

## **BCG 1.0A**

Standard

Implementation

ISO 6578

Refrigerated hydrocarbon  
liquids – static measurement –  
calculation procedure

LNG

## Notes:

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## Introduction

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This solution is an implementation of standard

*ISO 6578, First edition 1991-12-01: “Refrigerated hydrocarbon liquids – static measurement – Calculation procedure” – LNG part -*

It is part of the product Bulk Calculations Gas Version 1.0A (BCG 10A).

The revised “Klosek and McKinley model” defined in ISO 6578 is also described in

*ASTM D 4784-93 (Reapproved 2003): “Standard Specification for LNG Density Calculation Models”*

as one of four relevant models which is used widely within the LNG processing industry.

The solution runs only in an SAP ABAP environment in which IS-Oil has been implemented.

This solution can be accessed by the SAP Quantity Conversion Interface (QCI) and is controlled by the conversion groups provided within this configuration implementation.

## 1. Installation

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The technical implementation is provided as a part of a CSP package for BCG 10A.

Please follow the standard SAP instructions for importing service packages into your system via transaction SPAM, or the implementation on installation packages via transaction SAINT.

SAP Oil and Gas must be installed

QuantityWare BCG 10A must be installed.

Customizing settings, which are needed in every client in which this standard will be used, are included in the delivery package.

On releases based upon SAP 4.72 and below, the related customizing transport must be imported into all necessary clients, or distributed to them from client 000.

On releases based upon SAP ERP 2005 (ECC 6.00) or newer, BC Set /QTYW/BCG\_10A must be activated in the relevant clients.

Please refer to the QuantityWare BCG 10A Installation Guide for more information.

**▲ WARNING:** *If you import the customizing template into a pre-existing client, any pre-existing entries listed within the template (transport or BC-Set) will be **OVERWRITTEN!***

## 2. Basic definitions of natural gas/LNG processing

---

While natural gas in the gaseous state is transmitted through pipelines, LNG (Liquefied Natural Gas) offers the possibility to supply global locations via special LNG tankers that can not be reached via pipelines, e.g. Japan, South Korea and Taiwan. In addition LNG composition, due to the liquefaction process where components are removed, results in the delivery of a higher quality product to the market.

Simply put, LNG is natural gas with a specified composition (high methane content, low levels of corrosive components and components that would solidify during liquefaction) that is cooled down to cryogenic temperatures (typically at, or slightly below the melting point of methane - approximately minus 161°C). At such low temperatures the gas condenses into a liquid and experiences a volume reduction to approx. 1/600 when compared to the same amount in gaseous form. Using special tankers with insulated tanks, LNG can be shipped across oceans to reach locations where pipelines are not feasible, due to geographical, political or environmental obstacles. At present (2007) approx. 190 LNG tankers are available world wide, however the LNG market is expected to show high growth rates within the next decades. The rising demand for clean and reliable energy from LNG at an increasing number of locations justifies large investments – in liquefaction, storage and regasification sites, as well as LNG tankers. As an example of increasing interest and investment, tanker capacities are growing, latest plans include tankers with 250.000 Cubic Meter capacity, at initial investments of approx. 200 Mio US Dollars for one tanker.

From a measurement point of view, during custody transfer of the liquid (LNG), the LNG's density, molar composition and heating value are required; typically, molar composition is determined from several samples taken during transfer. Using the transfer samples, gas chromatography is applied to determine the composition (e.g. mol % of all components) of LNG, which can then be utilised to calculate the LNG density and heating values, as well as the density of the gaseous state at any desired reference condition. On a high level, the LNG process can be divided into the following steps:

- 1) Exploration of the natural gas
- 2) “Sweetening”, Removal of undesired components and Liquefaction (“Liquefaction trains”) at LNG loading sites and the storage of LNG in large tanks for shipment with LNG tankers.
- 3) Liquefied product transfer to LNG tankers (shore – to ship ) – Custody transfer point

- 4) Shipping to receiving countries - LNG custody transfer into receiving storage tanks
- 5) Regasification of LNG into pipeline network (high pressure) and distribution to end consumers

This document, **BCG 10A ISO LNG.pdf** describes the QuantityWare solution for LNG processing with a focus on custody transfer measurement procedures (shore-to-ship and ship-to-shore). With this LNG conversion package, LNG processes (transfer shore to ship, ship to shore), using the SAP Trader's & Schedulers Workbench (TSW), are fully supported from a measurement and quantity conversion point of view, including corrections for gas/vapour phase quantities, as well as transmission processes for pipeline via TSW, based on the solutions described in the additional documents delivered with BCG 10A.

Besides serving as basic feedstock for the chemical industry, natural gas is predominantly used for heat production as a fuel in large industry sites and millions of households around the world. In order to define a trading value for natural gas and to ensure natural gas interchangeability, certain quantities that characterize natural gas must be defined and recorded in business transactions for various processes e.g. inventory management, quality assurance, pricing and excise duty payments. This is true for the gaseous state as well as for LNG when it is traded and finally regasified for combustion.

For a comprehensive list of such quantities we recommend ISO standards 6976 & 6578 (LNG specific) as a reference, as well as GPA 2145 and GPA 2172.

In order to aid the comprehension of this documentation, we cite the most important definitions from these standards.

Superior calorific value:

The amount of heat which would be released by the complete combustion in air of a specified quantity of gas, in such a way that the pressure  $p_1$  at which the reaction takes place remains constant, and all the products of combustion are returned to the same specified temperature  $t_1$  as that of the reactants, all of these products being in the gaseous state except for water formed by combustion, which is condensed to the liquid state at  $t_1$ .

▲ A synonym for calorific value is the term **heating value**. Calorific values can be specified on a molar or mass basis. Then the calorific value depends on the combustion reference conditions  $t_1$  and  $p_1$ . More commonly, calorific values are determined based upon a volumetric basis ;in this instance, the calorific value needs to be specified with the combustion reference conditions  $t_1$  and  $p_1$  as well as the volumetric reference conditions  $t_2$  and  $p_2$ .

#### Inferior calorific value:

The amount of heat which would be released by the complete combustion in air of a specified quantity of gas, in such a way that the pressure  $p_1$  at which the reaction takes place remains constant, and all the products of combustion are returned to the same specified temperature  $t_1$  as that of the reactants, all of these products being in the gaseous state.

#### Density:

The density is the mass of a gas sample divided by its volume at specified conditions of pressure and temperature.

#### Relative density:

The density of a gas divided by the density of dry air of standard composition (see Annex B ISO 6976:1995 for a definition of dry air) at the same specified conditions of pressure and temperature.

#### Wobbe index:

The superior calorific value on a volumetric basis at specified reference conditions, divided by the square root of the relative density at the same specified metering reference conditions.

▲ The Wobbe index is an important quality designation for natural gas, which is commonly used to determine trade prices and the interchangeability of natural gas.

▲ The SAP QCI does not calculate the Wobbe index for natural gas. BCG contains functions to perform these calculations within the delivered global templates.

#### Gas interchangeability:

An important business requirement when trading natural gas is that natural gas combustion is kept at a defined quality levels that are e.g. required by burners. The Wobbe index (sometimes also referred to as Wobbe number) can serve as one important quality number to ensure interchangeability of natural gas batches with e.g. an apparent different composition.

#### Ideal gas and real gas:

An ideal gas is one that obeys the ideal gas law:

$$p \cdot V_m = R \cdot T \quad \dots(1)$$

where

$p$  is the absolute pressure

$T$  is the thermodynamic temperature

$V_m$  is the volume per mole of gas

$R$  is the molar gas constant, in coherent units.

No real gas obeys this law. For real gases, equation (1) must be rewritten as

$$p \cdot V_m = Z(T,p) \cdot R \cdot T \quad \dots(2)$$

where  $Z(T,p)$  is a variable often close to unity, and is known as the compression factor.

#### Compression factor:

The actual (real) volume of a given mass of a gas at specified pressure and temperature divided by its volume, under the same conditions, as calculated by the ideal gas law.

#### Combustion reference conditions:

The specified temperature  $t_1$  and pressure  $p_1$ . These are the conditions at which the fuel (natural gas) is notionally burned.

#### Metering reference conditions:

The specified temperature  $t_2$  and pressure  $p_2$ . These are the conditions at which the amount of the fuel to be burned is notionally determined; there is no a priori reason for these to be the same as the combustion reference conditions.

▲ *A range of reference conditions is in use throughout the world. In order to ensure ease of trade, exact conversions of natural gas quantities between different sets of reference conditions is required, based on international standards. This range of different reference conditions is also one of the main reasons why natural gas quantity conversions are complex, even in the low pressure regime.*

Standard reference conditions of selected countries:

Country	t <sub>1</sub>	p <sub>1</sub>	t <sub>2</sub>	p <sub>2</sub>
Argentina	-	101,325 kPa	15 °C	101,325 kPa
Australia	15 °C	101,325 kPa	0 °C	101,325 kPa
Austria	25 °C	101,325 kPa	0 °C	101,325 kPa
Belgium	25 °C	101,325 kPa	0 °C	101,325 kPa
Brazil	-	101,325 kPa	0 °C	101,325 kPa
Canada	15 °C	101,325 kPa	15 °C	101,325 kPa
China	20 °C	101,325 kPa	20 °C	101,325 kPa
Czechoslovakia	25 °C	101,325 kPa	20 °C and 0 °C	101,325 kPa
Denmark	25 °C	101,325 kPa	0 °C	101,325 kPa
Egypt	-	101,325 kPa	15 °C	101,325 kPa
Finland	-	101,325 kPa	15 °C	101,325 kPa
France	0 °C	101,325 kPa	0 °C	101,325 kPa
Germany	25 °C	101,325 kPa	0 °C	101,325 kPa
Hong Kong	-	101,325 kPa	15 °C	101,325 kPa
Hungary	-	101,325 kPa	0 °C	101,325 kPa
India	-	101,325 kPa	0 °C	101,325 kPa
Indonesia	-	101,325 kPa	0 °C	101,325 kPa
Iran	-	101,325 kPa	15 °C	101,325 kPa
Ireland	15 °C	101,325 kPa	15 °C	101,325 kPa
Italy	25 °C	101,325 kPa	0 °C	101,325 kPa
Japan	0 °C	101,325 kPa	0 °C	101,325 kPa
Netherlands	25 °C	101,325 kPa	0 °C	101,325 kPa

New Zealand	-	101,325 kPa	15 °C	101,325 kPa
Norway	-	101,325 kPa	15 °C	101,325 kPa
Pakistan	-	101,325 kPa	15 °C	101,325 kPa
Romania	25 °C	101,325 kPa	15 °C and 0 °C	101,325 kPa
Russia	25 °C	101,325 kPa	20 °C and 0 °C	101,325 kPa
Spain	0 °C	101,325 kPa	0 °C	101,325 kPa
Sweden	-	101,325 kPa	0 °C	101,325 kPa
United Kingdom	15 °C	101,325 kPa	15 °C	101,325 kPa
USA	15 °C	101,325 kPa	15 °C	101,325 kPa
Yugoslavia	0 °C	101,325 kPa	0 °C	101,325 kPa

Source: ISO 13443 and ISO 12213.

On the other hand, ISO 6976 specifies six sets of reference conditions for heating values on a volumetric basis (Table 5 therein), which can be extracted from the above table, and one additional set (25/15) is apparently in usage in some countries. QuantityWare thus defines a global template for the SI system based on seven sets of combustion and metering reference conditions, plus an additional three sets of U.S. customary conditions.

#### **Liquefied natural gas (LNG):**

Liquids composed predominantly of methane.

#### **Orthobaric density:**

The mass of the liquid occupying unit volume at a given temperature, the liquid being in equilibrium with its vapour.

### 3. Components of the Installation

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Within this implementation, we provide conversion groups and reading groups together with formula implementations that calculate the liquid (LNG) density, base heating values, densities (gaseous) and the Wobbe Index as well as quantity values (energies, masses, volumes (gaseous), volume(liquid) at any desired reference condition set for LNG (CRYOGENIC TEMPERATURES) at REAL GAS CONDITIONS using methods defined in ISO 6578. For simple demonstration and test purposes, we also provide conversion groups that operate on a simple “gross” calculation procedure, where the liquid density, heating value and molecular mass of the natural gas have to be known and ideal gas conversions are applied.

▲ *When entering a quantity value (transaction quantity in SAP terminology) that is transferred, the material temperature specifies the conditions for both LNG liquid volume and density. If the density is not calculated from the composition data, but entered based on a density determination via sampling, the test temperature has to be specified as well and a correction can be performed to adjust the test density to the LNG material temperature.*

*LNG contracts are typically long term (up to 20 years) in order to secure ship capacity and utilization. LNG contracts specify the calculation procedure including the physical parameter data that has to be utilized for the calculation procedure. ISO 6976, ISO 6578 and GPA 2145 provide such data. For each standard, QuantityWare delivers datasets which are assigned to conversion groups and depending on the contractual agreements, the conversion group with the correct data set has to be chosen or designed based on the template examples delivered by QuantityWare.*

### Customizing data for LNG conversions: Gross methods without molar composition data

SI system:

For the QuantityWare MQCI conversion groups QUA0 to QUAB and QUB0 to QUB5 are provided within BCG 1.0A using SI measurement units with standard reference pressure values  $p_1$  and  $p_2$  of 101,325 kPa,

For the SAP QCI conversion groups QU00 to QU07 are provided within BCG 1.0A using SI measurement units with standard reference pressure values  $p_1$  and  $p_2$  of 101,325 kPa,

$t_1/^\circ\text{C}$  = combustion reference temperature


$t_2/^\circ\text{C}$  = volumetric or metering reference temperature

Density type:

3: absolute density

Heating value types:

01: Energy / Volume

 *For LNG, the heating value type is required for manual entry of heating values. If heating values are calculated based on the molar component analysis data, the heating value type merely defines which heating value is calculated first during the conversion process.*

Heating value classes:

U.S.customary system:

For the QuantityWare MQCI conversion groups QUAC, QUAD and QUB6 are provided using U.S. customary measurement units.

For the SAP QCI conversion groups QU10 to QU12 are provided using U.S. customary measurement units:

Density type 03: Density

$t_1/^\circ\text{C}$  = combustion reference temperature = 60 °F

$t_2/^\circ\text{C}$  = volumetric or metering reference temperature 60°F

$p_2/\text{PSI}$  = volumetric or metering reference pressure , variable (different in different U.S. states)

Heating value types:

01: Energy / Volume

*▲ For LNG, the heating value type is required for manual entry of heating values, if heating values are calculated based on the molar component analysis data it merely defines which heating value is calculated first during the conversion process.*

Heating value classes:

#### **Customizing data for LNG conversions: Detailed method with molar composition data**

SI system:

For the QuantityWare MQCI conversion groups QUC0 to QUC6 are provided within BCG 1.0A using SI measurement units with standard reference pressure values  $p_1$  and  $p_2$  of 101,325 kPa,

For the SAP QCI conversion groups QU2\*, QU4\*, QU6\* and QU8\* are provided within BCG 1.0A using SI measurement units with standard reference pressure values  $p_1$  and  $p_2$  of 101,325 kPa,

$t_1/^\circ\text{C}$  = combustion reference temperature

$t_2/^\circ\text{C}$  = volumetric or metering reference temperature

Density type:

3: absolute density

*▲ It is also possible to maintain conversion groups using API gravity or relative density (water).*

Heating value types:

01: Energy / Volume

▲ *For LNG, the heating value type is required for manual entry of heating values, if heating values are calculated based on the molar component analysis data it merely defines which heating value is calculated first during the conversion process.*

Heating value classes:

SD: Superior,dry

U.S.customary system:

For the QuantityWare MQCI conversion group QUC7 is provided using U.S. customary measurement units:

For the SAP QCI conversion groups QU3\*, QU5\*, QU7\* and QU9\* are provided using U.S. customary measurement units:

Density type 03: Density

$t_1/^\circ\text{C}$  = combustion reference temperature = 60 °F

$t_2/^\circ\text{C}$  = volumetric or metering reference temperature 60°F

$p_2/\text{PSI}$  = volumetric or metering reference pressure , variable (different in different U.S. states)

Heating value types:

01: Energy / Volume

▲ *For LNG, the heating value type is required for manual entry of heating values, if heating values are calculated based on the molar component analysis data it merely defines which heating value is calculated first during the conversion process.*

Heating value classes:

SD: Superior,dry

## Unit of measure and conversion group customizing

- ▲ *QuantityWare delivers a new dimension VOLLIQ and the units of measure - BLQ (Barrel, liquid), M3L (Cubic meter, liquid) and CFL (Cubic foot, liquid), so that it is possible to clearly distinguish between LNG (in the liquid state) and corresponding natural gas in the gaseous state (VOLUME).*
- ▲ *For LNG MQCI conversion groups, you define a base LNG temperature (for the liquid state) in the conversion group.*
- ▲ *For LNG MQCI conversion groups, you specify the calculation data and procedures within the conversion group customizing*

### Programs & test tools:

The following programs are provided:

- ➔ Test reports:                /QTYW/GROSS\_LNG\_TEST, /QTYW/DETAIL\_LNG\_TEST  
                                  /QTYW/MQCI\_GROSS\_LNG\_TEST,  
                                  /QTYW/MQCI\_DETAIL\_LNG\_TEST
- ➔ Function Group:             /QTYW/LNG\_CONVERSION
- ➔ Function Group:             /QTYW/ISO\_LNG
- ➔ BAdI Implementation:     /QTYW/NATGAS

### BAdI Implementations - relevant for SAP QCI only

One method must be implemented, to ensure that Natural gas results are passed to the SAP applications and stored in the database if the SAP QCI conversion groups are utilized.

```
METHOD if_ex_oib_qci_cust_param-move_cust_par_to_result .

*/ QW Implementation to pass additional natural gas results to
*/ calling application
DATA: ls_naturalgas_export TYPE /qtyw/naturalgas_export.
CALL FUNCTION 'OIB_QCI_MOVE_ITAB_TO_STRUC'
  EXPORTING
    i_ddic_reference      = '/QTYW/NATURALGAS_EXPORT'
  IMPORTING
    e_structure          = ls_naturalgas_export
  TABLES
    t_oib_a10            = it_param
  EXCEPTIONS
    structure_not_exists = 1
    field_type_not_valid = 2
    inconsistent_customizing = 3
    OTHERS               = 4.
IF sy-subrc <> 0.
  MESSAGE ID sy-msgid TYPE sy-msgty NUMBER sy-msgno
    WITH sy-msgv1 sy-msgv2 sy-msgv3 sy-msgv4
    RAISING calculation_failure.
ENDIF.

MOVE-CORRESPONDING ls_naturalgas_export TO cs_customer.

ENDMETHOD.
```

1. BAdI Implementation: **/QTYW/LNG\_CHECK**– relevant for **SAP QCI conversion groups only**

▲ *This method must be implemented, to correct an SAP QCI coding error.*

```

METHOD if_ex_oib_qci_round_qty-check_qci_input .
* QuantityWare LNG solution: QCI error - SAP QCI leaves
* "old" errors in internal table GTC_RETURN, Clear
* statement missing in Function OIB_QCI_QUANTITY_CONTROL,
* FORM oib_qci_badi_check !
* Check for Product Type LNG
***** IMPORTANT *****
* IF QuantityWare customers have already implemented this BAdI
* Method, just put this code, which is LNG product type
* specific at the end of the active method implementation !
*****
DATA: ls_oib01 TYPE oib01.

CALL FUNCTION 'OIB_QCI_MOVE_ITAB_TO_STRUC'
  EXPORTING
    i_ddic_reference      = 'OIB01'
  IMPORTING
    e_structure          = ls_oib01
  TABLES
    t_oib_a10            = ct_param
  EXCEPTIONS
    structure_not_exists = 1
    field_type_not_valid = 2
    inconsistent_customizing = 3
    OTHERS               = 4.
IF sy-subrc <> 0.
  MESSAGE ID sy-msgid TYPE sy-msgty NUMBER sy-msgno
    WITH sy-msgv1 sy-msgv2 sy-msgv3 sy-msgv4.
ENDIF.
IF NOT ls_oib01-pdtyp IS INITIAL.
  IF ls_oib01-pdtyp EQ '7'.
    CLEAR ct_return[].
  ENDIF.
ELSE.
* QCI does not always pass all oib01 data !
CALL FUNCTION 'OIB01_SINGLE_READ'
  EXPORTING
    oib01_umrs1 = ls_oib01-umrs1
  IMPORTING
    woib01      = ls_oib01
  EXCEPTIONS
    not_found   = 1
    OTHERS      = 2.
IF sy-subrc <> 0.
  MESSAGE ID sy-msgid TYPE sy-msgty NUMBER sy-msgno
    WITH sy-msgv1 sy-msgv2 sy-msgv3 sy-msgv4.
ENDIF.
IF ls_oib01-pdtyp EQ '7'.
  CLEAR ct_return[].
ENDIF. ENDIF.

```

## 2. BAdI Implementation: /QTYW/LNG – relevant for SAP QCI conversion groups only

This BAdI implementation is required to connect the LNG conversions for all Dimensions (Liquid volume, Mass, Energy, Volume) to the SAP QCI. It is defined for filter type PDTYP = 7 (LNG). Exactly one method is implemented:

```

METHOD if_ex_oib_qci_dim1_to_dim2~dimension_to_dimension .
  /* This QuantityWare implementation connects the QuantityWare
  /* LNG conversion to the SAP QCI
  CLEAR ct_return[].

  CALL FUNCTION '/QTYW/LNG_QUANTITY_CONVERSION'
    EXPORTING
      if_trqty          = i_trqty
      if_truom          = i_truom
      if_tguom          = i_tguom
      if_trtmp          = i_trtmp
      if_trpres         = i_trpres
      if_tgtmp          = i_tgtmp
      if_tgpres         = i_tgpres
      if_trdim          = i_trdim
      if_tgdim          = i_tgdim
      if_dimmass        = i_dimmass
      if_dimmvolume     = i_dimmvolume
      if_dimenergy      = i_dimenergy
      if_dimdimless     = i_dimdimless
    TABLES
      itc_param         = itc_param
    CHANGING
      cf_tgqty          = c_tgqty
    EXCEPTIONS
      calculation_failure = 1
      OTHERS             = 2.
  IF sy-subrc <> 0.
    PERFORM collect_message IN PROGRAM saploib_qci
      TABLES
        ct_return
      USING
        sy-msgid
        sy-msgno
        sy-msgty
        sy-msgv1
        sy-msgv2
        sy-msgv3
        sy-msgv4.
    MESSAGE ID sy-msgid TYPE sy-msgty NUMBER sy-msgno
      WITH sy-msgv1 sy-msgv2 sy-msgv3 sy-msgv4
      RAISING calculation_failure.
  ENDIF.
ENDMETHOD.

```

## 4. Formula and requirements

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### Implemented formula

This is an implementation of LNG conversion groups based on:

*ISO 6578, first edition 1991-12-01: "Refrigerated hydrocarbon liquids – static measurement – Calculation procedure"* – LNG part.

The revised Klosek and McKinley model defined in ISO 6578 is also described in:

*ASTM D 4784-93 (Reapproved 2003): "Standard Specification for LNG Density Calculation Models"*

as one of four relevant models, and is widely used within the LNG processing industry.

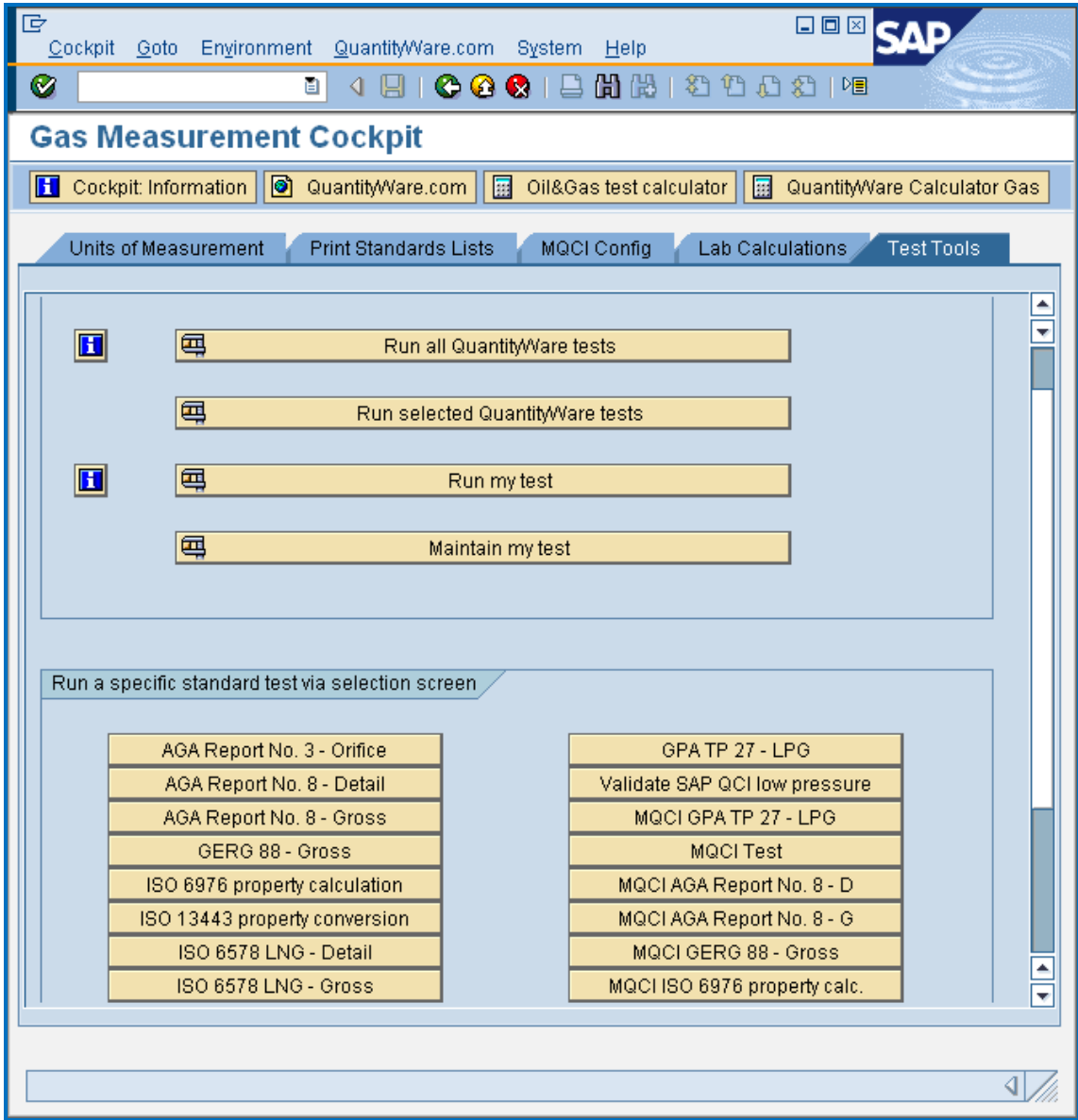
- Some formulas required for the conversion of natural gas are implemented within the SAP QCI, which allow conversions between different sets of standard (base) reference conditions. Although ISO 13443 defines a temperature value of 15 °C (288.15 K) and a pressure value of 101,325 kPa as standard reference conditions for measurements and calculations for real dry gas (natural gases, natural-gas substitutes, similar fluids in the gaseous state), it is recognized that in certain circumstances it may be impracticable or even unallowable to use these ISO standard reference conditions (e.g. forced by national legislation or contractual obligations). Thus, conversion formulae are provided in ISO 13443 which enable values of properties (relating to any known other reference conditions) to be converted to values for the ISO standard reference conditions. In addition to the formulae provided within ISO 13443, calculation formulae based on ISO 6976:1995 (E) are utilized within this solution by QuantityWare.
- The LNG conversion routines are implemented in QuantityWare functions - provided within BCG 1.0A - that implement and connect the LNG equation procedures via the provided conversion groups to the SAP QCI; both the formulae and implementation procedures are based on ISO 6578:1991, ISO 6976:1995(E), ISO 13443:1996.
- The QuantityWare MQCI implementations operate completely independent from the SAP QCI logic, and merely use the SAP QCI BAdI as integration interface.

### Implementation requirements

None beyond the requirements described above.

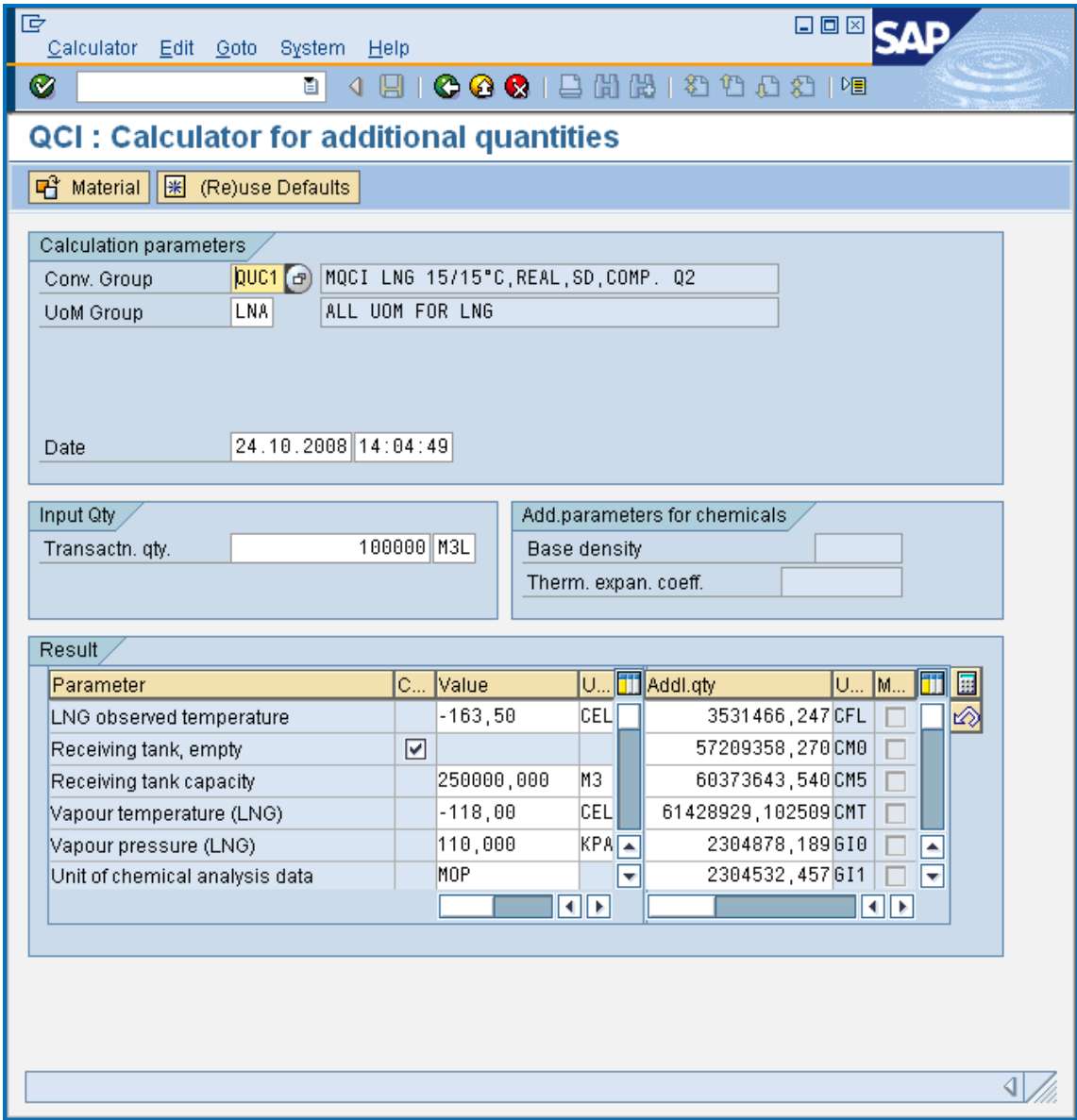
## 5. Installation Test

Included in the BCG 1.0A package, are test & validation programs that can be used to test and also validate the installation of this conversion group set. You can easily access the tests via the Gas Measurement Cockpit:



## 6. Integration into SAP - QCI desktop calculator

This configuration implementation (global template) is fully integrated into the QCI and thus into all logistics processes such as the SAP Trader's & Schedulers Workbench (TSW). The desktop calculator (transaction O3QCITEST) can be accessed from the Gas Measurement Cockpit and used to calculate natural gas quantities for all of the above defined conversion groups:



**Calculation parameters**

Conv. Group: QUC1 MQCI LNG 15/15°C, REAL, SD, COMP. Q2  
 UoM Group: LNA ALL UOM FOR LNG

Date: 24.10.2008 14:04:49

**Input Qty**

Transactn. qty.: 100000 M3L

**Add.parameters for chemicals**

Base density:   
 Therm. expan. coeff.:

**Result**

Parameter	C...	Value	U...	Addl.qty	U...	M...
LNG observed temperature		-163,50	CEL	3531466,247	CFL	<input type="checkbox"/>
Receiving tank, empty	<input checked="" type="checkbox"/>			57209358,270	CM0	<input type="checkbox"/>
Receiving tank capacity		250000,000	M3	60373643,540	CM5	<input type="checkbox"/>
Vapour temperature (LNG)		-118,00	CEL	61428929,102509	CMT	<input type="checkbox"/>
Vapour pressure (LNG)		110,000	KPA	2304878,189	G10	<input type="checkbox"/>
Unit of chemical analysis data		MOP		2304532,457	G11	<input type="checkbox"/>