

Procedure: Creep Test at SNL

Version Date:

July ²¹~~7~~, 2015

Form Completed By: Laxmi

1 Test Description

Parameters	Value
Test Name	UNM-WP-HY-90- 07 06
Salt Provenance (Circle One)	Avery Island / <u>WIPP</u>
Test Type (Circle One)	<u>Hydrostatic</u> / Shear
Salt Can Label	4A
Water Added to Salt (Circle One)	<u>yes</u> / no
Target/Actual Water Added (Percent by Mass [%])	Target 1% / ^{act} 0.97%
Temperature: [°C / °F]	90°C
Pressure [MPa / psi]	
Jacketing Components (Circle All)	<u>Outer Lead</u> Outer Viton - <u>Inner Lead</u> - <u>Inner Copper</u>
Tested In (Circle One)	<u>Frame 2</u> Frame 3
Test Target (permeability / fractional density / etc)	

Table 1: Description of Test

X
Failed
~60s of
oil entered
sample
during
Pre Consolidation

Pre-Test Measurements

2.1 Height of components:

Components	Count	Component Label	Recorded Height [mm]
Platens	1	C1	37.32
	2	C8 C8	34.302
Chamfer Discs	1	CP1	12.75
	2	CP7	8.28
Mesh Discs	1	NA	1.01
	2	NA	1.05
Cumulative Height of Components		94.74	mm

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

2.2 Jacket Dimensions

2.2.1 Jacket Components

For all tests, the jacketing materials will be -> one outer lead jacket and two inner copper jackets.

2.2.2 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 10.5 inches (266.7 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 1.5 inches (38.1 mm);

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)	218	1
Outer Viton Jacket (mm)	—	—
Inner Lead Jacket (mm)	130	1
Inner Copper Jacket (mm)	133	1
Height of Total Sample (mm)		NA

330*133 mm

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

Checklist of Jacketing Materials:

Components	Count	Verification Checkmark (and Component Label is Applicable)
Platens	1	✓
	2	✓
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	✓
	2	✓
Mesh Discs	1	✓
	2	✓
Inner Copper Jacket (indicate No. used)	1	Thickness of 1 Sheet of Copper (mm) 0.02
Outer Lead Jacket	1	Jacket Thickness (mm) 1.5 mm

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

Measured Value	Values	Units	Comments
Prior to Dunk: Water Level Reading on Burette	72.4	mL (burette)	
After Dunk: Water Level Reading on Burette	63.4	mL (burette)	
Volume of Components (No Salt)	1030.4802	mL	
Mass of Components (No Salt)	4.6686	kg	
Approximate Diameter of Salt		mm	
Approximate Height of Salt		mm	
Dunk Tank Volume Factor: 114.4978 mL/Burette Unit			

Table 5: Measurements of All Components (No Salt)

Measured Mass of Salt

3.1 Date:

Parameters	Value	
Salt Can Label	4A	
Before Making Sample: Mass of Salt and Can (with lid)	1.7205	kg
After Sample is Made: Remaining Mass of Salt and Can (with lid)	0.2294	kg
Mass of Salt Used for Sample	1.4911	kg
Cumulative Mass of Components and Salt	6.1597	kg

Table 6: Mass of Salt

Gross Check = 6.1597, OK.

• Height of sample before pre-consolidation = 218.803 mm

• Diameter of sample before pre-consolidation = 107.395

3 Pre-consolidation Measurements

3.0.2 Date: 7/23/2015

3.0.3 Data Sample Rate:

Volume Displayed on ISCO Pump	Volume [mL]	Pressure [psi]	Time [hh:mm]
Initial Reading: prior to consolidation	507.57	18.9	11:06 AM
Reading: When at pre-consolidation pressure			
Final Reading: after pre consolidation	285.84	10	11:20 AM

Table 7: Pre-consolidation Details

Parameter	Values	Units
Prior to Dunk: Mass of Specimen (with all components)	6.2222	kg
Prior to Dunk: Water Level Reading on Burette	72.9	mL (burette)
After Dunk: Water Level Reading on Burette	56.3	mL (burette)
Preconsolidated Specimen (all components listed above plus salt)	1900.663	mL
After Dunk: Mass of Specimen (with all components)	6.2214	kg
Total Height of Specimen	214.16	mm
Approximate Outside Diameter of Specimen	102.6	mm
Preconsolidated Salt (Salt Only) - Volume and Mass	870.182	mL
	1.5528	kg
Dunk Tank Volume Factor: 114.4978 mL/Burette Unit		

Table 8: Measurements Made After Preconsolidation of Specimen.

$$\frac{1.5528}{870.182} \times 100^3 = 1784.45$$

$$\text{Fractional Density} = \frac{1784.45}{2160} = 82.6\%$$

Application of Heat to Obtain Test Temperature

5.0.4 Data Sample Rate:

Event	Date	Time	Confining Pressure [psi]	Expelled Silicone Oil Volume (mL)
Start Temperature Increase				
End Temperature Increase				

Table 9: Dates of Details of Temperature Increase

5 Creep Test

5.0.5 Date (Start Test):

5.0.6 Data Sample Rate:

Event	Value	Comment
ISCO Pump Volume (Pre Pressure Increase)		
ISCO Pump Pressure (Pre Pressure Increase)		
Begin Pressure Increase	Time:	
End Pressure Increase	Time:	
ISCO Pump Volume (Post to Pressure Increase)		
ISCO Pump Pressure (Post Pressure Increase)		
ISCO Pump Flow Rate (Post Pressure Increase)		

Table 10: Details of Test Initiation

5.0.7 Date (End Test):

Parameters	Values	Units
Final Mass of Specimen		kg
Initial Dunk Tank Values		mL (burette)
Final Dunk Tank Values		mL (burette)
Volume of Specimen		mL
Specimen Diameter		mm
Specimen Height		mm
Density of Salt only		kg/m ³
Dunk Tank Volume Factor: 114.4978 mL/Burette Unit		

Table 11: Post Test Measurements

Procedure: Creep Test at SNL

Version Date:

July 7, 2015

Form Completed By: _____

1 Test Description

Parameters	Value
Test Name	UNM-WP-HY-90-06
Salt Provenance (Circle One)	Avery Island / <u>WIPP</u>
Test Type (Circle One)	<u>Hydrostatic</u> / Shear
Salt Can Label	4I
Water Added to Salt (Circle One)	<u>yes</u> / no
Target/Actual Water Added (Percent by Mass [%])	Target 1% / 1.04%
Temperature: [°C / °F]	90°C
Pressure [MPa / psi]	20 MPa
Jacketing Components (Circle All)	Outer <u>Lead</u> Outer Viton <u>Inner Lead</u> - Inner <u>Copper</u>
Tested In (Circle One)	Frame 2 / <u>Frame 3</u>
Test Target (permeability / <u>fractional density</u> / etc)	95% FD

Table 1: Description of Test

Sample
Failed
in
Pre Consolidation
7/20/15

Pre-Test Measurements

2.1 Height of components:

Components	Count	Component Label	Recorded Height [mm]
Platens	1	C1	37.32
	2	C7	34.33
Chamfer Discs	1	CP1	12.75
	2	CP7	8.28
Mesh Discs	1	NA	1.29
	2	NA	1.25
Cumulative Height of Components			mm

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

2.2 Jacket Dimensions

2.2.1 Jacket Components

For all tests, the jacketing materials will be -> one outer lead jacket and two inner copper jackets.

2.2.2 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 10.5 inches (266.7 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 1.5 inches (38.1 mm);

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)	217	1
Outer Viton Jacket (mm)	—	—
Inner Lead Jacket (mm)	130	1
Inner Copper Jacket (mm)	133 mm ^{5 1/4"}	2
Height of Total Sample (mm)		NA

— 330 mm x 133 mm

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

3 Checklist of Jacketing Materials:

Components	Count	Verification Checkmark (and Component Label is Applicable)
Platens	1	✓
	2	✓
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	✓
	2	✓
Mesh Discs	1	✓
	2	✓
Inner Copper Jacket (indicate No. used)	1	Thickness of 1 Sheet of Copper (mm)
Outer Lead Jacket	1	Jacket Thickness (mm)

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

Measured Value	Values	Units	Comments
Prior to Dunk: Water Level Reading on Burette	72	mL (burette)	
After Dunk: Water Level Reading on Burette	62.8	mL (burette)	
Volume of Components (No Salt)	1053.37	mL	
Mass of Components (No Salt)	4.6999	kg	
Approximate Diameter of Salt		mm	
Approximate Height of Salt		mm	
Dunk Tank Volume Factor: 114.4978 mL/Burette Unit			

Table 5: Measurements of All Components (No Salt)

Measured Mass of Salt

6-3464

2.3.1 Date:

Parameters	Value	
Salt Can Label	41	
Before Making Sample: Mass of Salt and Can (with lid)	1.7408	kg
After Sample is Made: Remaining Mass of Salt and Can (with lid)	0.3397	kg
Mass of Salt Used for Sample	1.4011	kg
Cumulative Mass of Components and Salt	6.0837	kg

Table 6: Mass of Salt

Diameter = 108.12 mm
Height = 215.81 mm

3 Pre-consolidation Measurements

3.0.2 Date: 7/20/15

3.0.3 Data Sample Rate: 10 Sec.

Volume Displayed on ISCO Pump	Volume [mL]	Pressure [psi]	Time [hh:mm]
Initial Reading: prior to consolidation	507.64	16.1	15:16
Reading: When at pre-consolidation pressure			
Final Reading: after pre consolidation			

Table 7: Pre-consolidation Details

Parameter	Values	Units
Prior to Dunk: Mass of Specimen (with all components)		kg
Prior to Dunk: Water Level Reading on Burette		mL (burette)
After Dunk: Water Level Reading on Burette		mL (burette)
Preconsolidated Specimen (all components listed above plus salt)		mL
After Dunk: Mass of Specimen (with all components)		kg
Total Height of Specimen		mm
Approximate Outside Diameter of Specimen		mm
Preconsolidated Salt (Salt Only) - Volume and Mass		mL
		kg
Dunk Tank Volume Factor: 114.4978 mL/Burette Unit		

Table 8: Measurements Made After Preconsolidation of Specimen.