Note: 000100

Overview

Number	**000100**
Description	**Advanced Development - High Pressure Hydrogen Quantity Conversions**
Version	**01 from 13.07.2022**
Status	**Released to Customer**
Language	**EN**
Responsible	**Markus Seng**
Product	**BCG**
Category	**Advanced Development**

Symptom

Increasing industry demand for hydrogen quantity conversions.

Cause

Climate change.

Solution

With this note, the Advanced Development (AD) - Development Phase HPH 1 – High pressure hydrogen gas calculations – volumes and masses - as defined in the QuantityWare Development Strategy - Hydrogen Quantity Conversions, is delivered.

Four new template hydrogen conversion groups may be configured - with this AD in place - by certified BCS consultants. Details concerning the configuration and implementation are provided in the working paper "High Pressure Hydrogen Quantity Conversions".

With the next BCS 3.0 CSP, the complete configuration will be included into the BCG 3.0 BC set:

Display Template Conversion Groups for Product Group:

QT
Hydrogen

No	C.Grp	Rdg. group	Ranges	QCI	Set ID	Description	P.t.	Qty.EL %	Qty.WL %	Qty WH %	Qty.EH %
1	QTH0	QTH0	QTH0	QTYW	QX	HYDROGEN HIGH PRESA 15 °C / 101.325 KPA	B	0.50	0.10	0.10	0.50
2	QTH1	QTH0	QTH0	QTYW	QX	HYDROGEN HIGH PRESG 15 °C / 101.325 KPA	B	0.50	0.10	0.10	0.50
3	QTH2	QTH2	QTH2	QTYW	QY	HYDROGEN HIGH PRESA 60 °F / 14.696 PSI	B	0.50	0.10	0.10	0.50
4	QTH3	QTH2	QTH2	QTYW	QY	HYDROGEN HIGH PRESG 60 °F / 14.696 PSI	B	0.50	0.10	0.10	0.50

Oil & Gas Test Calculator Examples:

QCI : Calculator for additional quantities

Calculation parameters

Conv. Group	QTH0	HYDROGEN HIGH PRESA 15 °C / 101.325 KPA
UoM Group	QHY	QUANTITYWARE HYDROGEN - MASS & VOLUME

Date: 04.04.2022 16:04:05

Input Qty

Transactn. qty.	100000	M3

Add.parameters for chemicals

Base density	
Therm. expan. coeff.	

Result

Parameter	C...	Value	U...	Addl.qty	U...	M...
Flowing pressure		110.200000	BAR	10632281.601	CM0	
Flowing temperature		-12.50	CEL	11215956.950	CM5	
Molar mass		0.00201590	KGM	940.560	LTO	
Density @ base		0.0852	KGV	100000.000	M3	
Molar density (mol/L) @ base		0.042267		388165.291	MC1	
density @ flowing		9.5565	KGV	395934.312	MC2	

QuantityWare

QCI : Calculator for additional quantities

← SAP | QCI : Calculator for additional quantities

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Calculation parameters

Conv. Group	QTH0	HYDROGEN HIGH PRESA 15 °C / 101.325 KPA
UoM Group	QHY	QUANTITYWARE HYDROGEN - MASS & VOLUME

Date	04.04.2022	16:04:05

Input Qty

Transactn. qty.	100000	M3

Add.parameters for chemicals

Base density	
Therm. expan. coeff.	

Result

Parameter	C...	Value	U...	Addl.qty	U...	M...
density @ flowing		9.5565	KGV	388165.291	MC1	☐
Molar density (mol/L) @flowing		4.740624		395934.312	MC2	☐
Compression @ base		1.000608		3531.466	MCF	☐
Compression @ flowing		1.072639		396849770	SCF	☐
Compr. fac. flowing to base		0.932847		955.653	TO	☐
Press. fac. flowing to base		108.758944				

QCI : Calculator for additional quantities

Calculation parameters

Conv. Group	QTH0	HYDROGEN HIGH PRESA 15 °C / 101.325 KPA
UoM Group	QHY	QUANTITYWARE HYDROGEN - MASS & VOLUME

Date	04.04.2022 16:04:05

Input Qty

Transactn. qty.	100000 M3

Add.parameters for chemicals

Base density	
Therm. expan. coeff.	

Result

Parameter	C...	Value	U...	Addl.qty	U...	M...
Compr. fac. flowing to base		0.932847		388165.291	MC1	☐
Press. fac. flowing to base		108.758944		395934.312	MC2	☐
Temp.fac. flowing to base		1.105505		3531.466	MCF	☐
Heating value, superior		12.1020	MJM	396849770	SCF	☐
Heating value, inferior		10.2230	MJM	955.653	TO	☐

a. Calculation of molar densities and compression factors is achieved via a new NIST ABAP function, defined in J. Res. Natl. Inst. Stand. Technol. 113, 341-350 (2008) - Revised Standardized Equation for Hydrogen Gas Densities for Fuel Consumption Applications.
b. Masses and volumes may be calculated & converted; volume UoM need to be either at observed conditions (no temperature and no pressure value assigned to the UoM) or at defined standard reference conditions (temperature and pressure value assigned to UoM).
c. Typically, the volume at flowing conditions is the transaction quantity. However, any UoM of SAP Dimension ID MASS or VOLUME may be used as transaction UoM (symmetric model implementation), if the requirement described in (b) for volume UoM is considered.
d. The molar mass and the heating values are read from the assigned physical property data set. The density value is calculated from the molar density value.

Transport Reference

SAP Release	Transport	File Name	Notes
ECC600	QOIK900370	NOTE-00100-30x.SAR	
S/4 HANA	QOIK900370	NOTE-00100-30x.SAR	

Validity

SAP Release	From SP	To SP	In SP Shipment
ECC600	BCS 3.0 CSP02	BCS 3.0 CSP03	BCS 3.0 CSP03
S/4 HANA	BCS 3.0 CSP01	BCS 3.0 CSP02	BCS 3.0 CSP02