

API Cement Tests

API Cement Standards

API RP 10B-2/API Spec 10A

API Tests

1 Mixing

Mixing is the first step in preparing an API cement slurry. Water, additives, and dry cement blend are combined according to API RP 10B-2 to obtain a homogeneous slurry for subsequent laboratory testing.

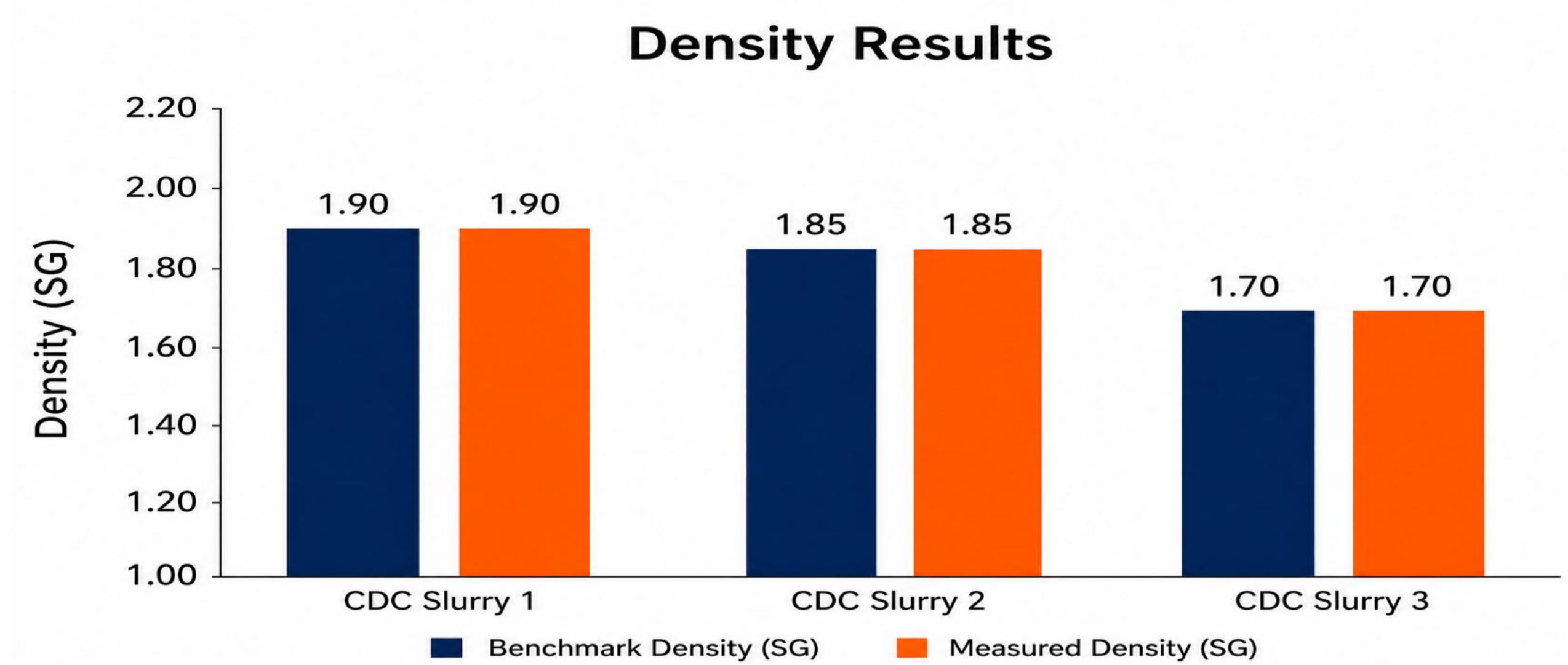
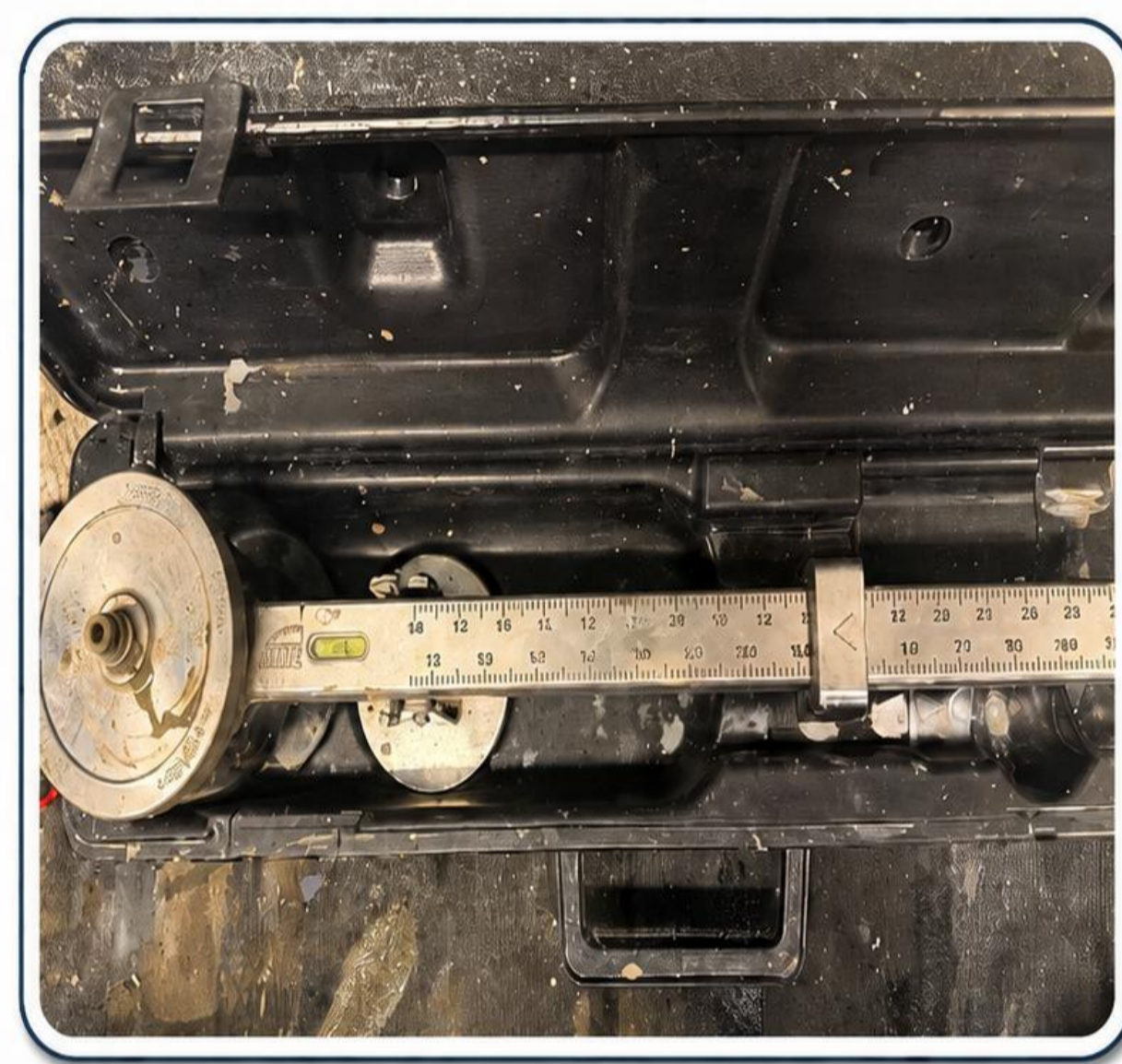
Mixing Conditions (API RP 10B-2)				
Slurry	Blend Addition Time(sec)	Total Mixing Time(sec)	Low speed Mixing(RPM)	High speed Mixing(RPM)
CDC	15	35	4000	12000



2 Density

Density measurement confirms slurry specific gravity before further API testing. A pressurized density balance is used to measure slurry density.

Density Measurement Summary				
Slurry ID	Benchmark Density (SG)	Measured Density (SG)	Measured Density (PPG)	Assessment
CDC Slurry 1	1.90	1.90	15.86	Achieved
CDC Slurry 2	1.85	1.85	15.43	Achieved
CDC Slurry 3	1.70	1.70	14.19	Achieved



3 Conditioning and Rheology

Conditioning

Conditioning is performed before rheology testing to simulate slurry pumping at BHCT and wellbore conditions.



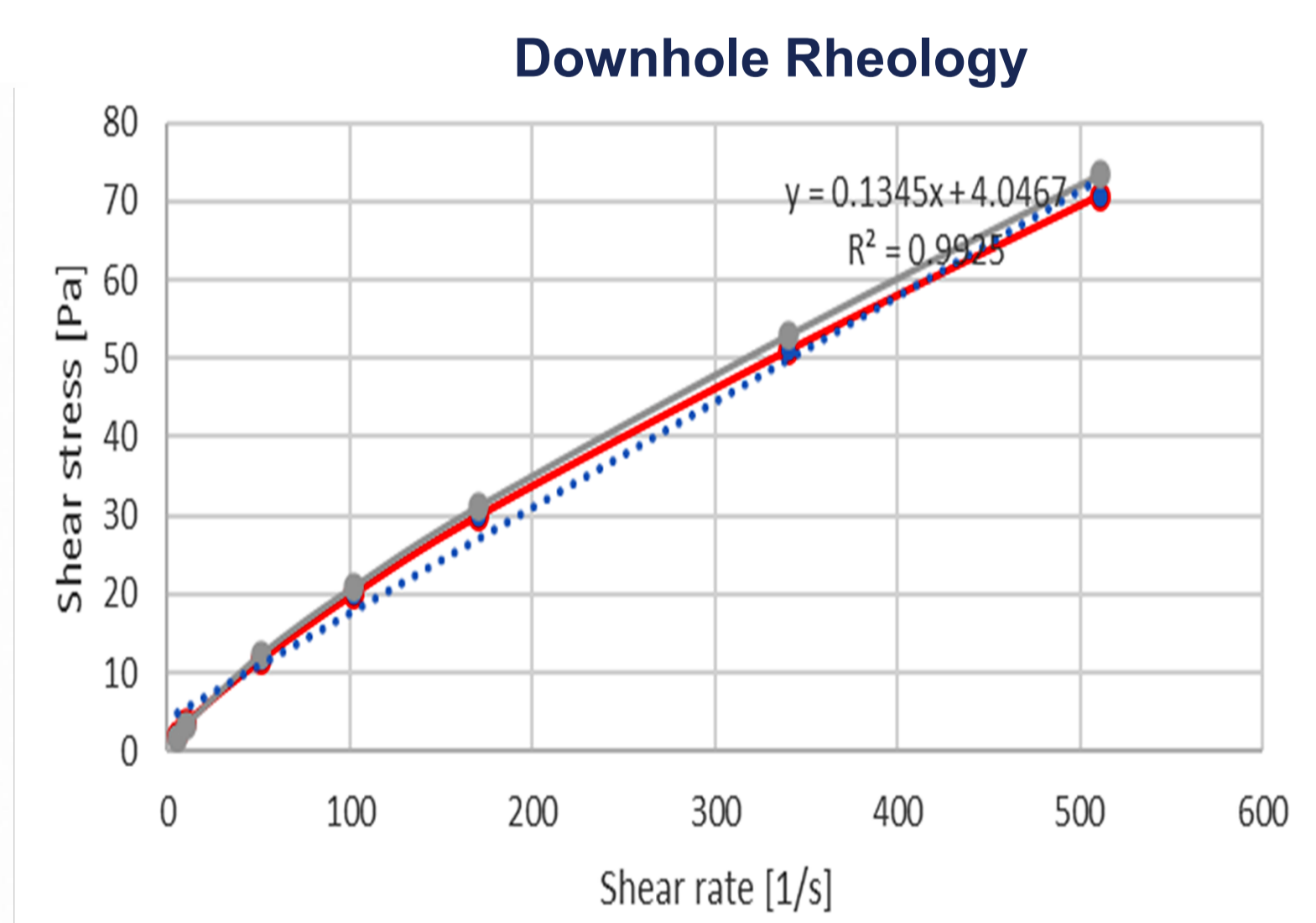
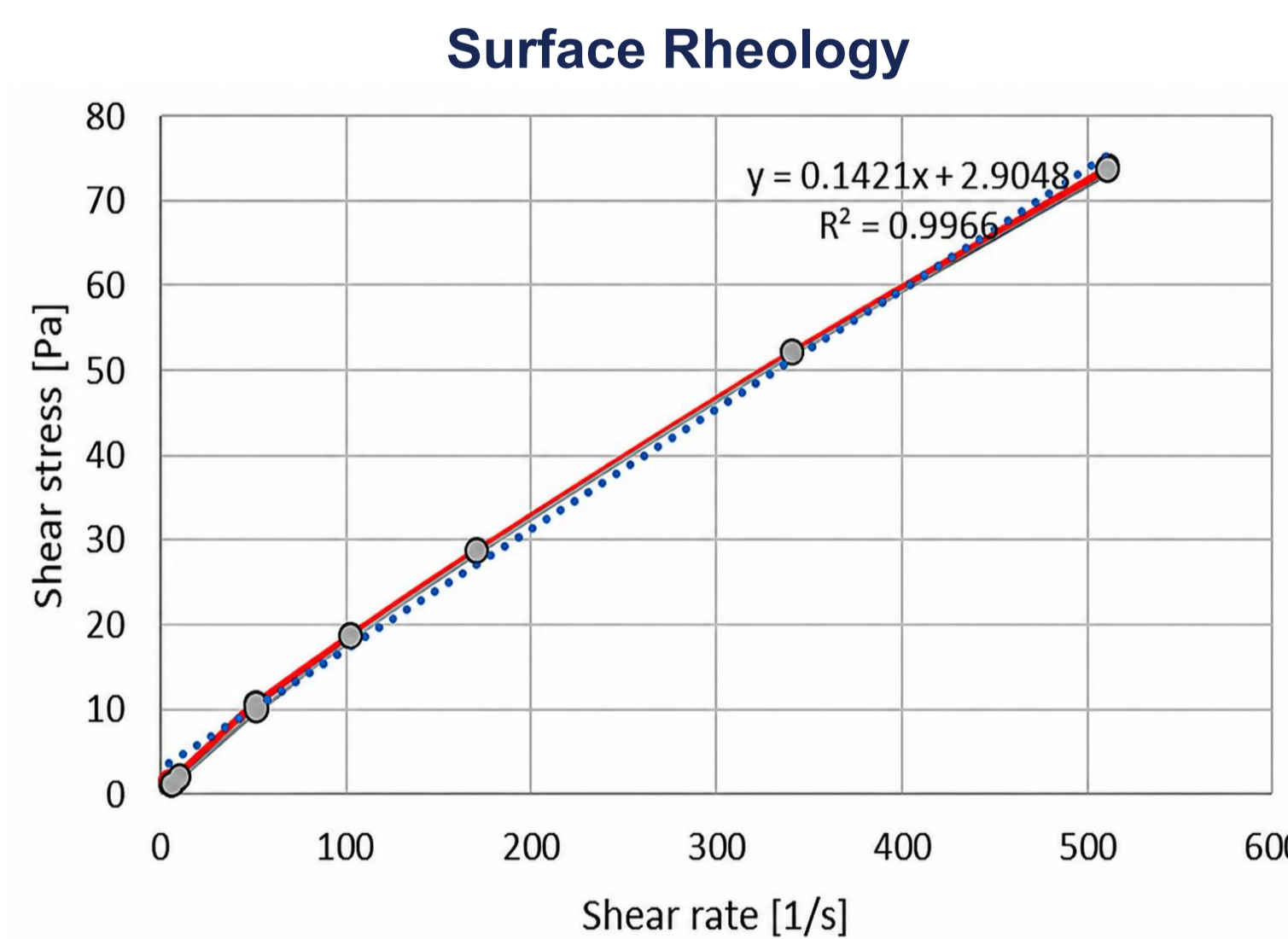
Conditioning Summary	
Parameter	Value
Conditioning Time	30 min
Conditioning Temperature	BHCT
Conditioning Pressure	Atmospheric

Rheology

Rheology evaluates rheological parameters including plastic viscosity (PV), yield point (YP) and gel strength (Gel) after conditioning to assess slurry flow behavior at surface and downhole condition



Rheology Summary			
Parameter	Benchmark	CDC measured	Assessment
PV(cp)	142	142	Matched
Yp(lb/100ft ²)	5	5.8	Acceptable
Gel 10sec	3	4	Acceptable
Gel 10 min	12	9	Acceptable



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4 Free Fluid Test

Free fluid test evaluates slurry stability after conditioning and static settling. The slurry is conditioned for 30 min, then held statically for 2 hours at 0° or 45° at surface condition before measuring the free fluid.

Slurry	Conditioning	Test Temperature	Incl	Free Fluid (ml/2hr)
CDC	BHCT/30min	23°C	0°	0ml/0%
Benchmark	BHCT/30min	21°C	0°	0ml/0%



5 Fluid Loss Test

Fluid loss quantifies filtrate released from cement slurry under pressure and temperature in (ml/30min).

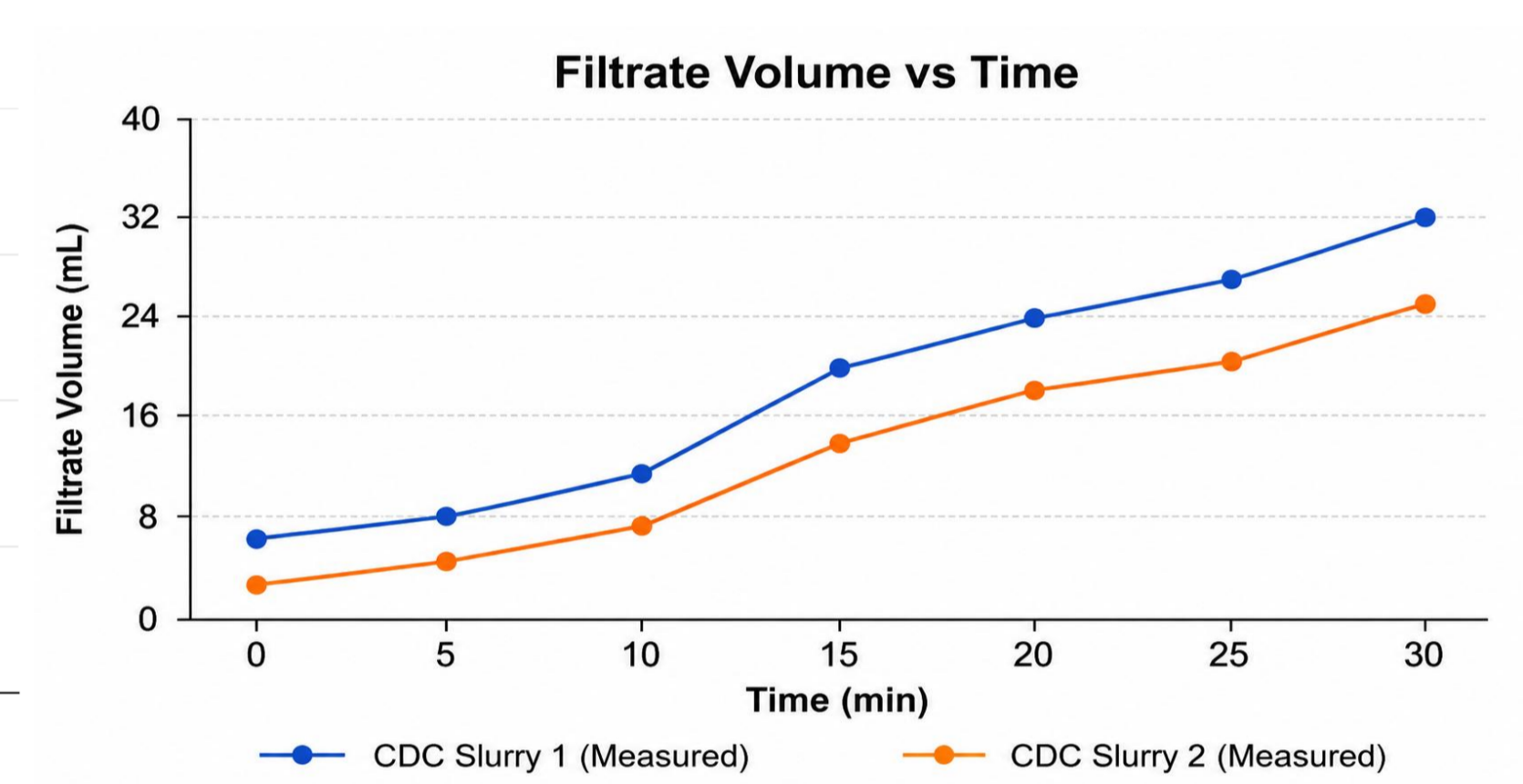
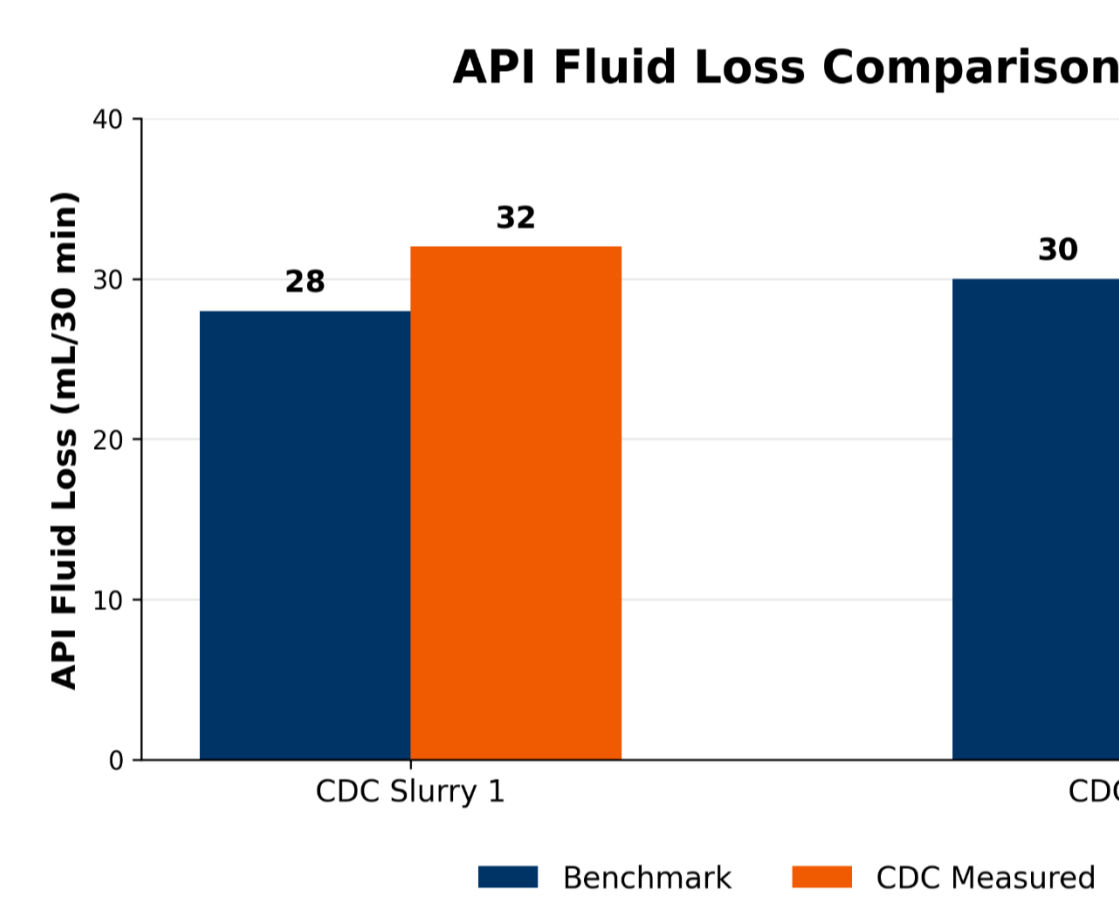
Conditions:

Conditioning for 30 min before testing. API fluid-loss test performed at 1000 psi and test temperature.



Conditioning Summary			
Slurry	Conditioning Time	Conditioning Temperature	Conditioning Pressure
CDC 1&2	30 min	BHCT	Atmospheric

Fluid Loss Results			
Slurry	CDC Measured (ml/30min)	Benchmark (ml/30min)	Assessment
CDC Slurry#1	32	28	Acceptable
CDC Slurry#2	30	30	Matched



6 Thickening Time

Thickening time test evaluates slurry consistency development under simulated downhole pressure and temperature.

Conditions:

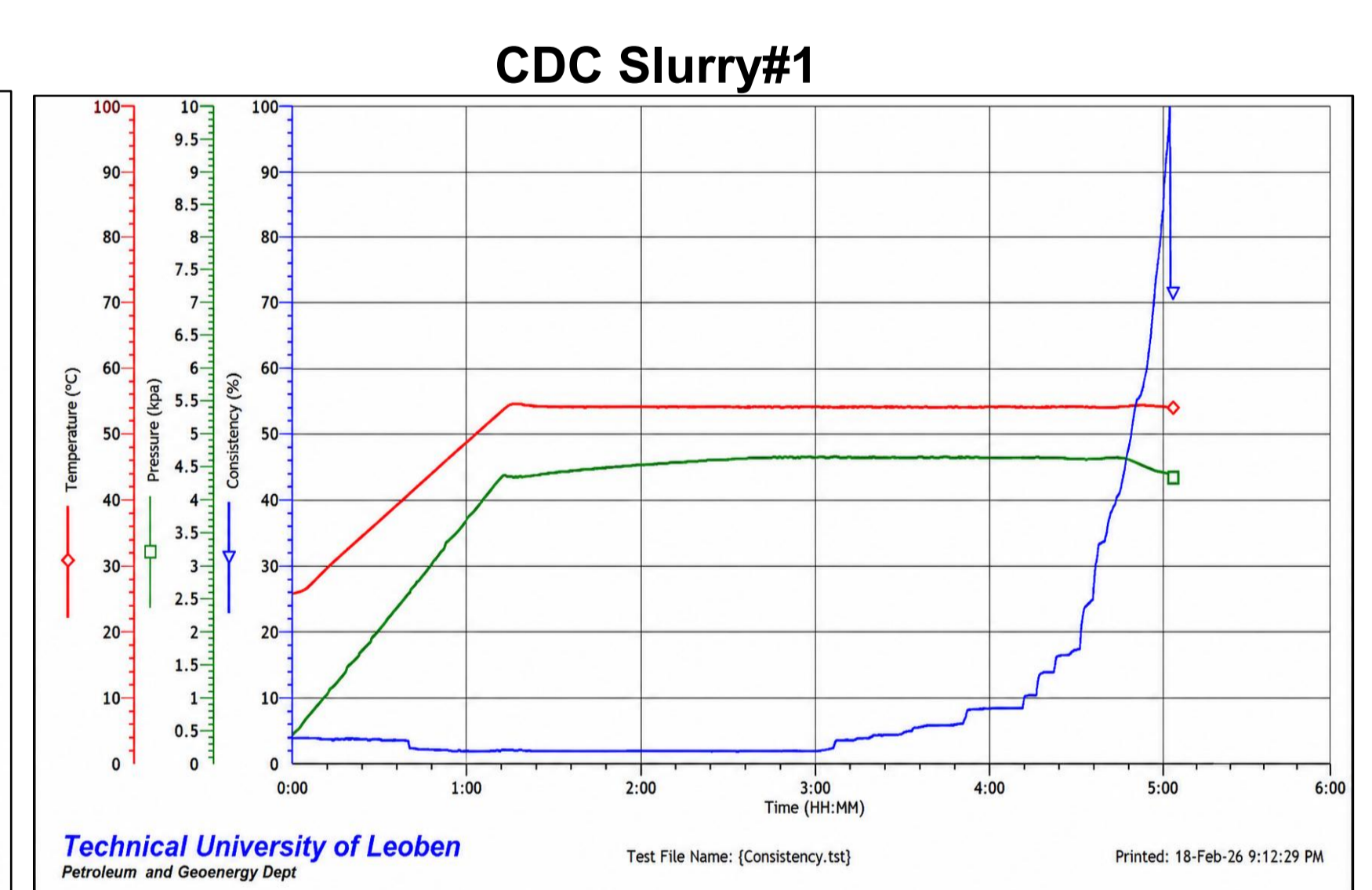
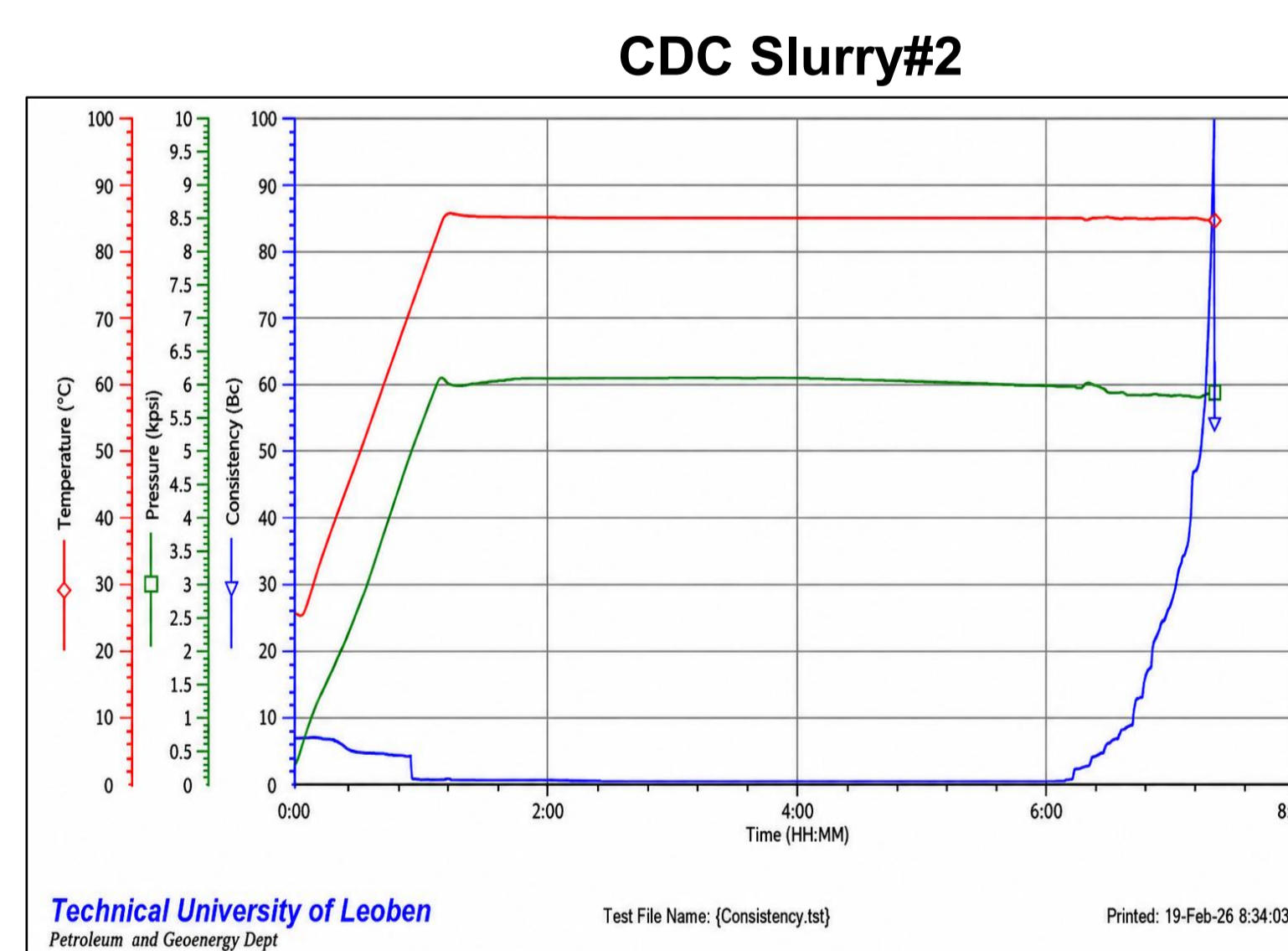
Measured using a pressurized consistometer with programmed temperature and pressure ramps.



Pressurised Consistometer

Thickening time test data			
Slurry	Test Temperature(°c)	Test Pressure(Bar)	Ramp up
CDC Slurry#1	54	300	72min
CDC Slurry#2	85	400	68min

Thickening time test results					
Slurry	Source	30 BC	50 BC	70BC	100BC
CDC Slurry#1	CDC Measured	04:36	04:48	04:56	05:02
CDC Slurry#1	Benchmark	05:19	05:36	06:07	06:08
CDC Slurry#2	CDC Measured	07:02	07:14	07:18	07:21
CDC Slurry#2	Benchmark	06:37	07:06	07:17	07:21



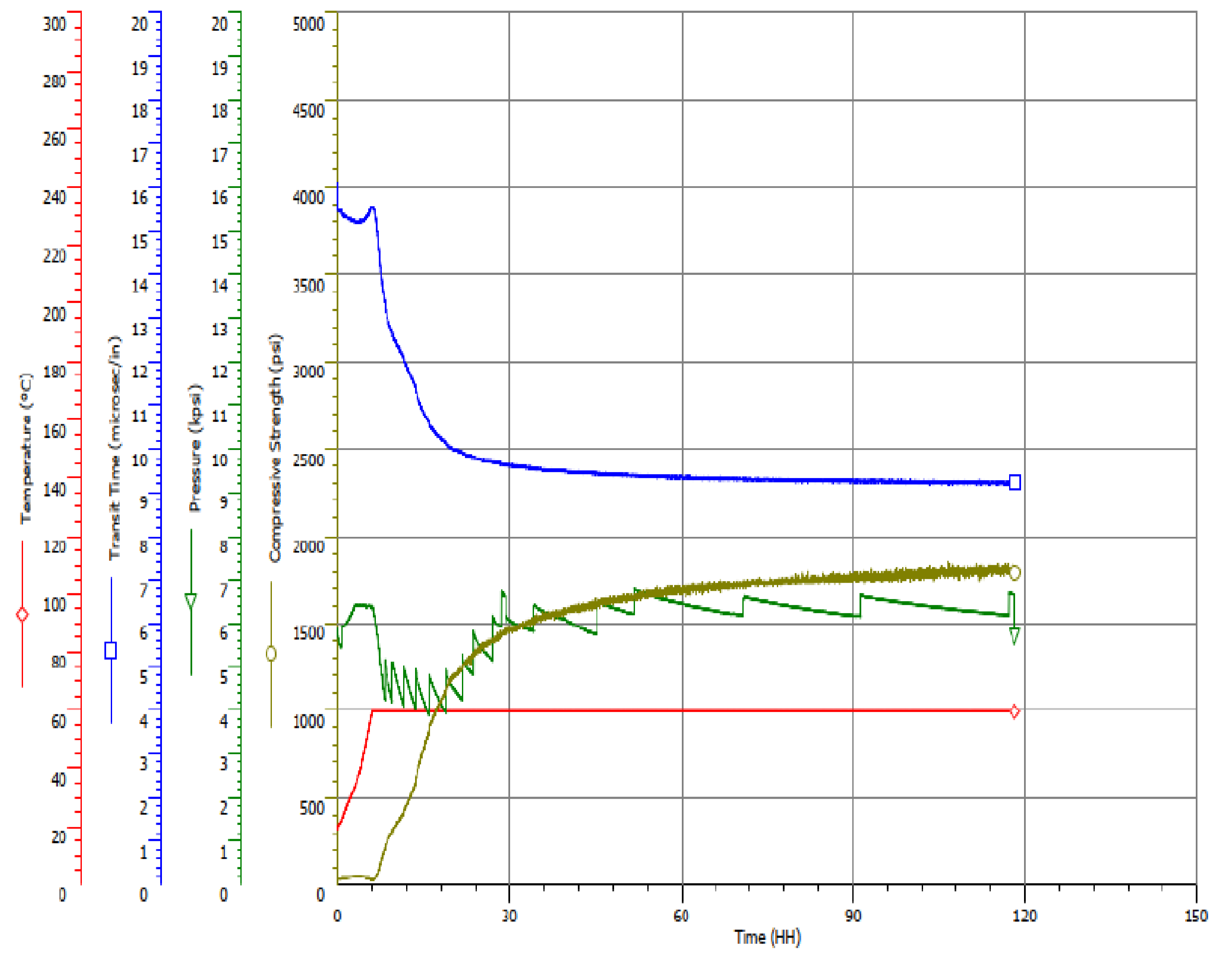
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7 UCA Test

Ultrasonic Cement Analyzer

UCA testing determine cement compressive-strength development over time under programmed temperature and pressure conditions.

The method evaluates strength evolution without destroying the sample and supports assessment of early- and long-term cement performance. Before measuring compressive strength, the slurry must be conditioned in pressurized consistometer for 30 min at BHCT.



UCA Test Results

Time(HH:mm)	Compressive strength(psi)
06:44	50
12:30	500
24:00	1338
48:00	1643

UCA Summary

Parameter	Value
Slurry	CDC slurry
Test type	UCA
Result of test	Compressive Strength development
Result Basis	Time to strength/Strength evolution

8 HP/HT Curing

The cement specimens were cured in a controlled curing chamber to simulate downhole conditions prior to further testing. The curing procedure and cement testing approach can be aligned with API cement-testing recommendations, particularly API RP 10B-2, depending on the selected pressure and temperature conditions.

Curing Summary

Parameter	Value
Cement sample size	1in
Curing Time	14 days
Curing Pressure	BHP
Curing Temperature	BHST

Cement Specimens and Pressurized Curing Setup



Multiple cement specimens in moulds



Close-up of cured cement specimens



Pressurized curing chamber



Specimen holder for curing

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INTEGRITY
PLATFORM

Research Interests:

- Cement integrity
- CCS data analysis
- Cement-Co₂ exposure analysis

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