پروژه	بسته کاری	صادرکننده	تسهیلات	رشته	نوع مدرک	سریال	نسخه
BK	GCS	PEDCO	120	EL	RT	0001	D02

طرح نگهداشت و افزایش تولید ۲۷ مخزن

ELECTRICAL NETWORK (LOAD FLOW, MOTOR STARTING & SHORT CIRCUIT) STUDY REPORT

نگهداشت و افزایش تولید میدان نفتی بینک

D02	Oct. 2023	IFA	H.Shakiba	M.Fakharian	S.Faramarzpour	
D01	Jan. 2023	IFA	H.Shakiba	M.Fakharian	M.Mehrshad	
D00	Jun. 2022	IFC	H.Shakiba	M.Fakharian	M.Mehrshad	
Rev.	**Date**	**Purpose of Issue/Status**	**Prepared by:**	**Checked by:**	**Approved by:**	**Client Approval**

Class:1 | **Client Doc. Number: F0Z-709071**

Status:

IDC: Inter-Discipline Check
IFC: Issued For Comment
IFA: Issued For Approval
AFD: Approved For Design
AFC: Approved For Construction
AFP: Approved For Purchase
AFQ: Approved For Quotation
IFI: Issued For Information
AB-R: As-Built for Client Review
AB-A: As-Built –Approved

REVISION RECORD SHEET

PAGE	D00	D01	D02	D03	D04
1	X	X	X		
2	X	X	X		
3	X				
4	X				
5	X	X			
6	X				
7	X		X		
8	X	X	X		
9			X		
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					
23					
24					
25					
26					
27					
28					
29					
30					
31					
32					
33					
34					
35					
36					
37					
38					
39					
40					
41					
42					
43					
44					
45					
46					
47					
48					
49					
50					

PAGE	D00	D01	D02	D03	D04
51					
52					
53					
54					
55					
56					
57					
58					
59					
60					
61					
62					
63					
64					
65					
66					
67					
68					
69					
70					
71					
72					
73					
74					
75					
76					
77					
78					
79					
80					
81					
82					
83					
84					
85					
86					
87					
88					
89					
90					
91					
92					
93					
94					
95					
96					
97					
98					
99					
100					

CONTENTS

1.0 INTRODUCTION

Binak oilfield in Bushehr province is a part of the southern oilfields of Iran, is located 20 km northwest of Genaveh city.

With the aim of increasing production of oil from Binak oilfield, an EPC/EPD Project has been defined by NIOC/NISOC and awarded to Petro Iran Development Company (PEDCO). Also PEDCO (as General Contractor) has assigned the EPC-packages of the Project to "Hirgan Energy - Design and Inspection" JV.

As a part of the Project, a New Gas Compressor Station (adjacent to existing Binak GCS) shall be constructed to gather of 15 MMSCFD (approx.) associated gases and compress & transfer them to Siahmakan GIS.

GENERAL DEFINITION

The following terms shall be used in this document.

CLIENT:	National Iranian South Oilfields CLIENT (NISOC)
PROJECT:	Binak Oilfield Development – Surface Fcilities; New Gas Compressor Station
EPD/EPC CONTRACTOR (GC):	Petro Iran Development Company (PEDCO)
EPC CONTRACTOR:	Joint Venture of : Hirgan Energy – Design & Inspection (D&I) Companies
VENDOR:	The firm or person who will fabricate the equipment or material.
EXECUTOR:	Executor is the party which carries out all or part of construction and/or commissioning for the project.
THIRD PARTY INSPECTOR (TPI):	The firm appointed by EPD/EPC CONTRACTOR (GC) and approved by CLIENT (in writing) for the inspection of goods.
SHALL:	Is used where a provision is mandatory.
SHOULD:	Is used where a provision is advisory only.
WILL:	Is normally used in connection with the action by CLIENT rather than by an EPC/EPD CONTRACTOR, supplier or VENDOR.
MAY:	Is used where a provision is completely discretionary.

2.0 SCOPE

This document is prepared to report Load Flow, Motor Starting & Short Circuit Study in New Gas Compressor Station of Binak oilfield.

3.0 NORMATIVE REFERENCES

3.1 Local Codes & Standards

- IPS-E-EL-100 (1) Engineering Standard for Electrical System

3.2 International Codes & Standard

This document shall be shall be produced in accordance with the latest editions of the International Electro technical Commission (IEC) and BS standards

3.3 The Project Documents

- BK-GNRAL-PEDCO-000-PR-DB-0001 Process Basis of Design
- BK-GCS-PEDCO-120-EL-LI-0001 Electrical Load List
- BK-GNRAL-PEDCO-000-EL-DC-0001 Electrical System Design Criteria
- BK-GCS-PEDCO-120-EL-SL-0001 Overall single line diagram
- BK-GCS-PEDCO-120-EL-SL-0003 Existent MV Switchgear Expansion Single Line Diagram
- BK-GCS-PEDCO-120-EL-SL-0002 LV Switchgear/MCC Single Line Diagram
- BK-GCS-PEDCO-120-EL-LI-0002 Electrical Power & Control Cable Schedule

4.0 PLANT MODEL

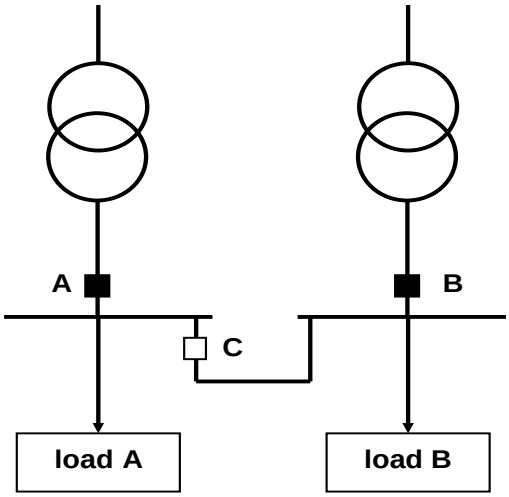
The model used for the calculations of the distribution network for Binak Oilfield Development gas compressor station units includes:

- The 11KV switchgear expansion fed by two 230/11 kV Transformers and 11KV motors.
- The new 0.4 KV switchgear installation fed by two 11/0.42 kV Transformers.
- Emergency bus bar fed by a 0.4 KV, 500 KVA diesel generators.

5.0 STUDIED CONFIGURATION

5.1 Normal Configuration

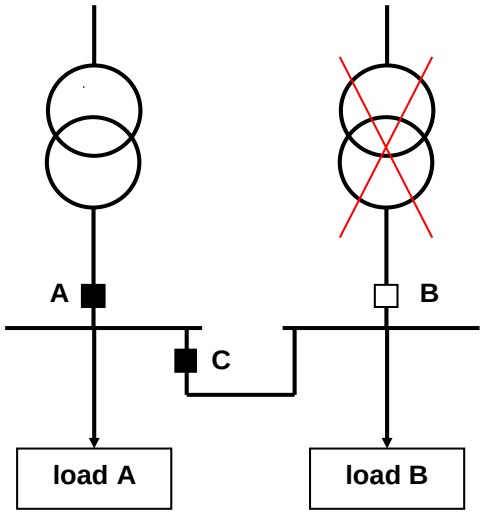
In normal configuration bus-tie breaker is normally open, and each section is fed by its own transformer.



Normal Configuration

5.2 Worst Case Configuration

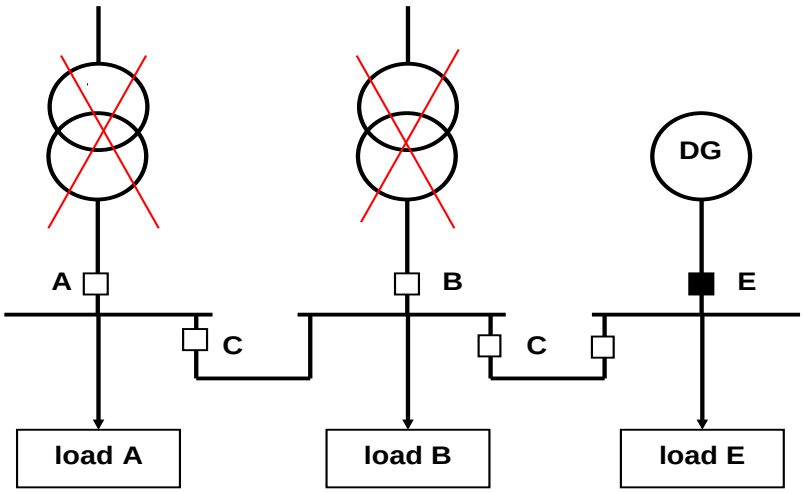
In the worst case condition, or also for maintenance purposes, one transformer can be out of service and whole load feed from the other transformer by closing the bus-tie breaker.



Worst Case Configuration

5.3 Emergency Configuration

In the emergency condition, all transformers are out of service and only emergency loads will be fed from the Diesel generator. The bus-tie breaker “C” is open in this configuration.



Emergency Configuration

6.0 LOAD FLOW STUDY

The load flow study calculates the active and reactive power flow and the bus voltages in different plant configurations. The main goals of the load flow studies are:

- To verify that no cable or transformer is overloaded.
- To check the bus voltages

D02

Result of load flow study is reported in Attachment 1.

Load Flow Result (Based on ETAP 12.6)

Item	Tag	Normal		Worst Case		Emergency
Condition		With Cap	Without Cap	With Cap	Without Cap	-
1	230 KV Substation	99.21%	99.16%	99.22%	99.17%	-
2	SS-11-OSWG-001A	98.26%	97.88%	96.62%	95.93%	-
3	SS-11-OSWG-001B	97.63%	97.26%	-	-	-
4	GCS-11-OSWG-001A	98.24%	97.86%	96.57%	95.88%	-
5	GCS-11-OSWG-001B	97.61%	97.23%	-	-	-
6	GCS-3.3-SWG-001	95.44%	95.05%	94.38%	93.67%	-
7	GCS-400-NSWG-001A	102.21%	101.22%	97.84%	96.05%	-
8	GCS-400-NSWG-001B	99.81%	98.86%	97.84%	96.05%	-

Load Flow Result (Based on ETAP 12.6)

Item	Tag	Normal		Worst Case		Emergency
Condition		With Cap	Without Cap	With Cap	Without Cap	-
9	GCS-400-NSWG-001E	99.81%	98.86%	97.84%	96.05%	99.75%
10	T1-Existing (25 MVA)	4481 KVA	4917 KVA	11466 KVA	12321 KVA	-
11	T3-Existing (25 MVA)	6991 KVA	7420 KVA	-	-	-
12	T5-New (1250 KVA)	344 KVA	388 KVA	1021 KVA	1105 KVA	-
13	T8-New (1250 KVA)	725 KVA	777 KVA	-	-	-
14	Gen 2-New (500 KVA)	-	-	-	-	422 KVA
Note 1: Items 1~9 are voltage%. Note 2: “Cap” means Capacitor bank						

7.0 SHORT CIRCUIT ANALYSIS

At this stage, the maximum short circuit values are calculated in worst case operation to verify that the switchgear withstand capacity is higher than the maximum short circuit current. In this configuration the motor contribution for each bus is maximum.

Result of maximum short circuit currents is reported in Attachment 2.

Table below compares the results of the 3ph short circuit studies with the switchgear withstand capacity.

D02

Short Circuit Result (Based on ETAP 12.6)

Item	Tag	Maximum (KA)	Minimum (KA)
1	230 KV Substation	2.07	1.63
2	SS-11-OSWG-001A	13.31	10.53
3	SS-11-OSWG-001B	-	10.79
4	GCS-11-OSWG-001A	13.21	10.44
5	GCS-11-OSWG-001B	13.21	10.71
6	GCS-3.3-SWG-001	2.9	2.62
7	GCS-400-NSWG-001A	27.66	23.6
8	GCS-400-NSWG-001B	27.66	23.69
9	GCS-400-NSWG-001E	27.66	23.69
Note 1: Maximum short circuit will be occurred in Worst Case Condition. Note 2: Minimum short circuit will be occurred in Normal Condition.			

All the switchgears are able to withstand the expected fault currents.

8.0 MOTOR STARTING ANALYSIS

D02

At this stage, the motor starting analysis is considered according to client request in worst case that all of continues loads & 4 continuous motors are in service, then the 5th (Mtr5-New) standby largest motor will be started & one of the largest motor will be shut down.

Result of motor starting analysis is reported in Attachment 3.