

BCG 3.0 Test Manual

Test Cases for BCG Test Installations

Notes

The latest version of this documentation can be found in the QuantityWare <u>Knowledge Base</u>. All documentation is kept current for the combinations of latest BCS release with the latest supported SAP Oil, Gas, & Energy release. For all currently supported combinations see <u>Note #000086 "Support and</u> <u>Release (Lifecycle) details" page 2, "Release Lifecycle"</u>.

Your release level can be determined via:

"/o/QTYW/COCKPIT" -> "Cockpit" -> "Support Package Level"

Version History

Version	Date	Description
00	2015-06-01	Initial version
01	2017-12-01	Editorial changes
02	2019-06-25	Editorial changes
03	2020-07-14	Usage key terminology
04	2021-04-24	S/4HANA 2020 / 2020_EX validity confirmed -
		modern QW document style applied. 30A CSP02 / 30B CSP01
		changes
05	2023-11-01	30A CSP03 / 30B CSP02 changes

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1. Introduction

You have obtained a free-of-charge test usage key(s) for QuantityWare BCG – Bulk Calculations Gas. Your technical team has installed the software package in one of your test systems, following the Technical Installation Guide. In the QuantityWare template client 045, the BCG BC set has been activated. Your task is now to test BCG within the next 4 weeks (possibly with an extension period granted by QuantityWare).

QuantityWare provides three major customizing and configuration documents along with the BCG software package:

- The BCG Project and Implementation Guidelines BCG PAIG
- The BCG Supported Standards Manual
- The BCG Documentation Reference Manual

If you decide to conclude a usage agreement for BCG, it is strongly recommended that you consider all the above documents - following the PAIG Methodology to implement BCG into your system landscape as well as familiarizing yourself with the BCG Supported Standards Documentation and the BCG Documentation Reference Manual.



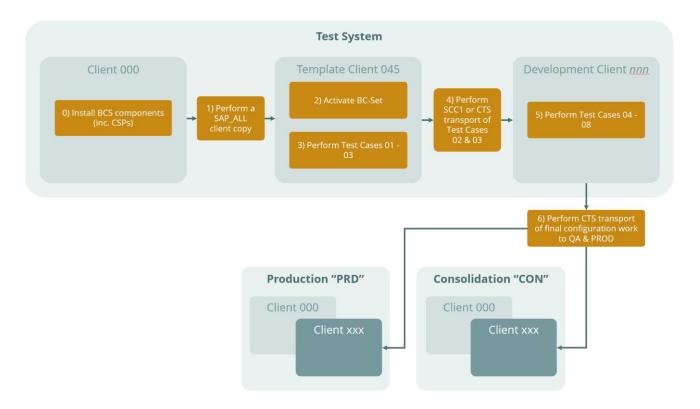
QuantityWare strongly recommends that a certified BCG consultant is employed for the implementation project, or that before implementation, you attend the appropriate BCG certification course.

During the 4-week testing period, you may not have a certified BCG consultant available, and may not have attended a certification course. Typically, testing time budgets are limited and detailed quantity conversions' configuration knowledge is not commonplace; in order to provide detailed guidance for your testing efforts, this document - the BCG Test Manual - provides a sequence **of eight (8) test cases** which you may execute in your system (client 045 and your own development/test client) in order to define a production ready conversion group in your development/test client – including automated test cases - based on the BCG template configuration.

The Gas Measurement Cockpit (GMC) is the central access point to for the configuration and testing of all quantity conversion settings in your system, thus all test cases are executed via the GMC. The only exception to this rule is test case 08, where you require the authority to assign a conversion group and UoM group to a material in the material master.

Each test case contains a sequence of actions to be performed in the BCG Gas Measurement Cockpit, illustrated with screen shots to ensure that you can easily identify all steps and execute the test case.

To execute the test cases in your test system, you require access to the QuantityWare **template client 045 and to your development client** (where all your business process' configuration data is available), as illustrated below:



In summary, through execution of the 8 test cases you:

- Learn how to selectively probe the rich BCG template in client 045
- Learn how to copy required conversion group configuration data to your Z* name space
- Transport that data to your development client for additional tests and final configuration.

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To execute the test cases, you must be familiar with SAP customizing transactions and have knowledge of working with SAP customizing transports. Additionally, good SAP QCI knowledge is required. To reduce the number of required screen shots for this document, customizing actions such as copying an object typically omit obvious steps.

The total execution time for all 8 test cases – if your use ID is equipped with all required authorizations – is estimated to be **8 hours** if you fulfill the above noted requirements.

If your organization is unfamiliar with the requirements for quantity conversions or has no documentation / experience concerning existing system configuration in this area, QuantityWare strongly recommends using the services of a <u>QuantityWare</u> <u>certified consultant</u>. QuantityWare can provide your organization with a <u>list of</u> <u>companies and independents</u> offering such consulting. QuantityWare does not offer such consulting services itself and support will not provide remote consulting through the service portal.



If you are planning to run BCG within your SAP PRA installation, test case 08 is not relevant for you. SAP PRA requires the assignment of a conversion group to a delivery network and is designed for low pressure natural gas quantity conversions – property data entry. Read the QuantityWare working paper "<u>PRA Measurement System</u> <u>Integration</u>" and QuantityWare <u>note 000059</u> for additional guidance. From a product point of view, QuantityWare CTG is the solution of choice for SAP PRA installations.

2. Test Cases

2.1. Test Case 01 – Run Installation Test - Template

Estimated test case execution time: 10 minutes

Part 1 - Log on to your template client 045 and launch the Gas Measurement Cockpit (GMC) – Transaction /n/qtyw/cockpit_gas. You first need to check if your basis team has installed the BCG test usage key. From the Gas Measurement Cockpit (GMC) menu select: Cockpit -> Usage Key. Then, select "Display" and note the list display:

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This looks good ☺, a BCG usage key is in place - in our example we also have a BCP usage key installed, which is not required.



Part 2: From the Gas Measurement Cockpit menu select: Environment -> BC Set Activation Test – is performed by the basis team, but a 4-eyes principle is always good.

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Part 3: Now you can run the QuantityWare BCG Installation Test. Select the GMC "Test Tools" tab strip and select the "Run Installation Test" push button.

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Low Pressure Gas & Property Data High Pressure Gas - Compression Factors		
ISO 6976(16) Property Calc. ISO 6976(05) Property Calc.		
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Description Nitrogen (N2) Dxygen mpurities: unit of measure Hydrogen sulfide Tot.sulphur(incl. Mercaptane) Transaction quantity: Transaction quantity Expected parameters: Expected parameter	Value Unit 0.400000 MGQ 5.000000 150.000000 67,056.000 M3L 462.000000 KGV 462.000000 KGV	cubic meter - LNG - liquid kilogram per cubic meter kilogram per cubic meter	Nitrogen (N2) Oxygen Impurities: unit of measure Hydrogen sulfide Tot.sulphur(incl. Mercaptane) Transaction quantity LNG Base density LNG Base density			

You may select any scenario to inspect its details.

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If the BCG installation test (validating the BCP template) does not run "green", do NOT proceed with the following 7 test cases. Before continuing with the steps described in this document, the issues causing the "red" test runs must be resolved. In such cases, the experience and multi-customer knowledge of a certified BCG consultant can pay for itself in time and effort saved.

2.2. Test Case 02 – Identify & Copy LNG Conversion Group - Template

Estimated test case execution time: 60 minutes

Introduction:

The QuantityWare BCG template contains more than 270 conversion groups for **dry natural gas**, **hydrogen**, **NGL** (**Natural Gas Liquids**) and **LNG** (**Liquefied Natural Gas**) quantity conversions, mapping all meaningful BCG supported measurement standard combinations.



All QuantityWare template conversion groups are defined in the Q* name range.

In the template client, QuantityWare also delivers test UoM groups, allowing you to perform test calculations for each template conversion group in that client without having to perform additional intricate configuration. A complete template of more than 390 UoM definitions (4 languages) is provided as a part of the delivery.

Each **NGL** conversion group is comprised of 4 different measurement standards:

- UoM conversion standards
- Mass-to-weight conversion standards
- CT(P)L standards ("Corrections for the effect of Temperature and Pressure on Liquid")
- Calculation model standards

Natural gas conversion groups fall into four main categories:

- Low pressure dry natural gas LPNG (including natural gas / hydrogen mixtures)
- High pressure dry natural gas HPNG (including natural gas / hydrogen mixtures)
- Liquefied natural gas LNG
- High pressure hydrogen HPH (100 % hydrogen)



For each category, two types of conversion groups are available:

- Conversion groups configured to perform quantity conversions based on **complete chemical composition** and flowing conditions of the dry natural gas (LP/HP)H / NG / LNG COMP
- Conversion groups configured to perform quantity conversions based on physical properties (heating value, density) and possibly partial chemical composition and flowing conditions of the dry natural gas (LP/HP)NG / LNG - PROP

The BCG template **MQCI** conversion groups for natural gas (LP/HP) NG and LNG are identified via 17 different calculation scenarios (considering the relevant combinations of natural gas calculation standards):

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	Use ISO tab./formula Heating value class Source R, M(air) Flowing press. calc. Summation fact. ind. (Rel.) density calc. Z mix calc.(Hv./d.) Z mix usage (E,V,m) Density type	HPNG COMP - compos. data AGA8-92DC, use all AGA8 res D1 HPNG COMP - compos. data AGA8-92DC, use ISO res. & AGA8 - D2 HPNG COMP - compos. data GERG2008, use all GERG 2008 r D1 HPNG COMP - compos. data GERG2008, use ISO res. & GERG - D2 HPNG COMP - composition data - VNIC SMV / GOST 30319-2 D
	Heating value type Activate ISO 6976 2016 e Extend range of standard Metering & combustion re	LNG COMP compos. data, ISO 6578 rev. Klosek-McKinley - D
•	Metering temperature(t2)	HPH COMP - flowing p, T - 100% hydrogen NIST JR VOL 113

These 17 calculation scenarios are mapped in the following table to the 7 possible classification combinations (as defined above):

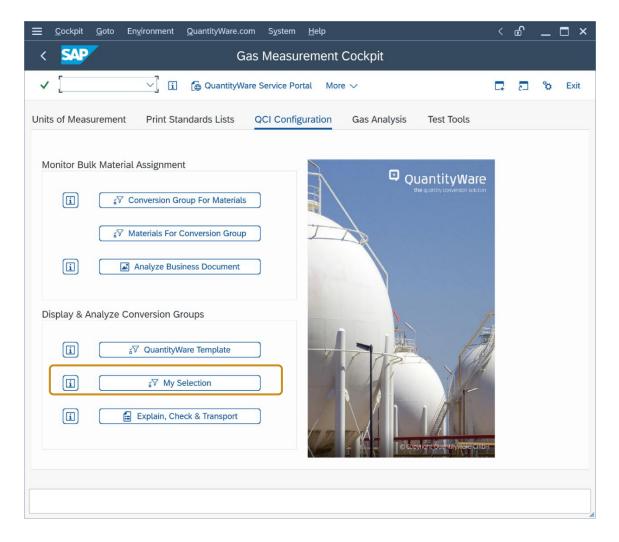
Category	Туре	Conversion group calculation scenario
LPNG	COMP	complete composition data
LPNG	PROP	heating value & density
HPNG	COMP	compos. data AGA8-92DC, use all AGA8 res D1
HPNG	COMP	compos. data AGA8-92DC, use ISO res. & AGA8 - D2
HPNG	COMP	compos. data GERG2008, use all GERG 2008 r D1
HPNG	COMP	compos. data GERG2008, use ISO res. & GERG - D2
HPNG	COMP	composition data - VNIC SMV / GOST 30319-2 D
HPNG	PROP	heating value/density/CO2/H2 - SGERG 88 - G
HPNG	PROP	heating value/density/CO2/H2 - SGERG-mod-H2 - G
HPNG	PROP	heating value/density/CO2/H2 - AGA8 - G1
HPNG	PROP	heating value/density/CO2/CO/H2 - AGA8 - G2
HPNG	PROP	density/N2/CO2 - GERG 91 / GOST 30319-2 G1
HPNG	PROP	density/N2/CO2 - NX19 modified /GOST 30319-2 G2
LNG	COMP	compos. data, ISO 6578 rev. Klosek-McKinley - D
LNG	PROP	heat. value/liquid density/gas density - G1
LNG	PROP	LNG PROP - heat. value/liquid density/gas mol. mass - G2
НРН	СОМР	flowing p, T - 100% hydrogen NIST JR VOL 113



The most challenging task during BCG implementation is the correct choice of a QuantityWare template conversion group for a material (group of materials). Here, <u>certified BCG consultants</u> bring years of experience to your project.

Once this assignment is made, you simply copy the Q*** template conversion group and associated configuration objects (e.g., reading group) to your Z*** name space in the template client. In this document, we assume that you know exactly which measurement standards are relevant for your materials; if this is not the case, see the BCG PAIG documentation for the required additional time.

Part 1: Select the GMC "QCI Configuration & Products" tab strip. Three selections are available to display defined subsets of the template conversion groups. Select "My selection", followed by the selection "Select by scenario (gas/LNG)":



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Define selection Select by scenario (gas/LNG)	< SAP Gas Measurement Cockpit: Conversion Group Selections				
Select by scenario (gas/LNG) Select by conv. group range Select by standards - NGL	✓ 🖂 🤤 i Cancel 🖶	L*	2	ô	Exit
	Define selection Select by scenario (gas/LNG) Select by conv. group range				
					< >

With this selection, you probe the MQCI natural gas template conversion groups by calculation scenario. As described above, 17 calculation scenarios are available.

For this test case, we wish to find an LNG MQCI conversion group at ISO base conditions (15 °C, 101.325 kPa) where we can enter the complete LNG chemical composition for the quantity conversions, and we thus select "LNG COMP compos. Data, ISO 6578 rev. Klosek-McKinley - D" from the list of the 17 calculation scenarios and then "select "Execute" (F8):

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No C.Grp Rdg. grou	ıp Ranges	QCI Se	ID Description		P.t.	Qty.EL %	Qty.WL %	Qty WH %	Qty.EH %
1 <u>QUC0</u> <u>QUC0</u>	QUC0		MQCI LNG 15/15	C,REAL,SD,COMP. Q8	7	0.50	0.10	0.10	0.50
2 <u>QUC1</u> <u>QUC0</u>	QUC0	QTYW Q2	MQCI LNG 15/15	C,REAL,SD,COMP. Q2	7	0.50	0.10	0.10	0.50
3 <u>QUC2</u> <u>QUC0</u>	QUC0	QTYW Q3	MQCI LNG 0/0°C	C,REAL,SD,COMP. Q3	7	0.50	0.10	0.10	0.50
4 <u>QUC3</u> <u>QUC0</u>	QUC0	QTYW Q1	MQCI LNG 25/0°C	,REAL,SD,COMP. Q1	7	0.50	0.10	0.10	0.50
5 <u>QUC4</u> <u>QUC0</u>	QUC0	QTYW Q4	MQCI LNG 15/ 0 °	C,REAL,SD,COMP. Q4	7	0.50	0.10	0.10	0.50
6 <u>QUC5</u> <u>QUC0</u>	QUC0	QTYW Q5	MQCI LNG 20/20 °	C,REAL,SD,COMP. Q5	7	0.50	0.10	0.10	0.50
7 <u>QUC6</u> <u>QUC0</u>	QUC0	QTYW Q6	MQCI LNG 25/20 °	C,REAL,SD,COMP. Q6	7	0.50	0.10	0.10	0.50
8 <u>QUC7</u> <u>QUC7</u>	QUC7	QTYW QE	MQCI LNG 60 °F/1	4.696 PSI,REAL,SD,CP Q	<u>A</u> 7	0.50	0.10	0.10	0.50
9 QUCA QUCA	<u>QUCA</u>	QTYW Q8	MQCI LNG 15/15	C,REAL,SD,CP.Q8 K1/2 V	<u>′l</u> 7	0.50	0.10	0.10	0.50
10 <u>QUCB QUCB</u>	QUCB		MQCI LNG 15/15	C,REAL,SD,COMP.Q8 VC	<u>VI</u> 7	0.50	0.10	0.10	0.50
11 <u>QUCC QUCC</u>	QUCC		MQCI LNG 15 °C I	HHV/WOBBE 60°F Q8 K1/2	<u>2 VI</u> 7	0.50	0.10	0.10	0.50
12 <u>QUCD QUCD</u>	QUCD	QTYW QS	MQCI LNG 15 °C,	ISO 6578:17 QS K1/2 VI	7	0.50	0.10	0.10	0.50
13 QUCE QUCD	QUCD	QTYW QS	MQCI LNG 15 °C,	ISO 6578:17 QS C K1/2 VI	7	0.50	0.10	0.10	0.50

13 template conversion groups are available for this calculation scenario. By clicking on the description text, a detailed description of the conversion group is displayed. In this case it is informing you that conversion group QUC0, QUC1 and QUCA to QUCE are configured with ISO base conditions (15 °C, 101.325 kPa) for the gas phase. For this test case, we select **QUC1**, which carries physical property data set Q2 and does not require as much configuration data from the template client to be migrated to our development client. In a real-life project, this selection process takes much more time since detailed requirements need to be gathered from several departments, **including contractually defined calculation data for LNG**.

Let's perform a trial conversion using conversion group QUC1. In the GMC, select push button "Oil & Gas Test Calculator".

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✓ [] [GuantityWare Service Portal 🗐 OilGas Test Calculator More ∨	🗔 🔁 💝 Exit
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Display & Analyze Conversion Groups	

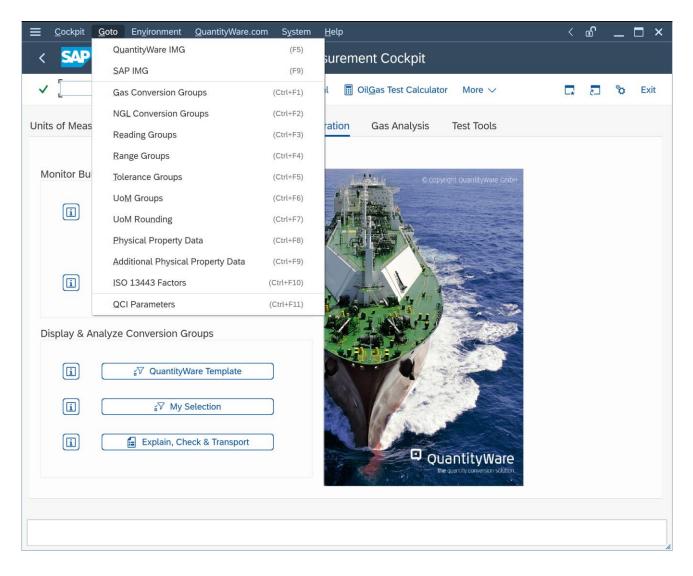
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Conv. Group QUC1 Q MQCI L	15/15 °C,REAL,SD,0	COMP. Q2	
UoM Group QLN QUANTI	ARE LNG, SD TEST		
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Transactn. qty. 100	M3L Base density	у	
	Therm. expa	an. coeff.	
Result			
Parameter	Value U	Addl.qty U M M M	
LNG observed temperature	-163.50 CEL	3557380.677CFC □	
Receiving tank, empty		3531466.247CFL	
Receiving tank capacity	100000.000 M3	56793210.254CM0	
Vapour temperature (LNG)	-118.00 CEL	59934478.118CM5	
Vapour pressure (LNG)	110.000 KPA	60982087.402CMT	
Unit of chemical analysis data	MOP	2534839.598GJ0	
		< < >	

Enter conversion group QUC1 and test UoM group QLN and a transaction quantity of e.g., 100,000 M3L (Cubic meter, liquid phase). The quantity values for all UoM defined in UoM group QLN are readily calculated.



For LNG quantity conversions, UoM quantity values for **four** different SAP Dimensions (quantities) may be calculated: Energies, masses, liquid volumes, and gaseous volumes

Part 2: Now let's copy template conversion group QUC1 in the template client to the customer name range – ZUC1. You have two options. Either navigate to the QuantityWare IMG via menu path: Goto -> QuantityWare IMG:



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<u>`</u>	24	
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1	× .	Bulk Calculations - Gas (BCG)
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		C Define compression factors for dry an
ן ר		Maintain hoo Isono conversion raccors Maintain physical property data for natural gas, LNG & LPG components
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and select the relevant customizing nodes, or directly access the three main nodes via the direct menu path access: **Goto -> Gas Conversion Groups / Reading Groups / Range Groups**. The second option is faster, so here goes ③

Goto -> Gas Conversion Groups:

In "Change" mode, select conversion group QUC1 and select "Copy As ... (F6):

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✓	 ✓ Cancel 			5 °0	×
Conversion goup	Description MQCI LNG 15/15 °C, REAL, SD, COMP. Q2				0
QCI: LNG, Natural Gas & I	Hydrogen Conversion Groups				I
Product type	Liquefied Natural Gas (LNG)				I.
Product class	\sim				I.
Ideal/real formulas	Use real gas routine				I
Calculation scenario	LNG COMP compos. data, ISO 6578 rev. Klosek-McKinley - D				L
Use ISO tab./formula	Use ISO 13443 formulas, AGA Rep.7 format (p*t*Z) multipliers				A
Heating value class	(superior / dry), equiv.: (gross,upper,total / dry)				
Source R, M(air)	Use ISO 6976 data, calc Z_air if not defined (AGA) \sim				
Flowing press. calc.	Flowing pressure already corrected to absolute units \sim				
Summation fact. ind.	Use ISO 6976 / GOST 30319 definition for calc. & data maint. \sim				
(Rel.) density calc.	Calc. rel. density using gas molar mass,then density \sim				
Z mix calc.(Hv./d.)	Calc. Z_base: ISO 6976/GPA 2172/GOST 30319 - detail sc. only				
Z mix usage (E,V,m)	Use Z_base: ISO 6976/GPA 2172/GOST 30319 - detail sc. only				
Density type	~				
Heating value type	~				
Activate ISO 6976 2016	edition calculations				
Extend range of standard	I implementation				
Metering & combustion re	eference conditions				
Metering temperature(t2)	15.00 Combustion temperature(t1) 15.00				
Metering temperature Uc	M CEL Combustion temperature UoM CEL				0
Specify target entries V	iew details				

In the details screen, enter ZUC1 as target name and select "copy all" after you press "Return".

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< SAP Change Vie	iew "QCI: LNG, Natu	al Gas & Hydrogen Conversion Groups": Ov	er	
	🖁 🌮 🍳 New Entries	🗐 \ominus 😘 👯 More 🗸 🖶	5	🏠 Exit
✓ ✓	CI: LNG, Natural Gas & Hy Conversion group	Vdrogen Convers Description MQCI LNG 15/15 °C,REAL,SD,COMP. Q2		
Comparison of the second		 ★≣ Position Entry 274 of 274		<>↓

Save your actions and select an appropriate customizing transport.

Goto -> Reading Groups:

Repeat the copy procedure as described above and copy reading group QUC0 (Conversion group QUC1 utilizes reading group QUC0!) to ZUC1:

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\sim 🗇 Reading Group Definition	Reading group	Description	
Reading Group Entries		MQCI LNG, COMPOSITION, DET, ISO6578 VP	0
		MQCI LNG, COMP., DET,ISO6578 VP, U.S.	
	QUCA	MQCI LNG, COMPOSITION, DET, ISO6578 VP	
	QUCB	MQCI LNG, COMPOSITION, DET, ISO6578 VP	
		MQCI LNG, COMPOSITION, DET, ISO6578 VP	
		MQCI LNG, COMP., DET., ISO 6578:2017 VP	
	QV00	ISO 12213 GAS 1, E/VOLUME, REL. DENSITY	
	QV02	ISO 12213 GAS 1, E/VOLUME, DENSITY	
	QV04	ISO 12213 GAS 1, E/MASS, REL. DENSITY	
	QV06	ISO 12213 GAS 1, E/MOL, DENSITY	
	QV0E	ISO 12213 GAS 2, E/VOLUME, REL. DENSITY	
	QV0G	ISO 12213 GAS 2, E/VOLUME, DENSITY	
	QV0I	ISO 12213 GAS 2, E/MASS, REL. DENSITY	
	QV0K	ISO 12213 GAS 2, E/MOL, DENSITY	
	QV0S	ISO 12213 GAS 3, E/VOLUME, REL. DENSITY	
	Ο Ονου	ISO 12213 GAS 3, E/VOLUME, DENSITY	
	QVOW	ISO 12213 GAS 3, E/MASS, REL. DENSITY	^
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Change View "Reading Group Definition": Overview Image: Change View "Reading Group Definition": Overview Image: Change View "Reading Group Definition": Overview Image: Change View "Reading Group Definition": Overview Image: Change View "Reading Group Definition": Overview Image: Change View "Reading Group Definition": Overview Image: Change View "Reading Group Definition": Overview Image: Change View Transform Image: Change View Transform Image: Change View Transform Image: Change View Transform Image: Change View Transform Image: Change View Transform Image: Change View Transform Image: Change View Transform Image: Change View Transform Image: Change View Transform Image: Change View Transform Image: Change View Transform Image: Change View Transform Image: Change View Transform Image: Change Transform Image: Change Transform Image: Change Transform Image: Change Transform Image:	≡	<u>T</u> able View	<u>E</u> dit	<u>G</u> oto	<u>S</u> elect	tion <u>U</u> 1	tilities S	System	<u>H</u> elp								<	£	_	⊐ ×
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→≣ Position Entry 455 of 455	~13	Reading Gro			R	Reading g		ition	->≣ Po	MQCI	LNG,	COMF				VP				

Save your copy actions and select an appropriate customizing transport.

Goto -> Range Groups:

Repeat the copy procedure for range group QUC0 (copy to ZUC1):

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				LNG	DETAI	LED M	1ETH	OD RANGE	S					
	QV00			ISO	12213	GAS	1, 1	E/VOLUME	, REL. I	DENSITY				
	QV02			ISO	12213	GAS	1, 1	E/VOLUME	, DENSI	ΤY				
	QV04			ISO	12213	GAS	1, 1	E/MASS,	REL. DEI	NSITY				
	QV06			ISO	12213	GAS	1, 1	E/MOL, D	ENSITY					
	QV0E			ISO	12213	GAS	2, I	E/VOLUME	, REL. I	DENSITY				
	QV0G			ISO	12213	GAS	2, 1	E/VOLUME	, DENSI	ΤY				
	QV0I			ISO	12213	GAS	2, I	E/MASS,	REL. DEI	NSITY				
	QV0K			ISO	12213	GAS	2, 1	E/MOL, D	ENSITY					
	QV0S			ISO	12213	GAS	3, I	E/VOLUME	, REL. I	DENSITY				
	QVOU			ISO	12213	GAS	3, 1	E/VOLUME	, DENSI	ΤY				
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Save your copy actions and select an appropriate customizing transport.

Finally, go back to the conversion group configuration via GMC menu path: Goto -> Gas Conversion Groups and select "Link reading group to conversion group" for your new conversion group ZUC1:

<u> </u>	<u>S</u> election <u>U</u> tilities	System <u>H</u> elp			<	° ∎ – ∎ ×
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✓ ✓	Link Reading Group Conversion group			Big More ∨		a 2 % Exit
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Data was saved View details						

Change the assignment from QUC0 to ZUC1. Save your actions and select an appropriate customizing transport.

Now you have finished copying template conversion group QUC1 to ZUC1. A test calculation (via the GMC push button "Oil & Gas Test Calculator") should produce identical results when compared with the test calculation for conversion group QUC1:

☰ <u>C</u> alculator <u>E</u> dit <u>G</u> oto System <u>I</u>	<u>H</u> elp						<	£	_	⊐ ×
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Conv. Group	NG 1	5/15 °C,	REAL, SD,	COMP. Q2						
	TYWA	RE LNG,	SD TEST							
		-								
Date 02.02.2023 17:	33:1	7								
Input Qty		A	dd.parame	eters for chem	icals					
Transactn. qty. 100	000	M3L I	Base densit	ty						
		-	Therm. exp	an. coeff.						
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Parameter	C	Value	U	Addl.qty	U M	۵.				
LNG OBSERVED TEMPERATURE		-163.50	CEL	0	0.000CFC	¢)				
RECEIVING TANK, EMPTY					0.000CFL					
RECEIVING TANK CAPACITY	-	100000.00	00 M3		0.000CM0	D				
VAPOUR TEMPERATURE (LNG)		-118.00	CEL		0.000CM5					
VAPOUR PRESSURE (LNG)	-	110.000	KPA		0.000CMT					
UNIT OF CHEMICAL ANALYSIS DATA		MOP < >		> ~ < >	0.000GJ0 🗌	^				
			X		,					
			71104							
A Technical component data missing in cus	tomiz	ing table fo	r 20C1							

Apparently, we are still missing some settings for ZUC1. The "Technical Component Data" is missing. To solve this, we navigate to the QuantityWare BCG IMG:

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	ucture	0	uantityWare Solutions
	>	Q	Bulk Calculations - Petroleum (BCP)
	>		Compliance & Transparency - Petroleum (CTP)
	~		Bulk Calculations - Gas (BCG)
		>	Basic Settings & Constants
		>	Quantity Conversion Settings
	```	~	Product & Standard Specific Settings
			🗟 🕒 Assign natural gas & LNG main component technical keys
			🔂 🕒 Define basic natural gas, LNG & LPG physical constants & values
			🚡 🕞 Define compression factors for dry air
			🚯 🕒 Maintain ISO 13443 conversion factors
			🗟 🕒 Maintain physical property data for natural gas, LNG & LPG components
			🙆 🕒 Maintain additional physical property data settings
			🙆 🕒 Define empirical formula for natural gas components
			🔝 🕒 Maintain ISO 6578 constants for LPG density calculation
			🙆 🕒 Maintain orthobaric molar volumes of individual components of LNG
			🙆 🕒 Maintain correction factors for volume reduction of LNG mixtures
			<u> (</u> Maintain UoM Compliance Analysis reference data
		>	Gas Measurement Cockpit Settings
	>		Compliance & Transparency - Gas (CTG)

✓	🖫 🍪 New Entries 🗐 🔿	S Sa Sa Sa Sa More ∨	ලි 🗖 🗔 🏷 Exit
Maintain Natural Gas & LNG S	Special Components		(Q
Conversion group	Methane technical name	Nitrogen technical name	Oxygen technical name
QUAC	METHANE	NITROGEN	OXYGEN
QUAD	METHANE	NITROGEN	OXYGEN
QUBO	METHANE	NITROGEN	OXYGEN
QUB1	METHANE	NITROGEN	OXYGEN
QUB2	METHANE	NITROGEN	OXYGEN
QUB3	METHANE	NITROGEN	OXYGEN
QUB4	METHANE	NITROGEN	OXYGEN
QUB5	METHANE	NITROGEN	OXYGEN
QUB6	METHANE	NITROGEN	OXYGEN
_ QUC0	METHANE	NITROGEN	OXYGEN
ν ρυς1		NITROGEN	OXYGEN
QUC2	METHANE	NITROGEN	OXYGEN
QUC3	METHANE	NITROGEN	OXYGEN
QUC4	METHANE	NITROGEN	OXYGEN
QUC5	METHANE	NITROGEN	OXYGEN
QUC6	METHANE	NITROGEN	OXYGEN
QUC7	METHANE	NITROGEN	OXYGEN
	Entry 13 o	< > f 37	

Here, we select: Product & Standard Specific Settings -> Assign natural gas & LNG main component keys. Apparently, an entry is defined for our source conversion group QUC1, it needs to be present for ZUC1 as well. Thus, you now copy this entry to ZUC1:

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Main	tain Natural	Gas &	LNG S	pecia	l Com	ponents															
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Save your actions and select an appropriate customizing transport.

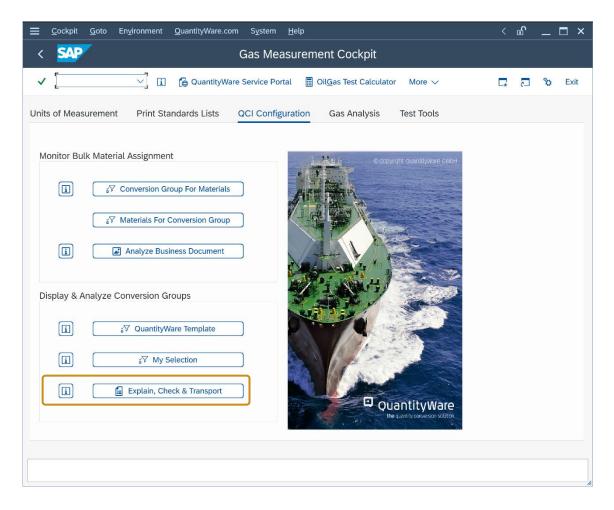
Now the trial calculation is working with the expected identical results:

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✓ 🔄 Material ★ (Re)use Defaults Cancel	📮 🗔 🗞 Exit	✓ 🔁 Material ★ (Re)use Defaults Cancel	🗔 💭 🗞 Exit
Calculation parameters         Carx. Group         ZUCT_CT         MOCT_LNG_15/15 *C.REAL.SD.COMP. 02           UoM Group         0LN         QUANTITYWARE LNG. SD TEST           Date         02.02.2023 [17:35:22		Calculation parameters         MOCI L ING 15/15 °C, REAL, SD, COMP. 02           UoM Group         ULN(G)         WACIT LING 15/15 °C, REAL, SD, COMP. 02           Dotte         02.022, 0223 17:35:22	
Input Qty Add.parameters for chemicals Base density Transactin. qty. 100000 M3L Therm. expen. coeff.		Input Qty Add.parameters for chemicals Transactin. qty. 100000 M3L Base density Therm. expan. coeff.	
Result		Result	
Parameter C Value U © AddLoty U M ©		Parameter C Value U © AddLqty U M ©	
LNG observed temperature -163.50 CEL 2 3557380.677CFC     25		LNG observed temperature -163.50 CEL 3557380.677CFC 5	
Receiving tank, empty		Receiving tank, empty 3531466.247CFL	
Receiving tank capacity 100000.000 M3 56793210.254CM0		Receiving tank capacity 100000.000 M3 56793210.254 CM0	
Vapour temperature (LNG) -118.00 CEL 59934478.118CM5		Vapour temperature (LNG) -118.00 CEL 59934478.118CM5	
Vapour pressure (LNG) 110.000 KPA 60982087.482CMT		Vapour pressure (LNG) 110.000 KPA 60982087.402CMT	
Unit of chemical analysis data MOP 2534839, 5986J0 []		Unit of chemical analysis data MOP 2534839.5986.00	

#### 2.3. Test Case 03 – Build Transport for LNG Conversion Group - Template

#### Estimated test case execution time: 150 minutes

Part 1 The GMC contains the "Explain, Check and Transport" Tool, which simplifies the collection of all relevant template configuration data for a conversion group. This is useful as a conversion group is a complex configuration object which may require additional data from many different tables - not only the ones you touched during test case 02 execution. Select the GMC "QCI Configuration & Products" tab strip and select "Explain Check & Transport" - ECT.



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< SAP Gas Measurement Cockpit: ECT - LNG, N	latural Gas, H2 & NGL Conv. Groups		
✓ ✓ 🔚 🤤 🖬 Cancel	<b>ē </b> ,	5	🍄 Exit
Select conversion group       ZUC1         Language       English         Check conversion group       Display UoM for conv. group         Include UoM into transport       1         Include conv. group i. transp.       1			

=	Enter Transport Request								
Request	SOIK902716 Customizing request								
Short Description	ZUC1 to Development Client 010								
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Conversion group [ZUC1] 진				
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O Explain conversion group				
O Check conversion group				
O Display UoM for conv. group				
Include UoM into transport				
Include conv. group i. transp.				
		_		< >
Transport SOIK902716 has been created/updated with all required objects for ZUC1				

Enter your new ZUC1 conversion group and select "Include conv. group i. transp.". Select an empty/new customizing transport. **Follow your in-house procedures to have this transport imported into your development client.** 

-	

With the "Check, Explain and Transport" tool, you may also include all required UoM data for a conversion group into a single customizing transport. Since your development client typically contains previously configured UoM data, it is strongly recommended to **only copy UoM data for UoM that are NOT already present** into your development client from client 045. Otherwise, you may overwrite your existing and (hopefully) validated UoM data in that client with the QuantityWare template UoM configuration, which is validated using <u>NIST SP 811</u>.

**Part 2:** Natural gas quantity conversions may require several new SAP Dimension IDs and associated UoM definitions, which are delivered with the BCG Template in client 045. **To prepare the configuration in your development client**, you should thus **merge & migrate** all additional SAP Dimension ID and associated UoM from the template client 045 to your development client. To identify the required Dimension ID and UoM, Select the GMC "Units of Measurement" tab strip and select "Natural Gas Units – Display":

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Units of Measurement Print Standards Lists QCI Configuration Gas Analysis Test Tools		
Natural Gas Units     SAP Units     Unit Tools       Image: Consistency     Image: Consistency     Image: Comparison       Image: Comparison     Image: Comparison		
Image: Calculator     Image: Calculator		
© QuantityWare the quantity conversion solution		

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Disp	ay UoM for Natural Gas Property/Dimension				\$
•	Volume (gas)				
C	Volume (liquid, LNG)				
С	Energy				
C	Heating value (energy/volume)				
0	Heating value (energy/mass)				
C	Heating value (energy/mol)				
C	Mass				
C	Molar volume				
C	Density				
0	Molar mass				
C	Wobbe index				
C	Mass proportion				
C	Mole proportion				
0	Volume proportion				
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Inclu	de selection into customizing transport				
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Compare the available UoM for all SAP Dimension ID (Volume, Volume (liquid, LNG), Energy ... Pressure, Temperature) with those available in your development client. If Dimension ID or UoM are missing in your development client, collect the missing data in client 045 and **follow your in-house procedures to have this transport imported into your development client.** 

Alternatively, you can list the UoM and SAP dimension ID's which are required for conversion group ZUC1 using the ECT tool again:

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<ul> <li>Explain conversion group</li> </ul>					
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<ul> <li>Display UoM for conv. group</li> </ul>					
<ul> <li>Include UoM into transport</li> </ul>					
<ul> <li>Include conv. group i. transp.</li> </ul>					
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lo Dimension text	OG ISO		Measurement unit text	One UoM		Factor	SI	UoM conversion		
2 pressure	PAL	×	pascal	-	=	1.000000000	PA JM3	UoM Conversion		
<ul> <li><u>heating value(vol.)</u></li> <li>heating value(molar)</li> </ul>	<u>B8</u> B15		joule per cubic meter joule per mole	<u>1</u> JM3 1 JOM		1.0000000000		UoM Conversion		
25 heating value (molar)	J2	×	joule per kilogram	1 JKG		1.0000000000		UoM Conversion		
26 mass proportion	3H	×	kilogram per kilogram	1 KGK		1.0000000000		UoM Conversion		
27 mole fraction	<u>511</u>	^	mole fraction	1 MOM		1.0000000000		UoM Conversion		
28 gas constant			SI unit J /( mol * K)	-	=	1.0000000000	RSI	UoM Conversion		
29 length	MTR	x	meter	1 M	=	1.0000000000	M	UoM Conversion		
30 heating value(molar)	B44		kilojoule per mole	-	=	1,000.0000000000		UoM Conversion		
31 molar mass	0-14	~	kilogram per kilomole	1 KKM		0.0010000000		UoM Conversion		
32 No dimension			relative density (air) - gas	1 RDA		See mat. master		Not possible		
33 mole fraction			mole %	1 MOP		0.010000000	MOM	UoM Conversion		
34 density	GP	х	milligram per cubic meter	1 MGQ		0.0000010000		UoM Conversion		
			API gravity	1 API		See mat. master		Not possible		
35 No dimension			relative density (water 60 °F)	1 RDW		See mat. master		Not possible		

You may selectively collect this UoM data in client 045 and **follow your in-house procedures to have this transport imported into your development client.** 



In the following test cases, your material and plant data definitions as well as available UoM groups/definitions may differ from those used in the screen shots



#### 2.4. Test Case 04 – Test LNG Conversion Group in Development Client

#### Estimated test case execution time: 60 minutes

After your ZUC1 conversion group has been successfully transported to your development client, log on to that client and start the Gas Measurement Cockpit (GMC) using transaction /n/qtyw/cockpit_gas. Note that in this client, the GMC will show less options than in client 045 (where the QuantityWare template is available). For example, the BCG installation test is not available in this client, since it requires the complete QuantityWare BCG template.

**Part 1**: Go to the "Oil & Gas Test Calculator" and check if conversion group ZUC1 has been transported correctly to your development client, i.e., perform several trial calculations:

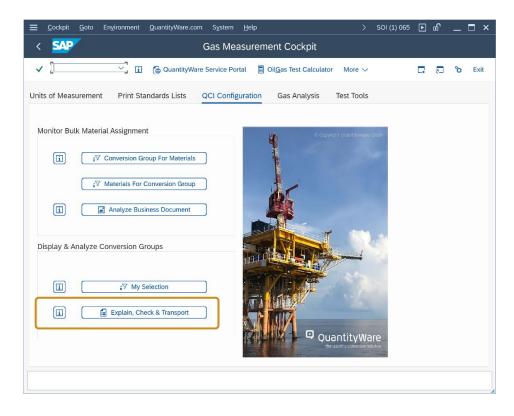
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UoM Group LNT LNG TEST	MANUAL									
Date 02.02.2023 17:58			neters for chemicals							
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		Therm. ex	pan. coeff.							
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LNG observed temperature	-163.5	O CEL	59934478	.118CM5	¢)	Ĵ				
Receiving tank, empty			2531037	.339GJ1 🗌						
Receiving tank capacity	100000	.000 M3	99573	.317M3Z						
Vapour temperature (LNG)	-118.0	D CEI	2398827	.254MBD	. B.					
Vapour pressure (LNG)	110.00	9 KPA	46673	.202T0						
Unit of chemical analysis data	MOP				<b>.</b>					
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Note that we did <u>not</u> transport test UoM group QLN and are using a newly defined UoM group LNT instead. UoM group LNG contains 5 different UoM of four different SAP dimensions:

Display Unit of Measu Unit of measure group: LNT		毘 職 Mor Ranges	easure (U ne ∽	loM) Config Q	gurati ्	on The Ca		°	Exit
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2 energy OG GV	gigajoule - 15 °C comb.,sup.	<u>1</u> GJ1 =		0,000.00000000	000 J	UoM Com	version		
4 <u>OG BZ</u>	million Btu(IT) - 60 °F c.,s.	<u>1</u> MBD =	1,055,055	5,852.62000000	000 J	UoM Conv	version		
5 mass or weight NSM/W TNE	X tonne ("metric ton" in U.S.)	<u>1</u> TO =	= 1,000.000	00000000	KG	UoM Con	version		
3 <u>volume (LNG, liquid)</u> OG	cubic meter - LNG -165 °C	<u>1</u> M3Z =	1.000000	00000	M	UoM Com	version		
1 volume NOV / NSV OG MTQ	cubic meter - 15 °C metering	<u>1</u> CM5 =	1.000000	00000	M3	UoM Conv	version		

In your development client, you should define a UoM group like UoM group LNG for testing purposes.

**Part 2**: Once you have manually validated that conversion group ZUC1 is running in your development client, perform the automated validation test. Select the GMC "QCI Configuration" tab strip and select "Explain Check & Transport". Enter ZUC1 as conversion group, select "Check conversion group" and then "Execute" (F8)



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Ensure that no error or warning messages are present. **This test should produce identical results** when compared with the results for ZUC1 in client 045.



#### 2.5. Test Case 05 – Define UoM Rounding - Development

#### Estimated test case execution time: 10 minutes

In your development client, define the appropriate UoM rounding for your UoM group. From the GMC menu, select: Goto -> UoM Rounding and enter the UoM M3Z, MBD, GJ1, CM5 and TO with 1 / 0 (Space) decimal places rounding:

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Check that the rounding settings are working by performing another trial calculation (via GMC push button "Oil & Gas Test Calculator"):

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Receiving tank, empty		2531037.000G	J1 🗌			
Receiving tank capacity	100000.000 M3	99573.000M	3Z 🗌			
Vapour temperature (LNG)	-118.00 CEL					
Vapour pressure (LNG)	110.000 KPA	46673.202T	0			
Unit of chemical analysis data	MOP		< > ²			
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Via transaction CUNI, you may also change the display decimal settings for all UoM, such that <u>trailing zeros</u> are no longer displayed (as shown in the screen print above).

#### 2.6. Test Case 06 – Define Ranges for LNG Conversion Group -Development

#### Estimated test case execution time: 20 minutes

In your development client, define the appropriate range limits for three of the input parameters. From the GMC menu, select: Goto -> Range Groups and define range limits for the LNG observed temperature (liquid), LNG methane fraction (CH4) and LNG Tot. Sulphur (incl. Mercaptan) fraction:

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Once you have maintained the ranges and saved your work, perform trial conversions and test that the range limits are working:

Cl: Calculator for additional quantities         ✓       ✓         ✓       ✓         ✓       ✓         ✓       ✓         ✓       ✓         ✓       ✓         ✓       ✓         ✓       ✓         ✓       ✓         ✓       ✓         ✓       ✓         ✓       ✓         ✓       ✓         ✓       ✓         ✓       ✓         ✓       ✓         ✓       ✓         ✓       ✓         ✓       ✓         ✓       ✓         ✓       ✓         ✓       ✓         ✓       ✓         ✓       ✓         ✓       ✓         ✓       ✓         ✓       ✓         ✓       ✓         ✓       ✓         ✓       ✓         ✓       ✓         ✓       ✓         ✓       ✓         ✓       ✓         ✓       ✓         ✓       ✓         ✓       ✓ <th>_ 🗆 ×</th>	_ 🗆 ×
Calculation parameters         Conv. Group       ZUC1       MQCI LNG 15/15 °C, REAL, SD, COMP. Q2         UoM Group       LNT       LNG TEST MANUAL         Date       03.02.2023 12:21:47         Add.parameters for chemicals         Transactn. qty.       100000 M3L         Base density	
Conv. Group       ZUC1       MQCI LNG 15/15 °C, REAL, SD, COMP. Q2         UoM Group       LNT       LNG TEST MANUAL         Date       03.02.2023 12:21:47         Input Qty       Add.parameters for chemicals         Transactn. qty.       100000 M3L         Base density	🏷 Exit
UoM Group LNT     Date 03.02.2023 12:21:47     Input Qty Add.parameters for chemicals     Transactn. qty. 100000 M3L     Base density   Therm. expan. coeff.     Parameter   C   Value   U.N.   Add.qty   U   Mathematical Structure   Parameter   C   Value   U.N.   Sesult   Parameter   C   Value   U.N.   Sesult   Parameter   C   Value   179   CEL   Seguint   Seguint   Seguint   VaPOUR TEMPERATURE   110.000   KPA   46673.202T0	
Date       03.02.2023 12:21:47         Input Qty       Add.parameters for chemicals         Transactn. qty.       100000 M3L       Base density         Therm. expan. coeff.       Image: Common control of the state o	
Input Qty       Add.parameters for chemicals         Transactn. qty.       100000 M3L         Base density       Image: Comparison of the mail of th	
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Input Qty       Add.parameters for chemicals         Transactn. qty.       100000 M3L         Base density       Image: Comparison of the mail of th	
Transactn. qty.       100000 M3L       Base density Therm. expan. coeff.         Result         Parameter       C Value       U @ AddL.qty       U M @ III         LNG OBSERVED TEMPERATURE       -179       CEL       59934478.000CM5       55         RECEIVING TANK, EMPTY       Intermediate       2531037.000GJ1       5         RECEIVING TANK CAPACITY       100000.000       M3       99573.000M3Z       5         VAPOUR TEMPERATURE (LNG)       -118.00       CEL       2398827.300MBD       1         VAPOUR PRESSURE (LNG)       110.000       KPA       46673.202T0       1	
Transactn. qty.       100000 M3L       Base density Therm. expan. coeff.         Result         Parameter       C Value       U @ AddL.qty       U M @ III         LNG OBSERVED TEMPERATURE       -179       CEL       59934478.000CM5       55         RECEIVING TANK, EMPTY       Intermediate       2531037.000GJ1       5         RECEIVING TANK CAPACITY       100000.000       M3       99573.000M3Z       5         VAPOUR TEMPERATURE (LNG)       -118.00       CEL       2398827.300MBD       1         VAPOUR PRESSURE (LNG)       110.000       KPA       46673.202T0       1	
Result       Therm. expan. coeff.         Parameter       C       Value       U       Addl.qty       U       M       Image: Comparison of the system of th	
Parameter       C       Value       U       Image: AddL.qty       U       M       Image: AddL.qty         LNG OBSERVED TEMPERATURE       -179       CEL       59934478.000 CM5       55         RECEIVING TANK, EMPTY       Image: AddL.qty       Image: AddL	
ParameterCValueUImage: Constraint of the second s	
LNG OBSERVED TEMPERATURE-179CEL59934478.000CM555934478.000CM5RECEIVING TANK, EMPTY100000.000M399573.000GJ1100003.000RECEIVING TANK CAPACITY100000.000M399573.000M3Z100003.000VAPOUR TEMPERATURE (LNG)-118.00CEL2398827.300MBD100000.000VAPOUR PRESSURE (LNG)110.000KPA46673.202TO100000.000UNIT OF CHEMICAL ANALYSIS DATAMOP100000.00010000	
LNG OBSERVED TEMPERATURE       -179       CEL       59934478.000CM5       55         RECEIVING TANK, EMPTY       Image: Cel image	
RECEIVING TANK CAPACITY       100000.000       M3       99573.000M3Z          VAPOUR TEMPERATURE (LNG)       -118.00       CEL       2398827.300MBD          VAPOUR PRESSURE (LNG)       110.000       KPA       46673.202TO          UNIT OF CHEMICAL ANALYSIS DATA       MOP       •       •       •	
VAPOUR TEMPERATURE (LNG)     -118.00     CEL     2398827.300MBD       VAPOUR PRESSURE (LNG)     110.000     KPA     46673.202T0       UNIT OF CHEMICAL ANALYSIS DATA     MOP	
VAPOUR PRESSURE (LNG) 110.000 KPA 46673.202TO UNIT OF CHEMICAL ANALYSIS DATA MOP	
UNIT OF CHEMICAL ANALYSIS DATA MOP	
179.000000- CEL for LNG observed temperature is below the error limit of 169.000000- CEL View details	

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Good range data is vital to ensure good data quality e.g., for measurement values being passed from the field to the ERP system, as well as to prevent fraudulent via "open door (unrealistic) calculations". <u>For production usage, you should define ranges</u> <u>for all relevant input data</u> e.g., the complete chemical composition data as well.

#### 2.7. Test Case 07 – Define Test Scenarios for LNG Conversion Group -Development

#### Estimated test case execution time: 60 minutes

Test scenarios are your insurance against manipulation and proof that that your quantity conversion configuration is running as designed and tested, in production. For this test case we assume that you have validated the calculations of conversion group ZUC1 (e.g., independent calculations in a spread sheet or by comparing the results with data from legacy systems, typically done by certified BCG consultants). Let's take the following test calculation - GMC push button "Oil & Gas Test Calculator" - and transfer it into our first test scenario:

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Calculation parameters											
Conv. Group	LNG	15/15 °C,R	EAL,SD,(	COMP. Q2							
	FEST	MANUAL									
Date 03.02.2023 12	2:21:	47									
Input Qty		Add	d.parame	ters for chemicals							
Transactn. qty.	00000	M3L Ba	ase densit	y							
		Th	nerm. expa	an. coeff.							
Result											
				~		~ (=	G				
Parameter	C	Value	U	<ul> <li>Addl.qty</li> </ul>	U M		5				
LNG observed temperature		-161.00	CEL	\$ 59497874		्री	ע				
Receiving tank, empty Receiving tank capacity		100000.000	0 M3		.000GJ1	н.					
Vapour temperature (LNG)		-118.00	CEL		.500MBD						
Vapour pressure (LNG)		110.000	KPA		.202TO						
Unit of chemical analysis data		MOP		•		<u>,</u>					
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l	JoM Tests	;									
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From the GMC tab strip "Test Tools" select "Maintain Scenarios", then "Create scenarios":

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Select scenario activity					
Activity:					
Display scenarios					
Create scenarios					
Copy scenarios					
Change scenarios					
Delete scenarios					
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Enter the scenario ID (e.g., ZUCA), a description, the conversion group ZUC1 and UoM group LNT and press "Enter":

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<ul> <li>✓</li> </ul>	🗑 i Cancel			□.	5	°o	Exit
Application: Conversion group: Unit of measure group: Test mode Run red on error	ZUCA     Q by first BCG Scenario     Description       BCG     ZUC1       LNT						
Expected results							
Select expected results class							
<ul> <li>Check quantities &amp; parame</li> <li>Check quantities only</li> <li>Check parameters only</li> </ul>	eters						
							<
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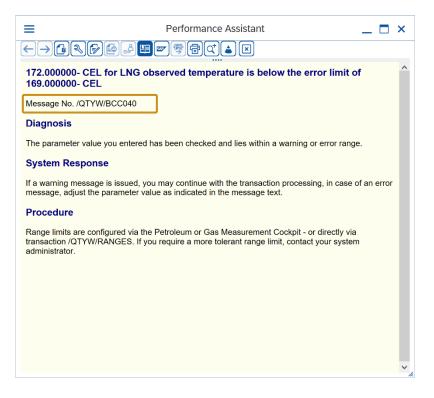
In the details screen, the reading group values are defaulted as input parameters. Now enter the LNG observed temperature as -161.000 °C and the transaction quantity of 100,000.000 M3L. Then select the "Calculate expected result" push button, confirm the calculation and save the scenario (CTRL + F4), confirming all messages:

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$\checkmark$	~ 🗑 i	Calculate expected result	ts	Calculation log	More 🗸		C.	5	ô	Exit
	LNG observed temperature	161.000000-	CEL	degree Celsius						¢
	Receiving tank, empty									
	Receiving tank capacity	100,000.000000	MЗ	cubic meter						
	Vapour temperature (LNG)	118.000000-	CEL	degree Celsius						
	Vapour pressure (LNG)	110.000000	KPA	kilopascal						
	Unit of chemical analysis data	MOP								- 1
	Methane (CH4)	90.00000								- 1
	Ethane (C2H6)	4.900000								- 1
	Propane (C3H8)	2.900000								- 1
	n-Butane (n-C4H10)	1.300000								- 1
	2-Methylpropane (i-Butane)	0.400000								- 1
	n-Pentane (C5H12)	0.100000								- 5
	2-Methylbutane (i-Pentane)									
	Hexanes +									
	Nitrogen (N2)	0.400000								
	Oxygen (O2)									
	Impurities: unit of measure	MGQ								
	Hydrogen sulfide	5.000000								
	Tot.sulphur(incl. Mercaptane)	150.000000								
Tra	ansaction quantity			_						
	Quantity	100000	M3L							
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· · · ·	i	Calculate expected result	s 🔶	Calculation log	More 🗸	□.	5	ô	E
Base density (gas, relative)		0.635491	RDA	relative density (	air) gas				
Heating value (Sup.,E/Vol)		42.230072	MJM	megajoule per ci	ubic meter				
Heating value (Sup.,E/mol)		995.818560	KJL	kilojot <mark>l</mark> e per mol	le				
Heating value (Sup.,E/mass)		54.228920	MJK	megaj <mark>pule per k</mark> i	ilogram				
Heating value (Inf.,E/Vol)		38.171167	MJM	] megaj <mark>oule per c</mark> i	ubic meter				
Heating value (Inf.,E/mol)		900.106370	KJL	kilojol <mark>le per mol</mark>	le				
Heating value (Inf.,E/mass)		49.016757	MJK	] megaj <mark>oule per k</mark> i	ilogram				
Wobbe Index		52.974522	MJM	] megaj <mark>oule per c</mark> i	ubic meter				
Molar mass LNG		18.363238	KKM	kilogram per kilo	omole				
LNG heating value(E/Vol., liq)		25,197.838057	MJM	megaj <mark>oule per c</mark> i	ubic meter				
Press. fac. flowing to base		1.000000							
Temp.fac. flowing to base		1.000000							
Compression flowing to base		1.000000							
Combustion corr. wet-dry @obs		1.000000							
Combust. fac. obs. to base		1.000000							
quantities									
energy		2,512,600.0000	GJ1	gigajo <mark>ule - 15</mark> °C	comb.,sup.				
energy		2,381,352.5000	MBD	millior Btu(IT) -	60 °F c.,s.				
mass or weight NSM/W		46,333.2020	то	tonne ("metric to	on" in U.S.)				
volume (LNG, liquid)		98,848.0000	M3Z	cubic meter - LN	G -165 ℃				
volume NOV / NSV		59,497,874.0000	CM5	cubic meter - 15	°C metering				

NOTE: Save the scenario via More -> Save Scenario (CTRL + F4)

For the second scenario, we want to ensure that the range check is always executed correctly (extremely important for production environments):



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✓	~	[중] Mate	erial	★ (Re)use	Defaults	Cancel					<b>□</b>	5	°	Exit
Calculation paramet	ers													
Conv. Group	ZUC1	MQCI	LNG :	15/15 °C,I	REAL, SD,	COMP. Q2								
UoM Group	LNT	LNG 1	TEST I	MANUAL										
Date Input Qty Transactn. qty. Result	03.02	.2023 12	2:32:4	Ac M3L E	<b>Id.parame</b> Base densit Therm. exp		als							
Parameter			C	Value	U	Addl.qty	U	M	0	ן				
LNG OBSERVED TE	MPERATU	URE		-172.00	CEL	\$	0.000CM5		्रि					
RECEIVING TANK, I	EMPTY			L	_		0.000GJ1			-				
RECEIVING TANK C	APACITY			100000.00	00 M3		0.000M3Z							
VAPOUR TEMPERA	TURE (LN	IG)		-118.00	CEL		0.000MBD		с.					
VAPOUR PRESSUR				110.000	KPA		0.000TO							
UNIT OF CHEMICAL	ANALYS	IS DATA		MOP	0	≎ <>		<	, ÷					
A 172.000000- CEL 1	for LNG ob	oserved ter	mperati	ure is below t	the error lin	nit of 169.000000	CEL View de	etails						

#### Thus, we define the following scenario:

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nge scenario																					
Scenario ID:	ZUCE	My s	seco	nd BC	G test s	cenario	o -E		De	script	ion										
Application:	BCG	Bulk	k Ca	lculatio	ons / Co	mplian	ice & Tr	ransp	arer	ıcy - (	Gas										
Conversion group:	ZUC1	MQC	CI L	NG 15/	15 °C,F	EAL,SI	D,COM	P. Q2				ZUC	:1 R	ead	ng g	roup					
Jnit of measure group:	LNT	LNG	à TE	ST MAI	NUAL																
est mode																					
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Run red on error	$\bigcirc$																				
Run red on error Run green on error	•																				
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Run green on error Application area ut parameters and quantit arameter (Reading Group LNG observed temperatur Receiving tank, empty Receiving tank capacity	• [/QTYW/ y )) e	/BCC		100	,000. 118.	00000	0 -	CEL M3 CEL	] de ] cul	gree bic m	Cels										
Run green on error Application area It parameters and quantit arameter (Reading Group LNG observed temperature Receiving tank, empty Receiving tank capacity Vapour temperature (LNG)	• [/qтүw, y )) e	/BCC			,000. 118.	00000	0 -	CEL M3 CEL	] de ] cul	gree bic m	Cels										
Run green on error Application area ut parameters and quantit arameter (Reading Group LNG observed temperature Receiving tank, empty Receiving tank capacity Vapour temperature (LNG)	• [/qтүw, y )) e	/ BCC			),000. 118. 110.	00000	0 - 0 - 0	CEL M3 CEL	] de ] cul	gree bic m	Cels										
Run green on error Application area ut parameters and quantit arameter (Reading Group LNG observed temperature Receiving tank, empty Receiving tank capacity Vapour temperature (LNG) Vapour pressure (LNG) Unit of chemical analysis o	• [/qтүw, y )) e	/ BCC			9,000. 118. 110. 90.	00000 00000 00000 00000	0 - 0 - 0 - 0	CEL M3 CEL	] de ] cul	gree bic m	Cels										

NOTE: Save the scenario via More -> Save Scenario (CTRL + F4)

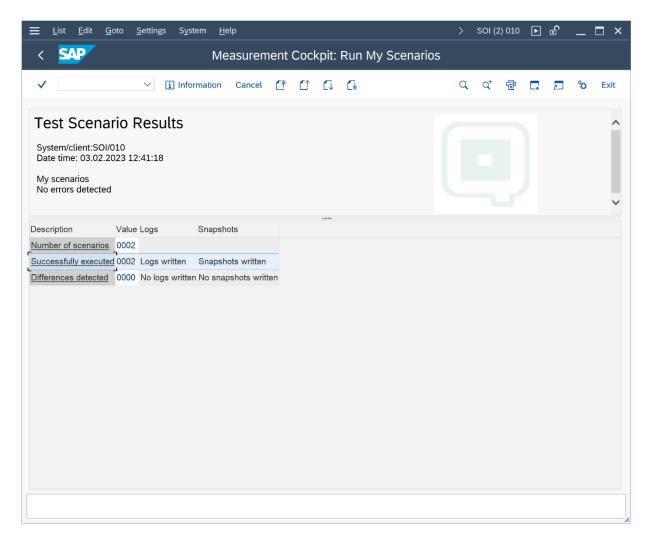
Now, go back to the GMC tab strip "Test Tools" and select "Run Scenarios". Then, select "Run selected scenarios", enter "ZUC1" as conversion group and "Write snapshot and log":

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< SAP Gas Measurement Cockpit	
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Units of Measurement Print Standards Lists QCI Configuration Gas Analysis Test Tools	
Installation Tests	
Run Technical Installation Test	
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Run Scenarios	
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< SAP	Measurement Cockpit: Run My Scenarios			
<ul><li>✓</li></ul>	巾) 👔 Cancel	f	<b>□</b> . ₹	) 🏷 Exit
Select run mode Run all available scenarios Run selected scenarios Run all scenarios w/o snapshot				
Select range of scenarios for run				
Select scenario ID	to d			
or scenarios for conv. group	ZUC1			
Select log and snapshot indicator				
$\bigcirc$ Write no log, no snapshot	No logs and no new snapshot stored			
⊖ ₩rite log, no snapshot	Logs will be stored for all scenarios, no new snapshots s	stored		
• Wite snapshot and log	Logs and new snapshots (for green scenarios) stored			



If you have maintained the two scenarios correctly, the following result will be displayed:



The system has performed a quantity conversion in background and compared the actual results with the expected results defined in the scenarios. Two logs have been written to the database and snapshots for successfully executed scenarios have been written to the database as well.

To test this tool, let's go back to the range data for conversion group ZUC1 (see test case 06) and change the LNG actual temperature "low" error limit to -175 °C.

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				Reading	g Group: F	aramet	ter Rai	nges					_							
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If we now run all available scenarios again, one scenario fails:

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✓ 🖂 🤤 🗇 👔 Cancel		Ē	<b>□</b> ,	5	°o	Exit
Select run mode						
Run all available scenarios     Run selected scenarios     Run all scenarios w/o snapshot						
Select range of scenarios for run						
Select scenario ID	J					
Select log and snapshot indicator						
Write no log, no snapshot No logs and no new snapshot stored						
Wite log, no snapshot     Logs will be stored for all scenarios, no new snapshot	stor	ed				
Logs and new snapshots (for green scenarios) stored						
						$\sim$

<u> </u>	<u>S</u> ettings System <u>H</u> elp	>	SOI (2	2) 010	▶	£	_	⊐ ×
< SAP Measurement Cockpit: Run My Scenarios								
✓	✓ i Information Cancel f [↑] f ¹ f↓ f↓	Q	Q⁺	ē	<b>□</b> ,	2	°o	Exit
Test Scenario Results System/client:SOI/010 Date time: 03.02.2023 12:44:23 My scenarios ERRORS detected								< >
Number of scenarios	Iue Logs     Snapshots       02     Iue Logs written No snapshots written       01     Logs written No snapshots written							

The expected range error is not raised during the internal test run, which is displayed in the detail view for the scenario:

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✓	✓ i Informatio	n Cancel f 🚹	Ci Ci	Q	Q ⁺	ē	G,	5	°	Exit
Results Scenario ID: ZUCE - My se QuantityWare: Bulk Calcul Con.Grp.: ZUCI - MQCI LN Read.Grp.: ZUCI - MQCI L UOM Group: LNT - LNG TE Last changed: SENGM - 03 Test mode: Run green on e	ations - Gas NG 15/15 °C,REAL, NG, COMPOSITIO ST MANUAL 3.02.2023 12:40:27	SD,COMP. Q2 N, DET, ISO6578 VP								^
A different error occured = Appl. area, message numb Appl. area: /QTYW/BCC Appl. area: /QTYW/BCC	per expected / oc - Mess. number: 04	0								
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Go back to the GMC tab strip "Test Tools" and select "Maintain my test". Now select the "Analyze scenarios" option, such that you can compare the snapshot data with the current configuration data:

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< SAP Measurement Cockpit: Maintain My Scenarios			
✓ 🖂 🤤 i Cancel	đ	□ □	🏠 Exit
Select scenario activity			
Activity:			
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Enter the scenario ID ZUCE and select "Execute (F8) to display the snapshot header data:

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OR analyze scenarios for conversion group						
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Test Scenario List for Analysis Snapshot database Number of snapshots: 1 Scenario -> Compare scenario (DB/Snapshot) Appl., Run date, Run time -> Analyze Scenario Config.							
Scenario Appl. Run date Run time Run by CvG UoMG Mod. by Mod. date Time           ZUCE         BCG 03.02.2023 12:41:15           SENGM ZUC1 LNT         SENGM 03.02.2023 12:40:27							

If you click the Scenario ID, the comparison of the snapshot data for the scenario and the current system scenario is displayed:

			Scenarios - Compare D				
✓ ~	i Information	Cancel 😭 🚺	C.	र द' 🖶 ।	*	<b>°</b> 5	Exit
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nput parameters: NG observed temperature Receiving tank, empty Receiving tank capacity	172.000000- CE	L degree Celsius	Input parameters: LNG observed temperature Receiving tank, empty	172.000000-	CEL	degree C cubic me	eter
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nput parameters: NG observed temperature	172.000000- CE 100,000.000000 M3 118.000000- CE	L degree Celsius cubic meter L degree Celsius	Input parameters: LNG observed temperature Receiving tank, empty Receiving tank capacity Vapour temperature (LNG)	172.000000- 100,000.000000 118.000000-	CEL M3 CEL KPA	degree C cubic me degree C	eter Celsius
nput parameters: NG observed temperature Receiving tank, empty Receiving tank capacity /apour temperature (LNG) /apour pressure (LNG)	172.000000- CE 100,000.000000 M3 118.000000- CE 110.000000 KP	L degree Celsius cubic meter L degree Celsius	Input parameters: LNG observed temperature Receiving tank, empty Receiving tank capacity Vapour temperature (LNG) Vapour pressure (LNG)	172.00000- 100,000.000000 118.000000- 110.000000	CEL M3 CEL KPA	degree C cubic me degree C	eter Celsius
NG observed temperature Receiving tank, empty Receiving tank capacity /apour temperature (LNG) /apour pressure (LNG) Jnit of chemical analysis data /lethane (CH4)	172.000000- CE 100,000.000000 M3 118.000000- CE 110.000000 KP MOP	L degree Celsius cubic meter L degree Celsius	Input parameters: LNG observed temperature Receiving tank, empty Receiving tank capacity Vapour temperature (LNG) Vapour pressure (LNG) Unit of chemical analysis data	172.00000- 100,000.000000 118.000000- 110.000000 MOP	CEL M3 CEL KPA	degree C cubic me degree C	eter Celsius
NG observed temperature Receiving tank, empty Receiving tank capacity Yapour temperature (LNG) Yapour pressure (LNG) Unit of chemical analysis data Methane (CH4) Sthane (C2H6)	172.000000- CE 100,000.000000 M3 118.000000- CE 110.000000 KP MOP 90.000000	L degree Celsius cubic meter L degree Celsius	Input parameters: LNG observed temperature Receiving tank, empty Receiving tank capacity Vapour temperature (LNG) Vapour pressure (LNG) Unit of chemical analysis data Methane (CH4)	172.000000- 100,000.000000 118.000000- 110.000000 MOP 90.000000	CEL M3 CEL KPA	degree C cubic me degree C	eter Celsius
NG observed temperature Receiving tank, empty Receiving tank capacity Yapour temperature (LNG) Yapour pressure (LNG) Unit of chemical analysis data Methane (CH4) Ethane (C2H6) Propane (C3H8)	172.000000- CE 100,000.000000 M3 118.000000- CE 110.000000 KP MOP 90.000000 4.900000	L degree Celsius cubic meter L degree Celsius	Input parameters: LNG observed temperature Receiving tank, empty Receiving tank capacity Vapour temperature (LNG) Vapour pressure (LNG) Unit of chemical analysis data Methane (CH4) Ethane (C2H6)	172.00000- 100,000.000000 118.000000 110.000000 MOP 90.000000 4.900000	CEL M3 CEL KPA	degree C cubic me degree C	eter Celsius
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Apparently, there are no differences detectable in the scenario definition.

If you click the application (BCG), the configuration data is displayed and compared with the current system data:

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Analyze Scenario											^
Scenario ZUCE - My second BCG test scenario -E Application - QuantityWare: Bulk Calculations - Gas Con.Grp.: ZUC1 -MQCI LNG 15/15 °C,REAL,SD,COMF Status: Number of tables: 32 Tables with differences: 1	P. Q2										)
Description	Table Name	Status	Equal Dif	ferent Sn	apshot	t DB or	nly				
Maintain reading group data											
Definition of Reading Groups	OIB RDGRDEF	:-)	1								
Description of Reading Group Definition	OIB RDGRDEFT	:-)	1								
Reading group : Define parameters for a conversion group	OIB READINGGROUP	:-)	<u>37</u>								
Description of reading group parameter	OIB RDGGROUPT	:-)	<u>37</u>								
Define ranges for reading group data											
Definition of range group for input parameters of r. group	/QTYW/RDGRD CHC	<u>≺</u> :-)	1								
Description of range group	/QTYW/RDGRT CHCK	≦ :-)	<u>1</u>								
Range group data - Input parameters of reading group	/QTYW/READINGCCK	:-(	<u>18</u>	<u>1</u>							
Description of range group parameters	/QTYW/READINGCKT	:-)	<u>19</u>								
Conversion group maintenance (natural gas & LNG)											
Definition of Conversion Groups	<u>OIB01</u>	:-)	1								
Conversion Group Text	OIB01T	:-)	1								
Function module definition (API/AGA/Customer functions)	OIB04	:-)	14								1

As expected, the change of the range data is marked in red and by clicking the "1" in the "Different" column, the change of the reading group range is displayed.

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< 🐅	Measure	ment Cockpit: A	Analyze My S	Scenario - Coi	nfiguratio	on Tables			
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Comparison Different lines: 0001		YW/READIN	GCCK						^
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ZUC1 MTLNG	169.00000-2	164.000000-2	155.000000-2	157.000000-2	CEL				
	$\bigcirc$								< >

Practically seen from an application agents' perspective, this makes complex, laborious debugging of such issues a thing of the past! From a business management perspective, we have "raised the bar" in the areas of data integrity, security, and process transparence as we have an easy-to-use automated "audit" check for the most important values in our ERP system – the quantities.



#### 2.8. Test Case 08 – Assign LNG Conversion Group to Material -Development

#### Estimated test case execution time: 30 minutes

Now that you have a well-defined conversion group ZUC1 available, including automated test scenarios (QuantityWare recommends to defined **at least 10** scenarios per conversion group), you assign the conversion group to a material in the material master at plant level (Oil specific data view).

In our example development client, we utilize transaction MM02 (Change Material) and an LNG material code:

< SAP Create Material LNG (Finished Product)	
✓ $\checkmark$ ( $\blacksquare$ ( $\boxdot$ ) → Additional Data ( $\blacksquare$ Org. Levels More $\checkmark$ ( $\blacksquare$ ( $\blacksquare$ ( $\blacksquare$ ( $\blacksquare$ ( $\blacksquare$ )))	Exit
Classification	
Parallel inventory management and excise duty processing	
Base Unit of Measure     MBD       UoM Group     LNT       LNT     LNG TEST MANUAL       Conv. Group     ZUC1       MQCI LNG 15/15 °C,REAL,SD,COMP. Q2	
Air Buoy. Fact.     Conv.coeff	
Excise Duty Group       Oil content %       Cust.tariff nr	
Plant-to-plant transfer	
Transfer sign	
Localization - Brazil	
Material tax group	

Let's go back to the Gas Measurement Cockpit, tab strip "QCI Configuration & Products" and select "Conv. group for materials":

<u>         ⊆ C</u> ockpit <u>G</u> oto Environment <u>QuantityWare.com</u> System <u>H</u> elp         →	SOI (2) 010 🕨 🖬 🔔 🗖	×
< SAP Gas Measurement Cockpit		
V	° ⊑, ⊒	xit
Units of Measurement Print Standards Lists QCI Configuration Gas Analysis Test Tools		
Monitor Bulk Material Assignment	e Geroff	
€7 Conversion Group For Materials	-	
€7 Materials For Conversion Group		
Analyze Business Document		
Display & Analyze Conversion Groups		
i c⊽ My Selection		
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		1.

Enter e.g., the material name (LNG) and select "Execute" (F8):

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Material         LNG         to         I           Plant         0001         Q         to         I	r)					
Material Type	_					
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3 LNG Export 0001 Werk 0001 MBD LNT ZUC1 🛛 🖈 MQCI LNG 15/15 °C, REAL, SD, COMP. Q2 2 0 🗚 🦻 🖳 2	Analyze scenarios
E LNG Export 0001 Werk 0001 MBD LNT ZUC1 ► MQCI LNG 15/15 °C, REAL, SD, COMP. Q2 2 0▲0 🦻 🖳 2	0

From this central list, you can monitor the quantity conversion status for all materials in production, e.g., execute test scenario runs if errors have occurred, analyze the test scenario log status (typically the test scenarios should be executed via a periodic job in background) or perform a snapshot analysis.

#### 3. Summary

The BCG Test Manual provides overview guidance for **testing** the QuantityWare BCG solution and obtaining a detailed overview on the BCG capabilities.

The 8 test cases described in this document provide a quick and goal-oriented way to define an LNG conversion group for production usage. In addition, the importance of automated test scenarios is emphasized which is, with respect to time, typically the major effort in an implementation project (see PAIG for further details). Test scenarios can and should be transported through your system landscape together with your conversion group configuration, once defined in your development client. If your organization attributes value to auditing and auditable processes, test scenarios **must** be created, distributed, and used.

As noted in test case 02, one of the most challenging tasks is the correct assignment of a BCG template conversion group to your bulk materials. In addition, the test cases described in this document assume that no further configuration adjustments to a template conversion group is required, which is almost never the case. E.g., many template conversion groups are equipped with configuration options for specific requirements - trained experts must decide whether changes are required before moving a Z*** copy to production.

Thus, if you decide to purchase and implement QuantityWare BCG, careful inspection, validation, and implementation of BCG <u>by certified BCG consultants</u> or staff is strongly recommended - to save time and effort, but also to ensure that the configuration of such a fundamental system area has been performed accurately and correctly.

#### Legal Notices

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