



# ISO 91:2017 Consulting Paper

## Guidance for QuantityWare BCP Implementations

What is the impact of ISO 91:2017 and how do I check that my template or production conversion groups comply with ISO 91:2017?

## Version History

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Version	Date	Description
00	2017-05-19	Initial Version
01	2017-08-02	Editorially revised and confirmed, added ASTM Table 1 Requirements
02	2020-07-17	Editorial revision
03	2020-07-24	Layout revision
04	2021-02-21	Layout revision
05	2021-06-22	Modern QW document style applied
06	2023-11-01	Editorial revision

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## 1. BCP ISO 91:2017 Compliance Overview

In May 2017 [ISO](#), the International Organization for Standardization, published [ISO 91:2017](#):

### **"Petroleum and related products - Temperature and pressure volume correction factors (petroleum measurement tables) and standard reference conditions"**

This new measurement standard release represents a major step forward in international standardization and harmonization of petroleum measurement standards for the global oil industries. With this paper, QuantityWare provides guidance to its customers and certified BCP consultants as to how to perform a compliance analysis of QuantityWare BCP (Bulk Calculations - Petroleum) template and production conversion groups with respect to ISO 91:2017.



#### Summary

Since 2011, all QuantityWare BCP (Bulk Calculations - Petroleum) customers have had access to ISO 91:2017 compliant measurement standard implementations via 82 BCP MQCI template conversion groups (BCS 3.0). Thus, an easy transition to ISO 91:2017 calculations is available or has already been made during your BCP implementation project.

After a summary of the overall aim of this new standard, detailed guidance is given in Chapter 1 as to how certified BCP consultants and BCP customers can select ISO 91:2017-compliant template conversion groups. Chapter 2 describes how production conversion groups can be checked for ISO 91:2017 compliance.



QuantityWare strongly recommends that you purchase your own licensed copy of ISO 91:2017 to access all vital details defined in ISO 91:2017. The information concerning ISO 91:2017 that is provided in this consulting paper is freely available at <https://www.iso.org/obp/ui/#iso:std:iso:91:ed-1:v1:en> (accessed at 07/03/2023 - 12:00 UTC)

## 2. ISO 91:2017 Management Summary

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As stated in [ISO 91:2017](#), ISO 91:2017 cancels and replaces [ISO 91-1:1992](#), [ISO 91-2:1991](#), [ISO 9770:1989](#), and [ISO 5024:1999](#).

### What does this mean?

ISO 91:2017 globally **advises that new implementations** of quantity conversion calculations:

- for determination of Volume Correction Factors (VCF/CTPL: Temperature and Pressure Corrections)
- and for Density/Weight/Volume Intraconversion

**shall be based on the latest API MPMS (American Petroleum Institute Manual of Petroleum Measurement Standards) versions.**

**This recommendation is made for crude oil, petroleum products, lubricating oils and special application products, as well as LPG (Liquefied Petroleum Gas) and NGL (Natural Gas Liquids).**

Furthermore, a recommendation is given in ISO 91:2017 as to when new applications shall refer to this new ISO standard and whether existing applications are considered compliant with ISO 91:2017 (if they are compliant with the now cancelled ISO 91-1:1992 or ISO 91-2:1991).

For LPG and NGL there are many historical standard versions still in use globally, for which a differing compliance status is defined.

ISO 91:2017 also contains the definition of the measurement standard reference conditions.

Ultimately, the use of any measurement standard is voluntarily and needs to be agreed on by the parties involved in business transactions. Varying national legal requirements need to be considered too. For this reason, QuantityWare BCP provides a wealth of measurement standard implementations based on national and international measurement standards, including different historical versions (e.g., ISO 91-1:1992 and ISO 91-2:1991).

Guided by [certified BCP consultants](#), customers can select which standard versions are to be applied to conversion groups based on such agreements and regulations during their implementation projects.

### 3. Chapter 1: ISO 91:2017 Template Conversion Group Determination

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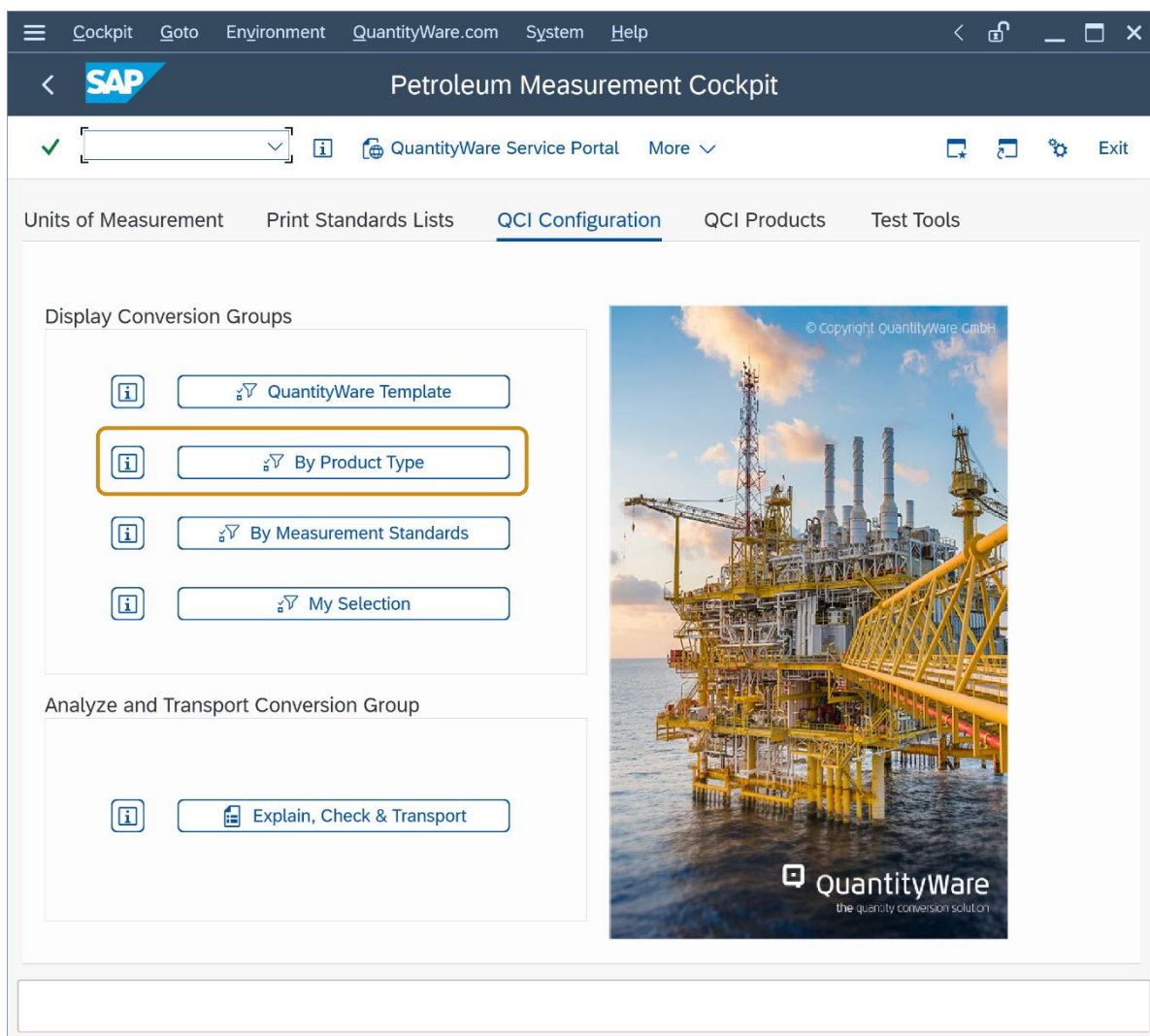
[ISO 91:2017](#) lists the following normative references:

- CTPL Measurement Standards:
  - Crude oil & products:
    - API Manual of Petroleum Measurement Standards (MPMS) Chapter 11.1–2004/Adjunct to ASTM D1250-042/Adjunct to IP 200/04, Temperature and Pressure Volume Correction Factors for Generalized Crude Oils, Refined Products, and Lubricating Oils/Addendum 1-2007
  - NGL/LPG:
    - API MPMS Chapter 11.2.2-1986, Compressibility Factors for Hydrocarbons: 0.350–0.637 Relative Density (60°F/60°F) and –50 °F to 140 °F Metering Temperature/Errata June 1996
    - API MPMS Chapter 11.2.2M-1986, Compressibility Factors for Hydrocarbons: 350–637 Kilograms per Cubic Metre Density (15 °C) and –46 °C to 60 °C Metering Temperature
    - API MPMS Chapter 11.2.4 - 2007/GPA Technical Publication TP-27-2007, Temperature Correction for the Volume of NGL and LPG, Tables 23E, 24E, 53E, 54E, 59E, and 60E (since 2019 available as GPA Standard 8217)
- Density/Weight/Volume Intraconversion Standards
  - All products:
    - API MPMS Chapter 11.5 Part 1-2009/Adjunct to ASTM D1250-08/Adjunct to IP 200/08, Density/Weight/Volume Intraconversion — Part 1: Conversions of API gravity at 60 °F
    - API MPMS Chapter 11.5 Part 2-2009/Adjunct to ASTM D1250-08/Adjunct to IP 200/08, Density/Weight/Volume Intraconversion — Part 2: Conversions for Relative Density (60/60 °F)

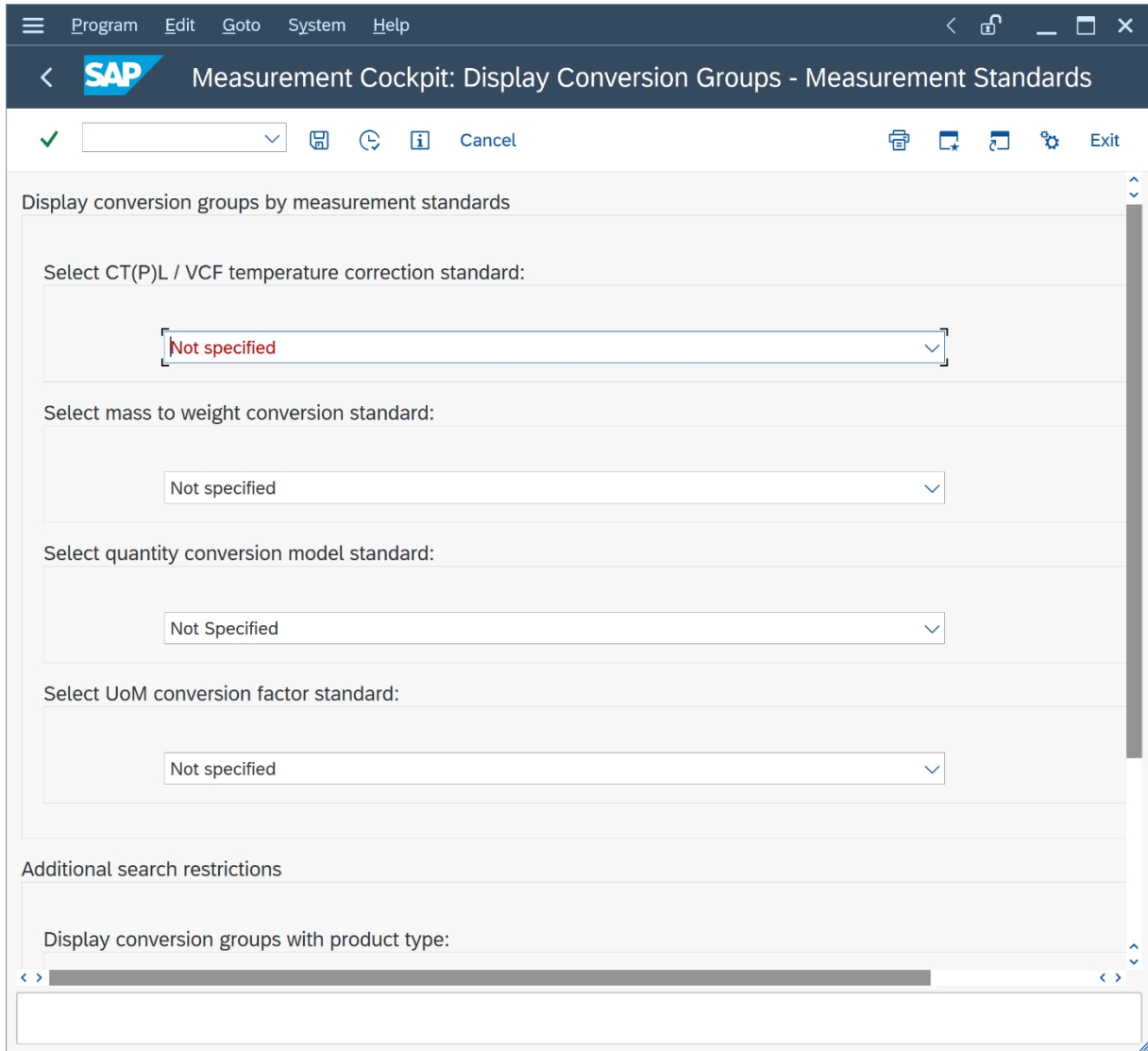
- API MPMS Chapter 11.5 Part 3-2009/Adjunct to ASTM D1250-08/Adjunct to IP 200/08, Density/Weight/Volume Intraconversion— Part 3: Conversions for Absolute Density at 15 °C

With this information at hand, you easily select ISO 91: 2017-compliant QuantityWare BCP template conversion groups:

First, launch the Petroleum Measurement Cockpit (PMC) and navigate to tab strip "QCI Configuration":



Now select "By Measurement Standards":



The screenshot shows the SAP Measurement Cockpit interface for displaying conversion groups by measurement standards. The window title is "Measurement Cockpit: Display Conversion Groups - Measurement Standards". The interface includes a menu bar (Program, Edit, Goto, System, Help) and a toolbar with icons for save, refresh, help, cancel, print, copy, paste, settings, and exit. The main content area is titled "Display conversion groups by measurement standards" and contains four dropdown menus for selecting standards:

- Select CT(P)L / VCF temperature correction standard: Not specified
- Select mass to weight conversion standard: Not specified
- Select quantity conversion model standard: Not Specified
- Select UoM conversion factor standard: Not specified

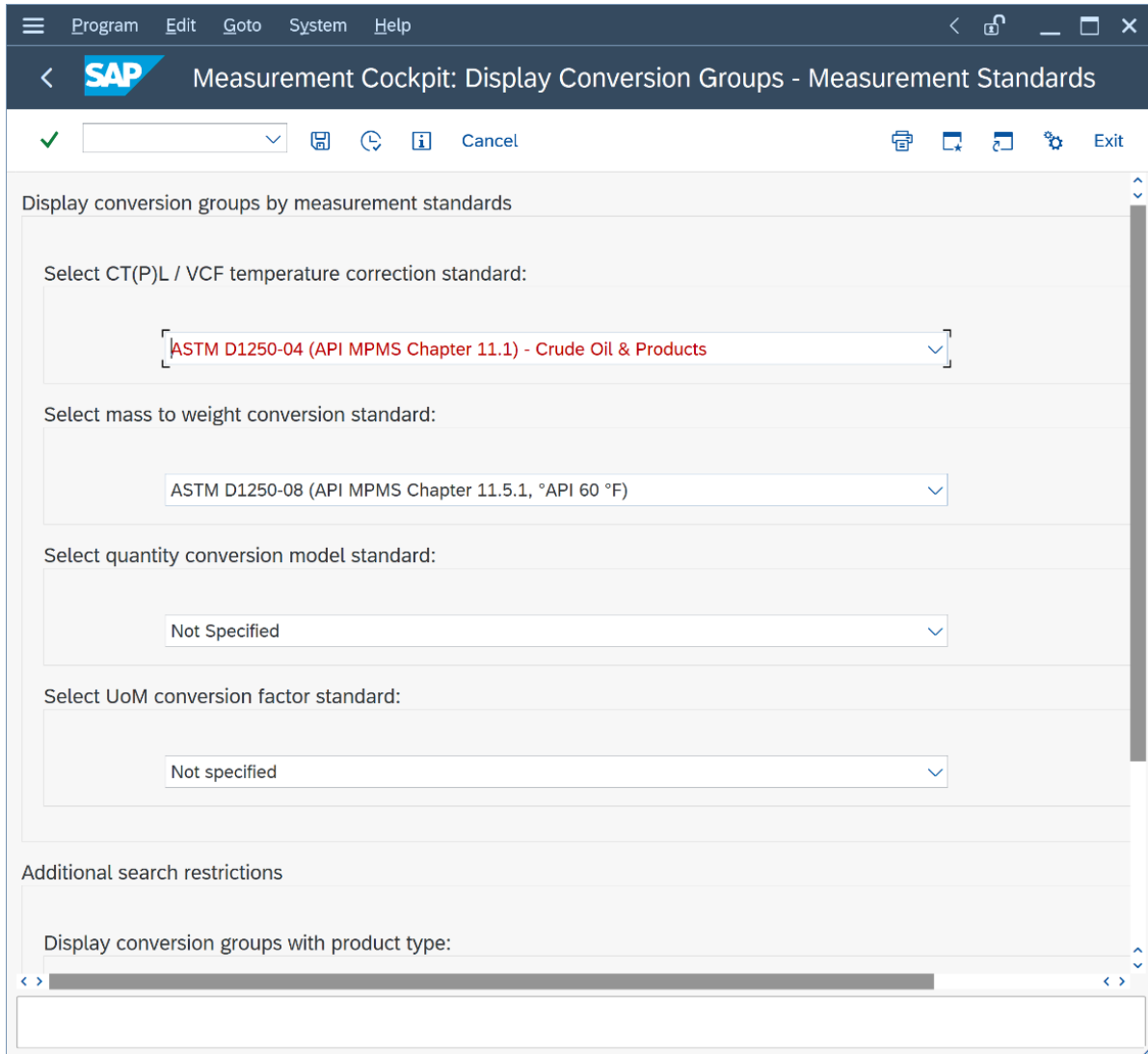
Below these is the "Additional search restrictions" section, which includes a field for "Display conversion groups with product type:".



To display ISO 91:2017 compliant conversion groups, enter the API MPMS CTPL standard and the API MPMS mass to weight conversion standard listed as normative reference:



Display all ISO 91:2017-compliant Template Conversion Groups for **Crude Oil, Petroleum Products, Lubricating Oils and Special Applications - API Gravity at 60 °F:**



The screenshot shows the SAP Measurement Cockpit interface for displaying conversion groups. The window title is "Measurement Cockpit: Display Conversion Groups - Measurement Standards". The interface includes a menu bar with "Program", "Edit", "Goto", "System", and "Help". Below the menu bar is a toolbar with a search icon, a dropdown menu, and buttons for "Cancel", "Exit", and other functions. The main content area is titled "Display conversion groups by measurement standards" and contains four selection fields:

- Select CT(P)L / VCF temperature correction standard:** [ASTM D1250-04 (API MPMS Chapter 11.1) - Crude Oil & Products]
- Select mass to weight conversion standard:** [ASTM D1250-08 (API MPMS Chapter 11.5.1, °API 60 °F)]
- Select quantity conversion model standard:** [Not Specified]
- Select UoM conversion factor standard:** [Not specified]

Below these fields is a section for "Additional search restrictions" with a label "Display conversion groups with product type:" and a search input field.

List Edit Goto Settings System Help

**SAP** Measurement Cockpit: Display Conversion Groups - Measurement Standards

Display Conversion Groups by Measurement Standards

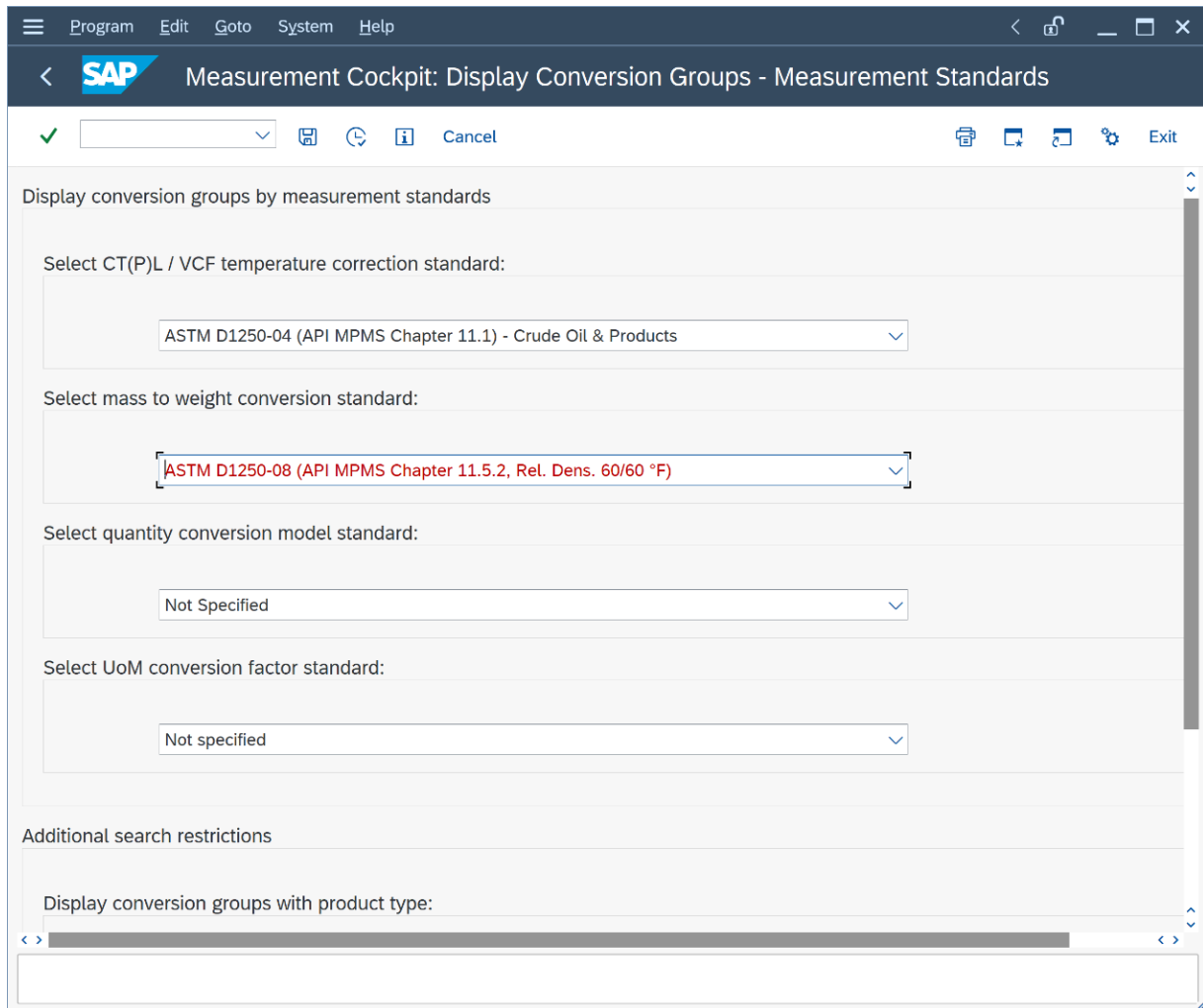
CTPL measurement standard:  
 ASTM D1250-04 (API MPMS Chapter 11.1) - Crude Oil & Products  
 Weight & mass conversion standard:  
 ASTM D1250-08 (API MPMS Chapter 11.5.1, °API 60 °F)  
 Quantity conversion model standard:  
 Not specified  
 Unit of measure intraconversion standard:  
 Not specified

No	C.Grp	Rdg.	group	Ranges	QCI	Set ID	Description	P.t.	Qty.EL %	Qty.WL %	Qty.WH %	Qty.EH %
1	Q156	Q156	Q156	QTYW			CRUDE 04/08 SW/MCF/PRES 60 °F API G/NET	1	0.50	0.10	0.10	0.50
2	Q1A1	Q2A1	Q2A1	QTYW			CRUDE 2004/08 API 60 °F MPMS MODEL.LB/GA	1	0.50	0.10	0.10	0.50
3	Q1A3	Q2A3	Q2A3	QTYW			CRUDE 2004/08 API 60 °F MPMS MODEL.LTO/B	1	0.50	0.10	0.10	0.50
4	Q1A5	Q2A5	Q2A5	QTYW			CRUDE 2004/08 API 60 °F MPMS MODEL.LTO/G	1	0.50	0.10	0.10	0.50
5	Q1A7	Q2A7	Q2A7	QTYW			CRUDE 2004/08 API 60 °F MPMS MODEL.MTO/B	1	0.50	0.10	0.10	0.50
6	Q1A9	Q2A9	Q2A9	QTYW			CRUDE 2004/08 API 60 °F MPMS MODEL.MTO/G	1	0.50	0.10	0.10	0.50
7	Q1AB	Q2AB	Q2AB	QTYW			CRUDE 2004/08 API 60 °F MPMS MODEL.STO/B	1	0.50	0.10	0.10	0.50
8	Q1AD	Q2AD	Q2AD	QTYW			CRUDE 2004/08 API 60 °F MPMS MODEL.STO/G	1	0.50	0.10	0.10	0.50
9	Q1IA	Q1IA	Q1IA	QTYW			CRUDE OIL ISO 91:2017 60 °F API GRS/NET	1	0.50	0.10	0.10	0.50
10	Q2A1	Q2A1	Q2A1	QTYW			PRODUCTS 2004/08 API 60 °F MPMS, LB/GAL	2	0.50	0.10	0.10	0.50
11	Q2A3	Q2A3	Q2A3	QTYW			PRODUCTS 2004/08 API 60 °F MPMS, LTO/BBL	2	0.50	0.10	0.10	0.50
12	Q2A5	Q2A5	Q2A5	QTYW			PRODUCTS 2004/08 API 60 °F MPMS, LTO/GAL	2	0.50	0.10	0.10	0.50
13	Q2A7	Q2A7	Q2A7	QTYW			PRODUCTS 2004/08 API 60 °F MPMS, MTO/BBL	2	0.50	0.10	0.10	0.50
14	Q2A9	Q2A9	Q2A9	QTYW			PRODUCTS 2004/08 API 60 °F MPMS, MTO/GAL	2	0.50	0.10	0.10	0.50



To simplify implementations for our certified consultant base, new ISO 91:2017 template conversion groups (Q\*I\*) are delivered (including ASTM D1250-19 support of unrounded volume correction factors) with BCS 30B-01 and BCS 30A-02.  
 Example: Q1IA and Q2IA.

Display all ISO 91:2017-compliant Template Conversion Groups for **Crude Oil, Petroleum Products, Lubricating Oils and Special Applications - Relative Density 60/60 °F:**






The screenshot shows the SAP Measurement Cockpit interface for displaying conversion groups. The window title is "SAP Measurement Cockpit: Display Conversion Groups - Measurement Standards". The interface includes a menu bar (Program, Edit, Goto, System, Help) and a toolbar with icons for save, refresh, help, and exit. The main content area is titled "Display conversion groups by measurement standards" and contains four selection fields:

- Select CT(P)L / VCF temperature correction standard:** Dropdown menu with the selected value "ASTM D1250-04 (API MPMS Chapter 11.1) - Crude Oil & Products".
- Select mass to weight conversion standard:** Dropdown menu with the selected value "ASTM D1250-08 (API MPMS Chapter 11.5.2, Rel. Dens. 60/60 °F)".
- Select quantity conversion model standard:** Dropdown menu with the selected value "Not Specified".
- Select UoM conversion factor standard:** Dropdown menu with the selected value "Not specified".

Below these fields is a section for "Additional search restrictions" with a label "Display conversion groups with product type:" and a horizontal scrollbar.

[List](#) [Edit](#) [Goto](#) [Settings](#) [System](#) [Help](#)

 Measurement Cockpit: Display Conversion Groups - Measurement Standards

### Display Conversion Groups by Measurement Standards

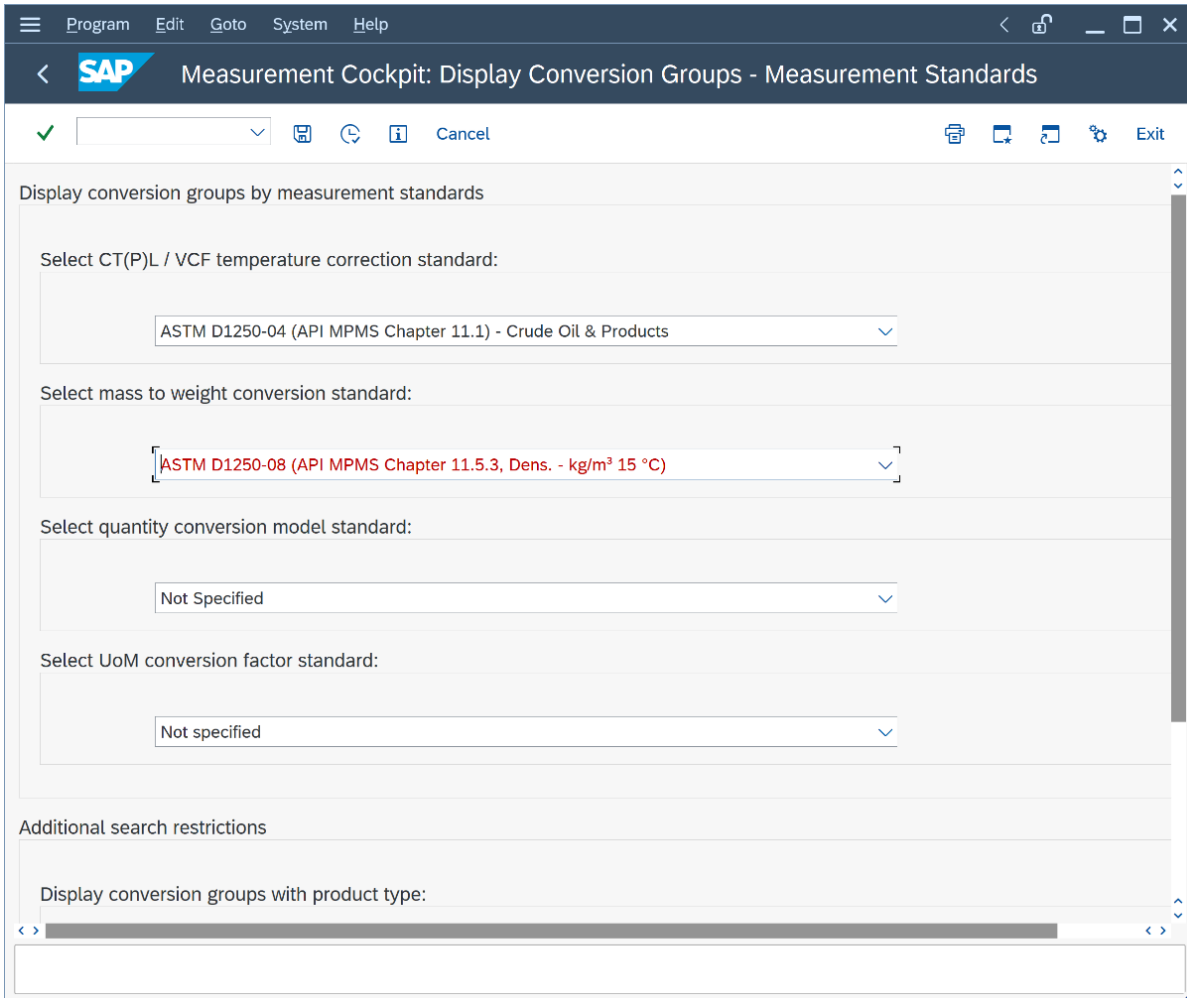
CTPL measurement standard:  
 ASTM D1250-04 (API MPMS Chapter 11.1) - Crude Oil & Products  
 Weight & mass conversion standard:  
 ASTM D1250-08 (API MPMS Chapter 11.5.2, Rel. Dens. 60/60 °F)  
 Quantity conversion model standard:  
 Not specified

No	C.Gr	Rdg. group	Ranges	QCI	Set ID	Description	P.t.	Qty.EL %	Qty.WL %	Qty.WH %	Qty.EH %
1	<a href="#">Q157</a>	<a href="#">Q157</a>	<a href="#">Q157</a>	<a href="#">QTYW</a>		CRUDE 04/08 SW/MCF/PRES 60 °F RD G/NET	1	0.50	0.10	0.10	0.50
2	<a href="#">Q1A2</a>	<a href="#">Q2A2</a>	<a href="#">Q2A2</a>	<a href="#">QTYW</a>		CRUDE 2004/08 RD 60 °F MPMS MODEL, LB/GA	1	0.50	0.10	0.10	0.50
3	<a href="#">Q1A4</a>	<a href="#">Q2A4</a>	<a href="#">Q2A4</a>	<a href="#">QTYW</a>		CRUDE 2004/08 RD 60 °F MPMS MODEL,LTO/BB	1	0.50	0.10	0.10	0.50
4	<a href="#">Q1A6</a>	<a href="#">Q2A6</a>	<a href="#">Q2A6</a>	<a href="#">QTYW</a>		CRUDE 2004/08 RD 60 °F MPMS MODEL,LTO/G	1	0.50	0.10	0.10	0.50
5	<a href="#">Q1A8</a>	<a href="#">Q2A8</a>	<a href="#">Q2A8</a>	<a href="#">QTYW</a>		CRUDE 2004/08 RD 60 °F MPMS MODEL,MTO/B	1	0.50	0.10	0.10	0.50
6	<a href="#">Q1AA</a>	<a href="#">Q2AA</a>	<a href="#">Q2AA</a>	<a href="#">QTYW</a>		CRUDE 2004/08 RD 60 °F MPMS MODEL,MTO/G	1	0.50	0.10	0.10	0.50
7	<a href="#">Q1AC</a>	<a href="#">Q2AC</a>	<a href="#">Q2AC</a>	<a href="#">QTYW</a>		CRUDE 2004/08 RD 60 °F MPMS MODEL,STO/B	1	0.50	0.10	0.10	0.50
8	<a href="#">Q1AE</a>	<a href="#">Q2AE</a>	<a href="#">Q2AE</a>	<a href="#">QTYW</a>		CRUDE 2004/08 RD 60 °F MPMS MODEL,STO/G	1	0.50	0.10	0.10	0.50
9	<a href="#">Q1IR</a>	<a href="#">Q1IR</a>	<a href="#">Q1IR</a>	<a href="#">QTYW</a>		CRUDE OIL ISO 91:2017 60 °F RD GRS/NET	1	0.50	0.10	0.10	0.50
10	<a href="#">Q2A2</a>	<a href="#">Q2A2</a>	<a href="#">Q2A2</a>	<a href="#">QTYW</a>		PRODUCTS 2004/08 RD 60 °F MPMS, LB/GAL	2	0.50	0.10	0.10	0.50
11	<a href="#">Q2A4</a>	<a href="#">Q2A4</a>	<a href="#">Q2A4</a>	<a href="#">QTYW</a>		PRODUCTS 2004/08 RD 60 °F MPMS,LTO/BBL	2	0.50	0.10	0.10	0.50
12	<a href="#">Q2A6</a>	<a href="#">Q2A6</a>	<a href="#">Q2A6</a>	<a href="#">QTYW</a>		PRODUCTS 2004/08 RD 60 °F MPMS,LTO/GAL	2	0.50	0.10	0.10	0.50
13	<a href="#">Q2A8</a>	<a href="#">Q2A8</a>	<a href="#">Q2A8</a>	<a href="#">QTYW</a>		PRODUCTS 2004/08 RD 60 °F MPMS,MTO/BBL	2	0.50	0.10	0.10	0.50
14	<a href="#">Q2AA</a>	<a href="#">Q2AA</a>	<a href="#">Q2AA</a>	<a href="#">QTYW</a>		PRODUCTS 2004/08 RD 60 °F MPMS,MTO/GAL	2	0.50	0.10	0.10	0.50
15	<a href="#">Q2AC</a>	<a href="#">Q2AC</a>	<a href="#">Q2AC</a>	<a href="#">QTYW</a>		PRODUCTS 2004/08 RD 60 °F MPMS,STO/BBL	2	0.50	0.10	0.10	0.50



To simplify implementations for our certified consultant base, new ISO 91:2017 template conversion groups (Q\*I\*) are delivered (including ASTM D1250-19 support of unrounded volume correction factors) with BCS 30B-01 and BCS 30A-02.  
 Example: Q1IR and Q2IR.

Display all ISO 91:2017-compliant Template Conversion Groups **for Crude Oil, Petroleum Products, Lubricating Oils and Special Applications - Absolute Density at 15 °C:**



The screenshot shows the SAP Measurement Cockpit interface for displaying conversion groups. The window title is "SAP Measurement Cockpit: Display Conversion Groups - Measurement Standards". The interface includes a menu bar with "Program", "Edit", "Goto", "System", and "Help". Below the menu bar, there are navigation icons and a "Cancel" button. The main content area is titled "Display conversion groups by measurement standards" and contains four selection fields:

- Select CT(P)L / VCF temperature correction standard:** Set to "ASTM D1250-04 (API MPMS Chapter 11.1) - Crude Oil & Products".
- Select mass to weight conversion standard:** Set to "ASTM D1250-08 (API MPMS Chapter 11.5.3, Dens. - kg/m<sup>3</sup> 15 °C)".
- Select quantity conversion model standard:** Set to "Not Specified".
- Select UoM conversion factor standard:** Set to "Not specified".

Below these fields is the "Additional search restrictions" section, which includes a field for "Display conversion groups with product type:".

Measurement Cockpit: Display Conversion Groups - Measurement Standards

### Display Conversion Groups by Measurement Standards

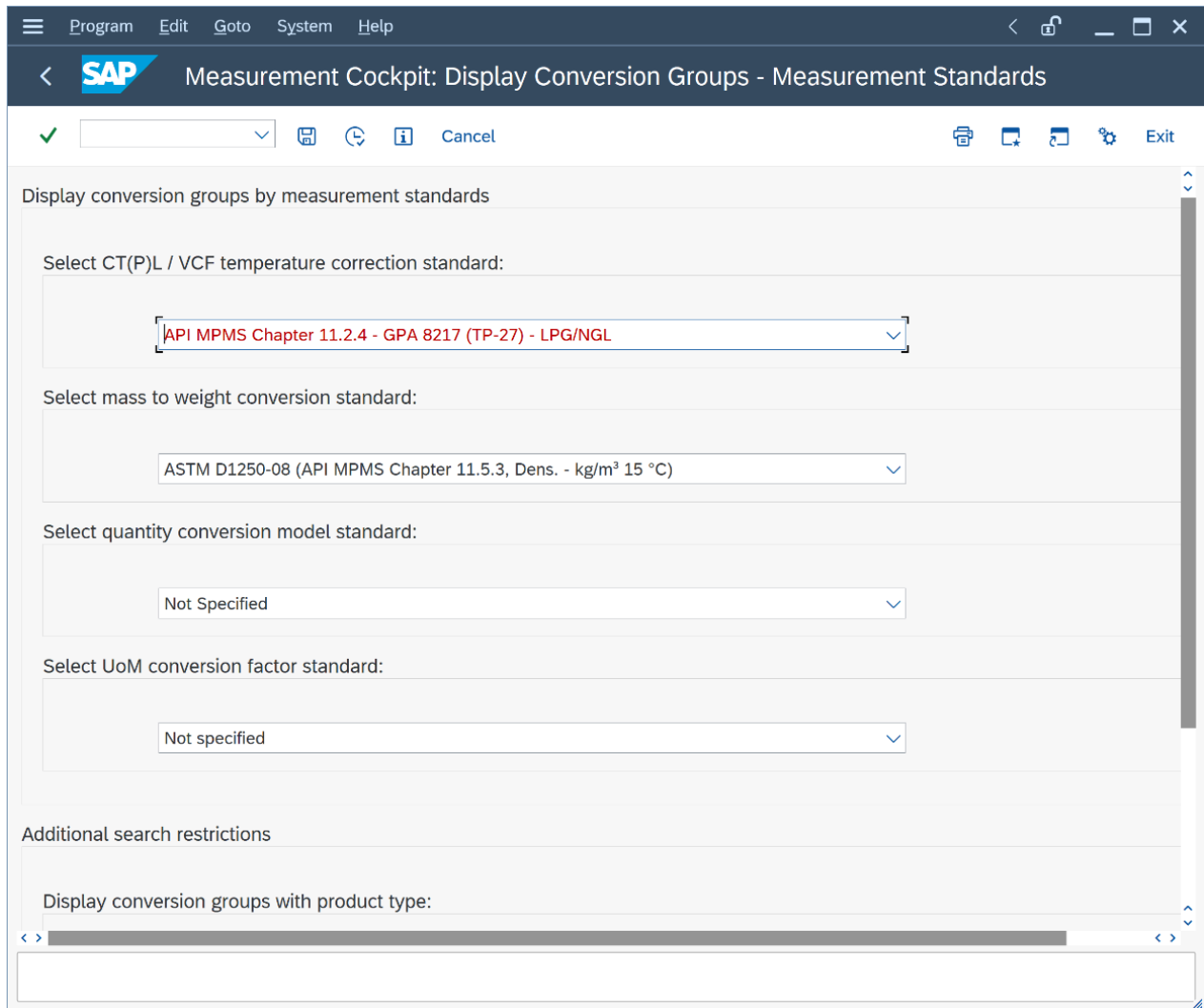
CTPL measurement standard:  
 ASTM D1250-04 (API MPMS Chapter 11.1) - Crude Oil & Products  
 Weight & mass conversion standard:  
 ASTM D1250-08 (API MPMS Chapter 11.5.3, Dens. - kg/m<sup>3</sup> 15 °C)  
 Quantity conversion model standard:  
 Not specified  
 Unit of measure intraconversion standard:  
 Not specified

No	C.Grp	Rdg. group	Ranges	QCI	Set ID	Description	P.t.	Qty.EL %	Qty.WL %	Qty.WH %	Qty.EH %
1	Q154	Q130	Q130	QTYW		CRUDE OIL 04/08 SW/MCF/PRES 15 °C G/NET	1	0.50	0.10	0.10	0.50
2	Q155	Q130	Q130	QTYW		CRUDE OIL 04/08 SW/MCF/PRES 20 °C G/NET	1	0.50	0.10	0.10	0.50
3	Q160	Q160	Q160	QTYW		CRUDE 04/08 CORIOLIS M./SW 15 °C GRS/NET	1	0.50	0.10	0.10	0.50
4	Q1A0	Q2A0	Q2A0	QTYW		CRUDE 2004/08 DENSITY 15 °C MPMS MODEL	1	0.50	0.10	0.10	0.50
5	Q1AF	Q2A0	Q2A0	QTYW		CRUDE 2004/08 DENSITY 15 °C MPMS LB/GAL	1	0.50	0.10	0.10	0.50
6	Q1I2	Q1I2	Q1I2	QTYW		CRUDE OIL ISO 91:2017 20 °C GROSS/NET	1	0.50	0.10	0.10	0.50
7	Q1ID	Q1ID	Q1ID	QTYW		CRUDE OIL ISO 91:2017 15 °C GROSS/NET	1	0.50	0.10	0.10	0.50
8	Q2A0	Q2A0	Q2A0	QTYW		PRODUCTS 2004/08 DENSITY 15 °C MPMS	2	0.50	0.10	0.10	0.50
9	Q2AF	Q2A0	Q2A0	QTYW		PRODUCTS 2004/08 DENSITY 15 °C MPMS LB/G	2	0.50	0.10	0.10	0.50
10	Q2I2	Q2I2	Q2I2	QTYW		PRODUCTS ISO 91:2017 DENSITY 20 °C	2	0.50	0.10	0.10	0.50
11	Q2ID	Q2ID	Q2ID	QTYW		PRODUCTS ISO 91:2017 DENSITY 15 °C	2	0.50	0.10	0.10	0.50
12	Q3A0	Q3A0	Q3A0	QTYW		SPEC. APP. 2004/08 D 15 °C, KG/M <sup>3</sup>	3	0.50	0.10	0.10	0.50
13	Q3AF	Q3A0	Q3A0	QTYW		SPEC. APP. 2004/08 D 15 °C, LB/UGL	3	0.50	0.10	0.10	0.50
14	Q3DM	Q3DM	Q3DM	QTYW		API MPMS 11.3.3 DEN. 99+% F. ALC. 15 °C	3	0.50	0.10	0.10	0.50



To simplify implementations for our certified consultant base, new ISO 91:2017 template conversion groups (Q\*I\*) are delivered (including ASTM D1250-19 support of unrounded volume correction factors) with BCS 30B-01 and BCS 30A-02. Example: Q2I2 and Q2ID.

Display all ISO 91:2017-compliant Template Conversion Groups for **LPG/NGL- Absolute Density at 15 °C**:



The screenshot shows the SAP Measurement Cockpit interface for displaying conversion groups. The window title is "Measurement Cockpit: Display Conversion Groups - Measurement Standards". The interface includes a menu bar with "Program", "Edit", "Goto", "System", and "Help". Below the menu bar, there is a toolbar with a checkmark, a dropdown menu, a refresh icon, an information icon, a "Cancel" button, a print icon, a copy icon, a paste icon, a settings icon, and an "Exit" button.

The main content area is titled "Display conversion groups by measurement standards". It contains four selection fields:

- Select CT(P)L / VCF temperature correction standard:** A dropdown menu with the selected option "API MPMS Chapter 11.2.4 - GPA 8217 (TP-27) - LPG/NGL".
- Select mass to weight conversion standard:** A dropdown menu with the selected option "ASTM D1250-08 (API MPMS Chapter 11.5.3, Dens. - kg/m<sup>3</sup> 15 °C)".
- Select quantity conversion model standard:** A dropdown menu with the selected option "Not Specified".
- Select UoM conversion factor standard:** A dropdown menu with the selected option "Not specified".

Below these fields is a section titled "Additional search restrictions". It contains a label "Display conversion groups with product type:" followed by a horizontal scrollbar and a text input field.

List Edit Goto Settings System Help

SAP Measurement Cockpit: Display Conversion Groups - Measurement Standards

Display Conversion Groups by Measurement Standards

CTPL measurement standard:  
 API MPMS Chapter 11.2.4 - GPA 8217 (TP-27) - LPG/NGL  
 Weight & mass conversion standard:  
 ASTM D1250-08 (API MPMS Chapter 11.5.3, Dens. - kg/m<sup>3</sup> 15 °C)  
 Quantity conversion model standard:  
 Not specified  
 Unit of measure intraconversion standard:  
 Not specified  
 Product type:  
 Not specified

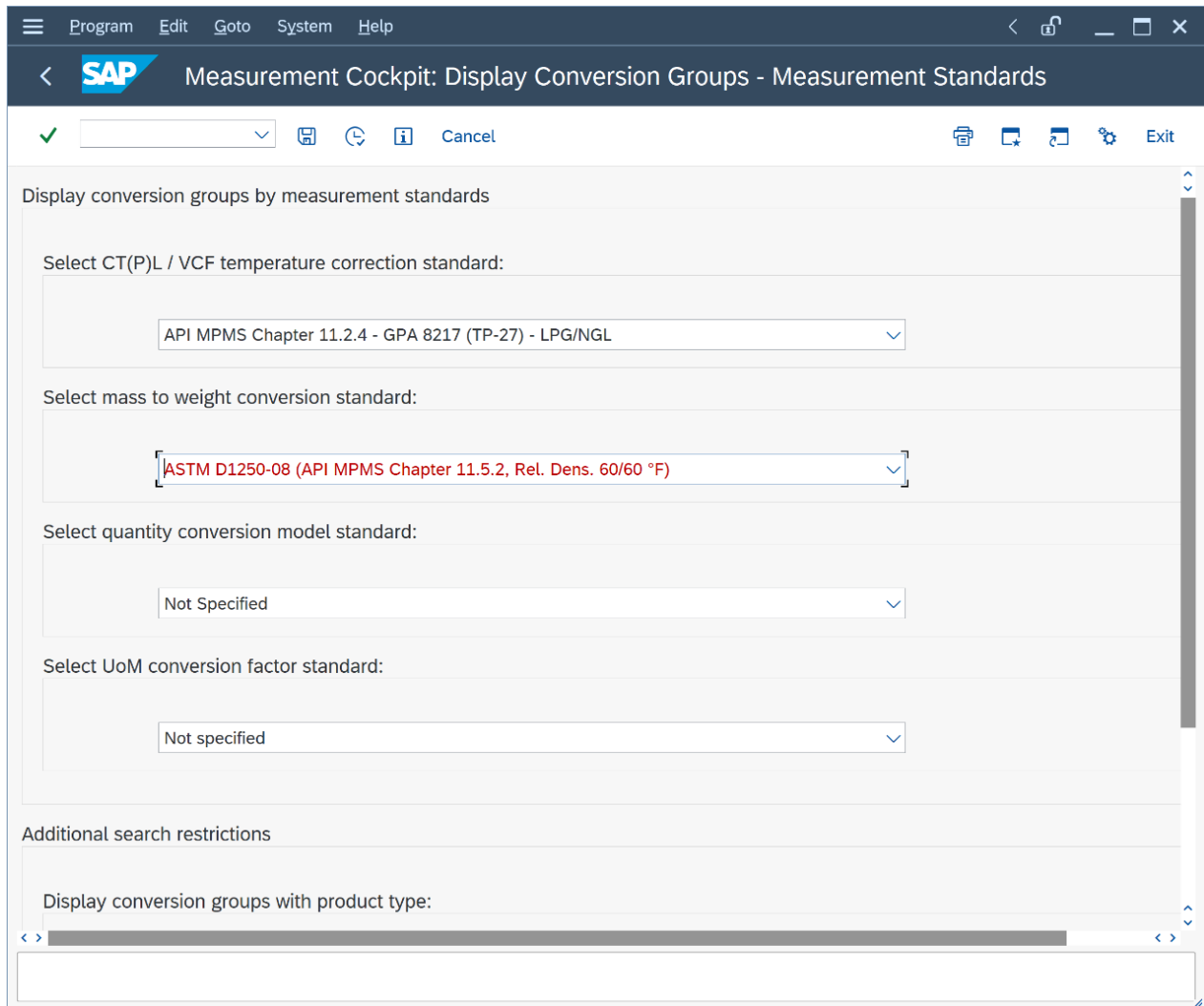
No	C.Grp	Rdg. group	Ranges	QCI	Set ID	Description	P.t.	Qty.EL %	Qty.WL %	Qty.WH %	Qty.EH %
1	Q7A1	Q7A1	Q7A1	QTYW		LPG 2008 8217 DENSITY 15 °C	8	0.50	0.10	0.10	0.50
2	Q7A3	Q7A3	Q7A3	QTYW		LPG 2008 8217 DENSITY 20 °C	8	0.50	0.10	0.10	0.50
3	Q7I2	Q7I2	Q7I2	QTYW		LPG ISO 91:2017 DENSITY 20 °C	8	0.50	0.10	0.10	0.50
4	Q7ID	Q7ID	Q7ID	QTYW		LPG ISO 91:2017 DENSITY 15 °C	8	0.50	0.10	0.10	0.50



To simplify implementations for our certified consultant base, new ISO 91:2017 template conversion groups (Q\*I\*) are delivered (including ASTM D1250-19 support of unrounded volume correction factors) with BCS 30B-01 and BCS 30A-02.  
 Example: Q7I2 and Q7ID.



Display all ISO 91:2017-compliant Template Conversion Groups for LPG/NGL- Relative Density 60/60 °F:



The screenshot shows the SAP Measurement Cockpit interface for displaying conversion groups. The window title is "Measurement Cockpit: Display Conversion Groups - Measurement Standards". The interface includes a menu bar with "Program", "Edit", "Goto", "System", and "Help". Below the menu bar is a toolbar with a search icon, a refresh icon, an information icon, and a "Cancel" button. The main content area is titled "Display conversion groups by measurement standards" and contains four selection fields:

- Select CT(P)L / VCF temperature correction standard:** API MPMS Chapter 11.2.4 - GPA 8217 (TP-27) - LPG/NGL
- Select mass to weight conversion standard:** ASTM D1250-08 (API MPMS Chapter 11.5.2, Rel. Dens. 60/60 °F)
- Select quantity conversion model standard:** Not Specified
- Select UoM conversion factor standard:** Not specified

Below these fields is a section for "Additional search restrictions" with a label "Display conversion groups with product type:" and a search input field.

List Edit Goto Settings System Help
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SAP Measurement Cockpit: Display Conversion Groups - Measurement Standards

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### Display Conversion Groups by Measurement Standards

CTPL measurement standard:  
 API MPMS Chapter 11.2.4 - GPA 8217 (TP-27) - LPG/NGL  
 Weight & mass conversion standard:  
 ASTM D1250-08 (API MPMS Chapter 11.5.2, Rel. Dens. 60/60 °F)  
 Quantity conversion model standard:  
 Not specified  
 Unit of measure intraconversion standard:  
 Not specified

No	C.Grp	Rdg. group	Ranges	QCI	Set ID	Description	P.t.	Qty.EL %	Qty.WL %	Qty.WH %	Qty.EH %
1	Q7A4	Q7A4	Q7A4	QTYW		LPG 2008 8217 RD 60 °F, LB/GAL	8	0.50	0.10	0.10	0.50
2	Q7A5	Q7A5	Q7A5	QTYW		LPG 2008 8217 RD 60 °F,LTO/BBL	8	0.50	0.10	0.10	0.50
3	Q7A6	Q7A6	Q7A6	QTYW		LPG 2008 8217 RD 60 °F,LTO/GAL	8	0.50	0.10	0.10	0.50
4	Q7A7	Q7A7	Q7A7	QTYW		LPG 2008 8217 RD 60 °F,MTO/BBL	8	0.50	0.10	0.10	0.50
5	Q7A8	Q7A8	Q7A8	QTYW		LPG 2008 8217 RD 60 °F,MTO/GAL	8	0.50	0.10	0.10	0.50
6	Q7A9	Q7A9	Q7A9	QTYW		LPG 2008 8217 RD 60 °F,STO/BBL	8	0.50	0.10	0.10	0.50
7	Q7AA	Q7AA	Q7AA	QTYW		LPG 2008 8217 RD 60 °F,STO/GAL	8	0.50	0.10	0.10	0.50
8	Q7IR	Q7IR	Q7IR	QTYW		LPG ISO 91:2017 RD 60 °F, LB/GAL	8	0.50	0.10	0.10	0.50



To simplify implementations for our certified consultant base, new ISO 91:2017 template conversion groups (Q\*I\*) are delivered (including ASTM D1250-19 support of unrounded volume correction factors) with BCS 30B-01 and BCS 30A-02.  
 Example: Q7IR.



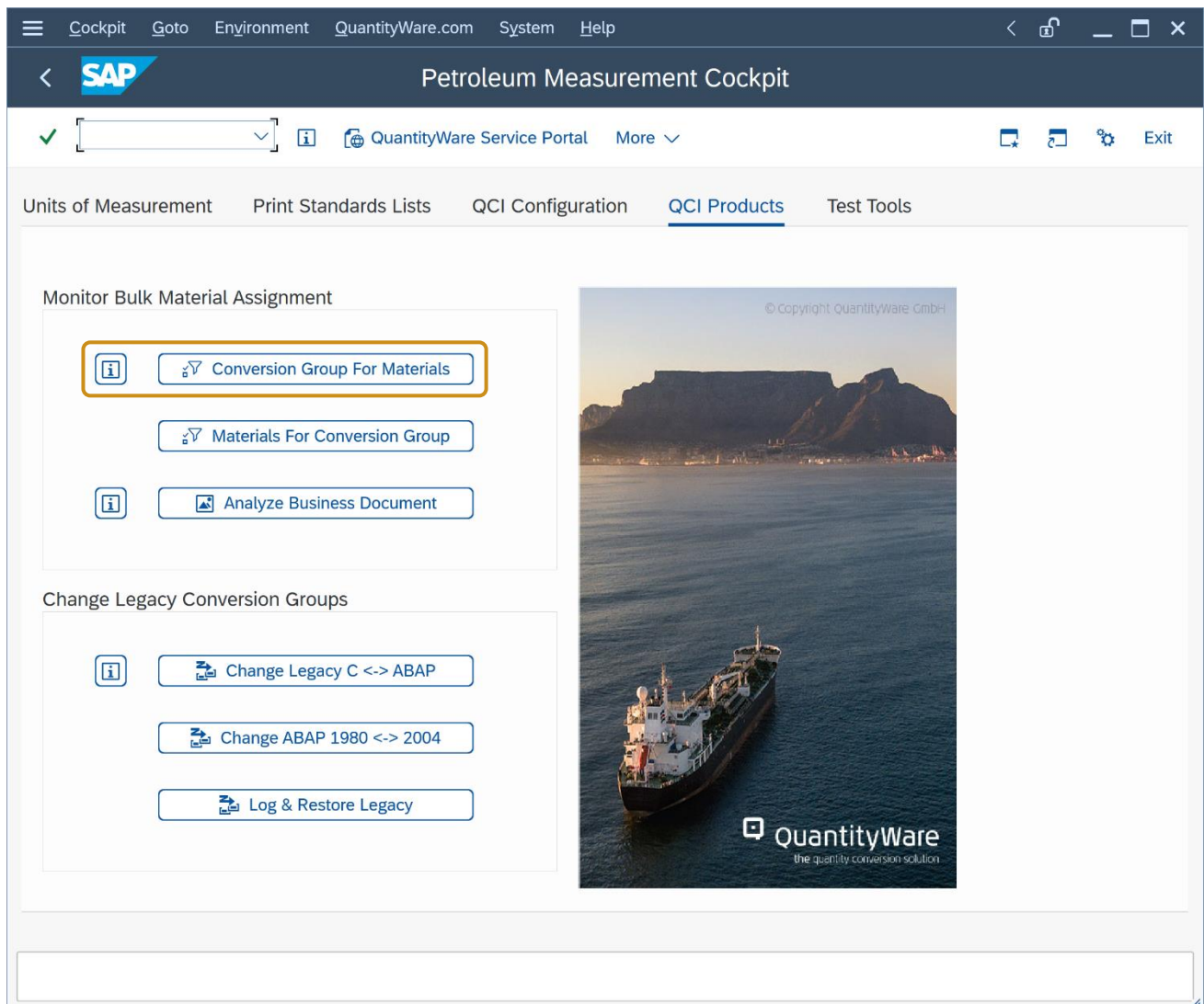
To determine ISO 91-1:1992 and ISO 91-2:1991 compliance, enter the respective API MPMS versions for the template conversion group selection, referenced in these two versions.

Pressure corrections may be activated in an MQCI conversion group (either for ISO-91:2017 or ISO 91-1:1992 and ISO 91-2:1991) which automatically activates the required API MPMS versions.

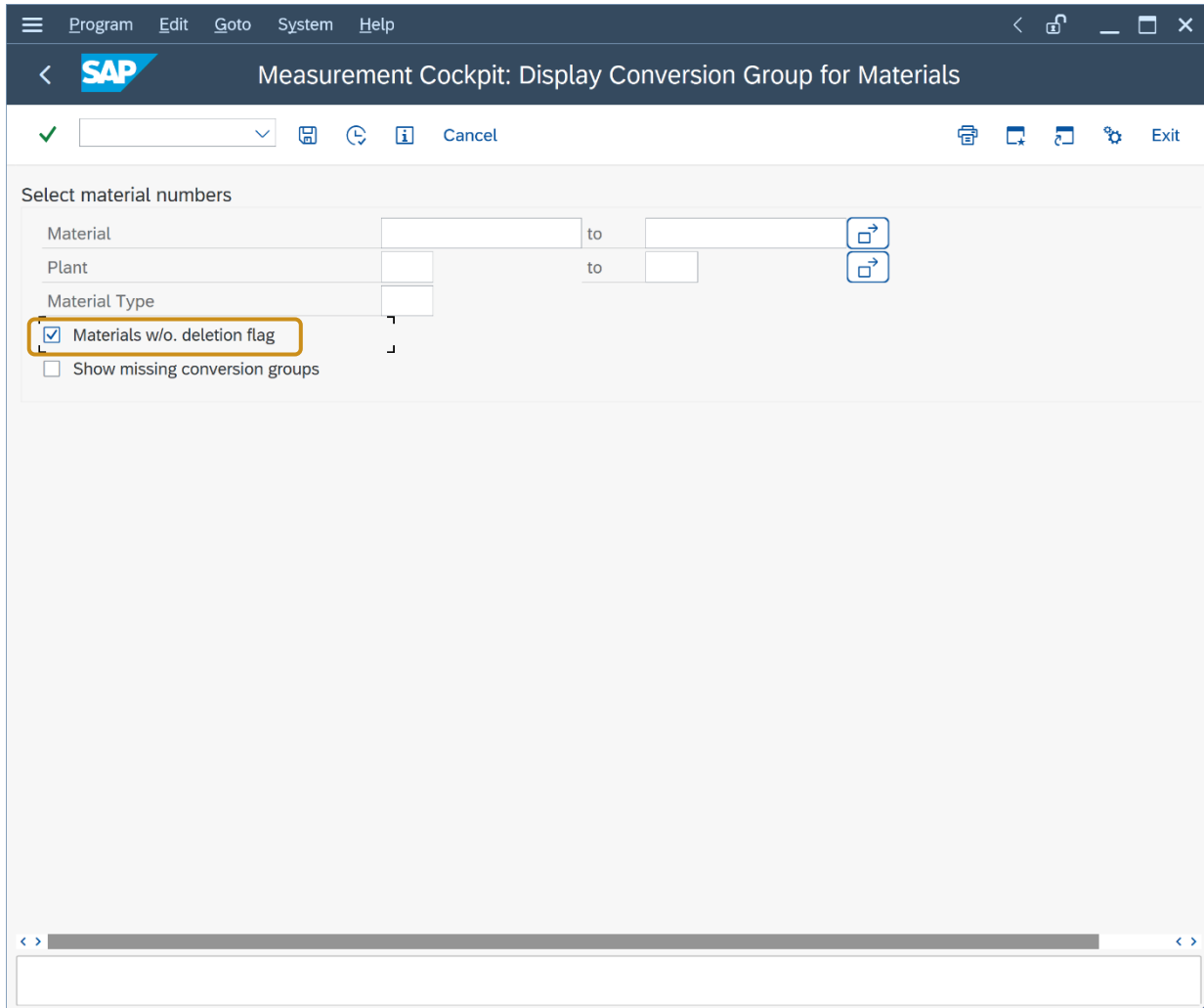
ISO 91:2017 also specifies replacement of ASTM Table 1 (ASTM D1250-80 Volume XI) with API MPMS Chapter 11.5.1/2/3 (Annex D conversion factors). All conversion groups displayed in this document are already set to utilize the relevant ASTM Table 1 UoM conversions or may be set to do so with one configuration click.

## 4. Chapter 2: ISO 91:2017 Production Conversion Group Compliance

To determine whether your production conversion groups are ISO 91:2017-compliant, launch the Petroleum Measurement Cockpit in your production system and select the "QCI Products" tab strip:



Select the "Conversion Group For Materials" push button:



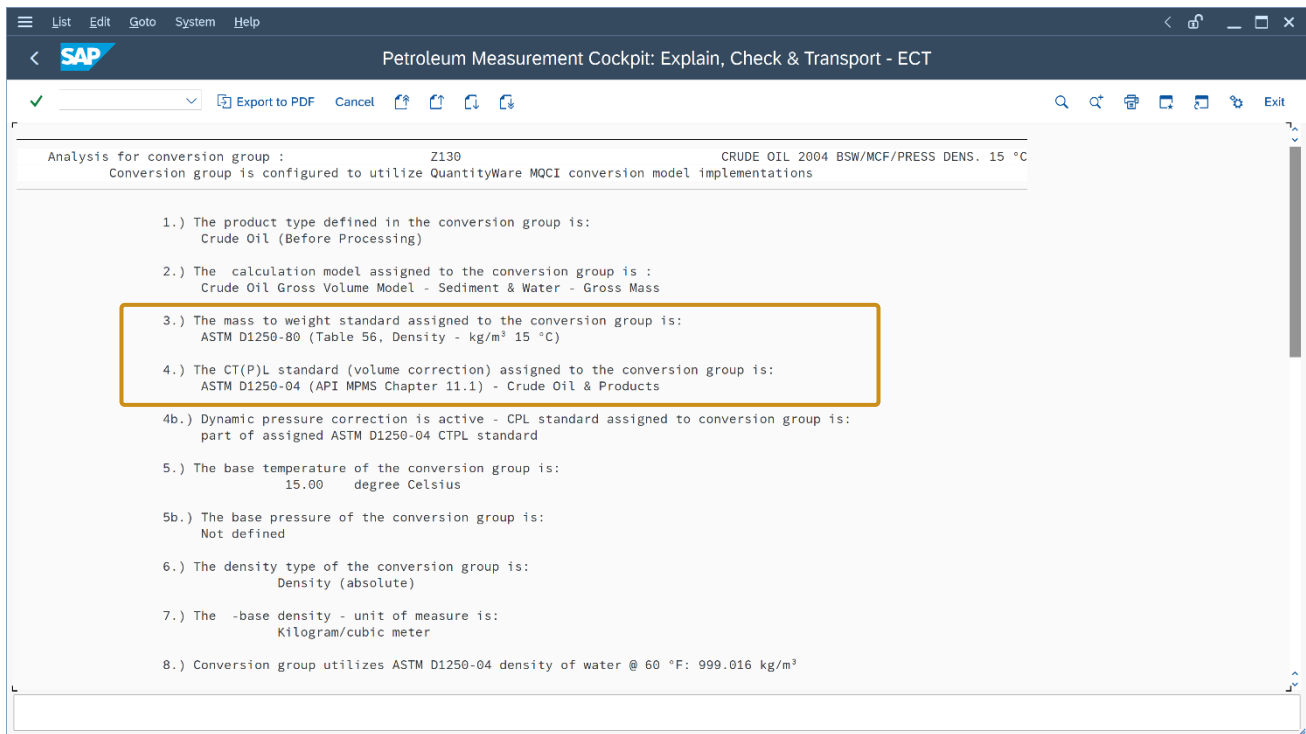
and enter a range of your production relevant material and plant values, then select "Execute" to display the comprehensive list:

Measurement Cockpit: Display Conversion Group for Materials

Matnr. fr.: ASPHALT A500 Matnr. to: PROPANE\_BUTANE  
 Plant fr.: AP01 Plant to: GP01  
 Material type:  
 Material w./o. deletion flag:  
 Display missing conversion groups:

No	Material	Material Description	Plant	Plant name	BU	UoMG	C	Grp	Conv. stat.	Description of conversion group	No.S.	Run scen.	Log status	Analyze logs	No. ...	An. s
1	ETHANOL	Ethanol	GP01	Plant GP01	L15	BCP	Z0A1		▾	BULK CHEMICALS - LINEAR DCF - DAIR 15 °C	10	□	○○■	🔍	10	□
2	CRUDE IMPORT	Crude import	GP01	Plant GP01	L15	BCC	Z130		○○■	CRUDE OIL 2004 BSW/MCF/PRESS DENS. 1..	10	□	○○■	🔍	10	□
3	DIESEL B10	Diesel 10% BIO	GP01	Plant GP01	L15	BCP	Z210		▾	PRODUCTS 2004 WEIGHT DENSITY 15 °C	10	□	○○■	🔍	10	□
4	DIESEL LOW SULF.	Diesel Low sulfur	GP01	Plant GP01	L15	BCP	Z210		▾	PRODUCTS 2004 WEIGHT DENSITY 15 °C	10	□	○○■	🔍	10	□
5	DIESEL MAX	Diesel maximum power	GP01	Plant GP01	L15	BCP	Z210		▾	PRODUCTS 2004 WEIGHT DENSITY 15 °C	10	□	○○■	🔍	10	□
6	FUEL OIL 2%	Fuel Oil 2%	GP01	Plant GP01	L15	BCP	Z210		▾	PRODUCTS 2004 WEIGHT DENSITY 15 °C	10	□	○○■	🔍	10	□
7	FUEL OIL <1%	Fuel Oil <1%	GP01	Plant GP01	L15	BCP	Z210		▾	PRODUCTS 2004 WEIGHT DENSITY 15 °C	10	□	○○■	🔍	10	□
8	FUEL OIL > 3%	Fuel Oil > 3%	GP01	Plant GP01	L15	BCP	Z210		▾	PRODUCTS 2004 WEIGHT DENSITY 15 °C	10	□	○○■	🔍	10	□
9	FUEL OIL >5%	Fuel Oil >5%	GP01	Plant GP01	L15	BCP	Z210		▾	PRODUCTS 2004 WEIGHT DENSITY 15 °C	10	□	○○■	🔍	10	□
10	GASOLINE 95	Gasoline 95	GP01	Plant GP01	L15	BCP	Z210		▾	PRODUCTS 2004 WEIGHT DENSITY 15 °C	10	□	○○■	🔍	10	□
11	GASOLINE 98	Gasoline 98	GP01	Plant GP01	L15	BCP	Z210		▾	PRODUCTS 2004 WEIGHT DENSITY 15 °C	10	□	○○■	🔍	10	□
12	GASOLINE E10	Gasoline 10% ethanol	GP01	Plant GP01	L15	BCP	Z210		▾	PRODUCTS 2004 WEIGHT DENSITY 15 °C	10	□	○○■	🔍	10	□
13	GASOLINE E5	Gasoline 5% ethanol	GP01	Plant GP01	L15	BCP	Z210		▾	PRODUCTS 2004 WEIGHT DENSITY 15 °C	10	□	○○■	🔍	10	□
14	GASOLINE MAX	Gasoline maximum power	GP01	Plant GP01	L15	BCP	Z210		▾	PRODUCTS 2004 WEIGHT DENSITY 15 °C	10	□	○○■	🔍	10	□

Double-click on the "Description of conversion group" line for any material, so that the conversion group analysis documentation is displayed for the conversion group which is assigned to the material and plant (Note: The conversion group analysis documentation can also be downloaded from your SAP system as a PDF document):



Check that under 3.), for NGL/LPG, the mass to weight standard is API MPMS Chapter 11.5.2 or API MPMS Chapter 11.5.3 and under 4.) the CT(P)L standard is API MPMS Chapter 11.2.4. (Not the case in the example screen shot above)

For crude oil and all other products, check that under 3.) the mass to weight standard is API MPMS Chapter 11.5.1 or API MPMS Chapter 11.5.2 or API MPMS Chapter 11.5.3 and under 4.) the CT(P)L standard is API MPMS Chapter 11.1 - 2004.



If this is the case, your Z\* conversion group is compliant with ISO 91:2017. Note that ASTM Table 1 conversions should also be activated (2008 version)

## 5. BCP Compliance Summary

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In this consulting paper, the transparency capacity of the Petroleum Measurement Cockpit (PMC) is demonstrated again in detail. Via the Petroleum Measurement Cockpit, you can easily determine whether your BCP conversion groups are compliant with ISO 91:2017 or ISO 91-1:1992 and ISO 91-2:1991, with a few clicks.

For ISO 91:2017 or ISO 91-1:1992 and ISO 91-2:1991, BCP contains fully compliant template conversion groups for all relevant products and base conditions or allows easy re-configuration to reach compliance.

The decision as to which of the standard versions your conversion groups should comply is made during an implementation or renovation project. Such decisions require clear communication between all relevant business partners.



**IMPORTANT:** Compliant conversion groups are always **QuantityWare MQCI conversion groups**, as in all ISO versions noted above, the Density/Weight/Volume Intraconversion - **based on the relevant API MPMS Chapter** - needs to be considered.

All SAP QCI conversion groups implement the hard-coded DIN 51757 weight calculations (based on an "air buoyancy factor" of - typically - 1.1 kg/m<sup>3</sup>). Thus, only via customer projects - that implement, validate and maintain specific SAP QCI BAdI realizations - can compliance with the API MPMS Density/Weight/Volume Intraconversion standards - and thus with ISO 91:2017 - be attempted.



## Legal Notices

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