Procedure: Creep Test at SNL

Version Date:

July 7, 2015

Form Completed By:_____

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	5D
Water Added to Salt (Circle One)	yes / (no)
Target/Actual Water Added (Percent by Mass [%])	———
Temperature: [°C / °F]	90°C
Pressure [MPa / psi]	14, 22, 30, 38
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)	Multi-stage creep

Table 1: Description of Test

Failed Jacket

2 Pre-Test Measurements

2.1 Height of components:

Components	Count	Component Label	Recorded Height [mm]
Platens	1	C2	37.05
	2	C4	37.08
Chamfer Discs	1	CP2	12.73
	2	CP3	8.38
Mesh Discs	1	NA	1.31
	2	NA	1.23
Cumulative Height of Components		97.78	mm

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

2.2 Jacket Dimensions

2.2.1 Jacket Componenets

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)	—	—
Inner Copper Jacket (mm)	134	2
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)	2	Thickness of 1 Sheet of Copper (mm) ~~1.41~~
Outer Lead Jacket	1	Jacket Thickness (mm) ~~0.13~~

0.13? 1.41.

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	60.6	mL (burette)	
After Dunk: Water Level Reading on Burette	51.9	mL (burette)	
~~Volume of Components (No Salt)~~	~~996.13~~	mL	
~~Mass of Components (No Salt)~~	~~4.1538~~	kg	
Approximate Diameter of Salt	102.61	mm	
Approximate Height of Salt		mm	
Dunk Tank Volume Factor: 114.4978 mL/Burette Unit			

Which?

Table 5: Measurements of All Components (No Salt)

Initial dunk + Mass of 4 full hose clamps

4 HC Pieces
$m = 75.83g$

$V = 86.5 - 76 = 10.5 mL$

Mass Components = 4.0780 kg

Volume Components = 985.63 mL

11/6 Re check

Components

4.1596 kg

includes 4 Hose clam tails

Initial 61.6

Final 52.6

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9 ⇒ ~~[illegible]~~ 1030.4 mL

⇐ 1019.98 mL w/o hoseClamp tails

D mm	h mm	-6.20 mm (Shim to measure above hose clamps)
103.38	219.4	213.20
102.45	214.81	213.61
102.35	220.28	214.08
102.27	219.78	213.58
Av 102.61 mm		Av = 213.62 mm

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)~~	1.9260	kg
After Sample is Made: Remaining Mass of Salt and Can ~~(with lid)~~	0.4437	kg
Mass of Salt Used for Sample	1.4818	kg
Cumulative Mass of Components and Salt	5.5596	kg

1.9255

Table 6: Mass of Salt

↑ doesn't add up

3 Pre-consolidation Measurements

3.0.2 Date: 10/16/15

3.0.3 Data Sample Rate: NA

Volume Displayed on ISCO Pump	Volume [mL]	Pressure [psi]	Time [hh:mm]
Initial Reading: prior to consolidation		1500	3:15 PM
Reading: When at pre-consolidation pressure			
Final Reading: after pre consolidation			

Gas used ↓ Nitrogen

Table 7: Pre-consolidation Details

Parameter	Values	Units
Prior to Dunk: Mass of Specimen (with all components)	5.5600	kg
Prior to Dunk: Water Level Reading on Burette	61	mL (burette)
After Dunk: Water Level Reading on Burette	44	mL (burette)
Preconsolidated Specimen (all components listed above plus salt)	1946.46	mL
After Dunk: Mass of Specimen (with all components)	5.5609	kg
Total Height of Specimen	213.62	mm
Approximate Outside Diameter of Specimen	102.61	mm
Preconsolidated Salt (Salt Only) - Volume and Mass	960.83	mL
	1.4818	kg
Dunk Tank Volume Factor: 114.4978 mL/Burette Unit		

Table 8: Measurements Made After Preconsolidation of Specimen.

ρ = 1542.21 $\frac{kg}{m^3}$

FD = 0.71

10/21

Re Dunk

Initial 61.3

Final 44.4

Outside Dimensions

D

h

4 Application of Heat to Obtain Test Temperature

85.4°C 10/26 8:00am

4.0.4 Data Sample Rate: 1000 sec

Event	Date	Time	Confining Pressure [psi]	Expelled Silicone Oil Volume (mL)
Start Temperature Increase	~~10/23~~	12:15	0	0
End Temperature Increase	10/26	8:45 AM	0	225 mL

Table 9: Dates of Details of Temperature Increase

Heating #2
10/27/15
12:00pm
expelled 220ml

5 Creep Test

5.0.5 Date (Start Test): 10/26/15

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)	~~203~~ 7 psi	
Begin Pressure Increase	Time: 9:00	-Bled ~ 200 mL
End Pressure Increase	Time: 9:05	
ISCO Pump Volume (Post to Pressure Increase)		497.28 mL → 10:48
ISCO Pump Pressure (Post Pressure Increase)	2,030 psi	
ISCO Pump Flow Rate (Post Pressure Increase)		

Isco now connect + monitoring flo

Table 10: Details of Test Initiation

5.0.7 Date (End Test): 10/26/2015 → Leaked Gas out bottom Nipple

Parameters	Values	Units
Final Mass of Specimen	5.5844	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

mL V
0 ~~2.580566~~ 9.999695

Isco Cal: 508.07
-50.807

-07.54 0.000610 9.9991

Final

Height	Diameter
- 213.25	
- 212.64	99.09
212.20	98.79
	100.9
212.63	98.65

Gap ~~4.6mm~~ 5.97