# Test Report



## Project number : 13200541
## Report number : NMi-13200541-5

| | | |
|---|---|---|
| Issued by | : | NMi Certin B.V.<br>Hugo de Grootplein 1<br>3314 EG DORDRECHT<br>The Netherlands |
| Testadress | : | NMi Certin B.V.<br>Hugo de Grootplein 1<br>3314 EG Dordrecht<br>The Netherlands |
| Test specifications | : | Liquid volume conversion calculations according to:<br>- ASTM D1250-04 23A, 23B, 24A, 24B, 24C<br>- GPA-TP27 ( = API 23E/24E)<br>- AGA7<br><br>Gas volume conversion calculations according to:<br>- AGA8 detailed<br>- AGA8 gross 1<br>- AGA8 gross 2 |
| Manufacturer | : | Dynamic Flow Computers<br>12603 Southwest Freeway<br>77477 Stafford<br>United States of America |
| Pattern designation | : | Micro MV |
| Test period | : | 1 October 2013 – 1 December 2013 |
| Issue date | : | 30 January 2014 |
| Remark | : | This Test Report replaces Test Report NMi-13200541-4 |
| Signatures | : | |

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TESTING

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## General information on the calculating and indicating device

Using manually input product temperature, product pressure and product density, volume at reference conditions is calculated from volume at measurement conditions or volume at measurement conditions is calculated from volume at reference conditions.
For the AGA-7 test volume at measurement conditions was simulated with impulses.

For these tests the calculating and indicating device make Dynamic Flow computers, type Micr MV, serial number DEMO024 was used.

Software identification
Liquid application: PC application version 2.19
Flow computer version 6.11.15
Flow computer application name MicroMVL

Gas application: PC application version 1.27
Flow computer version 6.11.00
Flow computer application name MicroMVG

## Scope of investigation

Testing the volume conversion calculation methods according to the test specifications on page 1 of this report.

**Test report**

In this test report the following abbreviations are used:

| | |
|---|---|
| t; $t_{ref}$ | observed product temperature. |
| P; $P_{ref}$ | observed product pressure. |
| rho_base | product density at reference conditions. |
| rho_t,P | product density at measurement conditions. |
| ind | indication |
| SG | specific gravity |
| $C_{ind}$ | indicated volume conversion factor (or calculated from indicated measured density and base density |
| $C_{ref}$ | indicated volume conversion factor |
| error C | error in the indicated conversion factor |

Remark: for conversion from SG to Lb/ft$^3$ the factor 62,428 has been used.

Because the used standards do not specify maximum permissible errors, the report does not give maximum permissible errors as well.
For guidance, the maximum permissible errors from the OIML Recommendation R117-1, for liquid, and the maximum permissible errors from the standard EN12405-1, for gas can be used.

For liquid (methods 23 and 24), in metric values the maximum permissible density error in OIML Recommendation R117-1 is equal to 3 kg/m3. Assuming a largest density of 1200 kg/m$^3$, this is equal to 0,25%.
This is also true for a CTPL value.

The maximum permissible error in conversion factor C as specified by EN12405-1 is equal to 0,2 % of reading.
The test report shows that all detected errors are smaller than 0,2 %, and in most cases are much smaller.

Volume conversion calculation method ASTM D1250-04 23A
commodity: crude

| input t °F | input P PSIG | input rho_t, P SG | reference rho_base SG | reference rho_base Lb/ft3 | indicated rho_base Lb/ft3 | error in ind rho_base % |
|---|---|---|---|---|---|---|
| -50 | 100 | 0,6780 | 0,6189 | 38,6343 | 38,6440 | 0,03 |
| -50 | 500 | 0,6780 | 0,6165 | 38,4843 | 38,4950 | 0,03 |
| -50 | 1000 | 0,6780 | 0,6134 | 38,2903 | 38,3020 | 0,03 |
| -50 | 1300 | 0,6780 | 0,6114 | 38,1703 | 38,1820 | 0,03 |
| | | | | | | |
| 50 | 100 | 0,6220 | 0,6155 | 38,4254 | 38,4260 | 0,00 |
| 50 | 500 | 1,1220 | 1,1173 | 69,7538 | 69,7540 | 0,00 |
| 50 | 1000 | 0,6440 | 0,6298 | 39,3168 | 39,3180 | 0,00 |
| 50 | 1500 | 1,1220 | 1,1141 | 69,5528 | 69,5530 | 0,00 |
| | | | | | | |
| 150 | 100 | 0,5990 | 0,6462 | 40,3416 | 40,3370 | -0,01 |
| 150 | 500 | 1,1240 | 1,1491 | 71,7358 | 71,7320 | -0,01 |
| 150 | 1000 | 0,5990 | 0,6341 | 39,5862 | 39,5860 | 0,00 |
| 150 | 1500 | 1,1240 | 1,1454 | 71,5074 | 71,5040 | 0,00 |
| | | | | | | |
| 302 | 100 | 0,5990 | 0,7166 | 44,7351 | 44,7230 | -0,03 |
| 302 | 500 | 1,0111 | 1,0861 | 67,8020 | 67,7940 | -0,01 |
| 302 | 1000 | 0,5990 | 0,7029 | 43,8808 | 43,8730 | -0,02 |
| 302 | 1500 | 1,0111 | 1,0812 | 67,5000 | 67,4920 | -0,01 |

Volume conversion calculation method ASTM D1250-04 23B
commodity: refined

| input t °F | input P PSIG | input rho_t SG | reference rho_ref SG | reference rho_ref Lb/ft3 | indicated rho_ref Lb/ft3 | error in ind rho_ref % |
|---|---|---|---|---|---|---|
| -50 | 100 | 0,6880 | 0,6290 | 39,2678 | 39,2750 | 0,02 |
| -50 | 500 | 0,6880 | 0,6268 | 39,1305 | 39,1380 | 0,02 |
| -50 | 1000 | 0,6880 | 0,6240 | 38,9538 | 38,9620 | 0,02 |
| -50 | 1500 | 0,6880 | 0,6211 | 38,7710 | 38,7800 | 0,02 |
| | | | | | | |
| 50 | 100 | 0,6220 | 0,6155 | 38,4241 | 38,4240 | 0,00 |
| 50 | 500 | 1,1220 | 1,1168 | 69,7178 | 69,7180 | 0,00 |
| 50 | 1000 | 0,6440 | 0,6297 | 39,3117 | 39,3130 | 0,00 |
| 50 | 1500 | 1,1220 | 1,1136 | 69,5170 | 69,5170 | 0,00 |
| | | | | | | |
| 150 | 100 | 0,5990 | 0,6474 | 40,4180 | 40,4140 | -0,01 |
| 150 | 500 | 1,1240 | 1,1549 | 72,0961 | 72,0930 | 0,00 |
| 150 | 1000 | 0,5990 | 0,6350 | 39,6443 | 39,6450 | 0,00 |
| 150 | 1500 | 1,1120 | 1,1392 | 71,1199 | 71,1180 | 0,00 |
| | | | | | | |
| 302 | 100 | 0,5990 | 0,7251 | 45,2640 | 45,2540 | -0,02 |
| 302 | 500 | 1,0111 | 1,0988 | 68,5937 | 68,5810 | -0,02 |
| 302 | 1000 | 0,5990 | 0,7114 | 44,4137 | 44,4080 | -0,01 |
| 302 | 1500 | 1,0111 | 1,0938 | 68,2858 | 68,2740 | -0,02 |

Volume conversion calculation method TP-27 23E

| input t °F | input P PSIG | input rho_t SG | reference rho_ref SG | reference rho_ref Lb/ft3 | indicated rho_ref Lb/ft3 | error in ind rho_ref % |
|---|---|---|---|---|---|---|
| -50 | 0 | 0,5500 | 0,4613 | 28,7959 | 28,8070 | 0,04 |
| 50 | 0 | 0,4500 | 0,4395 | 27,4372 | 27,4350 | -0,01 |
| 120 | 0 | 0,4000 | 0,4686 | 29,2525 | 29,2440 | -0,03 |
| 50 | 0 | 0,5515 | 0,5445 | 33,9906 | 33,9900 | 0,00 |
| 150 | 0 | 0,3515 | 0,4709 | 29,3986 | 29,3810 | -0,06 |
| -50 | 0 | 0,5115 | 0,4077 | 25,4510 | 25,4700 | 0,07 |
| 55 | 0 | 0,5115 | 0,5074 | 31,6780 | 31,6760 | -0,01 |
| 155 | 0 | 0,5115 | 0,5789 | 36,1385 | 36,1290 | -0,03 |
| 199,4 | 0 | 0,5115 | 0,6053 | 37,7848 | 37,7690 | -0,04 |
| -50 | 0 | 0,5959 | 0,5208 | 32,5094 | 32,5240 | 0,04 |
| 55 | 0 | 0,5959 | 0,5929 | 37,0125 | 37,0150 | 0,01 |
| 155 | 0 | 0,5959 | 0,6475 | 40,4245 | 40,4140 | -0,03 |
| 199,4 | 0 | 0,5959 | 0,6686 | 41,7368 | 41,7230 | -0,03 |
| -50 | 0 | 0,6880 | 0,6315 | 39,4225 | 39,4340 | 0,03 |
| 55 | 0 | 0,6880 | 0,6857 | 42,8042 | 42,8080 | 0,01 |
| 155 | 0 | 0,6080 | 0,6579 | 41,0706 | 41,0620 | -0,02 |
| 199,4 | 0 | 0,6080 | 0,6784 | 42,3508 | 42,3410 | -0,02 |

Volume conversion calculation method ASTM D1250-04 24A
commodity: crude

| input t °F | input P PSIG | input rho_base SG | reference rho_t,P SG | indicated rho_t,P SG | error in ind rho_t,P % |
|---|---|---|---|---|---|
| -50 | 100 | 0,6120 | 0,6718 | 0,6718 | 0,00 |
| -50 | 500 | 1,1220 | 1,1565 | 1,1565 | 0,00 |
| -50 | 1000 | 0,6120 | 0,6768 | 0,6768 | 0,00 |
| -50 | 1500 | 1,1646 | 1,2006 | 1,2006 | 0,00 |
| | | | | | |
| 50 | 100 | 0,6120 | 0,6185 | 0,6185 | 0,00 |
| 50 | 500 | 1,1220 | 1,1266 | 1,1266 | 0,00 |
| 50 | 1000 | 0,6120 | 0,6274 | 0,6274 | 0,00 |
| 50 | 1500 | 1,1646 | 1,1723 | 1,1723 | 0,00 |
| | | | | | |
| 150 | 100 | 0,6612 | 0,6150 | 0,6150 | 0,00 |
| 150 | 500 | 1,1220 | 1,0963 | 1,0963 | 0,00 |
| 150 | 1000 | 0,6512 | 0,6158 | 0,6158 | 0,00 |
| 150 | 1500 | 1,1640 | 1,1429 | 1,1429 | 0,00 |
| | | | | | |
| 302 | 100 | 0,7312 | 0,6159 | 0,6159 | 0,00 |
| 302 | 500 | 1,1220 | 1,0495 | 1,0495 | 0,00 |
| 302 | 1000 | 0,7222 | 0,6196 | 0,6196 | 0,00 |
| 302 | 1500 | 1,1640 | 1,0989 | 1,0989 | 0,00 |

Volume conversion calculation method ASTM D1250-04 24B
commodity: refined

| input t °F | input P PSIG | input rho_base SG | reference rho_t,P SG | indicated rho_t,P SG | error in ind rho_t,P % |
|---|---|---|---|---|---|
| -50 | 100 | 0,6120 | 0,6718 | 0,6718 | 0,00 |
| -50 | 500 | 1,1220 | 1,1628 | 1,1628 | 0,00 |
| -50 | 1000 | 0,6120 | 0,6769 | 0,6769 | 0,00 |
| -50 | 1500 | 1,1640 | 1,2072 | 1,2072 | 0,00 |
| | | | | | |
| 50 | 100 | 0,6120 | 0,6185 | 0,6185 | 0,00 |
| 50 | 500 | 1,1220 | 1,1272 | 1,1272 | 0,00 |
| 50 | 1000 | 0,6120 | 0,6274 | 0,6274 | 0,00 |
| 50 | 1500 | 1,1640 | 1,1723 | 1,1723 | 0,00 |
| | | | | | |
| 150 | 100 | 0,6612 | 0,6133 | 0,6132 | -0,02 |
| 150 | 500 | 1,1220 | 1,0909 | 1,0909 | 0,00 |
| 150 | 1000 | 0,6512 | 0,6144 | 0,6144 | 0,00 |
| 150 | 1500 | 1,1640 | 1,1369 | 1,1369 | 0,00 |
| | | | | | |
| 302 | 100 | 0,7312 | 0,6057 | 0,6057 | 0,00 |
| 302 | 500 | 1,1220 | 1,0348 | 1,0348 | 0,00 |
| 302 | 1000 | 0,7222 | 0,6097 | 0,6097 | 0,00 |
| 302 | 1500 | 1,1640 | 1,0822 | 1,0822 | 0,00 |

Volume conversion calculation method ASTM D1250-04 24C

| input t °F | input P PSIG | input rho_base SG | input alpha *1E6 | reference CTPL unit/unit | indicated CTPL unit/unit | error in indicated CTPL % |
|---|---|---|---|---|---|---|
| -50 | 100 | 0,8010 | 240 | 0,8223 | 0,8223 | 0,00 |
| -50 | 500 | 1,1220 | 930 | 1,2339 | 1,2339 | 0,00 |
| -50 | 1000 | 0,8010 | 240 | 0,8252 | 0,8252 | 0,00 |
| -50 | 1500 | 1,1640 | 930 | 1,2829 | 1,2829 | 0,00 |
| | | | | | | |
| 50 | 100 | 0,8010 | 240 | 1,0030 | 1,0030 | 0,00 |
| 50 | 500 | 1,1220 | 930 | 1,0107 | 1,0107 | 0,00 |
| 50 | 1000 | 0,8010 | 240 | 1,0081 | 1,0081 | 0,00 |
| 50 | 1500 | 1,1640 | 930 | 1,0134 | 1,0133 | 0,00 |
| | | | | | | |
| 150 | 100 | 0,8410 | 240 | 0,9790 | 0,9790 | 0,00 |
| 150 | 500 | 1,1220 | 930 | 0,9161 | 0,9161 | 0,00 |
| 150 | 1000 | 0,8410 | 240 | 0,9852 | 0,9851 | 0,00 |
| 150 | 1500 | 1,1640 | 930 | 0,9190 | 0,9190 | 0,00 |
| | | | | | | |
| 302 | 100 | 0,8910 | 240 | 0,9419 | 0,9419 | 0,00 |
| 302 | 500 | 1,1220 | 930 | 0,7685 | 0,7685 | 0,00 |
| 302 | 1000 | 0,8910 | 240 | 0,9499 | 0,9499 | 0,00 |
| 302 | 1500 | 1,1640 | 930 | 0,7717 | 0,7716 | 0,00 |

Volume conversion calculation method TP27-24E, with pressure set to zero.

| input t °F | input P PSIG | input rho_base SG | reference rho_t SG | indicated rho_t SG | error in ind rho_t % |
|---|---|---|---|---|---|
| -50 | 0 | 0,3500 | 0,4828 | 0,4828 | 0,00 |
| 50 | 0 | 0,3500 | 0,3686 | 0,3686 | 0,00 |
| 120 | 0 | 0,4000 | 0,2352 | 0,2352 | 0,00 |
| -50 | 0 | 0,4515 | 0,5428 | 0,5428 | 0,00 |
| 50 | 0 | 0,4515 | 0,4614 | 0,4614 | 0,00 |
| 150 | 0 | 0,4515 | 0,3018 | 0,3018 | 0,00 |
| -50 | 0 | 0,5115 | 0,5889 | 0,5889 | 0,00 |
| 55 | 0 | 0,5115 | 0,5155 | 0,5155 | 0,00 |
| 155 | 0 | 0,5115 | 0,4160 | 0,4160 | 0,00 |
| 199,4 | 0 | 0,5115 | 0,3300 | 0,3300 | 0,00 |
| -50 | 0 | 0,5959 | 0,6577 | 0,6577 | 0,00 |
| 55 | 0 | 0,5959 | 0,5989 | 0,5989 | 0,00 |
| 155 | 0 | 0,5959 | 0,5333 | 0,5333 | 0,00 |
| 199,4 | 0 | 0,5959 | 0,4981 | 0,4981 | 0,00 |
| -50 | 0 | 0,6880 | 0,7386 | 0,7386 | 0,00 |
| 55 | 0 | 0,6880 | 0,6903 | 0,6903 | 0,00 |
| 155 | 0 | 0,6880 | 0,6423 | 0,6423 | 0,00 |
| 199,4 | 0 | 0,6880 | 0,6195 | 0,6195 | 0,00 |
| 0 | 0 | 0,0000 | 0,0000 | 0,0000 | 0,00 |

Volume conversion calculation method TP27-24E, with pressure and eq. pressure.
Pressure conversion method ASTM 11.2.2
Equilibrium pressure calculation method ASTM-TP15, equation 2

| input t °F | input P PSIG | input rho_base SG | reference rho_t,P SG | indicated rho_t,P SG | error in rho_t,P % |
|---|---|---|---|---|---|
| -50 | 100 | 0,5959 | 0,6583 | 0,6583 | 0,00 |
| -50 | 1500 | 0,5959 | 0,6660 | 0,6660 | 0,00 |
| 140 | 100 | 0,5959 | 0,5449 | 0,5449 | 0,00 |
| 140 | 1500 | 0,5959 | 0,5660 | 0,5660 | 0,00 |
| -50 | 100 | 0,4000 | 0,5065 | 0,5066 | 0,02 |
| -50 | 1500 | 0,4000 | 0,5216 | 0,5216 | 0,00 |
| 100 | 100 | 0,5100 | 0,4731 | 0,4731 | 0,00 |
| 100 | 200 | 0,5100 | 0,4760 | 0,4759 | -0,02 |
| 100 | 1500 | 0,5100 | 0,5029 | 0,5029 | 0,00 |

AGA 7 Impulse accuracy test

k-factor = 100 impulses / unit; two impulse channels counted

| impulse frequency | pulses | K-factor | calculated volume units | indicated volume units | error in indicated volume % |
|---|---|---|---|---|---|
| 500 Hz | 50000 | 50 | 1000 | 1000 | 0,00 |
| 2500 Hz | 50000 | 50 | 1000 | 1000 | 0,00 |
| 2500 Hz | 50000 | 50 | 1000 | 1000 | 0,00 |
| 2500 Hz | 100000 | 50 | 2000 | 2000 | 0,00 |
| 500 Hz | 100000 | 50 | 2000 | 2000 | 0,00 |

| impulse frequency | pulses | K-factor | meter factor | calculated volume units | indicated volume units | error in indicated volume % |
|---|---|---|---|---|---|---|
| 500 Hz | 50000 | 50 | 1,500 | 1500 | 1500 | 0,00 |
| 2500 Hz | 50000 | 50 | 1,500 | 1500 | 1500 | 0,00 |
| 2500 Hz | 50000 | 50 | 0,550 | 550 | 550 | 0,00 |
| 2500 Hz | 100000 | 50 | 0,990 | 1980 | 1980 | 0,00 |
| 500 Hz | 100000 | 50 | 1,111 | 2222 | 2222 | 0,00 |

Error calculation:

When the error is expressed as an absolute value, it is defined as:

$$\text{Error} = \text{Indicated value} - \text{True value}$$

When the error is expressed as a percentage, it is defined as:

$$\text{Error [\%]} = \frac{\text{Indicated value} - \text{True value}}{\text{True value}} \times 100\%$$

The electronic conversion device (EVCD) is checked according to the following formula:

$$V_b = C \times V \qquad \text{with} \quad C = \frac{p_{abs}}{p_b} \times \frac{t_b + 273{,}15}{t + 273{,}15} \times \frac{Z_b}{Z}$$

where:
- $V_b$ = volume at base conditions [$m^3$]
- $V$ = volume at measurement conditions [$m^3$]
- $C$ = conversion factor
- $p_{abs}$ = indicated pressure [bar]
- $p_b$ = absolute pressure at base conditions [bar]
- $t$ = indicated temperature [°C]
- $t_b$ = temperature at base conditions [°C]
- $Z_b/Z$ = compression factor

Pressure conversion factor: 1 Bar = 14,50377 PSI
Base pressure: 1,01325 Bar = 14,6969 Psi

Gas compositions

| number | $H_S$ MJ/m$^3$ | d | $N_2$ fraction | $CO_2$ fraction | $H_2$ fraction | CO fraction | $CH_4$ fraction |
|---|---|---|---|---|---|---|---|
| 4 | 34,1600 | 0,5990 | 0,100000 | 0,016000 | 0,095000 | 0,010000 | 0,735000 |
| 5 | 36,6400 | 0,6860 | 0,057000 | 0,076000 | 0,000000 | 0,000000 | 0,812000 |
| 6 | 36,5800 | 0,6440 | 0,117000 | 0,011000 | 0,000000 | 0,000000 | 0,826000 |
| 7 | 44,8880 | 0,6733 | 0,003940 | 0,019730 | 0,000000 | 0,000000 | 0,837500 |
| 8 | 35,2670 | 0,6446 | 0,139310 | 0,009800 | 0,000000 | 0,000000 | 0,814780 |
| 9 | 39,7820 | 0,5646 | 0,008858 | 0,000668 | 0,000000 | 0,000000 | 0,982722 |

| number | $C_2H_6$ fraction | $C_3H_8$ fraction | $C_4H_{10}$ fraction | $C_4H_{10}$ fraction | $C_5H_{12}$ fraction | $C_5H_{12}$ fraction | $C_6H_{14}$ fraction |
|---|---|---|---|---|---|---|---|
| 4 | 0,033000 | 0,007400 | 0,001200 | 0,001200 | 0,000400 | 0,000400 | 0,000200 |
| 5 | 0,043000 | 0,009000 | 0,001500 | 0,001500 | 0,000000 | 0,000000 | 0,000000 |
| 6 | 0,035000 | 0,007500 | 0,001200 | 0,001200 | 0,000400 | 0,000400 | 0,000200 |
| 7 | 0,093454 | 0,033080 | 0,009680 | 0,000000 | 0,001996 | 0,000000 | 0,000447 |
| 8 | 0,028990 | 0,003960 | 0,001480 | 0,000000 | 0,000680 | 0,000000 | 0,000280 |
| 9 | 0,005159 | 0,001607 | 0,000592 | 0,000000 | 0,000157 | 0,000000 | 0,000055 |

| number | $C_7H_{16}$ fraction | $C_8H_{18}$ fraction | He fraction |
|---|---|---|---|
| 4 | 0,000100 | 0,000100 | 0,000000 |
| 5 | 0,000000 | 0,000000 | 0,000000 |
| 6 | 0,000100 | 0,000000 | 0,000000 |
| 7 | 0,000133 | 0,000040 | 0,000000 |
| 8 | 0,000200 | 0,000040 | 0,000480 |
| 9 | 0,000016 | 0,000009 | 0,000157 |

Test results

**AGA 8, gas composition no. 4**

| $p_{ref}$ [PSI] | $t_{ref}$ [°F] | $p_{ref}$ [bar] | $t_{ref}$ [°C] | $C_{ind}$ unit/unit | $C_{ref}$ unit/unit | error C [%] |
|---|---|---|---|---|---|---|
| 100,00 | 0,1 | 7,91 | -17,72 | 8,9654 | 8,9652 | + 0,00 |
| 1798,50 | 0,1 | 125,02 | -17,72 | 183,5215 | 183,5057 | + 0,01 |
| 3611,40 | 0,1 | 250,01 | -17,72 | 333,3763 | 333,3323 | + 0,01 |
| 5424,40 | 0,1 | 375,01 | -17,72 | 406,0422 | 406,0139 | + 0,01 |
| 7237,40 | 0,1 | 500,01 | -17,72 | 450,4547 | 450,4324 | + 0,00 |
| 7237,40 | 95 | 500,01 | 35,00 | 380,5320 | 380,5013 | + 0,01 |
| 5424,40 | 95 | 375,01 | 35,00 | 327,4779 | 327,4381 | + 0,01 |
| 3611,40 | 95 | 250,01 | 35,00 | 247,8854 | 247,8500 | + 0,01 |
| 1798,50 | 95 | 125,02 | 35,00 | 128,7919 | 128,7886 | + 0,00 |
| 100,00 | 95 | 7,91 | 35,00 | 7,3567 | 7,3567 | + 0,00 |
| 100,00 | 212 | 7,91 | 100,00 | 6,0398 | 6,0398 | + 0,00 |
| 1798,50 | 212 | 125,02 | 100,00 | 98,1420 | 98,1388 | + 0,00 |
| 3611,40 | 212 | 250,01 | 100,00 | 189,0106 | 188,9916 | + 0,01 |
| 5424,40 | 212 | 375,01 | 100,00 | 260,5153 | 260,4698 | + 0,02 |
| 7237,40 | 212 | 500,01 | 100,00 | 314,4787 | 314,4288 | + 0,02 |

**AGA 8, gas composition no. 5**

| $p_{ref}$ [PSI] | $t_{ref}$ [°F] | $p_{ref}$ [bar] | $t_{ref}$ [°C] | $C_{ind}$ unit/unit | $C_{ref}$ unit/unit | error C [%] |
|---|---|---|---|---|---|---|
| 100,00 | 0,1 | 7,91 | -17,72 | 9,0315 | 9,0315 | + 0,00 |
| 1798,50 | 0,1 | 125,02 | -17,72 | 225,3915 | 225,3872 | + 0,00 |
| 3611,40 | 0,1 | 250,01 | -17,72 | 369,4513 | 369,4504 | + 0,00 |
| 5424,40 | 0,1 | 375,01 | -17,72 | 426,1554 | 426,1564 | – 0,00 |
| 7237,40 | 0,1 | 500,01 | -17,72 | 461,0966 | 461,0986 | – 0,00 |
| 7237,40 | 95 | 500,01 | 35,00 | 392,5931 | 392,5973 | – 0,00 |
| 5424,40 | 95 | 375,01 | 35,00 | 345,8916 | 345,8953 | – 0,00 |
| 3611,40 | 95 | 250,01 | 35,00 | 270,8095 | 270,8122 | – 0,00 |
| 1798,50 | 95 | 125,02 | 35,00 | 140,0415 | 140,0428 | – 0,00 |
| 100,00 | 95 | 7,91 | 35,00 | 7,3857 | 7,3858 | – 0,00 |
| 100,00 | 212 | 7,91 | 100,00 | 6,0517 | 6,0517 | – 0,00 |
| 1798,50 | 212 | 125,02 | 100,00 | 102,1045 | 102,1055 | – 0,00 |
| 3611,40 | 212 | 250,01 | 100,00 | 199,3141 | 199,3161 | – 0,00 |
| 5424,40 | 212 | 375,01 | 100,00 | 272,0507 | 272,0534 | – 0,00 |
| 7237,40 | 212 | 500,01 | 100,00 | 323,9231 | 323,9265 | – 0,00 |

**AGA 8, gas composition no. 6**

| $p_{ref}$ [PSI] | $t_{ref}$ [°F] | $p_{ref}$ [bar] | $t_{ref}$ [°C] | $C_{ind}$ unit/unit | $C_{ref}$ unit/unit | error C [%] |
|---|---|---|---|---|---|---|
| 100,00 | 0,1 | 7,91 | -17,72 | 9,0015 | 9,0014 | + 0,00 |
| 1798,50 | 0,1 | 125,02 | -17,72 | 203,1722 | 203,1672 | + 0,00 |
| 3611,40 | 0,1 | 250,01 | -17,72 | 349,5831 | 349,5788 | + 0,00 |
| 5424,40 | 0,1 | 375,01 | -17,72 | 411,8834 | 411,8803 | + 0,00 |
| 7237,40 | 0,1 | 500,01 | -17,72 | 450,0762 | 450,0738 | + 0,00 |
| 7237,40 | 95 | 500,01 | 35,00 | 382,8107 | 382,8111 | – 0,00 |
| 5424,40 | 95 | 375,01 | 35,00 | 334,3208 | 334,3211 | – 0,00 |
| 3611,40 | 95 | 250,01 | 35,00 | 258,4159 | 258,4160 | – 0,00 |
| 1798,50 | 95 | 125,02 | 35,00 | 134,4157 | 134,4157 | + 0,00 |
| 100,00 | 95 | 7,91 | 35,00 | 7,3727 | 7,3727 | – 0,00 |
| 100,00 | 212 | 7,91 | 100,00 | 6,0463 | 6,0463 | + 0,00 |
| 1798,50 | 212 | 125,02 | 100,00 | 100,1489 | 100,1489 | + 0,00 |
| 3611,40 | 212 | 250,01 | 100,00 | 193,7185 | 193,7186 | – 0,00 |
| 5424,40 | 212 | 375,01 | 100,00 | 264,9517 | 264,9519 | – 0,00 |
| 7237,40 | 212 | 500,01 | 100,00 | 316,8851 | 316,8854 | – 0,00 |

**AGA 8, gas composition no. 7**

| pref [PSI] | tref [°F] | pref [bar] | tref [°C] | Cind unit/unit | Cref unit/unit | error C [%] |
|---|---|---|---|---|---|---|
| 100,00 | 0 | 7,91 | -17,72 | 9,0906 | 9,0905 | + 0,00 |
| 1798,50 | 0 | 125,02 | -17,72 | 263,0228 | 263,0150 | + 0,00 |
| 3611,40 | 0 | 250,01 | -17,72 | 378,4031 | 378,3993 | + 0,00 |
| 5424,40 | 0 | 375,01 | -17,72 | 423,1842 | 423,1816 | + 0,00 |
| 7237,40 | 0 | 500,01 | -17,72 | 451,6991 | 451,6971 | + 0,00 |
| 7237,40 | 0 | 500,01 | 35,00 | 389,3226 | 389,3231 | – 0,00 |
| 5424,40 | 0 | 375,01 | 35,00 | 349,0724 | 349,0728 | – 0,00 |
| 3611,40 | 0 | 250,01 | 35,00 | 282,8108 | 282,8111 | – 0,00 |
| 1798,50 | 0 | 125,02 | 35,00 | 150,3803 | 150,3803 | + 0,00 |
| 100,00 | 0 | 7,91 | 35,00 | 7,4108 | 7,4108 | – 0,00 |
| 100,00 | 0 | 7,91 | 100,00 | 6,0615 | 6,0615 | + 0,00 |
| 1798,50 | 0 | 125,02 | 100,00 | 105,3459 | 105,3459 | + 0,00 |
| 3611,40 | 0 | 250,01 | 100,00 | 205,7461 | 205,7462 | – 0,00 |
| 5424,40 | 0 | 375,01 | 100,00 | 276,0732 | 276,0734 | – 0,00 |
| 7237,40 | 0 | 500,01 | 100,00 | 323,8437 | 323,8440 | – 0,00 |

**AGA 8, gas composition no. 8**

| pref [PSI] | tref [°F] | pref [bar] | tref [°C] | Cind unit/unit | Cref unit/unit | error C [%] |
|---|---|---|---|---|---|---|
| 100,00 | 0,1 | 7,91 | -17,72 | 8,9906 | 8,9905 | + 0,00 |
| 1798,50 | 0,1 | 125,02 | -17,72 | 196,9288 | 196,9237 | + 0,00 |
| 3611,40 | 0,1 | 250,01 | -17,72 | 344,4149 | 344,4096 | + 0,00 |
| 5424,40 | 0,1 | 375,01 | -17,72 | 409,1595 | 409,1552 | + 0,00 |
| 7237,40 | 0,1 | 500,01 | -17,72 | 448,8100 | 448,8063 | + 0,00 |
| 7237,40 | 95 | 500,01 | 35,00 | 381,2180 | 381,2174 | + 0,00 |
| 5424,40 | 95 | 375,01 | 35,00 | 331,7039 | 331,7032 | + 0,00 |
| 3611,40 | 95 | 250,01 | 35,00 | 255,0048 | 255,0042 | + 0,00 |
| 1798,50 | 95 | 125,02 | 35,00 | 132,6648 | 132,6644 | + 0,00 |
| 100,00 | 95 | 7,91 | 35,00 | 7,3679 | 7,3679 | + 0,00 |
| 100,00 | 212 | 7,91 | 100,00 | 6,0443 | 6,0443 | + 0,00 |
| 1798,50 | 212 | 125,02 | 100,00 | 99,5177 | 99,5175 | + 0,00 |
| 3611,40 | 212 | 250,01 | 100,00 | 192,1361 | 192,1357 | + 0,00 |
| 5424,40 | 212 | 375,01 | 100,00 | 263,2430 | 263,2425 | + 0,00 |
| 7237,40 | 212 | 500,01 | 100,00 | 315,5586 | 315,5581 | + 0,00 |

**AGA 8, gas composition no. 9**

| pref [PSI] | tref [°F] | pref [bar] | tref [°C] | Cind unit/unit | Cref unit/unit | error C [%] |
|---|---|---|---|---|---|---|
| 100,00 | 0,1 | 7,91 | -17,72 | 9,0004 | 9,0002 | + 0,00 |
| 1798,50 | 0,1 | 125,02 | -17,72 | 206,6344 | 206,6285 | + 0,00 |
| 3611,40 | 0,1 | 250,01 | -17,72 | 357,0165 | 357,0109 | + 0,00 |
| 5424,40 | 0,1 | 375,01 | -17,72 | 419,6464 | 419,6418 | + 0,00 |
| 7237,40 | 0,1 | 500,01 | -17,72 | 458,0771 | 458,0732 | + 0,00 |
| 7237,40 | 95 | 500,01 | 35,00 | 389,1621 | 389,1612 | + 0,00 |
| 5424,40 | 95 | 375,01 | 35,00 | 339,9220 | 339,9212 | + 0,00 |
| 3611,40 | 95 | 250,01 | 35,00 | 262,3701 | 262,3694 | + 0,00 |
| 1798,50 | 95 | 125,02 | 35,00 | 135,2777 | 135,2773 | + 0,00 |
| 100,00 | 95 | 7,91 | 35,00 | 7,3731 | 7,3731 | + 0,00 |
| 100,00 | 212 | 7,91 | 100,00 | 6,0471 | 6,0470 | + 0,00 |
| 1798,50 | 212 | 125,02 | 100,00 | 100,5506 | 100,5502 | + 0,00 |
| 3611,40 | 212 | 250,01 | 100,00 | 195,5698 | 195,5693 | + 0,00 |
| 5424,40 | 212 | 375,01 | 100,00 | 268,3420 | 268,3413 | + 0,00 |
| 7237,40 | 212 | 500,01 | 100,00 | 321,3566 | 321,3559 | + 0,00 |

**AGA8 Gross 1, gas composition 4**

| pref [PSI] | tref [°F] | pref [bar] | tref [°C] | Cind unit/unit | Cref unit/unit | error C % |
|---|---|---|---|---|---|---|
| 14,31 | 32 | 2,0 | 0 | 1,9769 | 1,9776 | -0,04 |
| 710,49 | 95 | 50,0 | 35 | 46,2066 | 46,2211 | -0,03 |
| 1435,68 | 95 | 100,0 | 35 | 96,4125 | 96,4707 | -0,06 |
| 1435,68 | 129,2 | 100,0 | 54 | 88,4174 | 88,4599 | -0,05 |
| 1435,68 | 1,4 | 100,0 | -17 | 133,4829 | 133,6699 | -0,14 |

**AGA8 Gross 2, gas composition 4**

| pref [PSI] | tref [°F] | pref [bar] | tref [°C] | Cind unit/unit | Cref unit/unit | error C % |
|---|---|---|---|---|---|---|
| 14,31 | 32 | 2,0 | 0 | 1,9768 | 1,9776 | -0,04 |
| 710,49 | 95 | 50,0 | 35 | 46,2066 | 46,2211 | -0,03 |
| 1435,68 | 95 | 100,0 | 35 | 96,4125 | 96,4707 | -0,06 |
| 1435,68 | 129,2 | 100,0 | 54 | 88,4174 | 88,4599 | -0,05 |
| 1435,68 | 1,4 | 100,0 | -17 | 133,4829 | 133,6699 | -0,14 |