

### Heat Exchanger Specification Sheet

|    |   |   |                               |  |
|----|---|---|-------------------------------|--|
| 1  | Fabricated By: CIMCO Division of Toromont Industries Ltd. |   | Our Reference: 05HP086 Add. 1 |  |
| 2  | For: Altagas  |   |                               |  |
| 3  | Service of Unit: Subcooler                                |   |                               |  |
| 4  | Item No.: E-104   |   |                               |  |
| 5  | Date: August 24, 2005                                     |   | Rev No.: 0                    |  |
| 6  | Size  | 6--168                                    | in                            | Type NEN hor Connected in 1 parallel 1 series      |
| 7  | Surf/unit(eff.)   | 70  | ft <sup>2</sup>               | Shells/unit 1 Surf/shell (eff.) 70 ft <sup>2</sup> |
| 8  | <b>PERFORMANCE OF ONE UNIT</b>                            |   |                               |  |
| 9  | Fluid allocation  | Shell Side                                |                               | Tube Side  |
| 10 | Fluid name  | Propane                                   |                               | HC   |
| 11 | Fluid quantity, Total                                     | 4786                                      |                               | 782  |
| 12 | Vapor (In/Out)  |   |                               | 100 137  |
| 13 | Liquid  | 4786                                      | 4786                          | 681 644  |
| 14 | Noncondensable  |   |                               |  |
| 15 |   |   |                               |  |
| 16 | Temperature (In/Out)                                      | °F  | 110 95                        | -6 101.28  |
| 17 | Dew / Bubble point  | °F  |                               | -6   |
| 18 | Density   | lb/ft <sup>3</sup>                        | 28.74 29.726                  | 40.187 1.741                                       |
| 19 | Viscosity   | cp  | 0.083 0.09                    | 0.312 0.012  |
| 20 | Molecular wt, Vap   |   |                               | 22.36 26.31  |
| 21 | Molecular wt, NC  |   |                               |  |
| 22 | Specific heat   | BTU/(lb F)                                | 0.7672 0.7191                 | 0.5337 0.5389                                      |
| 23 | Thermal conductivity                                      | BTU/(ft h F)                              | 0.048 0.051                   | 0.075 0.018  |
| 24 | Latent heat   | BTU/lb                                    |                               | 188 143.7  |
| 25 | Pressure  | psi                                       | 222.865                       | 398.4  |
| 26 | Velocity  | ft/s                                      | 0.49                          | 0.68   |
| 27 | Pressure drop, allow./calc.                               | psi                                       | 5 0.283                       | 5 0.191  |
| 28 | Fouling resist. (min)                                     | ft <sup>2</sup> h F/BTU                   | 0.001                         | 0.001  |
| 29 | Heat exchanged  | 53140                                     | BTU/h                         | MTD corrected 35.97 °F                             |
| 30 | Transfer rate, Service                                    | 21.09                                     | Dirty 21.94                   | Clean 23.09 BTU/(h ft <sup>2</sup> F)              |
| 31 | <b>CONSTRUCTION OF ONE SHELL</b>                          |   |                               | <b>Sketch</b>                                      |
| 32 |   | Shell Side                                |                               | Tube Side  |
| 33 | Design/Test pressure                                      | psi                                       | 300/ /Code                    | 1415/ /Code  |
| 34 | Design temperature  | °F  | 250                           | 250  |
| 35 | Number passes per shell                                   |   | 1                             | 1  |
| 36 | Corrosion allowance                                       | in  | 0.0625                        | 0.0625   |
| 37 | Connections   | In  | 2/300 ANSI                    | 1/900 ANSI   |
| 38 | Size/rating   | Out                                       | 2/300 ANSI                    | 1/900 ANSI   |
| 39 |   | in/ Intermediate                          | /300 ANSI                     | /900 ANSI  |
| 40 | Tube No. 31   | OD 0.625                                  | Tks-avg 0.065                 | in Length 14 ft Pitch 0.7812 in                    |
| 41 | Tube type Plain   | Material CS                               |                               | Tube pattern 30                                    |
| 42 | Shell CS  | ID  | OD 6.625                      | in Shell cover                                     |
| 43 | Channel or bonnet   | CS  |                               | Channel cover CS                                   |
| 44 | Tubesheet-stationary                                      | CS  |                               | Tubesheet-floating                                 |
| 45 | Floating head cover                                       |   |                               | Impingement protection None                        |
| 46 | Baffle-crossing   | CS  | Type single seg               | Cut(%d) 38 hor Spacing: c/c 2.5 in                 |
| 47 | Baffle-long   |   | Seal type                     | Inlet 6.625 in                                     |
| 48 | Supports-tube   | U-bend                                    |                               | Type   |
| 49 | Bypass seal   |   | Tube-tubesheet joint          | groove/expand                                      |
| 50 | Expansion joint   |   | Type                          |  |
| 51 | RhoV2-Inlet nozzle  | 129                                       | Bundle entrance 9             | Bundle exit 8 lb/(ft s <sup>2</sup> )              |
| 52 | Gaskets - Shell side                                      |   | Tube Side                     |  |
| 53 | Floating head   |   |                               |  |
| 54 | Code requirements   | ASME Code Sec VIII Div 1                  |                               | TEMA class C                                       |
| 55 | Weight/Shell  | 790                                       | Filled with water 939.7       | Bundle 243.1 lb                                    |
| 56 | Remarks   | Tubes furnished c/w internal turbulators. |                               |  |
| 57 |   |   |                               |  |
| 58 |   |   |                               |  |

