



Performance Qualification

• Step Accuracy: STD C-D Gradient_3

• Instruments and Fluidics

Instrument Name	Model	Supplier's Name	Serial Number
Pump	LPG-3400A	Thermo Scientific	8002568
UV Detector	DAD-3000RS	Thermo Scientific	8043573
Chromeleon Datasystem	V. 6.80 SR16 Build 5387	Thermo Scientific	40640

Accessories	Description
Back Pressure Device	Capillary (L:15 m; ID:0,18 mm)
Solvent C for Gradient	Water (HPLC-Grade)
Solvent D for Gradient	Water + 0.1% Acetone

• Additional Information

Customer: Customer's Name
 Operator: Operator's Name
 Operator's Jobtitle
 Execution Date: 2020-mai-29
 Next Qualification: 2020-nov

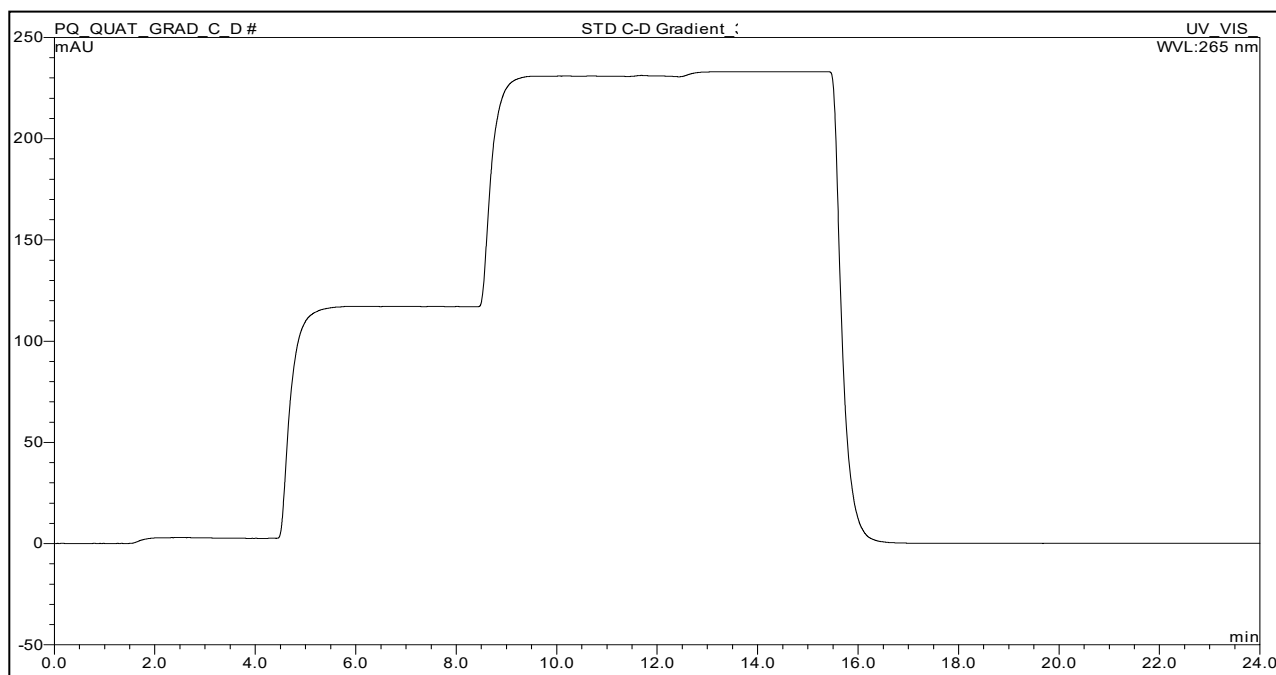
• Limits and Test Results

	Limit	Observed max. Deviation	Result of all Steps
Step Accuracy	<= 2,000 %	0,217 %	Test passed
Step Ripple	<= 0,500 %	0,102 %	Test passed

• Signatures

	Signature	Date
Submitter / Operator:	{seq.submitOperator.userName}	{seq.submitTime}
Reviewer:	{seq.reviewOperator.userName}	{seq.reviewTime}
Approver (e-sig. only):	{seq.approveOperator.userName}	{seq.approveTime}

• **Chromatogram of STD C-D Gradient_3**



Flow [ml/min]: 2,000

• Data of STD C-D Gradient_3

<i>Observed Value [mAU]</i>	<i>Expected Value [%]</i>	<i>Calculated Value [%]</i>	<i>Abs. Critical Deviation [%]</i>	<i>Calculated Deviation [%]</i>	<i>Result</i>
0,00	0,00	0,000	2,000	0,000	ok
2,57	1,00	1,103	2,000	0,103	ok
117,00	50,00	50,217	2,000	0,217	ok
231,03	99,00	99,160	2,000	0,160	ok
232,99	100,00	100,000	2,000	0,000	ok

• Ripple of STD C-D Gradient_3

<i>Step [%]</i>	<i>Ripple [mAU]</i>	<i>Calculated Ripple [%]</i>	<i>Critical Ripple [%]</i>	<i>Result</i>
1,00	0,084	0,036	0,500	ok
50,00	0,086	0,037	0,500	ok
99,00	0,237	0,102	0,500	ok

Definition:

Sample Name: STD C-D Gradient_3

Gradienttype: STD

Sample Number: 4
 First Solvent: C Solvent Help: C-D
 Second Solvent: D

Calculation of Gradient accuracy and -precision:

Observed Values for Pumps with Standard Mixing Chamber:

Name	Signal Start mAU	Signal Step mAU	Signal Step 50 mAU	Signal Step 99 mAU	Signal Step 100 mAU
	UV_VIS_1	UV_VIS_1	UV_VIS_1	UV_VIS_1	UV_VIS_1
Solvent change	n.a.	n.a.	n.a.	n.a.	n.a.
STD C-D Gradient_1	0,020	2,598	117,533	231,329	233,418
STD C-D Gradient_2	-0,012	2,218	117,155	231,134	233,198
STD C-D Gradient_3	0,067	2,643	117,082	231,121	233,085

Calculated Steps [%]

	STD A-B	LON	STD C-D	C-D (1.0 ml/min)	Current
Start	0,00	0,00	0,00	0,00	0,00
Step 1	0,00	0,00	1,00	1,00	1,00
Step 2	0,00	0,00	50,00	99,00	50,00
Step 3	0,00	0,00	99,00	0,00	99,00
End	0,00	0,00	100,00	0,00	100,00

Calculation of Ripple:

**Observed Values for Pumps:
 with Standard Mixing Chamber: with Mixing Kit 1 or 2:**

Name	Ripple Step 1 mAU	Ripple Step 50 mAU	Ripple Step 99 mAU	Ripple Step 1 mAU	Ripple Step 50 mAU
	UV_VIS_1	UV_VIS_1	UV_VIS_1	UV_VIS_1	UV_VIS_1
Solvent change	n.a.	n.a.	n.a.	n.a.	n.a.
STD C-D Gradient_1	0,062	0,077	0,238	0,053	0,039
STD C-D Gradient_2	0,046	0,130	0,153	0,144	0,060
STD C-D Gradient_3	0,084	0,086	0,237	0,083	0,054

Determination of Pump Unit for Dionex DGPs

Sequence name: PQ_QUAT_GRAD_C_D
 Right end of the sequence _C_D
 Pump's model number: LPG-3400A
 Pump's model variant: LPG
 Pump unit:

Determination of Pump Flow (Full Qualified and Non-Full-Qualified Variable Name)

CM-Version:	Flow:	
CM6:	2,000	(Pump)
CM7:	n.a.	(Pump - DDK driver)
	n.a.	(MicroPump - DDK driver)
	n.a.	(LoadingPump - DDK driver)
	n.a.	(PumpLeft - DDK driver)
	n.a.	(PumpRight - DDK driver)
	2,000	(Pump)
	n.a.	(MicroPump)
	n.a.	(LoadingPump)
	n.a.	(PumpLeft)
	n.a.	(PumpRight)
Used Flow Rate	2,000	(= maximum flow rate)

Determination of Gradient Composition (Full Qualified and Non-Full-Qualified Variab

CM-Version:	%B(0.1):	%B(1.1):	%B(4.1):	%B(8.1):	%B(12.1):
CM6:	n.a.	n.a.	n.a.	n.a.	n.a.
CM7:	0,0	0,0		0,0	0,0
	n.a.	n.a.	n.a.	n.a.	n.a.
	n.a.	n.a.	n.a.	n.a.	n.a.
	n.a.	n.a.	n.a.	n.a.	n.a.
	n.a.	n.a.	n.a.	n.a.	n.a.
	n.a.	n.a.	n.a.	n.a.	n.a.
Used %B	0,000	0,000	0,000	0,000	0,000

Determination of Gradient Composition (Full Qualified and Non-Full-Qualified Variab

CM-Version:	%B(0.1):	%B(2.1):	%B(8.1):	%B(23.1):	%B(36.1):
CM6:	n.a.	n.a.	n.a.	n.a.	n.a.
CM7:	0,0	0,0		0,0	0,0
	n.a.	n.a.	n.a.	n.a.	n.a.
	n.a.	n.a.	n.a.	n.a.	n.a.
	n.a.	n.a.	n.a.	n.a.	n.a.
	n.a.	n.a.	n.a.	n.a.	n.a.
	n.a.	n.a.	n.a.	n.a.	n.a.
Used %B	0,000	0,000	0,000	0,000	0,000

Determination of Gradient Composition (Full Qualified and Non-Full-Qualified Variab

CM-Version:	%D(0.1):	%D(1.1):	%D(4.1):	%D(8.1):	%D(12.1):
CM6:	n.a.	n.a.	n.a.	n.a.	n.a.
CM7:	0,0	1,0		50,0	99,0
	n.a.	n.a.	n.a.	n.a.	n.a.
	n.a.	n.a.	n.a.	n.a.	n.a.
	n.a.	n.a.	n.a.	n.a.	n.a.
	n.a.	n.a.	n.a.	n.a.	n.a.
	n.a.	n.a.	n.a.	n.a.	n.a.
Used %D	0,000	1,000	50,000	99,000	100,000

Determination of Gradient Composition (Full Qualified and Non-Full-Qualified Variab

CM-Version:	%D(0.1):	%D(2.1):	%D(8.1):	%D(23.1):	%D(36.1):
CM6:	n.a.	n.a.	n.a.	n.a.	n.a.
CM7:	0,0	1,0	99,0	0,0	0,0
	n.a.	n.a.	n.a.	n.a.	n.a.
	n.a.	n.a.	n.a.	n.a.	n.a.
	n.a.	n.a.	n.a.	n.a.	n.a.
	n.a.	n.a.	n.a.	n.a.	n.a.
	n.a.	n.a.	n.a.	n.a.	n.a.
Used %D	0,000	1,000	99,000	0,000	0,000







Observed Values for Pumps with Mixing Kit 1 or 2:

Signal Step	Signal Start mAU	Signal Step 1 mAU	Signal Step 50 mAU	Signal Step 99 mAU	Signal Step 100 mAU	Signal Step End mAU
UV	UV_VIS_1	UV_VIS_1	UV_VIS_1	UV_VIS_1	UV_VIS_1	UV_VIS_1
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
0	2,938	117,510	0,088	n.a.	n.a.	n.a.
0	2,274	117,139	0,064	n.a.	n.a.	n.a.
0	2,825	117,070	0,105	n.a.	n.a.	n.a.

with Micro Mixing Kit:

Ripple Step	Ripple Step 1 mAU	Ripple Step 50 mAU	Ripple Step 99 mAU
UV	UV_VIS_1	UV_VIS_1	UV_VIS_1
n.a.	n.a.	n.a.	n.a.
n.a.	0,062	0,077	0,238
n.a.	0,046	0,130	0,153
n.a.	0,084	0,086	0,237

File Name) - STD Gradient A-B

(Pump)
(Pump)
(MicroPump)
(LoadingPump)
(PumpLeft)
(PumpRight)
(Agilent ICF)
(= maximum %B)

File Name) - LON Gradient A-B

(Pump)
(Pump)
(MicroPump)
(LoadingPump)
(PumpLeft)
(PumpRight)
(Agilent ICF)
(= maximum %B)

File Name) - STD Gradient C-D

(Pump)
(Pump)
(MicroPump)
(LoadingPump)
(PumpLeft)
(PumpRight)
(Agilent ICF)
(= maximum %D)

File Name) - Gradient C-D (Flow rate: 1.000 ml/min)

(Pump)
(Pump)
(MicroPump)
(LoadingPump)
(PumpLeft)
(PumpRight)
(Agilent ICF)
(= maximum %B)

Observed Values for Pumps with Micro Mixing Kit:

Signal Start mAU	Signal Step 1 mAU	Signal Step 50 mAU	Signal Step 99 mAU	Signal Step 100 mAU	Signal End mAU
UV_VIS_1	UV_VIS_1	UV_VIS_1	UV_VIS_1	UV_VIS_1	UV_VIS_1
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
0,020	2,598	117,533	231,329	233,418	0,081
-0,012	2,218	117,155	231,134	233,198	0,063
0,067	2,643	117,082	231,121	233,085	0,108

Linear Drift correction: $Y = m \cdot X + t$ Drift corrected Signal values: $Y(\text{corr}) = Y(\text{obs}) - m \cdot X - t$

Slope m mAU / min $m = (Y2-Y1)/(X2-X1)$	Offset t mAU $t = Y1-m \cdot X1$	Signal Step S mAU UV_VIS_1	Signal Step 1 mAU UV_VIS_1	Signal Step 50 mAU UV_VIS_1	Signal Step 99 mAU UV_VIS_1
#VALEUR!	#VALEUR!	#VALEUR!	#VALEUR!	#VALEUR!	#VALEUR!
0,00268315	0,017114858	0,000	2,570	117,495	231,279
0,003297552	-0,015346308	0,000	2,220	117,144	231,110
0,001780853	0,065537695	0,000	2,570	117,002	231,034

Calculated Steps [%]

Signal Step 100 mAU	Signal Step 99 %	Signal Step 50 %	Signal Step 1 %	Signal Step 100 %	Signal Step 100 %
UV_VIS_1	UV_VIS_1	UV_VIS_1	UV_VIS_1	UV_VIS_1	UV_VIS_1
#VALEUR!	#VALEUR!	#VALEUR!	#VALEUR!	#VALEUR!	#VALEUR!
233,361	0,000	1,101	50,349	99,108	100,000
233,164	0,000	0,952	50,241	99,119	100,000
232,992	0,000	1,103	50,217	99,160	100,000