



QuantityWare Consulting Paper

Comparison of two ASTM D1250-80

implementations: SAP ABAP & C

Documentation of comparison results: BCP ASTM D1250-80 implementation

Version History

Version	Date	Description
00	2009-09-20	Initial Version
01	2017-08-02	Editorially revised and confirmed
02	2020-07-17	Editorial revision
03	2021-06-22	Modern QW document style applied
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1. Introduction

More and more QuantityWare BCP (Bulk Calculations – Petroleum) customers are replacing their legacy API c-code (1980) implementations with the corresponding BCP implementation of ASTM D1250-80. This is typically done as a first step (driven by national legal requirements to stay for some more time with the 1980 version while leveraging the various massive benefits delivered with BCP) before moving to the most current ASTM D1250 version at some later point in time.

In this validation report we now publicly provide the detailed comparison results of all comparison measurements which QuantityWare has performed for the first time in 2007 during the implementation and quality assurance phase of the ASTM D1250-80 standard.

Before publication of this report, we repeated all calculations in September 2009 to provide most current data.

A fully automated installation test which is executed weekly in our internal systems and after technical BCS installation at customer sites secures this validation and compliance measure.

2. Comparison Methodology

QuantityWare purchased a license for the API C-code implementations from the American Petroleum Institute (API) in 2007.

At present, to our knowledge, the 1980 version is not available anymore for purchasing.

For this comparison, we compiled and linked the 1980 version to the SAP Quantity Conversion Interface (QCI) and performed more than 60 million single calculations for both the API c-code implementation and our QuantityWare BCP implementation.

The comparison has been automated via a QuantityWare internal SAP ABAP report. The report calculates volume correction factors or base densities (depending on the ASTM D1250-80 table that requires comparison) via the QuantityWare BCP implementation and via the API C-code implementation for a wide range of density and temperature values, with user defined increments. If differences are detected, they are marked and can be printed out and analyzed after the report has completed a comparison run.

A comparison run is made for each ASTM D1250-80 table (5, 6, 23, 24, 53, 54, 59 and 60) for all four product types.

3. Comparison Results

In table 1 we summarize the results for all comparison runs. The table lists the specific ASTM D1250-80 table, the density and temperature range and increments, and shows the number of calculations performed for each run.



For all 62 326 690 single calculations, the results of the BCP ABAP based implementation and the API c-code implementation were identical.

Table	Density			Temperature			Calculations
	From	To	Increment	From	To	Increment	
5A	0	100	0.1	0	300	0.1	3 004 001
5B	0	85	0.1	0	300	0.1	2 553 851
5D	-10	45	0.1	0	300	0.1	1 653 551
6A	0	100	0.1	0	300	0.1	3 004 001
6B	0	85	0.1	0	300	0.1	2 553 851
6D	-10	45	0.1	0	300	0.1	1 653 551
23A	0.611	1.076	0.0005	0	300	0.1	2 793 931
23B	0.6535	1.076	0.0005	0	300	0.1	2 538 846
23D	0.8	1.164	0.0005	0	300	0.1	2 187 729
24A	0.611	1.076	0.0005	0	300	0.1	2 793 931
24B	0.6535	1.076	0.0005	0	300	0.1	2 538 846
24D	0.8	1.164	0.0005	0	300	0.1	2 187 729

53A	610.5	1075	0.5	-18.00	150	0.1	1 563 330
53B	653	1075	0.5	-18.00	150	0.1	1 420 445
53D	800	1164	0.5	-20.00	150	0.1	1 240 029
54A	610.5	1075	0.5	-18.00	150	0.1	1 563 330
54B	653	1075	0.5	-18.00	150	0.1	1 420 445
54D	800	1164	0.5	-20.00	150	0.1	1 240 029
59A	610,5	1075	0.5	-18.00	150	0.1	1 563 330
59B	653	1075	0.5	-18.00	150	0.1	1 420 445
59D	800	1164	0.5	-20.00	150	0.1	1 240 029
60A	610,5	1075	0.5	-18.00	150	0.1	1 563 330
60B	653	1075	0.5	-18.00	150	0.1	1 420 445
60D	800	1164	0.5	-20.00	150	0.1	1 240 029
Table	Density			Temperature			Calculations
	From	To	Increment	From	To	Increment	
6C	0.00027	0.00093	0.0000005	0	300	0.1	3 964 321
24C	0.00027	0.00093	0.0000005	0	300	0.1	3 964 321
54C	0.000486	0.001674	0.0000005	-18.00	150	0.1	3 995 737
60C	0.000486	0.001674	0.0000005	-20.00	150	0.1	4 043 277
				Number of all calls:			62 326 690

Table 1: Summarized comparison data for all ASTM D1250-80 petroleum measurement tables

The temperature units of measure are °C and °F, the density units are °API, rel. density and absolute density (kg/m³) for the corresponding tables.

Table 2 provides an overview on the runtimes of these comparison runs:

Column Title	Runtime in seconds		Runtime ratio
	QW ABAP:	API C-code:	API C-code/ABAP
5A	2 139	42 050	19.7
5B	2 010	36 991	18.4
5D	982	24 817	25.3
6A	777	42 170	54.3
6B	669	37 101	55.5
6C	762	60 224	79.0
6D	413	25 073	60.7
23A	1 987	41 090	20.7
23B	1 992	38 223	19.2
23D	1 340	33 134	24.7
24A	744	40 821	54.9
24B	682	37 966	55.7
24C	727	60 346	83.0
24D	563	33 261	59.1
53A	1 068	23 209	21.7
53B	1 074	21 554	20.1
53D	722	18 846	26.1

54A	387	22 899	59.2
54B	357	21 269	59.6
54C	783	60 729	77.6
54D	296	18 822	63.6
59A	1 992	23 001	11.5
59B	1 821	21 406	11.8
59D	1 246	18 642	15.0
60A	1 232	22 796	18.5
60B	1 104	21 211	19.2
60C	918	46 110	50.2
60D	882	18 761	21.3
Summary	29 669	912 522	30,8

Table 2: Runtime of comparison calculations in seconds

The total runtime for the ABAP calculations in seconds converts to approx. 8 ½ hours, for the API c-codes the total runtime converts to approx. 253 ½ hours. Three runs were executed in parallel in background mode, so that the total elapsed time for this comparison study took about 3 days.

BCP customers can print the detailed results for the ABAP implementations using the Petroleum Measurement Cockpit.

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