

As Built Documentation

Chapter 2.2 Plant description with flow diagram

- Process description
- Process flow diagram
- Process specification

Process Description

Air Compression and Purification

Process Air is cleaned from dust and other particles in an air filter and then compressed to the required process pressure by a multi-stage centrifugal air compressor. The compressed air is cooled against cooling water and chilled water in a 2-stage direct contact cooler.

Then the air passes through a molecular sieve adsorber unit consisting of two cyclic operating adsorber vessels filled with two layers of activated alumina and molecular sieve material. Process air passes through one of the adsorbers where water, carbon dioxide and most of the hydrocarbons are removed from the air stream. Concurrently, the other adsorber is regenerated by dry waste nitrogen from the air separation unit. The regeneration gas is heated to improve and accelerate the desorption process. Before switching the regenerated bed to adsorption it is cooled to operating temperature by waste nitrogen.

Part of the dry and CO₂-free air is withdrawn as instrument air downstream the adsorber.

Liquefier and Internal Compression

The equipment arrangement of booster air compressor, expander driven compressors and main heat exchanger serves a dual purpose, as an air liquefier and for internal compression. The booster air compressor is used for both duties, liquefaction and internal compression.

After the adsorber unit the dry and CO₂ free air is split into two streams. The first portion is flowing straight to the main heat exchanger. The remaining air is compressed further in a booster air compressor and also fed to the main heat exchanger.

Main Heat Exchanger

One portion of the dry air (hereafter called "main air") passes directly to the main heat exchanger where it is cooled close to saturation against product streams leaving the heat exchanger and fed into the high pressure (HP) column.

The remaining process air having been compressed further in the booster air compressor (BAC) is cooled close to ambient temperature in a shell-and-tube after-cooler and thereafter cooled down in the main heat exchanger. A side-stream is withdrawn at the mid-point of the heat exchanger and expanded in two turbines operating in parallel. The expanded air is blended with main air from the cold-end outlet of the main heat exchanger. The remaining booster air is further cooled down and after the main heat exchanger reduced to HP column pressure. One part of this liquefied air is fed to the HP column; the other part is passed to the low pressure (LP) column via the subcooler.

Air Separation

In the HP column, the air streams are separated in oxygen rich bottom liquid and pure nitrogen at the top. The overhead vapour stream is condensed against boiling oxygen in the LP column sump. The condensed nitrogen serves as reflux for the HP and LP column, as gaseous nitrogen product, as liquid product and as refrigerant for the pure argon condenser. The liquid nitrogen product and LP column reflux stream are subcooled in the subcooler. In a cryogenic liquid nitrogen pump liquid nitrogen is brought to the required gaseous nitrogen pressure and thereafter vaporised in the main heat exchanger against air.

The bottom liquid of the HP column is subcooled, partially vaporised in the crude argon condenser and fed into the LP column.

In the LP column the final air separation takes place. Nitrogen gas is withdrawn from the top of the low pressure column, passes the subcooler and is heated to near ambient temperature in the main heat exchanger. It is then compressed to the desired pressure and serves as medium pressure product nitrogen.

Also a waste gas stream is withdrawn from the LP column and heated to ambient in the subcooler and subsequently in the main heat exchanger. The waste nitrogen gas is then utilised to produce chilled water in the chill tower and to regenerate the molecular sieve unit.

The liquid oxygen product is taken from the LP column sump, is pumped to the required pressure and vaporised in the main heat exchanger to provide GOX product. A part of the liquid oxygen is fed to the LOX storage tank.

Argon recovery by rectification

A zone of argon enriched oxygen gas exists in the lower part of the LP column. This gas is used as a feed stream for the crude argon column. In this column, most of the oxygen of the argon enriched side-gas is removed by cryogenic rectification.

The feed enters the bottom of the column, is condensed against oxygen rich liquid from the HP column and the bottom liquid is returned to the LP column. Part of the top product is withdrawn from the crude argon column and is fed into the pure argon column.

In the pure argon column, remaining nitrogen is removed by cryogenic rectification. The gas leaving at the top of the column, containing mostly nitrogen, is vented to atmosphere; the pure liquid argon product from the sump is transferred to the liquid argon (LAR) storage tank (low pressure). The liquid argon is withdrawn from the low pressure storage tank, pumped to the required product pressure and vaporised in ambient air vaporisers. It is then passed as gaseous argon product to the customer.

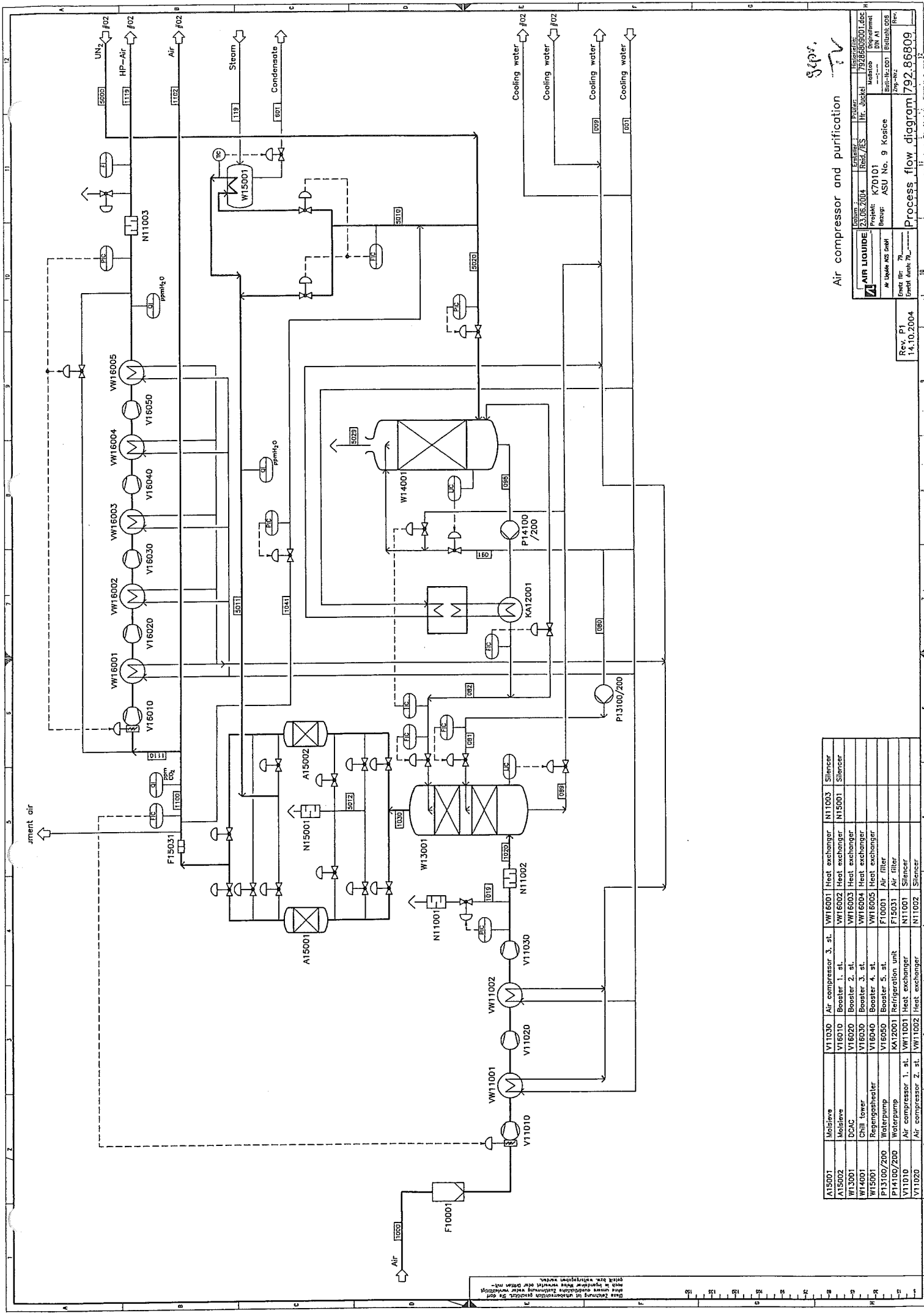
Back-up System

During shutdown or shortage of production of the air separation unit(s) the customer is provided with gaseous oxygen and gaseous nitrogen product from the back-up system.

Liquid oxygen is withdrawn from low pressure storage tanks, brought to the required pressures by cryogenic pumps, vaporised and heated to ambient temperature. The gas is fed into the product pipeline to the customer.

Liquid nitrogen is withdrawn from a low pressure storage tank, pumped to the required pressure by cryogenic pumps, vaporised and heated to ambient temperature. The gas is fed to the product pipelines.

Liquid argon withdrawn from the low pressure storage tank is pumped to the required product pressure and fed to a high pressure tank. Liquid from the high pressure tank is vaporised and heated to ambient temperature. The gas is fed to the product pipeline.

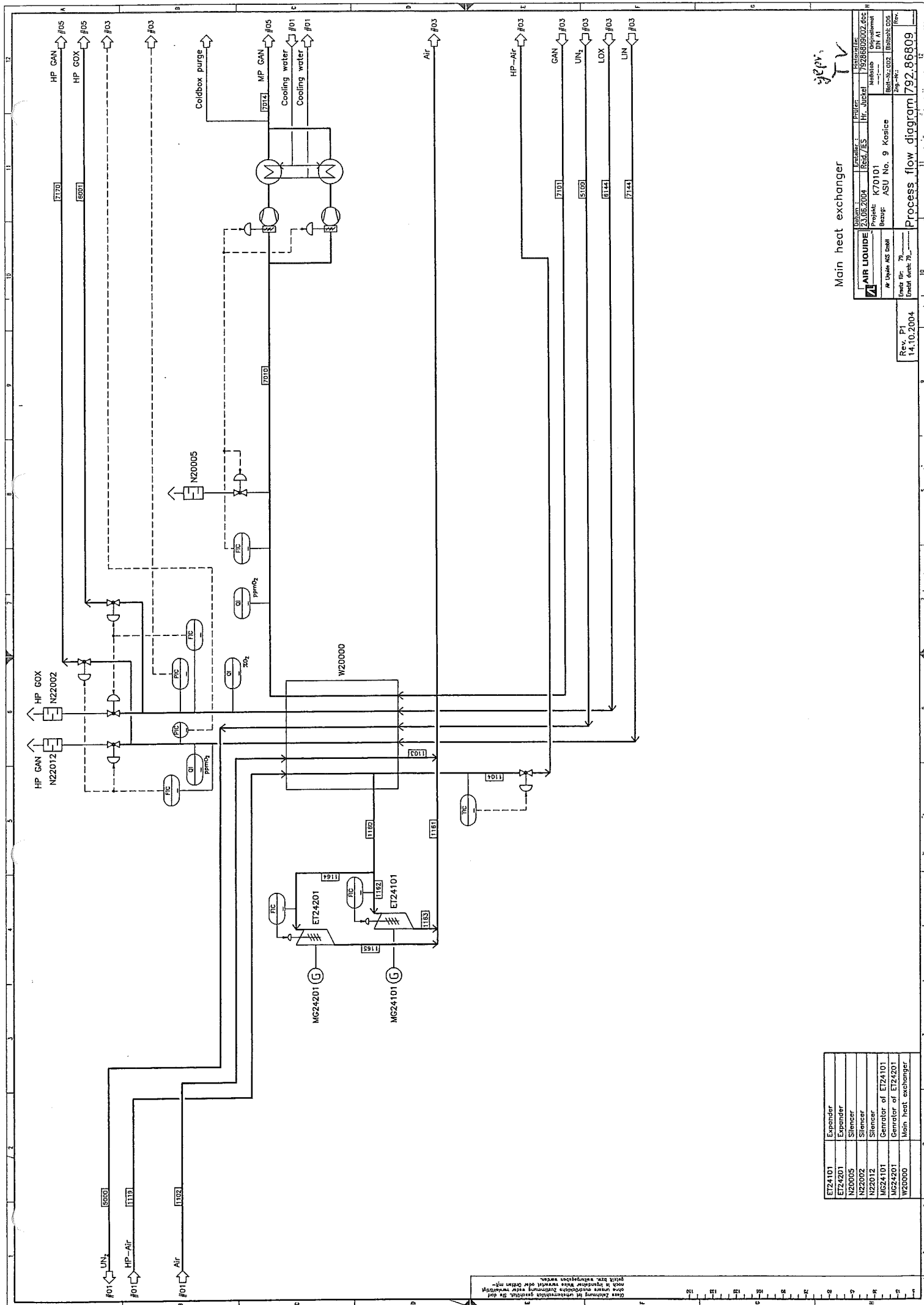


A15001	Moldave	V11030	Air compressor 3. st.	VW16001	Heat exchanger	N11003	Silencer
A15002	Moldave	V16010	Booster 1. st.	VW16002	Heat exchanger	N15001	Silencer
W13001	DCAC	V16020	Booster 2. st.	VW16003	Heat exchanger		
W14001	Refrigerator	V16030	Booster 3. st.	VW16004	Heat exchanger		
W15001	Refrigerator	V16040	Booster 4. st.	VW16005	Heat exchanger		
P13100/200	Water pump	V16050	Booster 5. st.	F10001	Air filter		
P14100/200	Water pump	KA12001	Refrigeration unit	F15031	Air filter		
V11010	Air compressor 1. st.	VW11001	Heat exchanger	N11001	Silencer		
V11020	Air compressor 2. st.	VW11002	Heat exchanger				

Datum: 23.06.2004 Projekt: K70101 Auftrag: ASU No. 9 Kosić Zeichner: ASU No. 9 Kosić Rev. P1 14.10.2004	Titel: AIR LIQUIDE Projekt: K70101 Auftrag: ASU No. 9 Kosić Zeichner: ASU No. 9 Kosić Rev. P1 14.10.2004	Datum: 23.06.2004 Projekt: K70101 Auftrag: ASU No. 9 Kosić Zeichner: ASU No. 9 Kosić Rev. P1 14.10.2004
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Air compressor and purification

Process flow diagram 792.86809



Main heat exchanger

jepr

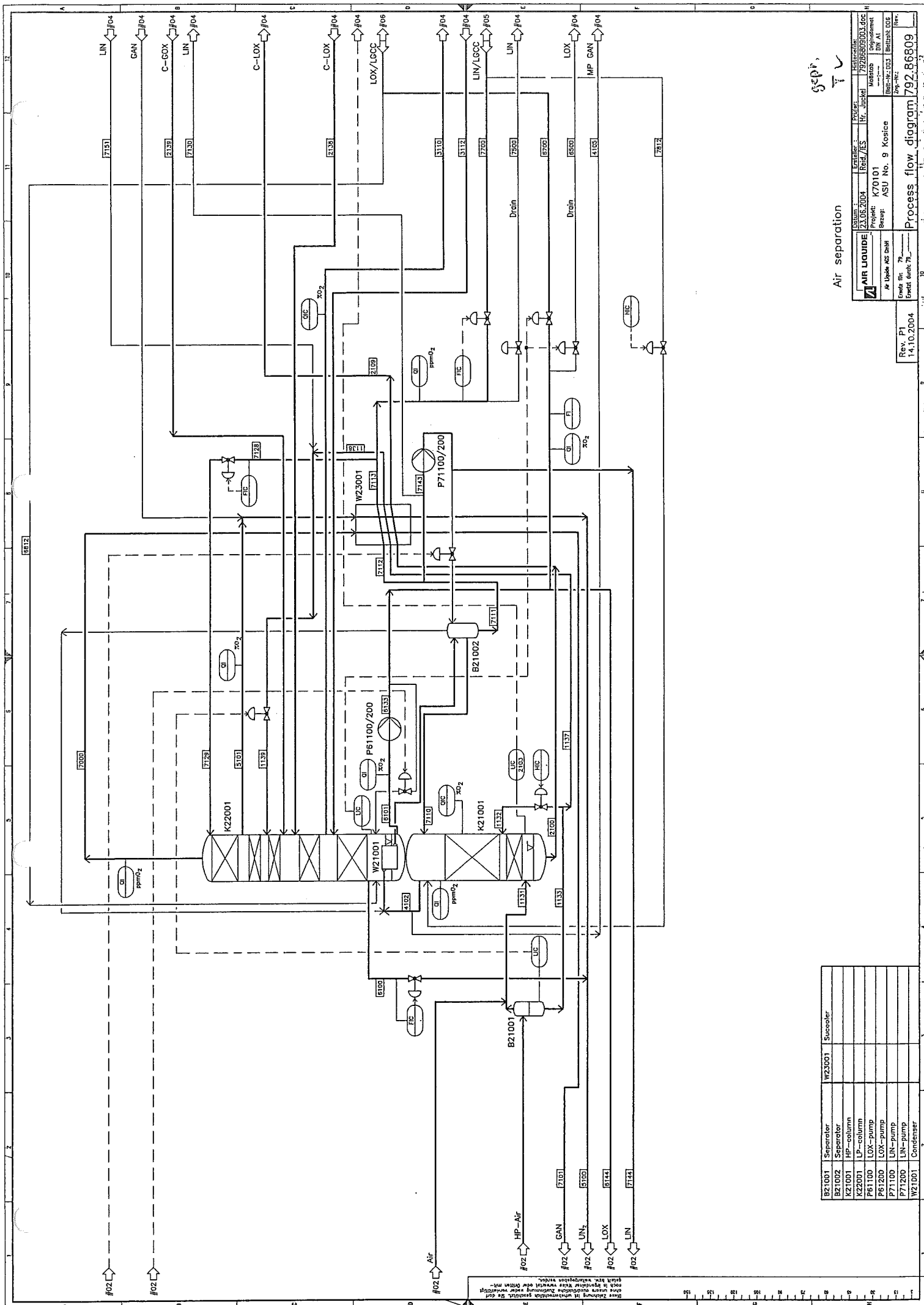
ET24101	Expander
ET24201	Expander
N20005	Silencer
N22002	Silencer
N22012	Silencer
MG24101	Generator of ET24101
MG24201	Generator of ET24201
W20000	Main heat exchanger

Project	23.05.2004	Rev. / ES	7928603002.002	Project	7928603002.002
Author	Jepr	Rev. / ES	7928603002.002	Project	7928603002.002
Check	7928603002.002	Rev. / ES	7928603002.002	Project	7928603002.002
Drawn	7928603002.002	Rev. / ES	7928603002.002	Project	7928603002.002
Approved	7928603002.002	Rev. / ES	7928603002.002	Project	7928603002.002
Original	7928603002.002	Rev. / ES	7928603002.002	Project	7928603002.002
Revised	7928603002.002	Rev. / ES	7928603002.002	Project	7928603002.002
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Rev. P1	14.10.2004	Rev. P1	14.10.2004
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Process flow diagram 792.86809

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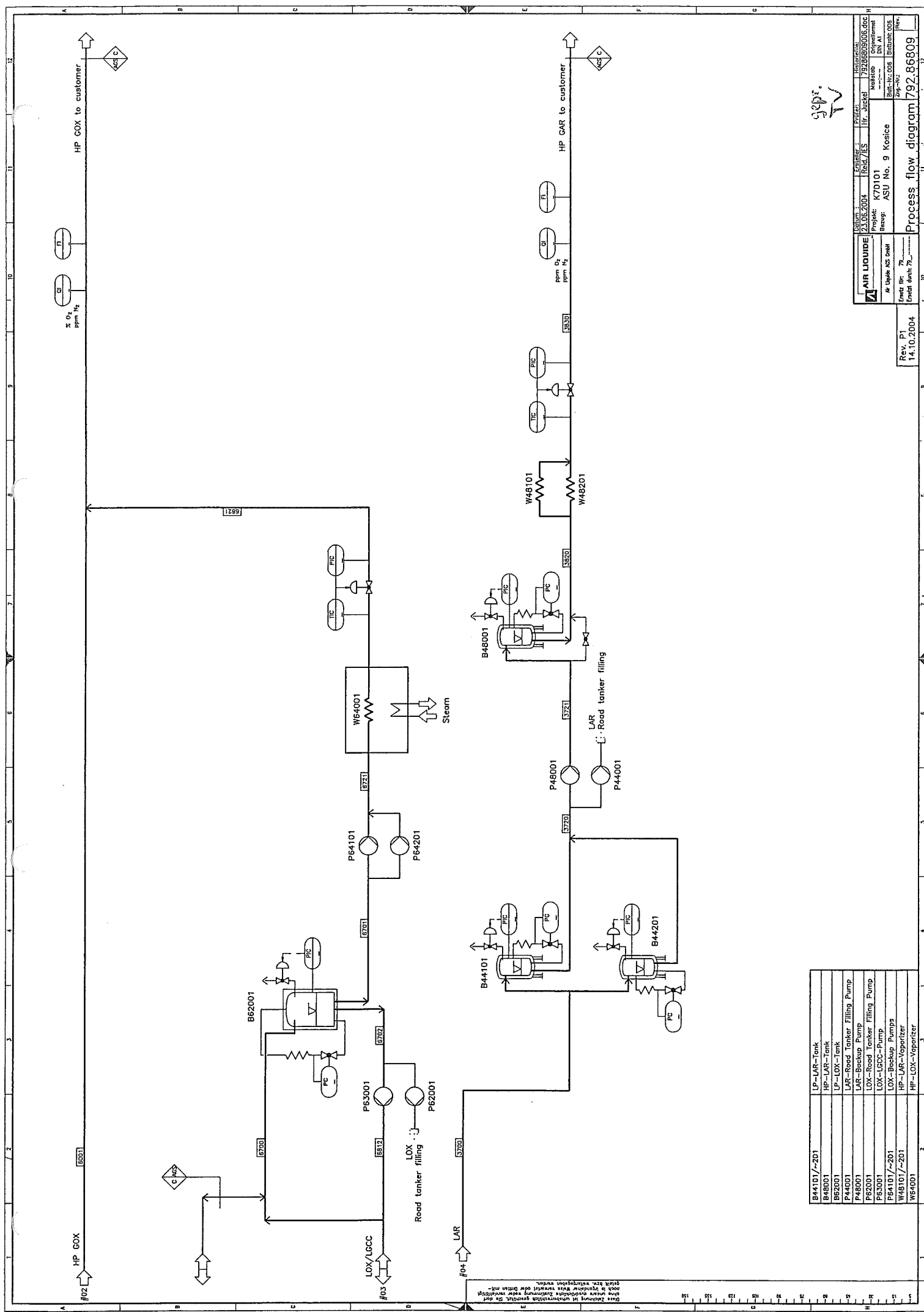


Separator	Succeder
B21001	
B21002	
K22001	
K21001	
P61100	
P71100	
W21001	
W22001	
W23001	

Air separation

Project: K70101 ASU No. 9 Kosice Rev. P1 14.10.2004	Author: 23.08.2004 Editor: 23.08.2004 Check: 23.08.2004 Release: 23.08.2004 Project: K70101 ASU No. 9 Kosice Rev. P1 14.10.2004	Material: 79286805003.doc Material: 79286805003.doc Material: 79286805003.doc Material: 79286805003.doc
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Process flow diagram 792.86809



B44101/-201	LP-LAR-Tank
B48001	HP-LAR-Tank
B48201	LP-LOX-Tank
P44001	LAR-Road Tanker Filling Pump
P48001	LAR-Backup Pump
P62001	LOX-Road Tanker Filling Pump
P65001	LOX-LGCC-Pump
P64101/-201	LOX-Backup Pumps
W48101/-201	HP-LAR-Vaporizer
W64001	HP-LOX-Vaporizer

AIR LIQUIDE		23.05.2004	Rev. 1	Rev. 2	Rev. 3	Rev. 4	Rev. 5	Rev. 6	Rev. 7	Rev. 8	Rev. 9	Rev. 10	Rev. 11	Rev. 12	Rev. 13	Rev. 14	Rev. 15	Rev. 16	Rev. 17	Rev. 18	Rev. 19	Rev. 20	Rev. 21	Rev. 22	Rev. 23	Rev. 24	Rev. 25	Rev. 26	Rev. 27	Rev. 28	Rev. 29	Rev. 30	Rev. 31	Rev. 32	Rev. 33	Rev. 34	Rev. 35	Rev. 36	Rev. 37	Rev. 38	Rev. 39	Rev. 40	Rev. 41	Rev. 42	Rev. 43	Rev. 44	Rev. 45	Rev. 46	Rev. 47	Rev. 48	Rev. 49	Rev. 50	Rev. 51	Rev. 52	Rev. 53	Rev. 54	Rev. 55	Rev. 56	Rev. 57	Rev. 58	Rev. 59	Rev. 60	Rev. 61	Rev. 62	Rev. 63	Rev. 64	Rev. 65	Rev. 66	Rev. 67	Rev. 68	Rev. 69	Rev. 70	Rev. 71	Rev. 72	Rev. 73	Rev. 74	Rev. 75	Rev. 76	Rev. 77	Rev. 78	Rev. 79	Rev. 80	Rev. 81	Rev. 82	Rev. 83	Rev. 84	Rev. 85	Rev. 86	Rev. 87	Rev. 88	Rev. 89	Rev. 90	Rev. 91	Rev. 92	Rev. 93	Rev. 94	Rev. 95	Rev. 96	Rev. 97	Rev. 98	Rev. 99	Rev. 100	Rev. 101	Rev. 102	Rev. 103	Rev. 104	Rev. 105	Rev. 106	Rev. 107	Rev. 108	Rev. 109	Rev. 110	Rev. 111	Rev. 112	Rev. 113	Rev. 114	Rev. 115	Rev. 116	Rev. 117	Rev. 118	Rev. 119	Rev. 120	Rev. 121	Rev. 122	Rev. 123	Rev. 124	Rev. 125	Rev. 126	Rev. 127	Rev. 128	Rev. 129	Rev. 130	Rev. 131	Rev. 132	Rev. 133	Rev. 134	Rev. 135	Rev. 136	Rev. 137	Rev. 138	Rev. 139	Rev. 140	Rev. 141	Rev. 142	Rev. 143	Rev. 144	Rev. 145	Rev. 146	Rev. 147	Rev. 148	Rev. 149	Rev. 150	Rev. 151	Rev. 152	Rev. 153	Rev. 154	Rev. 155	Rev. 156	Rev. 157	Rev. 158	Rev. 159	Rev. 160	Rev. 161	Rev. 162	Rev. 163	Rev. 164	Rev. 165	Rev. 166	Rev. 167	Rev. 168	Rev. 169	Rev. 170	Rev. 171	Rev. 172	Rev. 173	Rev. 174	Rev. 175	Rev. 176	Rev. 177	Rev. 178	Rev. 179	Rev. 180	Rev. 181	Rev. 182	Rev. 183	Rev. 184	Rev. 185	Rev. 186	Rev. 187	Rev. 188	Rev. 189	Rev. 190	Rev. 191	Rev. 192	Rev. 193	Rev. 194	Rev. 195	Rev. 196	Rev. 197	Rev. 198	Rev. 199	Rev. 200	Rev. 201	Rev. 202	Rev. 203	Rev. 204	Rev. 205	Rev. 206	Rev. 207	Rev. 208	Rev. 209	Rev. 210	Rev. 211	Rev. 212	Rev. 213	Rev. 214	Rev. 215	Rev. 216	Rev. 217	Rev. 218	Rev. 219	Rev. 220	Rev. 221	Rev. 222	Rev. 223	Rev. 224	Rev. 225	Rev. 226	Rev. 227	Rev. 228	Rev. 229	Rev. 230	Rev. 231	Rev. 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1008	Rev. 1009	Rev. 1010	Rev. 1011	Rev. 1012	Rev. 1013	Rev. 1014	Rev. 1015	Rev. 1016	Rev. 1017	Rev. 1018	Rev. 1019	Rev. 1020	Rev. 1021	Rev. 1022	Rev. 1023	Rev. 1024	Rev. 1025	Rev. 1026	Rev. 1027	Rev. 1028	Rev. 1029	Rev. 1030	Rev. 1031	Rev. 1032	Rev. 1033	Rev. 1034	Rev. 1035	Rev. 1036	Rev. 1037	Rev. 1038	Rev. 1039	Rev. 1040	Rev. 1041	Rev. 1042	Rev. 1043	Rev. 1044	Rev. 1045	Rev. 1046	Rev. 1047	Rev. 1048	Rev. 1049	Rev. 1050	Rev. 1051	Rev. 1052	Rev. 1053	Rev. 1054	Rev. 1055	Rev. 1056	Rev. 1057	Rev. 1058	Rev. 1059	Rev. 1060	Rev. 1061	Rev. 1062	Rev. 1063	Rev. 1064	Rev. 1065	Rev. 1066	Rev. 1067	Rev. 1068	Rev. 1069	Rev. 1070	Rev. 1071	Rev. 1072	Rev. 1073	Rev. 1074	Rev. 1075	Rev. 1076	Rev. 1077	Rev. 1078	Rev. 1079	Rev. 1080	Rev. 1081	Rev. 1082	Rev. 1083	Rev. 1084	Rev. 1085	Rev. 1086	Rev. 1087	Rev. 1088	Rev. 1089	Rev. 1090	Rev. 1091	Rev. 1092	Rev. 1093	Rev. 1094	Rev. 1095	Rev. 1096	Rev. 1097	Rev. 1098	Rev. 1099	Rev. 1100	Rev. 1101	Rev. 1102	Rev. 1103	Rev. 1104	Rev. 1105	Rev. 1106	Rev. 1107	Rev. 1108	Rev. 1109	Rev. 1110	Rev. 1111	Rev. 1112	Rev. 1113	Rev. 1114	Rev. 1115	Rev. 1116	Rev. 1117	Rev. 1118	Rev. 1119	Rev. 1120	Rev. 1121	Rev.
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Process Specification										Project: K70101 ASU No.9 Kosice				
According to PFD No.: 792.86809; Rev. P1										Rev.: 2				
Air Liquide AGS GmbH										Date: 14.10.04				
Ambient Temperature [°C]: 12										By: TV / JJ				
Ambient Pressure [bar a]: 1,013										Humidity: 65%				
Cooling Water Temperature [°C]: 16														
Case	Stream	Normal Flow	Mass Flow	Pres.	Temp.	Phase	Vapor Fraction	Composition (mol/mol)			Density	Remarks		
		Nm³/h	kg/h	bar(a)	K			N₂	Ar	O₂	H₂	H₂O	kg/m³	
Normal	1	H2O	1700000	4	289	Liquid						1	999,1	
LOX	1	H2O	1700000	4	289	Liquid						1	999,1	
LIN	1	H2O	1700000	4	289	Liquid						1	999,1	
MaxGOX	1	H2O	1700000	4	289	Liquid						1	999,1	
MinGOX1	1	H2O	1700000	4	289	Liquid						1	999,1	
MinGOX2	1	H2O	1700000	4	289	Liquid						1	999,1	
Normal	9	H2O	1700000	2	299	Liquid						1	997,0	
LOX	9	H2O	1700000	2	299	Liquid						1	997,0	
LIN	9	H2O	1700000	2	299	Liquid						1	997,0	
MaxGOX	9	H2O	1700000	2	299	Liquid						1	997,0	
MinGOX1	9	H2O	1700000	2	299	Liquid						1	997,0	
MinGOX2	9	H2O	1700000	2	299	Liquid						1	997,0	
Normal	80	H2O	210000	4	289,1	Liquid						1	999,1	
LOX	80	H2O	210000	4	289,1	Liquid						1	999,1	
LIN	80	H2O	210000	4	289,1	Liquid						1	999,1	
MaxGOX	80	H2O	210000	4	289,1	Liquid						1	999,1	
MinGOX1	80	H2O	210000	4	289,1	Liquid						1	999,1	
MinGOX2	80	H2O	210000	4	289,1	Liquid						1	999,1	
Normal	81	H2O	210000	8	289,2	Liquid						1	999,2	
LOX	81	H2O	210000	8	289,2	Liquid						1	999,2	
LIN	81	H2O	210000	8	289,2	Liquid						1	999,2	
MaxGOX	81	H2O	210000	8	289,2	Liquid						1	999,2	
MinGOX1	81	H2O	210000	8	289,2	Liquid						1	999,2	
MinGOX2	81	H2O	210000	8	289,2	Liquid						1	999,2	
Normal	82	H2O	29654	9	284,8	Liquid						1	999,8	
LOX	82	H2O	29654	9	285,2	Liquid						1	999,8	
LIN	82	H2O	29689	9	285,7	Liquid						1	999,7	
MaxGOX	82	H2O	29691	9	285,3	Liquid						1	999,8	
MinGOX1	82	H2O	19920	9	288,1	Liquid						1	999,4	
MinGOX2	82	H2O	19931	9	288,1	Liquid						1	999,4	
Normal	89	H2O	240095	5,87	300	Liquid						1	996,9	
LOX	89	H2O	240091	5,83	300	Liquid						1	996,9	
LIN	89	H2O	240123	5,77	300	Liquid						1	996,9	
MaxGOX	89	H2O	240134	5,81	300,1	Liquid						1	996,8	
MinGOX1	89	H2O	230234	5,53	297,5	Liquid						1	997,5	
MinGOX2	89	H2O	230244	5,55	297,5	Liquid						1	997,5	
Normal	91	H2O	30000	4	289,1	Liquid						1	999,1	
LOX	91	H2O	30000	4	289,1	Liquid						1	999,1	
LIN	91	H2O	30000	4	289,1	Liquid						1	999,1	
MaxGOX	91	H2O	30000	4	289,1	Liquid						1	999,1	
MinGOX1	91	H2O	20000	4	289,1	Liquid						1	999,1	
MinGOX2	91	H2O	20000	4	289,1	Liquid						1	999,1	
Normal	98	H2O	45009	1,04	283,6	Liquid						1	999,6	
LOX	98	H2O	45009	1,04	284	Liquid						1	999,6	



Air Liquide AGS GmbH

Process Specification

Project: K70101 ASU No.9 Kosice
Rev.: 2
Date: 14.10.04
By: TV / JJ

According to PFD No: 792.86809; Rev. P1

Case:

Humidity: 65%

Cooling Water Temperature [°C]: 16

Ambient Pressure [bar a]: 1,013

Ambient Temperature [°C]: 12

Phase

Vapor Fraction

Composition (mol/mol)

Density

Remarks

N₂

Ar

O₂H₂H₂Okg/m³

K

bar(a)

kg/h

Nm³/h

Stream

Normal Flow

Mass Flow

Temp.

Phase

Vapor Fraction

Composition (mol/mol)

Density

Remarks

N₂

Ar

O₂H₂H₂Okg/m³

K

bar(a)

kg/h

Nm³/h

Stream

Normal Flow

Mass Flow

Temp.

Phase

Vapor Fraction

Composition (mol/mol)

Density

Remarks

N₂

Ar

O₂H₂H₂Okg/m³

K

bar(a)

kg/h

Nm³/h

Stream

Normal Flow

Mass Flow

Temp.

Phase

Vapor Fraction

Composition (mol/mol)

Density

Remarks

N₂

Ar

O₂H₂H₂Okg/m³

K

bar(a)

kg/h

Nm³/h

Stream

Normal Flow

Mass Flow

Temp.

Phase

Vapor Fraction

Composition (mol/mol)

Density

Remarks

N₂

Ar

O₂H₂H₂Okg/m³

K

bar(a)

kg/h

Nm³/h

Stream

Normal Flow

Mass Flow

Temp.

Phase

Vapor Fraction

Composition (mol/mol)

Density

Remarks

N₂

Ar

O₂H₂H₂Okg/m³

K

bar(a)

kg/h

Nm³/h

Stream

Normal Flow

Mass Flow

Temp.

Phase

Vapor Fraction

Composition (mol/mol)

Density

Remarks

N₂

Ar

O₂H₂H₂Okg/m³

K

bar(a)

kg/h

Nm³/h

Stream

Normal Flow

Mass Flow

Temp.

Phase

Vapor Fraction

Composition (mol/mol)

Density

Remarks

N₂

Ar

O₂H₂H₂Okg/m³

K

bar(a)

kg/h

Nm³/h

Stream

Normal Flow

Mass Flow

Temp.

Phase

Vapor Fraction

Composition (mol/mol)

Density

Remarks

N₂

Ar

O₂H₂H₂Okg/m³

K

bar(a)

kg/h

Nm³/h

Stream

Normal Flow

Mass Flow

Temp.

Phase

Vapor Fraction

Composition (mol/mol)

Density

Remarks

N₂

Ar

O₂H₂H₂Okg/m³

K

bar(a)

kg/h

Nm³/h

Stream

Normal Flow

Mass Flow

Temp.

Phase

Vapor Fraction

Composition (mol/mol)

Density

Remarks

N₂

Ar

O₂H₂H₂Okg/m³

K

bar(a)

kg/h

Nm³/h

Stream

Normal Flow

Mass Flow

Temp.

Phase

Vapor Fraction

Composition (mol/mol)

Density

Remarks

N₂

Ar

O₂H₂H₂Okg/m³

K

bar(a)

kg/h

Nm³/h

Stream

Normal Flow

Mass Flow

Temp.

Phase

Vapor Fraction

Composition (mol/mol)

Density

Remarks

N₂

Ar

O₂H₂H₂Okg/m³

K

bar(a)

kg/h

Nm³/h

Stream

Normal Flow

Mass Flow

Temp.

Phase

Vapor Fraction

Composition (mol/mol)

Density

Remarks

N₂

Ar

O₂H₂H₂Okg/m³

K

bar(a)

kg/h

Nm³/h

Stream

Normal Flow

Mass Flow

Temp.

Phase

Vapor Fraction

Composition (mol/mol)

Density

Remarks

N₂

Ar

O₂H₂H₂Okg/m³

K

bar(a)

kg/h

Nm³/h

Stream

Normal Flow

Mass Flow

Temp.

Phase

Vapor Fraction

Composition (mol/mol)

Density

Remarks

N₂

Ar

O₂H₂H₂Okg/m³

K

bar(a)

kg/h

Nm³/h

Stream

Normal Flow

Mass Flow

Temp.

Phase

Vapor Fraction

Composition (mol/mol)

Density

Remarks

N₂

Ar

O₂H₂H₂Okg/m³

K

bar(a)

kg/h

Nm³/h

Stream

Normal Flow

Mass Flow

Temp.

Phase

Vapor Fraction

Composition (mol/mol)

Density

Remarks

N₂

Ar

O₂H₂H₂Okg/m³

K

bar(a)

kg/h

Nm³/h

Stream

Normal Flow

Mass Flow

Temp.

Phase

Vapor Fraction

Composition (mol/mol)

Density

Remarks

N₂

Ar

O₂H₂H₂Okg/m³

K

bar(a)

kg/h

Nm³/h

Stream

Normal Flow

Mass Flow

Temp.

Phase

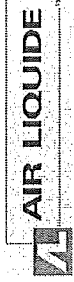
Vapor Fraction

Composition (mol/mol)

Density

Remarks

N₂



Air Liquide AGS GmbH

Process Specification

Project: K70101 ASU No.9 Kosice
Rev.: 2
Date: 14.10.04
By: TV / JJ

According to PFD No: 792.86809; Rev. P1

Case:

Design Conditions: Ambient Temperature [°C]: 12 Ambient Pressure [bar a]: 1.013 Humidity: 65% Cooling Water Temperature [°C]: 16

Case	Stream	Normal Flow	Mass Flow	Pres.	Temp.	Phase	Vapor Fraction	Composition (mol/mol)				H ₂ O	Density	Remarks
		Nm ³ /h	kg/h	bar(a)	K			N ₂	Ar	O ₂	H ₂		kg/m ³	
MinGOX1	1041	AIR	18000	5,31	296,1	Vapor		0,781	0,009	0,21			6,255	only for start-up
MinGOX2	1041	AIR	18000	5,34	296,1	Vapor		0,781	0,009	0,21			6,290	only for start-up
Normal	1100	AIR	95378	5,62	296,1	Vapor		0,781	0,009	0,210			6,62	
LOX	1100	AIR	95358	5,58	296,1	Vapor		0,781	0,009	0,210			6,57	
LIN	1100	AIR	95911	5,51	296,1	Vapor		0,781	0,009	0,210			6,49	
MaxGOX	1100	AIR	96851	5,54	296,1	Vapor		0,781	0,009	0,210			6,53	
MinGOX1	1100	AIR	71574	5,36	296,1	Vapor		0,781	0,009	0,210			6,31	
MinGOX2	1100	AIR	71608	5,38	296,1	Vapor		0,781	0,009	0,210			6,34	
Normal	1102	AIR	51468	5,62	296,1	Vapor		0,781	0,009	0,210			6,62	
LOX	1102	AIR	39325	5,58	296,1	Vapor		0,781	0,009	0,210			6,57	
LIN	1102	AIR	36837	5,51	296,1	Vapor		0,781	0,009	0,210			6,49	
MaxGOX	1102	AIR	51874	5,54	296,1	Vapor		0,781	0,009	0,210			6,53	
MinGOX1	1102	AIR	22686	5,36	296,1	Vapor		0,781	0,009	0,210			6,31	
MinGOX2	1102	AIR	36445	5,38	296,1	Vapor		0,781	0,009	0,210			6,34	
Normal	1103	AIR	51468	5,47	106	Vapor		0,781	0,009	0,210			20,06	
LOX	1103	AIR	39325	5,49	100,1	Vapor		0,781	0,009	0,210			21,89	
LIN	1103	AIR	36837	5,43	102,2	Vapor		0,781	0,009	0,210			20,96	
MaxGOX	1103	AIR	51874	5,39	110,4	Vapor		0,781	0,009	0,210			18,67	
MinGOX1	1103	AIR	22686	5,32	99,5	Vapor		0,781	0,009	0,210			21,30	
MinGOX2	1103	AIR	36445	5,29	106,2	Vapor		0,781	0,009	0,210			19,27	
Normal	1104	LAIR	35140	56,83	106	Liquid		0,781	0,009	0,210			752	
LOX	1104	LAIR	30183	56,77	100,1	Liquid		0,781	0,009	0,210			783	
LIN	1104	LAIR	35204	56,74	102,2	Liquid		0,781	0,009	0,210			772	
MaxGOX	1104	LAIR	44608	56,8	110,4	Liquid		0,781	0,009	0,210			728	
MinGOX1	1104	LAIR	24118	54,82	99,5	Liquid		0,781	0,009	0,210			785	
MinGOX2	1104	LAIR	27793	54,88	106,2	Liquid		0,781	0,009	0,210			750	
Normal	1110	AIR	43910	5,62	296,1	Vapor		0,781	0,009	0,210			6,62	
LOX	1110	AIR	56033	5,58	296,1	Vapor		0,781	0,009	0,210			6,57	
LIN	1110	AIR	59074	5,51	296,1	Vapor		0,781	0,009	0,210			6,49	
MaxGOX	1110	AIR	44978	5,54	296,1	Vapor		0,781	0,009	0,210			6,53	
MinGOX1	1110	AIR	48888	5,36	296,1	Vapor		0,781	0,009	0,210			6,31	
MinGOX2	1110	AIR	35163	5,38	296,1	Vapor		0,781	0,009	0,210			6,34	
Normal	1119	AIR	43910	57	298,1	Vapor		0,781	0,009	0,210			67,21	
LOX	1119	AIR	56033	57	298,1	Vapor		0,781	0,009	0,210			67,21	
LIN	1119	AIR	59074	57	298,1	Vapor		0,781	0,009	0,210			67,21	
MaxGOX	1119	AIR	44978	57	298,1	Vapor		0,781	0,009	0,210			67,21	
MinGOX1	1119	AIR	48888	55	298,1	Vapor		0,781	0,009	0,210			64,84	
MinGOX2	1119	AIR	35163	55	298,1	Vapor		0,781	0,009	0,210			64,84	
Normal	1131	AIR	63930	82522	5,47	105	Vapor	0,788	0,009	0,203			20,30	
LOX	1131	AIR	66195	85503	5,49	99,4	Vapor	0,783	0,009	0,208			22,12	
LIN	1131	AIR	62851	81159	5,43	100,8	Vapor	0,785	0,009	0,206			21,37	
MaxGOX	1131	AIR	59496	76725	5,39	109,3	Vapor	0,794	0,009	0,197			18,88	
MinGOX1	1131	AIR	48187	62242	5,32	102,7	Vapor	0,783	0,009	0,208			20,32	
MinGOX2	1131	AIR	46902	60533	5,29	105,2	Vapor	0,789	0,009	0,202			19,50	

AIR LIQUIDE				Process Specification										Project: K70101 ASU No.9 Kosice			
Air Liquide AGS GmbH				According to PFD No: 792.86809; Rev. P1				Case:		Humidity: 65%				Cooling Water Temperature [°C]: 16		Rev.: 2	
Design Conditions:				Ambient Temperature [°C]: 12		Ambient Pressure [bar a]: 1,013								Date: 14.10.04		By: TV / JJ	
Case	Stream	Normal Flow	Mass Flow	Pres.	Temp.	Phase	Vapor Fraction	Composition (mol/mol)				Density	Remarks				
		Nm³/h	kg/h	bar(a)	K			N₂	Ar	O₂	H₂	H₂O	kg/m3				
Normal	1132 LAIR	15644	20253	5,47	97,4	Liquid		0,768	0,010	0,222			780				
LOX	1132 LAIR	14501	18749	5,49	97,4	Liquid		0,777	0,009	0,214			777				
LIN	1132 LAIR	13160	17023	5,43	97,3	Liquid		0,773	0,010	0,217			779				
MaxGOX	1132 LAIR	14878	19283	5,4	97,3	Liquid		0,760	0,010	0,230			783				
MinGOX1	1132 LAIR	11613	15015	5,32	97	Liquid		0,777	0,009	0,214			779				
MinGOX2	1132 LAIR	9819	12713	5,3	97	Liquid		0,767	0,010	0,223			782				
Normal	1133 LAIR	31288	40505	5,47	97,4	Liquid		0,768	0,01	0,222			780				
LOX	1133 LAIR	29003	37499	5,49	97,4	Liquid		0,777	0,009	0,214			777				
LIN	1133 LAIR	32900	42558	5,43	97,3	Liquid		0,773	0,01	0,217			779				
MaxGOX	1133 LAIR	37196	48206	5,4	97,3	Liquid		0,76	0,01	0,23			783				
MinGOX1	1133 LAIR	23227	30029	5,32	97	Liquid		0,777	0,009	0,214			779				
MinGOX2	1133 LAIR	24547	31783	5,3	97	Liquid		0,767	0,010	0,223			782				
Normal	1137 LAIR	15644	20253	5,47	97,4	Liquid		0,768	0,010	0,222			780				
LOX	1137 LAIR	14501	18749	5,49	97,4	Liquid		0,777	0,009	0,214			777				
LIN	1137 LAIR	19740	25535	5,43	97,3	Liquid		0,773	0,010	0,217			779				
MaxGOX	1137 LAIR	22317	28924	5,4	97,3	Liquid		0,760	0,010	0,230			783				
MinGOX1	1137 LAIR	11613	15015	5,32	97	Liquid		0,777	0,009	0,214			779				
MinGOX2	1137 LAIR	14728	19070	5,3	97	Liquid		0,767	0,010	0,223			782				
Normal	1138 LAIR	15644	20253	5,47	88,1	Liquid		0,768	0,010	0,222			829				
LOX	1138 LAIR	14501	18749	5,49	87,9	Liquid		0,777	0,009	0,214			827				
LIN	1138 LAIR	19740	25535	5,43	89,1	Liquid		0,773	0,010	0,217			823				
MaxGOX	1138 LAIR	22317	28924	5,4	89,6	Liquid		0,760	0,010	0,230			824				
MinGOX1	1138 LAIR	11613	15015	5,32	89	Liquid		0,777	0,009	0,214			821				
MinGOX2	1138 LAIR	14728	19070	5,3	89	Liquid		0,767	0,010	0,223			825				
Normal	1139 LAIR	15654	20265	1,32	81,5	Mixed	6,7%	0,768	0,010	0,222			81,11				
LOX	1139 LAIR	14511	18761	1,32	81,4	Mixed	6,5%	0,777	0,009	0,214			83,31				
LIN	1139 LAIR	19749	25546	1,31	81,4	Mixed	7,8%	0,773	0,010	0,217			70,13				
MaxGOX	1139 LAIR	22326	28935	1,31	81,5	Mixed	8,2%	0,760	0,010	0,230			67,00				
MinGOX1	1139 LAIR	11621	15025	1,31	81,4	Mixed	7,7%	0,777	0,009	0,214			70,93				
MinGOX2	1139 LAIR	14736	19080	1,31	81,4	Mixed	7,7%	0,767	0,010	0,223			70,98				
Normal	1160 AIR	8400	10853	56,85	182	Vapor		0,781	0,009	0,210			133				
LOX	1160 AIR	25480	32922	56,65	182	Vapor		0,781	0,009	0,210			132				
LIN	1160 AIR	23500	30363	56,65	182	Vapor		0,781	0,009	0,210			133				
MaxGOX	1160 AIR		56,87	182	Vapor			0,781	0,009	0,210			117				
MinGOX1	1160 AIR	24400	31526	54,69	190	Vapor		0,781	0,009	0,210			130				
MinGOX2	1160 AIR	7000	9044	54,9	180	Vapor		0,781	0,009	0,210							
Normal	1161 AIR	8400	10853	5,5	99,5	Mixed	99,5%	0,781	0,009	0,210			22,17				
LOX	1161 AIR	25480	32922	5,56	99,6	Mixed	98,9%	0,781	0,009	0,210			22,54				
LIN	1161 AIR	23500	30363	5,49	99,4	Mixed	98,8%	0,781	0,009	0,210			22,29				
MaxGOX	1161 AIR		5,39	109,9	Vapor			0,781	0,009	0,210			18,78				
MinGOX1	1161 AIR	24400	31526	5,38	104,6	Vapor		0,781	0,009	0,210			20,06				
MinGOX2	1161 AIR	7000	9044	5,32	99,1	Vapor		0,781	0,009	0,210			21,43				
Normal	1162 AIR	8400	10853	56,85	182	Vapor		0,781	0,009	0,210			133				
LOX	1162 AIR	12740	16461	56,65	182	Vapor		0,781	0,009	0,210			132				



Air Liquide AGS GmbH

Process Specification

Project: K70101 ASU No.9 Kosice
Rev.: 2
Date: 14.10.04
By: TV / JJ

According to PFD No: 792.86809; Rev. P1

Case:

Design Conditions:			Ambient Temperature [°C]: 12		Ambient Pressure [bar a]: 1,013		Humidity: 65%			Cooling Water Temperature [°C]: 16		Remarks	
Case	Stream	Normal Flow	Mass Flow	Pres.	Temp.	Phase	Vapor Fraction	Composition (mol/mol)			Density		
		Nm³/h	kg/h	bar(a)	K			N₂	Ar	O₂	H₂	H₂O	
LIN	1162	AIR	11750	56,65	182	Vapor		0,781	0,009	0,210			132
MaxGOX	1162	AIR		56,87	182	Vapor		0,781	0,009	0,210			133
MinGOX1	1162	AIR	12200	54,69	190	Vapor		0,781	0,009	0,210			117
MinGOX2	1162	AIR	7000	9044	54,9	180	Vapor		0,781	0,009	0,210		130
Normal	1163	AIR	8400	5,5	99,5	Mixed	99,5%	0,781	0,009	0,210			22,17
LOX	1163	AIR	12740	5,56	99,6	Mixed	98,9%	0,781	0,009	0,210			22,54
LIN	1163	AIR	11750	5,49	99,4	Mixed	98,8%	0,781	0,009	0,210			22,29
MaxGOX	1163	AIR		5,39	109,9	Vapor		0,781	0,009	0,210			18,78
MinGOX1	1164	AIR	12200	54,69	190	Vapor		0,781	0,009	0,210			20,06
MinGOX2	1164	AIR	15763	54,9	180	Vapor		0,781	0,009	0,210			22,36
Normal	1165	AIR		5,5	99,3	Mixed	94,5%	0,781	0,009	0,210			822
LOX	1165	AIR	12740	5,56	99,6	Mixed	98,9%	0,781	0,009	0,210			821
LIN	1165	AIR	11750	5,49	99,4	Mixed	98,8%	0,781	0,009	0,210			823
MaxGOX	1165	AIR		5,39	109,9	Vapor		0,781	0,009	0,210			823
MinGOX1	1165	AIR	12200	5,38	104,6	Vapor		0,781	0,009	0,210			825
MinGOX2	1165	AIR	15763	5,32	98,9	Mixed	95,6%	0,781	0,009	0,210			827
Normal	2100	CLOX	60992	5,46	98,9	Liquid		0,628	0,015	0,357			834
LOX	2100	CLOX	62434	5,48	99	Liquid		0,628	0,015	0,357			834
LIN	2100	CLOX	43919	5,42	98,8	Liquid		0,625	0,016	0,359			833
MaxGOX	2100	CLOX	42416	5,39	98,7	Liquid		0,628	0,015	0,357			831
MinGOX1	2100	CLOX	34641	5,31	98,6	Liquid		0,624	0,016	0,360			840
MinGOX2	2100	CLOX	31986	5,29	98,6	Liquid		0,619	0,016	0,365			840
Normal	2109	CLOX	46152	5,46	96,7	Liquid		0,628	0,015	0,357			985
LOX	2109	CLOX	47247	5,48	96,7	Liquid		0,628	0,015	0,357			983
LIN	2109	CLOX	43919	5,42	97,1	Liquid		0,625	0,016	0,359			982
MaxGOX	2109	CLOX	42416	5,39	97,2	Liquid		0,628	0,015	0,357			983
MinGOX1	2109	CLOX	34641	5,31	95,9	Liquid		0,624	0,016	0,360			993
MinGOX2	2109	CLOX	31986	5,29	96,2	Liquid		0,619	0,016	0,365			993
Normal	2138	CLOX	9950	1,38	85,6	Liquid		0,381	0,020	0,599			5,98
LOX	2138	CLOX	10894	1,38	85,6	Liquid		0,387	0,020	0,593			5,98
LIN	2138	CLOX	11222	1,37	85,4	Liquid		0,392	0,020	0,588			5,94
MaxGOX	2138	CLOX	9871	1,37	85,5	Liquid		0,387	0,020	0,593			5,94
MinGOX1	2138	CLOX	8462	1,37	85,5	Liquid		0,387	0,020	0,593			5,94
MinGOX2	2138	CLOX	7968	1,37	85,8	Liquid		0,359	0,020	0,620			5,94
Normal	2139	CGOX	36202	1,38	85,6	Vapor		0,695	0,014	0,290			5,94
LOX	2139	CGOX	36353	1,38	85,6	Vapor		0,700	0,014	0,286			5,94
LIN	2139	CGOX	32697	1,37	85,4	Vapor		0,705	0,014	0,281			5,94
MaxGOX	2139	CGOX	32545	1,37	85,5	Vapor		0,701	0,014	0,285			5,94



Air Liquide AGS GmbH

Process Specification

Project: K70101 ASU No.9 Kosice
Rev.: 2
Date: 14.10.04
By: TV / JJ

According to PFD No.: 792.86809, Rev. P1

Case:

Design Conditions:		Ambient Temperature		Ambient Pressure [bar a]: 1.013		Humidity: 65%		Cooling Water Temperature [°C]: 16		Density		Remarks	
Case	Stream	Normal Flow	Mass Flow	Pres.	Temp.	Phase	Vapor Fraction	Composition (mol/mol)					
		Nm ³ /h	kg/h	bar(a)	K			N ₂	Ar	O ₂	H ₂	H ₂ O	kg/m ³
MinGOX1	2139	CGOX	34242	1,37	85,5	Vapor		0,701	0,014	0,285			5,94
MinGOX2	2139	CGOX	34355	1,37	85,8	Vapor		0,677	0,015	0,309			5,94
Normal	3110	GOX	39293	1,35	92,5	Vapor			0,105	0,895			6,02
LOX	3110	GOX	39309	1,35	92,5	Vapor			0,107	0,893			6,02
LIN	3110	GOX	34760	1,34	92,4	Vapor			0,100	0,900			5,97
MaxGOX	3110	GOX	34749	1,34	92,4	Vapor			0,098	0,902			5,97
MinGOX1	3110	GOX	28494	1,34	92,4	Vapor			0,107	0,893			5,98
MinGOX2	3110	GOX	28997	1,33	92,4	Vapor			0,104	0,896			5,93
Normal	3111	LOX	37965	1,25	91,7	Liquid			0,080	0,920			1154
LOX	3111	LOX	37982	1,25	91,7	Liquid			0,082	0,918			1154
LIN	3111	LOX	33584	1,25	91,7	Liquid			0,074	0,926			1152
MaxGOX	3111	LOX	33573	1,25	91,7	Liquid			0,073	0,927			1152
MinGOX1	3111	LOX	27532	1,23	91,5	Liquid			0,082	0,918			1155
MinGOX2	3111	LOX	28016	1,23	91,5	Liquid			0,078	0,922			1154
Normal	3112	LOX	37965	8	92,2	Liquid			0,080	0,920			1153
LOX	3112	LOX	37982	8	92,2	Liquid			0,082	0,918			1153
LIN	3112	LOX	33584	8	92,2	Liquid			0,074	0,926			1151
MaxGOX	3112	LOX	33573	8	92,2	Liquid			0,073	0,927			1151
MinGOX1	3112	LOX	27532	8	92	Liquid			0,082	0,918			1154
MinGOX2	3112	LOX	28016	8	92	Liquid			0,078	0,922			1153
Normal	3118	GAR	28224	1,15	88,3	Vapor			1,000				6,50
LOX	3118	GAR	28222	1,15	88,3	Vapor			1,000				6,50
LIN	3118	GAR	25006	1,15	88,3	Vapor			1,000				6,50
MaxGOX	3118	GAR	25006	1,15	88,3	Vapor			1,000				6,50
MinGOX1	3118	GAR	20472	1,15	88,3	Vapor			1,000				6,50
MinGOX2	3118	GAR	20854	1,15	88,3	Vapor			1,000				6,50
Normal	3119	LAR	745	1,15	88,3	Liquid			1,000				1386
LOX	3119	LAR	745	1,15	88,3	Liquid			1,000				1386
LIN	3119	LAR	660	1,15	88,3	Liquid			1,000				1386
MaxGOX	3119	LAR	660	1,15	88,3	Liquid			1,000				1386
MinGOX1	3119	LAR	540	1,15	88,3	Liquid			1,000				1386
MinGOX2	3119	LAR	550	1,15	88,3	Liquid			1,000				1386
Normal	3138	CGAR	610	1,5	90,9	Vapor		0,014	0,986				8,26
LOX	3138	CGAR	611	1,5	90,9	Vapor		0,025	0,975				8,23
LIN	3138	CGAR	541	1,5	91	Vapor		0,005	0,995				8,27
MaxGOX	3138	CGAR	541	1,5	91	Vapor		0,005	0,995				8,27
MinGOX1	3138	CGAR	443	1,5	91	Vapor		0,004	0,996				8,28
MinGOX2	3138	CGAR	452	1,5	91	Vapor		0,004	0,996				8,28
Normal	3139	CLAR	608	1,5	90,7	Liquid		0,013	0,987				1360
LOX	3139	CLAR	1077	1,5	90,5	Liquid		0,025	0,975				1350
LIN	3139	CLAR	539	1,5	90,9	Liquid		0,005	0,995				1366
MaxGOX	3139	CLAR	539	1,5	90,9	Liquid		0,005	0,995				1366
MinGOX1	3139	CLAR	441	1,5	90,9	Liquid		0,004	0,996				1367
MinGOX2	3139	CLAR	450	1,5	90,9	Liquid		0,004	0,996				1367

AIR LIQUIDE				Process Specification										Project: K70101 ASU No.9 Kosice			
Air Liquide AGS GmbH				According to PFD No: 792.86809; Rev. P1				Case:				Rev.: 2					
Design Conditions:				Ambient Temperature [°C]: 12		Ambient Pressure [bar a]: 1,013		Humidity: 65%		Cooling Water Temperature [°C]: 16		Date: 14.10.04					
												By: TV / JJ					
Case	Stream	Normal Flow	Mass Flow	Pres.	Temp.	Phase	Vapor Fraction	Composition (mol/mol)				Density	Remarks				
		Nm³/h	kg/h	bar(a)	K			N₂	Ar	O₂	H₂	H₂O	kg/m3				
Normal	3156 CGAR	2	3,5	1,5	90,7	Vapor		0,038	0,962				8,22				
LOX	3156 CGAR	2	3,5	1,5	90,5	Vapor		0,069	0,931				8,17				
LIN	3156 CGAR	2	3,5	1,5	90,9	Vapor		0,014	0,986				8,26				
MaxGOX	3156 CGAR	2	3,5	1,5	90,9	Vapor		0,014	0,986				8,26				
MinGOX1	3156 CGAR	2	3,6	1,5	90,9	Vapor		0,010	0,990				8,27				
MinGOX2	3156 CGAR	2	3,6	1,5	90,9	Vapor		0,011	0,989				8,27				
Normal	3500 LAR			1,74	92,6	Liquid		1					1359,7	max. 750 Nm3/h			
LOX	3500 LAR			1,74	92,6	Liquid		1					1359,7	max. 750 Nm3/h			
LIN	3500 LAR			1,74	92,6	Liquid		1					1359,7	max. 750 Nm3/h			
MaxGOX	3500 LAR			1,74	92,6	Liquid		1					1359,7	max. 750 Nm3/h			
MinGOX1	3500 LAR			1,74	92,6	Liquid		1					1359,7	max. 750 Nm3/h			
MinGOX2	3500 LAR			1,74	92,6	Liquid		1					1359,7	max. 750 Nm3/h			
Normal	3700 LAR	743	1324	1,74	92,6	Liquid		1,000					1360				
LOX	3700 LAR	743	1324	1,74	92,6	Liquid		1,000					1360				
LIN	3700 LAR	658	1173	1,74	92,6	Liquid		1,000					1360				
MaxGOX	3700 LAR	658	1173	1,74	92,6	Liquid		1,000					1360				
MinGOX1	3700 LAR	538	959	1,74	92,6	Liquid		1,000					1360				
MinGOX2	3700 LAR	548	977	1,74	92,6	Liquid		1,000					1360				
Backup	3720 LAR	400	713	1,63	91	Liquid		1					1369,8	maximum flow; design flow: 240 Nm³/h; pump capacity is 200 l/min			
Backup	3721 LAR	400	713	23	93	Liquid		1					1364,6	maximum flow; design flow: 240 Nm³/h; pump capacity is 200 l/min			
Backup	3820 LAR	400	713	22	131,6	Liquid		1					1049,6	maximum flow; design flow: 240 Nm³/h			
Backup	3830 GAR	400	713	21	275	Vapor		1					37,378	maximum flow; design flow: 240 Nm³/h			
Normal	4102 GAN	70260	87837	5,3	94,8	Vapor		0,999	0,001				21,93				
LOX	4102 GAN	70242	87815	5,31	94,8	Vapor		0,999	0,001				21,98				
LIN	4102 GAN	67383	84242	5,26	94,7	Vapor		0,999	0,001				21,77				
MaxGOX	4102 GAN	67157	83959	5,23	94,6	Vapor		0,999	0,001				21,66				
MinGOX1	4102 GAN	52461	65586	5,19	94,5	Vapor		0,999	0,001				21,50				
MinGOX2	4102 GAN	51808	64771	5,17	94,5	Vapor		0,999	0,001				21,40				
Normal	4105 GAN	820	1025	5,3	94,8	Vapor		0,999	0,001				21,93				
LOX	4105 GAN	820	1025	5,31	94,8	Vapor		0,999	0,001				21,98				
LIN	4105 GAN	726	908	5,26	94,7	Vapor		0,999	0,001				21,77				
MaxGOX	4105 GAN	726	908	5,23	94,6	Vapor		0,999	0,001				21,66				
MinGOX1	4105 GAN	594	743	5,19	94,5	Vapor		0,999	0,001				21,50				
MinGOX2	4105 GAN	605	756	5,17	94,5	Vapor		0,999	0,001				21,40				
Normal	5000 UN2	41223	51563	1,17	293	Vapor		0,998	0,002				1,35				
LOX	5000 UN2	41203	51536	1,17	294,8	Vapor		0,998	0,002				1,34				
LIN	5000 UN2	38841	48649	1,17	294,8	Vapor		0,993	0,004	0,003			1,34				
MaxGOX	5000 UN2	38681	48488	1,17	292,4	Vapor		0,987	0,004	0,009			1,35				
MinGOX1	5000 UN2	23324	29191	1,25	296,1	Vapor		0,997	0,003				1,42				
MinGOX2	5000 UN2	22648	28341	1,25	293,3	Vapor		0,997	0,003	0,001			1,44				
Normal	5010 UN2	18000	22515	1,17	292,9	Vapor		0,998	0,002				1,347				
LOX	5010 UN2	18000	22514	1,17	294,8	Vapor		0,998	0,002				1,339				
LIN	5010 UN2	18000	22545	1,17	294,8	Vapor		0,993	0,004	0,003			1,340				
MaxGOX	5010 UN2	18000	22563	1,17	292,3	Vapor		0,987	0,004	0,009			1,353				


AIR LIQUIDE			Process Specification										Project: K70101 ASU No.9 Kosice										
Air Liquide AGS GmbH			According to PFD No: 792.86809; Rev. P1			Case:			Humidity: 65%			Cooling Water Temperature [°C]: 16			Rev.: 2			Date: 14.10.04			By: TV / JJ		
Design Conditions:			Ambient Temperature [°C]: 12			Ambient Pressure [bar a]: 1,013			Composition (mol/mol)			Density			Remarks								
Case	Stream	Normal Flow	Mass Flow	Pres.	Temp.	Phase	Vapor Fraction	N ₂	Ar	O ₂	H ₂	H ₂ O	Density	Remarks									
		Nm ³ /h	kg/h	bar(a)	K			N ₂	Ar	O ₂	H ₂	H ₂ O	kg/m ³										
MinGOX1	5010	UN2	18000	22528	1,25	296,1	Vapor	0,997	0,003				1,424										
MinGOX2	5010	UN2	18000	22525	1,25	293,3	Vapor	0,997	0,003	0,001			1,438										
Normal	5011	UN2	18000	22515	1,12	473	Vapor	0,998	0,002				0,994										
LOX	5011	UN2	18000	22514	1,12	473	Vapor	0,998	0,002				0,994										
LIN	5011	UN2	18000	22545	1,12	473	Vapor	0,993	0,004	0,003			0,995										
MaxGOX	5011	UN2	18000	22563	1,12	473	Vapor	0,987	0,004	0,009			0,996										
MinGOX1	5011	UN2	18000	22522	1,12	473	Vapor	0,997	0,003				0,994										
MinGOX2	5011	UN2	18000	22523	1,12	473	Vapor	0,997	0,003				0,994										
Normal	5012	UN2	18000	22515	1,02	373	Vapor	0,998	0,002				0,922	cyclic temperature and moisture variation: ca. 0-100°C									
LOX	5012	UN2	18000	22514	1,02	373	Vapor	0,998	0,002				0,922	cyclic temperature and moisture variation: ca. 0-100°C									
LIN	5012	UN2	18000	22545	1,02	373	Vapor	0,993	0,004	0,003			0,923	cyclic temperature and moisture variation: ca. 0-100°C									
MaxGOX	5012	UN2	18000	22563	1,02	373	Vapor	0,987	0,004	0,009			0,924	cyclic temperature and moisture variation: ca. 0-100°C									
MinGOX1	5012	UN2	18000	22522	1,02	373	Vapor	0,997	0,003				0,922	cyclic temperature and moisture variation: ca. 0-100°C									
MinGOX2	5012	UN2	18000	22523	1,02	373	Vapor	0,997	0,003				0,922	cyclic temperature and moisture variation: ca. 0-100°C									
Normal	5020	UN2	23223	29048	1,17	292,9	Vapor	0,998	0,002				1,347										
LOX	5020	UN2	23203	29022	1,17	294,8	Vapor	0,998	0,002				1,339										
LIN	5020	UN2	20841	26104	1,17	294,8	Vapor	0,993	0,004	0,003			1,340										
MaxGOX	5020	UN2	20676	25918	1,17	292,3	Vapor	0,987	0,004	0,009			1,353										
MinGOX1	5020	UN2	5324	6663	1,25	296,1	Vapor	0,997	0,003				1,424										
MinGOX2	5020	UN2	4648	5817	1,25	293,3	Vapor	0,997	0,003	0,001			1,438										
Normal	5029	UN2	23653	29394	1,01	289,1	Vapor	0,98	0,002		0,018	0,018	1,175										
LOX	5029	UN2	23633	29368	1,01	289,1	Vapor	0,98	0,002		0,018	0,018	1,175										
LIN	5029	UN2	21228	26415	1,01	289,2	Vapor	0,975	0,004	0,003	0,018	0,018	1,177										
MaxGOX	5029	UN2	21060	26227	1,01	289,2	Vapor	0,969	0,004	0,008	0,018	0,018	1,177										
MinGOX1	5029	UN2	5423	6742	1,01	289,2	Vapor	0,978	0,003		0,018	0,018	1,175										
MinGOX2	5029	UN2	4735	5886	1,01	289,2	Vapor	0,978	0,003	0,001	0,018	0,018	1,175										
Normal	5100	UN2	41223	51563	1,27	96,9	Vapor	0,998	0,002				4,55										
LOX	5100	UN2	41203	51536	1,27	97	Vapor	0,998	0,002				4,54										
LIN	5100	UN2	38841	48649	1,27	96,8	Vapor	0,993	0,004	0,003			4,56										
MaxGOX	5100	UN2	38681	48488	1,26	96,7	Vapor	0,987	0,004	0,009			4,53										
MinGOX1	5100	UN2	23324	29191	1,29	97	Vapor	0,997	0,003				4,62										
MinGOX2	5100	UN2	22648	28341	1,29	97	Vapor	0,997	0,003	0,001			4,62										
Normal	5101	UN2	40413	50550	1,32	79,7	Vapor	0,998	0,002				5,91										
LOX	5101	UN2	40393	50524	1,32	79,7	Vapor	0,998	0,002				5,91										
LIN	5101	UN2	38124	47752	1,31	79,7	Vapor	0,993	0,004	0,004			5,87										
MaxGOX	5101	UN2	37964	47592	1,31	79,8	Vapor	0,987	0,004	0,009			5,87										
MinGOX1	5101	UN2	22738	28458	1,31	79,7	Vapor	0,996	0,003				5,87										
MinGOX2	5101	UN2	22051	27595	1,31	79,7	Vapor	0,997	0,003	0,001			5,87										
Normal	5129	GAN	810	1013	2,5	86	Vapor	0,999	0,001				10,71										
LOX	5129	GAN	810	1013	2,5	86	Vapor	0,999	0,001				10,71										
LIN	5129	GAN	717	897	2,5	86	Vapor	0,999	0,001				10,71										
MaxGOX	5129	GAN	717	896	2,5	86	Vapor	0,999	0,001				10,71										
MinGOX1	5129	GAN	586	733	2,5	86	Vapor	0,999	0,001				10,71										
MinGOX2	5129	GAN	597	746	2,5	86	Vapor	0,999	0,001				10,71										

AIR LIQUIDE				Process Specification										Project: K70101 ASU No.9 Kosice				
Air Liquide AGS GmbH				According to PFD No: 792.86809; Rev. P1			Case:			Rev.: 2			Date: 14.10.04			By: TV / JJ		
Design Conditions:				Ambient Temperature [°C]: 12		Ambient Pressure [bar a]: 1,013		Humidity: 65%		Cooling Water Temperature [°C]: 16								
Case	Stream	Normal Flow	Mass Flow	Pres.	Temp.	Phase	Vapor Fraction	Composition (mol/mol)				Density	Remarks					
		Nm³/h	kg/h	bar(a)	K			N₂	Ar	O₂	H₂	H₂O	kg/m3					
Normal	6001	GOX	20000	28574	28	293	Vapor		0,003	0,997			37,50					
	6001	GOX	17000	24289	28	294,8	Vapor		0,003	0,997			37,25					
LIN	6001	GOX	20000	28578	28	294,8	Vapor		0,004	0,996			37,26					
	6001	GOX	25000	35722	28	292,4	Vapor		0,003	0,997			37,59					
MinGOX1	6001	GOX	11000	15716	28	296,1	Vapor		0,003	0,997			37,07					
MinGOX2	6001	GOX	15000	21431	28	293,3	Vapor		0,003	0,997			37,46					
Normal	6100	GOX		1,38	93	Vapor			0,004	0,996			5,973	0 - 200 Nm3/h				
LOX	6100	GOX		1,38	93,1	Vapor			0,005	0,995			5,968	0 - 200 Nm3/h				
LIN	6100	GOX		1,36	92,9	Vapor			0,005	0,995			5,892	0 - 200 Nm3/h				
MaxGOX	6100	GOX		1,36	92,9	Vapor			0,005	0,995			5,892	0 - 200 Nm3/h				
MinGOX1	6100	GOX		1,28	92,3	Vapor			0,005	0,995			5,571	0 - 200 Nm3/h				
MinGOX2	6100	GOX		1,27	92,3	Vapor			0,004	0,996			5,524	0 - 200 Nm3/h				
Normal	6101	LOX	20000	28574	1,38	93	Liquid		0,003	0,997			1127					
LOX	6101	LOX	20000	28575	1,38	93,1	Liquid		0,003	0,997			1127					
LIN	6101	LOX	20000	28578	1,36	92,9	Liquid		0,004	0,996			1128					
MaxGOX	6101	LOX	25000	35722	1,36	92,9	Liquid		0,003	0,997			1128					
MinGOX1	6101	LOX	15000	21430	1,36	92,9	Liquid		0,003	0,997			1128					
MinGOX2	6101	LOX	15000	21431	1,35	92,9	Liquid		0,003	0,997			1128					
Normal	6133	LOX	20000	28574	29	95	Liquid		0,003	0,997			1124					
LOX	6133	LOX	20000	28575	29	95	Liquid		0,003	0,997			1124					
LIN	6133	LOX	20000	28578	29	94,9	Liquid		0,004	0,996			1125					
MaxGOX	6133	LOX	25000	35722	29	94,8	Liquid		0,003	0,997			1125					
MinGOX1	6133	LOX	15000	21430	29	94,8	Liquid		0,003	0,997			1125					
MinGOX2	6133	LOX	15000	21431	29	94,8	Liquid		0,003	0,997			1125					
Normal	6144	LOX	20000	28574	29	95	Liquid		0,003	0,997			1124					
LOX	6144	LOX	20000	24289	29	95	Liquid		0,003	0,997			1124					
LIN	6144	LOX	20000	28578	29	94,9	Liquid		0,004	0,996			1125					
MaxGOX	6144	LOX	25000	35722	29	94,8	Liquid		0,003	0,997			1125					
MinGOX1	6144	LOX	11000	15716	29	94,8	Liquid		0,003	0,997			1125					
MinGOX2	6144	LOX	15000	21431	29	94,8	Liquid		0,003	0,997			1125					
Normal	6500	LOX		2,8	95,6	Liquid			0,003	0,997			1114,4	max. 4000 Nm3/h				
LOX	6500	LOX		2,8	95,6	Liquid			0,003	0,997			1114,4	max. 4000 Nm3/h				
LIN	6500	LOX		2,8	95,5	Liquid			0,004	0,996			1115,1	max. 4000 Nm3/h				
MaxGOX	6500	LOX		2,8	95,5	Liquid			0,003	0,997			1114,9	max. 4000 Nm3/h				
MinGOX1	6500	LOX		2,8	94,9	Liquid			0,003	0,997			1118,0	max. 4000 Nm3/h				
MinGOX2	6500	LOX		2,8	94,9	Liquid			0,003	0,997			1118,0	max. 4000 Nm3/h				
Normal	6700	LOX		2,8	95,6	Liquid			0,003	0,997			1114					
LOX	6700	LOX	3000	4286	2,8	95,6	Liquid		0,003	0,997			1114					
LIN	6700	LOX		2,8	95,5	Liquid			0,004	0,996			1115					
MaxGOX	6700	LOX		2,8	95,5	Liquid			0,003	0,997			1115					
MinGOX1	6700	LOX	4000	5715	2,8	95,5	Liquid		0,003	0,997			1115					
MinGOX2	6700	LOX		2,8	95,4	Liquid			0,003	0,997			1115					
Backup	6701	LOX	24000	34298	1,28	90,3	Liquid		0,004	0,996			1141,2					
Normal	6702	LOX		1,1	90,8	Liquid			0,003	0,997			1138					

AIR LIQUIDE				Process Specification										Project: K70101 ASU No.9 Kosice			
Air Liquide AGS GmbH				According to PFD No: 792.86809; Rev. P1				Case:		Rev.: 2				Date: 14.10.04			
Design Conditions:				Ambient Temperature [°C]: 12		Ambient Pressure [bar a]: 1,013		Humidity: 65%		Cooling Water Temperature [°C]: 16				By: TV / JJ			
Case	Stream	Normal Flow	Mass Flow	Pres.	Temp.	Phase	Vapor Fraction	Composition (mol/mol)				Density	Remarks				
		Nm³/h	kg/h	bar(a)	K			N₂	Ar	O₂	H₂	H₂O	kg/m3				
LOX	6702 LOX			1,1	90,8	Liquid			0,003	0,997			1138				
LIN	6702 LOX			1,1	90,8	Liquid			0,003	0,997			1138				
MaxGOX	6702 LOX	5000	7144	1,1	90,8	Liquid			0,003	0,997			1138				
MinGOX1	6702 LOX			1,1	90,8	Liquid			0,003	0,997			1138				
MinGOX2	6702 LOX			1,1	90,8	Liquid			0,003	0,997			1138				
Backup	6721 LOX	24000	34298	29	92,3	Liquid			0,004	0,996			1137,7				
Normal	6812 LOX			4	91,2	Liquid			0,003	0,997			1137				
LOX	6812 LOX			4	91,2	Liquid			0,003	0,997			1137				
LIN	6812 LOX			4	91,2	Liquid			0,003	0,997			1137				
MaxGOX	6812 LOX	5000	7144	4	91,2	Liquid			0,003	0,997			1137				
MinGOX1	6812 LOX			4	91,2	Liquid			0,003	0,997			1137				
MinGOX2	6812 LOX			4	91,2	Liquid			0,003	0,997			1137				
Backup	6821 GOX	24000	34298	28	288	Vapor			0,004	0,996			38,228				
Normal	7010 GAN	29750	37187	1,13	293	Vapor		1,000					1,30				
LOX	7010 GAN	29750	37187	1,13	294,8	Vapor		1,000					1,29				
LIN	7010 GAN	29750	37187	1,12	294,8	Vapor		1,000					1,28				
MaxGOX	7010 GAN	29750	37187	1,12	292,4	Vapor		1,000					1,29				
MinGOX1	7010 GAN	29750	37187	1,12	296,1	Vapor		1,000					1,27				
MinGOX2	7010 GAN	29750	37188	1,12	293,3	Vapor		1,000					1,29				
Normal	7014 GAN	29500	36853	7,3	299	Vapor		1					8,234				
LOX	7014 GAN	29500	36853	7,3	299	Vapor		1					8,234				
LIN	7014 GAN	29500	36853	7,3	299	Vapor		1					8,234				
MaxGOX	7014 GAN	29500	36853	7,3	299	Vapor		1					8,234				
MinGOX1	7014 GAN	29500	36853	7,3	299	Vapor		1					8,234				
MinGOX2	7014 GAN	29500	36853	7,3	299	Vapor		1					8,234				
Normal	7100 GAN	29750	37187	1,31	79,6	Vapor		1,000					5,87				
LOX	7100 GAN	29750	37187	1,31	79,6	Vapor		1,000					5,87				
LIN	7100 GAN	29750	37187	1,3	79,6	Vapor		1,000					5,82				
MaxGOX	7100 GAN	29750	37187	1,3	79,5	Vapor		1,000					5,83				
MinGOX1	7100 GAN	29750	37187	1,31	79,6	Vapor		1,000					5,87				
MinGOX2	7100 GAN	29750	37188	1,3	79,6	Vapor		1,000					5,82				
Normal	7101 GAN	29750	37187	1,26	96,9	Vapor		1,000					4,51				
LOX	7101 GAN	29750	37187	1,26	97	Vapor		1,000					4,50				
LIN	7101 GAN	29750	37187	1,25	96,8	Vapor		1,000					4,48				
MaxGOX	7101 GAN	29750	37187	1,24	96,7	Vapor		1,000					4,44				
MinGOX1	7101 GAN	29750	37187	1,25	97	Vapor		1,000					4,47				
MinGOX2	7101 GAN	29750	37188	1,25	97	Vapor		1,000					4,47				
Normal	7110 LIN	37658	47079	5,29	94,8	Liquid		0,999	0,001				718				
LOX	7110 LIN	37612	47021	5,31	94,8	Liquid		0,999	0,001				718				
LIN	7110 LIN	36017	45028	5,25	94,7	Liquid		0,999	0,001				719				
MaxGOX	7110 LIN	35925	44913	5,23	94,6	Liquid		0,999	0,001				719				
MinGOX1	7110 LIN	27251	34069	5,18	94,5	Liquid		0,999	0,001				720				
MinGOX2	7110 LIN	27678	34604	5,17	94,5	Liquid		0,999	0,001				720				
Normal	7111 LIN	32602	40758	5,29	94,8	Liquid		0,999	0,001				718				

AIR LIQUIDE				Process Specification										Project: K70101 ASU No.9 Kosice							
Air Liquide AGS GmbH				According to PFD No: 792.86809; Rev. P1				Case:		Humidity: 65%				Cooling Water Temperature [°C]: 16		Rev.: 2		Date: 14.10.04		By: TV / JJ	
Design Conditions:				Ambient Temperature [°C]: 12		Ambient Pressure [bar a]: 1,013				Composition (mol/mol)		Density		Remarks							
Case	Stream	Normal Flow	Mass Flow	Pres.	Temp.	Phase	Vapor Fraction	N ₂	Ar	O ₂	H ₂	H ₂ O	Density	Remarks							
		Nm ³ /h	kg/h	bar(a)	K								kg/m3								
LOX	7111	LIN	32630	40794	5,31	Liquid		0,999	0,001				718								
LIN	7111	LIN	31366	39214	5,25	Liquid		0,999	0,001				719								
MaxGOX	7111	LIN	31232	39046	5,23	Liquid		0,999	0,001				719								
MinGOX1	7111	LIN	25266	31587	5,18	Liquid		0,999	0,001				720								
MinGOX2	7111	LIN	24129	30167	5,17	Liquid		0,999	0,001				720								
Normal	7112	LIN	29102	36383	5,29	Liquid		0,999	0,001				718								
LOX	7112	LIN	29130	36418	5,31	Liquid		0,999	0,001				718								
LIN	7112	LIN	27866	34838	5,25	Liquid		0,999	0,001				719								
MaxGOX	7112	LIN	27732	34671	5,23	Liquid		0,999	0,001				719								
MinGOX1	7112	LIN	21766	27211	5,18	Liquid		0,999	0,001				720								
MinGOX2	7112	LIN	20629	25791	5,17	Liquid		0,999	0,001				786								
Normal	7113	LIN	29102	36383	5,29	Liquid		0,999	0,001				786								
LOX	7113	LIN	29130	36418	5,31	Liquid		0,999	0,001				786								
LIN	7113	LIN	27866	34838	5,25	Liquid		0,999	0,001				786								
MaxGOX	7113	LIN	27732	34671	5,23	Liquid		0,999	0,001				786								
MinGOX1	7113	LIN	21766	27211	5,18	Liquid		0,999	0,001				788								
MinGOX2	7113	LIN	20629	25791	5,17	Liquid		0,999	0,001				788								
Normal	7128	LIN	29102	36383	5,29	Liquid		0,999	0,001				786								
LOX	7128	LIN	29130	36418	5,31	Liquid		0,999	0,001				786								
LIN	7128	LIN	24866	31088	5,25	Liquid		0,999	0,001				786								
MaxGOX	7128	LIN	23632	29545	5,23	Liquid		0,999	0,001				786								
MinGOX1	7128	LIN	21766	27211	5,18	Liquid		0,999	0,001				788								
MinGOX2	7128	LIN	20629	25791	5,17	Liquid		0,999	0,001				788								
Normal	7129	LIN	29102	36383	1,31	Mixed	2,1%	0,999	0,001				208								
LOX	7129	LIN	29130	36418	1,31	Mixed	2,1%	0,999	0,001				208								
LIN	7129	LIN	24866	31088	1,3	Mixed	2,1%	0,999	0,001				207								
MaxGOX	7129	LIN	23632	29545	1,3	Mixed	2,1%	0,999	0,001				207								
MinGOX1	7129	LIN	21766	27211	1,31	Mixed	1,7%	0,999	0,001				242								
MinGOX2	7129	LIN	20629	25791	1,3	Mixed	1,7%	0,999	0,001				241								
Normal	7130	LIN			5,29	Liquid		0,999	0,001				718,0	normally no flow							
LOX	7130	LIN			5,31	Liquid		0,999	0,001				718,0	normally no flow							
LIN	7130	LIN			5,25	Liquid		0,999	0,001				718,6	normally no flow							
MaxGOX	7130	LIN			5,23	Liquid		0,999	0,001				719,1	normally no flow							
MinGOX1	7130	LIN			4,94	Liquid		0,999	0,001				722,9	normally no flow							
MinGOX2	7130	LIN			4,93	Liquid		0,999	0,001				722,9	normally no flow							
Normal	7143	LIN	3500	4376	5,29	Liquid		0,999	0,001				718								
LOX	7143	LIN	3500	4376	5,31	Liquid		0,999	0,001				718								
LIN	7143	LIN	3500	4376	5,25	Liquid		0,999	0,001				719								
MaxGOX	7143	LIN	3500	4376	5,23	Liquid		0,999	0,001				719								
MinGOX1	7143	LIN	3500	4376	5,18	Liquid		0,999	0,001				720								
MinGOX2	7143	LIN	3500	4376	5,17	Liquid		0,999	0,001				720								
Normal	7144	LIN	3500	4376	22	Liquid		0,999	0,001				709								
LOX	7144	LIN	3500	4376	22	Liquid		0,999	0,001				709								
LIN	7144	LIN	3500	4376	22	Liquid		0,999	0,001				710								

AIR LIQUIDE				Process Specification										Project: K70101 ASU No.9 Kosice			
Air Liquide AGS GmbH				According to PFD No: 792.86809; Rev. P1				Case:				Rev.: 2					
Design Conditions:				Ambient Temperature [°C]: 12				Ambient Pressure [bar a]: 1,013				Date: 14.10.04					
				Ambient Temperature [°C]: 12				Humidity: 65%				By: TV / JJ					
				Ambient Temperature [°C]: 12				Cooling Water Temperature [°C]: 16									
Case	Stream	Normal Flow	Mass Flow	Pres.	Temp.	Phase	Vapor Fraction	Composition (mol/mol)				Density	Remarks				
		Nm³/h	kg/h	bar(a)	K			N₂	Ar	O₂	H₂	H₂O	kg/m3				
MaxGOX	7144	LIN	3500	4376	22	97,7	Liquid	0,999	0,001				710				
MinGOX1	7144	LIN	3500	4376	22	97,6	Liquid	0,999	0,001				710				
MinGOX2	7144	LIN	3500	4376	22	97,5	Liquid	0,999	0,001				711				
Normal	7150	LIN	820	1025	5,3	94,8	Liquid	0,999	0,001				718				
LOX	7150	LIN	820	1025	5,31	94,8	Liquid	0,999	0,001				718				
LIN	7150	LIN	726	908	5,26	94,7	Liquid	0,999	0,001				719				
MaxGOX	7150	LIN	726	908	5,23	94,6	Liquid	0,999	0,001				719				
MinGOX1	7150	LIN	594	743	5,19	94,5	Liquid	0,999	0,001				720				
MinGOX2	7150	LIN	605	756	5,17	94,5	Liquid	0,999	0,001				720				
Normal	7151	LIN	10	12,0	2,5	86	Liquid	0,999	0,001				764				
LOX	7151	LIN	10	11,9	2,5	86	Liquid	0,999	0,001				764				
LIN	7151	LIN	9	11,1	2,5	86	Liquid	0,999	0,001				764				
MaxGOX	7151	LIN	9	11,2	2,5	86	Liquid	0,999	0,001				764				
MinGOX1	7151	LIN	8	9,9	2,5	86	Liquid	0,999	0,001				764				
MinGOX2	7151	ULIN	8	10,1	2,5	86	Liquid	0,998	0,002				764				
Normal	7170	GAN	3500	4376	21	293	Vapor	0,999	0,001				24,24				
LOX	7170	GAN	3500	4376	21	294,8	Vapor	0,999	0,001				24,08				
LIN	7170	GAN	3500	4376	21	294,8	Vapor	0,999	0,001				24,08				
MaxGOX	7170	GAN	3500	4376	21	292,4	Vapor	0,999	0,001				24,29				
MinGOX1	7170	GAN	3500	4376	21	296,1	Vapor	0,999	0,001				23,97				
MinGOX2	7170	GAN	3500	4376	21	293,3	Vapor	0,999	0,001				24,21				
Normal	7500	LIN			2,3	81,7	Liquid	0,999	0,001				784,4	max. 4100 Nm3/h			
LOX	7500	LIN			2,3	81,7	Liquid	0,999	0,001				784,4	max. 4100 Nm3/h			
LIN	7500	LIN			2,3	81,6	Liquid	0,999	0,001				784,9	max. 4100 Nm3/h			
MaxGOX	7500	LIN			2,3	81,6	Liquid	0,999	0,001				784,9	max. 4100 Nm3/h			
MinGOX1	7500	LIN			2,3	80,7	Liquid	0,999	0,001				789,1	max. 4100 Nm3/h			
MinGOX2	7500	LIN			2,3	80,7	Liquid	0,999	0,001				789,1	max. 4100 Nm3/h			
Normal	7700	LIN			2,3	81,7	Liquid	0,999	0,001				784				
LOX	7700	LIN			2,3	81,7	Liquid	0,999	0,001				784				
LIN	7700	LIN	3000	3751	2,3	81,6	Liquid	0,999	0,001				785				
MaxGOX	7700	LIN	4100	5126	2,3	81,6	Liquid	0,999	0,001				785				
MinGOX1	7700	LIN			2,3	81,3	Liquid	0,999	0,001				786				
MinGOX2	7700	LIN			2,3	81,2	Liquid	0,999	0,001				787				
Backup	7701	LIN	20000	24997	1,13	77,7	Liquid	1					802,2				
Backup	7702	LIN	3500	4374	1,13	77,7	Liquid	1					802,2				
Backup	7721	LIN	20000	24997	1,165	78,6	Liquid	1					800,9				
Backup	7722	LIN	3500	4374	22	79,5	Liquid	1					799,5				
Normal	7812	LIN		8	100,4	Liquid		0,999	0,001				686				
LOX	7812	LIN		8	100,4	Liquid		0,999	0,001				686				
LIN	7812	LIN		8	100,4	Liquid		0,999	0,001				686				
MaxGOX	7812	LIN		8	100,4	Liquid		0,999	0,001				686				
MinGOX1	7812	LIN	700	875	8	100,4	Liquid	0,999	0,001				686				
MinGOX2	7812	LIN		8	100,4	Liquid		0,999	0,001				686				
Backup	7821	GAN	3500	4374	21	275	Vapor	1					25,908				

		<h2 style="text-align: center;">Process Specification</h2>										Project: K70101 ASU No.9 Kosice Rev.: 2 Date: 14.10.04 By: TV / JJ	
Design Conditions:		According to PFD No: 792.86809; Rev. P1		Ambient Pressure [bar a]: 1,013		Case:		Humidity: 65%		Cooling Water Temperature [°C]: 16			
	Stream	Normal Flow	Mass Flow	Pres.	Temp.	Phase	Vapor Fraction	Composition (mol/mol)			Density	Remarks	
		Nm³/h	kg/h	bar(a)	K			N₂	Ar	O₂	H₂	H₂O	
Backup	7861 GAN	16000	19997	7	288	Vapor		1					8,202
Backup	7862 GAN	20000	24997	7	288	Vapor		1					8,202
													only during steam shortage