```
         ---   Simulation  Input  File   ---
   *-STMT-*
             *XPSIM>  ...generated by XpsimWin v.1.06 ...
             *EXE-OPT> PAGELEN=66
             *
       100   RUN ID=SEALINE CUSTOMER=STAFF PROJECT='DEEP SEA CROSSING'
       200   DESC DEEP SEA PATH - FEASIBILITY ANALYSIS
       300   DESC PRESSURE AND TEMPERATURE PROFILE
       400   DESC NOMINAL DIAMETER 28 inches
       500   DIMENSION INPUT SI PRES=BAR VREF=4
             *
             *
       600   System Data
             *
             *
       700   CHEMCOMP H2O / N2 / CO2 / C1 / C2 / C3 / IC4 / NC4 / IC5
       800   THERMSET UID=M1
       900   METHODS K=SRK HS=LK CP=LK D=LK IV=LK TRAN=ELYHAN SURT=IDEAL
      1000   REGION PHASE=CRIT
      1100   WOPT K=2
             *
             *
      1200   Flowsheet Data
             *
             *
             *
      1300   STREAM=GASIN TEMP=50 PRES=90 RATE(W)=700000 XBASIS=M
      1400   COMP H2O:0.0090 / N2:0.19 / CO2:0.21 / C1:94.89 / C2:3.05 / C3:1.04 / +
              IC4:0.19 / NC4:0.26 / IC5:0.07
             *
      1500   COMPRESS IN GASIN OUT S1 UID=K1 DESC='GAS COMPRESSOR'
      1600   CALC POUT=250 POLY EFF=78
             *
      1700   HEATEXCH IN S1 OUT S2 UID=E1 DESC='GAS COOLER'
      1800   HOT OUT=S2 FEED=S1 TEMP=50 DP=0
             *
      1900   PIPELINE IN S2 OUT GASOUT UID=SEALINE1 DESC='DEEP SEA CROSSING LINE'
      2000   PARA PHASE=MIX COORD=PROJ LUNIT=KM STEP(MT)=500
      2100   CALC ALG=1 HILIM=TBULK TPROF
      2200   POINT DIST(KM)=0 ELEV(MT)=5 DIAM(MT)=0.64208 ROUGH(MICR)=15 TEXT=6 +
              K(W/MC)=59,0.3 THICK(MM)=22.23,4.2
      2300   POINT DIST=0.2 ELEV=2
      2400   POINT DIST=2.0 ELEV=3
      2500   POINT DIST=7.5 ELEV=1 TEXT=5 K=59,0.3,1.7 THICK=18.76,4.2,50
      2600   POINT DIST=9.1 ELEV=-50 TEXT=7
      2700   POINT DIST=14 ELEV=-100
      2800   POINT DIST=17 ELEV=-300 TEXT=9
      2900   POINT DIST=26.8 ELEV=-560 K=59,0.3,1.7 THICK=23.62,4.2,50
      3000   POINT DIST=39.5 ELEV=-1000 K=59,0.3,1.7 THICK=28.43,4.2,50
      3100   POINT DIST=125.0 ELEV=-1500 K=59,0.3,1.7 THICK=34.46,4.2,50
      3200   POINT DIST=210.0 ELEV=-2000
      3300   POINT DIST=223.0 ELEV=-2000
      3400   POINT DIST=527 ELEV=-2100
      3500   POINT DIST=688.0 ELEV=-2178
      3600   POINT DIST=755.0 ELEV=-2000 K=59,0.3,1.7 THICK=34.46,4.2,50
      3700   POINT DIST=820 ELEV=-1500 K=59,0.3,1.7 THICK=28.43,4.2,50
      3800   POINT DIST=885 ELEV=-1000 K=59,0.3,1.7 THICK=23.62,4.2,50
      3900   POINT DIST=920 ELEV=-560 K=59,0.3,1.7 THICK=18.76,4.2,50
      4000   POINT DIST=940.0 ELEV=-300 TEXT=7
      4100   POINT DIST=954.1 ELEV=-100 TEXT=5
      4200   POINT DIST=1035 ELEV=-50
      4300   POINT DIST=1056.1 ELEV=-32
```

```
        - Simulation input - Continuation -
   *-STMT-*
      4400     POINT DIST=1100.0 ELEV=-20
      4500     POINT DIST=1110.0 ELEV=0
      4600     PRINT PROP
               *
               *
      4700     Output Data
               *
               *
      4800     PRINT HCOMB
               *
               *
      4900     END
          ---   End of Simulation Input File   ---
```

I) * PROBLEM GENERAL DATA *

1) * PROBLEM/PROJECT *
'DEEP SEA PATH - FEASIBILITY ANALYSIS '
'PRESSURE AND TEMPERATURE PROFILE '
'NOMINAL DIAMETER 28 INCHES '

2) * UNITS OF MEASURE *
- Input system SI - Output system SI

- INPUT AND OUTPUT UNITS -

Time	- HR	Weight	- KG
Temperature	- CENT	Pressure	- BAR
Energy/Duty	- M-KJ	Work	- KW
Liq volums	- CUMT	Vap Volume	- CUMT
Viscosity	- CP	Thermal cond	- W/MC
Surface tens	- DYCM	Std Vap Vol	- N-CUMT

Standard Vapor Volume is 23.64469 M3/KMOL
Reference Status - Temperature 15°C - Pressure 1 atm

Enthalpy is 0.0 for ideal gas at 298.15 K
Std entropy is for ideal gas at 298.15 K and 1 Atm

II) * DEFINED COMPONENTS *

* No of Chemical Components 9
No of Hypothetical/Petroleum Components 0

No	1	2	3	4	5
CAS Registry no.	7732-18-5	7727-37-9	124-38-9	74-82-8	74-84-0
Name	WATER	NITROGEN	CARBON DIOXIDE	METHANE	ETHANE
Component Key	H2O	N2	CO2	C1	C2
Type	LIBRARY	LIBRARY	LIBRARY	LIBRARY	LIBRARY
Class	INOR	INOR	INOR	SHYD	SHYD
Formula	H2O	N2	CO2	CH4	C2H6
Molecular weight	18.020	28.010	44.010	16.040	30.070
Boiling point,CENT	100.00	-195.80	-78.55	-161.52	-88.60
Std spec. gravity	1.00100	0.64315	0.81906	0.40749	0.35522
Critical temp,CENT	374.15	-146.95	31.06	-82.62	32.27
Critical pres,BAR	221.200	34.000	73.825	45.950	48.790
Critical vol,CUMT	0.056313	0.089489	0.094039	0.099013	0.148129
Critical Z	0.231459	0.289987	0.274489	0.287211	0.284617
Acentric factor	0.344000	0.037000	0.223000	0.011000	0.099000
Lat. heat, KJ/KMOL	40714.413	5552.287	15245.787	8176.826	14535.497
H form, KJ/KMOL	-241828.891	0.000	-393494.298	-74586.151	-84015.754
G form, KJ/KMOL	-298119.724	-57066.025	-447817.337	-130101.793	-152322.057
Std entr, KJ/KML-C	188.80073	191.40074	182.20071	186.20072	229.10089

No	6	7	8	9
CAS Registry no.	74-98-6	75-28-5	106-97-8	78-78-4
Name	PROPANE	ISOBUTANE	BUTANE	ISOPENTANE
Component Key	C3	IC4	NC4	IC5
Type	LIBRARY	LIBRARY	LIBRARY	LIBRARY
Class	SHYD	SHYD	SHYD	SHYD
Formula	C3H8	C4H10	C4H10	C5H12
Molecular weight	44.100	58.120	58.120	72.150
Boiling point,CENT	-42.10	-11.73	-0.50	27.88
Std spec. gravity	0.50430	0.55891	0.58434	0.62469
Critical temp,CENT	96.67	134.99	152.03	187.28
Critical pres,BAR	42.490	36.480	37.980	33.830
Critical vol,CUMT	0.203227	0.262988	0.254914	0.305722
Critical Z	0.280844	0.282728	0.273882	0.270180
Acentric factor	0.153000	0.183000	0.200000	0.227000
Lat. heat, KJ/KMOL	18848.524	21127.358	21978.088	24309.374
H form, KJ/KMOL	-103855.711	-134606.193	-125771.935	-154473.463
G form, KJ/KMOL	-184416.002	-222679.880	-218138.991	-256918.009
Std entr, KJ/KML-C	270.20105	295.40115	309.80120	343.60134

III) * PVT/THERMO/TRANSPORT PROPERTIES CALCULATION METHODS *

* CALCULATION SET 1 - M1 *

VLE K-values	SRK	- REDLICH-KWONG-SOAVE
ENTHALPY - Vapor	LK	- LEE-KESLER
ENTHALPY - Liquid	LK	- LEE-KESLER
ENTROPY - Vapor	LK	- LEE-KESLER
ENTROPY - Liquid	LK	- LEE-KESLER
DENSITY - Vapor	LK	- LEE-KESLER
DENSITY - Liquid	LK	- LEE-KESLER
VISCOSITY - Vapor	ELYHAN	- ELY/HANLEY
VISCOSITY - Liquid	ELYHAN	- ELY/HANLEY
HEAT CAPACITY - Vapor	LK	- LEE-KESLER
HEAT CAPACITY - Liquid	LK	- LEE-KESLER
CONDUCTIVITY - Vapor	ELYHAN	- ELY/HANLEY
CONDUCTIVITY - Liquid	ELYHAN	- ELY/HANLEY
ISENTROPIC Vapor Coeff	LK	- LEE-KESLER
SURFACE TENSION	IDEAL	- IDEAL/LIBRARY

- LIMITS AND OPTIONS -
Temperature - Min -223.15 CENT - Max 1200.05 CENT
Pressure - Min 0.100000E-04 BAR - Max 3000.00 BAR

Lowest significant composition 0.10000000E-19

In supercritical regions phase is defined
by critical point calculation

Water K-values are calculated based on
'NGPA vapor pressure chart '
Water thermo-props are calculated based on
'Saturated conditions '
Water solubility in hydr phases calculated based on
'API solubility in HC mixtures '

*** DEFAULT DATA FOR PIPELINE UNITS ***

1) * GENERAL DATA & OPTIONS *

Flow phase is MIXED
Distances are given as 'CURVILINEAR ' coordinates
Integration step size 999.988 MT
Maximum ABSOLUTE pressure drop per step 3.447 BAR
Maximum temperature change per step 10.000 CENT

Automatic feed/product naming NOT specified

2) * TOLERANCES *
Minimum liquid holdup fraction 0.001000
Maximum liquid holdup fraction 0.999000
Segments with inclination lower than 1.000 degrees
are assumed HORIZONTAL
Segments inclined over 20.000 degrees
are assumed VERTICAL

Convergence tolerance on pressure 0.001 RELATIVE
Convergence tolerance on temperature 0.002 RELATIVE

3) * SELECTED CORRELATIONS *

- Set 1 -
Flow-pattern 'Mandhane '
Holdup 'Eaton '
Two-phase friction factor 'Dukler corrected'
Single phase friction factor COLEBROOK
Laminar flow - Reynolds No limit 1000.00
Turbulent flow - Reynolds No limit 2000.00
Up-hill flow model 'Gravitational Term not corrected'
Down-hill flow model 'Gravitational energy recovered '

*** STREAM 'GASIN ' ***
- Temperature 50.000 CENT - Pressure 90.0000 BAR

* No *	Component	GLOBAL STREAM Mols	-Mol fr-	Weight	-Wt fr-
1	WATER	3.694	0.000090	66.563	0.000095
2	NITROGEN	77.981	0.001902	2184.248	0.003120
3	CARBON DIOXIDE	86.190	0.002102	3793.202	0.005419
4	METHANE	38945.365	0.949764	624683.381	0.892405
5	ETHANE	1251.801	0.030528	37641.654	0.053774
6	PROPANE	426.843	0.010409	18823.801	0.026891
7	ISOBUTANE	77.981	0.001902	4532.257	0.006475
8	BUTANE	106.711	0.002602	6202.035	0.008860
9	ISOPENTANE	28.730	0.000701	2072.859	0.002961
	* TOTAL *	41005.295	1.000000	700000.000	1.000000
		KMOL		KG	

*** UNIT 1 - 'K1 ' - ' COMPRESSOR ' ***
Service/Desc 'GAS COMPRESSOR '
--- Feed Streams --- - Product Streams -
'GASIN ' 'S1 ' to unit 2 - E1
- 3 Phase VLE (LHLW separation) equilibrium applied

1) * OPERATING DATA *

Inlet pressure set lowest feed pressure
Outlet pressure set at 250.0000 BAR *
Compression assumed to be POLYTROPIC
Efficiency 78.00000 per cent
Calculation method 1

*** UNIT 2 - 'E1 ' - ' HEAT-EXCHANGER ' ***
Service/Desc 'GAS COOLER '
--- Feed Streams --- - Product Streams -
from unit 1 - K1 'S1 ' 'S2 ' to unit 3 - SEALINE1
- 3 Phase VLE (LHLW separation) equilibrium applied

1) * PRODUCTS SPECIFICATION *

Product 'S2 ' generated by HOT feed 'S1 '
Pressure set at feed pressure plus 0.0000 BAR
Temperature set at 50.000 CENT

2) * DUTY SPECIFICATION *

Exchanged heat is calculated

        ***   UNIT   3 - 'SEALINE1' - ' PIPELINE   '   ***
           Service/Desc 'DEEP SEA CROSSING LINE   '
                          --- Feed Streams ---   - Product Streams -
    from unit   2 - E1   'S2   '   'GASOUT '
      - 3 Phase VLE (LHLW separation) equilibrium applied

     1) * GENERAL DATA & OPTIONS *

      Flow phase MIXED
      Temperature profile CALCULATED
      Distances given as PROJECTED   coordinates
      Calculation performed from UPSTREAM   to DOWNSTREAM
      PVT/THERMO/TRANSPORT properties are calculated at each pressure/temperature

      Integration step   500.000 MT
      Maximum ABSOLUTE pressure drop per step   3.447 BAR
      Maximum temperature change per step   10.000 CENT

     2) * TOLERANCES *
      Minimum liquid holdup 0.001000
      Maximum liquid holdup 0.999000
      Segments with inclination lower than   1.000 deg are assumed HORIZONTAL
      Segments with inclination greater than   20.000 deg are assumed VERTICAL

      Convergence on pressure   0.001 RELATIVE
      Convergence on temperature   0.002 RELATIVE

     3) * CALCULATION METHOD & OPTIONS *
      Solution algorithm 1
      Flow efficiency 100.0000
      Internal liminar coef. is calculated at BULK temperature
         Calculation model 0
      Outside liminar coef. is NOT calculated
      Temperature profile across pipe/coibents is calculated

     4) * SELECTED CORRELATIONS *

      - Set 1 -
      Flow-pattern 'Mandhane   '
      Holdup 'Eaton   '
      Two-phase friction factor 'Dukler corrected'
      Single phase friction factor COLEBROOK
      Laminar flow - Reynolds No limit 1000.00
      Turbulent flow - Reynolds No limit 2000.00
      Up-hill flow model 'Gravitational Term not corrected'
      Down-hill flow model 'Gravitational energy recovered   '

5) * PIPELINE PROFILE *

No.	Distance KM	Elevation MT	Incl	Diameter MT	EXT. TEMP CENT	Roughness MM
1	0.000	5.000	INCL DN	0.642	6.000	0.015
	- HEAT TRANSFER DATA/GEOMETRY & PARAMETERS -					
	Coat Thickness, MM			22.2303	4.2001	
	Coat Conductivity,W/MC			59.0000	0.3000	
	Global Heat Transfer Coefficient			74.718	W/M2C	
	- Active Correlation Set 1 - '			'		

No.	Distance KM	Elevation MT	Incl	Diameter MT	EXT. TEMP CENT	
2	0.200	2.000	INCL DN	0.642	6.000	
3	2.000	3.000	INCL UP	0.642	6.000	
4	7.500	1.000	INCL DN	0.642	5.000	
	- HEAT TRANSFER DATA/GEOMETRY & PARAMETERS -					
	Coat Thickness, MM			18.7602	4.2001	50.0006
	Coat Conductivity,W/MC			59.0000	0.3000	1.7000
	Global Heat Transfer Coefficient			25.576	W/M2C	

No.	Distance KM	Elevation MT	Incl	Diameter MT	EXT. TEMP CENT	
5	9.100	-50.000	INCL DN	0.642	7.000	
6	14.000	-100.000	INCL DN	0.642	7.000	
7	17.000	-300.000	INCL DN	0.642	9.000	
8	26.800	-560.000	INCL DN	0.642	9.000	
	- HEAT TRANSFER DATA/GEOMETRY & PARAMETERS -					
	Coat Thickness, MM			23.6203	4.2001	50.0006
	Coat Conductivity,W/MC			59.0000	0.3000	1.7000
	Global Heat Transfer Coefficient			25.868	W/M2C	

No.	Distance KM	Elevation MT	Incl	Diameter MT	EXT. TEMP CENT	
9	39.500	-1000.000	INCL DN	0.642	9.000	
	- HEAT TRANSFER DATA/GEOMETRY & PARAMETERS -					
	Coat Thickness, MM			28.4304	4.2001	50.0006
	Coat Conductivity,W/MC			59.0000	0.3000	1.7000
	Global Heat Transfer Coefficient			26.155	W/M2C	

No.	Distance KM	Elevation MT	Incl	Diameter MT	EXT. TEMP CENT	
10	125.000	-1500.000	INCL DN	0.642	9.000	
	- HEAT TRANSFER DATA/GEOMETRY & PARAMETERS -					
	Coat Thickness, MM			34.4604	4.2001	50.0006
	Coat Conductivity,W/MC			59.0000	0.3000	1.7000
	Global Heat Transfer Coefficient			26.512	W/M2C	

No.	Distance KM	Elevation MT	Incl	Diameter MT	EXT. TEMP CENT
11	210.000	-2000.000	INCL DN	0.642	9.000
12	223.000	-2000.000	HORIZ	0.642	9.000
13	527.000	-2100.000	INCL DN	0.642	9.000
14	688.000	-2178.000	INCL DN	0.642	9.000
15	755.000	-2000.000	INCL UP	0.642	9.000

- HEAT TRANSFER DATA/GEOMETRY & PARAMETERS -

Coat Thickness, MM	34.4604	4.2001	50.0006
Coat Conductivity,W/MC	59.0000	0.3000	1.7000
Global Heat Transfer Coefficient	26.512	W/M2C	

No.	Distance KM	Elevation MT	Incl	Diameter MT	EXT. TEMP CENT
16	820.000	-1500.000	INCL UP	0.642	9.000

- HEAT TRANSFER DATA/GEOMETRY & PARAMETERS -

Coat Thickness, MM	28.4304	4.2001	50.0006
Coat Conductivity,W/MC	59.0000	0.3000	1.7000
Global Heat Transfer Coefficient	26.155	W/M2C	

No.	Distance KM	Elevation MT	Incl	Diameter MT	EXT. TEMP CENT
17	885.000	-1000.000	INCL UP	0.642	9.000

- HEAT TRANSFER DATA/GEOMETRY & PARAMETERS -

Coat Thickness, MM	23.6203	4.2001	50.0006
Coat Conductivity,W/MC	59.0000	0.3000	1.7000
Global Heat Transfer Coefficient	25.868	W/M2C	

No.	Distance KM	Elevation MT	Incl	Diameter MT	EXT. TEMP CENT
18	920.000	-560.000	INCL UP	0.642	9.000

- HEAT TRANSFER DATA/GEOMETRY & PARAMETERS -

Coat Thickness, MM	18.7602	4.2001	50.0006
Coat Conductivity,W/MC	59.0000	0.3000	1.7000
Global Heat Transfer Coefficient	25.576	W/M2C	

No.	Distance KM	Elevation MT	Incl	Diameter MT	EXT. TEMP CENT
19	940.000	-300.000	INCL UP	0.642	7.000
20	954.100	-100.000	INCL UP	0.642	5.000
21	1035.000	-50.000	INCL UP	0.642	5.000
22	1056.100	-32.000	INCL UP	0.642	5.000
23	1100.000	-20.000	INCL UP	0.642	5.000
24	1110.000	0.000	INCL UP	0.642	5.000

6) * PRINTOUT OPTIONS *

Thermo/PVT/Transport properties values

V) **** STREAM / UNITS DICTIONARY ****

1) STREAMS-UNITS CROSS-REFERENCE TABLE

No	Stream Id	Description/Service	Product of Unit	Feed of Unit(s)
1	GASIN	.....		1 K1
2	S1	.....	1 K1	2 E1
3	S2	.....	2 E1	3 SEALINE1
4	GASOUT	.....	3 SEALINE1	

2) UNITS-STREAMS CROSS-REFERENCE TABLE

No	Unit	Unit Description	Feed Streams		Product Streams	
1	K1	GAS COMPRESSOR	1	GASIN	2	S1
2	E1	GAS COOLER	2	S1	3	S2
3	SEALINE1	DEEP SEA CROSSING LINE	3	S2	4	GASOUT

VI) **** RUN STATISTICS ****

* No of streams   4
  process operations   3
  topping structures   0
  control operations   0
  set operations   0

The calculation is NOT a RECYCLE PROBLEM
Calculation sequence defined by input sequence

    *** SIMULATION TRACE FOLLOWS ***

 ... New/output binary file 'SEALINE ' initialized ...

 . Stream 'GASIN   ' flashed .
 . Feed/Recycle streams processed .
   Unit op   1 - 'K1   ' calculated
   Unit op   2 - 'E1   ' calculated
   Unit op   3 - 'SEALINE1' calculated

        *** SOLUTION OBTAINED ***

 ... Base case results loaded on binary file 'SEALINE ' ...

*** UNIT 1 - 'K1 ' - ' COMPRESSOR ' ***
Service/Desc 'GAS COMPRESSOR '
--- Feed Streams --- - Product Streams -
'GASIN ' 'S1 ' to unit 2 - E1

1) * OPERATING CONDITIONS *

Discharge Pressure 250.0000 bar
Temperature 149.60 °C
Energy required 42150.498 kW
Pressure ratio 2.778
Polytropic Efficiency 78.00 per cent
Adiabatic head 17674.3 m
Polytropic head 18329.8 m

2) * FEEDS *

Stream		GASIN
Temperature,	°C	50.00
Pressure,	bar	90.000
Total rate,	kmol/h	41005.
Vapor,	kmol/h	41005.
Liquid,	kmol/h	0.0000

3) * PRODUCTS *

Stream		S1
Temperature,	°C	149.60
Pressure,	bar	250.000
Total rate,	kmol/h	41005.
Vapor,	kmol/h	41005.
Liquid,	kmol/h	0.0000

*** UNIT 2 - 'E1 ' - ' HEAT-EXCHANGER ' ***
Service/Desc 'GAS COOLER '

	--- Feed Streams ---	- Product Streams -	
from unit 1 - K1	'S1 '	'S2 '	to unit 3 - SEALINE1

1) * OPERATING DATA *

Hot stream duty -224195.361 MJ/h
Cold stream duty 0.000 MJ/h
Received/specified Duty 0.000 MJ/h
Total Exchanged Heat -224195.361 MJ/h

2) * HOT SIDE CONDITIONS *

HOT Stream 1		Inlet	Outlet
ID/NAME		S1	S2
PHASE		VAPOR	VAPOR
Temperature, °C		149.598	50.00
Pressure, bar		250.000	250.000
Vapor,	kmol/h	41005.2953	41005.2953
	kg/h	700000.0000	700000.0000
Liquid,	kmol/h	0.0000	0.0000
	kg/h	0.0000	0.0000
Total,	kmol/h	41005.2953	41005.2953
	kg/h	700000.0000	700000.0000

*** UNIT 3 - 'SEALINE1' - ' PIPELINE ' ***
Service/Desc 'DEEP SEA CROSSING LINE '
--- Feed Streams --- - Product Streams -
from unit 2 - E1 'S2 ' 'GASOUT '

1) * OUTLET CONDITIONS *

Temperature 3.63 °C
Pressure 106.3840 bar

2) * CALCULATION RESULTS *

Node	PROJECT Distance km	Elevation m	Incl	Diameter m	Calculated Pressure bar	CALCULATED Temperature °C	Liquid Holdup	Liquid Mass Rate kg/s	Gas Mass Rate kg/s	Flow Pattern
1	0.000	5.000	INCL DN	0.642	250.000	50.000	0.000000	0.000000	194.4444	TURBULNT
2	0.200	2.000	INCL DN	0.642	250.023	48.135	0.000000	0.000000	194.4444	TURBULNT
2*	0.200	2.000	INCL UP	0.642	250.023	48.135	0.000000	0.000000	194.4444	TURBULNT
3	2.000	3.000	INCL UP	0.642	249.747	34.601	0.000000	0.000000	194.4444	TURBULNT
3*	2.000	3.000	INCL DN	0.642	249.747	34.601	0.000000	0.000000	194.4444	TURBULNT
4	7.500	1.000	INCL DN	0.642	249.073	15.110	0.000000	0.000000	194.4444	TURBULNT
4*	7.500	1.000	INCL DN	0.642	249.073	15.110	0.000000	0.000000	194.4444	TURBULNT
5	9.100	-50.000	INCL DN	0.642	249.961	14.222	0.000000	0.000000	194.4444	TURBULNT
5*	9.100	-50.000	INCL DN	0.642	249.961	14.222	0.000000	0.000000	194.4444	TURBULNT
6	14.000	-100.000	INCL DN	0.642	250.435	12.235	0.000000	0.000000	194.4444	TURBULNT
7	17.000	-300.000	INCL DN	0.642	254.428	12.024	0.000000	0.000000	194.4444	TURBULNT
7*	17.000	-300.000	INCL DN	0.642	254.428	12.024	0.000000	0.000000	194.4444	TURBULNT
8	26.800	-560.000	INCL DN	0.642	258.992	11.275	0.000000	0.000000	194.4444	TURBULNT
8*	26.800	-560.000	INCL DN	0.642	258.992	11.275	0.000000	0.000000	194.4444	TURBULNT
9	39.500	-1000.000	INCL DN	0.642	267.380	11.102	0.000000	0.000000	194.4444	TURBULNT
9*	39.500	-1000.000	INCL DN	0.642	267.380	11.102	0.000000	0.000000	194.4444	TURBULNT
10	125.000	-1500.000	INCL DN	0.642	268.949	9.240	0.000000	0.000000	194.4444	TURBULNT
10*	125.000	-1500.000	INCL DN	0.642	268.949	9.240	0.000000	0.000000	194.4444	TURBULNT
11	210.000	-2000.000	INCL DN	0.642	270.683	9.236	0.000000	0.000000	194.4444	TURBULNT
11*	210.000	-2000.000	HORIZ	0.642	270.683	9.236	0.000000	0.000000	194.4444	TURBULNT
12	223.000	-2000.000	HORIZ	0.642	269.188	9.025	0.000000	0.000000	194.4444	TURBULNT
12*	223.000	-2000.000	INCL DN	0.642	269.188	9.025	0.000000	0.000000	194.4444	TURBULNT
13	527.000	-2100.000	INCL DN	0.642	235.084	8.856	0.000000	0.000000	194.4444	TURBULNT
14	688.000	-2178.000	INCL DN	0.642	216.085	8.811	0.000000	0.000000	194.4444	TURBULNT
14*	688.000	-2178.000	INCL UP	0.642	216.085	8.811	0.000000	0.000000	194.4444	TURBULNT
15	755.000	-2000.000	INCL UP	0.642	203.584	8.541	0.000000	0.000000	194.4444	TURBULNT
15*	755.000	-2000.000	INCL UP	0.642	203.584	8.541	0.000000	0.000000	194.4444	TURBULNT
16	820.000	-1500.000	INCL UP	0.642	185.074	8.053	0.000000	0.000000	194.4444	TURBULNT
16*	820.000	-1500.000	INCL UP	0.642	185.074	8.053	0.000000	0.000000	194.4444	TURBULNT
17	885.000	-1000.000	INCL UP	0.642	166.521	7.883	0.000000	0.000000	194.4444	TURBULNT
17*	885.000	-1000.000	INCL UP	0.642	166.521	7.883	0.000000	0.000000	194.4444	TURBULNT
18	920.000	-560.000	INCL UP	0.642	153.762	7.357	0.000000	0.000000	194.4444	TURBULNT
18*	920.000	-560.000	INCL UP	0.642	153.762	7.357	0.000000	0.000000	194.4444	TURBULNT
19	940.000	-300.000	INCL UP	0.642	146.374	7.195	0.000000	0.000000	194.4444	TURBULNT
19*	940.000	-300.000	INCL UP	0.642	146.374	7.195	0.000000	0.000000	194.4444	TURBULNT
20	954.100	-100.000	INCL UP	0.642	140.933	5.806	0.000000	0.000000	194.4444	TURBULNT
20*	954.100	-100.000	INCL UP	0.642	140.933	5.806	0.000000	0.000000	194.4444	TURBULNT
21	1035.000	-50.000	INCL UP	0.642	124.263	4.002	0.000000	0.000000	194.4444	TURBULNT
22	1056.100	-32.000	INCL UP	0.642	119.474	3.903	0.000000	0.000000	194.4444	TURBULNT
23	1100.000	-20.000	INCL UP	0.642	109.094	3.764	0.000000	0.000000	194.4444	TURBULNT
24	1110.000	0.000	INCL UP	0.642	106.384	3.632	0.000000	0.000000	194.4444	TURBULNT

3) * FLUID VELOCITY AND FLOW RATES *

Node	Distance	GAS Volume Flow Rate	GAS Velocity	GAS Surface Velocity	LIQUID Volume Flow Rate	LIQUID Velocity	LIQUID Surface Velocity	Mixture Velocity
	km	m3/s	m/s	m/s	m3/s	m/s	m/s	m/s
1	0.000	1.088519	3.3617	3.3617	0.000000	0.0000	0.0000	3.3617
2	0.200	1.078455	3.3307	3.3307	0.000000	0.0000	0.0000	3.3307
2*	0.200	1.078030	3.3294	3.3294	0.000000	0.0000	0.0000	3.3294
3	2.000	1.003557	3.0994	3.0994	0.000000	0.0000	0.0000	3.0994
3*	2.000	1.003515	3.0992	3.0992	0.000000	0.0000	0.0000	3.0992
4	7.500	0.8984719	2.7748	2.7748	0.000000	0.0000	0.0000	2.7748
4*	7.500	0.8987018	2.7755	2.7755	0.000000	0.0000	0.0000	2.7755
5	9.101	0.8914168	2.7530	2.7530	0.000000	0.0000	0.0000	2.7530
5*	9.101	0.8918992	2.7545	2.7545	0.000000	0.0000	0.0000	2.7545
6	14.001	0.8803258	2.7188	2.7188	0.000000	0.0000	0.0000	2.7188
7	17.008	0.8697673	2.6862	2.6862	0.000000	0.0000	0.0000	2.6862
7*	17.008	0.8705404	2.6885	2.6885	0.000000	0.0000	0.0000	2.6885
8	26.811	0.8574620	2.6482	2.6482	0.000000	0.0000	0.0000	2.6482
8*	26.811	0.8573441	2.6478	2.6478	0.000000	0.0000	0.0000	2.6478
9	39.519	0.8405520	2.5959	2.5959	0.000000	0.0000	0.0000	2.5959
9*	39.519	0.8404382	2.5956	2.5956	0.000000	0.0000	0.0000	2.5956
10	125.020	0.8288979	2.5599	2.5599	0.000000	0.0000	0.0000	2.5599
10*	125.020	0.8289215	2.5600	2.5600	0.000000	0.0000	0.0000	2.5600
11	210.022	0.8258675	2.5506	2.5506	0.000000	0.0000	0.0000	2.5506
11*	210.022	0.8258900	2.5507	2.5507	0.000000	0.0000	0.0000	2.5507
12	223.022	0.8274118	2.5554	2.5554	0.000000	0.0000	0.0000	2.5554
12*	223.022	0.8275121	2.5557	2.5557	0.000000	0.0000	0.0000	2.5557
13	527.022	0.8980433	2.7735	2.7735	0.000000	0.0000	0.0000	2.7735
14	688.022	0.9518044	2.9395	2.9395	0.000000	0.0000	0.0000	2.9395
14*	688.022	0.9519524	2.9400	2.9400	0.000000	0.0000	0.0000	2.9400
15	755.022	0.9933704	3.0679	3.0679	0.000000	0.0000	0.0000	3.0679
15*	755.022	0.9935996	3.0686	3.0686	0.000000	0.0000	0.0000	3.0686
16	820.024	1.069455	3.3029	3.3029	0.000000	0.0000	0.0000	3.3029
16*	820.024	1.069856	3.3041	3.3041	0.000000	0.0000	0.0000	3.3041
17	885.026	1.174394	3.6270	3.6270	0.000000	0.0000	0.0000	3.6270
17*	885.026	1.174940	3.6286	3.6286	0.000000	0.0000	0.0000	3.6286
18	920.029	1.265295	3.9077	3.9077	0.000000	0.0000	0.0000	3.9077
18*	920.029	1.264608	3.9056	3.9056	0.000000	0.0000	0.0000	3.9056
19	940.030	1.329328	4.1055	4.1055	0.000000	0.0000	0.0000	4.1055
19*	940.030	1.328540	4.1030	4.1030	0.000000	0.0000	0.0000	4.1030
20	954.132	1.367382	4.2230	4.2230	0.000000	0.0000	0.0000	4.2230
20*	954.132	1.366319	4.2197	4.2197	0.000000	0.0000	0.0000	4.2197
21	1035.032	1.546513	4.7762	4.7762	0.000000	0.0000	0.0000	4.7762
22	1056.132	1.619194	5.0007	5.0007	0.000000	0.0000	0.0000	5.0007
23	1100.032	1.800358	5.5602	5.5602	0.000000	0.0000	0.0000	5.5602
24	1110.032	1.856292	5.7329	5.7329	0.000000	0.0000	0.0000	5.7329

4) * VELOCITY, FRICTION FACTOR, SONIC SPEED *

Node	Distance	Velocity	dP fric/L	Fric.Fact.	Reynolds No.	Sonic Vel	Mach No.
	km	m/s	bar			m/s	
1	0.000	3.3617	0.4585405E-04	0.957278E-02	0.175133E+08	0.0000	0.000000
2	0.200	3.3307	0.4543670E-04	0.957417E-02	0.174345E+08	0.0000	0.000000
2*	0.200	3.3294	0.4541914E-04	0.957423E-02	0.174308E+08	0.0000	0.000000
3	2.000	3.0994	0.4233431E-04	0.958620E-02	0.167615E+08	0.0000	0.000000
3*	2.000	3.0992	0.4233250E-04	0.958620E-02	0.167617E+08	0.0000	0.000000
4	7.500	2.7748	0.3800102E-04	0.961140E-02	0.155126E+08	0.0000	0.000000
4*	7.500	2.7755	0.3801042E-04	0.961132E-02	0.155164E+08	0.0000	0.000000
5	9.101	2.7530	0.3771190E-04	0.961377E-02	0.154057E+08	0.0000	0.000000

Node	Distance km	Velocity m/s	dP fric/L bar	Fric.Fact.	Reynolds No.	Sonic Vel m/s	Mach No.
5*	9.101	2.7545	0.3773171E-04	0.961362E-02	0.154125E+08	0.0000	0.000000
6	14.001	2.7188	0.3725692E-04	0.961744E-02	0.152421E+08	0.0000	0.000000
7	17.008	2.6862	0.3682688E-04	0.962183E-02	0.150509E+08	0.0000	0.000000
7*	17.008	2.6885	0.3685859E-04	0.962157E-02	0.150624E+08	0.0000	0.000000
8	26.811	2.6482	0.3632431E-04	0.962673E-02	0.148280E+08	0.0000	0.000000
8*	26.811	2.6478	0.3631958E-04	0.962680E-02	0.148251E+08	0.0000	0.000000
9	39.519	2.5959	0.3563753E-04	0.963472E-02	0.144997E+08	0.0000	0.000000
9*	39.519	2.5956	0.3563297E-04	0.963479E-02	0.144969E+08	0.0000	0.000000
10	125.020	2.5599	0.3516177E-04	0.963975E-02	0.142999E+08	0.0000	0.000000
10*	125.020	2.5600	0.3516274E-04	0.963974E-02	0.143003E+08	0.0000	0.000000
11	210.022	2.5506	0.3503896E-04	0.964133E-02	0.142382E+08	0.0000	0.000000
11*	210.022	2.5507	0.3503989E-04	0.964132E-02	0.142385E+08	0.0000	0.000000
12	223.022	2.5554	0.3510119E-04	0.964043E-02	0.142735E+08	0.0000	0.000000
12*	223.022	2.5557	0.3510526E-04	0.964037E-02	0.142755E+08	0.0000	0.000000
13	527.022	2.7735	0.3797031E-04	0.960822E-02	0.156430E+08	0.0000	0.000000
14	688.022	2.9395	0.4016324E-04	0.958908E-02	0.165939E+08	0.0000	0.000000
14*	688.022	2.9400	0.4016927E-04	0.958903E-02	0.165966E+08	0.0000	0.000000
15	755.022	3.0679	0.4186176E-04	0.957640E-02	0.172899E+08	0.0000	0.000000
15*	755.022	3.0686	0.4187109E-04	0.957633E-02	0.172941E+08	0.0000	0.000000
16	820.024	3.3029	0.4497502E-04	0.955663E-02	0.184763E+08	0.0000	0.000000
16*	820.024	3.3041	0.4499134E-04	0.955652E-02	0.184834E+08	0.0000	0.000000
17	885.026	3.6270	0.4927806E-04	0.953533E-02	0.199320E+08	0.0000	0.000000
17*	885.026	3.6286	0.4930034E-04	0.953521E-02	0.199407E+08	0.0000	0.000000
18	920.029	3.9077	0.5301071E-04	0.952068E-02	0.210693E+08	0.0000	0.000000
18*	920.029	3.9056	0.5298226E-04	0.952074E-02	0.210640E+08	0.0000	0.000000
19	940.030	4.1055	0.5564233E-04	0.951194E-02	0.217927E+08	0.0000	0.000000
19*	940.030	4.1030	0.5560972E-04	0.951200E-02	0.217874E+08	0.0000	0.000000
20	954.132	4.2230	0.5720453E-04	0.950685E-02	0.222586E+08	0.0000	0.000000
20*	954.132	4.2197	0.5716053E-04	0.950693E-02	0.222518E+08	0.0000	0.000000
21	1035.032	4.7762	0.6457439E-04	0.948861E-02	0.240228E+08	0.0000	0.000000
22	1056.132	5.0007	0.6756935E-04	0.948303E-02	0.246090E+08	0.0000	0.000000
23	1100.032	5.5602	0.7504227E-04	0.947203E-02	0.258711E+08	0.0000	0.000000
24	1110.032	5.7329	0.7735005E-04	0.946914E-02	0.262170E+08	0.0000	0.000000

5) * GAS HOLDUP *

Node	Distance km	Elevation m	Volume Fraction	Volume Holdup per Unit Length m3	Weight Holdup per Unit Length kg	Volume Holdup per Segment m3	Weight Holdup per Segment kg
1	0.000	5.000	1.000000	323.7955	57840.29	0.000000	0.000000
2	0.200	2.000	1.000000	323.7955	58380.04	64.76639	11677.32
2*	0.200	2.000	1.000000	323.7955	58403.02	0.000000	0.000000
3	2.000	3.000	1.000000	323.7955	62737.07	582.8320	110182.9
3*	2.000	3.000	1.000000	323.7955	62739.72	0.000000	0.000000
4	7.500	1.000	1.000000	323.7955	70074.80	1780.875	370388.0
4*	7.500	1.000	1.000000	323.7955	70056.87	0.000000	0.000000
5	9.101	-50.000	1.000000	323.7955	70629.40	518.3359	112778.6
5*	9.101	-50.000	1.000000	323.7955	70591.20	0.000000	0.000000
6	14.001	-100.000	1.000000	323.7955	71519.24	1586.681	348534.7
7	17.008	-300.000	1.000000	323.7955	72387.45	973.5428	216641.1
7*	17.008	-300.000	1.000000	323.7955	72323.16	0.000000	0.000000
8	26.811	-560.000	1.000000	323.7955	73426.27	3174.313	714768.2
8*	26.811	-560.000	1.000000	323.7955	73436.37	0.000000	0.000000
9	39.519	-1000.000	1.000000	323.7955	74903.44	4114.670	943417.7
9*	39.519	-1000.000	1.000000	323.7955	74913.58	0.000000	0.000000
10	125.020	-1500.000	1.000000	323.7955	75956.56	27684.99	6473084.
10*	125.020	-1500.000	1.000000	323.7955	75954.40	0.000000	0.000000
11	210.022	-2000.000	1.000000	323.7955	76235.28	27523.09	6468321.

Node	Distance	Elevation	Volume Fraction	Volume Holdup per Unit Length	Weight Holdup per Unit Length	Volume Holdup per Segment	Weight Holdup per Segment
	km	m		m3	kg	m3	kg
11*	210.022	-2000.000	1.000000	323.7955	76233.20	0.000000	0.000000
12	223.022	-2000.000	1.000000	323.7955	76092.99	4209.342	990210.4
12*	223.022	-2000.000	1.000000	323.7955	76083.77	0.000000	0.000000
13	527.022	-2100.000	1.000000	323.7955	70108.25	98433.84	2.2272162E+07
14	688.022	-2178.000	1.000000	323.7955	66148.30	52131.08	1.0977085E+07
14*	688.022	-2178.000	1.000000	323.7955	66138.01	0.000000	0.000000
15	755.022	-2000.000	1.000000	323.7955	63380.42	21694.38	4342197.
15*	755.022	-2000.000	1.000000	323.7955	63365.80	0.000000	0.000000
16	820.024	-1500.000	1.000000	323.7955	58871.33	21047.33	3978494.
16*	820.024	-1500.000	1.000000	323.7955	58849.28	0.000000	0.000000
17	885.026	-1000.000	1.000000	323.7955	53610.83	21047.33	3657987.
17*	885.026	-1000.000	1.000000	323.7955	53585.93	0.000000	0.000000
18	920.029	-560.000	1.000000	323.7955	49759.32	11333.74	1809139.
18*	920.029	-560.000	1.000000	323.7955	49786.39	0.000000	0.000000
19	940.030	-300.000	1.000000	323.7955	47362.45	6476.457	970905.1
19*	940.030	-300.000	1.000000	323.7955	47390.53	0.000000	0.000000
20	954.132	-100.000	1.000000	323.7955	46044.36	4565.976	658965.3
20*	954.132	-100.000	1.000000	323.7955	46080.17	0.000000	0.000000
21	1035.032	-50.000	1.000000	323.7955	40711.09	26195.06	3534878.
22	1056.132	-32.000	1.000000	323.7955	38883.69	6832.088	839988.8
23	1100.032	-20.000	1.000000	323.7955	34970.96	14214.62	1621479.
24	1110.032	0.000	1.000000	323.7955	33917.21	3237.962	344010.5

Pipeline Volume 359423.310 m3
Total Volume Holdup 359423.3 m3 - Average Holdup 1.000000
Total Weight Holdup 7.1767294E+07 kg

6) * PRESSURE LOSSES *

Sect	Total bar	Friction bar	Elevation bar	Kinetic bar
1	-2.3031135E-02	2.9954405E-02	-5.2798956E-02	-1.8658428E-04
2	0.2755365	0.2585545	1.8370560E-02	-1.3885970E-03
3	0.6745031	0.7170379	-4.0586545E-02	-1.9482731E-03
4	-0.8878388	0.1988425	-1.086551	-1.3080022E-04
5	-0.4739889	0.6025849	-1.076368	-2.0562640E-04
6	-3.993355	0.3653798	-4.358539	-1.9575352E-04
7	-4.563337	1.176640	-5.739749	-2.2814082E-04
8	-8.388452	1.499394	-9.887532	-3.1350992E-04
9	-1.568940	9.895262	-11.46399	-2.1606559E-04
10	-1.734558	9.788786	-11.52329	-5.6183697E-05
11	1.495705	1.495677	0.000000	2.8630945E-05
12	34.10395	36.32158	-2.218942	1.3095024E-03
13	18.99910	20.60881	-1.610706	9.9672708E-04
14	12.50104	9.006235	3.494036	7.7063183E-04
15	18.50953	9.238472	9.269652	1.4106033E-03
16	18.55359	10.02842	8.523229	1.9455624E-03
17	12.75814	5.863392	6.893060	1.6853040E-03
18	7.388892	3.561860	3.825845	1.1871640E-03
19	5.440123	2.606497	2.832921	7.0551605E-04
20	16.67058	16.00552	0.6617421	3.3210763E-03
21	4.788380	4.569964	0.2170692	1.3474979E-03
22	10.38059	10.24292	0.1343189	3.3587634E-03
23	2.709796	2.500179	0.2085802	1.0370152E-03

Total Pressure Drop 143.6160 bar
Total Friction DP 156.5820 bar
Total Elevation DP -12.98022 bar
Total Kinetic DP 1.4234460E-02 bar
Total Fitting DP 0.000000 bar (included in total friction dp)

7) * HEAT TRANSFER RESULTS *

Node	Temperature	Delta T	Text	T-Text	Log Mean DT	Heat per Segment	Exchanged per Unit Length(m)	Delta Enth.	Heat Transfer Coefficient
	°C	°C	°C	°C	°C	MJ/h	MJ/h	kJ/kg	W/m2.°C
1	50.000	0.000	6.000	44.000	0.000	0.000000	-22.96242	0.0000	71.849
2	48.135	-1.865	6.000	42.135	43.061	-4398.307	-21.98906	-0.2548	71.849
2*	48.135	0.000	6.000	42.135	42.135	0.000000	-21.98907	0.0000	71.849
3	34.601	-13.534	6.000	28.601	34.932	-31151.52	-14.92758	-1.8688	71.856
3*	34.601	0.000	6.000	28.601	28.601	0.000000	-14.92758	0.0000	71.856
4	15.110	-19.491	6.000	9.110	17.037	-46259.10	-4.755615	-2.7731	71.868
4*	15.110	0.000	5.000	10.110	9.601	0.000000	-1.853019	0.0000	25.234
5	14.222	-0.888	5.000	9.222	9.659	-2790.192	-1.690285	-0.1406	25.234
5*	14.222	0.000	7.000	7.222	8.181	0.000000	-1.323715	0.0000	25.234
6	12.235	-1.987	7.000	5.235	6.176	-5452.585	-0.9595788	-0.2952	25.234
7	12.024	-0.212	7.000	5.024	5.129	-2815.539	-0.9207274	-0.0802	25.233
7*	12.024	0.000	9.000	3.024	3.939	0.000000	-0.5541603	0.0000	25.233
8	11.275	-0.749	9.000	2.275	2.631	-4650.270	-0.4168787	-0.1621	25.233
8*	11.275	0.000	9.000	2.275	2.275	0.000000	-0.4215730	0.0000	25.517
9	11.102	-0.172	9.000	2.102	2.187	-5125.545	-0.3896309	-0.1153	25.517
9*	11.102	0.000	9.000	2.102	2.102	0.000000	-0.3938957	0.0000	25.796
10	9.240	-1.863	9.000	0.240	0.858	-8405.177	-4.4879688E-02	-0.2838	25.796
10*	9.240	0.000	9.000	0.240	0.240	0.000000	-4.5484216E-02	0.0000	26.143
11	9.236	-0.004	9.000	0.236	0.238	-3809.619	-4.4730800E-02	-0.0174	26.143
11*	9.236	0.000	9.000	0.236	0.236	0.000000	-4.4730798E-02	0.0000	26.143
12	9.025	-0.210	9.000	0.025	0.094	-273.0758	-4.7589909E-03	-0.0158	26.143
12*	9.025	0.000	9.000	0.025	0.025	0.000000	-4.7589918E-03	0.0000	26.143
13	8.856	-0.169	9.000	-0.144	-0.060	6254.400	2.7426327E-02	0.3876	26.146
14	8.811	-0.045	9.000	-0.189	-0.166	4960.618	3.5919104E-02	0.3063	26.147
14*	8.811	0.000	9.000	-0.189	-0.189	0.000000	3.5919110E-02	0.0000	26.147
15	8.541	-0.270	9.000	-0.459	-0.304	4952.672	8.7188063E-02	0.2055	26.148
15*	8.541	0.000	9.000	-0.459	-0.459	0.000000	8.7188090E-02	0.0000	26.148
16	8.053	-0.487	9.000	-0.947	-0.674	9989.589	0.1797747	0.3598	26.149
16*	8.053	0.000	9.000	-0.947	-0.947	0.000000	0.1773849	0.0000	25.801
17	7.883	-0.171	9.000	-1.117	-1.029	12598.76	0.2093578	0.5073	25.800
17*	7.883	0.000	9.000	-1.117	-1.117	0.000000	0.2070906	0.0000	25.521
18	7.357	-0.526	9.000	-1.643	-1.363	9424.147	0.3046036	0.3517	25.520
18*	7.357	0.000	9.000	-1.643	-1.643	0.000000	0.3012117	0.0000	25.236
19	7.195	-0.162	9.000	-1.805	-1.723	6355.026	0.3308511	0.2526	25.234
19*	7.195	0.000	7.000	0.195	-0.805	0.000000	-3.5729148E-02	0.0000	25.234
20	5.806	-1.389	7.000	-1.194	-0.500	1620.256	0.2188615	0.0052	25.234
20*	5.806	0.000	5.000	0.806	-0.194	0.000000	-0.1477134	0.0000	25.234
21	4.002	-1.803	5.000	-0.998	-0.096	8918.638	0.1828153	0.4695	25.230
22	3.903	-0.099	5.000	-1.097	-1.046	4060.043	0.2009356	0.2192	25.228
23	3.764	-0.140	5.000	-1.236	-1.165	9277.229	0.2264759	0.5128	25.222
24	3.632	-0.132	5.000	-1.368	-1.301	2399.832	0.2506023	0.1255	25.220

Feed/Product heat balance -40492.02 MJ/h

8) * TEMPERATURE/HEAT TRANSFER PROFILE *

Temperature, °C
Heat transfer, W/m2.°C

NO		BULK	I.WALL	COIBENT 1	COIBENT 2	COIBENT 3	EXT
1	TEMP	50.000	48.310	47.158	6.000		6.000
	HX	1870.632	2566.144	70.968	--		
2	TEMP	48.135	46.517	45.413	6.000		6.000
	HX	1871.052	2566.144	70.968	--		
2*	TEMP	48.135	46.517	45.413	6.000		6.000
	HX	1871.069	2566.144	70.968	--		
3	TEMP	34.601	33.505	32.756	6.000		6.000
	HX	1875.591	2566.144	70.968	--		
3*	TEMP	34.601	33.505	32.756	6.000		6.000
	HX	1875.607	2566.144	70.968	--		
4	TEMP	15.110	14.763	14.524	6.000		6.000
	HX	1884.216	2566.144	70.968	--		
4*	TEMP	15.110	14.975	14.896	11.541	5.000	5.000
	HX	1884.229	3056.126	70.963	31.781	--	
5	TEMP	14.222	14.099	14.027	10.966	5.000	5.000
	HX	1884.294	3056.126	70.963	31.781	--	
5*	TEMP	14.222	14.125	14.069	11.672	7.000	7.000
	HX	1884.261	3056.126	70.963	31.781	--	
6	TEMP	12.235	12.165	12.125	10.387	7.000	7.000
	HX	1884.798	3056.126	70.963	31.781	--	
7	TEMP	12.024	11.956	11.917	10.250	7.000	7.000
	HX	1883.298	3056.126	70.963	31.781	--	
7*	TEMP	12.024	11.983	11.959	10.956	9.000	9.000
	HX	1883.259	3056.126	70.963	31.781	--	
8	TEMP	11.275	11.244	11.226	10.471	9.000	9.000
	HX	1881.608	3056.126	70.963	31.781	--	
8*	TEMP	11.275	11.244	11.221	10.469	9.000	9.000
	HX	1881.542	2410.312	70.969	31.809	--	
9	TEMP	11.102	11.074	11.053	10.357	9.000	9.000
	HX	1878.045	2410.312	70.969	31.809	--	
9*	TEMP	11.102	11.073	11.048	10.355	9.000	9.000
	HX	1877.984	1988.867	70.975	31.835	--	
10	TEMP	9.240	9.236	9.233	9.154	9.000	9.000
	HX	1877.315	1988.867	70.975	31.835	--	

NO		BULK	I.WALL	COIBENT 1	COIBENT 2	COIBENT 3	EXT
10*	TEMP	9.240	9.236	9.233	9.154	9.000	9.000
	HX	1877.311	1627.086	70.982	31.868	--	
11	TEMP	9.236	9.232	9.229	9.151	9.000	9.000
	HX	1876.521	1627.086	70.982	31.868	--	
11*	TEMP	9.236	9.232	9.229	9.151	9.000	9.000
	HX	1876.517	1627.086	70.982	31.868	--	
12	TEMP	9.025	9.025	9.024	9.016	9.000	9.000
	HX	1877.170	1627.086	70.982	31.868	--	
12*	TEMP	9.025	9.025	9.024	9.016	9.000	9.000
	HX	1877.196	1627.086	70.982	31.868	--	
13	TEMP	8.856	8.858	8.860	8.907	9.000	9.000
	HX	1892.387	1627.086	70.982	31.868	--	
14	TEMP	8.811	8.813	8.816	8.878	9.000	9.000
	HX	1899.393	1627.086	70.982	31.868	--	
14*	TEMP	8.811	8.813	8.816	8.878	9.000	9.000
	HX	1899.419	1627.086	70.982	31.868	--	
15	TEMP	8.541	8.547	8.554	8.705	9.000	9.000
	HX	1903.011	1627.086	70.982	31.868	--	
15*	TEMP	8.541	8.547	8.554	8.705	9.000	9.000
	HX	1903.055	1627.086	70.982	31.868	--	
16	TEMP	8.053	8.066	8.080	8.391	9.000	9.000
	HX	1905.688	1627.086	70.982	31.868	--	
16*	TEMP	8.053	8.066	8.078	8.390	9.000	9.000
	HX	1905.755	1988.867	70.975	31.835	--	
17	TEMP	7.883	7.898	7.911	8.280	9.000	9.000
	HX	1902.049	1988.867	70.975	31.835	--	
17*	TEMP	7.883	7.898	7.909	8.279	9.000	9.000
	HX	1902.096	2410.312	70.969	31.809	--	
18	TEMP	7.357	7.379	7.395	7.939	9.000	9.000
	HX	1895.279	2410.312	70.969	31.809	--	
18*	TEMP	7.357	7.379	7.391	7.937	9.000	9.000
	HX	1895.474	3056.126	70.963	31.781	--	
19	TEMP	7.195	7.219	7.233	7.832	9.000	9.000
	HX	1888.385	3056.126	70.963	31.781	--	
19*	TEMP	7.195	7.192	7.191	7.126	7.000	7.000
	HX	1888.612	3056.126	70.963	31.781	--	
20	TEMP	5.806	5.822	5.831	6.227	7.000	7.000
	HX	1886.234	3056.126	70.963	31.781	--	

NO		BULK	I.WALL	COIBENT 1	COIBENT 2	COIBENT 3	EXT
20*	TEMP	5.806	5.795	5.789	5.521	5.000	5.000
	HX	1886.548	3056.126	70.963	31.781	--	
21	TEMP	4.002	4.016	4.024	4.355	5.000	5.000
	HX	1863.329	3056.126	70.963	31.781	--	
22	TEMP	3.903	3.918	3.927	4.291	5.000	5.000
	HX	1851.685	3056.126	70.963	31.781	--	
23	TEMP	3.764	3.781	3.791	4.201	5.000	5.000
	HX	1822.085	3056.126	70.963	31.781	--	
24	TEMP	3.632	3.651	3.662	4.115	5.000	5.000
	HX	1813.152	3056.126	70.963	31.781	--	

9) * GAS PROPERTIES *

Node	Pressure	Temperature	Molec. Weight	Molar Fract.	Weight Fract.	Volume Fract.	Enthalpy	Density	Z Factor	Viscosity
	bar	°C					kJ/kmol	kg/m3		cP
1	250.000	50.000	17.071	1.00000	1.00000	1.00000	-2186.273	178.632	0.88924	0.02202
2	250.023	48.135	17.071	1.00000	1.00000	1.00000	-2295.493	180.299	0.88622	0.02212
2*	250.023	48.135	17.071	1.00000	1.00000	1.00000	-2295.493	180.370	0.88587	0.02212
3	249.747	34.601	17.071	1.00000	1.00000	1.00000	-3096.618	193.755	0.85999	0.02301
3*	249.747	34.601	17.071	1.00000	1.00000	1.00000	-3096.618	193.763	0.85995	0.02301
4	249.073	15.110	17.071	1.00000	1.00000	1.00000	-4285.378	216.417	0.81978	0.02486
4*	249.073	15.110	17.071	1.00000	1.00000	1.00000	-4285.378	216.361	0.81999	0.02485
5	249.961	14.222	17.071	1.00000	1.00000	1.00000	-4345.653	218.130	0.81876	0.02503
5*	249.961	14.222	17.071	1.00000	1.00000	1.00000	-4345.653	218.012	0.81921	0.02502
6	250.435	12.235	17.071	1.00000	1.00000	1.00000	-4472.201	220.878	0.81575	0.02530
7	254.428	12.024	17.071	1.00000	1.00000	1.00000	-4506.597	223.559	0.81942	0.02562
7*	254.428	12.024	17.071	1.00000	1.00000	1.00000	-4506.597	223.361	0.82015	0.02560
8	258.992	11.275	17.071	1.00000	1.00000	1.00000	-4576.085	226.767	0.82449	0.02601
8*	258.992	11.275	17.071	1.00000	1.00000	1.00000	-4576.085	226.799	0.82437	0.02601
9	267.380	11.102	17.071	1.00000	1.00000	1.00000	-4625.531	231.329	0.83491	0.02660
9*	267.380	11.102	17.071	1.00000	1.00000	1.00000	-4625.531	231.361	0.83480	0.02660
10	268.949	9.240	17.071	1.00000	1.00000	1.00000	-4747.197	234.582	0.83363	0.02697
10*	268.949	9.240	17.071	1.00000	1.00000	1.00000	-4747.197	234.575	0.83365	0.02697
11	270.683	9.236	17.071	1.00000	1.00000	1.00000	-4754.658	235.443	0.83595	0.02708
11*	270.683	9.236	17.071	1.00000	1.00000	1.00000	-4754.658	235.436	0.83597	0.02708
12	269.188	9.025	17.071	1.00000	1.00000	1.00000	-4761.433	235.003	0.83350	0.02702
12*	269.188	9.025	17.071	1.00000	1.00000	1.00000	-4761.433	234.975	0.83361	0.02701
13	235.084	8.856	17.071	1.00000	1.00000	1.00000	-4595.269	216.520	0.79052	0.02465
14	216.085	8.811	17.071	1.00000	1.00000	1.00000	-4463.948	204.290	0.77025	0.02324
14*	216.085	8.811	17.071	1.00000	1.00000	1.00000	-4463.948	204.259	0.77037	0.02323
15	203.584	8.541	17.071	1.00000	1.00000	1.00000	-4375.837	195.742	0.75811	0.02230
15*	203.584	8.541	17.071	1.00000	1.00000	1.00000	-4375.837	195.697	0.75828	0.02230
16	185.074	8.053	17.071	1.00000	1.00000	1.00000	-4221.596	181.816	0.74325	0.02087
16*	185.074	8.053	17.071	1.00000	1.00000	1.00000	-4221.596	181.748	0.74353	0.02086
17	166.521	7.883	17.071	1.00000	1.00000	1.00000	-4004.110	165.570	0.73481	0.01935
17*	166.521	7.883	17.071	1.00000	1.00000	1.00000	-4004.110	165.493	0.73515	0.01934
18	153.762	7.357	17.071	1.00000	1.00000	1.00000	-3853.336	153.675	0.73240	0.01830
18*	153.762	7.357	17.071	1.00000	1.00000	1.00000	-3853.336	153.759	0.73200	0.01831
19	146.374	7.195	17.071	1.00000	1.00000	1.00000	-3745.053	146.273	0.73291	0.01769
19*	146.374	7.195	17.071	1.00000	1.00000	1.00000	-3745.053	146.359	0.73248	0.01770
20	140.933	5.806	17.071	1.00000	1.00000	1.00000	-3742.836	142.202	0.72949	0.01732
20*	140.933	5.806	17.071	1.00000	1.00000	1.00000	-3742.836	142.313	0.72892	0.01733
21	124.263	4.002	17.071	1.00000	1.00000	1.00000	-3541.564	125.731	0.73219	0.01605
22	119.474	3.903	17.071	1.00000	1.00000	1.00000	-3447.585	120.087	0.73733	0.01567

Node	Pressure	Temperature	Molec. Weight	Molar Fract.	Weight Fract.	Volume Fract.	Enthalpy	Density	Z Factor	Viscosity
	bar	°C					kJ/kmol	kg/m3		cP
23	109.094	3.764	17.071	1.00000	1.00000	1.00000	-3227.759	108.003	0.74897	0.01491
24	106.384	3.632	17.071	1.00000	1.00000	1.00000	-3173.949	104.749	0.75342	0.01471

10) * FEEDS *

Stream		S2
Temperature,	°C	50.00
Pressure,	bar	250.000
Total rate,	kmol/h	41005.
Vapor,	kmol/h	41005.
Liquid,	kmol/h	0.0000

11) * PRODUCTS *

Stream		GASOUT
Temperature,	°C	3.63
Pressure,	bar	106.384
Total rate,	kmol/h	41005.
Vapor,	kmol/h	41005.
Liquid,	kmol/h	0.0000

 *** STREAM DATA CALCULATION AND STORING ***

    Stream 'GASIN   ' pvt/thermo/trans props calculated
    Stream 'S1   ' pvt/thermo/trans props calculated
    Stream 'S2   ' pvt/thermo/trans props calculated
    Stream 'GASOUT ' pvt/thermo/trans props calculated

* STREAM 'GASIN ', feed of unit(s) 1 'K1 '

- Temperature 50.00 °C - Pressure 90.0000 bar

Phase		VAPOR
Molar Flow Rate	kmol/h	41005.295
Weight Flow Rate	kg/h	700000.000
Molar Fraction		1.000000
Weight Fraction		1.000000
Molecular Weight		17.0710
Std Vap Vol Rate	N-m3/h	969563.7814
Act Volume Rate	m3/h	10889.5522
Enthalpy	MJ/h	-17154.3423
Spec. Enthalpy	kJ/kg	-24.511
	kJ/kmol	-418.421
Gross H.of comb.	kJ/kmol	932528.175
	kJ/kg	54626.562
Net H.of comb.	kJ/kmol	841087.939
	kJ/kg	49270.085
Spec. Heat Cap.	kJ/kg °C	2.814609
	kJ/kmol °C	48.048092
Spec. Entropy	kJ/kg °C	9.0038
	kJ/kmol °C	153.7032
Compressibility		0.889427
Density	kg/m3	64.2818
Isentr. Exponent		1.318304
Viscosity	cP	0.1424E-01
Thermal Conduct.	W/m°C	0.049142

Reference Gas Status - Temperature 15°C - Pressure 1 atm

No	Components	TOTAL Mol. Rate kmol/h	TOTAL Mol. Fr	PHASE Wt. Rate kg /h	PHASE Wt. Fr.
1	WATER	3.694	0.000090	66.563	0.000095
2	NITROGEN	77.981	0.001902	2184.248	0.003120
3	CARBON DIOXIDE	86.190	0.002102	3793.202	0.005419
4	METHANE	38945.365	0.949764	624683.381	0.892405
5	ETHANE	1251.801	0.030528	37641.654	0.053774
6	PROPANE	426.843	0.010409	18823.801	0.026891
7	ISOBUTANE	77.981	0.001902	4532.257	0.006475
8	BUTANE	106.711	0.002602	6202.035	0.008860
9	ISOPENTANE	28.730	0.000701	2072.859	0.002961
***	TOTAL ***	41005.295	1.000000	700000.000	1.000000

* STREAM 'S1 ', product of unit 1 'K1 ', feed of unit(s) 2 'E1 '

- Temperature 149.60 °C - Pressure 250.0000 bar

Phase		VAPOR
Molar Flow Rate	kmol/h	41005.295
Weight Flow Rate	kg/h	700000.000
Molar Fraction		1.000000
Weight Fraction		1.000000
Molecular Weight		17.0710
Std Vap Vol Rate	N-m3/h	969563.7814
Act Volume Rate	m3/h	5834.2933
Enthalpy	MJ/h	134562.8752
Spec. Enthalpy	kJ/kg	192.268
	kJ/kmol	3282.194
Gross H.of comb.	kJ/kmol	932528.175
	kJ/kg	54626.562
Net H.of comb.	kJ/kmol	841087.939
	kJ/kg	49270.085
Spec. Heat Cap.	kJ/kg °C	3.117558
	kJ/kmol °C	53.219734
Spec. Entropy	kJ/kg °C	9.1178
	kJ/kmol °C	155.6488
Compressibility		1.011833
Density	kg/m3	119.9803
Isentr. Exponent		1.262023
Viscosity	cP	0.2033E-01
Thermal Conduct.	W/m°C	0.072294

Reference Gas Status - Temperature 15°C - Pressure 1 atm

No	Components	TOTAL Mol. Rate kmol/h	TOTAL Mol. Fr	PHASE Wt. Rate kg /h	PHASE Wt. Fr.
1	WATER	3.694	0.000090	66.563	0.000095
2	NITROGEN	77.981	0.001902	2184.248	0.003120
3	CARBON DIOXIDE	86.190	0.002102	3793.202	0.005419
4	METHANE	38945.365	0.949764	624683.381	0.892405
5	ETHANE	1251.801	0.030528	37641.654	0.053774
6	PROPANE	426.843	0.010409	18823.801	0.026891
7	ISOBUTANE	77.981	0.001902	4532.257	0.006475
8	BUTANE	106.711	0.002602	6202.035	0.008860
9	ISOPENTANE	28.730	0.000701	2072.859	0.002961
***	TOTAL ***	41005.295	1.000000	700000.000	1.000000

* STREAM 'S2 ', product of unit 2 'E1 ', feed of unit(s) 3 'SEALINE1'

- Temperature 50.00 °C - Pressure 250.0000 bar

Phase		VAPOR
Molar Flow Rate	kmol/h	41005.295
Weight Flow Rate	kg/h	700000.000
Molar Fraction		1.000000
Weight Fraction		1.000000
Molecular Weight		17.0710
Std Vap Vol Rate	N-m3/h	969563.7814
Act Volume Rate	m3/h	3918.6673
Enthalpy	MJ/h	-89632.4878
Spec. Enthalpy	kJ/kg	-128.070
	kJ/kmol	-2186.273
Gross H.of comb.	kJ/kmol	932528.175
	kJ/kg	54626.562
Net H.of comb.	kJ/kmol	841087.939
	kJ/kg	49270.085
Spec. Heat Cap.	kJ/kg °C	3.419260
	kJ/kmol °C	58.370073
Spec. Entropy	kJ/kg °C	8.2518
	kJ/kmol °C	140.8669
Compressibility		0.889071
Density	kg/m3	178.6322
Isentr. Exponent		1.265599
Viscosity	cP	0.2202E-01
Thermal Conduct.	W/m°C	0.069535

Reference Gas Status - Temperature 15°C - Pressure 1 atm

No	Components	TOTAL Mol. Rate kmol/h	TOTAL Mol. Fr	PHASE Wt. Rate kg /h	PHASE Wt. Fr.
1	WATER	3.694	0.000090	66.563	0.000095
2	NITROGEN	77.981	0.001902	2184.248	0.003120
3	CARBON DIOXIDE	86.190	0.002102	3793.202	0.005419
4	METHANE	38945.365	0.949764	624683.381	0.892405
5	ETHANE	1251.801	0.030528	37641.654	0.053774
6	PROPANE	426.843	0.010409	18823.801	0.026891
7	ISOBUTANE	77.981	0.001902	4532.257	0.006475
8	BUTANE	106.711	0.002602	6202.035	0.008860
9	ISOPENTANE	28.730	0.000701	2072.859	0.002961
***	TOTAL ***	41005.295	1.000000	700000.000	1.000000

* STREAM 'GASOUT ', product of unit 3 'SEALINE1'

- Temperature 3.63 °C - Pressure 106.3840 bar

Phase		VAPOR
Molar Flow Rate	kmol/h	41005.295
Weight Flow Rate	kg/h	700000.000
Molar Fraction		1.000000
Weight Fraction		1.000000
Molecular Weight		17.0710
Std Vap Vol Rate	N-m3/h	969563.7814
Act Volume Rate	m3/h	6679.4876
Enthalpy	MJ/h	-130125.0732
Spec. Enthalpy	kJ/kg	-185.927
	kJ/kmol	-3173.949
Gross H.of comb.	kJ/kmol	932528.175
	kJ/kg	54626.562
Net H.of comb.	kJ/kmol	841087.939
	kJ/kg	49270.085
Spec. Heat Cap.	kJ/kg °C	3.559379
	kJ/kmol °C	60.762043
Spec. Entropy	kJ/kg °C	8.3949
	kJ/kmol °C	143.3099
Compressibility		0.752911
Density	kg/m3	104.7985
Isentr. Exponent		1.330624
Viscosity	cP	0.1471E-01
Thermal Conduct.	W/m°C	0.049045

Reference Gas Status - Temperature 15°C - Pressure 1 atm

No	Components	TOTAL Mol. Rate kmol/h	TOTAL Mol. Fr	PHASE Wt. Rate kg /h	PHASE Wt. Fr.
1	WATER	3.694	0.000090	66.563	0.000095
2	NITROGEN	77.981	0.001902	2184.248	0.003120
3	CARBON DIOXIDE	86.190	0.002102	3793.202	0.005419
4	METHANE	38945.365	0.949764	624683.381	0.892405
5	ETHANE	1251.801	0.030528	37641.654	0.053774
6	PROPANE	426.843	0.010409	18823.801	0.026891
7	ISOBUTANE	77.981	0.001902	4532.257	0.006475
8	BUTANE	106.711	0.002602	6202.035	0.008860
9	ISOPENTANE	28.730	0.000701	2072.859	0.002961
***	TOTAL ***	41005.295	1.000000	700000.000	1.000000

*** STREAM INDEX ***

 - Calculation time   6.94 sec

 - Simulation no.   65 - Ended at 13.06.40 on AUG 29, 2008 -