILER UNIT BOARD B
380V ESP UNIT BOARD B
3kV UNIT BOARD B
TOSHIBA
ONELINE DIAGRAM OF 10kV UNIT BOARD B FOR UNIT 4
1GEH00169
Note: For the circuit symbols in this diagram,refer to the legend on Sheet 01

10kV UNIT BOARD (3/4)

SETTING RANGE

MOTOR		DATA OF LOAD						OCR SETTING					OCG SETTING	
								OC(51) Ir × 110% ~ 130% 10 ~ 320% (10% step) Charact. Curve × (0.05 ~ 2.0)			INSTANT(50) Is × 200% 1 ~ 20PU (1PU step)		(50N) Io × 10% ~ 30% 0.1 ~ 10A (0.1A step) 0.05~0.3~ 2.0S (0.05/0.1S step)	
MV-SWGR	FEEDER NAME	CAPACITY	RATED CURRENT Ir	STARTING CURRENT Is	Starting Time	LOCKED ROTOR TIME (Hot/Cold)	CT RATIO	CHARACT-ERISTIC	CURRENT	TIME DIAL	CURRENT	TIME DIAL	CURRENT	TIME DIAL
	ID FAN A, B (Unit 3, 4)													
A B	3(4)GG-F801A 3(4)GG-F801B	3500kW	243A	1580A	15S	20/30S	80	LT	3.5A (70%) 3.35A	0.7	40A (8 PU) 40A	0.05S (Fixed)	0.8A	1.4S
	FORCED DRAFT FAN A, B (Unit 3, 4)													
A B	3(4)AF-F501A 3(4)AF-F501B	2980kW	211A	1414A	18S	35/82S	60	LT	4A (80%) 3.8A	1	50A (10 PU) 47A	0.05S (Fixed)	1.1A	1.4S
	PRIMARY AIR FAN A, B (Unit 3, 4)													
A B	3(4)AL-F501A 3(4)AL-F501B	2110kW	145A	972A	14S	25/58S	40	LT	4.5A (80%) 4.01A	0.7	50A (10 PU) 48.6A	0.05S (Fixed)	1.7A	1.4S
	CIRCULATING WATER PUMP A, B (Unit 3, 4)													
A B	3(4)CW-P010A 3(4)CW-P010B	3100kW	262A	1308A	2.4S	19/27S	60	SI	5A (100%) 4.8A	0.8	45A (9 PU) 43.6A	0.05S (Fixed)	1.1A	1.4S



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Section II (Structure And Written Expression)	53
Section III (Vocabulary & Reading Comprehension)	48
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