

APPENDIX 13

ELECTRICAL LOAD SUMMARY

For
Project Kent (OA40)

At
Eastern Europe

Air Products Proposal No:50034819

REVISION HISTORY						
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ELECTRICAL ENGINEERING DEPARTMENT



Opportunity Number: 50034819

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PRELIMINARY LOAD SUMMARY REPORT

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ELECTRICAL ENGINEERING DEPARTMENT



PRELIMINARY LOAD SUMMARY REPORT

1.0 Introduction

- 1 All electrical and process loads are preliminary information and subject to change.
- 2 Electrical load summary is based on 4 nos. of sufficiently rated feeders from the existing substation of Client.
- 3 The standard transformer ratings mentioned (refer to section 3.0) include an allowance of 20% for spare circuits and future growth.
- 4 Electrical and process equipment tag prefixes denote the following : X01 = {Process Plant} X where X=1, 2, 3 etc .

2.0 Circuit Type


A = Circuit Breaker (typically Vacuum (MV) or Air (LV))
 B = Outgoing Feeder (Fuse Switch / MCCB)
 C = Contactor controlled outgoing Feeder (Fuse Switch / MCCB)
 D = Direct-on-Line Motor Starter
 E = Process Heater
 H = Heater (anti-condensation heater fed from same compartment as associated motor)
 VFD = Outgoing Feeder (feeding a VFD drive or Soft Start unit)


3.0 Transformer Sizing

Tag	Rating (MVA)	Max. Demand	Voltage Ratio	Busbar Voltage (kV)
		----		6.30
101-P230	1.25	----	10kV/0.42kV	0.40
101-P231	2.5		6.3kV/0.72kV	0.69

4.0 Reference Documents

Document Title	Document Number
Overall Simplified Single Line Diagram	50034819-ELE-ES601-001
PEELS	50034819-MCN-GL101-001, R0

Electrical Load Summary - Load Demand and Equipment Rating Summary													<div>AIR PRODUCTS</div>
Switchgear tag number	Continuous kW	Continuous kVAr	Intermittent kW	Intermittent kVAr	Standby kW	Standby kVAr	Maximum Demand kVA	Peak Demand kVA	Peak Demand with Spare Capacity (20%) (kVA)	Transformer Rating (kVA)		Remarks	
P220 / P221/ P222	35,232 kW	4,091 kVAr	41 kW	19 kVAr	193 kW	87 kVAr	35,482 kVA	35,502 kVA	42,602 kVA	N/A	Design	TOTAL Loading	
Distribution Board wise Loading													
P410	633 kW	284 kVAr	41 kW	21 kVAr	193 kW	141 kVAr	707 kVA	731 kVA	877 kVA	1,250 kVA	Design		
101-P470	2,440 kW	kVAr	kW	kVAr	kW	kVAr	2,440 kVA	2,440 kVA	2,928 kVA	2,500 kVA	Design	Spare Capacity was built in heater load itself. Hence not added in transformer spare capacity.	

Electrical Design Department - MV Load Summary Report																							
Switchboard & Bus Ref No	Bus No	AP Module Number	Voltage (kV)	Equipment Tag No.	Nameplate Description	Nameplate kW	Nameplate kVA	Nameplate Amps	Load kW	Amps	Continuous kW	Continuous kVAR	Intermittent kW	Intermittent kVAR	Standby kW	Standby kVAR	Efficiency at load point	Power Factor at load point	Operating Mode	Data Status	Notes	Circuit Type	
101-P220	A		6.30		Incomer from Upstream Switchboard			2500											Running	Estimated	Preliminary	A	
101-P220	B		6.30		Incomer from Upstream Switchboard			2500											Running	Estimated	Preliminary	A	
101-P220			6.30		Buscoupler -1			2500											Running	Estimated	Preliminary	A	
101-P220			6.30		Buscoupler -2			2500											Running	Estimated	Preliminary	A	
101-P221			6.30		ICOG Panel			1250											Running	Estimated	Preliminary	A	
101-P222			6.30		ICOG Panel			1250											Running	Estimated	Preliminary	A	
101-P221	A		6.30	101-P230	LV Services Distribution Transformer		2500.00	1250		64.20	639.16	286.78	41.3	18.5	192.93	86.6	99.00	0.91	Running	Estimated	Transformer Feeder	A	
101-P222	A		6.30	101-P231	Heater Load Distribution Transformer		2500.00	1250			2440.00	0.00	0.0	0.0	0.00	0.0	99.00	1.00	Running	Estimated	Transformer Feeder	A	
101-P220	A		6.30	101-D111	Main Air Compressor K111 Motor	19030		2500	17127.00	1601.65	17476.53	0.00					98.00	1.00	Running	Estimated	Synchronous Machine	A	
101-P220	A/B		6.30	101-P310	Soft Starter / LCI			1250											Running	Estimated	Starting purpose only	A	
101-P220	B		6.30	101-D131	Back up Air Compressor K131 Motor	10000		1250	8500.00	794.89	8673.47	0.00					98.00	1.00	Running	Estimated	Synchronous Machine	A	
101-P220	B		6.30	101-D701	GAN Compressor K701 Motor	3500		1250	3150.00	347.85	3264.25	1936.89					96.50	0.86	Running	Estimated	Induction Machine	A	
101-P220	B		6.30	101-D702	HP GAN Compressor K702 Motor	900		1250	810.00	92.05	843.75	545.01					96.00	0.84	Running	Estimated	Induction Machine	A	
101-P220	B		6.30	101-D703	Aux. HP GAN Compressor K703 Motor	2000		1250	1800.00	211.76	1894.74	1322.53					95.00	0.82	Running	Estimated	Induction Machine	A	
TOTAL SWITCHBOARD LOAD at 6.3kV											35,232 kW	4,091 kVAR	41 kW	19 kVAR	193 kW	87 kVAR							
Maximum Demand = (Continuous Load + 0.3*Intermittent Load) =											35,244 kW	4,097 kVAR	35,482 kVA										
Peak Demand = (Continuous Load + 0.3*Intermittent Load+0.1*Standby Load) =											35,264 kW	4,105 kVAR	35,502 kVA										
Power Factor =											0.99												

Electrical Design Department - LV Load Summary Report



Switchboard Ref No	Bus No	AP Module Number	Voltage (kV)	Equipment Tag No.	Nameplate Description	Nameplate kW	Nameplate kVA	Nameplate Amps	Load kW	Amps	Continuous kW	Continuous kVAr	Intermittent kW	Intermittent kVAr	Standby kW	Standby kVAr	Efficiency at load point	Power Factor at Load point	Operating Mode	Data Status	Notes	Circuit Type
101-P410	A		0.40		Incomer from Transformer 101-P230			4000											Running	Estimated		A
					UTILITIES																	
101-P410	A		0.40	101-P540	Battery Charger Feeder	10.0			8.0	16.0	9.4	5.8	0.0	0.0	0.00	0.00	85.0	0.85	Running	Estimated		B
101-P410	A		0.40	101-P520	UPS System Feeder		40.0		40.0	79.9	47.1	29.2	0.0	0.0	0.00	0.00	85.0	0.85	Running	Estimated		B
101-P410	A		0.40		Lighting and Small Power Feeder			200	30.0	59.9	35.3	21.9	0.0	0.0	0.00	0.00	85.0	0.85	Running	Estimated		B
					PROCESS																	
101-P410	A		0.40	101-G121	K111 Aux Lube Oil Pump Motor	30.0			24.0	0.0	0.0	0.0	0.0	0.0	25.53	19.15	94.0	0.80	Standby	Estimated		D
101-P410	A		0.40	101-K122	K111 Lube Oil Demist Fan Motor	1.5			1.0	2.5	1.2	1.3	0.0	0.0	0.00	0.00	84.2	0.68	Running	Estimated		D
101-P410	A		0.40	101-E123A/B/C	K111 Lube Oil Reservoir Heater	5.5			4.0	0.0	0.0	0.0	4.2	0.0	0.00	0.00	95.0	1.00	Intermittent	Estimated		E
101-P410	A		0.40	101-G141	K131 Aux Lube Oil Pump Motor	30.0			24.0	0.0	0.0	0.0	0.0	0.0	25.53	19.15	94.0	0.80	Standby	Estimated		D
101-P410	A		0.40	101-K142	K131 Lube Oil Demist Fan Motor	1.5			1.0	2.5	1.2	1.3	0.0	0.0	0.00	0.00	84.2	0.68	Running	Estimated		D
101-P410	A		0.40	101-E143A/B/C	K131 Lube Oil Reservoir Heater	5.5			4.0	0.0	0.0	0.0	4.2	0.0	0.00	0.00	95.0	1.00	Intermittent	Estimated		E
101-P410	A		0.40		K701 -Lube Oil Blower	1.5			1.0	2.5	1.2	1.3	0.0	0.0	0.00	0.00	84.2	0.68	Running	Estimated		D
101-P410	A		0.40		K701 Aux Lube Oil Pump Motor	3.7			2.5	0.0	0.0	0.0	2.9	3.1	0.00	0.00	87.6	0.68	Intermittent	Estimated		D
101-P410	A		0.40		K701 Lube Oil Heater	5.0			5.0	0.0	0.0	0.0	5.6	4.1	0.00	0.00	88.6	0.81	Intermittent	Estimated		D
101-P410	A		0.40		K702 -Lube Oil Blower	1.5			1.0	2.5	1.2	1.3	0.0	0.0	0.00	0.00	84.2	0.68	Running	Estimated		D
101-P410	A		0.40		K702 Aux Lube Oil Pump Motor	3.7			2.5	0.0	0.0	0.0	2.9	3.1	0.00	0.00	87.6	0.68	Intermittent	Estimated		D
101-P410	A		0.40		K702 Lube Oil Heater	5.0			5.0	0.0	0.0	0.0	5.6	4.1	0.00	0.00	88.6	0.81	Intermittent	Estimated		D
101-P410	A		0.40		K703 -Lube Oil Blower	1.5			1.0	2.5	1.2	1.3	0.0	0.0	0.00	0.00	84.2	0.68	Running	Estimated		D
101-P410	A		0.40		K703 Aux Lube Oil Pump Motor	3.7			2.5	0.0	0.0	0.0	2.9	3.1	0.00	0.00	87.6	0.68	Intermittent	Estimated		D
101-P410	A		0.40		K703 Lube Oil Heater	5.0			5.0	0.0	0.0	0.0	5.6	4.1	0.00	0.00	88.6	0.81	Intermittent	Estimated		D
101-P410	A		0.40	101-P310AUX	LCI / Soft Start Excitation Aux Feed	200.0			200.0	303.9	210.5	0.0	0.0	0.0	0.00	0.00	95.0	1.00	Running	Estimated		E
101-P410	A		0.40	101-G271	Compander Lube Oil Pump Motor	5.5			3.7	8.7	4.1	4.4	0.0	0.0	0.00	0.00	90.4	0.68	Running	Estimated		D
101-P410	A		0.40	101-E273	Compander Lube Oil Heater	7.0			7.0	0.0	0.0	0.0	7.4	0.0	0.00	0.00	95.0	1.00	Intermittent	Estimated		E
101-P410	A		0.40		Compander IGV Actuator Motor	0.2			0.2	0.6	0.3	0.3	0.0	0.0	0.00	0.00	71.1	0.64	Running	Estimated		D
101-P410	A		0.40	101-D231A	G231A LOX Pump Motor	90.0			81.0	142.8	85.1	50.5	0.0	0.0	0.00	0.00	95.2	0.86	Running	Estimated	VFD	D
101-P410	A		0.40	101-D231B	G231B LOX Pump Motor	90.0			3.0	6.3	3.2	3.1	0.0	0.0	0.00	0.00	94.8	0.72	Running	Estimated	VFD - slow roll	D
101-P410	A		0.40	101-D402A	G402A CLOX Return Pump Motor	18.5			15.0	29.6	16.2	12.6	0.0	0.0	0.00	0.00	92.6	0.79	Running	Estimated	VFD	D
101-P410	A		0.40	101-D402B	G402B CLOX Return Pump Motor	18.5			3.0	6.7	3.3	3.3	0.0	0.0	0.00	0.00	92.0	0.70	Running	Estimated	VFD - slow roll	D
101-P410	A		0.40	101-D161A	G161A Cooling Water Pump Motor	110.0			89.0	166.2	93.3	67.5	0.0	0.0	0.00	0.00	95.4	0.81	Running	Estimated	Soft Starter	D
101-P410	A		0.40	101-D161B	G161B Cooling Water Pump Motor	110.0			89.0	0.0	0.0	0.0	0.0	0.0	93.29	67.54	95.4	0.81	Standby	Estimated	Soft Starter	D
101-P410	A		0.40	101-D171A	G171A Chilled Water Pump Motor	55.0			46.0	86.6	48.6	35.2	0.0	0.0	0.00	0.00	94.7	0.81	Running	Estimated		D
101-P410	A		0.40	101-D171B	G171B Chilled Water Pump Motor	55.0			46.0	0.0	0.0	0.0	0.0	0.0	48.57	35.17	94.7	0.81	Standby	Estimated		D

Electrical Design Department - LV Load Summary Report



Switchboard Ref No	Bus No	AP Module Number	Voltage (kV)	Equipment Tag No.	Nameplate Description	Nameplate kW	Nameplate kVA	Nameplate Amps	Load kW	Amps	Continuous kW	Continuous kVAr	Intermittent kW	Intermittent kVAr	Standby kW	Standby kVAr	Efficiency at load point	Power Factor at Load point	Operating Mode	Data Status	Notes	Circuit Type
101-P410	A		0.40	101-P550	Excitation Panel for D111	30.0			30.0	59.9	35.3	21.9	0.0	0.0	0.00	0.00	85.0	0.85	Running	Estimated		B
101-P410	A		0.40	101-P551	Excitation Panel for D131	30.0			30.0	59.9	35.3	21.9	0.0	0.0	0.00	0.00	85.0	0.85	Running	Estimated		B

TOTAL X01-P401A SWITCHBOARD LOAD = 633 kW284 kVAr41 kW21 kVAr193 kW141 kVAr

Maximum Demand= (Continuous Load + 0.3*Intermittent Load) = 645 kW290 kVAr707 kVA

Peak Demand= (Continuous Load + 0.3*Intermittent Load+0.1*Standby Load) = 664 kW304 kVAr731 kVA

Power Factor = 0.910.890.81

Electrical Design Department - LV Load Summary Report



Switchboard Ref No	Bus No	AP Module Number	Voltage (kV)	Equipment Tag No.	Nameplate Description	Nameplate kW	Nameplate kVA	Nameplate Amps	Load kW	Amps	Continuous kW	Continuous kVAr	Intermittent kW	Intermittent kVAr	Standby kW	Standby kVAr	Efficiency at load point	Power Factor at Load point	Operating Mode	Data Status	Notes	Circuit Type
101-P470	A		0.69		Incomer from Transformer 101-P231			4000											Running	Estimated		A
					PROCESS HEATERS																	
101-P470	A		0.69	101-E182A-1	TSA Reactivation Heater - Stage 1	550			550	460.2	550.0	0.0	0.0	0.0	0.00	0.00	100.0	1.00	Running	Estimated	Contactora Feeder	H variable
101-P470	A		0.69	101-E182A-2	TSA Reactivation Heater - Stage 2	550			550	460.2	550.0	0.0	0.0	0.0	0.00	0.00	100.0	1.00	Running	Estimated	Contactora Feeder	H variable
101-P470	A		0.69	101-E182A-3	TSA Reactivation Heater - Stage 3	550			550	460.2	550.0	0.0	0.0	0.0	0.00	0.00	100.0	1.00	Running	Estimated	Contactora Feeder	H variable
101-P470	A		0.69	101-E182A-4	TSA Reactivation Heater - Stage 4	550			550	460.2	550.0	0.0	0.0	0.0	0.00	0.00	100.0	1.00	Running	Estimated	Contactora Feeder	H variable
101-P470	A		0.69	101-E182A-5	TSA Reactivation Heater - Stage 5	240			240	200.8	240.0	0.0	0.0	0.0	0.00	0.00	100.0	1.00	Running	Estimated	Thyristor Feeder	H variable

TOTAL X01-P401A SWITCHBOARD LOAD = 2,440 kWkVAr kWkVArkW kVAr

Maximum Demand= (Continuous Load + 0.3*Intermittent Load) = 2,440 kWkVAr 2,440 kVA
Peak Demand= (Continuous Load + 0.3*Intermittent Load+0.1*Standby Load) = 2,440 kWkVAr 2,440 kVA
Power Factor = 1.00#DIV/0!#DIV/0!