BANGLADESH PETROLEUM EXPLORATION & PRODUCTION CO. LTD.

CONSORTIUM OF
SINOPEC PETROLEUM ENGINEERING CORPORATION.
AND
ZICOM EQUIPMENT PTE. LTD.

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ELECTRICAL CALCULATION SHEET

Doc. No: 240-0214-EMEL-CS00-0008

Job No. : **240**

Client : **BANGLADESH PETROLEUM EXPLORATION & PRODUCTION CO. LTD.**

Location : **SRIKAIL GAS FIELD, BANGLADESH**

Item No. : **-**

Description : **FAULT LEVEL CALCULATION**

Project Title. : **60 MMSCFD GLYCOL DEHYDRATION TYPE GAS PROCESS PLANT**

Year Built : **2015**

Rev.	Date	Page	Description of Revision	Prepared	Checked	Approved
A	*28/10/2015*	*4*	*ISSUED FOR APPROVAL*	*AS*	*MH*	*VG*

BANGLADESH PETROLEUM EXPLORATION & PRODUCTION CO. LTD.	Electrical Calculation Sheet	CONSORTIUM OF ZICOM EQUIPMENT PTE LTD. AND SINOPEC PETROLEUM ENGINEERING CORPORATION	
USER	BANGLADESH PETROLEUM EXPLORATION & PRODUCTION CO. LTD.	DOC NO	240-0214-EMEL-CS00-0008
LOCATION	SRIKAIL GAS FIELD, BANGLADESH	SERVICE	FAULT LEVEL CALCULATION
PROJECT	60 MMSCFD SILICA GEL DEHYDRATION TYPE NATURAL GAS PLANT	TAG NO	
JOB NO	240	QUANTITY	

Generator KVA Rating	345	kVA
Line to Line Voltage	400	V
Line to Neutral Voltage	230	V
Full Load Ampere	497.98	A
Genset Alternator Percentage Impedance	12.5	%

Fault at zero distance/terminal			**Fault at zero distance/terminal**		
Full Load Ampreres	498	A	Full Load Ampreres	498	A
Multiplier,M1	8		Multiplier,M1	8	
Fault at Generator terminal	**3984**	A	Fault at Generator terminal	**5976**	A
L-L Fault	**3.98**	kA	**L-N Fault**	**5.98**	kA
L-L-L Fault(AFC)	**4.58**	kA			

For BUSBAR GROUP B

Fault at some distance from terminal			**Fault at some distance from terminal**		
Distance from terminal, L	10	ft	Distance from terminal, L	10	ft
No. of Conductor,N	1		No. of Conductor,N	1	
Conductor factor,C	129900		Conductor factor,C	129900	
Factor,f	0.0013		Factor,f	0.004	
Multiplier,M2	0.9987		Multiplier,M2	0.996	
Fault after 1st distance	**3979**	A	Fault after 1st distance	**5952.1**	A
L-L Fault	**3.98**	kA	**L-N Fault**	**5.95**	kA
L-L-L Fault(AFC)	**4.57**	kA			

Note

Reff. Drawing: 240-0214-EMEL-DW00-0008 POWER DISTRIBUTION SYSTEM

For conductor factor, C reff. document is attached

FLA=Full Load Ampere

AFC=Available Fault Current

L-L Fault=Approx. 87% L-L-L Fault

Sub-transient Reactance Per Unit,Xd"=0.125

For low resistance Percent Impedance≈12.5%

Percent Reactance data is found from Generator datasheet of Model No: PG345B3

Formula

For L-L Fault

$$\text{FLA}_{L\text{-}L} = \frac{KVA\,Rating * 1000}{L\text{-}L\,Voltage}$$

$$\text{Multiplier, M1} = \frac{100}{\%\,Percent\,Impedence}$$

$$\text{Factor, f} = \frac{1.732 * L * I(SCA)}{N * C * E(L\text{-}L)}$$

For L-N Fault

$$\text{FLA}_{L\text{-}N} = \frac{KVA\,Rating * 1000}{L\text{-}N\,Voltage}$$

$$\text{Multiplier, M2} = \frac{1}{1+f}$$

$$\text{Factor, f} = \frac{1.732 * L * I(SCA)}{N * C * E(L\text{-}N)}$$

I(SCA)= Short Circuit Current at the beginning of the circuit

L=Length of Cable

N=No. of Conductor Per Phase

C=Conductor factor(One over the impedance per foot)

E(L-L)=Phase to Phase Voltage or L-L Voltage

E(L-N)=Phase to Neutral Voltage or L-N Voltage

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JOB NO	240	QUANTITY	

Generator KVA Rating	345	kVA
Line to Line Voltage	400	V
Line to Neutral Voltage	230	V
Full Load Ampere	497.98	A
Genset Alternator Percentage Impedance	12.5	%

Fault at zero distance/terminal			**Fault at zero distance/terminal**		
Full Load Ampreres	498	A	Full Load Ampreres	498	A
Multiplier,M1	8		Multiplier,M1	8	
Fault at Generator terminal	**3984**	A	Fault at Generator terminal	**5976**	A
L-L Fault	**3.98**	kA	**L-N Fault**	**5.98**	kA
L-L-L Fault(AFC)	**4.58**	kA			

For BUSBAR GROUP C&D

Fault at some distance from terminal			**Fault at some distance from terminal**		
Distance from terminal, L	820	ft	Distance from terminal, L	820	ft
No. of Conductor,N	1		No. of Conductor,N	1	
Conductor factor,C	799		Conductor factor,C	799	
Factor,f	17.7041		Factor,f	53.331	
Multiplier,M2	0.0535		Multiplier,M2	0.0184	
Fault after 1st distance	**214**	A	Fault after 1st distance	**109.96**	A
L-L Fault	**0.21**	kA	**L-N Fault**	**0.11**	kA
L-L-L Fault(AFC)	**0.25**	kA			

Note

Reff. Drawing: 240-0214-EMEL-DW00-0008 POWER DISTRIBUTION SYSTEM

For conductor factor, C reff. document is attached

FLA=Full Load Ampere

AFC=Available Fault Current

L-L Fault=Approx. 87% L-L-L Fault

Sub-transient Reactance Per Unit,Xd"=0.125

For low resistance Percent Impedance≈12.5%

Percent Reactance data is found from Generator datasheet of Model No: PG345B3

Formula

For L-L Fault

$$\text{FLA}_{\text{L-L}} = \frac{KVA\,Rating * 1000}{L-L\,Voltage}$$

$$\text{Multiplier, M1} = \frac{100}{\%\,Percent\,Impedence}$$

$$\text{Factor, f} = \frac{1.732 * L * I(SCA)}{N * C * E(L-L)}$$

For L-N Fault

$$\text{FLA}_{\text{L-N}} = \frac{KVA\,Rating * 1000}{L-N\,Voltage}$$

$$\text{Multiplier, M2} = \frac{1}{1+f}$$

$$\text{Factor, f} = \frac{1.732 * L * I(SCA)}{N * C * E(L-N)}$$

I(SCA)= Short Circuit Current at the beginning of the circuit

L=Length of Cable

N=No. of Conductor Per Phase

C=Conductor factor(One over the impedance per foot)

E(L-L)=Phase to Phase Voltage or L-L Voltage

E(L-N)=Phase to Neutral Voltage or L-N Voltage

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PROJECT	60 MMSCFD SILICA GEL DEHYDRATION TYPE NATURAL GAS PLANT	TAG NO	
JOB NO	240	QUANTITY	

Generator KVA Rating	345	kVA
Line to Line Voltage	400	V
Line to Neutral Voltage	230	V
Full Load Ampere	497.98	A
Genset Alternator Percentage Impedance	12.5	%

Fault at zero distance/terminal			**Fault at zero distance/terminal**		
Full Load Ampreres	498	A	Full Load Ampreres	498	A
Multiplier,M1	8		Multiplier,M1	8	
Fault at Generator terminal	**3984**	A	Fault at Generator terminal	**5976**	A
L-L Fault	**3.98**	kA	**L-N Fault**	**5.98**	kA
L-L-L Fault(AFC)	**4.58**	kA			

For BUSBAR GROUP E

Fault at some distance from terminal			**Fault at some distance from terminal**		
Distance from terminal, L	20	ft	Distance from terminal, L	20	ft
No. of Conductor,N	1		No. of Conductor,N	1	
Conductor factor,C	981		Conductor factor,C	981	
Factor,f	0.3517		Factor,f	1.0594	
Multiplier,M2	0.7398		Multiplier,M2	0.4856	
Fault after 1st distance	**2948**	A	Fault after 1st distance	**2901.95**	A
L-L Fault	**2.95**	kA	**L-N Fault**	**2.9**	kA
L-L-L Fault(AFC)	**3.39**	kA			

Note

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For conductor factor, C reff. document is attached

FLA=Full Load Ampere

AFC=Available Fault Current

L-L Fault=Approx. 87% L-L-L Fault

Sub-transient Reactance Per Unit,Xd"=0.125

For low resistance Percent Impedance≈12.5%

Percent Reactance data is found from Generator datasheet of Model No: PG345B3

Formula

For L-L Fault

$$\text{FLA}_{\text{L-L}} = \frac{KVA\,Rating * 1000}{L-L\,Voltage}$$

$$\text{Multiplier, M1} = \frac{100}{\%\,Percent\,Impedence}$$

$$\text{Factor, f} = \frac{1.732 * L * I(SCA)}{N * C * E(L-L)}$$

For L-N Fault

$$\text{FLA}_{\text{L-N}} = \frac{KVA\,Rating * 1000}{L-N\,Voltage}$$

$$\text{Multiplier, M2} = \frac{1}{1+f}$$

$$\text{Factor, f} = \frac{1.732 * L * I(SCA)}{N * C * E(L-N)}$$

I(SCA)= Short Circuit Current at the beginning of the circuit

L=Length of Cable

N=No. of Conductor Per Phase

C=Conductor factor(One over the impedance per foot)

E(L-L)=Phase to Phase Voltage or L-L Voltage

E(L-N)=Phase to Neutral Voltage or L-N Voltage