



QuantityWare Working Paper

QuantityWare Interface – PRA Measurement System

A Working Paper describing principles and configuration steps required for the use of QuantityWare
Calculations with the PRA Measurement System

Version History

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1. PRA Measurement System

The PRA (Production Revenue Accounting) *Measurement System* provides a flexible method of recording measurement readings for all PRA business objects. The Measurement System in turn integrates the Quantity Conversion Interface (SAP QCI). The PRA Measurement System is utilized by PRA to:

- Provide a single point of data entry for the observed reading data e.g., from wells or measurement points
- Call the SAP QCI to convert a reading volume into standardized units
- Pass the required data back to the calling PRA transactions

During daily operations PRA will require various values, such as Measurement Point Volumes (MP_VOLUMES) or Well Completion Volumes (WC_VOLUMES).

The standardized values required by PRA are dependent on the product type:

- For oil and condensate: Volume and density
- For gas: Volume or energy, or both and heating value

1.1. Types of Calculations

There are different types of calculations. The QCI is called by the function “OIU_QCI_STD_CONVERSION” for:

- Calculations of oil products and condensates
- Calculations of gas products via BAdI implementation

1.1.1. Gas Products

The current PRA solution can process gas under low pressure and dry or wet conditions.

The conversion group **USGS - NATURAL GAS U.S. BASE CONDITIONS** has been developed to support such calculations, via the SAP QCI low pressure conversion routines, and wet to dry conversions being based on an example BAdI implementation OIU_WET_DRY_EXAMPLE, which implements a formula defined by the PRA development team based on legacy calculation logic defined in the PREMAS system. There is currently no need to support any other standard in the United States; therefore, the settings provided by SAP can be used after thorough validation.

1.1.2. Oil, Condensate, Liquids

The measured quantities of these products must be converted to standard conditions.

For such conversions, SAP provides an interface supporting the ASTM D1250-80 standard, based on the legacy “C-Code” implementation from the API. The related conversion group and Measurement System customizing settings are also provided.

QuantityWare recommends usage of the QuantityWare ABAP D1250-80 solution instead of the legacy “C-Codes” or, that customer’s use the new standard ASTM D1250-04 – (as required by the U.S. CBP - Customs and Border Protection). For business reasons (e.g., existing customer agreements), customers may need to use different versions of ASTM D1250 standard for different materials.

Additional standards may be required to support addition products. E.g., GPA 8217 / TP-27 (legacy version TP-25) is required for the calculation of LPG. The PRA Measurement System provides the flexibility to handle such cases.

It is possible to customize the use of different standards by different networks and to change the calculation standard of existing networks.

1.2. Main Objects of the Measurement System

The Measurement System contains objects to select and control measurements, their conversion and transport of the conversions' results.

1.2.1. Measurement Classes

Are used for the classification of business objects, such as WC_VOLUMES (Well Completion Volumes), etc. Each Measurement Class has a set of Measurement Types assigned to it. The Measurement Classes are hard coded in the PRA measurement transactions.

1.2.2. Measurement Types

Are a consistent set of readings to be taken for a business object in a Measurement Class.

These control:

- Input screen fields, their layout, and defaults
- The calculation to be used
- Field transport and measurement documents

1.3. Controlling the Measurement Process

Besides the Measurement Class of the PRA transaction, two more objects control the measurement process:

1. **Material** - with the related Major and Minor Product code assigned.

E.g.:

- Material EP100
- Major Product code: 0 - Oil
- Minor Product Code: 00 - general oil

The Measurement Type will be selected by:

- Measurement Class WC_VOLUMES
- Major Product Type 0
- Minor Product Type 00

E.g.: WC_VOLUMES, 0, 00 => WCDVLLILOILC

This is the Measurement Type which contains all required settings and controls for the related measurement process. All possible fields, the conversion and the field transport are assigned to the Measurement Type.

The selected Measurement Type is also responsible for the QCI Interface fields' definition.

2. **Measurement Group** with the assigned CONVGR (Conversion Group) and UOMGR (Unit of Measure Group).E.g.: 125004_60A with the assigned:

CONVGR: Q108 - ASTM D1250-05, CRUDE OIL 2004 API GRAVITY 60 °F

UOMGR: USL - Units BB6, LB

The CONVGR controls the QCI Conversion Group and the UOMGR defines for what Units of Measure the quantities are calculated, and the input screen field defaults.

1.3.1. Process Overview

1. Selection of Measurement type by:
 - Measurement Class
 - Material with assigned Major and Minor Product Code

2. The selected Measurement Type contains:
 - All needed screen input fields and their characteristics
 - The calculation and needed interface fields
 - The required field transports

3. The Measurement group with the assigned Conversion Group and Unit of Measure Group determines:
 - The QCI Conversion Group to be used
 - The selected input fields' default values and characteristics.

1.4. Measurement System Flexibility

As described in Chapter 1.3, the Measurement System can be customized to create and control any required input screen. It can call any assigned existing QCI calculation function by using the standardized QCI interface and it can show the results on the input screen generated.

It passes the results to the PRA application as defined by the field transports.

It fulfils all current productive requirements of the PRA solution; however it is limited by the current PRA solution functional extent.

E.g.: It is possible to configure the Measurement System to calculate the vapour mass of an LPG tank, however that quantity is unknown by the PRA solution and cannot be processed.

The Measurement System can be configured to call multiple standards such as ASTM D1250-80, ASTM D1250-04 (with and without pressure) and GPA TP-25 or GPA 8217 / TP-27 for LPG.

Any quantity conversion “standard” that provides PRA-required calculation results can be customized in the Measurement System, even the parallel use of differing standards by different Networks and for different Materials or Units of Measurements.

2. Standards Support Examples

The Measurement System's flexibility allows the use of any available standard that supports the SAP QCI interface. All currently available standards are implemented by QuantityWare based on the Standard SAP QCI Interface.

Since the current PRA Gas solution cannot use any standard other than the hard-coded formula (example BAdI), no further explanation is necessary, and we shall continue with descriptions for the implementation for Oil, Condensates and Liquids.

SAP provides example settings for the use of ASTM D1250-80 via legacy C-Codes.

The C-Codes and the QuantityWare BCS ABAP implementation of the ASTM D1250-80 standard are using the same SAP QCI interface and have been proven to calculate identically. If both calculations have been licensed and installed, conversion group settings dictate whether legacy C-Codes or the QuantityWare ABAP implementation will be used.

Simply put, by changing the assigned conversion group the system can be switched between using the legacy C-Codes or the QuantityWare ABAP solution. It is also possible to change existing conversion group settings to facilitate the swap between legacy C-Codes or the QuantityWare ABAP solution usage.

2.1. SAP Settings for ASTM D1250-80

SAP provides, without warranty, examples of configuration required for the use of ASTM D1250-80 calculations.

Owing to their age, the related conversion groups are designed to call the legacy external C-Codes originally provided by the API; we will use a conversion group that calls the QuantityWare ABAP implementation instead.

See [ASTM D1250-80](#) for technical details and an example.

2.2. ASTM D1250-04 without Pressure

ASTM D1250-04 (revision from 2013) is the current version of ASTM D1250. It also provides more calculation functionalities and includes many improvements registered with and made by the ASTM in the 33 years since the Release of ASTM D1250-80.

More details can be found here: [Comparison of ASTM D1250 standard implementations](#)

ASTM D1250-04 can also be called with the same input parameters as the superseded version ASTM D1250-80. If additional fields such as pressure are not provided with values, they will be considered as “initial” and not included into the calculation. As all input fields are identical, it is possible to use QuantityWare ASTM D1250-04 calculations by replacement or by changing the appropriate conversion group.

No other Measurement System changes are needed.

See ASTM D1250-04 without Pressure ASTM D1250-04 with Pressure for technical details and an example.

2.3. ASTM D1250-04 with Pressure

If pressure values are provided, ASTM D1250-04 includes these into the “correction factor” calculation. To use pressure values, the related Measurement Type’s fields must be customised to allow such values to be passed to the calculation.

If standard ASTM D1250-80 is also in use via the same Measurement Type, the pressure field will appear on the input screen even although it is not needed. Thus, we recommend the creation of a new Measurement Type for ASTM D1250-04 usage, which can be a copy of an existing D1250-80 measurement type, but with the pressure field added.

See ASTM D1250-04 with Pressure for technical details and an example.

2.4. GPA 8217 / TP-27 - LPG

This is an example of quantity conversion standard configuration for a standard currently unknown to PRA. In this instance, the following steps must be completed:

Customizing:

- Create a new Measurement Type and assign the required input fields and field transfers.
- Assign required fields to the calculation (input of GPA 8217 / TP-27)
- Assign the new Measurement Type to the Measurement Classes.

In the PRA application:

- Create a material and assign the proper Major and Minor Product codes
- Assign Measurement Type to the Measurement Class, Major and Minor Product Code
- Create a new Measurement Group with the desired Conversion Group and Unit of Measurement Group.

See GPA 8217 / TP-27 – LPG for technical details.

3. Conclusion

The SAP PRA application can support a wide variety of quantity conversion standards, including the latest, legally required standards for oil, condensate, and liquid products for the United States market.

For gaseous products, standards support is defined by the current architectural limitations of the SAP PRA product.

QuantityWare BCS seamlessly plugs into SAP PRA, however a PRA Measurement System Expert is recommended to be available. This working paper provides guidance how to proceed with such a task.

Appendix

In this section we define the necessary basic settings to allow the use of the standards previously discussed in the document, including examples of the Well Completion Volume Transaction and Measurement Class **WC_VOLUMES**.

Read and understand ASTM D1250-80 before trying to approach any other listed configuration and customising scenarios. ASTM D1250-80 describes the SAP-provided example settings along with explanations.

QuantityWare has created, tested and validated all configuration in the following appendices in internal QuantityWare systems.

There are no customer namespaces available for the necessary customising.

SAP recommends never to modify or delete SAP standard shipment objects, but create and assign new ones instead.

Appendix A. ASTM D1250-80

All needed settings of the Measurement System are provided by SAP.

We must set up a Delivery Network and use the settings of the Measurement System.

A.1. Delivery Network

Unit of Measure Group

It is possible to create a new group or use the existing one:

Dialog Structure		Unit of measure group	
Unit of measure group		Uo...	Description of the unit of measure group
Assignment to unit		USL	NA Liquid Barrels @ 60°F

Dialog Structure		UoM group	
Unit of measure group		USL	
Assignment to unit		Assignment to unit of me	
		MU	Std
		BB6	<input checked="" type="checkbox"/>
		LB	<input type="checkbox"/>

Measurement Group

We create a new group:

Unit of Measure Group: 125080_60A

Major Product Code: Oil (0)

Conversion Group: Q104

Unit of Measure Group: USL with BB6 and LB

If needed, we can add more Major Products to the group. The entry will be selected by the Material.

Measurement Group	125080_60A	D1250-80 60 FAH API			
Entries					
Major Product	Uo...	Description	Co...	Description	
Oil	USL	NA Liquid Barrels @ 60°F	Q104	CRUDE OIL 1980 API GR...	

Material and Assignment to the Product Codes:

The material must exist in table MARA (Material Master), but only as reference.

It must be defined in the PRA General Master Date Maintenance.

We use the existing material or create a new one.

Major Product Code: OIL

Minor Product Code: 00

Material	EP100
Major Product	Oil 
Product code	00

Minor Product Codes:

SAP provides a reference set, but we can define additional codes as shown later.

These codes will be used to select the Measurement Type.

00	OIL
01	DILUENT OIL
03	SKIM/SCRUB/DRIP OIL
04	POWER OIL
05	SKIM OIL
06	TANK BOTTOMS-OIL
30	OIL CONDENSATE MIX
3Y	OIL PLT CONDENSATE (PRICED AS GAS)

Delivery Network

Now we have all we need to create a Delivery Network and Delivery Network Dated.

Delivery Network	2	Oil ASTM D1250-80 60 FAH API
DN type	Network	
Effective From	01/01/2015	Effective To 12/31/9999

Production	Contract Allocation	Valuation
-------------------	---------------------	-----------

<input checked="" type="checkbox"/> Allocated	Meas. Group	125080_60A	D1250-80 60 FAH API
<input type="checkbox"/> Inactive			

Gas Allocation Basis		
<input checked="" type="radio"/> Volume	<input type="radio"/> Energy	<input type="radio"/> Dual

This Network must be completed by creating Wells, Well Completions and Measurement Points and assign them to the network (DN Downstream Nodes), Allocation Profile, etc.

A.2. Measurement System

Measurement Type

The assignment of the Measurement Type to the Major and Minor Product Code has already been done and can be used.

The Measurement Type **WCDVLL0ILC** is selected:

Well Completion Volumes Measurement Type Determinatio			
Major PD	P...	M.Type	
0i1	00	WCDVLL0ILC	

The **Field Transport** of Measurement Class and Measurement Type has been already set up and can be used:

Dialog Structure		Meas.Class	WC_VOLUMES	Well Completion Volumes	
Measurement class		Meas.Type	WCDVLL0ILC	WC Volumes Oil Condensate Liquids	
Measurement type :		Field transport			
Field transport		Field transport			
		M.Rdg	Description	Reading field	Unit field
		CONV	conversion group	CONV_GRP	
		ODN	Obs Density	BASE_DENSITY	BASE_DENSITY_U
		PDAY	Producing Days	DAYS_PROD	
		PHRS	Producing Hours	PRD_HRS	
		SDN	Std Density	STD_DENSITY	STD_DENSITY_U
		SVOL	Std Volume	STD_VOL	STD_VOL_U

Measurement Type Settings – Readings

Dialog Structure		Measurement type		
Measurement type		Meas.Type	Description	Label
Reading groups		WCDVLLH20	WC Volumes Water Liquids	Water Liquids
Readings		WCDVLL0ILC	WC Volumes Oil Condensate Liquids	Oil Cond Liquids
		WCDVLL0ILP	WC Volumes Oil Condensate Liquids Proce	Oil Cond Liquids Pr

We do not need to create a Reading Group.

All readings have already been set and can be used.

The selected fields will be generated into the input screen in the order defined in column "Row".

Dialog Structure

- Measurement type
 - Reading groups
 - Readings

Meas.Type WCDVLL0ILC

Reading ID	Reading Label	Read Type	Reading Type Name	Col	Row	Obs
PDAY	Producing Days	DAYS	Days up		1	<input checked="" type="checkbox"/>
PHRS	Producing Hours	HOURS_PROD	Producing Hours		2	<input checked="" type="checkbox"/>
ODN	Obs Density	DENSITY	Density		3	<input checked="" type="checkbox"/>
TTMP	Density Temp	OBS_VLTMP	Volumes Temps		4	<input checked="" type="checkbox"/>
HCOR	Hydrometer correcti.	FLAG	Flag indicator		5	<input checked="" type="checkbox"/>
DTMP	Obs Temp Vol	OBS_VLTMP	Volumes Temps		6	<input checked="" type="checkbox"/>
DVL	Obs Volume	OBS_VOLLIQ	OBS Liquid Volume		7	<input checked="" type="checkbox"/>
APRE	Alternate pressure	ALT_PRES	Alternate pressure		8	<input checked="" type="checkbox"/>
SDN	Std Density	STD_DENSI	STD Density		9	<input checked="" type="checkbox"/>
SVOL	Std Volume	STD_C_VOL	Std Calculated Volume		10	<input checked="" type="checkbox"/>

The specifications of each field can be shown/set/changed by double clicking on the line of the reading.
E.g. Reading ODN:

Dialog Structure

- Measurement type
 - Reading groups
 - Readings

Meas.Type WCDVLL0ILC WC Volumes Oil Condensate Liquids

Reading ID ODN Obs Density
Observed Density

Reading

Reading Type DENSITY Density
Reading Group

Status

Active
 SAP Active

Control

Hidden
 Display only
 Required
 SAP Required

Position

Column
Row 3

Input

Derived
 Observed

Copy control

Always copy

For each reading a Reading Type is assigned. In that case above:

Reading ID: ODN

Reading Type: DENSITY

Reading Types

Reading Types contain the characteristics of the reading field, they are used to define the generation of the input screen field.

Reading Types can be defined for specific Unit of Measure Groups or generically for all assigned Readings.

Here the example of Reading Type DENSITY:

Dialog Structure		Read.Type	DENSITY	Density			
<ul style="list-style-type: none"> Reading type <ul style="list-style-type: none"> Reading type chara 							
Reading type characteristics							
Uo...	UoM Description	Neg	Lng	Dec	UoM	NoC	Rqd
NA1	North American Measurements	<input type="checkbox"/>	9	5		<input checked="" type="checkbox"/>	<input type="checkbox"/>
USL	NA Liquid Barrels @ 60°F	<input type="checkbox"/>	9	5		<input checked="" type="checkbox"/>	<input type="checkbox"/>
USR	NA Gallons @ 60°F, RDW	<input type="checkbox"/>	9	5	RDW	<input checked="" type="checkbox"/>	<input type="checkbox"/>

Read.Type	DENSITY	Density	Format	N
UoM group	USL	NA Liquid Barrels @ 60°F		
Unit of measure				
Unit of measure	<input type="text"/>	<input type="checkbox"/> Required	<input checked="" type="checkbox"/> No change	
Formatting				
Output length	<input type="text" value="9"/>	Display format	<input type="text"/>	
Output decimals	<input type="text" value="5"/>	Rounding	<input type="checkbox"/> 0	
Allowed values				
<input type="checkbox"/> Allow negative values				
Default	<input type="text"/>			
Warning	<input type="text"/>	to	<input type="text"/>	
Error	<input type="text"/>	to	<input type="text"/>	
Data Dictionary				
Check table	<input type="text"/>			
Check field	<input type="text"/>			
Reference domain	<input type="text"/>			
Search help	<input type="text"/>			
Search parameter	<input type="text"/>			

Calculation

The function OIU_QCI_STD_CONVERSION is provided by SAP allowing PRA to call the QCI.

All possible parameters for that calculation have been already defined by SAP and can be selected for use in the desired call.

We must assign this calculation to our Measurement Type and define the necessary parameters.

Dialog Structure		Measurement type		
		Meas.Type	Description	Label
Measurement type		WCDVLLH20	WC Volumes Water Liquids	Water Liquids
Calculation		WCDVLL0ILC	WC Volumes Oil Condensate Liquids	Oil Cond Liquids
Observed parameter		WCDVLL0ILP	WC Volumes Oil Condensate Liquids Press	Oil Cond Liquids Pr.
Derived parameter				

Each calculation contains a calling sequence of ABAP Functions.

The final one (that calls the QCI) is OIU_QCI_STD_CONVERSION.

Previous functions are used to validate input data and to transfer fields.

Since QuantityWare offers the possibility to define ranges for each of the input data, input checks should not be done here.

Dialog Structure		Meas.Type	WC Volumes Oil Condensate Liquids	Sequence
Measurement type		WCDVLL0ILC	WC Volumes Oil Condensate Liquids	
Calculation				
Observed parameter				
Derived parameter				
Calculation				
Calc	CSeq	Function Module	Short text for function module	
UOME		OIU_ME_VERIFY_NO_CONDITION_UOM	Edit check for UOM's on volume	
1	1	OIU_ME_WCDVLH_DAYS_HOURS	days hours	
TTMP	2	OIU_ME_COPY_VALUE_IF_NULL	Copy on value to another	
OTMP	3	OIU_ME_COPY_VALUE_IF_NULL	Copy on value to another	
ODN	9	OIU_ME_VOLUMES_OIL_DENSITY	Oil gravity Edits	
2	10	OIU_ME_WCDVLH_OBS_TEMP	OBS Temperature	
3	11	OIU_ME_WCTST_BSW_PERCENT_EDIT	BSW Percent / Oil Volume edit	
4	12	OIU_ME_WCDVLH_STD_UOM	Gets STD UOM from UOMG tab	
5	13	OIU_QCI_STD_CONVERSION	Calculate Gas Volume, Quantit	

All parameters have been set by SAP in their example and no changes are necessary in our case, e.g. function OIU_QCI_STD_CONVERSION parameters for the final QCI-call.

It is important to assign the Reading ID to the proper QCI Parameter (column Param) to pass those values to the QCI. In our case, these have been previously set in SAP example.

Dialog Structure

- Measurement type
 - Calculation
 - Observed param
 - Derived param

Meas.Type WC Volumes Oil Condensate Liquids

Calculation

Function

Calculate Gas Volume, Quantity, Energy by QCI

Observed parameters			
P.Seq	Reading ID	Description	Param
	UOMG	unit of measure group	UOMGR
	TTMP		OBSTSTMETT
	STMP	STD Temperature	STDMETTMP
	OVL	Observed Volume	OBSQTY
	OTMP	Observed Temperature	OBSMTMETTP
	ODN	Observed Density	OBSTSTDENS
	OCOF	Compressibility factor at observed cond	COMPFCOBSR
	HCOR	Hydrometer correction	HYDROCORR
	CONV	conversion group	CONVGROUP
	AQTY		ALTQTY
	APRE		ALTMETPRES
	ACOF	Compressibility factor at observed cond	COMPFCALT

Dialog Structure

- Measurement type
 - Calculation
 - Observed param
 - Derived param

Meas.Type WC Volumes Oil Condensate Liquids

Calculation

Function

Calculate Gas Volume, Quantity, Energy by QCI

Derived parameters				
P.Seq	Reading ID	Description	Param	R
	SDN	Standard Density	STDDEN	X
	SVOL	Standard Volume		X

Finished. This is all that we need to call the PRA Volume Transaction to collect measurements, standardize them and pass them back to the calling transaction. The Measurement System creates a Measurement Reading and a Measurement Document.

Here, the generated sub screen with the calculated results.

WC Volume Transaction

Create WC Volumes: Overview

Header
Edits / Calculations

Well Completion	<input type="text" value="5"/>	<input type="text" value="1"/>	Oil Well 5 Completion 1
Delivery Network	<input type="text" value="2"/>		Oil ASTM D1250-80 60 FAH API
Effective From	<input type="text" value="01/01/2015"/>	Effective To	<input type="text" value="01/01/2015"/>
Material	<input type="text" value="EP100"/>		Oil
Volume Type	<input type="text" value="ALLOCATION VOLUME"/>		

Allocation Frequency

Monthly
 Daily

Reading	Value	UoM	Name
Producing Days	1.000		
Producing Hours	24.000		
Obs Density	34.00000		
Density Temp	70.00	FAH	°F
Hydrometer correcti.	X		Yes
Obs Temp Vol	75.00	FAH	°F
Obs Volume	100,000.00	BBL	barrel
Std Density	33.200		
Std Volume	99,304.00	BB6	bbl 60 °F

Appendix B. ASTM D1250-04 without Pressure

If no field for pressure is passed to the calculation function of ASTM D1250-04, pressure will not be included into the calculation, thus no changes of the input fields are necessary to change between ASTM D1250-80 and ASTM D1250-04.

We can replace the Conversion Group assigned to the Measurement Group or create a new Measurement Group and assign it to the Network.

Measurement Group

Unit of Measure Group: 125004_60A

Major Product Code: Oil (0)

Conversion Group: Q108

Unit of Measure Group: USL with BB6 and LB

Measurement Group		125004_60A	D1250-04 60 FAH API		
Entries					
	Major Product	Uo...	Description	Co...	Description
	Oil	USL	NA Liquid Barrels @ 60°F	Q108	CRUDE OIL 2004 API GR...

Delivery Network

Assign the Measurement Group to the Network.

Delivery Network	1	Oil ASTM D1250-04 60 FAH API
DN type	Network	
Effective From	01/01/2015	Effective To 12/31/9999

Production	Contract Allocation	Valuation
-------------------	---------------------	-----------

<input checked="" type="checkbox"/> Allocated	Meas. Group	125004_60A	D1250-04 60 FAH API
<input type="checkbox"/> Inactive			

Gas Allocation Basis		
<input checked="" type="radio"/> Volume	<input type="radio"/> Energy	<input type="radio"/> Dual

Now you can call the Well Completion Volumes transaction using standard ASTM D1250-04 without pressure.

Here, the generated sub screen with the calculated results.

WC Volume Transaction

Well Completion	3	1	Oil Well 3 Completion 1
Delivery Network	1		Oil ASTM D1250-04 60 FAH API
Effective From	01/01/2015	Effective To	01/01/2015
Material	EP100		Oil
Volume Type	ALLOCATION VOLUME 		

Allocation Frequency

Monthly
 Daily

Reading	Value	UoM	Name
Producing Days	1.000		
Producing Hours	24.000		
Obs Density	34.00000		
Density Temp	70.00	FAH	°F
Hydrometer correcti.	X		Yes
Obs Temp Vol	75.00	FAH	°F
Obs Volume	100,000.00	BBL	barrel
Std Density	33.232		
Std Volume	99,304.00	BB6	bbl 60 °F

Appendix C. ASTM D1250-04 with Pressure

The settings are fundamentally the same as for ASTM D1250-80 and ASTM D1250-04 without pressure, however we additionally need the pressure field to appear at the generated input screen and for its values to be passed to the QCI.

When we add the field to the Measurement Type, it will appear at all calculations involving that Type; to avoid this and errors if using ASTM D1250-80 in parallel, we must create a new Measurement Type and select it by the Major Product Code Oil and a new Minor Product code.

C.1. PRA Settings

Material, Major and Minor Product Code

We create a new Material and a new Minor Product Code;

Pd	Product Code Description
00	OIL
01	DILUENT OIL
03	SKIM/SCRUB/DRIP OIL
04	POWER OIL
05	SKIM OIL
06	TANK BOTTOMS-OIL
30	OIL CONDENSATE MIX
3Y	OIL PLT CONDENSATE (PRICED AS GAS)
Z1	OIL under pressure

Material	EP1Z1
Major Product	Oil 
Product code	Z1

C.2. Measurement System Settings

Measurement Type

We copy the new measurement Type WCDVLL0ILP from the existing WCDVLL0ILC.

Measurement type			
Meas.Type	Description	Label	
WCDVLL0ILC	WC Volumes Oil Condensate Liquids	Oil Cond Liquids	
WCDVLL0ILP	WC Volumes Oil Condensate Liquids Press	Oil Cond Liquids Pr.	

Then we assign the new Measurement Type to the Major and Minor Product Code.

Well Completion Volumes Measurement Type Determinatio			
Major PD	P...	M.Type	
Oi1	00	WCDVLL0ILC	
Oi1	Z1	WCDVLL0ILP	

Now we add the pressure field to the Readings of the Measurement Type:

Readings							
Reading ID	Reading Label	Read Type	Reading Type Name	Col	Row	Obs	
PDAY	Producing Days	DAYS	Days up		1	<input checked="" type="checkbox"/>	
PHRS	Producing Hours	HOURS_PROD	Producing Hours		2	<input checked="" type="checkbox"/>	
ODN	Obs Density	DENSITY	Density		3	<input checked="" type="checkbox"/>	
TTMP	Density Temp	OBS_VLTMP	Volumes Temps		4	<input checked="" type="checkbox"/>	
HCOR	Hydrometer correcti.	FLAG	Flag indicator		5	<input checked="" type="checkbox"/>	
OTMP	Obs Temp Vol	OBS_VLTMP	Volumes Temps		6	<input checked="" type="checkbox"/>	
OVL	Obs Volume	OBS_VOLLIQ	OBS Liquid Volume		7	<input checked="" type="checkbox"/>	
APRE	Alternate pressure	ALT_PRES	Alternate pressure		8	<input checked="" type="checkbox"/>	
SDN	Std Density	STD_DENSI	STD Density		9	<input checked="" type="checkbox"/>	
SVOL	Std Volume	STD_C_VOL	Std Calculated Volume		10	<input checked="" type="checkbox"/>	

And maintain the details of the new Reading:

Dialog Structure

- ▼ Measurement type
 - Reading groups
 - Readings

Meas.Type	WCDVLL0ILP	WC Volumes Oil Condensate Liquids Press
Reading ID	APRE	Alternate pressure

Reading

Reading Type	ALT_PRES	Alternate pressure
Reading Group		

Status

Active

SAP Active

Control

Hidden

Display only

Required

SAP Required

Position

Column

Row

Input

Derived

Observed

Copy control

Always copy

Reading Type - ALT_PRES

We create the settings of the Reading Type ALT_PRES for Unit of Measure Group USL:

<p>Dialog Structure</p> <ul style="list-style-type: none"> Reading type <ul style="list-style-type: none"> Reading type chara 	<p>Read.Type ALT_PRES Alternate pressure Format N</p> <hr/> <p>UoM group USL NA Liquid Barrels @ 60°F</p> <hr/> <p>Unit of measure</p> <p>Unit of measure PSI pound-force per square Inch <input type="checkbox"/> Required <input type="checkbox"/> No change</p> <hr/> <p>Formatting</p> <p>Output length <input type="text"/> Display format <input type="text"/> Output decimals 5 Rounding <input type="checkbox"/> 0</p> <hr/> <p>Allowed values</p> <p><input type="checkbox"/> Allow negative values</p> <p>Default <input checked="" type="checkbox"/> <input type="text" value="0.00000"/> Warning <input type="checkbox"/> <input type="text"/> to <input type="text"/> Error <input type="checkbox"/> <input type="text"/> to <input type="text"/></p> <hr/> <p>Data Dictionary</p> <p>Check table <input type="text"/> Check field <input type="text"/> Reference domain <input type="text"/> Search help <input type="text"/> Search parameter <input type="text"/></p>
--	---

Function OIU_QCI_STD_CONVERSION – add new field.

We must make sure that the pressure field will be passed to the QCI.

Dialog Structure: Measurement type > Calculation

Meas.Type: WCDVLL0ILP WC Volumes Oil Condensate Liquid... Sequence

Calculation				
Calc	CSeq	Function Module	Short text for function module	
UOME		OIU_ME_VERIFY_NO_CONDITION_UOM	Edit check for UOM's on volume	
1	1	OIU_ME_WCDVLH_DAYS_HOURS	days hours	
TTMP	2	OIU_ME_COPY_VALUE_IF_NULL	Copy on value to another	
OTMP	3	OIU_ME_COPY_VALUE_IF_NULL	Copy on value to another	
ODN	9	OIU_ME_VOLUMES_OIL_DENSITY	Oil gravity Edits	
2	10	OIU_ME_WCDVLH_OBS_TEMP	OBS Temperature	
3	11	OIU_ME_WCTST_BSW_PERCENT_EDIT	BSW Percent / Oil Volume edit	
4	12	OIU_ME_WCDVLH_STD_UOM	Gets STD UOM from UOMG tab	
5	13	OIU_QCI_STD_CONVERSION	Calculate Gas Volume, Quantit	

Dialog Structure: Measurement type > Calculation

Meas.Type: WCDVLL0ILP WC Volumes Oil Condensate Liquids Press

Calculation: 5

Function: OIU_QCI_STD_CONVERSION

Calculate Gas Volume, Quantity, Energy by QCI

Observed parameters				
P.Seq	Reading ID	Description	Param	
	UOMG	unit of measure group	UOMGR	
	TTMP		OBSTMETT	
	STMP	STD Temperature	STDMETMP	
	OVL	Observed Volume	OBSQTY	
	OTMP	Observed Temperature	OBSMETTP	
	ODN	Observed Density	OBSTDENS	
	OCOF	Compressibility factor at observed cond	COMPFCOBSR	
	HCOR	Hydrometer correction	HYDROCORR	
	CONV	conversion group	CONVGROUP	
	AQTY		ALTQTY	
	APRE		ALTMETPRES	
	ACOF	Compressibility factor at observed cond	COMPFCALT	

Here, the generated sub screen with the calculated results.

WC Volume Transaction

Well Completion	11	1	Oil Well 11 Completion 1
Delivery Network	5		Oil ASTM D1250-04 60 FAH API Press
Effective From	01/01/2015	Effective To	01/01/2015
Material	EP1Z1		Oil
Volume Type	ALLOCATION VOLUME 		

Allocation Frequency

Monthly
 Daily

Reading	Value	UoM	Name
Producing Days	1.000		
Producing Hours	24.000		
Obs Density	34.00000		
Density Temp	70.00	FAH	°F
Hydrometer correcti.	X		Yes
Obs Temp Vol	75.00	FAH	°F
Obs Volume	100,000.00	BBL	barrel
Alternate pressure	50.000	PSI	lbf / in ²
Std Density	33.232		
Std Volume	99,329.00	BB6	bbl 60 °F

Appendix D. GPA 8217 / TP-27 – LPG

There is no example for LPG provided by SAP.

Since PRA supports only the calculated Standard Volume and Standard Density, we can use a simple conversion group and ignore all other functionality provided by BCP, such as vapour mass and energy calculations, etc.

The structure of this configuration will be the same as for ASTM D1250-04 with pressure, see ASTM D1250-04 with Pressure.

D.1. PRA Settings

Material, Major and Minor Product Code

We create a new Material and a new Minor Product Code at the Major Product code

Plant NGLS – 4.

Major Product Code: 4	
Pd	Product Code Description
Z1	LIQUID PETROLEUM GAS - LPG

Assign the product codes to the material.

Material	EP4Z1
Major Product	Plant NGLS 
Product code	Z1

Measurement Group

- create a new one

Unit of Measure Group: TP27_60REL
 Major Product Code: Plant NGLS (4)
 Conversion Group: Q715
 Unit of Measure Group: USR with IG6 and LB

Measurement Group

Entries					
	Major Product	Uo...	Description	Co...	Description
	Plant NGLS	USR	NA Gallons @ 60°F, RDW	Q715	LPG GPA TP-27 REL.DEN...

Delivery Network

Assign the Measurement Group to the Network.

Delivery Network LPG GPA TP-27 REL.DENS 60 °F
 DN type
 Effective From Effective To

Production Contract Allocation Valuation

Allocated Inactive

Meas. Group TP-27 60 FAH REL. DENS

Gas Allocation Basis
 Volume Energy Dual

D.2. Measurement System Settings

Measurement Type

We copy the new measurement Type WCV_LPGSAP from the existing WCDVLLILOIC; also copying the field transport which can be used as defined.

Measurement type		
Meas.Type	Description	Label
WCV_LPGSAP	WC Volumes LPG SAP Model	WC Vols LPG SAP
WCV_NGLGEN	WC Vols NGL Generic	WC Vols NGL Generic

Then we assign the new Measurement Type to the Major and Minor Product Codes.

Well Completion Volumes Measurement Type Determina		
Major PD	P...	M.Type
Plant NGLS	00	WCV_NGLGEN
Plant NGLS	Z1	WCV_LPGSAP

Readings

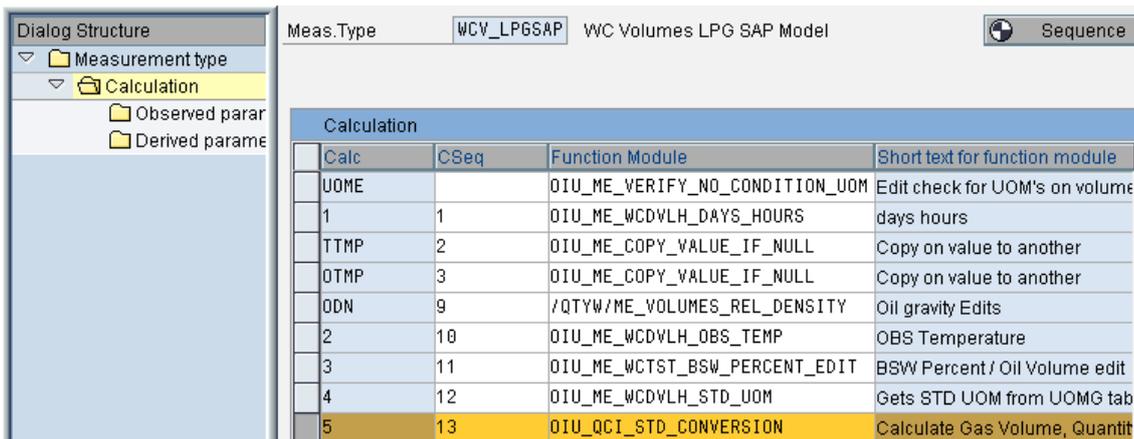
We do not need to define a Reading Group.

The readings have already been copied with the Measurement Type, but need to be maintained. The Reading Types of the marked readings have to be set as they have to appear on the input screen using Unit of Measure Group USR.

Readings							
Reading ID	Reading Label	Read Type	Reading Type Name	Col	Row	Obs	
PDAY	Producing Days	DAYS	Days up		1	<input checked="" type="checkbox"/>	
PHRS	Producing Hours	HOURS_PROD	Producing Hours		2	<input checked="" type="checkbox"/>	
ODN	Obs Density	RELDENSITY	Relative Density		3	<input checked="" type="checkbox"/>	
TTMP	Density Temp	OBS_VLTMP	Volumes Temps		4	<input checked="" type="checkbox"/>	
HCOR	Hydrometer correcti.	FLAG	Flag indicator		5	<input checked="" type="checkbox"/>	
OTMP	Obs Temp Vol	OBS_VLTMP	Volumes Temps		6	<input checked="" type="checkbox"/>	
OVL	Obs Volume	OBS_VOLLIQ	OBS Liquid Volume		7	<input checked="" type="checkbox"/>	
SDN	Std Density	STD_DENSI	STD Density		8	<input checked="" type="checkbox"/>	
SVOL	Std Volume	STD_C_VOL	Std Calculated Volume		9	<input checked="" type="checkbox"/>	

Function OIU_QCI_STD_CONVERSION

ODN (Observed Density) calculations are not necessary; the corresponding function can be deleted or changed to relative density.



The screenshot shows a software window titled 'Meas.Type WCV_LP6SAP WC Volumes LPG SAP Model'. On the left is a 'Dialog Structure' tree with 'Measurement type' expanded to 'Calculation'. The main area contains a table with the following data:

Calculation			
Calc	CSeq	Function Module	Short text for function module
UOME		OIU_ME_VERIFY_NO_CONDITION_UOM	Edit check for UOM's on volume
1	1	OIU_ME_WCDVLH_DAYS_HOURS	days hours
TTMP	2	OIU_ME_COPY_VALUE_IF_NULL	Copy on value to another
OTMP	3	OIU_ME_COPY_VALUE_IF_NULL	Copy on value to another
ODN	9	/QTYW/ME_VOLUMES_REL_DENSITY	Oil gravity Edits
2	10	OIU_ME_WCDVLH_OBS_TEMP	OBS Temperature
3	11	OIU_ME_WCTST_BSW_PERCENT_EDIT	BSW Percent / Oil Volume edit
4	12	OIU_ME_WCDVLH_STD_UOM	Gets STD UOM from UOMG tab
5	13	OIU_QCI_STD_CONVERSION	Calculate Gas Volume, Quantit

The copied parameters can be used as defined.

All necessary settings have been completed and the WC Volume Transaction can be used.

Here, the generated sub screen with the calculated results.

WC Volume Transaction

Well Completion	7	1	LPG Well 7 Completion 1
Delivery Network	3		LPG GPA TP-27 REL.DENS 60 °F
Effective From	01/02/2015	Effective To	01/02/2015
Material	EP4Z1		Oil
Volume Type	ALLOCATION VOLUME 		

Allocation Frequency

Monthly
 Daily

Reading	Value	UoM	Name
Producing Days	2.000		
Producing Hours	48.000		
Obs Density	0.470	RDW	RDW
Density Temp	60.00	FAH	°F
Hydrometer correcti.	X		Yes
Obs Temp Vol	70.00	FAH	°F
Obs Volume	100,000.00	GAL	gal (U.S.)
Std Density	0.470	RDW	RDW
Std Volume	81,553.775	IG6	gi - 60 °F

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