Procedure: Creep Test at SNL

Version Date:

~~June 24, 2015~~ June 30, 2015

Form Completed By: Tim Lynn

1 Test Description

Parameters	Value
Test Name	UNM - WP - HY - 90 - 04
Salt Provenance (Circle One)	Avery Island / (WIPP)
Test Type (Circle One)	(Hydrostatic) / Shear
Salt Can Label	1A + 0.2265 kg from 90-03
Water Added to Salt (Circle One)	(yes) / no
If Water Added, What Percent by Mass [%]	1%
Temperature: [°C / °F]	90°C
Pressure [MPa / psi]	20 MPa
Jacketing Components (Circle All)	Outer (Lead) - Outer Viton - Inner Lead - (Inner Copper #2)
Tested In (Circle One)	Frame 2 / (Frame 3)

Table 1: Description of Test

2 Pre-Test Measurements

2.1 Height of components:

Components	Count	Component Label	Recorded Height [mm]
Platens	1	C5	37.14
	2	C3	37.07
Chamfer Discs	1	CP3	8.38
	2	CP4	8.55
Mesh Discs	1	NA	0.60
	2	NA	0.60
Cumulative Height of Components		92.34	mm

- 1/16 screw

Table 2: Itemized List of Components for Height Measurements (No Salt).

2.2 Jacket Dimensions

If the test is performed at:

1. A temperature above 100 $°C$ (high temp.) -> one outer lead jacket and one or more inner copper jackets will be used;
2. A temperature below 100 $°C$ (low temp.) -> one outer Viton jacket, one inner lead jacket, and one inner copper jacket. Spatially, from outer to inner, the jacket order will be Viton, lead, and copper; with the salt being in contact with copper.

2.2.1 Height of Outer Jacket

This value will vary depending on which platens (steel or aluminium) and chamfer pieces are used, in general:

1. Outer Jacket: 10.125 inches (257.17 mm) to 11.0 inches (279.4 mm);
2. Inner Shell: 12.0 inches (304.8 mm) -> this is for both A1 and A2;
3. Specimen Clearance: 1.875 inches (47.62 mm) to 1.0 inches (25.4 mm);

add height meas.

NOTE: the maximum height inside Frame 2 and 3 is 12 inches (304.8 mm) - If the upper internal port of the shell is plugged, the available height is decreased to 11.75 inches (298.45 mm)

Jacket Description	Height	No. of Jackets Used
Outer Lead Jacket (mm)	261	1
Outer Viton Jacket (mm)	—	0
Inner Lead Jacket (mm)	—	0
Inner Copper Jacket (mm)	165	2

Table 3: Height of Jacketing Components (if jacket not used, write "NA")

2.2.2 Checklist of Jacketing Materials:

Components	Count	Verification Checkmark (and Component Label is Applicable)
Platens	1	C5
	2	C3
Platen O-rings	1	✓
	2	✓
	3	✓
	4	✓
Platen Screws (0.25 inch 20 rnd)	1	✓
	2	✓
Screw-In Nipples	1	✓
	2	✓
Nipple O-rings	1	✓
	2	✓
	3	✓
	4	✓
Nipple Adapter (HIP HF4 connection)	1	✓
	2	✓
Nipple Plugs (HIP HF4 plugs)	1	✓
	2	✓
Chamfer Discs	1	CP3
	2	CP4
Mesh Discs	1	✓
	2	✓
Inner Copper Jacket (indicate No. used)	2	✓
Outer Lead Jacket	1	✓
Inner Lead Jacket	~~1~~	
Outer Viton Jacket	~~1~~	
Wire Ties - Wrapped Around Viton Jacket	~~1~~	
	~~2~~	
	~~3~~	
	~~4~~	

Table 4: Itemized List of Components for Mass and Volume Measurements (No Salt).

BCL (7/7/15)
950.33 mL
Volume of comp.

Measured Value	Values	Units
Prior to Dunk: Water Level Reading on Burette	67.6	mL (burette)
After Dunk: Water Level Reading on Burette	59.2	mL (burette)
→ Volume of Components (No Salt)	~~522.8~~	mL
Mass of Components (No Salt)	3.9414	kg

Subtract 11.45 mL (C.1 burette) from Volume
See Sheet 5

Table 5: Measurements of All Components (No Salt)

0.4429
−0.3710
0.0719 Previous Method Sample

2.3 Measured Mass of Salt

2.3.1 Date:

Parameters	Value	
Salt Can Label	1A + 0.2665 kg from UNM WPHY 90-03	
Before Making Sample: Mass of Salt ~~and Can (with lid)~~ w/ 2 Bags	1.8794	kg
After Sample is Made: Remaining Mass of Salt and Can ~~(with lid)~~ 2 Bags	0.0122	kg
Mass of Salt Used for Sample	1.9288	kg
Cumulative Mass of Components and Salt	5.8696	kg

assembly w/ Plugs on top 3.9069

~~5.80~~

Table 6: Mass of Salt

3 Pre-consolidation Measurements

3.0.2 Date: 7/11/15

3.0.3 Data Sample Rate: No Data Logging

Volume Displayed on ISCO Pump	Volume [mL]	Pressure [psi]	Time [hh:mm]
Initial Reading: prior to consolidation	507.60	23	12:25
Reading: When at pre-consolidation pressure	63.69	2820	12:32.34
Final Reading: after pre consolidation	~~+2~~ 152.82	~~25~~26	12:40

Table 7: Pre-consolidation Details

Components	Volume [mL]	Mass [kg]
Preconsolidated Specimen (all components listed above plus salt)		5.8702
Preconsolidated Salt (Salt Only)	1029.2	1.9288

Table 8: Pre-consolidation Measurments

⇒ Measure Sample Height Here

Dithane
- 0.1
Assembly to Assembled Sample
Plug 68.0
Nipple 67.8
Nipple
Plug

3.1 Pre-Creep Test Measurements (After Specimen Has Been Preconsolidated)

3.1.1 Date:

Parameter	Values	Units
Prior to Dunk: Mass of Specimen (with all components)	5.8071	kg
Prior to Dunk: Water Level Reading on Burette	67.8	mL (burette)
After Dunk: Water Level Reading on Burette	49.9	mL (burette)
After Dunk: Mass of Specimen (with all components)	5.8096	kg
Measured Volume Change of Salt Caused by Pre consolidation		mL
Measured Volume of Salt Prior to Creep Test		mL

2049.5

Table 9: Measurements Made During Seconds Dunk of Specimen (after pre consolidation).

4 Application of Heat to Obtain Test Temperature

Heat will be applied to the specimen until the desired test temperature is obtained, this will be done under quasi-atmospheric pressure.

4.0.2 Date: 7/2/15 → 90°C

4.0.3 Data Sample Rate: 1 min

Event	Date	Time	Confining Pressure [psi]	Comments
Start Temperature Increase	7/2/15	1:28 PM	0.9 (dita)	Vent. to Atm
End Temperature Increase	7/2/15	3:30 PM	0.9	ISCO Vol. 507. mL

Table 10: Dates of Details of Temperature Increase

Sch #1 => -0.29
Sch #2 => -0.14

5 Begin Creep Test

ISCO Press = -1 psi
Vol = 507.57
} raise to 10 psi

5.0.4 Date:

5.0.5 Data Sample Rate:

Event	Value	Comment
ISCO Pump Volume (Pre Pressure Increase)	480	goal: 201 mL
ISCO Pump Pressure (Pre Pressure Increase)	10	
Begin Pressure Increase	Time: 3:42 PM	
End Pressure Increase	Time: 3:47 PM	
ISCO Pump Volume (Post to Pressure Increase)	280	
ISCO Pump Pressure (Post Pressure Increase)	2900	
ISCO Pump Flow Rate (Post Pressure Increase)	4.2 mL/min	

Table 11: Details of Test Initiation

Final Dunk details (7/7/15) BCL

Push fluid from A3 (12:03)
Total Mass of Sample = 5.8070 kg
Initial dunk tank value = 69.2 } 114.
final dunk tank valu = 52.5
Volume of sample = 1912.11326 mL
Mass After Dunk =
→ Take Pictures

Mass of salt: 1.9288 kg

Salt Volume ~~= 1522.8~~ 1912.11 mL → sample mL → components = 950.33 mL

~~389.37~~ mL of salt (final volume)

~~= 3.8937~~ 10^{-4} m^3

961.78 mL

final salt density = 2005.4 kg/m^3