QuantityWare

# Bulk Calculations – Solution BCS 3.0 CSP01

## Release Notes Maintenance Level 01

Listing of Delivery Content shipped with BCS 3.0 CSP01

**20.12.2016**

## Notes

# Contents

# Introduction

In 2006 QuantityWare GmbH was officially founded. Ten years after the initial release of BCP 1.0A (Bulk Calculations - Petroleum) in 2006, **BCS 3.0** (Bulk Calculations - Solution) was made available on 11.10.2016 to a constantly growing global customer base.
The Release Notes for BCS 3.0 Maintenance Level 00 are published here.

Bulk Calculations - Solution (BCS) contains four products:

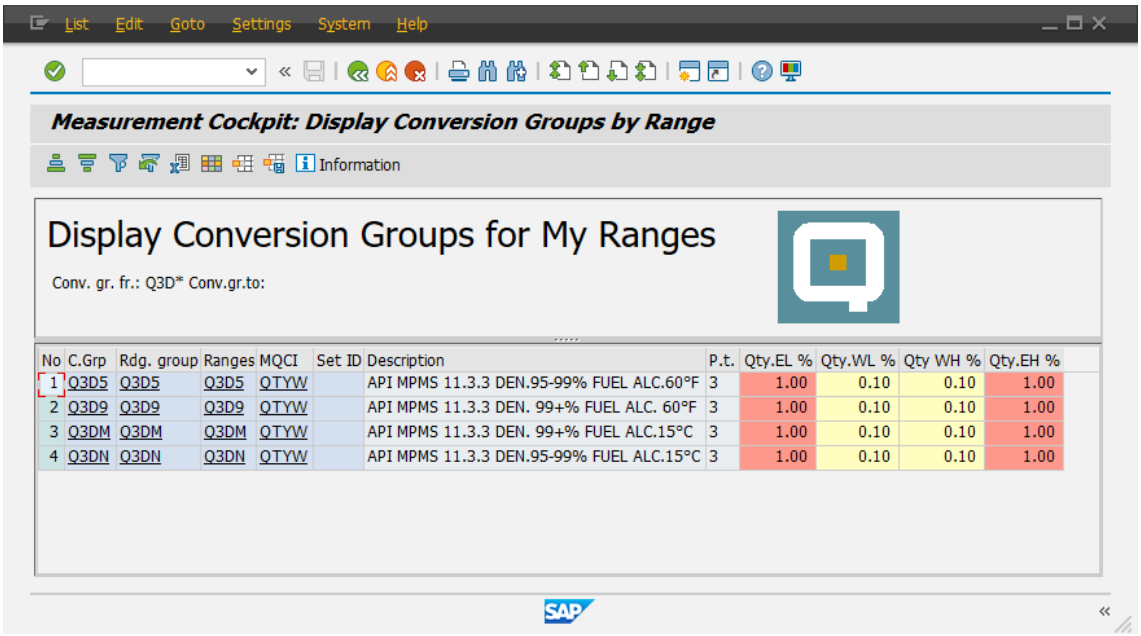
- Bulk Calculations - Petroleum (BCP)
- Bulk Calculations - Gas (BCG)
- Compliance and Transparency - Petroleum (CTP)
- Compliance and Transparency - Gas (CTG)

> ⚠ *This document describes the functional and usability enhancements that are delivered with **BCS 3.0 - Maintenance Level 01** - for the four products listed above – on **31.03.2017***

# Petroleum and Gas Measurement Standards

### Support of API MPMS Chapter 11.3.3 – Denatured Ethanol

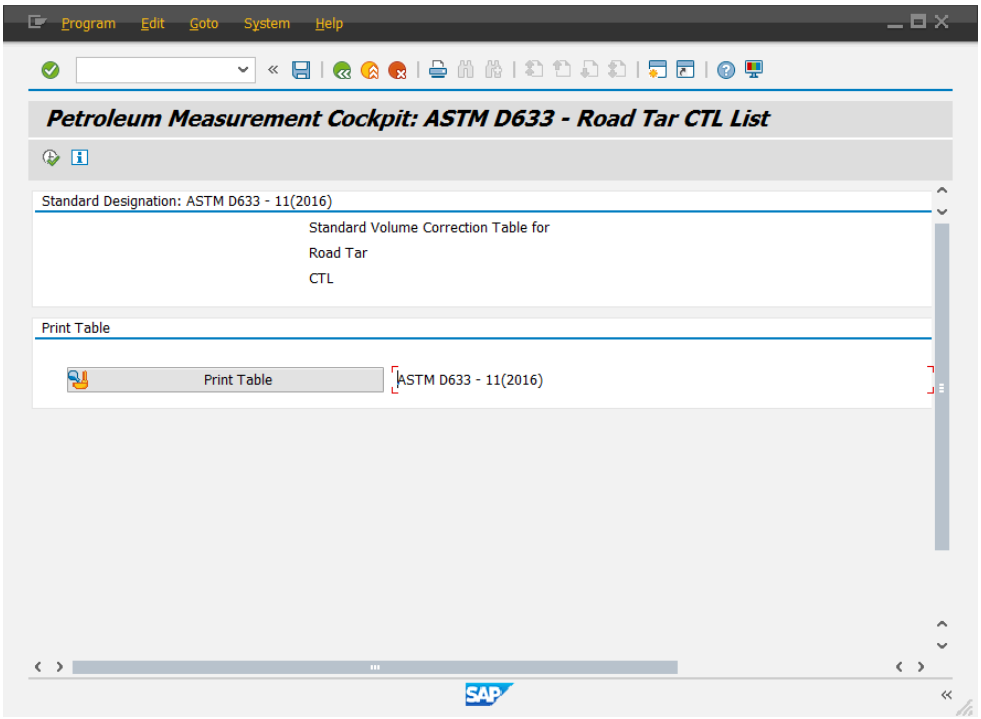
API MPMS Chapter 11.3.3 – “Miscellaneous Hydrocarbon Product Properties – Denatured Ethanol Density and Volume Correction Factors” has been issued as a second edition in November 2015. QuantityWare has analyzed this new version and confirms that BCP implementations of API MPMS Chapter 11.3.3 comply with this latest version. With BCS 3.0 CSP01, four new API MPMS 11.3.3 template conversion groups are delivered:




### Support of ASTM D633-11(2016) Calculations – Road Tar

ASTM D633 – Standard Volume Correction Table for Road Tar – has been reapproved and issued as ASTM D633-11(2016). QuantityWare has analyzed this new version and confirms that BCP implementations of ASTM D633 comply with this latest version. As in the previous versions, two apparent typographical errors have been identified and communicated to the responsible ASTM subcommittee for revision.

| °F | °C | ASTM D633-11(2016) | Suggested Correction – BCS 3.0 |
|---|---|---|---|
| 175 | 79.44 | 0.9657 | 0.9667 |
| 210 | 98.89 | 09589 | 0.9569 |




### Support of API MPMS Chapter 14.2.1 – AGA Report No. 3 Part 2 – Natural Gas

AGA Report No. 3 – ORIFICE METERING OF NATURAL GAS AND OTHER RELATED HYDROCARBON FLUIDS PART 2: Specification and Installation Requirements – has been revised and released as 5th Edition in March 2016. Part 2 of this standard has no impact on the technical installation of Natural Gas Applications (Part 3) or Implementation Procedures (Part 4). However, organizations utilizing the implementation as defined in Part 3 and Part 4 are advised to obtain Part 2 as a reference. No changes of the technical software implementations delivered with BCS 3.0 CSP01 are required.

### Support of API MPMS Chapter 12 - S&W Corrections - Gross Standard Masses and Weights (GSM/GSW) and Net Standard Masses and Weights (NSM/NSW) - *Parallel Calculations*

With BCS 3.0 CSP01, two new crude oil gross volume models are being delivered, in addition to the already available two models. For the two available models, customers have to decide whether to calculate mass and weight quantity values as net masses or gross masses.
With the two additional models, gross masses and gross weight quantity values may be calculated in parallel with net masses and net weights within all relevant SAP ECC 600 and S/4HANA business processes.

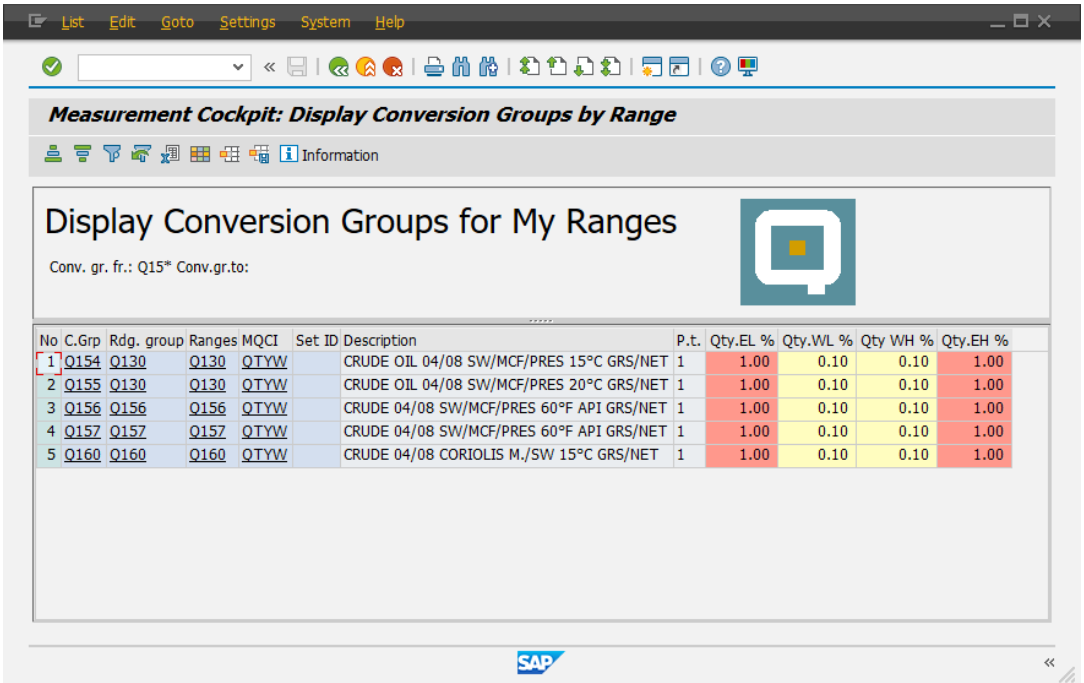
The American Petroleum Institute API defines the following quantities (relevant for ERP system crude oil sediment & water processes) in API MPMS Chapter 12, which can now for the first time all be mapped to SAP & QuantityWare Dimension ID (DIMID) and calculated via the SAP QCI (utilizing QuantityWare MQCI conversion groups):

- GOV - gross observed volume <-> DIMID GRSVOL, All UoM w/o standard temperature
- GSV- gross standard volume <-> DIMID GRSVOL, All UoM with standard temperature assigned
- NOV - net observed volume <-> DIMID VOLUME, All UoM w/o standard temperature assigned
- NSV - net observed volume <-> DIMID VOLUME, All UoM with standard temperature assigned
- GSW - gross standard weight <-> DIMID GWGHTA, All UoM
- NSW - net standard weight <-> DIMID WGHTA, All UoM
- GSM - gross standard mass <-> SAP DIMID GMASS, All UoM
- NSM - net standard mass <-> DIMID MASS, All UoM

> ⚠ *In legacy systems, one may define UoM of DIMID MASS to be net standard weights and DIMID VMASS to be net standard masses.*
>
> ⚠ *With S/4HANA, you can add new UoM to the UoM group of a production material, thus new gross UoM (volume, mass, weight) may be added to your crude materials and realistic sediment & water conversions are thus enabled.*

> ⚠ *For all four crude gross models, it is possible to enter a meter factor MF, which internally is multiplied with a CTPL (which, depending on the CTL standard version of AP MPMS Chapter 11.1 is rounded to 4 or 5 decimals) to obtain a combined correction factor CCF. Since there is clear guidance missing in API MPMS Chapter 12 on the exact rounding logic (e.g. number of decimals for 2004 CTL versions), currently the CCF is NOT rounded within the four models. Once clear guidance from the API with the next API MPMS Chapter 12 version is available, such rounding options will be made available as well, either via an advanced development note or via the next BCS 3.0 CSP. Usage of a meter factor redefines all GOV quantities to indicated volumes (IV). The meter factor can of course be removed from BCP template conversion groups.*

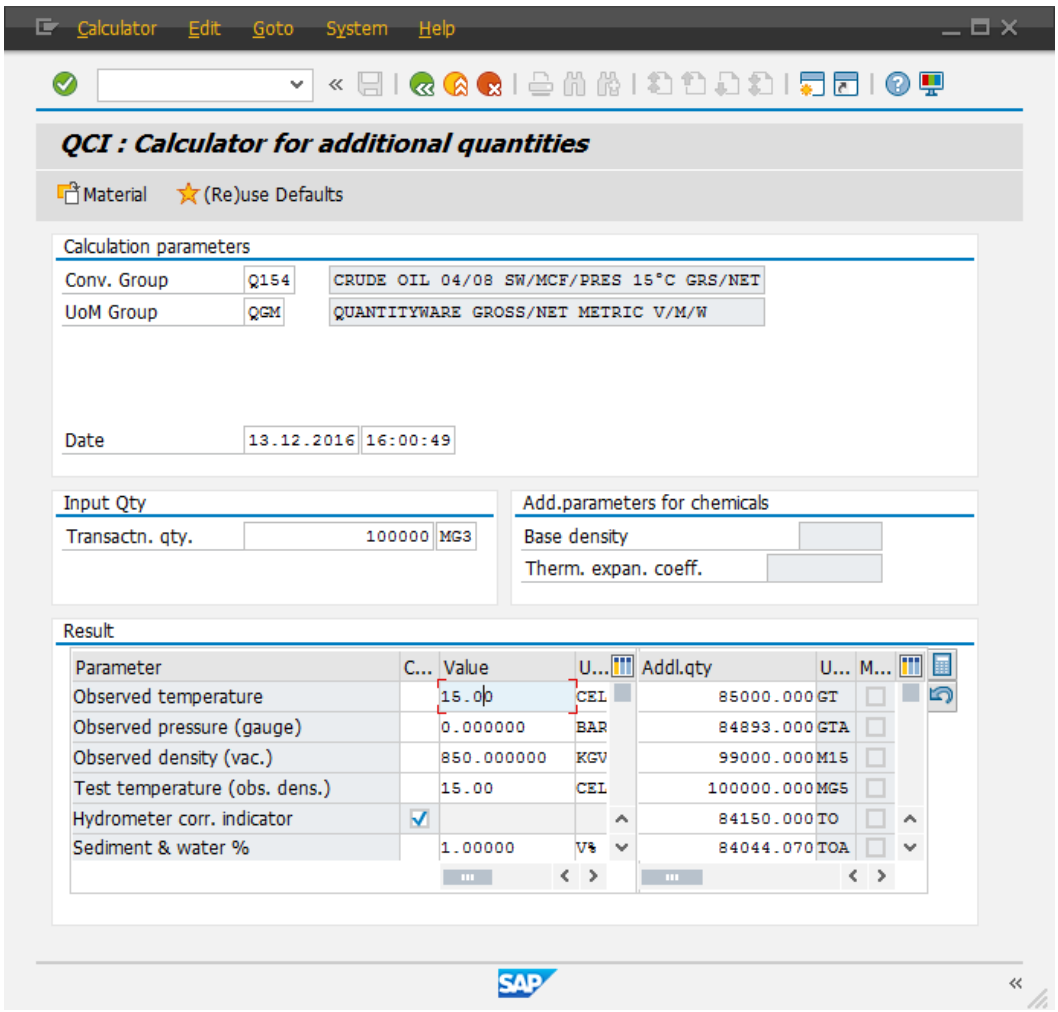
Five new template conversion groups are delivered for the two new crude oil models:




| No | C.Grp | Rdg. group | Ranges | MQCI | Set ID | Description | P.t. | Qty.EL % | Qty.WL % | Qty WH % | Qty.EH % |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Q154 | Q130 | Q130 | QTYW | | CRUDE OIL 04/08 SW/MCF/PRES 15°C GRS/NET | 1 | 1.00 | 0.10 | 0.10 | 1.00 |
| 2 | Q155 | Q130 | Q130 | QTYW | | CRUDE OIL 04/08 SW/MCF/PRES 20°C GRS/NET | 1 | 1.00 | 0.10 | 0.10 | 1.00 |
| 3 | Q156 | Q156 | Q156 | QTYW | | CRUDE 04/08 SW/MCF/PRES 60°F API GRS/NET | 1 | 1.00 | 0.10 | 0.10 | 1.00 |
| 4 | Q157 | Q157 | Q157 | QTYW | | CRUDE 04/08 SW/MCF/PRES 60°F API GRS/NET | 1 | 1.00 | 0.10 | 0.10 | 1.00 |
| 5 | Q160 | Q160 | Q160 | QTYW | | CRUDE 04/08 CORIOLIS M./SW 15°C GRS/NET | 1 | 1.00 | 0.10 | 0.10 | 1.00 |

For Coriolis metering, template conversion group Q160 is being made available, such that no observed temperature input is required if gross mass quantity values are utilized as transaction quantities.

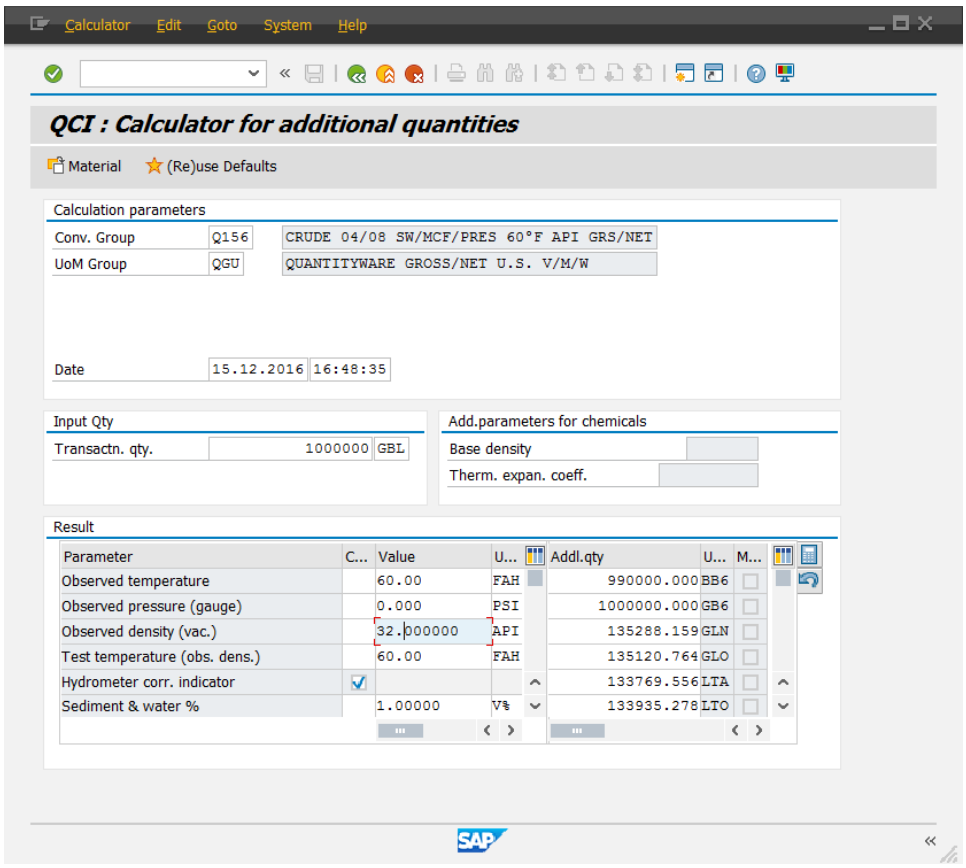
Example Calculation in metric units:



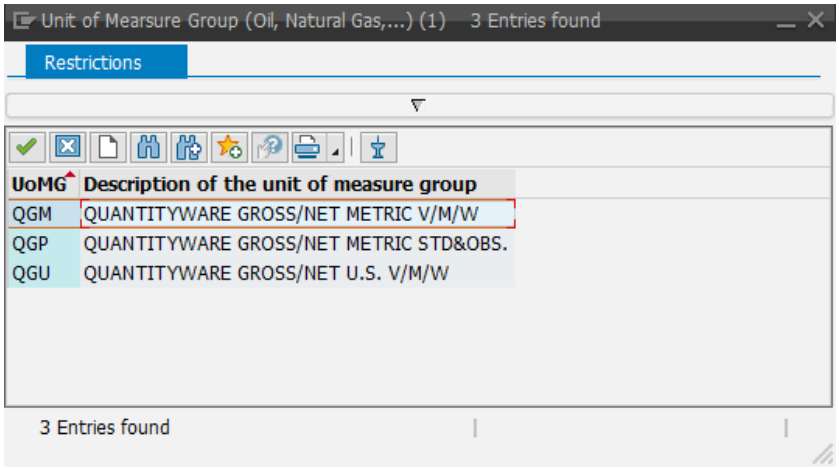

Quantity values for GSM (here UoM GT – gross ton), GSW (here UoM GTA – gross ton in air), NSV (here UoM M15, net m³ at 15 °C), GSV (here UoM MG5, gross m³ at 15 °C), NSM (here UoM TO – net metric ton) and NSW (here UoM TOA, net metric ton in air) are calculated for an observed gross volume of 100 000 m³ (UoM MG3) at 15 °C observed temperature, a gross base density of 850 kg/m³ and a sediment & water % of 1 %.

> ⚠ ***The basic assumption for these calculations is that the gross base density is equal to the net base density, such that the S&W volume correction is identical with the mass and weight correction. For small S&W % values this assumption can be readily made, as the density of water and sediment is within the same order of magnitude as the product density.***

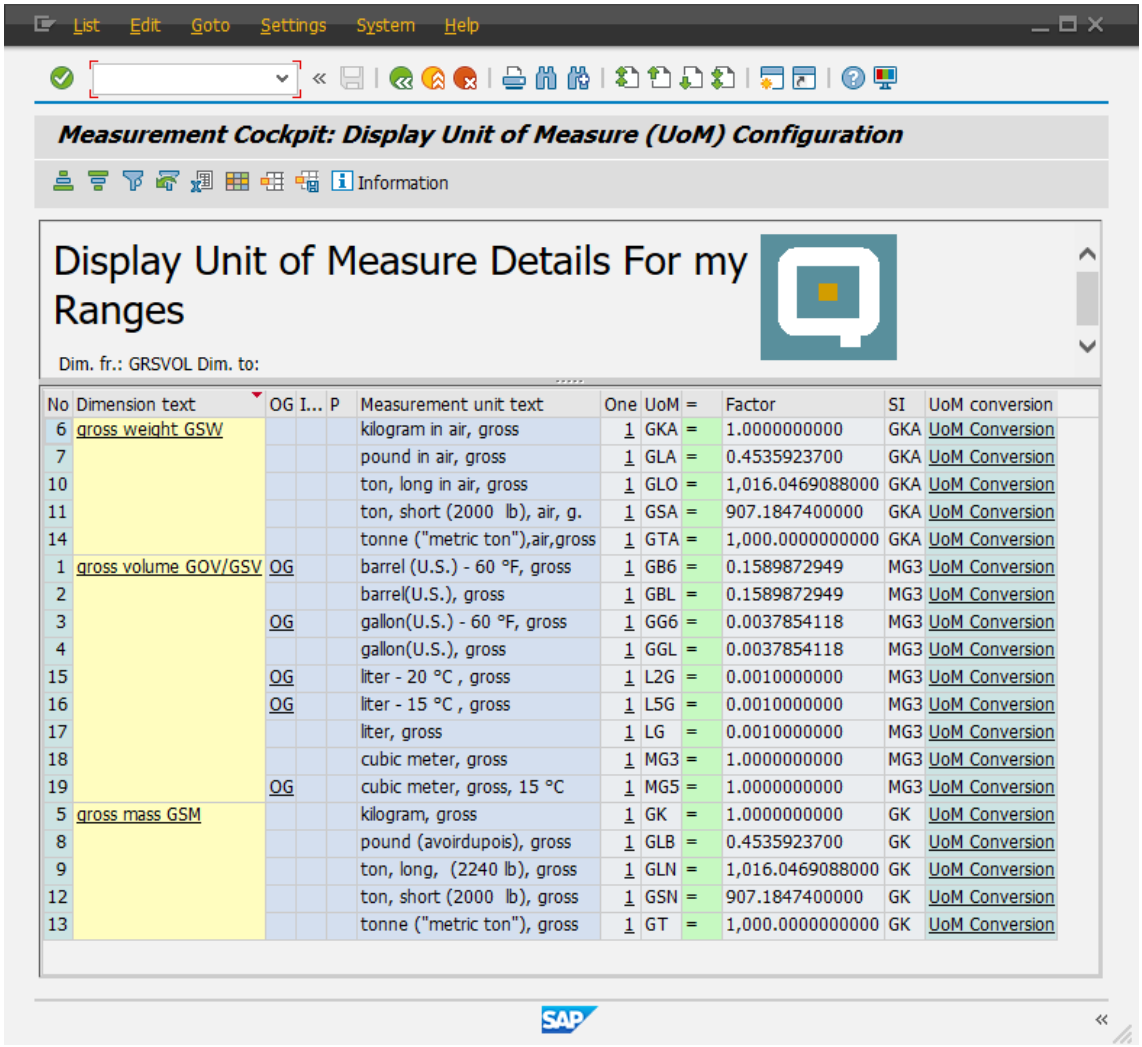
Example Calculation U.S. customary units:




You may combine any number of U.S. customary and metric units of any of the six dimensions (as well as NOV and GOV UoM) into one UoM group. For testing purposes within the BCP template, three new UoM groups are delivered with the BCS 3.0 CSP01 template as well:



For the new quantities GSM and GSW, two new SAP DIMID are delivered with five UoM for each new dimension; UoM MG5 is delivered as a new gross standard volume UoM, to extend the UoM delivered for that quantity:




| No | Dimension text | OG | I... | P | Measurement unit text | One | UoM | = | Factor | SI | UoM conversion |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 6 | gross weight GSW | | | | kilogram in air, gross | 1 | GKA | = | 1.0000000000 | GKA | UoM Conversion |
| 7 | | | | | pound in air, gross | 1 | GLA | = | 0.4535923700 | GKA | UoM Conversion |
| 10 | | | | | ton, long in air, gross | 1 | GLO | = | 1,016.0469088000 | GKA | UoM Conversion |
| 11 | | | | | ton, short (2000 lb), air, g. | 1 | GSA | = | 907.1847400000 | GKA | UoM Conversion |
| 14 | | | | | tonne ("metric ton"),air,gross | 1 | GTA | = | 1,000.0000000000 | GKA | UoM Conversion |
| 1 | gross volume GOV/GSV | OG | | | barrel (U.S.) - 60 °F, gross | 1 | GB6 | = | 0.1589872949 | MG3 | UoM Conversion |
| 2 | | | | | barrel(U.S.), gross | 1 | GBL | = | 0.1589872949 | MG3 | UoM Conversion |
| 3 | | OG | | | gallon(U.S.) - 60 °F, gross | 1 | GG6 | = | 0.0037854118 | MG3 | UoM Conversion |
| 4 | | | | | gallon(U.S.), gross | 1 | GGL | = | 0.0037854118 | MG3 | UoM Conversion |
| 15 | | OG | | | liter - 20 °C , gross | 1 | L2G | = | 0.0010000000 | MG3 | UoM Conversion |
| 16 | | OG | | | liter - 15 °C , gross | 1 | L5G | = | 0.0010000000 | MG3 | UoM Conversion |
| 17 | | | | | liter, gross | 1 | LG | = | 0.0010000000 | MG3 | UoM Conversion |
| 18 | | | | | cubic meter, gross | 1 | MG3 | = | 1.0000000000 | MG3 | UoM Conversion |
| 19 | | OG | | | cubic meter, gross, 15 °C | 1 | MG5 | = | 1.0000000000 | MG3 | UoM Conversion |
| 5 | gross mass GSM | | | | kilogram, gross | 1 | GK | = | 1.0000000000 | GK | UoM Conversion |
| 8 | | | | | pound (avoirdupois), gross | 1 | GLB | = | 0.4535923700 | GK | UoM Conversion |
| 9 | | | | | ton, long, (2240 lb), gross | 1 | GLN | = | 1,016.0469088000 | GK | UoM Conversion |
| 12 | | | | | ton, short (2000 lb), gross | 1 | GSN | = | 907.1847400000 | GK | UoM Conversion |
| 13 | | | | | tonne ("metric ton"), gross | 1 | GT | = | 1,000.0000000000 | GK | UoM Conversion |

# Application and Usage Specific Features

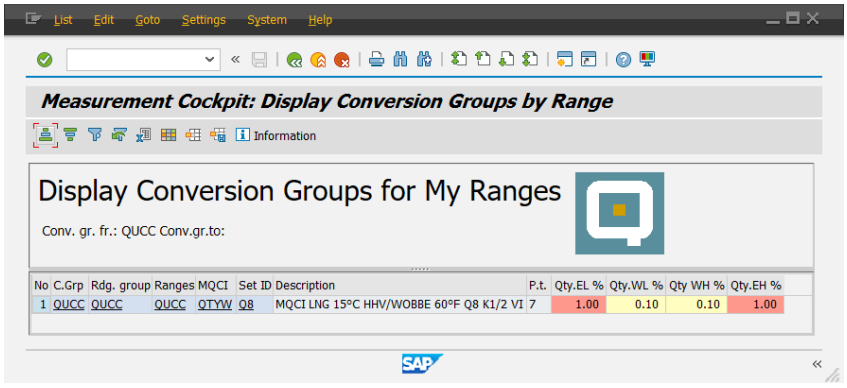
## BCP/CTP & BCG/CTG Functionality

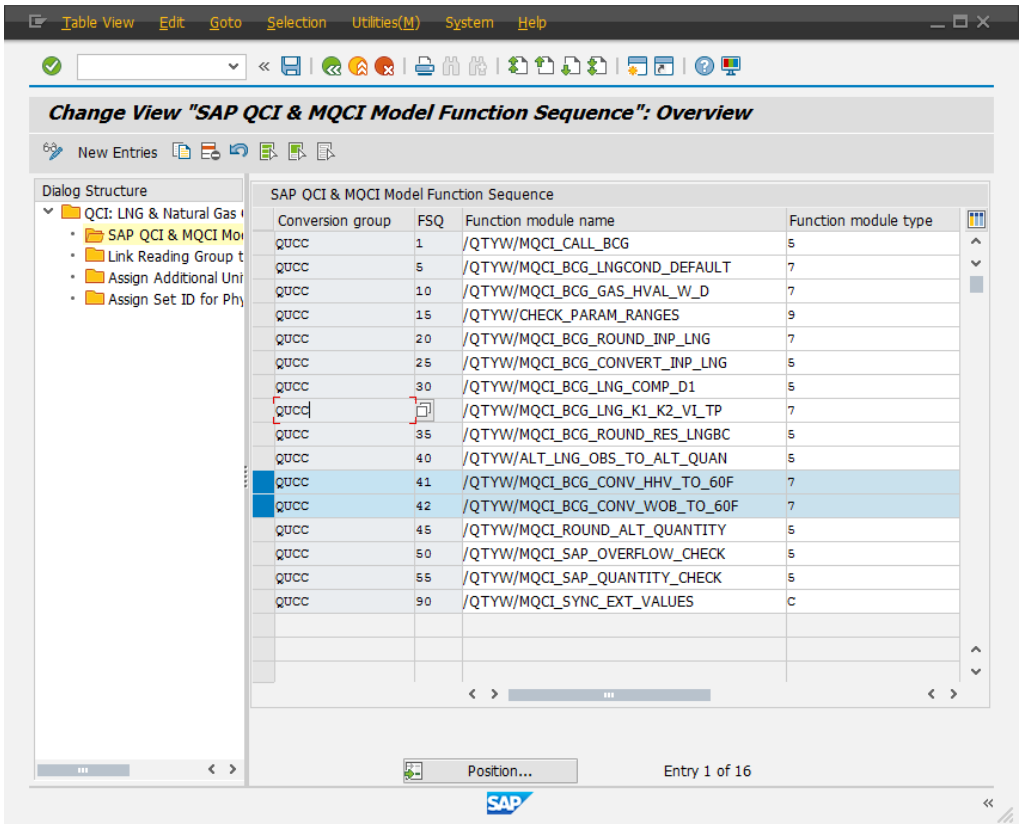
### ISO 13443 Base Condition Result Conversions – Wobbe Index and Higher Heating Value

As a fundamental design principle, for natural gas, LNG and all other liquid product conversion groups, physical properties like gas densities, liquid densities, heating values etc. are being calculated at the conditions (temperature and pressure values, for metering and combustion) which are defined as base conditions in a conversion group. For MQCI LNG calculations, the higher heating value HHV (gross/superior heating value on a volumetric base) and the Wobbe index can be converted to 60 °F and 14.696 PSI via four new ISO 13443 conversion functions for any conversion group at different conditions, which may be required in business contracts:

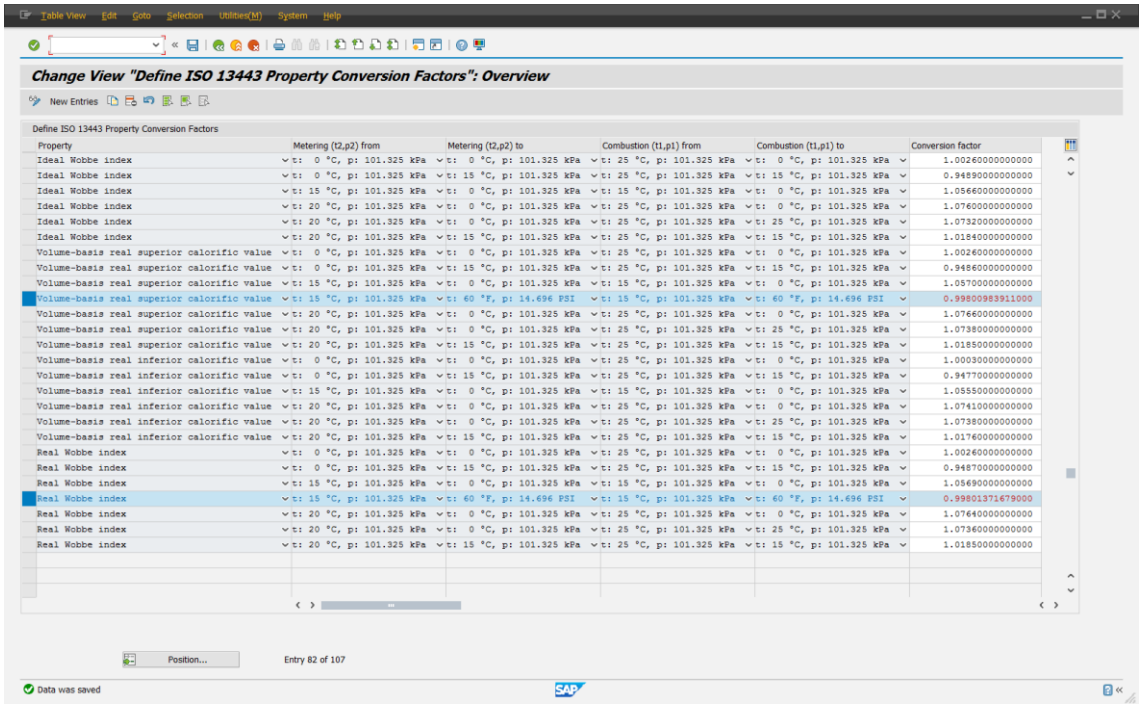
| | |
|---|---|
| /QTYW/MQCI_BCG_CONV_HHV_TO_60F | Convert LNG higher heating value (vol.) to 60 °F / 14.696 PSI met./comb. |
| /QTYW/MQCI_BCG_CONV_WOB_TO_60F | Convert LNG Wobbe index to 60 °F / 14.696 PSI met./comb. |
| /QTYW/MQCI_BCG_CONV_HHV_T_60FT | Convert LNG HHV (vol.) to 60 °F / 14.696 PSI met./comb. - table value |
| /QTYW/MQCI_BCG_CONV_WOB_T_60FT | Convert LNG Wobbe index to 60 °F / 14.696 PSI met./comb. - table value |

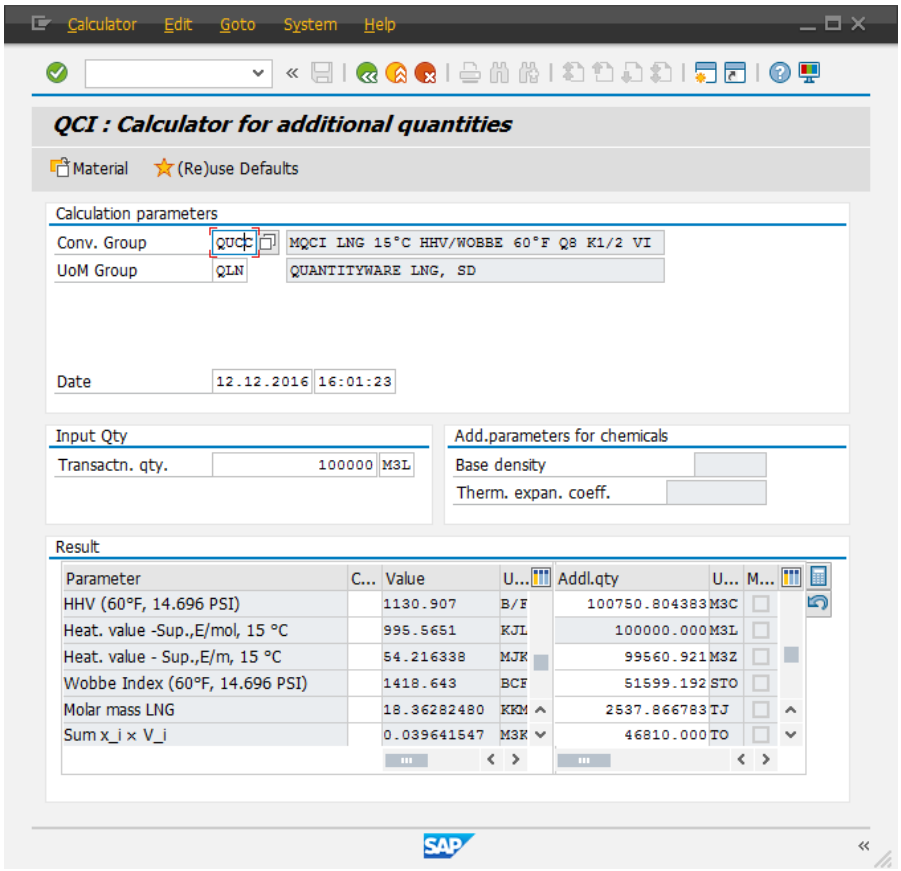
This apparent violation of the fundamental design principle is only possible since the HHV and the Wobbe index are both not required for the LNG quantity conversion calculation model, which strictly requires property values at conversion group conditions or LNG liquid observed conditions (here: mass based heating value, natural gas base density, LNG liquid density at observed temperature).
The extension follows then the second fundamental design principle, which is to solely utilize ISO 13443 formulas or derived table values for LNG and natural gas property and quantity conversions, if required.
A new template conversion group QUCC demonstrates how these two (plus two) new functions can be integrated into existing conversion groups:



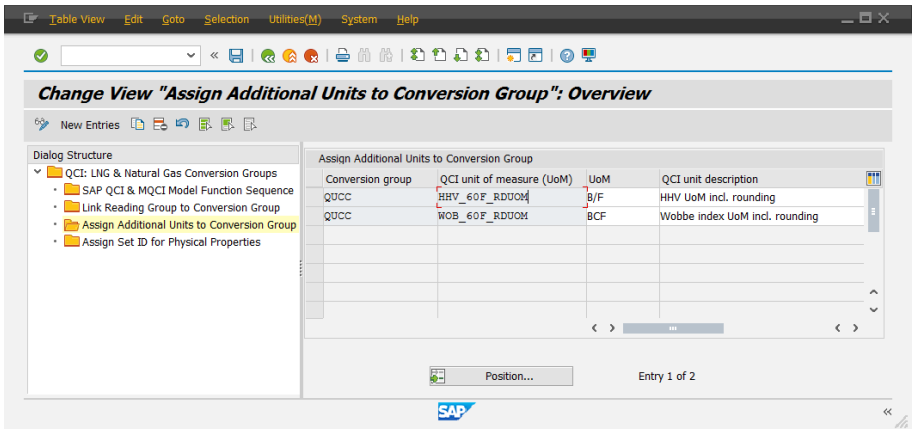



Note: The two functions indicated above utilize the ISO 13443 formulas. Two other functions are available which utilize the ISO 13443 Table values, which then need to be maintained in a customer system:






Note: Rounding of the two property values is supported via the standard MQCI UoM rounding for UoM declared in an MQCI LNG conversion group:



### Additional MQCI Rounding Functions

Additional rounding functions for MQCI conversion group usage are delivered with BCS 3.0 CSP01 (within function groups /QTYW/MQCI_COMMON and /QTYW/MQCI_COMMON_BCG) :

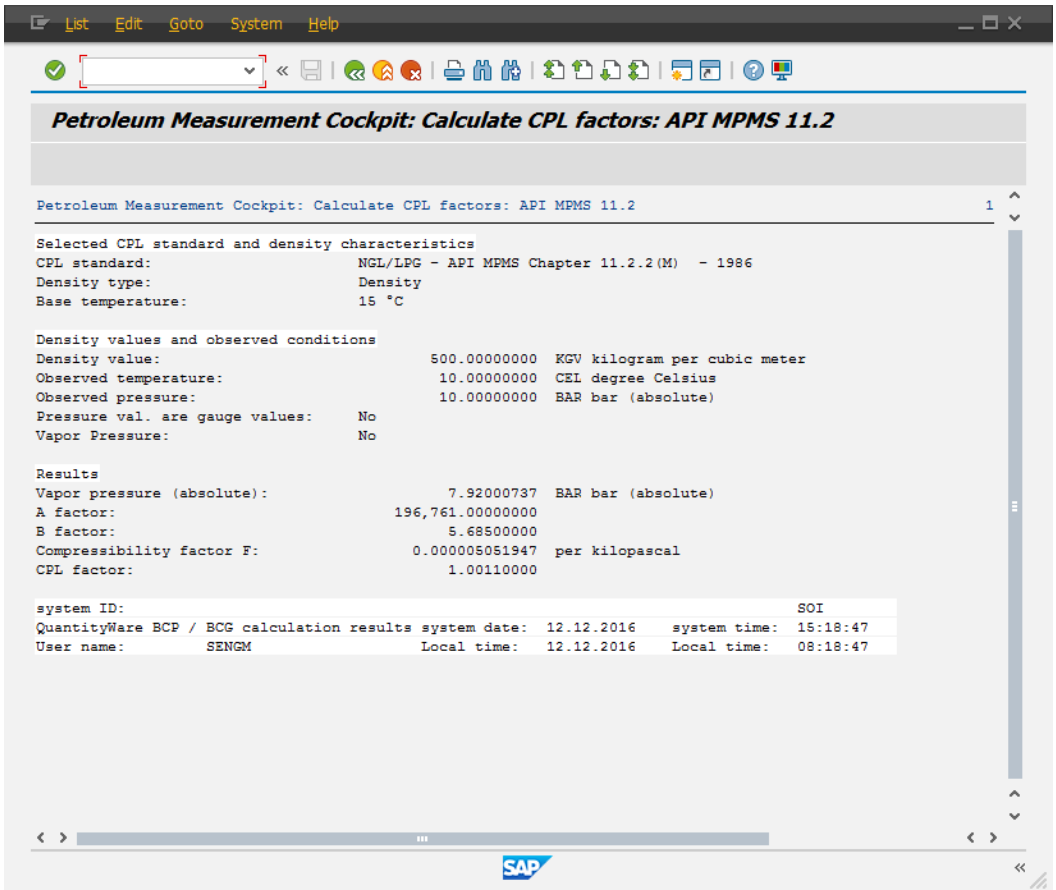
| Function | Description | Product |
|---|---|---|
| /QTYW/MQCI_BCG_ROUND_RES_GASBC | Round natural gas results and intermediate data - base conversion units | BCG |
| /QTYW/MQCI_BCG_ROUND_RES_LNGBC | Round LNG results and intermediate data - base conversion units | BCG |
| /QTYW/MQCI_ROUND_DENSITIES_2_1 | Round densities to 0.01 (kg/m³) - use e.g. for values in kg/m³ or °API | BCP/G |
| /QTYW/MQCI_ROUND_DENSITIES_3_1 | Round densities to 0.001 (kg/m³) - use e.g. for values in kg/m³ or °API | BCP/G |
| /QTYW/MQCI_ROUND_DENSITIES_4_1 | Round densities to 0.0001 - use e.g. for relative densities or kg/L | BCP/G |
| /QTYW/MQCI_ROUND_DENSITIES_5_1 | Round densities to 0.000 01 - use e.g. for relative densities or kg/m³ | BCP/G |
| /QTYW/MQCI_ROUND_SW_FRAC_5_1 | Round sediment & water fraction to 0.000 01 | BCP/G |
| /QTYW/MQCI_ROUND_MF_4_1 | Round meter factor to 0.000 1 | BCP/G |

### BCP/CTP & BCG/CTG Usability

Reflecting the constructive and important feedback from customers and consultants who work with the Petroleum and Gas Measurement Cockpit, the following PMC and GMC usability enhancements are delivered with BCS 3.0:

#### Enhanced Usability – API MPMS Chapter 11.2 - CPL Calculator

If you select “F8” within the API MPMS Chapter 11.2 CPL Calculator, the result list is printed as classic SAP list:

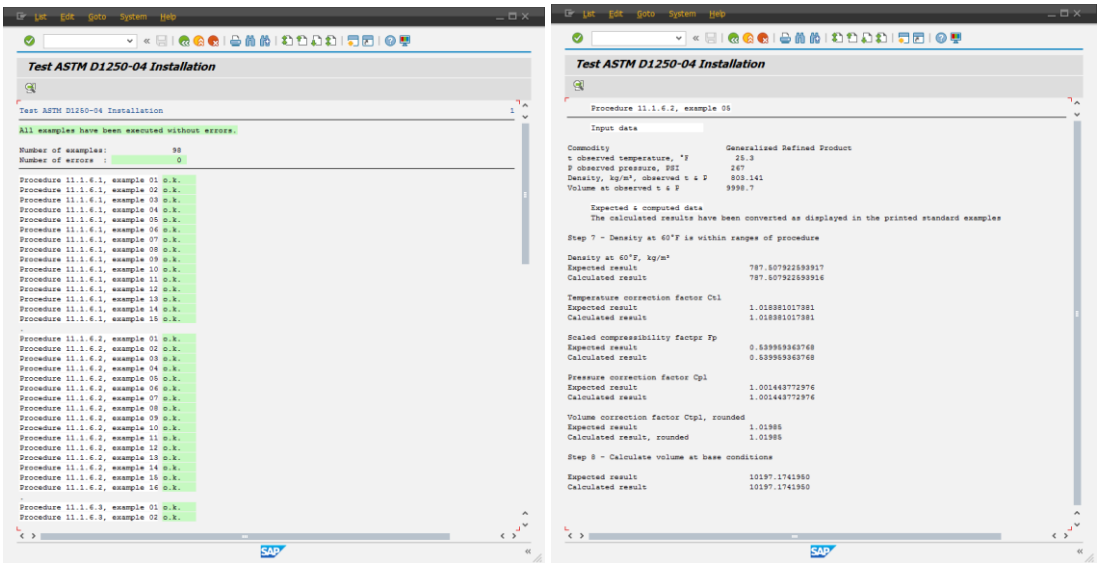



#### Enhanced Usability – Oil & Gas Test Calculator

After selection of the Oil & Gas Test Calculator push button (transaction O3QCITEST) within the PMC and GMC, the calculator is started with the conversion group entry screen as default. No additional user action to switch to this entry screen from the former default, the material/plant entry screen, is required. Technically, a copy of transaction O3QCITEST (/QTYW/QCITEST) is utilized.

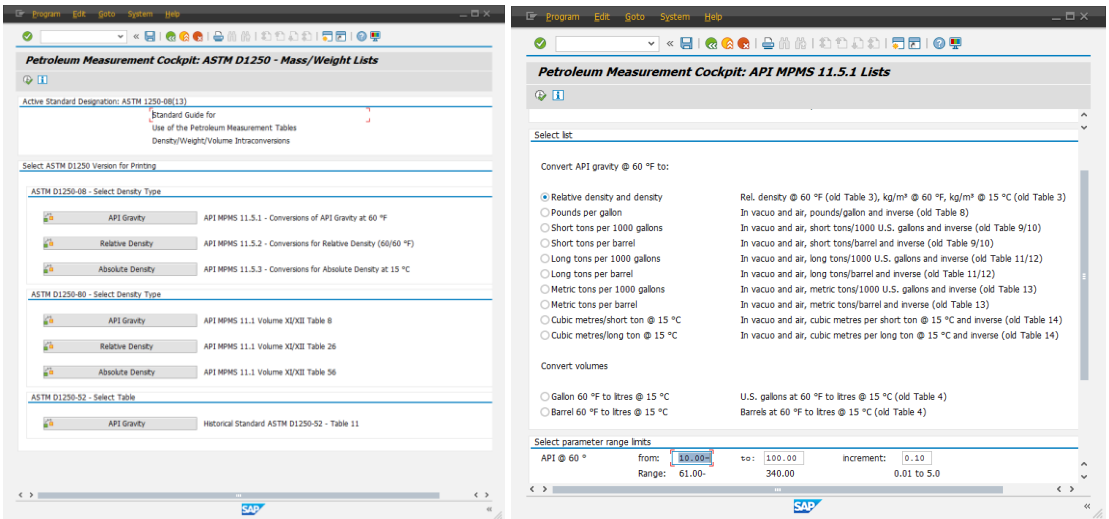
## Enhanced Usability – API MPMS Chapter 11.1 – 2004: Detail Installation Test Results

The 98 test examples have been reorganized and the details are now being formatted for easy comparison with the implementation guidelines document:




## Enhanced Usability - API MPMS Chapter - 11.5 List Printing

The API MPMS Chapter 11.5 List Printing has been enhanced such that the old Table nomenclature (ASTM D1250-80) is now displayed upon selection of a specific table set:



### Enhanced Usability - Documentation

The PMC and GMC documentation has been completely revised and corrected, including the message texts and long texts of all four message classes; a list of commonly used abbreviations is now available in the PMC and GMC overview documentation.

### BCP and BCG Corrections

QuantityWare notes 000068, 000069, and 000070 are contained in BCS 3.0 CSP01:

| Note No. | Short Text | Link |
|---|---|---|
| 000068 | Minor Calculation Differences SAP QCI – API C <> QuantityWare BCS | Note-000068 |
| 000069 | C to ABAP Migration Tool Enhancements & Corrections | Note-000069 |
| 000070 | ISO 6578 – LNG: intermediate parameter rounding – additional option for molar volumes $V_i$ rounding | Note-000070 |

In addition to these corrections and advanced developments - already delivered as individual notes - the following minor enhancements and corrections within the PMC and GMC are provided:

1. The API MPMS Chapter 11.2 CPL Calculator Documentation has been clearly rewritten stating that the calculator is not designed for calculations based on the API MPMS Chapter 11.1-2004 (ASTM D125-04) pressure corrections.

2. The pressure input check logic of the API MPMS Chapter 11.2 CPL Calculator has been enhanced to accept all realistic pressure values.

3. For all four S&W crude oil calculation models, enhanced consistency checks (UoM check and SAP dimension check) for the sediment and water percent value entry are implemented.

4. The API MPMS Chapter 11.2.5 – GPA TP-15 implementation has been corrected such that the exact range limit of -50 °F passes the range check.

5. The API MPMS Chapter 11.2.2 and 11.2.2(M) implementation guidelines have been critically analyzed for the higher density limits of 0.637 and 637 kg/m³ - the implementation guidelines for these two special values apparently do not require rounding these density values 0.637 to 0.638 or 637 kg/m³ to 638 kg/m³. Thus the BCS 3.0 CSP01 implementations now also do not round these special boundary values and exactly reproduce the printed table values.

6. The ALV list options for the BCP and BCG configuration check reports have been corrected such that sorting of the detailed results is enabled.

7. The PMC UoM consistency tool has been enhanced such that additional constant values (only relevant for temperature UoM) and real rounding settings for all UoM are checked to be not set to a non-initial value for all template UoM.

8. The BCP Template Calculator has been declared obsolete and has been removed from template client 045 access via push button “Petroleum Specialist Calculators”.

9. The display of the physical property data sets via the GMC has been corrected such that the component names are printed correctly (not repeating the first name for all components) when selecting the “Print PP set” push button.