Procedure: Creep Test at SNL

Version Date:

August 7, 2015

Form Completed By: TDL

1 Test Description

Parameters	Value
Test Name	175 - 07
Salt Provenance (Circle One)	Avery Island / (WIPP)
Test Type (Circle One)	(Hydrostatic) / Shear
Salt Can Label	5C
Water Added to Salt (Circle One)	yes / (no)
Target/Actual Added Water Content	$w = \frac{m_{water-added}}{m_{salt}}$
Temperature: [°C / °F]	175°C
Pressure [MPa / psi]	14 => 22 => 30 => 38. MPa
Jacketing Components (Circle All)	Outer (Lead) - Outer Viton - Inner Lead - Inner (Copper)
Tested In (Circle One)	Frame 2 / (Frame 3)
Test Target (permeability / fractional density / etc)	0.95 FD

Table 1: Description of Test

Failed

Jacket Leak

2 Pre-Test Measurements

2.1 Height of components:

Components	Count	Component Label	Recorded Height [mm]
Platens	1	C2	37.04
	2	C5	37.07
Chamfer Discs	1	CP3	8.30
	2	CP2	12.73
Mesh Discs	1	NA	1.09
	2	NA	1.07
Cumulative Height of Components		97.30	mm

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

2.2 Jacket Dimensions

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 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)		
Inner Copper Jacket (mm)	134	2
Height of Total Sample (mm)		

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		
Platen O-rings		
Platen Screws (0.25 inch 20 rnd)		
Screw-In Nipples		
Nipple O-rings		
Nipple Adapter (HIP HF4 connection)		
Nipple Plugs (HIP HF4 plugs)		
Chamfer Discs		
Mesh Discs		
Inner Copper Jacket (indicate No. used)		Thickness of 1 Sheet of Copper (mm):
Inner Lead Jacket		Jacket Thickness (mm):
Outer Lead Jacket		Jacket Thickness (mm):
External Hose Clamps		

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

2.2.3 Volume and Mass of Components (No Salt)

Measured Value	Values	Units	Comments
Prior to Dunk: Water Level Reading on Burette	56.8	mL (burette)	
After Dunk: Water Level Reading on Burette	48.0	mL (burette)	
Volume of Components (No Salt)	997.58	mL	w/o HC
Mass of Components (No Salt)	4.1924	kg	
Approximate Outside Diameter of Sample		mm	
Dunk Tank Volume Factor: 114.4978 mL/Burette Unit			

8.8
1007.5
w/ full H

Table 5: Measurements of All Components (No Salt)

HC Tails
75.71g

T 27.0
F 57.0

10 mL

Mass w/o HC
4.1167 kg

Pre Con

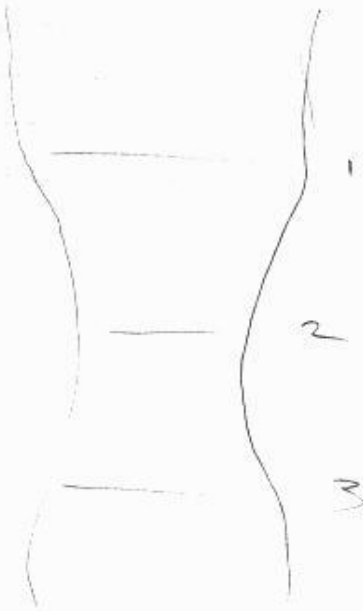
- 28.35"

h — 240.98 - 212.63
240.16 - 211.81
240.98 - 212.63
240.14 - 211.84
Av 212.23 mm

D_1 — 102.62
— 104.52
— 102.93
Av = 103.36

D_2 — 101.85"
— 102.19
— 102.65"
Av = 102.23

D_3 103.84
104.66
104.14
Av 104.21



H = 212.23
- 97.30
114.93

D
OA Av 103.27

2.3 Measured Mass of Salt

2.3.1 Date:

Parameters	Value	
Salt Can Label		
Before Making Sample: Mass of Salt and Can (with lid)	1.9662	kg
After Sample is Made: Remaining Mass of Salt and Can (with lid)	0.49413	kg
Bulk Mass of Salt Used for Sample	1.47207	kg
Cumulative Mass of Components and Salt	5.5889	kg

Table 6: Mass of Salt Before Preconsolidation

3 Pre-consolidation Measurements

II Gs 1500psi

3.0.2 Date: 12/21/15

3.0.3 Data Sample Rate: N/A

Volume Displayed on GUI	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)	5.5894	kg
Prior to Dunk: Water Level Reading on Burette	57.1	mL (burette)
After Dunk: Water Level Reading on Burette	40.3	mL (burette)
Preconsolidated Specimen (all components listed above plus salt)	1923.56	mL
After Dunk: Mass of Specimen (with all components)	5.5894	kg
Average Height of Specimen	212.23	mm
Average Outside Diameter of Specimen	103.27	mm
Bulk Salt Volume (Salt and added water):	925.98	mL
Dunk Tank Volume Factor: 114.4978 mL/Burette Unit		

16.8

Table 8: Measurements Made After Preconsolidation of Specimen.

Dunk

DT Vol salt

925.98 cc

Mass 1.47207 ~~1.48207~~ kg

$$\frac{1.47207 \text{ kg}}{925.98 \text{ cm}^3}$$

$\rho = 1589.74 \frac{kg}{m^3}$ ~~$\rho = 1600.54 \frac{kg}{m3}$~~ $\rho =$

FD = 0.736 ~~FD 0.741~~

D = 103.27

h = 114.93 mm

962.66 cc

$\rho = 1529.17 \frac{kg}{m^3}$

FD 0.708

Parameter	Values	Units
Salt Only - Volume: $V^{salt}_{sample} = V^{bulk}_{sample} * (1 - w)$	925.98	mL
Salt Only - Mass: $m^{salt}_{sample} = m^{bulk}_{sample} * (1 - w)$	1.47207	kg
Salt Only - Denisty: $\rho^{salt}_{sample} = m^{salt}_{sample}/V^{salt}_{sample}$	1589.74	kg/m^3
Salt Only - Fractional Density: $\overline{\rho} = \rho^{salt}_{sample}/2160$	0.736	-

Table 9: Post-Consolidation Density Calculations

4 Application of Heat to Obtain Test Temperature

4.0.4 Data Sample Rate: 1,000 sec

Event	Date	Time	Confining Pressure [psi]	Expelled Silicone Oil Volume (mL)
Start Temperature Increase	12/26	7:15 AM	20 ~~1500~~	0
End Temperature Increase	12/27	7:10 AM	20 isco	485 mL

Table 10: Dates of Details of Temperature Increase

5 Creep Test

5.0.5 Date (Start Test): 12/27

5.0.6 Data Sample Rate: 10 sec

Event	Value	Comment
ISCO Pump Volume (Pre Pressure Increase)	508.03	
ISCO Pump Pressure (Pre Pressure Increase)		
Begin Pressure Increase	Time: ~~7:29~~ 7:33 ≈	
End Pressure Increase	Time: 7:36	
ISCO Pump Volume (Post to Pressure Increase)	165 ≈	
ISCO Pump Pressure (Post Pressure Increase)	2030	
ISCO Pump Flow Rate (Post Pressure Increase)	≈ 3.5 mL/min	

Table 11: 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
Average Height of Specimen		mm
Average Outside Diameter of Specimen		mm
Density of Salt only		kg/m^3
Dunk Tank Volume Factor: 114.4978 mL/Burette Unit		

Table 12: Post Test Measurements

Parameter	Values	Units
Salt Only - Volume: $V^{salt}_{sample} = V^{bulk}_{sample} * (1 - w)$		mL
Salt Only - Mass: $m^{salt}_{sample} = m^{bulk}_{sample} * (1 - w)$		kg
Salt Only - Denisty: $\rho^{salt}_{sample} = m^{salt}_{sample}/V^{salt}_{sample}$		kg/m^3
Salt Only - Fractional Density: $\overline{\rho} = \rho^{salt}_{sample}/2160$		-

Table 13: Post Test Density Calculations