



QuantityWare Consulting Paper

Advanced Development RESOLUÇÃO ANP No 894 – 2022 / RESOLUÇÃO CNP No 6 – 70

Implementation Details & Instructions for certified BCP consultants

Notes

This consulting paper supports certified QuantityWare BCP consultants in the implementation of the [Advanced Development \(AD\)](#) delivered with [note 000114](#) – Advanced Development - Brazilian Standard RESOLUÇÃO ANP N° 894 2022 – RESOLUÇÃO CNP N° 6 - 70 - Tables I & II.

Version History

Version	Date	Description
01	2023-06-20	Initial Version
02	2023-11-30	Editorial revision , BCS 30A CSP03 / 30B CSP02 changes

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1. Introduction & Methodology

1.1. Introduction

With [RESOLUÇÃO ANP No 894 - 2022](#) , RESOLUÇÃO CNP No 6 – 70 has been revoked, and technically been put into force again. No changes to the 1970 Tables 1(I) and 2(II) content and description have been made. [These tables are available as PDF documents \(Agência Nacional do Petróleo, Gás Natural e Biocombustíveis\)](#) which are apparently scanned from historic (1970) documents. Thus, from an implementation point of view, the documentation of this new implementation will refer to it as RESOLUÇÃO ANP No 894 - 2022 / RESOLUÇÃO CNP No 6 – 70, whereas the technical implementation continues to utilize RESOLUÇÃO CNP No 6 – 70 / CNP 6 - 70 as technical ID (e.g., ABAP programs).

As described in [note 000113](#), the current BCP support of this Brazilian standard is a Table II, algorithm-based, implementation (see Annex 1 for details). This implementation is extended with this advanced development, to support Table I density corrections for the hard coded table values. Also, an implementation for the hard coded Table II values is delivered with this note. Algorithm-based MQCI and SAP QCI integration functions are also delivered, but not released at this point in time, since the table values are the new standard and differences between the printed table values and the algorithm-based values are observable.

1.2. Methodology

Since this reconfirmed national Brazilian standard is the [printed table values](#), a complete validation of the algorithm-based approach against all printed table values has been necessary as part of this development.

- In a preliminary step, a rough comparison between the algorithm-based values and a subset of the printed values has been made. Differences do occur (approx. 2 % of all the compared values) for Table I, which are documented in internal test reports. For Table II, deviations have been found for calculation results when input data requires interpolation/calculation of table values. Thus, as noted above, the algorithm-based solution is not fit for use for this newly approved Brazilian standard for both Tables I & II. The PDF table values are to be utilized.
- First, the printed values (which are of medium to very bad quality – see Annex 2 for examples) were scanned electronically and corrected via a manual process.
- Then, these values were compared with the available algorithm. If differences occurred, a manual comparison and correction process followed.
- The supporting assumption for this approach is that it is unlikely that both the PDF printed value and the algorithm-based value are identical **and** incorrect.

QuantityWare has thus invested massive effort to computerize the scanned document values of Table I and Table II and compared these values with the algorithm implementation. More than 200 000 table values have been validated and are now delivered. It is important to note that, due to the limited quality of the historical scans, single values may still be incorrect when compared with the PDF printed values.

Also, as stated above, **the now newly reconfirmed national Brazilian standard is the printed table values, not the algorithm that has been made available to QuantityWare as an XLS from industry experts in 2012.**

With the [next BCS CSP](#), the related template configuration will also be delivered. In this consulting paper, we document the required configuration settings for the two new template conversion groups, as well as all enhancements made to the PMC and customizing and configuration.

Finally, it has been decided that the delivery of the PDF table values requires an initial load process, where each customer triggers and executes the initial load of two new customizing tables, which then contain all Table I and II values derived from the process described above. With this initial load activity each customer agrees that:



The initial content load of table 1 and table 2 of 'RESOLUÇÃO ANP No 894 - 2022, RESOLUÇÃO CNP No 6 - 70' is provided on an "AS IS" basis with no warranties.

Licensee agrees to test the configuration and software carefully before using in systems that contain productive data.

QuantityWare GmbH cannot guarantee the correctness of the table entries used in calculations nor of the correctness of the results.

In no event will QuantityWare GmbH be liable for any loss of profits, loss of use, direct, incidental, consequential, or special damages, regardless of whether QuantityWare GmbH has advance notice of the possibility of such damages.

Each customer thus must validate its initial load data and can adjust that data, if found to be incorrect, in their system.

Details are provided in the following sections.

2. Configuration Support – Advanced Development

This consulting paper provides detailed support to [certified BCS consultants](#), who wish to implement the [RESOLUÇÃO ANP No 894 - 2022](#) solution.

As noted above, the solution is delivered as an Advanced Development (AD) with [note 000114](#). Thus, note 000114 must be implemented into the customer system landscape before the configuration can be implemented in the QuantityWare template client 045 by a certified BCS consultant.

The specification details of the advanced development are briefly described in section 5 of [note 000101](#).

For additional clarifications, a consultant inquiry ticket (available to all certified BCS consultants) should be raised via the [QuantityWare Support Portal](#).

3. Brazilian Standard RESOLUÇÃO ANP No 894 - 2022

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AGÊNCIA NACIONAL DO PETRÓLEO, GÁS NATURAL E BIOCOMBUSTÍVEIS

RESOLUÇÃO ANP Nº 894, DE 18 DE NOVEMBRO DE 2022 - DOU DE 23-11-2022

Estabelece os coeficientes de correção da densidade (massa específica) e do volume dos derivados de petróleo.

A DIRETORIA DA AGÊNCIA NACIONAL DO PETRÓLEO, GÁS NATURAL E BIOCOMBUSTÍVEIS - ANP, no exercício das atribuições conferidas pelo art. 65 do Regimento Interno e pelo art. 7º do Anexo I do Decreto nº 2.455, de 14 de janeiro de 1998, tendo em vista o disposto na Lei nº 9.478, de 6 de agosto de 1997 e no art. 45. da Lei nº 9.784, de 20 de janeiro de 1999, com base no Processo nº 48610.205397/2021-13 e nas deliberações tomadas na 1.105ª Reunião de Diretoria, realizada em 8 de novembro de 2022, RESOLVE:

Art. 1º Esta Resolução estabelece, para uso na comercialização dos derivados do petróleo, o coeficiente de correção para temperatura de 20°C, da densidade (massa específica) e do volume daqueles produtos.

Parágrafo único. Os coeficientes de que se trata o caput estão disponíveis no sítio eletrônico da ANP na Internet (www.gov.br/anp) nas seguintes tabelas:

I - Tabela I - Conversão da densidade observada para densidade a 20°C; e

II - Tabela II - Correção de volume para 20°C.

Art. 2º Fica revogada a Resolução CNP nº 6, de 25 de junho de 1970.

Art. 3º Esta Resolução entra em vigor em 1º de dezembro de 2022.

RODOLFO HENRIQUE DE SABOIA
Diretor-Geral


Este texto não substitui o publicado no Diário Oficial da União.


publicação no sistema: 23 de novembro de 2022

Source: <https://atosoficiais.com.br/anp/resolucao-n-894-2022-estabelece-os-coeficientes-de-correcao-da-densidade-massa-especifica-e-do-volume-dos-derivados-de-petroleo?origin=instituicao&q=894>

In November 2022, Brazilian standard ANP No. 894 was issued:

LINK: <https://www.gov.br/anp/pt-br/assuntos/qualidade-de-produtos/tabelas-de-conversao-da-densidade-e-conversao-de-volume-resolucao-anp-no-894-2022>



The screenshot shows the gov.br website interface. At the top left is the gov.br logo with 'Ministério de Minas e Energia' below it. To the right are navigation links: 'Órgãos do Governo', 'Acesso à Informação', 'Legislação', and 'Acessibilidade'. A blue button 'Entrar com o gov.br' is on the far right. Below the navigation is a search bar with the placeholder text 'O que você procura?' and a magnifying glass icon. A breadcrumb trail reads: 'Assuntos > Qualidade de Produtos > Tabelas de conversão da densidade e conversão de volume (Resolução ANP nº 894/2022)'. The main heading is 'Tabelas de conversão da densidade e conversão de volume (Resolução ANP nº 894/2022)'. Below the heading, it says 'Publicado em 01/12/2022 16h06' and 'Atualizado em 02/12/2022 13h25'. On the right, there are social media sharing icons for Facebook, Twitter, and LinkedIn.

Tabelas de conversão da densidade e conversão de volume (Resolução ANP nº 894/2022)

Publicado em 01/12/2022 16h06 | Atualizado em 02/12/2022 13h25

Compartilhe:   

A **Resolução ANP nº 894/2022** estabelece, para uso na comercialização dos derivados do petróleo, o coeficiente de correção para temperatura de 20°C, da densidade (massa específica) e do volume destes produtos.

Os coeficientes estão disponíveis nas seguintes tabelas:

- **Tabela I** - Conversão da densidade observada para densidade a 20°C; e
- **Tabela II** - Correção de volume para 20°C.

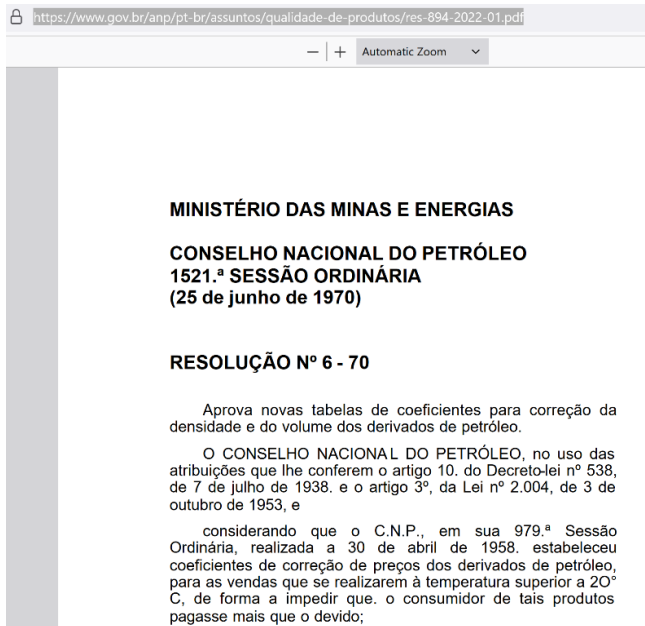
Here, the two tables I and II are accessible as PDF documents:

Table I : <https://www.gov.br/anp/pt-br/assuntos/qualidade-de-produtos/res-894-2022-01.pdf>

Table II : <https://www.gov.br/anp/pt-br/assuntos/qualidade-de-produtos/res-894-2022-02.pdf>

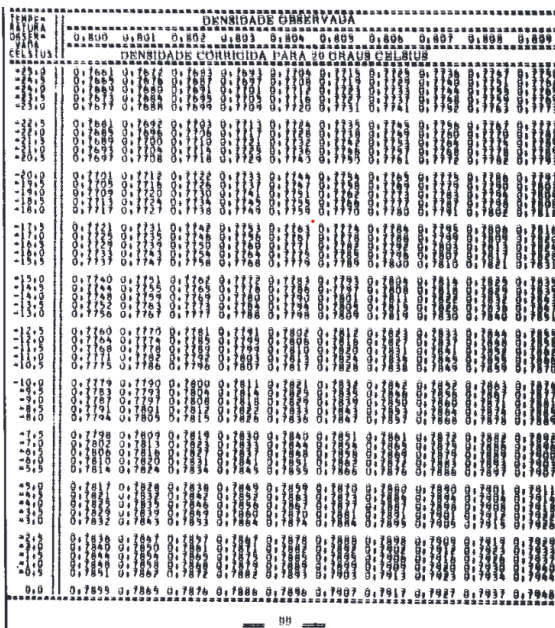
3.1. Standard Analysis

A detailed inspection of these two tables reveals that they are identical with the 1970 versions:



In general, the quality of the data - provided by these two PDF documents – is extremely bad and required a massive effort by the implementation team for computerization.

Example: Table I, page 99, which is unreadable.



All issues that the QuantityWare implementation team found are documented and can be found in Annex 2 of this document.

For Table I, exactly one example is provided as to how to utilize these tables:

EXAMPLE

The density of a product is 0,7852 at 26°C. What will be its density at 20°C?
 We find the value 0.785 in the table column "Observed Density" and note that in the column "Observed Temperature" corresponding to 26°C, the equivalent density at 20°C is0.7893
 In the same way, for a density of 0.786, the value corresponding to 20°C is0.7903
 As an increase of 0.0010 in density at 26°C entails an increase of 0.0010 in density at 20°C, an increase from 0.785 to 0.7852 increases the density at 20°C by 0.2 x 0.0010, i.e. by.....0,0002
 Therefore, the density at 20°C equivalent to the density 0.7852 at 26°C is 0.7893 + 0.0002, or0,7895

For Table II, two examples are provided as to how to utilize these tables:

Example 1

What is the volume at 20°C of 86.424 liters measured at 12.5°C of a product whose density at 20°C is 0.6257?
 We approximate the density to 0.626, which is the closest value next to an even digit in the third decimal place, and, entering in the table with this value it is noted that, for the temperature of 12.5°C, the Volume Correction Factor for 20°C is in.....1.012
 Therefore, the 86.424 liters at 12.5°C occupy a volume 20°C of 86.424 x 1.012, or 87.461 l

Example 2

What is the volume at 20°C of 100,000 liters measured at 24.5°C of a product whose density at 20°C is 0.7468?
 Bring the density closer to 0.746, which is the closest value next to an even digit in the third decimal place and, entering in the table with this value, one finds, for the temperature of 24.5°C, a Volume Correction Factor to 20°C equal to The..... 0.9951
 Therefore, the 100,000 liters measured at 24.5°C occupy a volume at 20°C of 100,000 x 0.9951, that is, of.....99,510 l

- No guidance is provided for measurements of temperature and subsequent rounding of values that are not multiples of 0.5 °C .
- Table I base density values shall apparently be calculated by interpolation between the closest observed density values. The observed density values of Table I are given with 3 decimal accuracy in kg/L, in 0.1 kg/L steps.
- No guidance is provided on rounding of the interpolated result.

- Table II base densities apparently shall be rounded to the nearest 0.2 kg/L value (The table entries(VCF) are given for densities in kg/L in 0.2 kg/L steps), to use the VCF of that rounded value.
- Finally, base density values (Table I) and VCF (Table II) below 0.650 kg/L are given (for exceptions, see Annex 2) with 3 decimals accuracy, above 0.650 kg/L with 4 decimals accuracy.

3.2. Standard Implementation Decisions

Based on the analysis results summarized in the previous chapter, and the ambiguities described therein, QuantityWare has implemented - for the table value based solution - the following **main** option:

Table I:

1. All temperature values are rounded to the nearest 0.5 °C before accessing the Table I.
2. The base density value is then either directly available “(direct hit”) or calculated via an interpolation as defined by the example. The result is rounded to either 3 or 4 decimal places (kg/L value). This is also done if the observed temperature is 20 °C, which may lead to a result where e.g. an observed density of 0.6257 kg/L at 20 °C leads to a base density at 20 °C of 0.626 kg/L. (See Annex 1 for details and additional motivation to use this approach - this logic has apparently been implemented with the XLS as well).

Table II:

1. All temperature values are rounded to the nearest 0.5 °C before accessing the Table II.
2. The base density is rounded to the nearest 0.2 kg/L value before accessing the Table II and then selects the VCF defined for that base density value.

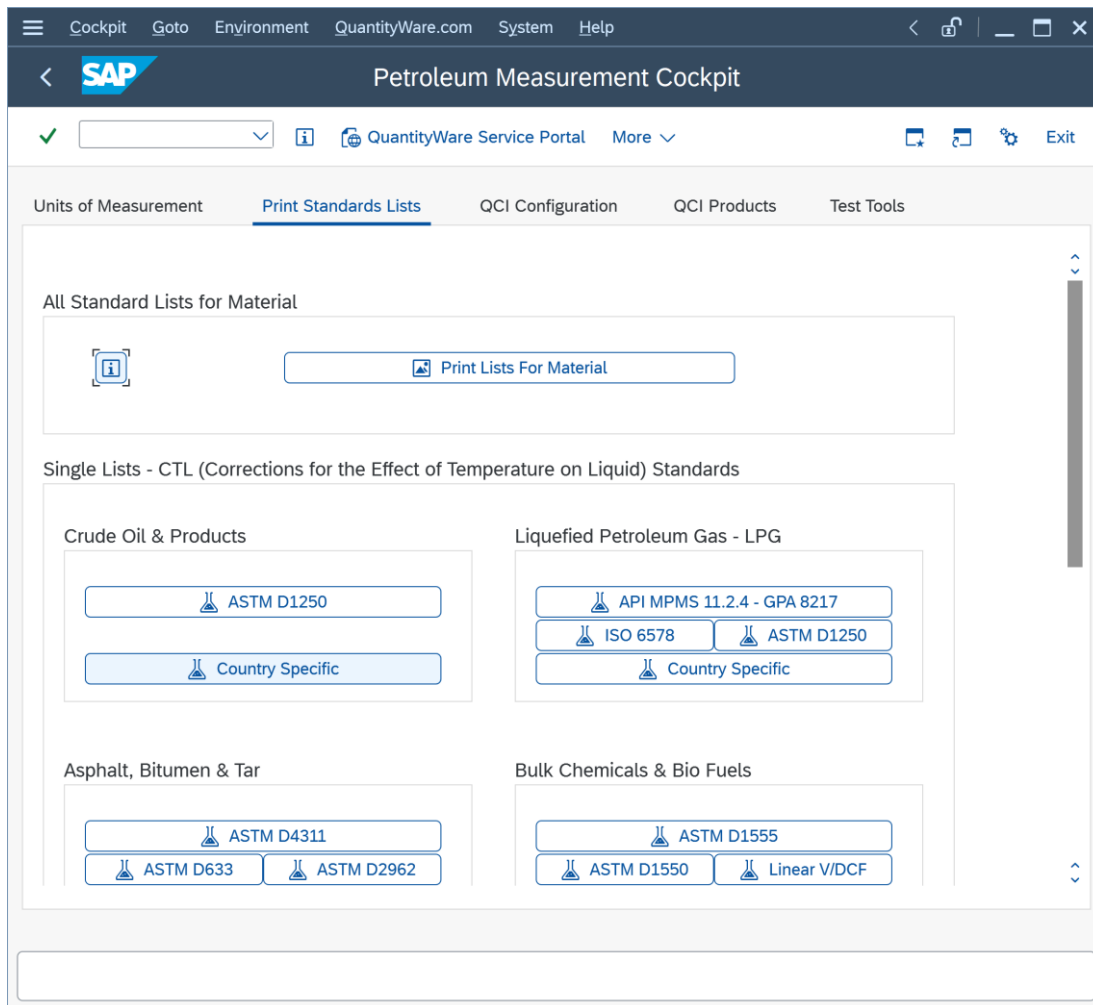
As an **alternate** approach, QuantityWare has implemented a bilinear interpolation solution, where the couple of input temperature and density value is taken to determine the rectangle of four Table I (or Table II) values surrounding that couple. Then, a bilinear interpolation is performed to determine the base density (Table I) or VCF (Table II) and subsequent rounding as defined for the main option is made.

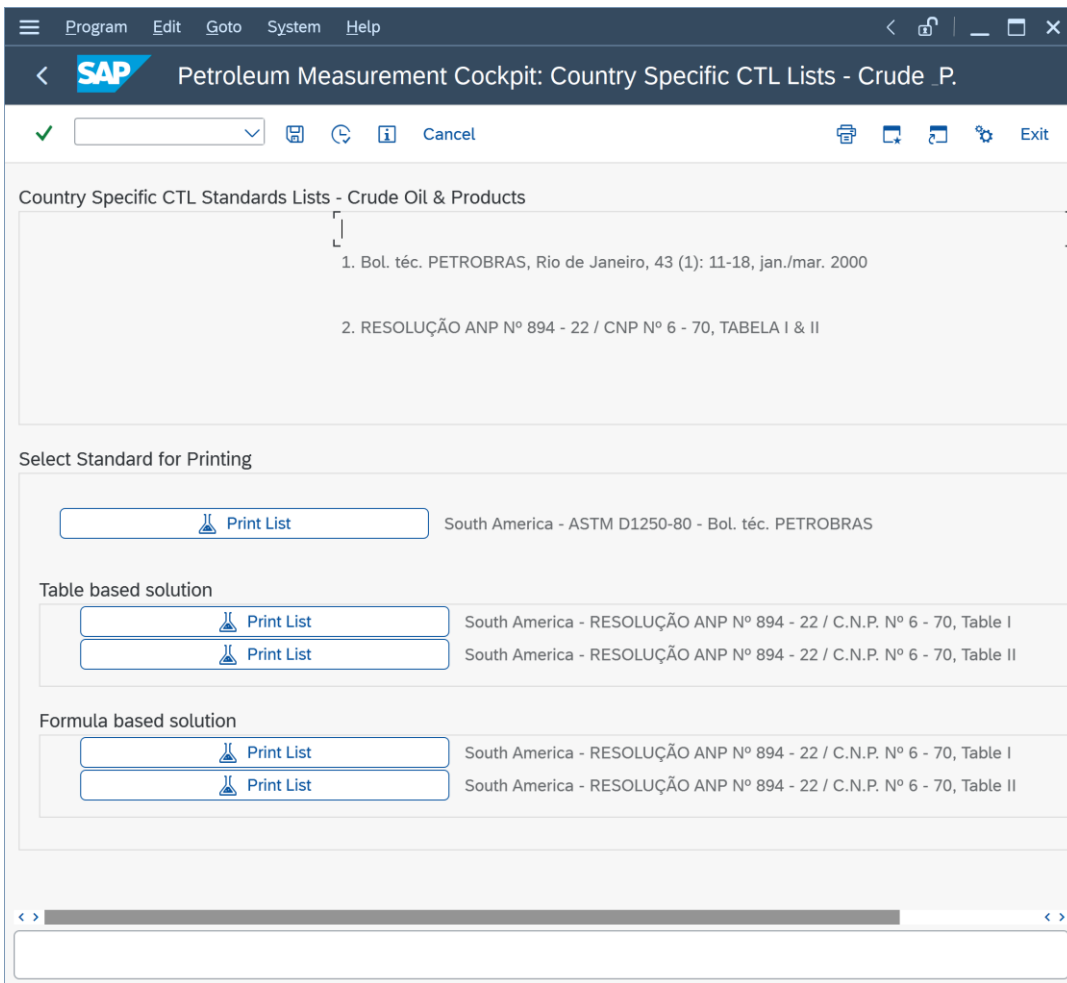
All configuration details for these options are available in the “Configuration Details” section of this document.

4. PMC Enhancements

4.1. List Printing

In section "Print Standards Lists" list printing is available via push button "Country Specific" for both "Crude Oil & Products" and "Liquefied Petroleum Gas - LPG"

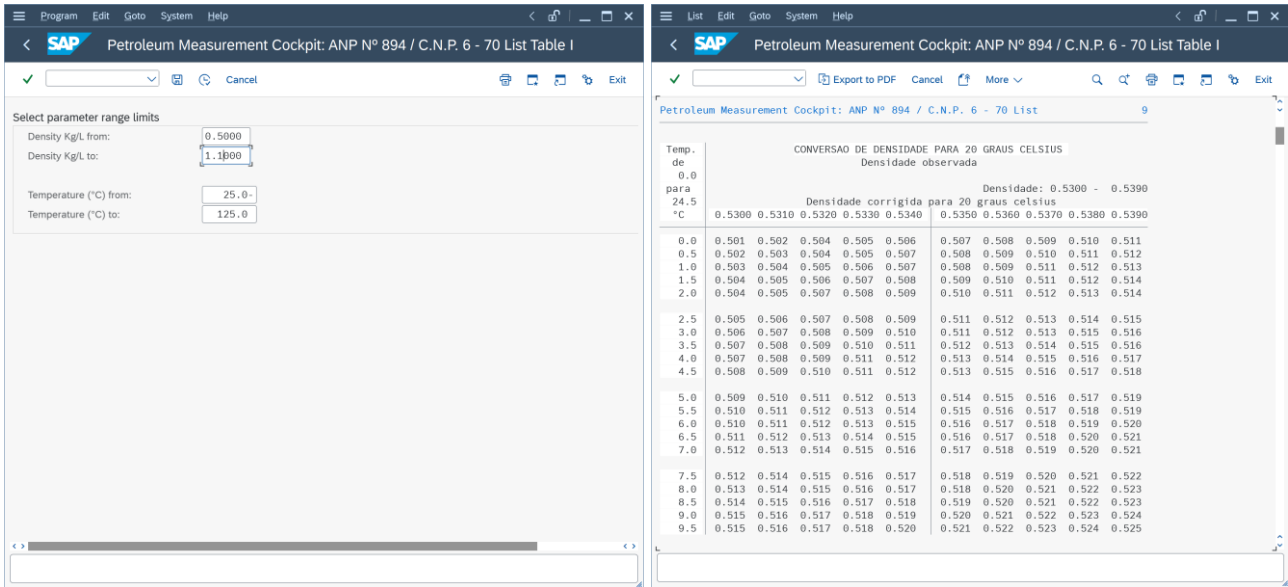




The Table based values (which you maintain in customizing, see initial load section) can all be printed here.

As a reference, the formula based calculation results can be printed here, too.

Table I: The maximum range of value is defaulted, you may restrict that range for your comparison analysis:



The screenshot shows two windows from the SAP system. The left window is titled 'Petroleum Measurement Cockpit: ANP Nº 894 / C.N.P. 6 - 70 List Table I' and displays 'Select parameter range limits'. The right window shows the resulting data table.

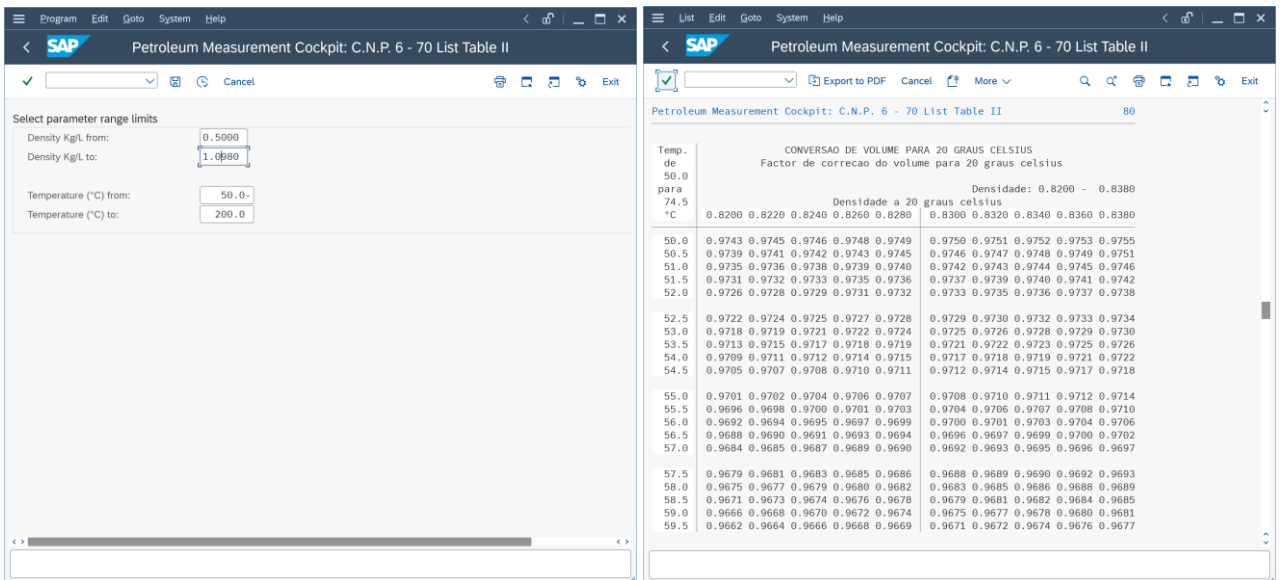
Parameter Range Limits:

- Density Kg/L from: 0.5000
- Density Kg/L to: 1.1000
- Temperature (°C) from: 25.0
- Temperature (°C) to: 125.0

Data Table: CONVERSÃO DE DENSIDADE PARA 20 GRAUS CELSIUS

Temp. de para 24.5 °C	Densidade corrigida para 20 graus celsius					Densidade: 0.5300 - 0.5390				
°C	0.5300	0.5310	0.5320	0.5330	0.5340	0.5350	0.5360	0.5370	0.5380	0.5390
0.0	0.501	0.502	0.504	0.505	0.506	0.507	0.508	0.509	0.510	0.511
0.5	0.502	0.503	0.504	0.505	0.507	0.508	0.509	0.510	0.511	0.512
1.0	0.503	0.504	0.505	0.506	0.507	0.508	0.509	0.510	0.511	0.512
1.5	0.504	0.505	0.506	0.507	0.508	0.509	0.510	0.511	0.512	0.513
2.0	0.504	0.505	0.507	0.508	0.509	0.510	0.511	0.512	0.513	0.514
2.5	0.505	0.506	0.507	0.508	0.509	0.510	0.511	0.512	0.513	0.514
3.0	0.506	0.507	0.508	0.509	0.510	0.511	0.512	0.513	0.514	0.515
3.5	0.507	0.508	0.509	0.510	0.511	0.512	0.513	0.514	0.515	0.516
4.0	0.507	0.508	0.509	0.511	0.512	0.513	0.514	0.515	0.516	0.517
4.5	0.508	0.509	0.510	0.511	0.512	0.513	0.514	0.515	0.516	0.517
5.0	0.509	0.510	0.511	0.512	0.513	0.514	0.515	0.516	0.517	0.519
5.5	0.510	0.511	0.512	0.513	0.514	0.515	0.516	0.517	0.518	0.519
6.0	0.510	0.511	0.512	0.513	0.515	0.516	0.517	0.518	0.519	0.520
6.5	0.511	0.512	0.513	0.514	0.515	0.516	0.517	0.518	0.520	0.521
7.0	0.512	0.513	0.514	0.515	0.516	0.517	0.518	0.519	0.520	0.521
7.5	0.512	0.514	0.515	0.516	0.517	0.518	0.519	0.520	0.521	0.522
8.0	0.513	0.514	0.515	0.516	0.517	0.518	0.520	0.521	0.522	0.523
8.5	0.514	0.515	0.516	0.517	0.518	0.519	0.520	0.521	0.522	0.523
9.0	0.515	0.516	0.517	0.518	0.519	0.520	0.521	0.522	0.523	0.524
9.5	0.515	0.516	0.517	0.518	0.520	0.521	0.522	0.523	0.524	0.525

Table II: The maximum range of values is defaulted, you may restrict that range for your comparison analysis:



The screenshot shows two windows from the SAP system. The left window is titled 'Petroleum Measurement Cockpit: C.N.P. 6 - 70 List Table II' and displays 'Select parameter range limits'. The right window shows the resulting data table.

Parameter Range Limits:

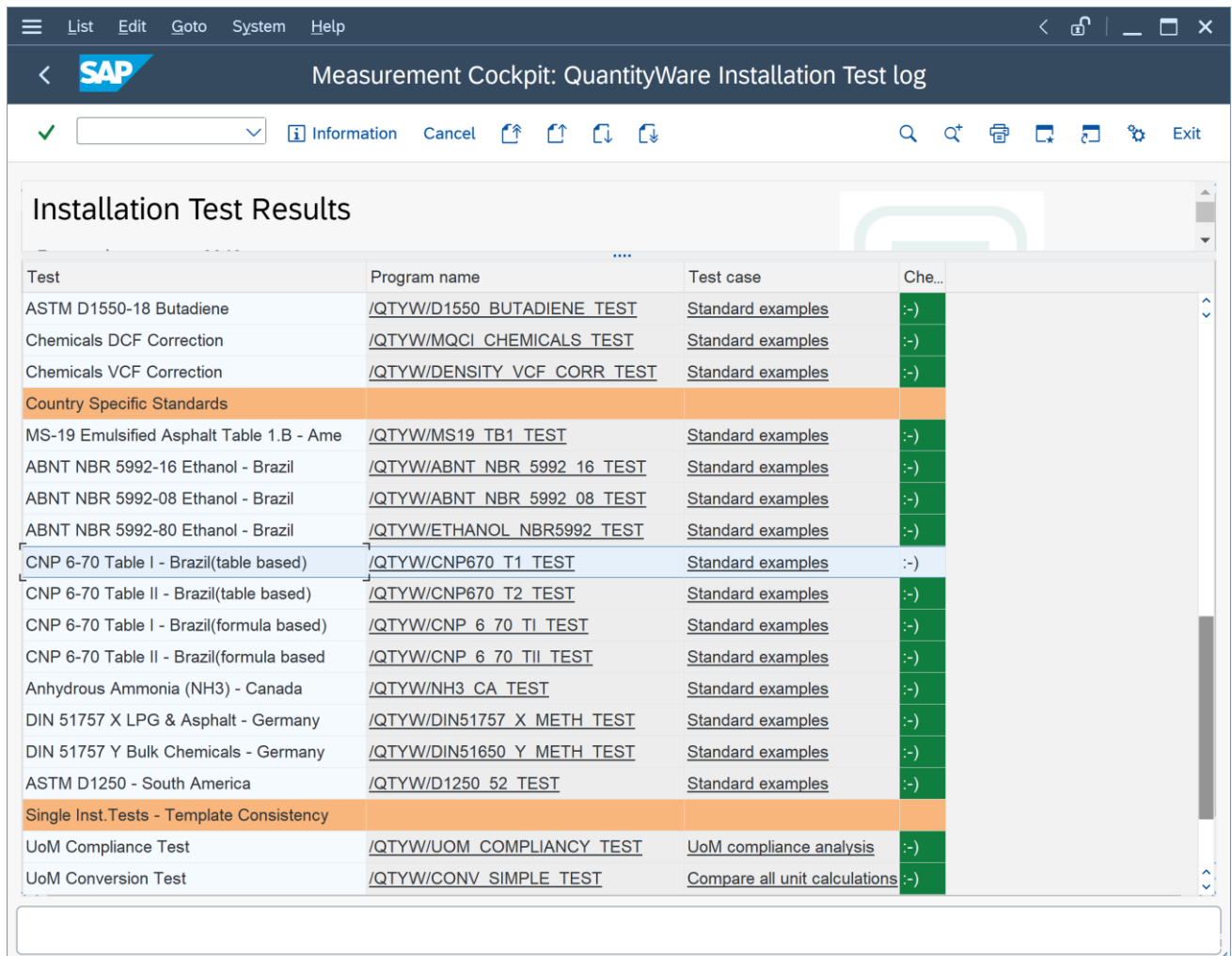
- Density Kg/L from: 0.5000
- Density Kg/L to: 1.0000
- Temperature (°C) from: 50.0
- Temperature (°C) to: 200.0

Data Table: CONVERSÃO DE VOLUME PARA 20 GRAUS CELSIUS

Temp. de para 74.5 °C	Densidade a 20 graus celsius					Densidade: 0.8200 - 0.8380				
°C	0.8200	0.8220	0.8240	0.8260	0.8280	0.8300	0.8320	0.8340	0.8360	0.8380
50.0	0.9743	0.9745	0.9746	0.9748	0.9749	0.9750	0.9751	0.9752	0.9753	0.9755
50.5	0.9739	0.9741	0.9742	0.9743	0.9745	0.9746	0.9747	0.9748	0.9749	0.9751
51.0	0.9735	0.9736	0.9738	0.9739	0.9740	0.9742	0.9743	0.9744	0.9745	0.9746
51.5	0.9731	0.9732	0.9733	0.9735	0.9736	0.9737	0.9739	0.9740	0.9741	0.9742
52.0	0.9726	0.9728	0.9729	0.9731	0.9732	0.9733	0.9735	0.9736	0.9737	0.9738
52.5	0.9722	0.9724	0.9725	0.9727	0.9728	0.9729	0.9730	0.9732	0.9733	0.9734
53.0	0.9718	0.9719	0.9721	0.9722	0.9724	0.9725	0.9726	0.9728	0.9729	0.9730
53.5	0.9713	0.9715	0.9717	0.9718	0.9719	0.9721	0.9722	0.9723	0.9725	0.9726
54.0	0.9709	0.9711	0.9712	0.9714	0.9715	0.9717	0.9718	0.9719	0.9721	0.9722
54.5	0.9705	0.9707	0.9708	0.9710	0.9711	0.9712	0.9714	0.9715	0.9717	0.9718
55.0	0.9701	0.9702	0.9704	0.9706	0.9707	0.9708	0.9710	0.9711	0.9712	0.9714
55.5	0.9696	0.9698	0.9700	0.9701	0.9703	0.9704	0.9706	0.9707	0.9708	0.9710
56.0	0.9692	0.9694	0.9695	0.9697	0.9699	0.9700	0.9701	0.9703	0.9704	0.9706
56.5	0.9688	0.9690	0.9691	0.9693	0.9694	0.9696	0.9697	0.9699	0.9700	0.9702
57.0	0.9684	0.9685	0.9687	0.9689	0.9690	0.9692	0.9693	0.9695	0.9696	0.9697
57.5	0.9679	0.9681	0.9683	0.9685	0.9686	0.9688	0.9689	0.9690	0.9692	0.9693
58.0	0.9675	0.9677	0.9679	0.9680	0.9682	0.9683	0.9685	0.9686	0.9688	0.9689
58.5	0.9671	0.9673	0.9674	0.9676	0.9678	0.9679	0.9681	0.9682	0.9684	0.9685
59.0	0.9666	0.9668	0.9670	0.9672	0.9674	0.9675	0.9677	0.9678	0.9680	0.9681
59.5	0.9662	0.9664	0.9666	0.9668	0.9669	0.9671	0.9672	0.9674	0.9676	0.9677

4.2. Test Tools

Three new test reports are delivered with this AD. These are executed as part of the BCP Installation Test, and can be accessed via the Installation Test log:



Test	Program name	Test case	Che...
ASTM D1550-18 Butadiene	/QTYW/D1550 BUTADIENE TEST	Standard examples	-)
Chemicals DCF Correction	/QTYW/MQCI CHEMICALS TEST	Standard examples	-)
Chemicals VCF Correction	/QTYW/DENSITY VCF CORR TEST	Standard examples	-)
Country Specific Standards			
MS-19 Emulsified Asphalt Table 1.B - Ame	/QTYW/MS19 TB1 TEST	Standard examples	-)
ABNT NBR 5992-16 Ethanol - Brazil	/QTYW/ABNT NBR 5992 16 TEST	Standard examples	-)
ABNT NBR 5992-08 Ethanol - Brazil	/QTYW/ABNT NBR 5992 08 TEST	Standard examples	-)
ABNT NBR 5992-80 Ethanol - Brazil	/QTYW/ETHANOL NBR5992 TEST	Standard examples	-)
CNP 6-70 Table I - Brazil(table based)	/QTYW/CNP670 T1 TEST	Standard examples	-)
CNP 6-70 Table II - Brazil(table based)	/QTYW/CNP670 T2 TEST	Standard examples	-)
CNP 6-70 Table I - Brazil(formula based)	/QTYW/CNP 6 70 TI TEST	Standard examples	-)
CNP 6-70 Table II - Brazil(formula based)	/QTYW/CNP 6 70 TII TEST	Standard examples	-)
Anhydrous Ammonia (NH3) - Canada	/QTYW/NH3 CA TEST	Standard examples	-)
DIN 51757 X LPG & Asphalt - Germany	/QTYW/DIN51757 X METH TEST	Standard examples	-)
DIN 51757 Y Bulk Chemicals - Germany	/QTYW/DIN51650 Y METH TEST	Standard examples	-)
ASTM D1250 - South America	/QTYW/D1250 52 TEST	Standard examples	-)
Single Inst.Tests - Template Consistency			
UoM Compliance Test	/QTYW/UOM COMPLIANCY TEST	UoM compliance analysis	-)
UoM Conversion Test	/QTYW/CONV SIMPLE TEST	Compare all unit calculations	-)

These report simply check if the table values match expected values for a small number of data points. 50 Test Scenarios have been created in our internal systems, which are utilized for the AD delivery assembly and QA in our internal systems.

Customers have to develop their own test scenarios after installation of the AD.

[With the next CSP](#), the new test reports are also available via new “Country Specific Standards” push buttons:

QuantityWare Service Portal

Petroleum Measurement Cockpit

QuantityWare Service Portal More

Units of Measurement Print Standards Lists QCI Configuration QCI Products **Test Tools**

Country Specific Standards


Americas

- ABNT NBR 5992-16 Ethanol
- ABNT NBR 5992-08 Ethanol
- ABNT NBR 5992-80 Ethanol
- CNP 670 Table I- Values
- CNP 670 Table II- Values
- CNP 670 Table I- Formula
- CNP 670 Table II-Formula
- ASTM D1250 Crude/Products
- MS-19 Emulsified Asphalt
- Anhydrous Ammonia

Germany

- DIN 51757-(X) LPG & Asphalt
- DIN 51757(Y) Chemicals

☰ List Edit Goto System Help < 🔒 ▢ ✕

<  Test C.N.P 6 - 70 Table I Installation - South America

✓ Cancel 📄 📄 📄 📄 🔍 🔍 🖨 📄 📄 ⚙ Exit

C.N.P. RESOLUÇÃO Nº 6 - 70, TABELA I 1

C.N.P 6 - 70 Table I - Test of the Procedure

Number of examples : 00040
No errors occurred

Example 00001			
Observed density	: 0.5400	Base density expected	: 0.4970
Observed temperature:	10.5-	Base density on DB:	0.4970

Example 00002			
Observed density	: 0.6000	Base density expected	: 0.5720
Observed temperature:	5.0-	Base density on DB:	0.5720

Example 00003			
Observed density	: 0.5600	Base density expected	: 0.5350
Observed temperature:	0.0	Base density on DB:	0.5350

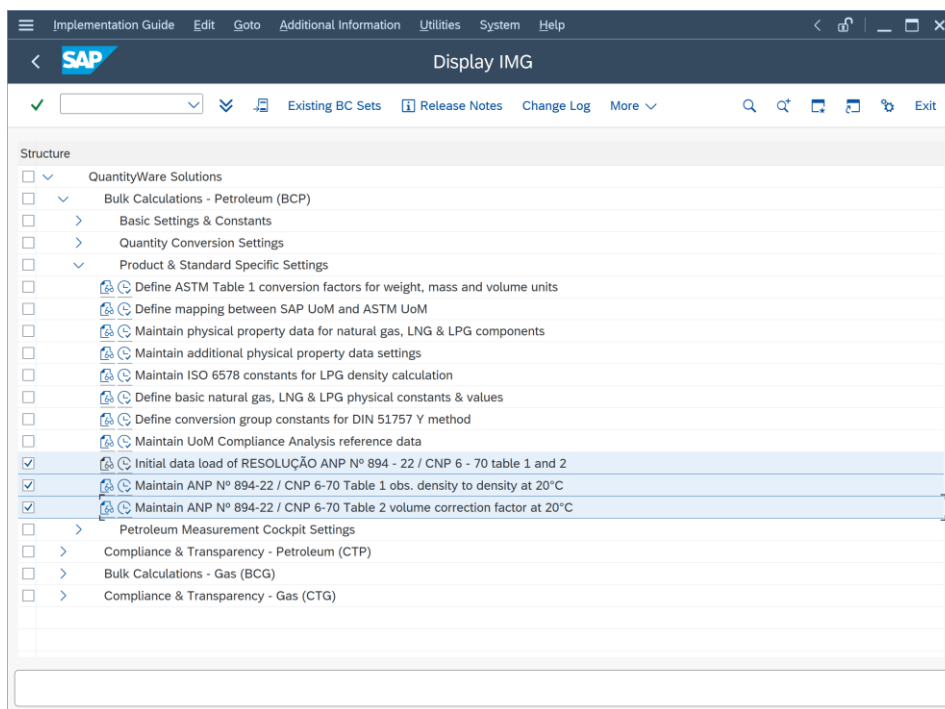
Example 00004			
Observed density	: 0.8600	Base density expected	: 0.8477
Observed temperature:	1.5	Base density on DB:	0.8477

Example 00005			
Observed density	: 0.6700	Base density expected	: 0.6568
Observed temperature:	5.5	Base density on DB:	0.6568

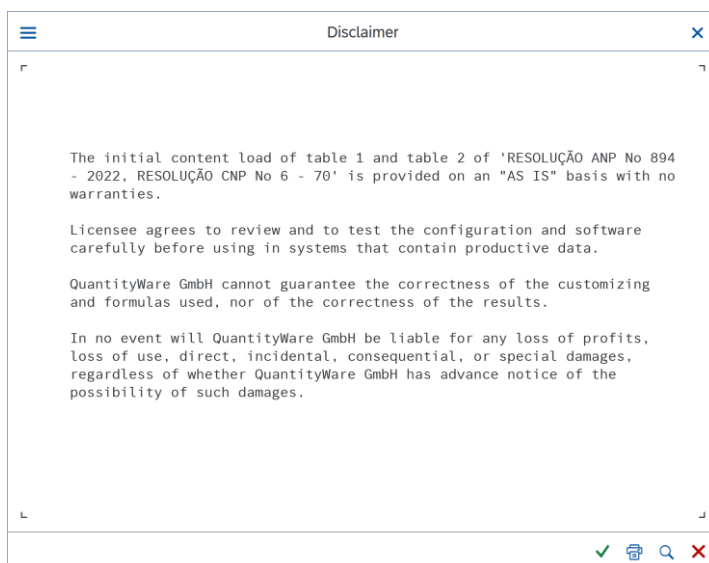
5. Configuration Details

5.1. Customizing – Initial Load & Data Maintenance

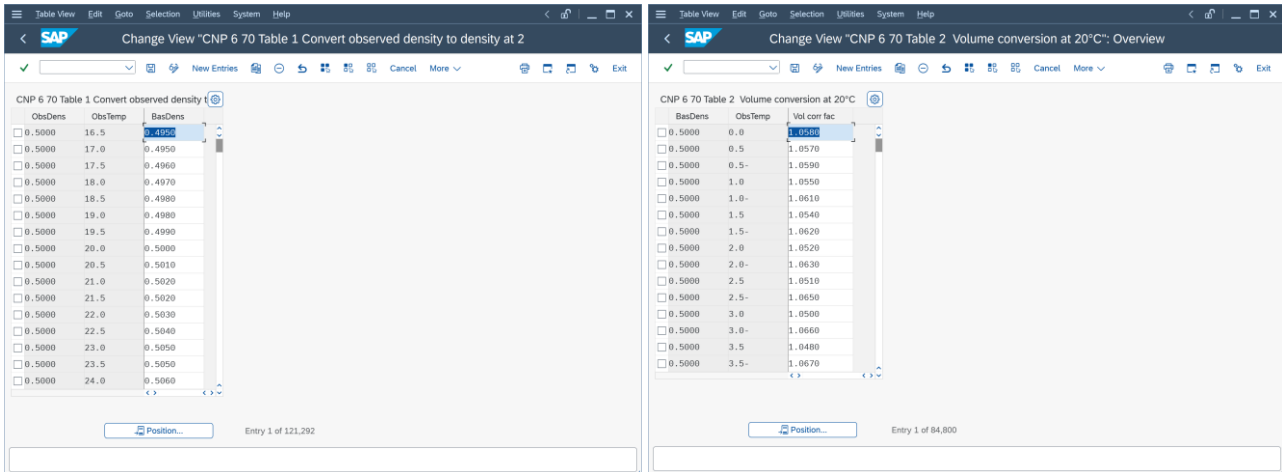
In BCP customizing, three new nodes are delivered with this AD.



After you have technically implemented the AD with [note 000114](#), you select the initial load option:



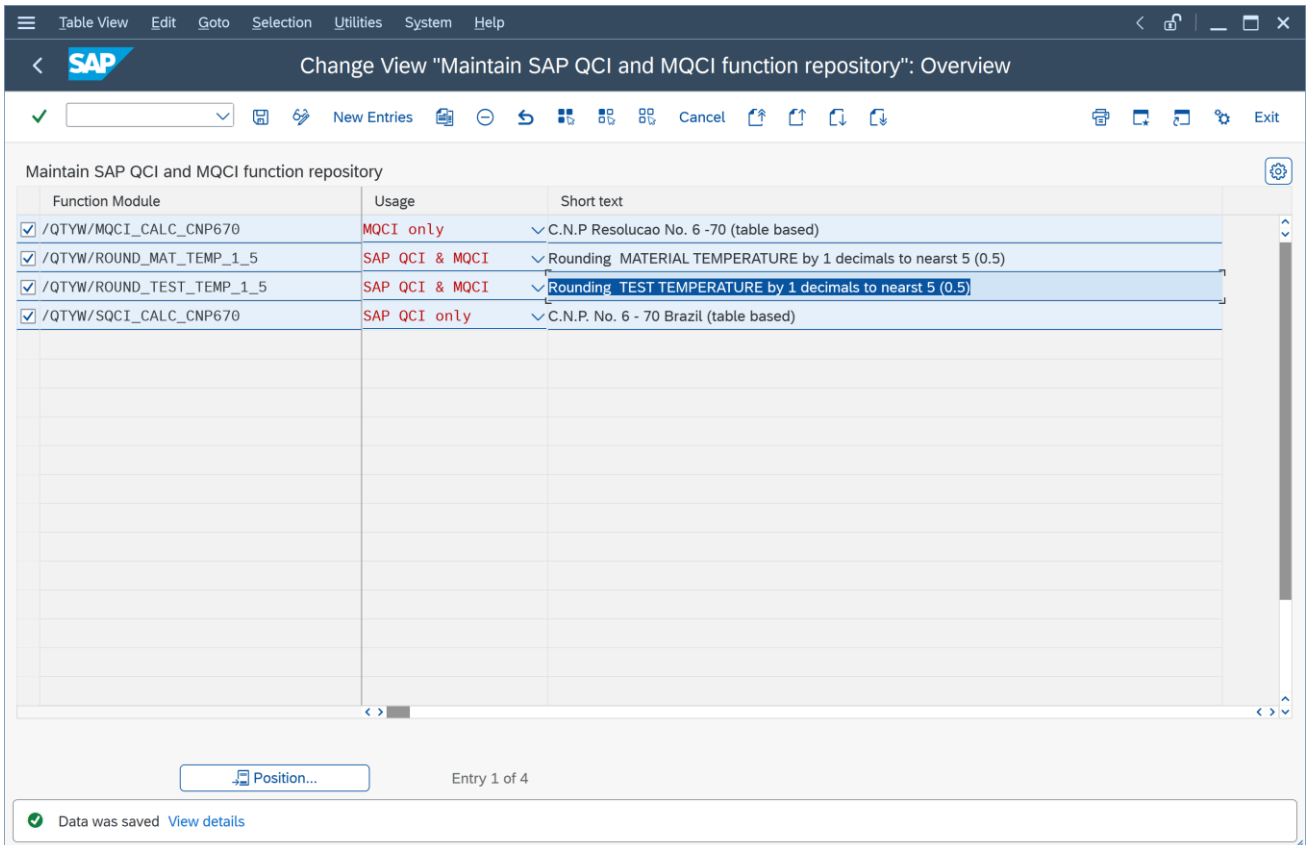
If you confirm the Disclaimer, the two new customizing tables for Table I and Table II are filled with all entries:



More than 200 000 entries are now available. Note that you have to include all entries into a transport for distribution into other clients/systems.

5.2. Add New Functions to Function Repository

Add the four newly delivered functions to the function repository in client 045:



The screenshot shows the SAP S/4HANA 'Maintain SAP QCI and MQCI function repository' overview screen. The table contains the following data:

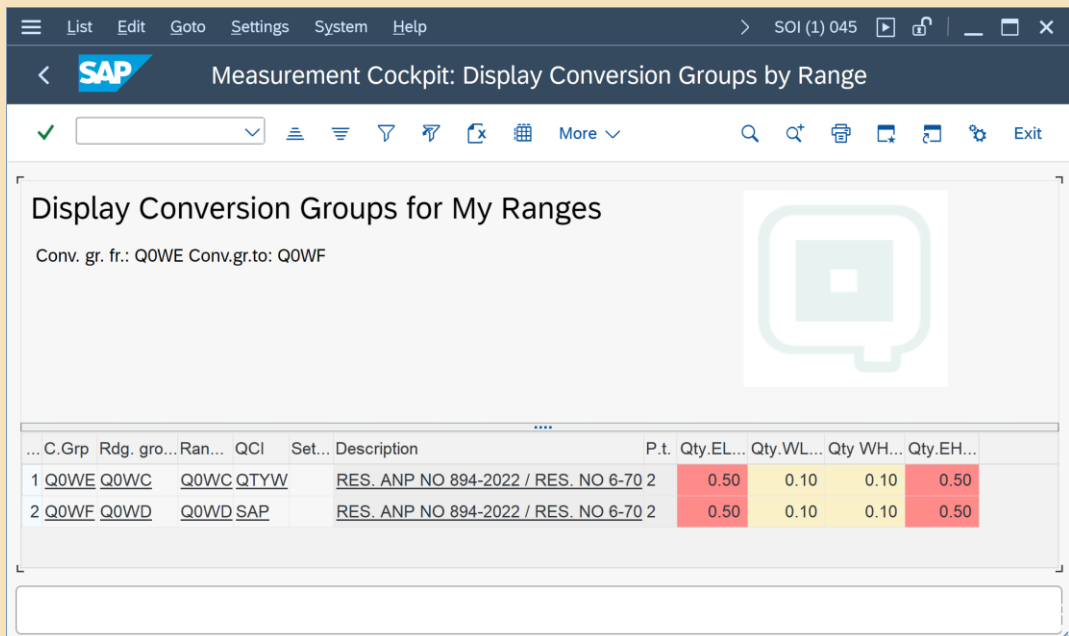
Function Module	Usage	Short text
<input checked="" type="checkbox"/> /QTYW/MQCI_CALC_CNP670	MQCI only	∨ C.N.P Resolucao No. 6 -70 (table based)
<input checked="" type="checkbox"/> /QTYW/ROUND_MAT_TEMP_1_5	SAP QCI & MQCI	∨ Rounding MATERIAL TEMPERATURE by 1 decimals to nearest 5 (0.5)
<input checked="" type="checkbox"/> /QTYW/ROUND_TEST_TEMP_1_5	SAP QCI & MQCI	∨ Rounding TEST TEMPERATURE by 1 decimals to nearest 5 (0.5)
<input checked="" type="checkbox"/> /QTYW/SQCI_CALC_CNP670	SAP QCI only	∨ C.N.P. No. 6 - 70 Brazil (table based)

At the bottom of the screen, a status bar indicates 'Data was saved' and 'View details'. The entry count is 'Entry 1 of 4'.

5.3. Conversion Group, Reading Group & Range Group Configuration



With BCS 30A CSP03 / BCS 30B CSP02 (delivered in Q4 2023) QuantityWare delivers the two new template conversion groups Q0WE and Q0WF as part of the BCP BC set. They are available in client 045 once the BC set is activated therein. After activation, you check that the conversion group Q0WE and Q0WF with their reading groups and range groups Q0WC and Q0WD are available



The screenshot shows the SAP Measurement Cockpit interface for 'Display Conversion Groups by Range'. The title bar indicates 'SOI (1) 045'. The main content area is titled 'Display Conversion Groups for My Ranges' and shows 'Conv. gr. fr.: Q0WE Conv.gr.to: Q0WF'. Below this is a table with the following data:

...	C.Grp	Rdg. gro...	Ran...	QCl	Set...	Description	P.t.	Qty.EL...	Qty.WL...	Qty.WH...	Qty.EH...
1	Q0WE	Q0WC	Q0WC	QTYW		RES. ANP NO 894-2022 / RES. NO 6-70	2	0.50	0.10	0.10	0.50
2	Q0WF	Q0WD	Q0WD	SAP		RES. ANP NO 894-2022 / RES. NO 6-70	2	0.50	0.10	0.10	0.50

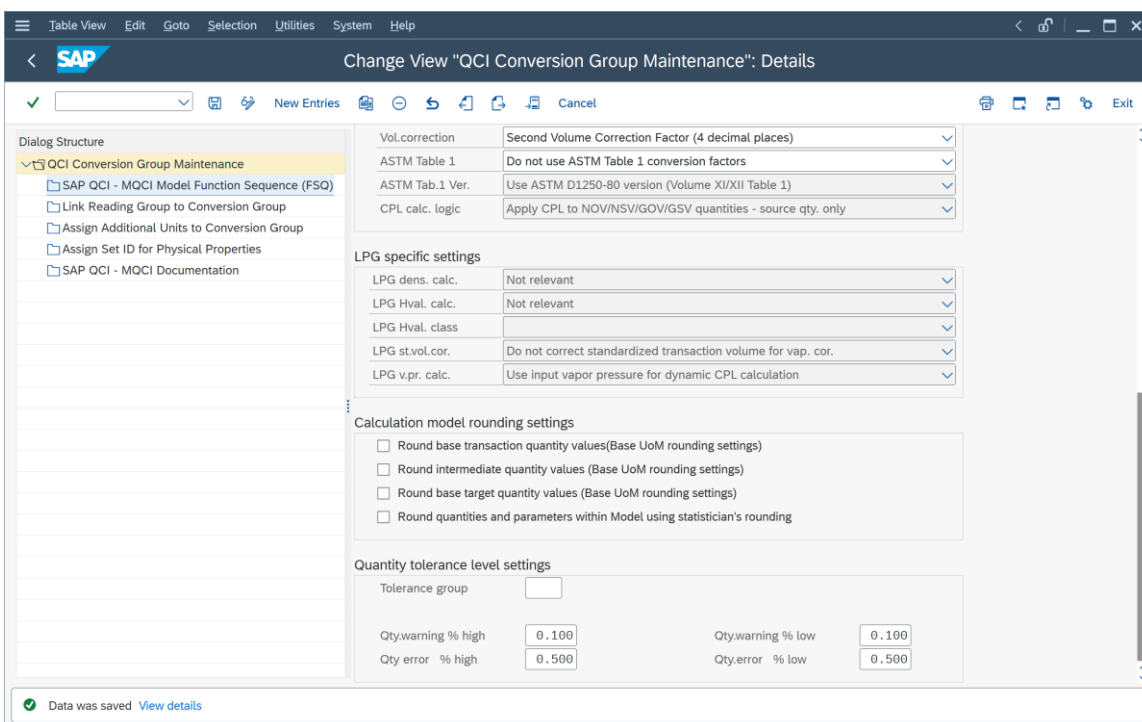
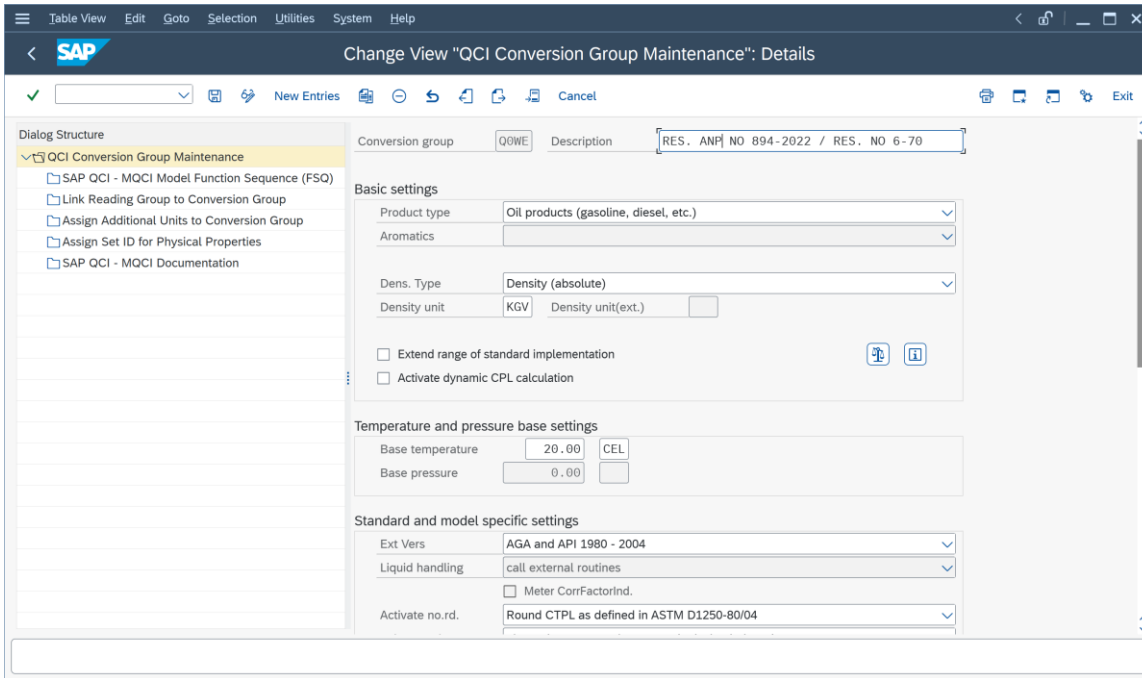
and proceed with Chapter 5.5 in this document. You do not have to perform the manual steps described in the following chapters to create the two conversion groups Q0WE and Q0WF.

Otherwise, two conversion groups, two reading groups and two range groups must now be configured in your BCP template client 045:

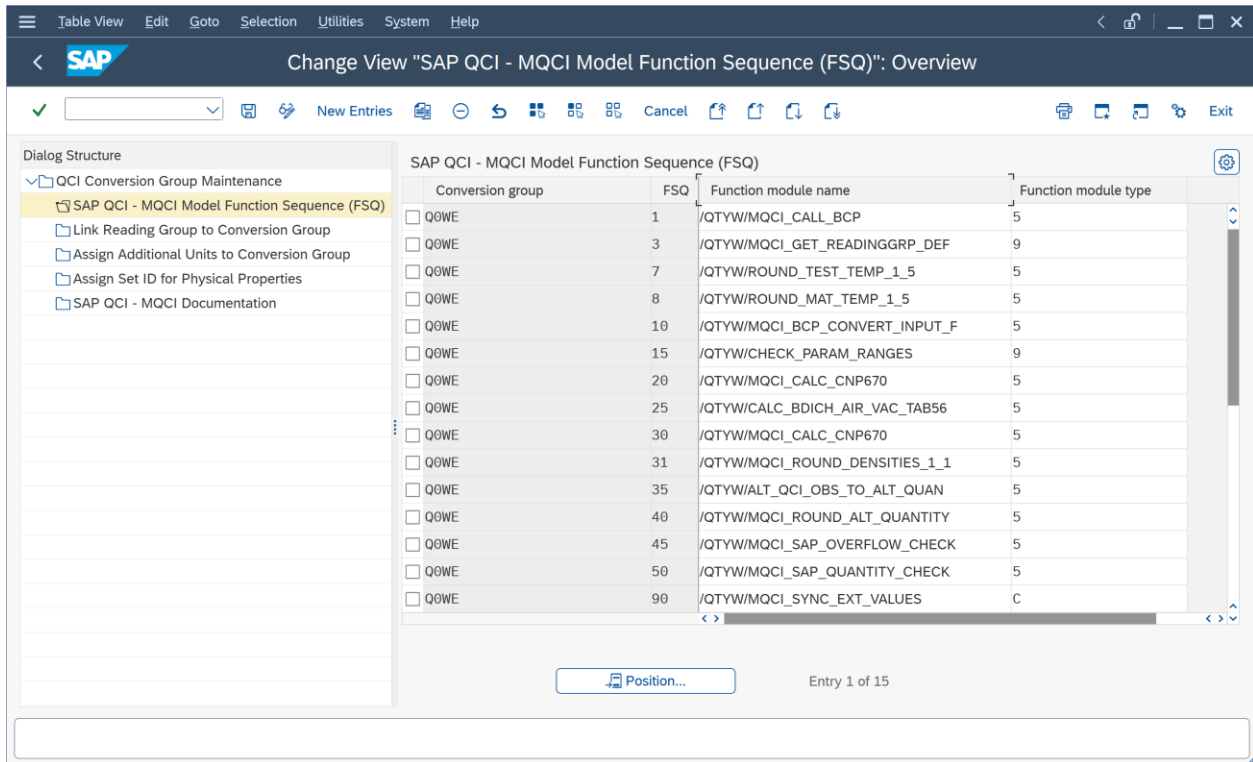
Q0WE is the MQCI conversion group that utilizes the new table based implementation, Q0WF is the corresponding SAP QCI conversion group.

5.3.1. Q0WE Conversion Group Configuration Details

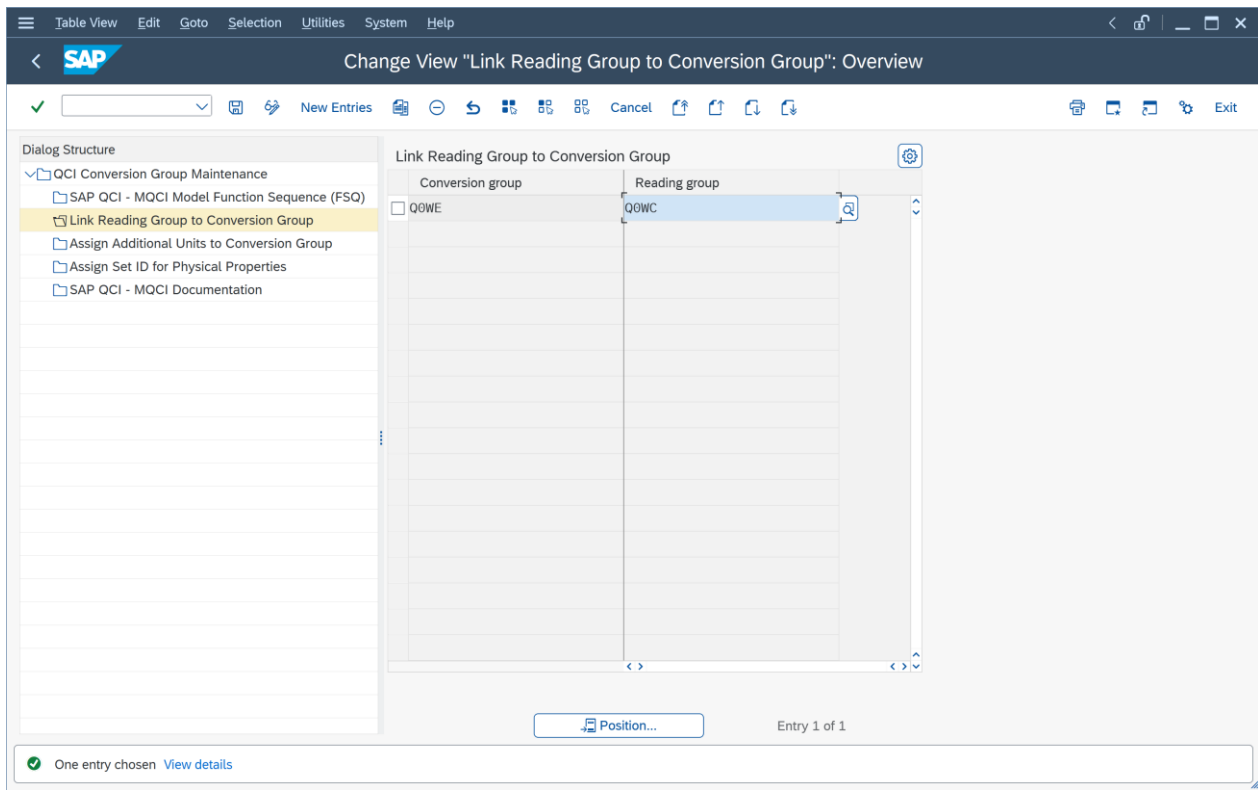
Follow the screen prints step by step – Tip: You may copy conversion group Q0WA to Q0WE and make the appropriate changes/additions:



Note: the Vol. correction setting has no effect on the VCF rounding and is set to 4 merely for documentation purposes. As explained above, 3 decimal and 4 decimal VCF are defined as table values, depending on the density value.



Conversion group	FSQ	Function module name	Function module type
Q0WE	1	/QTYW/MQCI_CALL_BCP	5
Q0WE	3	/QTYW/MQCI_GET_READINGGRP_DEF	9
Q0WE	7	/QTYW/ROUND_TEST_TEMP_1_5	5
Q0WE	8	/QTYW/ROUND_MAT_TEMP_1_5	5
Q0WE	10	/QTYW/MQCI_BCP_CONVERT_INPUT_F	5
Q0WE	15	/QTYW/CHECK_PARAM_RANGES	9
Q0WE	20	/QTYW/MQCI_CALC_CNP670	5
Q0WE	25	/QTYW/CALC_BDICH_AIR_VAC_TAB56	5
Q0WE	30	/QTYW/MQCI_CALC_CNP670	5
Q0WE	31	/QTYW/MQCI_ROUND_DENSITIES_1_1	5
Q0WE	35	/QTYW/ALT_QCI_OBS_TO_ALT_QUAN	5
Q0WE	40	/QTYW/MQCI_ROUND_ALT_QUANTITY	5
Q0WE	45	/QTYW/MQCI_SAP_OVERFLOW_CHECK	5
Q0WE	50	/QTYW/MQCI_SAP_QUANTITY_CHECK	5
Q0WE	90	/QTYW/MQCI_SYNC_EXT_VALUES	C



(Note: You have to maintain reading group Q0WC before you assign it here)

SAP Change View "SAP QCI - MQCI Documentation": Details

Conversion grp. QQWE

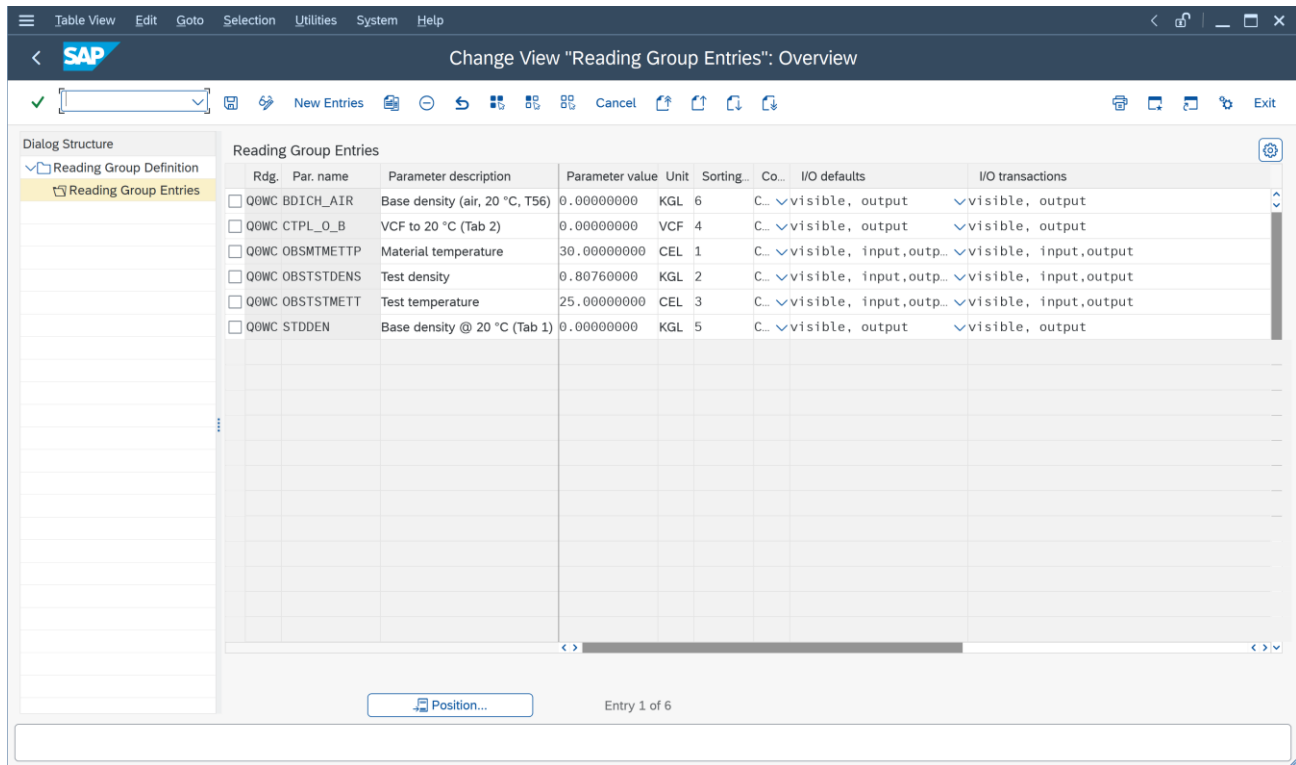
SAP QCI - MQCI Documentation

MQCI model	Alternate Base Model - Net Quantities
CTPL standard	Resolucao ANP No 894-22 / No 6-70 - Products & LPG/NGL
Weight standard	ASTM D1250-80 (Table 56, Density - kg/m ³ 15 °C)

One entry chosen [View details](#)

5.3.2. Q0WC Reading Group Configuration Details

Define reading group Q0WC – “RES. ANP NO 894-2022 / RES. NO 6-70” with the following entries:



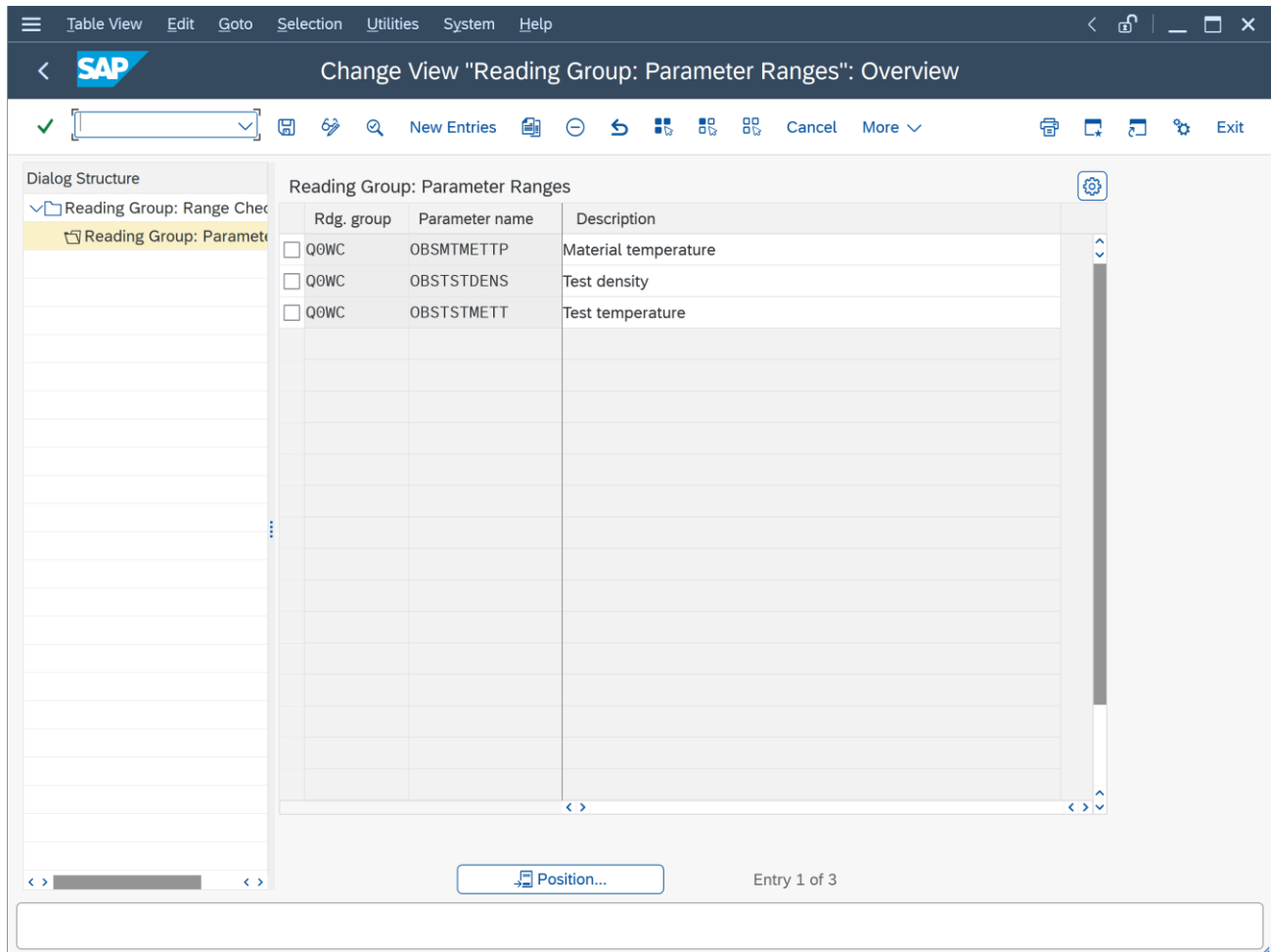
The screenshot shows the SAP 'Change View Reading Group Entries' dialog. The 'Dialog Structure' on the left includes 'Reading Group Definition' and 'Reading Group Entries'. The main table lists the following entries:

Rdg.	Par. name	Parameter description	Parameter value	Unit	Sorting	Co.	I/O defaults	I/O transactions
<input type="checkbox"/>	Q0WC BDICH_AIR	Base density (air, 20 °C, T56)	0.00000000	KGL	6	C..	visible, output	visible, output
<input type="checkbox"/>	Q0WC CTPL_O_B	VCF to 20 °C (Tab 2)	0.00000000	VCF	4	C..	visible, output	visible, output
<input type="checkbox"/>	Q0WC OBSMTMETTP	Material temperature	30.00000000	CEL	1	C..	visible, input,output	visible, input,output
<input type="checkbox"/>	Q0WC OBSTSTDENS	Test density	0.80760000	KGL	2	C..	visible, input,output	visible, input,output
<input type="checkbox"/>	Q0WC OBSTSTMETT	Test temperature	25.00000000	CEL	3	C..	visible, input,output	visible, input,output
<input type="checkbox"/>	Q0WC STDDEN	Base density @ 20 °C (Tab 1)	0.00000000	KGL	5	C..	visible, output	visible, output

At the bottom of the dialog, there is a 'Position...' button and the text 'Entry 1 of 6'.

5.3.3. Q0WC Range Group Configuration Details

Define range group Q0WC – “RES. ANP NO 894-2022 / RES. NO 6-70” with the following entries:



The screenshot shows the SAP S/4HANA 'Change View Reading Group: Parameter Ranges' dialog. The dialog title is 'Change View "Reading Group: Parameter Ranges": Overview'. The main area contains a table with the following data:

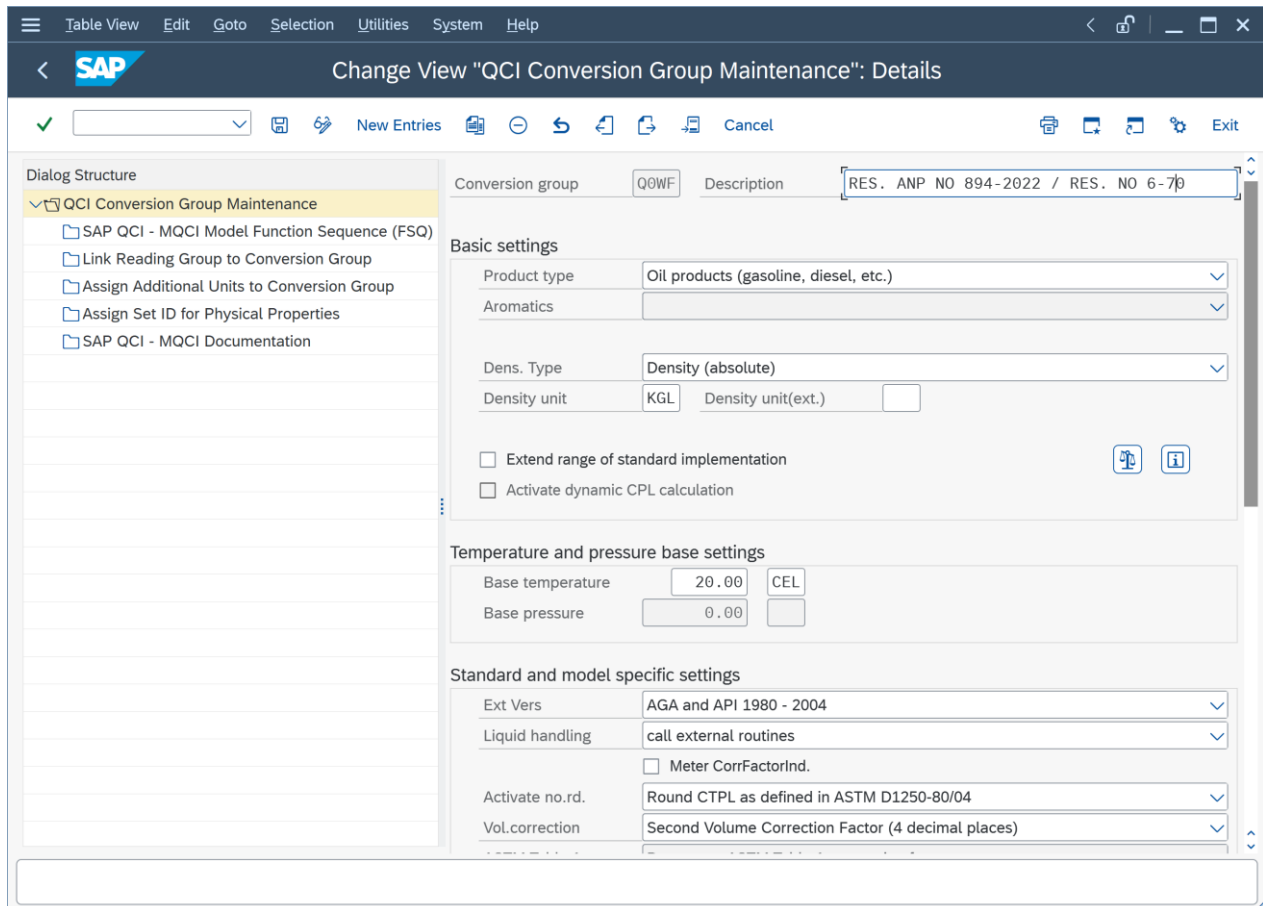
Rdg. group	Parameter name	Description
<input type="checkbox"/> Q0WC	OBSMTMETTP	Material temperature
<input type="checkbox"/> Q0WC	OBSTSTDENS	Test density
<input type="checkbox"/> Q0WC	OBSTSTMETT	Test temperature

The dialog also includes a 'Dialog Structure' pane on the left, a 'Position...' button at the bottom, and a status bar indicating 'Entry 1 of 3'.

Note: define appropriate range values for your products in your X/Y/Z*** copy of the new template conversion group.

5.3.4. Q0WF Conversion Group Configuration Details

Follow the screen prints step by step – Tip: You may copy conversion group Q0WB to Q0WF and make the appropriate changes/additions:



Note: the Vol. correction setting has no effect on the VCF rounding and is set to 4 merely for documentation purposes. As explained above, 3 decimal and 4 decimal VCF are defined as table values, depending on the density value.

SAP Change View "QCI Conversion Group Maintenance": Details

Vol.correction: Second Volume Correction Factor (4 decimal places)

ASTM Table 1: Do not use ASTM Table 1 conversion factors

ASTM Tab.1 Ver.: Use ASTM D1250-80 version (Volume XI/XII Table 1)

CPL calc. logic: Apply CPL to NOV/NSV/GOV/GSV quantities - source qty. only

LPG specific settings

LPG dens. calc.: Not relevant

LPG Hval. calc.: Not relevant

LPG Hval. class:

LPG st.vol.cor.: Do not correct standardized transaction volume for vap. cor.

LPG v.pr. calc.: Use input vapor pressure for dynamic CPL calculation

Calculation model rounding settings

- Round base transaction quantity values(Base UoM rounding settings)
- Round intermediate quantity values (Base UoM rounding settings)
- Round base target quantity values (Base UoM rounding settings)
- Round quantities and parameters within Model using statistician's rounding

Quantity tolerance level settings

Tolerance group: []

Qty.warning % high: 0.100 Qty.warning % low: 0.100

Qty.error % high: 0.500 Qty.error % low: 0.500

SAP Change View "SAP QCI - MQCI Model Function Sequence (FSQ)": Overview

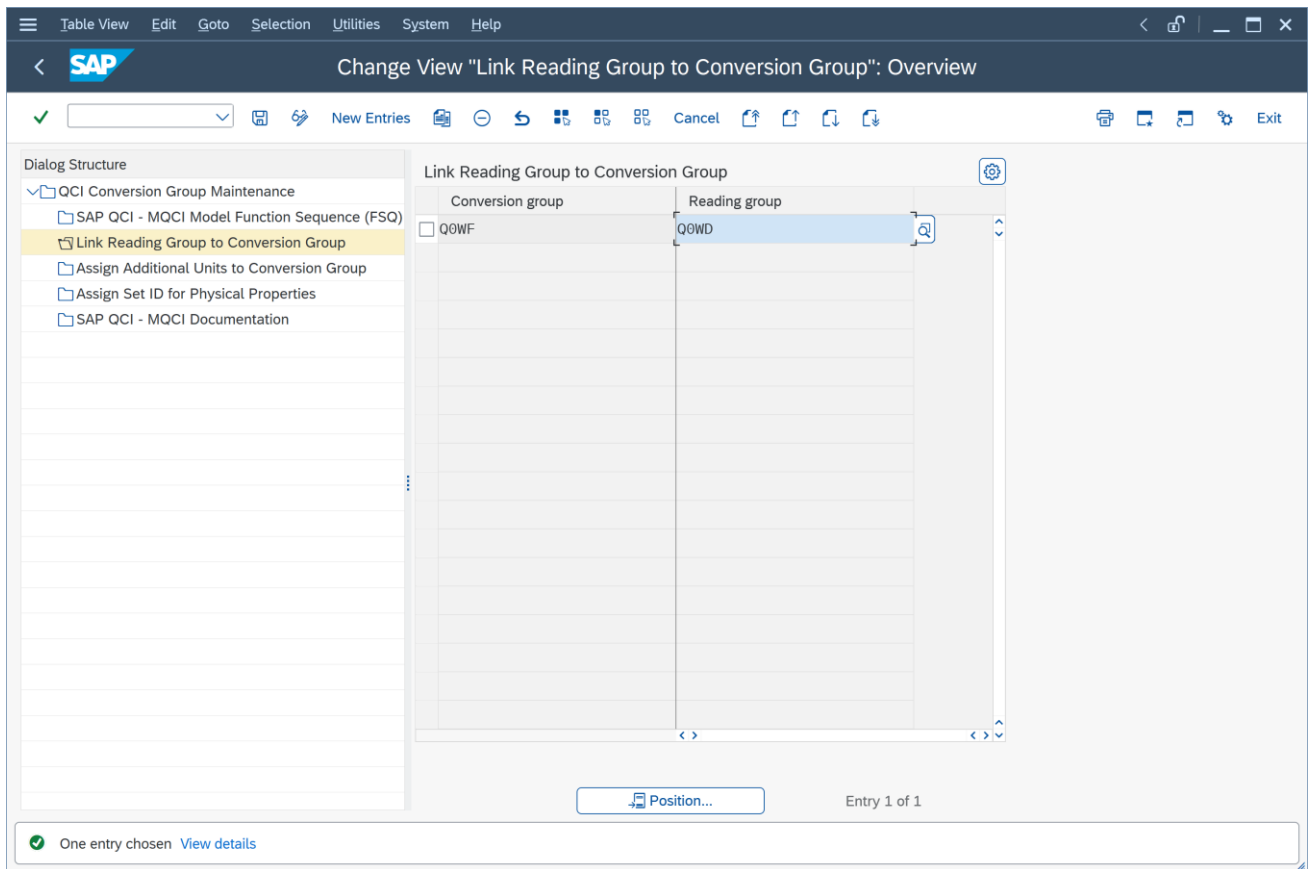
Dialog Structure

- QCI Conversion Group Maintenance
 - SAP QCI - MQCI Model Function Sequence (FSQ)
 - Link Reading Group to Conversion Group
 - Assign Additional Units to Conversion Group
 - Assign Set ID for Physical Properties
 - SAP QCI - MQCI Documentation

Conversion group	FSQ	Function module name	Function module type
<input type="checkbox"/> Q0WF	1	/QTYW/CHECK_PARAM_RANGES	5
<input type="checkbox"/> Q0WF	2	/QTYW/SQCI_CALC_CNP670	5

Position... Entry 1 of 2

Q0WF	1	/QTYW/CHECK_PARAM_RANGES	5
Q0WF	2	/QTYW/SQCI_CALC_CNP670	5



(Note: You have to maintain reading group Q0WD before you assign it here)

Table View Edit Goto Selection Utilities System Help

Change View "SAP QCI - MQCI Documentation": Details

✓ [] New Entries Cancel Exit

Dialog Structure

- QCI Conversion Group Maintenance
 - SAP QCI - MQCI Model Function Sequence (FSO)
 - Link Reading Group to Conversion Group
 - Assign Additional Units to Conversion Group
 - Assign Set ID for Physical Properties
 - SAP QCI - MQCI Documentation**

Conversion grp. Q0WF

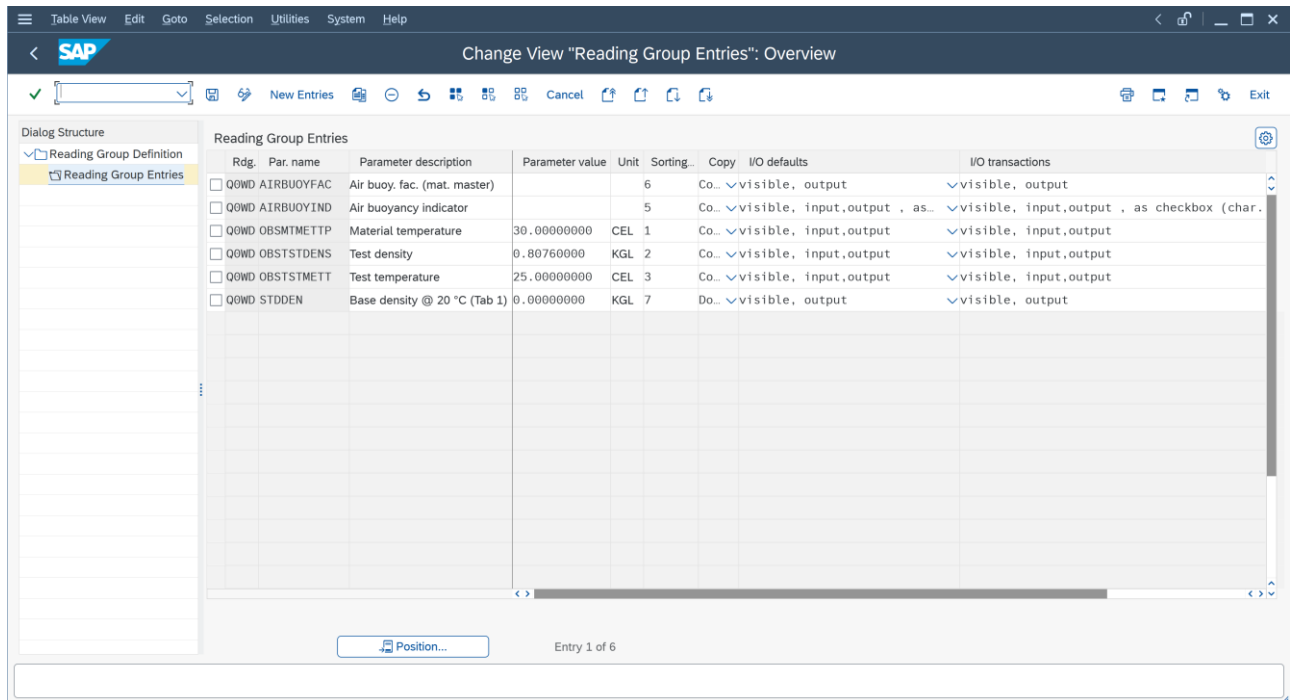
SAP QCI - MQCI Documentation

MQCI model	SAP QCI Model - BAcl Extensions w. Customer Code
CTPL standard	Resolucao ANP No 894-22 / No 6-70 - Products & LPG/NGL
Weight standard	SAP QCI Air Buoyancy Factor - Material Master

One entry chosen [View details](#)

5.3.5. Q0WD Reading Group Configuration Details

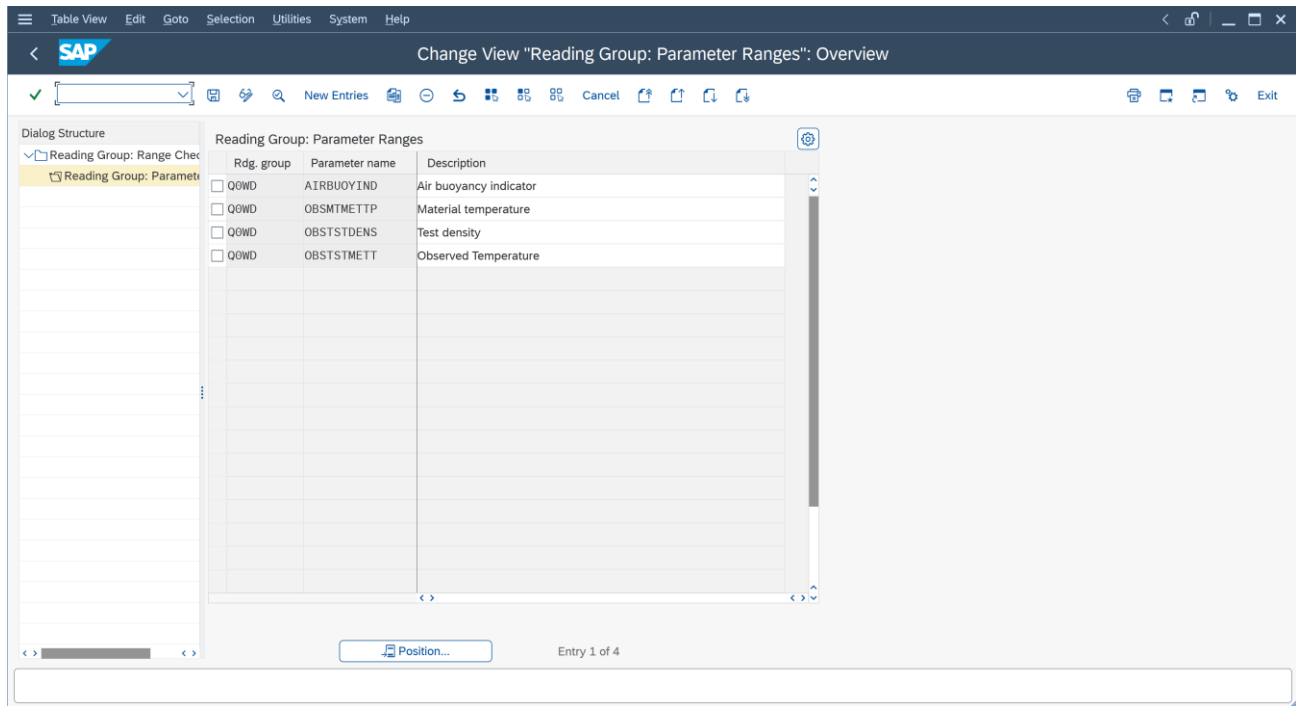
Define reading group Q0WD – “RES. ANP NO 894-2022 / RES. NO 6-70” with the following entries:



Rdg.	Par. name	Parameter description	Parameter value	Unit	Sorting...	Copy	I/O defaults	I/O transactions
<input type="checkbox"/>	Q0WD AIRBUOYFAC	Air buoy. fac. (mat. master)			6	Co...	visible, output	visible, output
<input type="checkbox"/>	Q0WD AIRBUOYIND	Air buoyancy indicator			5	Co...	visible, input,output , as...	visible, input,output , as checkbox (char...
<input type="checkbox"/>	Q0WD OBSMTMETTP	Material temperature	30.00000000	CEL	1	Co...	visible, input,output	visible, input,output
<input type="checkbox"/>	Q0WD OBSTSTDENS	Test density	0.80760000	KGL	2	Co...	visible, input,output	visible, input,output
<input type="checkbox"/>	Q0WD OBSTSTMETT	Test temperature	25.00000000	CEL	3	Co...	visible, input,output	visible, input,output
<input type="checkbox"/>	Q0WD STDDEN	Base density @ 20 °C (Tab 1)	0.00000000	KGL	7	Do...	visible, output	visible, output

5.3.6. Q0WD Range Group Configuration Details

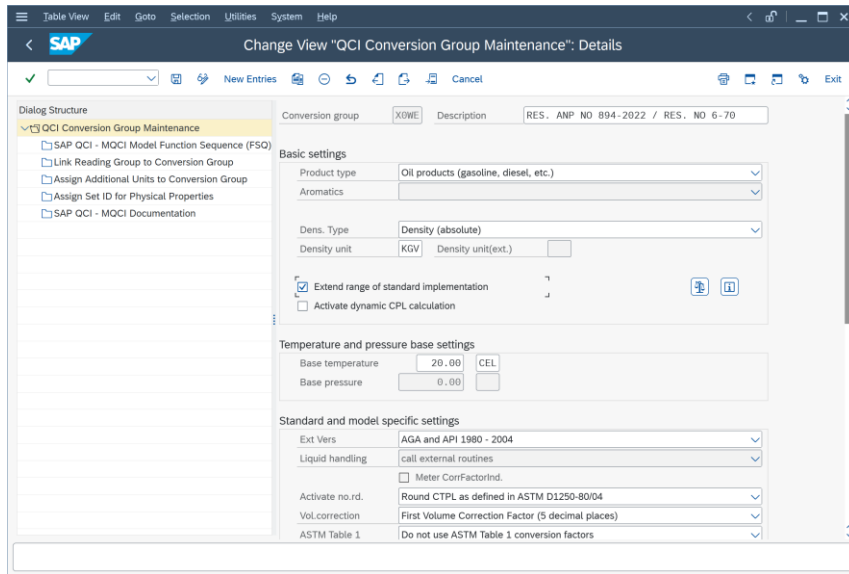
Define range group Q0WD – “RES. ANP NO 894-2022 / RES. NO 6-70” with the following entries:



Note: define appropriate range values for your products in your X/Y/Z*** copy of the new template conversion group.

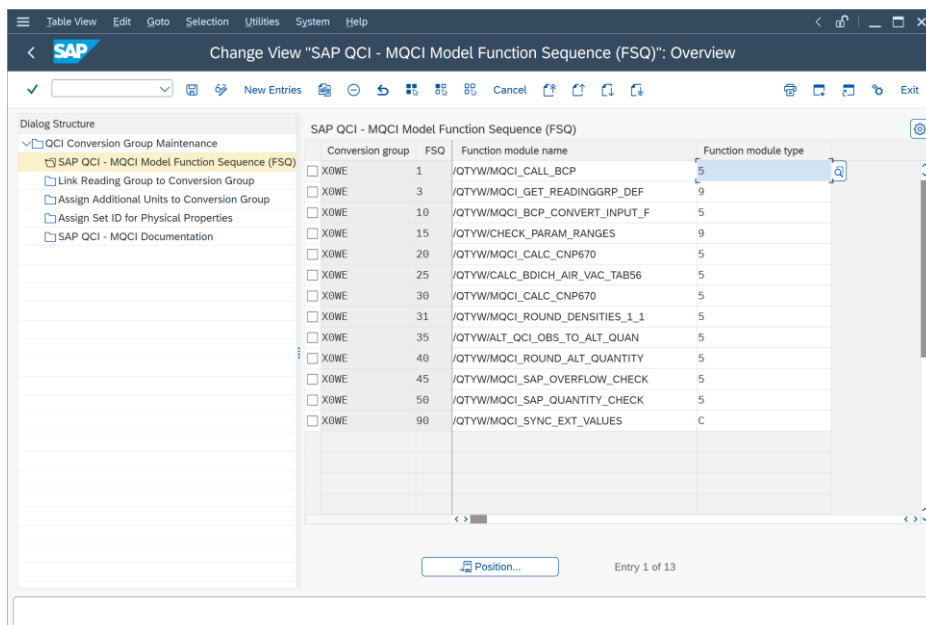
5.4. Alternate Calculation Approach – Configuration Settings

If you decide to utilize the alternate approach described in [Chapter 3.2](#), you simply set the “extend range of standard implementation” in your conversion group.



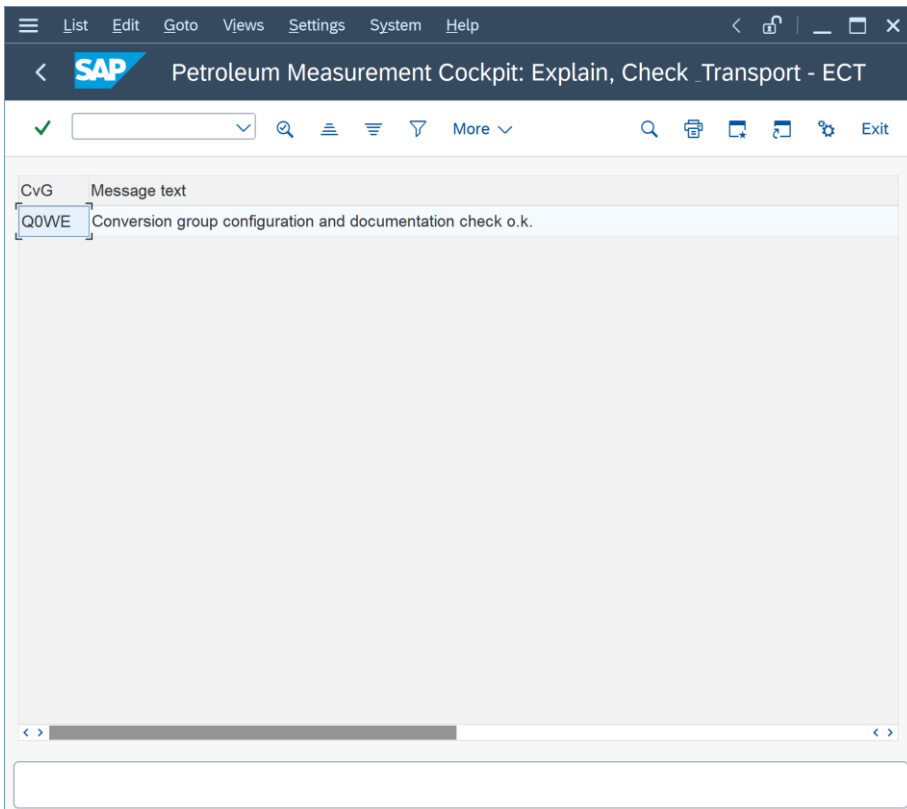
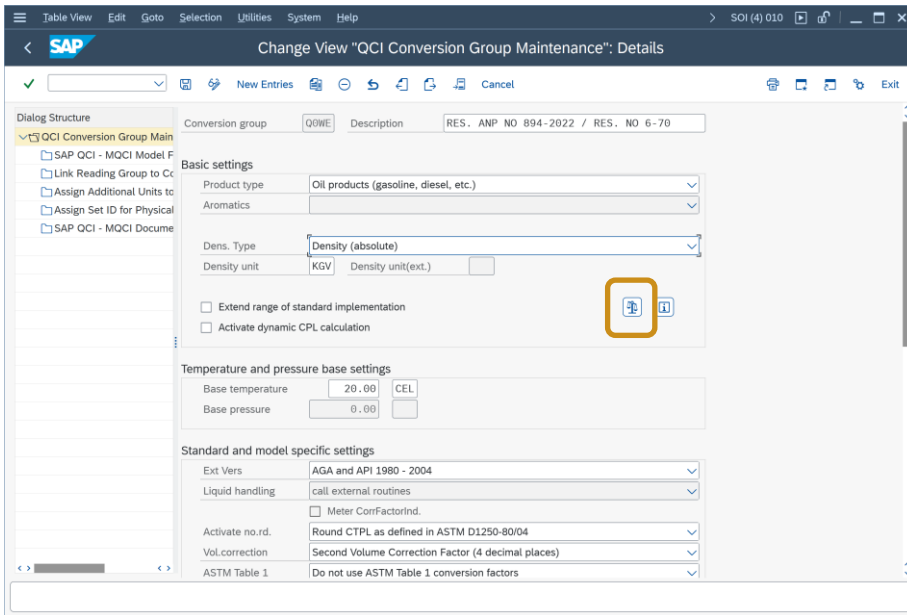
In the MQCI conversion group, you then must remove the two temperature rounding functions from the MQCI model function sequence:

Q0WE	7	/QTYW/ROUND_TEST_TEMP_1_5	5
Q0WE	8	/QTYW/ROUND_MAT_TEMP_1_5	5

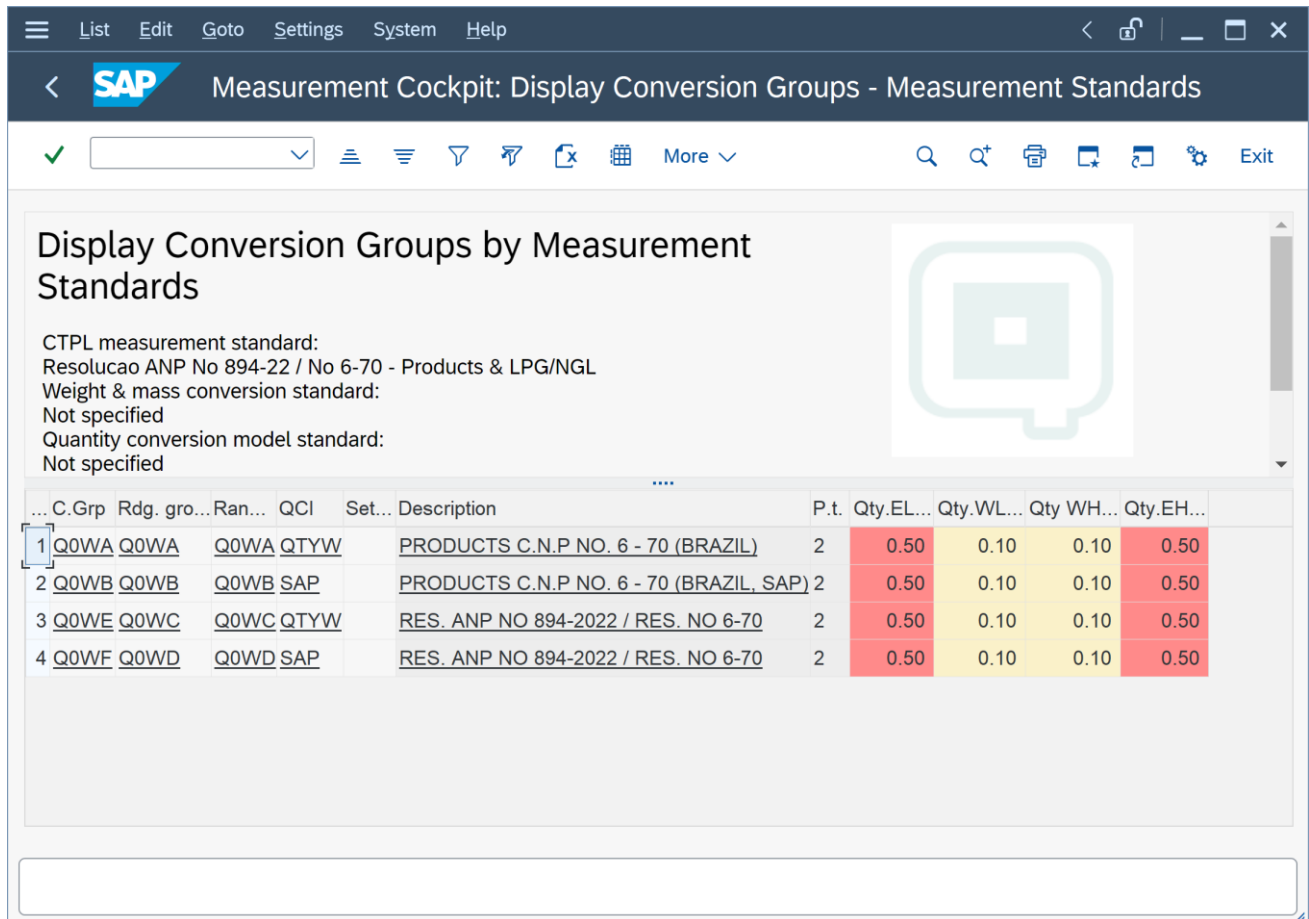


5.5. Conversion Group Configuration Check & Display

Finally, you should execute the conversion group configuration check for your two new template conversion groups:



In your template client 045, you are now able to display the two new template conversion groups Q0WE and Q0WF – together with the existing algorithm-based Table II conversion groups:



Display Conversion Groups by Measurement Standards

CTPL measurement standard:
Resolucao ANP No 894-22 / No 6-70 - Products & LPG/NGL
Weight & mass conversion standard:
Not specified
Quantity conversion model standard:
Not specified

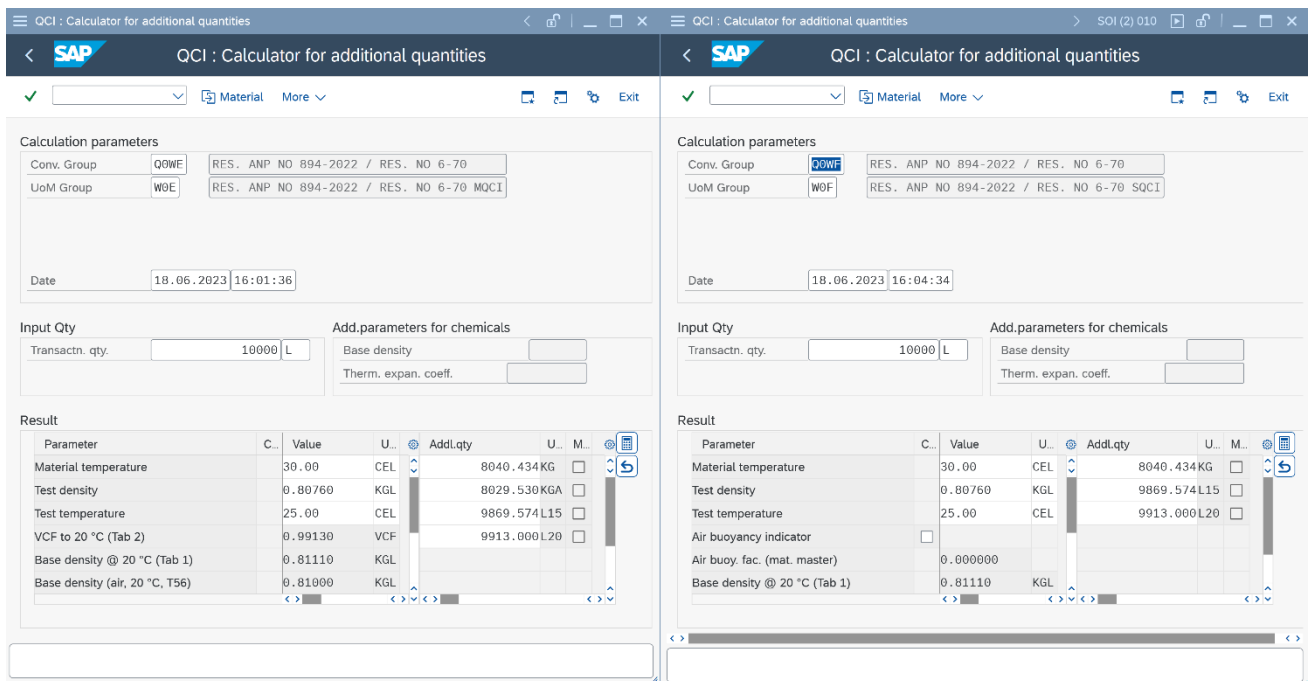
...	C.Grp	Rdg. gro...	Ran...	QCI	Set...	Description	P.t.	Qty.EL...	Qty.WL...	Qty.WH...	Qty.EH...
1	Q0WA	Q0WA	Q0WA	QTYW		PRODUCTS C.N.P NO. 6 - 70 (BRAZIL)	2	0.50	0.10	0.10	0.50
2	Q0WB	Q0WB	Q0WB	SAP		PRODUCTS C.N.P NO. 6 - 70 (BRAZIL, SAP)	2	0.50	0.10	0.10	0.50
3	Q0WE	Q0WC	Q0WC	QTYW		RES. ANP NO 894-2022 / RES. NO 6-70	2	0.50	0.10	0.10	0.50
4	Q0WF	Q0WD	Q0WD	SAP		RES. ANP NO 894-2022 / RES. NO 6-70	2	0.50	0.10	0.10	0.50

6. Calculation Examples Table I & II

Once the conversion groups are configured correctly, you can start your own implementation tests – utilizing your copy into the X/Y/Z*** name range. QuantityWare has performed hundreds of internal tests; however, as stated above and documented in the Annex 2, due to quality issues and ambiguities originating from the quality of the standard, it is the customers’ responsibility to perform rigorous testing and validations.

Here, we document some examples of our internal tests – which are also documented as internal test scenarios:

Reading Group Default Example:



The image displays two side-by-side screenshots of the SAP QCI Calculator for additional quantities interface. Both screenshots show the same calculation parameters and results, but with different conversion groups and UoM groups.

Left Screenshot (Q0WE / W0E):

- Conv. Group: Q0WE
- UoM Group: W0E
- RES.: ANP NO 894-2022 / RES. NO 6-70
- RES.: ANP NO 894-2022 / RES. NO 6-70 MQCI
- Date: 18.06.2023 16:01:36
- Transactn. qty.: 10000 L
- Base density: [empty]
- Therm. expan. coeff.: [empty]
- Result Table:

Parameter	C..	Value	U..	Addl.qty	U..	M..
Material temperature		30.00	CEL	8040.434	KG	<input type="checkbox"/>
Test density		0.80760	KGL	8029.530	KGA	<input type="checkbox"/>
Test temperature		25.00	CEL	9869.574	L15	<input type="checkbox"/>
VCF to 20 °C (Tab 2)		0.99130	VCF	9913.000	L20	<input type="checkbox"/>
Base density @ 20 °C (Tab 1)		0.81110	KGL			
Base density (air, 20 °C, T56)		0.81000	KGL			

Right Screenshot (Q0WF / W0F):

- Conv. Group: Q0WF
- UoM Group: W0F
- RES.: ANP NO 894-2022 / RES. NO 6-70
- RES.: ANP NO 894-2022 / RES. NO 6-70 SQCI
- Date: 18.06.2023 16:04:34
- Transactn. qty.: 10000 L
- Base density: [empty]
- Therm. expan. coeff.: [empty]
- Result Table:

Parameter	C..	Value	U..	Addl.qty	U..	M..
Material temperature		30.00	CEL	8040.434	KG	<input type="checkbox"/>
Test density		0.80760	KGL	9869.574	L15	<input type="checkbox"/>
Test temperature		25.00	CEL	9913.000	L20	<input type="checkbox"/>
Air buoyancy indicator		<input type="checkbox"/>				
Air buoy. fac. (mat. master)		0.000000				
Base density @ 20 °C (Tab 1)		0.81110	KGL			

Table I Example:

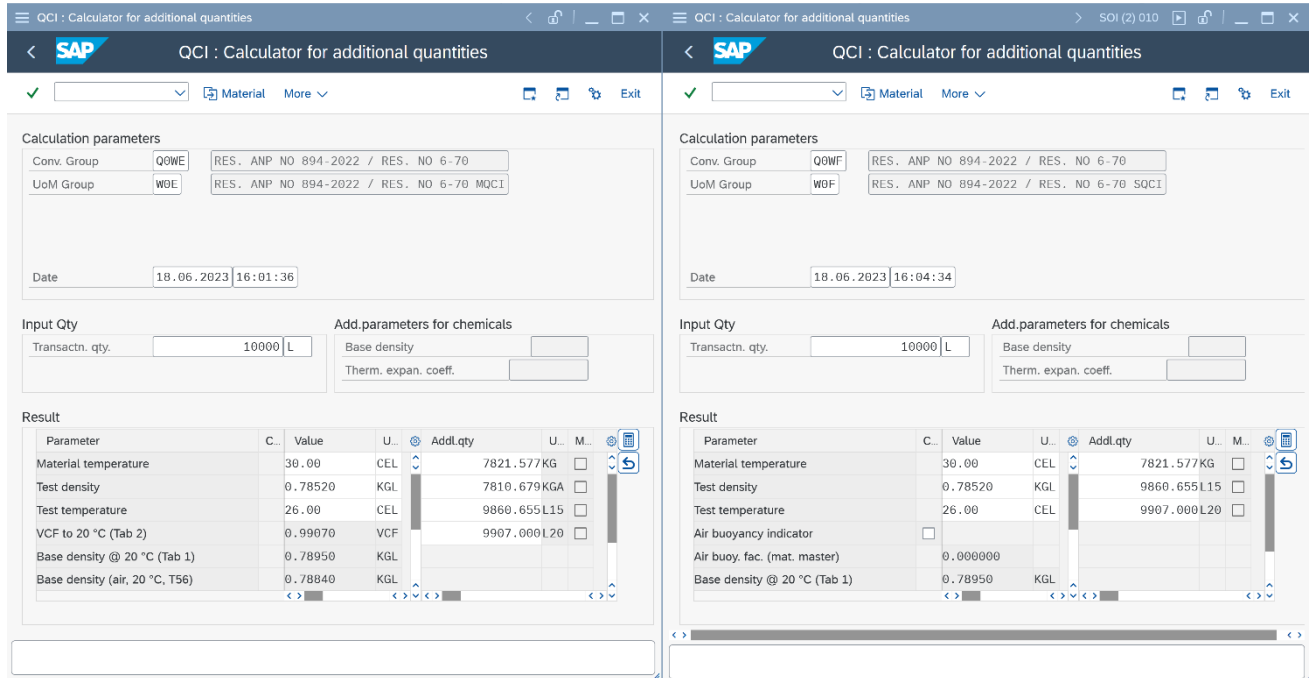


Table I - Left Screenshot (Material QOWE):

Parameter	C.	Value	U.	Addl. qty	U.	M.
Material temperature		30.00	CEL	7821.577	KG	<input type="checkbox"/>
Test density		0.78520	KGL	7810.679	KGA	<input type="checkbox"/>
Test temperature		26.00	CEL	9860.655	L15	<input type="checkbox"/>
VCF to 20 °C (Tab 2)		0.99070	VCF	9907.000	L20	<input type="checkbox"/>
Base density @ 20 °C (Tab 1)		0.78950	KGL			
Base density (air, 20 °C, T56)		0.78840	KGL			

Table I - Right Screenshot (Material QOWF):

Parameter	C.	Value	U.	Addl. qty	U.	M.
Material temperature		30.00	CEL	7821.577	KG	<input type="checkbox"/>
Test density		0.78520	KGL	9860.655	L15	<input type="checkbox"/>
Test temperature		26.00	CEL	9907.000	L20	<input type="checkbox"/>
Air buoyancy indicator						<input type="checkbox"/>
Air buoy. fac. (mat. master)		0.000000				
Base density @ 20 °C (Tab 1)		0.78950	KGL			

Table II Example 1:

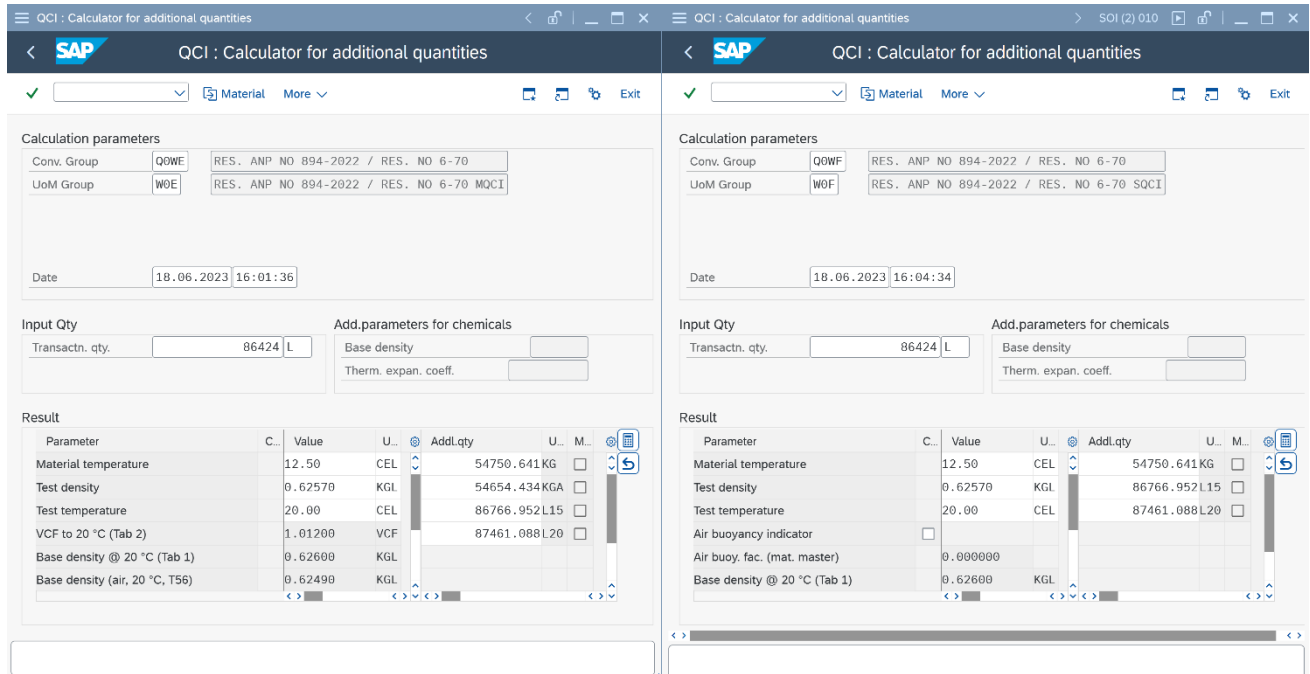


Table II - Left Screenshot (Material QOWE):

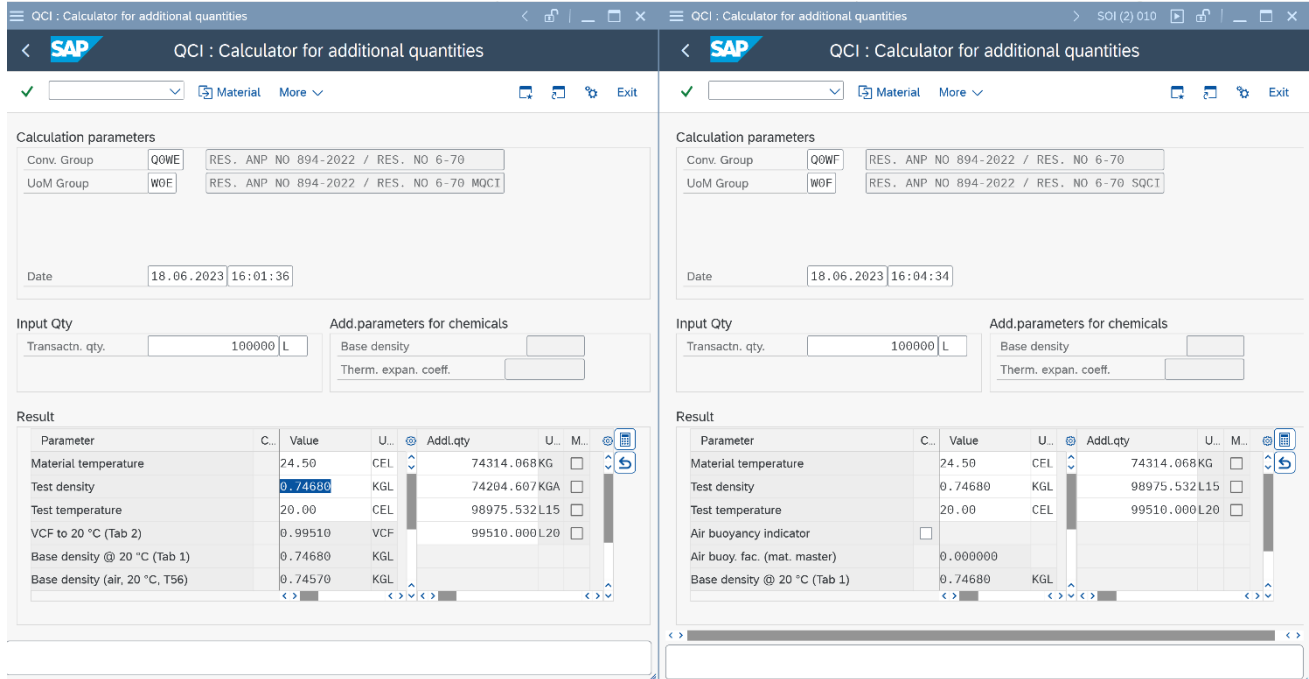
Parameter	C.	Value	U.	Addl. qty	U.	M.
Material temperature		12.50	CEL	54750.641	KG	<input type="checkbox"/>
Test density		0.62570	KGL	54654.434	KGA	<input type="checkbox"/>
Test temperature		20.00	CEL	86766.952	L15	<input type="checkbox"/>
VCF to 20 °C (Tab 2)		1.01200	VCF	87461.088	L20	<input type="checkbox"/>
Base density @ 20 °C (Tab 1)		0.62600	KGL			
Base density (air, 20 °C, T56)		0.62490	KGL			

Table II - Right Screenshot (Material QOWF):

Parameter	C.	Value	U.	Addl. qty	U.	M.
Material temperature		12.50	CEL	54750.641	KG	<input type="checkbox"/>
Test density		0.62570	KGL	86766.952	L15	<input type="checkbox"/>
Test temperature		20.00	CEL	87461.088	L20	<input type="checkbox"/>
Air buoyancy indicator						<input type="checkbox"/>
Air buoy. fac. (mat. master)		0.000000				
Base density @ 20 °C (Tab 1)		0.62600	KGL			

Note that – as explained above – the base density is rounded to three decimals; although the test density is given at base temperature.

Table II Example 2:



The image displays two side-by-side screenshots of the SAP QCI Calculator for additional quantities interface. Both screenshots show the same calculation parameters and input data, but with different results.

Calculation parameters (Left Screenshot):

- Conv. Group: Q0WE
- UoM Group: W0F
- Date: 18.06.2023 16:01:36
- Transactn. qty.: 100000 L
- Test density: 0.74680

Result (Left Screenshot):

Parameter	C..	Value	U..	AddQty	U..	M..
Material temperature		24.50	CEL	74314.068	KG	
Test density		0.74680	KGL	74294.607	KGA	
Test temperature		20.00	CEL	98975.532	L15	
VCF to 20 °C (Tab 2)		0.99510	VCF	99510.000	L20	
Base density @ 20 °C (Tab 1)		0.74680	KGL			
Base density (air, 20 °C, T56)		0.74570	KGL			

Calculation parameters (Right Screenshot):

- Conv. Group: Q0WF
- UoM Group: W0F
- Date: 18.06.2023 16:04:34
- Transactn. qty.: 100000 L
- Test density: 0.74680

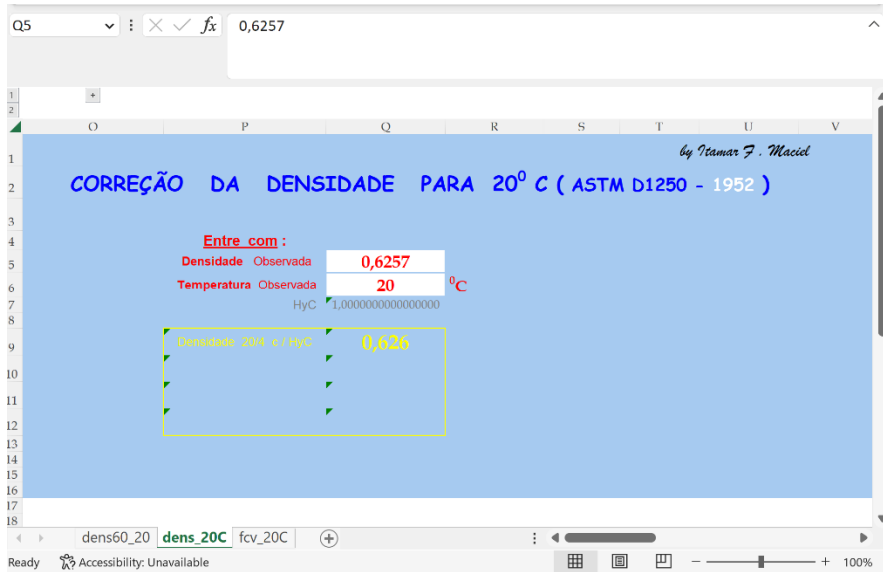
Result (Right Screenshot):

Parameter	C..	Value	U..	AddQty	U..	M..
Material temperature		24.50	CEL	74314.068	KG	
Test density		0.74680	KGL	98975.532	L15	
Test temperature		20.00	CEL	99510.000	L20	
Air buoyancy indicator						
Air buoy. fac. (mat. master)		0.000000				
Base density @ 20 °C (Tab 1)		0.74680	KGL			

Annex 1. XLS Algorithm

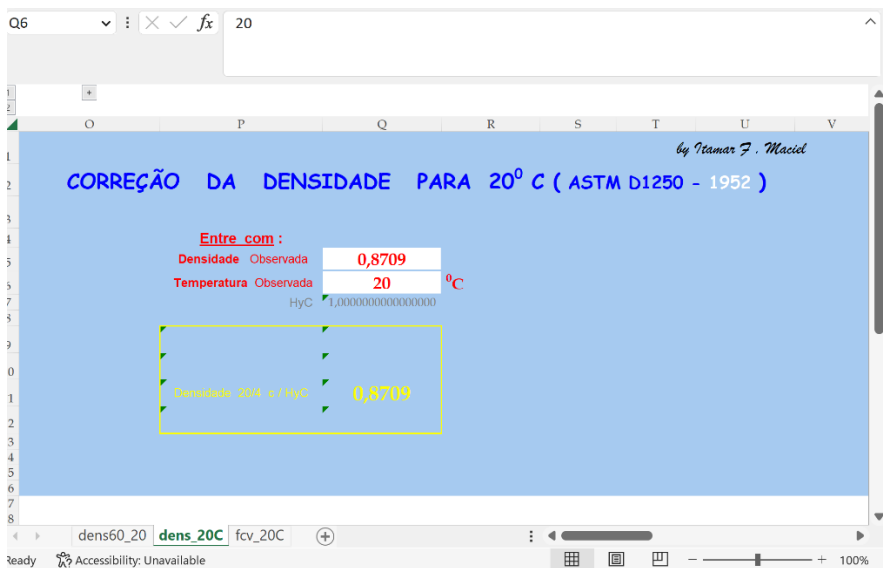
In 2012, business experts from a Brazilian project team presented QuantityWare an XLS sheet, which apparently implements an algorithm-based solution for Table I and Table II:

Table I examples:



The screenshot shows an Excel spreadsheet with the following content:

- Formula bar: Q5, fx 0,6257
- Worksheet title: *by Namar F. Maciel*
- Section title: **CORREÇÃO DA DENSIDADE PARA 20° C (ASTM D1250 - 1952)**
- Input fields:
 - Densidade Observada: 0,6257
 - Temperatura Observada: 20 °C
 - HyC: 1,0000000000000000
- Output field: Densidade 20° C / HyC: 0,626



The screenshot shows an Excel spreadsheet with the following content:

- Formula bar: Q6, fx 20
- Worksheet title: *by Namar F. Maciel*
- Section title: **CORREÇÃO DA DENSIDADE PARA 20° C (ASTM D1250 - 1952)**
- Input fields:
 - Densidade Observada: 0,8709
 - Temperatura Observada: 20 °C
 - HyC: 1,0000000000000000
- Output field: Densidade 20° C / HyC: 0,8709

Q5 0,7549

by Itamar F. Maciel

CORREÇÃO DA DENSIDADE PARA 20^o C (ASTM D1250 - 1952)

Entre com :

Densidade Observada	0,7549
Temperatura Observada	25 °C

HyC 0,9998845000000000

Densidade 20M g / H ₂ O	0,7587
------------------------------------	--------

dens60_20 dens_20C fcv_20C

Table II examples:

N6 10000

by Itamar F. Maciel

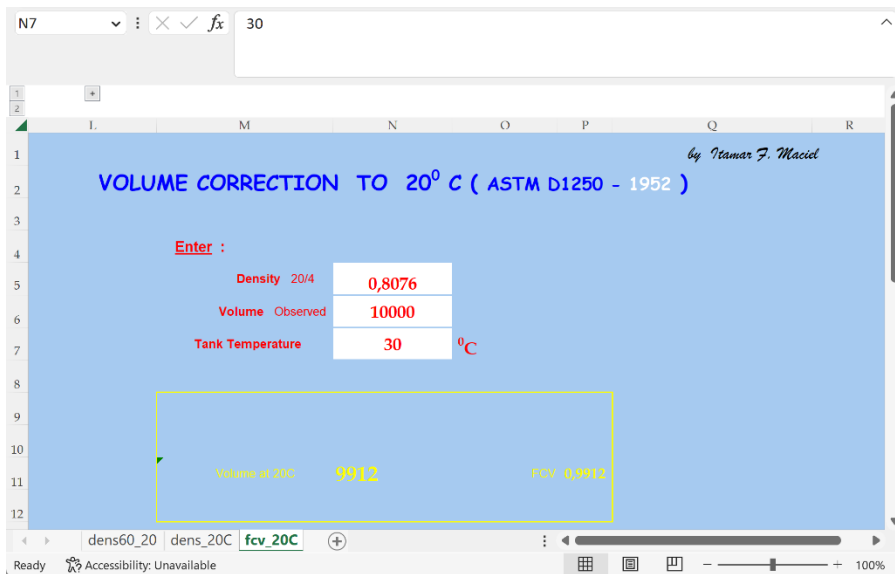
VOLUME CORRECTION TO 20^o C (ASTM D1250 - 1952)

Enter :

Density 20M	0,5830
Volume Observed	10000
Tank Temperature	30 °C

Volume a 20C	9810	fcv_0,981
--------------	------	-----------

dens60_20 dens_20C fcv_20C



QuantityWare has performed a detailed comparison analysis between these values and the printed values (the printed values being the standard). Since numerous differences have been detected for Table I values, as well as for Table II values, QuantityWare delivers the table value based solution with this AD.

As can be seen from the examples above, rounding of base densities (and VCF) for densities less than 0.650 to 3 decimals is performed, as suggested by the accuracy of the printed values; even if the observed density is available with higher accuracy at base temperature 20 °C or when interpolation is performed.

This appears to be a decision of the programmer who developed this XLS; caused by the ambiguity of the printed values in the PDF, which are accompanied with only 1 + 2 examples; as stated beforehand, the standard contains no rounding clarification at all.

Thus, QuantityWare has implemented the rounding in the same manner as defined in the Excel development, for this AD.

Annex 2. Standard Issues Detected

In this Annex, we list the major issues we found during conversion of the printed PDF values to computerized values.

Annex 2.a. Issue 1

Table I contains many unrecognizable values:

55,5	0,7860	0,8106	0,8105	not exactly recognizable corrected as per formula
30,5	0,6590	0,6685		not exactly recognizable corrected as per formula
31,5	0,6590	0,6694		not exactly recognizable corrected as per formula
-22	0,8020	0,7706		not exactly recognizable corrected as per formula
-21	0,8020	0,7715		not exactly recognizable corrected as per formula
-17	0,8030	0,7756		not exactly recognizable corrected as

				per formula corrected as per formula
-20	0,8050	0,7755		not exactly recognizable corrected as per formula
-13,5	0,8050	0,7804		not exactly recognizable corrected as per formula
-1,5	0,8050	0,7895		not exactly recognizable corrected as per formula
-18	0,8060	0,7780		not exactly recognizable corrected as per formula
-5,5	0,8070	0,7886		not exactly recognizable corrected as per formula
-21,5	0,8080	0,7775		not exactly recognizable corrected as per formula

Annex 2.c. Issue 3

As shown below, rounding to 3 decimals for values below 0.650 is not a clearly defined rule ... in reference to page 42, a rounding on temperatures between 21,5°C and 24.5°C to 4 decimals is applied. Also duplicate-reported base densities with different values between page 42 & 43 for 25°C may lead to a misinterpretation of this standard.

20,0	II	C,640	0,641	0,642	0,643	0,644	0,645	0,646	0,647	0,648	0,649
20,5	II	C,640	0,641	0,642	0,643	0,644	0,645	0,646	0,647	0,648	0,649
21,0	II	C,641	0,642	0,643	0,644	0,645	0,646	0,647	0,648	0,649	0,650
21,5	II	C,6414	0,6424	C,6434	0,6444	C,6454	0,6464	0,6474	0,6484	0,6494	0,6504
22,0	II	C,6419	0,6429	C,6439	0,6449	0,6459	0,6469	0,6479	0,6489	0,6498	0,6508
22,5	II	C,6423	0,6433	0,6443	0,6453	0,6463	0,6473	0,6483	0,6493	0,6503	0,6513
23,0	II	C,6428	0,6438	0,6448	0,6458	0,6468	0,6478	0,6488	0,6498	0,6508	0,6518
23,5	II	C,6433	0,6443	0,6453	0,6463	0,6473	0,6482	0,6492	0,6502	0,6512	0,6522
24,0	II	C,6437	0,6447	0,6457	0,6467	0,6477	0,6487	0,6497	0,6507	0,6517	0,6527
24,5	II	C,6442	0,6452	C,6462	0,6472	0,6482	0,6492	0,6502	0,6512	0,6521	0,6531
25,0	II	C,6447	0,6457	C,6467	0,6476	0,6486	C,6496	0,6506	0,6516	C,6526	C,6536

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TABELA I

CONVERSÃO DE DENSIDADE PARA 20 GRAUS CELSIUS

0,640 A 0,649
25,0 A 30,0

TEMPE- RATURA OBSER- VADA CELSIUS	DENSIDADE OBSERVADA										
	0,640	0,641	0,642	0,643	0,644	0,645	0,646	0,647	0,648	0,649	
	DENSIDADE CORRIGIDA PARA 20 GRAUS CELSIUS										
25,0	0,645	0,646	0,647	0,648	0,649	0,650	0,6506	0,6516	0,6526	0,6536	
25,5	0,645	0,646	0,647	0,648	0,649	0,6501	0,6511	0,6521	0,6531	0,6540	
26,0	0,646	0,647	0,648	0,649	0,650	0,6505	0,6515	0,6525	0,6535	0,6545	
26,5	0,646	0,647	0,648	0,649	0,650	0,6510	0,6520	0,6530	0,6540	0,6550	
27,0	0,647	0,648	0,648	0,649	0,6505	0,6515	0,6524	0,6534	0,6544	0,6554	
27,5	0,647	0,648	0,649	0,650	0,6509	0,6519	0,6529	0,6539	0,6549	0,6559	

Annex 2.d. Issue 4

Table 2 page 389 is a mistakenly scanned page 141, thus page 389 has been reconstructed through use of our formula solution.

22,0	0,9975	0,9975	0,9975	0,9975	0,9975	0,9975	0,9975	0,9975	0,9975	0,9975	0,9975
24,0	0,9972	0,9972	0,9972	0,9972	0,9972	0,9972	0,9972	0,9972	0,9972	0,9972	0,9972
25,0	0,9968	0,9968	0,9969	0,9969	0,9969	0,9969	0,9969	0,9969	0,9969	0,9969	0,9969

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TABELA I
CONVERSÃO DE DENSIDADE PARA 20 GRAUS CELSIUS

0,880 A 0,889
25,0 A 50,0

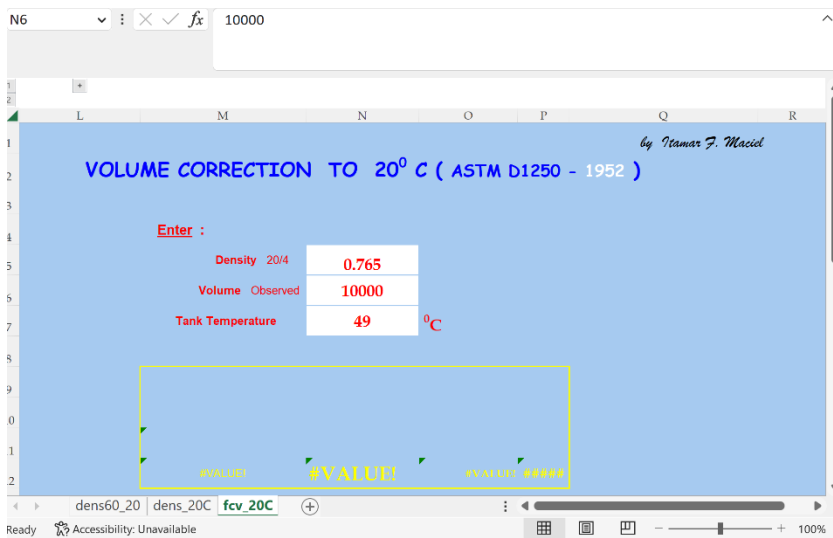
TEMPERATURA OBSERVADA CELSIUS	DENSIDADE OBSERVADA										
	0,880	0,881	0,882	0,883	0,884	0,885	0,886	0,887	0,888	0,889	
	DENSIDADE CORRIGIDA PARA 20 GRAUS CELSIUS										
25,0	0,8832	0,8842	0,8852	0,8862	0,8872	0,8882	0,8892	0,8902	0,8912	0,8922	
25,5	0,8835	0,8845	0,8855	0,8865	0,8875	0,8885	0,8895	0,8905	0,8915	0,8925	
26,0	0,8838	0,8848	0,8858	0,8868	0,8878	0,8888	0,8898	0,8908	0,8918	0,8928	
26,5	0,8842	0,8852	0,8862	0,8872	0,8882	0,8892	0,8902	0,8912	0,8922	0,8932	
27,0	0,8845	0,8855	0,8865	0,8875	0,8885	0,8895	0,8905	0,8915	0,8925	0,8935	
27,5	0,8848	0,8858	0,8868	0,8878	0,8888	0,8898	0,8908	0,8918	0,8928	0,8938	
28,0	0,8851	0,8861	0,8871	0,8881	0,8891	0,8901	0,8911	0,8921	0,8931	0,8941	
28,5	0,8854	0,8864	0,8874	0,8884	0,8894	0,8904	0,8914	0,8924	0,8934	0,8944	
29,0	0,8858	0,8868	0,8878	0,8888	0,8898	0,8908	0,8918	0,8927	0,8937	0,8947	
29,5	0,8861	0,8871	0,8881	0,8891	0,8901	0,8911	0,8921	0,8931	0,8941	0,8951	
30,0	0,8864	0,8874	0,8884	0,8894	0,8904	0,8914	0,8924	0,8934	0,8944	0,8954	
30,5	0,8867	0,8877	0,8887	0,8897	0,8907	0,8917	0,8927	0,8937	0,8947	0,8957	
31,0	0,8870	0,8880	0,8890	0,8900	0,8910	0,8920	0,8930	0,8940	0,8950	0,8960	
31,5	0,8874	0,8884	0,8894	0,8904	0,8913	0,8923	0,8933	0,8943	0,8953	0,8963	
32,0	0,8877	0,8887	0,8897	0,8907	0,8917	0,8927	0,8937	0,8947	0,8957	0,8966	
32,5	0,8880	0,8890	0,8900	0,8910	0,8920	0,8930	0,8940	0,8950	0,8960	0,8970	
33,0	0,8883	0,8893	0,8903	0,8913	0,8923	0,8933	0,8943	0,8953	0,8963	0,8973	
33,5	0,8886	0,8896	0,8906	0,8916	0,8926	0,8936	0,8946	0,8956	0,8966	0,8976	
34,0	0,8890	0,8899	0,8909	0,8919	0,8929	0,8939	0,8949	0,8959	0,8969	0,8979	
34,5	0,8893	0,8903	0,8913	0,8922	0,8932	0,8942	0,8952	0,8962	0,8972	0,8982	
35,0	0,8896	0,8906	0,8916	0,8926	0,8936	0,8946	0,8956	0,8965	0,8975	0,8985	
35,5	0,8899	0,8909	0,8919	0,8929	0,8939	0,8949	0,8959	0,8969	0,8979	0,8989	
36,0	0,8902	0,8912	0,8922	0,8932	0,8942	0,8952	0,8962	0,8972	0,8982	0,8992	
36,5	0,8905	0,8915	0,8925	0,8935	0,8945	0,8955	0,8965	0,8975	0,8985	0,8995	
37,0	0,8908	0,8918	0,8928	0,8938	0,8948	0,8958	0,8968	0,8978	0,8988	0,8998	
37,5	0,8912	0,8922	0,8932	0,8941	0,8951	0,8961	0,8971	0,8981	0,8991	0,9001	
38,0	0,8915	0,8925	0,8935	0,8945	0,8955	0,8964	0,8974	0,8984	0,8994	0,9004	
38,5	0,8918	0,8928	0,8938	0,8948	0,8958	0,8968	0,8978	0,8988	0,8998	0,9008	
39,0	0,8921	0,8931	0,8941	0,8951	0,8961	0,8971	0,8981	0,8991	0,9001	0,9011	
39,5	0,8924	0,8934	0,8944	0,8954	0,8964	0,8974	0,8984	0,8994	0,9004	0,9014	
40,0	0,8927	0,8937	0,8947	0,8957	0,8967	0,8977	0,8987	0,8997	0,9007	0,9017	
40,5	0,8931	0,8941	0,8950	0,8960	0,8970	0,8980	0,8990	0,9000	0,9010	0,9020	
41,0	0,8934	0,8944	0,8953	0,8963	0,8973	0,8983	0,8993	0,9003	0,9013	0,9023	
41,5	0,8937	0,8947	0,8957	0,8967	0,8976	0,8986	0,8996	0,9006	0,9016	0,9026	
42,0	0,8940	0,8950	0,8960	0,8970	0,8980	0,8990	0,9000	0,9010	0,9020	0,9030	
42,5	0,8943	0,8953	0,8963	0,8973	0,8983	0,8993	0,9003	0,9013	0,9023	0,9033	
43,0	0,8946	0,8956	0,8966	0,8976	0,8986	0,8996	0,9006	0,9016	0,9026	0,9036	
43,5	0,8949	0,8959	0,8969	0,8979	0,8989	0,8999	0,9009	0,9019	0,9029	0,9039	
44,0	0,8952	0,8962	0,8972	0,8982	0,8992	0,9002	0,9012	0,9022	0,9032	0,9042	
44,5	0,8956	0,8965	0,8975	0,8985	0,8995	0,9005	0,9015	0,9025	0,9035	0,9045	
45,0	0,8959	0,8969	0,8979	0,8989	0,8999	0,9009	0,9018	0,9028	0,9038	0,9048	
45,5	0,8962	0,8972	0,8982	0,8992	0,9002	0,9012	0,9022	0,9032	0,9042	0,9051	
46,0	0,8965	0,8975	0,8985	0,8995	0,9005	0,9015	0,9025	0,9035	0,9045	0,9055	
46,5	0,8968	0,8978	0,8988	0,8998	0,9008	0,9018	0,9028	0,9038	0,9048	0,9058	
47,0	0,8971	0,8981	0,8991	0,9001	0,9011	0,9021	0,9031	0,9041	0,9051	0,9061	
47,5	0,8974	0,8984	0,8994	0,9004	0,9014	0,9024	0,9034	0,9044	0,9054	0,9064	
48,0	0,8977	0,8987	0,8997	0,9007	0,9017	0,9027	0,9037	0,9047	0,9057	0,9067	
48,5	0,8981	0,8991	0,9001	0,9010	0,9020	0,9030	0,9040	0,9050	0,9060	0,9070	
49,0	0,8984	0,8994	0,9004	0,9014	0,9024	0,9034	0,9044	0,9053	0,9063	0,9073	
49,5	0,8987	0,8997	0,9007	0,9017	0,9027	0,9037	0,9047	0,9056	0,9066	0,9076	
50,0	0,8990	0,9000	0,9010	0,9020	0,9030	0,9040	0,9050	0,9060	0,9070	0,9080	

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Annex 2.e. Issue 5

Excel (XLS) issues:

The formula-based XLS solution leads to a zero value on the table 1 integration for several use cases, e.g.:



`add_test '49' '0.765' '0.786'`. "... there is an error in the excel and in the function leading to a zero result

`add_test '0.0' '0.5450' '0.5180'`. "... there is an error in the excel and in the function leading to a zero result

These are two examples of many more occurring, and which are consequently also occurring in the ABAP algorithm based solution. This is another technical reason why the table value based solution has to be utilized – it is the standard and defined for all possible values.

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