

Procedure: Creep Test at SNL

Version Date:

²⁹
July 7, 2015

Form Completed By: Laxmi

1 Test Description

Parameters	Value
Test Name	UNM-WP-HY-90-08
Salt Provenance (Circle One)	<u>Avery Island</u> / WIPP
Test Type (Circle One)	<u>Hydrostatic</u> Shear
Salt Can Label	5E
Water Added to Salt (Circle One)	yes <u>no</u>
Target/Actual Water Added (Percent by Mass [%])	
Temperature: [°C / °F]	
Pressure [MPa / psi]	40 MPa
Jacketing Components (Circle All)	<u>Outer Lead</u> Outer Viton <u>Inner Lead</u> <u>Inner Copper</u>
Tested In (Circle One)	Frame 2 <u>Frame 3</u>
Test Target (permeability / fractional density / etc)	0.95

Table 1: Description of Test

2 Pre-Test Measurements

2.1 Height of components:

Components	Count	Component Label	Recorded Height [mm]
Platens	1	C9	37.19
	2	C2	37.05
Chamfer Discs	1	CP2	12.73
	2	CP3	8.38
Mesh Discs	1	NA	0.63
	2	NA	1.10
Cumulative Height of Components		97.08	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)	220	1
Outer Viton Jacket (mm)		
Inner Lead Jacket (mm)	130	1
Inner Copper Jacket (mm)	134	1
Height of Total Sample (mm)		NA

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

2.2.3 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	56.2	mL (burette)	
After Dunk: Water Level Reading on Burette	46.8	mL (burette)	
Volume of Components (No Salt)	1099.63 1076.28	mL	No hose clamps
Mass of Components (No Salt)	5.1525	kg	w/ Full hose clamp (a)
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)

Trimig from
Lead +
hose clamps 80.67g

107628 + 34.35
= 1110.63

Volume
of

Hose Clamps (4)

Initial 56.3

Final 56.0

= 0.3

$\times 114.4478$

34.35 mL

4 hose
clamps

8.59 mL each

1 (hose clamp)

34.35 + 46.35

34.35

2.3 Measured Mass of Salt

2.3.1 Date:

Parameters	Value	
Salt Can Label	5E	
Before Making Sample: Mass of Salt and Can (with lid)	1.9264	kg
After Sample is Made: Remaining Mass of Salt and Can (with lid)	0.6181	kg
Mass of Salt Used for Sample	1.3083	kg
Cumulative Mass of Components and Salt	6.3809	kg

Table 6: Mass of Salt

3 Pre-consolidation Measurements

3.0.2 Date: 7/29/15

3.0.3 Data Sample Rate: 10 sec

goal: 5557.5 psi
38.32 MPa

Volume Displayed on ISCO Pump	Volume [mL]	Pressure [psi]	Time [hh:mm]
Initial Reading: prior to consolidation	508.05	12.7	15:55
Reading: When at pre-consolidation pressure	40 in 10k	5559.4	16:34
Final Reading: after pre consolidation		18 psi	16:40

Table 7: Pre-consolidation Details

stopped Is
@ 5200 psi
(164.64 =
Vol = 103.05,
Press =

Parameter	Values	Units
Prior to Dunk: Mass of Specimen (with all components)	6.3836	kg
Prior to Dunk: Water Level Reading on Burette	56.0	mL (burette)
After Dunk: Water Level Reading on Burette	40.3	mL (burette)
Preconsolidated Specimen (all components listed above plus salt)	15.70114.4778 = 1797.6	mL
After Dunk: Mass of Specimen (with all components)	6.3836	kg
Total Height of Specimen	min = 208 Avg = 206.64 max = 205	mm
Approximate Outside Diameter of Specimen	97.7	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.

4 Application of Heat to Obtain Test Temperature

4.0.4 Data Sample Rate: 10 → 100 sec

Event	Date	Time	Confining Pressure [psi]	Expelled Silicone Oil Volume (mL)
Start Temperature Increase	8/4/15	12:04	4 psi	0
End Temperature Increase	8/4/15	15:16	0.9 psi	235

Table 9: Dates of Details of Temperature Increase

5 Creep Test

5.0.5 Date (Start Test): 8/4/15

5.0.6 Data Sample Rate: 10 sec

Event	Value	Comment
ISCO Pump Volume (Pre Pressure Increase)	506.71	
ISCO Pump Pressure (Pre Pressure Increase)	10 psi	Ran to 3200 w/ISCO
Begin Pressure Increase	Time: 15:19	15:29 switch to dial
End Pressure Increase	Time: 16:00	*
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): 8/7/2015

Parameters	Values	Units
Final Mass of Specimen	6.3840	kg
Initial Dunk Tank Values	58.4	mL (burette)
Final Dunk Tank Values	43.2	mL (burette)
Volume of Specimen	1740.37	mL
Specimen Diameter	~ 95	mm
Specimen Height		mm
Density of Salt only	2041.86	kg/m ³
Dunk Tank Volume Factor: 114.4978 mL/Burette Unit		

Table 11: Post Test Measurements

Fractional density
= 0.9453

1740.37
- 1099.63
640.74 mL

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1 Test Description

Parameters	Value
Test Name	VNM-WP-HY-20-08
Salt Provenance (Circle One)	Avery Island / WIPP
Test Type (Circle One)	Hydrostatic / Shear
Salt Can Label	
Water Added to Salt (Circle One)	yes / <u>no</u>
Target/Actual Water Added (Percent by Mass [%])	
Temperature: [$^{\circ}\text{C}$ / $^{\circ}\text{F}$]	
Pressure [MPa / psi]	40
Jacketing Components (Circle All)	Outer Lead - Outer Viton - Inner Lead - Inner Copper
Tested In (Circle One)	Frame 2 / <u>Frame 3</u>
Test Target (permeability / fractional density / etc)	0.95

Table 1: Description of Test

Note



Jacket failed
prior to Preconsolidation
7/28/15

2 Pre-Test Measurements

2.1 Height of components:

Components	Count	Component Label	Recorded Height [mm]
Platens	1	C1	37.19
	2	C2	37.05
Chamfer Discs	1	CP2	12.73
	2	CP3	8.38
Mesh Discs	1	NA	1.21
	2	NA	1.15
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:

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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)

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Outer Lead Jacket (mm)	220	1
Outer Viton Jacket (mm)		
Inner Lead Jacket (mm)	130	1
Inner Copper Jacket (mm)	134	1
Height of Total Sample (mm)		NA

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

2.2.3 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)		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	56.1	mL (burette)	
After Dunk: Water Level Reading on Burette	46.8	mL (burette)	79.3
Volume of Components (No Salt)	1064.33	mL	
Mass of Components (No Salt)	4.8438	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)

2.3 Measured Mass of Salt

2.3.1 Date: 7/28/15

Parameters	Value	
Salt Can Label	1D	
Before Making Sample: Mass of Salt and Can (with lid)	1.8874	kg
After Sample is Made: Remaining Mass of Salt and Can (with lid)	0.6091	kg
Mass of Salt Used for Sample	1.2783	kg
Cumulative Mass of Components and Salt	6.1163	kg

Table 6: Mass of Salt

Diameter before pre-consolidation = 217.7 mm
 Height " " " = 107.89 mm

3 Pre-consolidation Measurements

3.0.2 Date:

3.0.3 Data Sample Rate:

6.2076 + 91.35 ms Soil

Volume Displayed on ISCO Pump	Volume [mL]	Pressure [psi]	Time [hh:mm]
Initial Reading: prior to consolidation			
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.