

Procedure: Creep Test at SNL

Version Date:

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Form Completed By: TDL

1 Test Description

UNM-WP-HY-175-09

Parameters	Value
Test Name	UNM-WP-HY-175-10
Salt Provenance (Circle One)	Avery Island <u>WIPP</u>
Test Type (Circle One)	<u>Hydrostatic</u> / Shear
Salt Can Label	3G
Water Added to Salt (Circle One)	yes <u>no</u>
Target/Actual Added Water Content	$w = \frac{m_{\text{water-added}}}{m_{\text{salt}}} =$ _____
Temperature: [°C / °F]	175°C
Pressure [MPa / psi]	Multi-Stage
Jacketing Components (Circle All)	Outer <u>Lead</u> - Outer Viton - Inner Lead - Inner <u>Copper</u>
Tested In (Circle One)	Frame 2 / <u>Frame 3</u>
Test Target (permeability / fractional density / etc)	

Table 1: Description of Test

2 Pre-Test Measurements

2.1 Height of components:

Components	Count	Component Label	Recorded Height [mm]
Platens	1	C2 Top	37.06
	2	C9 Bot	37.16
Chamfer Discs	1	CP6 Top	8.24
	2	CP4 Bot	8.29
Mesh Discs	1	NA	1.10
	2	NA	1.10
Cumulative Height of Components		92.95	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)	230	1
Outer Viton Jacket (mm)		
Inner Lead Jacket (mm)		
Inner Copper Jacket (mm)	144	2
Height of Total Sample (mm)	230	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	Bolt
	2	Bolt
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	53.1	mL (burette)	
After Dunk: Water Level Reading on Burette	44.0	mL (burette)	
Volume of Components (No Salt)	1031.93	mL	w/o HC tails
Mass of Components (No Salt)	4.4821	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)

$$1041.93 - 10 \text{ mL} = 1031.93 \text{ mL}$$

HCT 2%

HC Tails ~~78.13~~
73.15

2.3 Measured Mass of Salt

2.3.1 Date:

3/28

Parameters	Value	
Salt Can Label	39	
Before Making Sample: Mass of Salt and Can (with lid)	1921.1	kg
After Sample is Made: Remaining Mass of Salt and Can (with lid)	0.362.9	kg
Mass of Salt Used for Sample	1.5586	kg
Cumulative Mass of Components and Salt	5.9676	kg

155856

Table 6: Mass of Salt

L No HC Tails

3 Pre-consolidation Measurements

3.0.2 Date:

He @ ≈ 1000 psi

3.0.3 Data Sample Rate:

N/A

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	53.4	mL (burette)
After Dunk: Water Level Reading on Burette	38.35.8 35.8	mL (burette)
Preconsolidated Specimen (all components listed above plus salt)	2015.16	mL
After Dunk: Mass of Specimen (with all components)	5.9688	kg
Total Height of Specimen	215.14	mm
Approximate Outside Diameter of Specimen	104.45	mm
Preconsolidated Salt (Salt Only) - Volume and Mass	983.23	mL
	1.5586	kg
Dunk Tank Volume Factor: 114.4978 mL/Burette Unit		

17.6

Table 8: Measurements Made After Preconsolidation of Specimen.

D = 1585.14
FD = 0.73

4 Application of Heat to Obtain Test Temperature

4.0.4 Data Sample Rate: 4/5/16 @ 100 sec

Event	Date	Time	Confining Pressure [psi]	Expelled Silicone Oil Volume (mL)
Start Temperature Increase	4/5	3:20 pm	41 = 70	0
End Temperature Increase	4/6	8:45	42 = 70	485 mL

Table 9: Dates of Details of Temperature Increase

4:40 4/5
Ex 320 mL @ 120°C

5 Creep Test

5.0.5 Date (Start Test):

5.0.6 Data Sample Rate:

Start ISCO
@ 463.04

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	5.4685	kg
Initial Dunk Tank Values	50.8	mL (burette)
Final Dunk Tank Values	35.2	mL (burette)
Volume of Specimen	1786.17	mL
Specimen Diameter	99.75	mm
Specimen Height	203.83	mm
Density of Salt only	2066.58	kg/m ³
Dunk Tank Volume Factor: 114.4978 mL/Burette Unit		

Table 11: Post Test Measurements

Comp = 1031.93 mL

M_s = 1.5587

V_s = 754.24

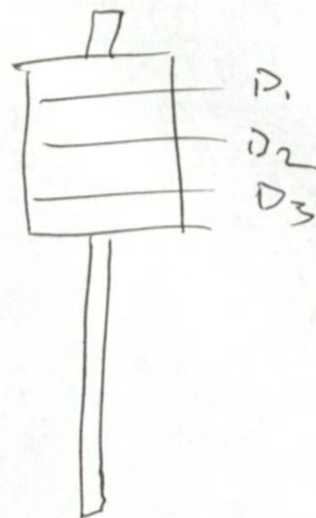
2066.58
FD = 0.96
P₁ = 4

As built Sample

$$D_1 = \begin{array}{r} 108.58 \\ - 107.45 \\ \hline 108.59 \end{array}$$

$$D_2 = \begin{array}{r} 108.36 \\ - 107.69 \\ \hline 108.12 \end{array}$$

$$D_3 = \begin{array}{r} 107.66 \\ - 109.00 \\ \hline 101.75 \end{array}$$



$$h (2 \text{ blocks used}) = 57.0 \text{ mm}$$

$$\begin{array}{rcl} - 279.47 & \Rightarrow & 222.47 \\ - 278.75 & \Rightarrow & 221.75 \\ - 279.44 & \Rightarrow & 222.44 \\ - 278.63 & \Rightarrow & 221.63 \end{array}$$

Pie Consolidated

$$D_3 = \begin{array}{l} - 104.65 \\ - 104.93 \\ - 103.96 \end{array} \quad 104.57$$

$$D_2 = \begin{array}{l} - 103.75 \\ - 103.67 \\ - 103.80 \end{array} \quad \text{Ave } 103.74$$

$$D_3 = \begin{array}{l} - 104.92 \\ - 104.91 \\ - 105.51 \end{array} \quad 105.11$$

height (-57.0 mm)

$$- 271.95 = 214.95$$

$$- 272.88 = 215.88$$

$$- 272.95 = 215.95$$

$$- 271.83 = 214.83$$

$$AV \quad 215.40$$

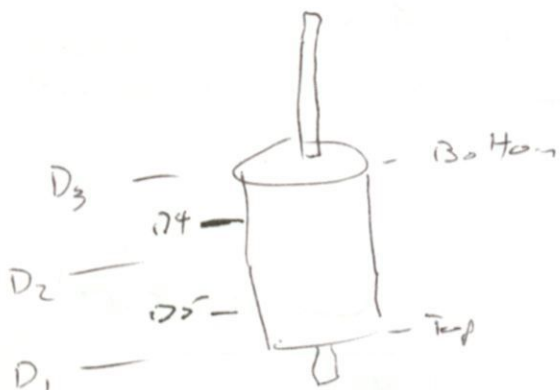
$$D_3 = 105.11$$

Post Consolidation

7/7/16

$$h_{comp} = 94.89$$

$$h = \frac{1310.115}{17} = 76.11 \text{ mm}$$



204.30	①	280.41
204.34	②	280.45
203.22	③	279.33
203.46	④	279.57

$$h_{av} = 203.83$$

$$- 108.99$$

D4

①	97.64	
②	97.91	97.29
③	96.32	

D5

①	94.57	95.15
②	95.78	
③	95.09	

$$8.5734 \times 10^{-4} \text{ m}^3$$

$$95.42$$

D1

①	103.69
②	102.86
③	103.42

D2

①	94.83
②	95.88
③	95.55

D3

①	100.97
②	100.44
③	99.91

$$\frac{D_{ox} \Delta V}{99.75}$$