

ENGINE PERFORMANCE

TITAN 130-20502S
CS/MD
59F MATCH
GAS

DATA FOR MINIMUM PERFORMANCE

Fuel Type	CHOICE GAS					
Elevation	metres	140				
Inlet Loss	mm H2O	100.0				
Exhaust Loss	mm H2O	100.0				
Accessory on GP Shaft	kW	43.0				
Engine Inlet Temp.	deg C	-36.0	-15.0	0	15.0	32.0
Relative Humidity	%	48.0	48.0	48.0	67.0	67.0
Elevation Loss	kW	268	262	256	242	209
Inlet Loss	kW	246	244	241	230	205
Exhaust Loss	kW	90	91	91	89	83
Driven Equipment Speed	RPM	8257	8329	8347	8346	8133
Optimum Equipment Speed	RPM	8257	8329	8347	8346	8133
Gas Generator Speed	RPM	11220	11220	11220	11203	11204
Specified Load	kW	FULL	FULL	FULL	FULL	FULL
Net Output Power	kW	15764	15455	15072	14222	12313
Fuel Flow	m3@20C/hr	4890.83	4616.44	4403.05	4211.72	3839.74
Heat Rate	kJ/kW-hr	10886	10481	10250	10391	10942
Therm Eff	%	33.064	34.343	35.115	34.638	32.894
Inlet Air Flow	kg/hr	203998	190988	182048	172359	155546
Engine Exhaust Flow	kg/hr	206860	193694	184630	174835	157809
PCD	kPaG	1750.0	1700.0	1660.5	1583.0	1427.0
Exhaust Temperature	deg C	476	483	488	507	526

FUEL GAS COMPOSITION (VOLUME PERCENT)

LHV (kJ/Std.m3) = 35703.4 SG = 0.6075 W.I. @15.56C (Btu/Scf) = 1227.6
W.I. @15.56C (kJ/Std.m3) = 45806.1

Methane (CH4)	= 91.7641
Ethane (C2H6)	= 4.6891
Propane (C3H8)	= 0.9976
I-Butane (C4H10)	= 0.1207
N-Butane (C4H10)	= 0.1703
I-Pentane (C5H12)	= 0.0578
N-Pentane (C5H12)	= 0.0511
Hexane (C6H14)	= 0.1011
Heptane (C7H16)	= 0.0684
Octane (C8H18)	= 0.0472
Carbon Dioxide (CO2)	= 0.2717
Water Vapor (H2O)	= 0.1590
Nitrogen (N2)	= 1.5017

This performance was calculated with a basic inlet and exhaust system. Special equipment such as low noise silencers, special filters, heat recovery systems or cooling devices will affect engine performance. Performance shown is "Expected" performance at the pressure drops stated, not guaranteed.

COMPRESSOR PERFORMANCE

DESIGN CONDITIONS, 4x25%

Column # 1 :

Compressor No.= 1	Family = C61-7
Case(kcx) 16, Type 0 Operation	Driven End= suction
EOS used= REDLICH-KWONG(components input)	Seals= Dry Gas
Reynolds Correction: ICAAMC Mach: Every	Driver= Titan 130
Stages: [606] E1F D3M D2M D1M C3M C2M C2R	
Stage Diam.: 23.84 23.40 23.40 23.40 23.40 23.40 23.40	

Column # 2 :

Compressor No.= 2	Family = C51-7
Case(kcx) 16, Type 0 Operation	Driven End= suction
EOS used= REDLICH-KWONG(components input)	Seals= Dry Gas
Reynolds Correction: ICAAMC Mach: Every	Driver= Titan 130
Stages: [506] C3F C2M C2M C1M B3M B3M B2R	
Stage Diam.: 19.83 19.83 19.83 19.83 19.83 19.83 19.83	

PIPE/COOLER INPUTS:

Series configuration
Pipe/Cooler No. 1 (Compressor 1 Discharge to Compressor 2 Suction)
Specified Pressure Drop = 80 kPa
Specified Outlet Temperature = 45 Deg C
No Sidestream, SQ(in)=SQ(out)

GEARBOX INPUTS:

No Gearbox

POSITION	B2*	B1*	Driver-LP-HP
P1	500.00	1975.54	kPaa
P2	2055.54	5599.53	kPaa
HEAD, ISEN	222.7	169.8	kJ/kg
HEAD, POLY	228.9	173.9	kJ/kg
INLET FLOW	24596.52	6724.65	m^3/hr
STANDARD FLOW	3000.00	3000.00	m^3/day (20C)-e3
MASS FLOW	25.40	25.40	kg/sec
POWER	7080.	5491.	kW (12571. Total)
SPEED	8175.	8175.	rpm
PRESS. RATIO	4.111	2.834	
T1	15.0	45.0	Deg C
T2	137.5	141.4	Deg C
EFF, ISEN	81.8	79.8	percent
EFF, POLY	84.1	81.8	percent
SURGE MARGIN	20.4	20.6	percent
TURNDOWN	25.7	25.6	
PCP	675.1	675.1	psia

API Output:

Molecular Wt. 17.600 17.600

Gas Components (Mol.%):

2-C1H4	91.7642	91.7642	Methane
3-C2H6	4.6891	4.6891	Ethane
4-C3H8	0.9976	0.9976	Propane
5-IC4H10	0.1207	0.1207	I-Butane
6-NC4H10	0.1703	0.1703	N-Butane

7-IC5H12	0.0578	0.0578	I-Pentane
8-NC5H12	0.0482	0.0482	N-Pentane
9-C5H12	0.0029	0.0029	Neo-Pentane
10-C6H14	0.1012	0.1012	N-Hexane
11-C7H16	0.0684	0.0684	N-Heptane
12-C8H18	0.0327	0.0327	N-Octane
13-C9H20	0.0145	0.0145	N-Nonane
46-N2	1.5017	1.5017	Nitrogen
49-CO2	0.2717	0.2717	Carbon Dioxide
61-H2O	0.1590	0.1590	Water

TODAY CONDITIONS, 4x25%, max flow (estimation)

Column # 1 :

Compressor No.= 1	Family = C61-7
Case(kcx) 16, Type 0 Operation	Driven End= suction
EOS used= REDLICH-KWONG(components input)	Seals= Dry Gas
Reynolds Correction: ICAAMC Mach: Every	Driver= Titan 130

Stages: [606] E1F D3M D2M D1M C3M C2M C2R
Stage Diam.: 23.84 23.40 23.40 23.40 23.40 23.40 23.40

Column # 2 :

Compressor No.= 2	Family = C51-7
Case(kcx) 16, Type 0 Operation	Driven End= suction
EOS used= REDLICH-KWONG(components input)	Seals= Dry Gas
Reynolds Correction: ICAAMC Mach: Every	Driver= Titan 130

Stages: [506] C3F C2M C2M C1M B3M B3M B2R
Stage Diam.: 19.83 19.83 19.83 19.83 19.83 19.83 19.83

PIPE/COOLER INPUTS:

Series configuration
Pipe/Cooler No. 1 (Compressor 1 Discharge to Compressor 2 Suction)
Specified Pressure Drop = 80 kPa
Specified Outlet Temperature = 45 Deg C
No Sidestream, SQ(in)=SQ(out)

GEARBOX INPUTS:

No Gearbox

POSITION	B2*	B1*	Driver-LP-HP
P1	1000.00	2895.15	kPaa
P2	2975.15	5600.14	kPaa
HEAD, ISEN	163.8	101.6	kJ/kg
HEAD, POLY	167.5	103.6	kJ/kg
INLET FLOW	17204.57	6398.37	m ³ /hr
STANDARD FLOW	4248.92	4248.92	m ³ /day (20C)-e3
MASS FLOW	35.97	35.97	kg/sec
POWER	7271.	4757.	kW (12028. Total)
SPEED	6896.	6896.	rpm
PRESS. RATIO	2.975	1.934	
T1	15.0	45.0	Deg C
T2	108.3	106.6	Deg C
EFF, ISEN	82.3	77.9	percent
EFF, POLY	84.2	79.4	percent
SURGE MARGIN	9.9	35.6	percent
TURNDOWN	12.6	43.6	
SPEC. GRAVITY	0.6076	0.6076	

COMPRESSION FROM 5 to 31 BARA, 4x25%, max flow (estimation)

Column # 1 :

Compressor No.= 1 Family = C61-7
Case(kcx) 16, Type 0 Operation Driven End= suction
EOS used= REDLICH-KWONG(components input) Seals= Dry Gas
Reynolds Correction: ICAAMC Mach: Every Driver= Titan 130

Stages: [606] E1F D3M D2M D1M C3M C2M C2R
Stage Diam.: 23.84 23.40 23.40 23.40 23.40 23.40 23.40

Column # 2 :

Compressor No.= 2 Family = C51-7
Case(kcx) 16, Type 0 Operation Driven End= suction
EOS used= REDLICH-KWONG(components input) Seals= Dry Gas
Reynolds Correction: ICAAMC Mach: Every Driver= Titan 130

Stages: [506] C3F C2M C2M C1M B3M B3M B2R
Stage Diam.: 19.83 19.83 19.83 19.83 19.83 19.83 19.83

PIPE/COOLER INPUTS:

Series configuration
Pipe/Cooler No. 1 (Compressor 1 Discharge to Compressor 2 Suction)
Specified Pressure Drop = 80 kPa
Specified Outlet Temperature = 45 Deg C
No Sidestream, SQ(in)=SQ(out)

GEARBOX INPUTS:

No Gearbox

POSITION	B2*	B1*	Driver-LP-HP
P1	500.00	1628.52	kPaa
P2	1708.52	3100.08	kPaa
HEAD, ISEN	189.7	100.9	kJ/kg
HEAD, POLY	195.7	104.6	kJ/kg
INLET FLOW	28977.94	9668.03	m^3/hr
STANDARD FLOW	3534.40	3534.40	m^3/day (20C)-e3
MASS FLOW	29.92	29.92	kg/sec
POWER	7465.	4845.	kW (12309. Total)
SPEED	8270.	8270.	rpm
PRESS. RATIO	3.417	1.904	
T1	15.0	45.0	Deg C
T2	125.4	116.3	Deg C
EFF, ISEN	77.8	63.6	percent
EFF, POLY	80.3	65.9	percent
SURGE MARGIN	31.1	43.8	percent
TURNDOWN	43.1	62.8	
SPEC. GRAVITY	0.6076	0.6076	

COMPRESSION FROM 10 to 31 BARA, 4x25%, max flow (estimation)

Column # 1 :

Compressor No.= 1 Family = C61-7
Case(kcx) 16, Type 0 Operation Driven End= suction
EOS used= REDLICH-KWONG(components input) Seals= Dry Gas
Reynolds Correction: ICAAMC Mach: Every Driver= Titan 130

Stages: [606] E1F D3M D2M D1M C3M C2M C2R
Stage Diam.: 23.84 23.40 23.40 23.40 23.40 23.40 23.40

Column # 2 :

Compressor No.= 2 Family = C51-7
Case(kcx) 16, Type 0 Operation Driven End= suction
EOS used= REDLICH-KWONG(components input) Seals= Dry Gas
Reynolds Correction: ICAAMC Mach: Every Driver= Titan 130

Stages: [506] C3F C2M C2M C1M B3M B3M B2R
Stage Diam.: 19.83 19.83 19.83 19.83 19.83 19.83 19.83

PIPE/COOLER INPUTS:

Series configuration
Pipe/Cooler No. 1 (Compressor 1 Discharge to Compressor 2 Suction)
Specified Pressure Drop = 80 kPa
Specified Outlet Temperature = 45 Deg C
No Sidestream, SQ(in)=SQ(out)

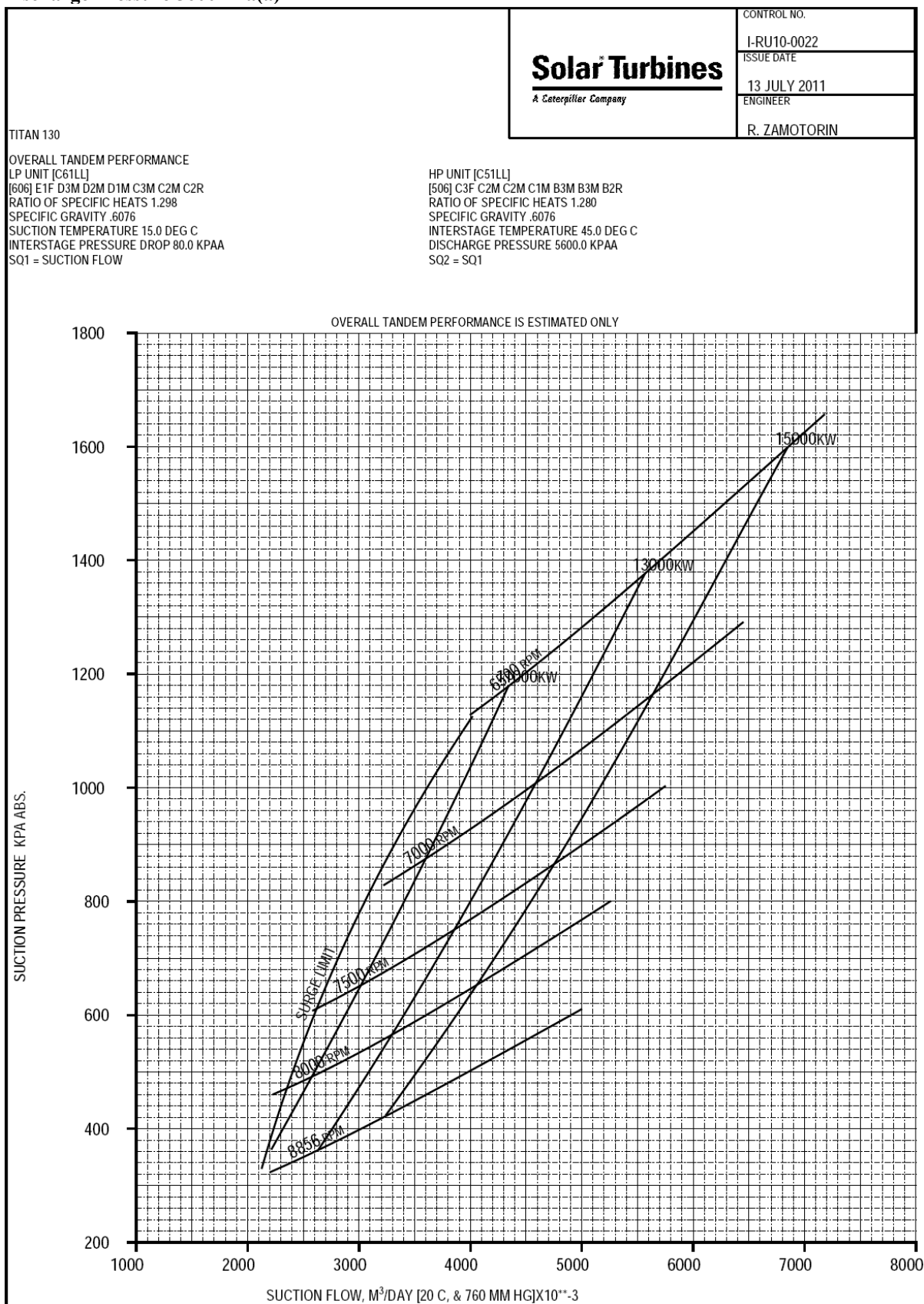
GEARBOX INPUTS:

No Gearbox

POSITION	B2*	B1*	Driver-LP-HP
P1	1000.00	2454.70	kPaa
P2	2534.70	3100.04	kPaa
HEAD, ISEN	137.3	34.5	kJ/kg
HEAD, POLY	140.1	35.7	kJ/kg
INLET FLOW	17411.39	7694.15	m^3/hr
STANDARD FLOW	4300.00	4300.00	m^3/day (20C)-e3
MASS FLOW	36.40	36.40	kg/sec
POWER	6215.	3074.	kW (9289. Total)
SPEED	6546.	6546.	rpm
PRESS. RATIO	2.535	1.263	
T1	15.0	45.0	Deg C
T2	94.5	82.4	Deg C
EFF, ISEN	81.7	41.7	percent
EFF, POLY	83.4	43.1	percent
SURGE MARGIN	17.1	49.7	percent
TURNDOWN	22.8	71.9	
SPEC. GRAVITY	0.6076	0.6076	

COMPRESSOR CURVES

Discharge Pressure 5600 kPa(a)



Discharge Pressure 3100 kPa(a)

Solar Turbines
A Caterpillar Company

CONTROL NO.
I-RU10-0022
ISSUE DATE
13 JULY 2011
ENGINEER
R. ZAMOTORIN

TITAN 130

OVERALL TANDEM PERFORMANCE
LP UNIT [C61LL]
[606] E1F D3M D2M D1M C3M C2M C2R
RATIO OF SPECIFIC HEATS 1.298
SPECIFIC GRAVITY .6076
SUCTION TEMPERATURE 15.0 DEG C
INTERSTAGE PRESSURE DROP 80.0 KPAA
SQ1 = SUCTION FLOW

HP UNIT [C51LL]
[506] C3F C2M C2M C1M B3M B3M B2R
RATIO OF SPECIFIC HEATS 1.298
SPECIFIC GRAVITY .6076
INTERSTAGE TEMPERATURE 45.0 DEG C
DISCHARGE PRESSURE 3100.0 KPAA
SQ2 = SQ1

