

Procedure: Creep Test at SNL

Version Date:

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1 Test Description

Parameters	Value
Test Name	UNM-WP-HY-90-03 - Feil
Salt Provenance (Circle One)	Avery Island (WIPP)
Test Type (Circle One)	Hydrostatic / Shear
Salt Can Label	2 B full can / 5 B 1/2 can
Water Added to Salt (Circle One)	(yes) no
If Water Added, What Percent by Mass [%]	1.13%
Temperature: [°C / °F]	90°C
Pressure [MPa / psi]	20 MPa
Jacketing Components (Circle All)	Outer Lead - (Outer Viton) - Inner Lead - (Inner Copper)
Tested In (Circle One)	Frame 2 / (Frame 3)

Table 1: Description of Test

2 Pre-Test Measurements

2.1 Height of components:

Components	Count	Component Label	Recorded Height [mm]
Platens	1	CS5	51.10
	2	CS6	35.92
Chamfer Discs	1	CP3	8.36
	2	CP4	8.38
Mesh Discs	1	NA	28/84 0.64
	2	NA	13/51 1.09
Cumulative Height of Components		105.49	mm

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

2.2 Jacket Dimensions

If the test is performed at:

1. A temperature above 100 °C (high temp.) -> one outer lead jacket and one or more inner copper jackets will be used;
2. A temperature below 100 °C (low temp.) -> one outer Viton jacket, one inner lead jacket, and one inner copper jacket. Spatially, from outer to inner, the jacket order will be Viton, lead, and copper; with the salt being in contact with copper.

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 11.0 inches (279.4 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 1.0 inches (25.4 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)

Initial Height

Jacket Description	Height	No. of Jackets Used
Outer Lead Jacket (mm)		
Outer Viton Jacket (mm)	266	1
Inner Lead Jacket (mm)		
Inner Copper Jacket (mm)	163	2

61.2

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	1	✓
	2	✓
Platen O-rings	1	✓
	2	
	3	✓
	4	✓
Platen Screws (0.25 inch 20 rnd)	1	—
	2	—
Screw-In Nipples	1	Plug Nipple
	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	✓
Outer Lead Jacket	1	
Inner Lead Jacket	1	
Outer Viton Jacket	1	✓
Wire Ties - Wrapped Around Viton Jacket	1	✓
	2	✓
	3	✓
	4	✓

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

Measured Value	Values	Units
Prior to Dunk: Water Level Reading on Burette	57.4	mL (burette)
After Dunk: Water Level Reading on Burette	47.8	mL (burette)
Volume of Components (No Salt)		mL
Mass of Components (No Salt)		kg

Table 5: Measurements of All Components (No Salt)

Deduction in volume = 20.8 mL → trimmed viton Jacket vol.

2.3 Measured Mass of Salt

2.3.1 Date:

Parameters	Value	
Salt Can Label (2 cans used)	2B (full can), 5B (1/2 can)	
Before Making Sample: Mass of Salt and Can (with lid)	2.4165	kg
After Sample is Made: Remaining Mass of Salt and Can (with lid)	0.4422	kg
Mass of Salt Used for Sample	1.9742	kg
Cumulative Mass of Components and Salt	8.4930	kg

Table 6: Mass of Salt

3 Pre-consolidation Measurements → attempted on 6/24 but failed
(prev. press. to ~200 psi)

3.0.2 Date: 6/25

3.0.3 Data Sample Rate: 15 sec

Volume Displayed on ISCO Pump	Volume [mL]	Pressure [psi]	Time [hh:mm]
Initial Reading: prior to consolidation	424.96	64	11:04
Reading: When at pre-consolidation pressure	426 112	2900	11:12
Final Reading: after pre consolidation	205.76	30	11:18

Table 7: Pre-consolidation Details

Components	Volume [mL]	Mass [kg]
Preconsolidated Specimen (all components listed above plus salt)		
Preconsolidated Salt (Salt Only)		

Table 8: Pre-consolidation Measurements

3.1 Pre-Creep Test Measurements (After Specimen Has Been Preconsolidated)

3.1.1 Date:

Parameter	Values	Units
Prior to Dunk: Mass of Specimen (with all components)	Did not dunk	kg
Prior to Dunk: Water Level Reading on Burette	Viton Jacket!	mL (burette)
After Dunk: Water Level Reading on Burette		mL (burette)
After Dunk: Mass of Specimen (with all components)		kg
Measured Volume Change of Salt Caused by Pre consolidation		mL
Measured Volume of Salt Prior to Creep Test	1053.87	mL

Table 9: Measurements Made During Seconds Dunk of Specimen (after pre consolidation).

from measurements w/ caliper

4 Application of Heat to Obtain Test Temperature

Heat will be applied to the specimen until the desired test temperature is obtained, this will be done under quasi-atmospheric pressure.

4.0.2 Date: 6/26

4.0.3 Data Sample Rate: 10 min

- Vessel warm from test on silicon oil

Event	Date	Time	Confining Pressure [psi]	Comments
Start Temperature Increase	6/26/15	12:00	5 (on Iso)	$T_{fluid} = 30^{\circ}\text{C}$ (still warm)
End Temperature Increase	6/26/15	14:55	3 (on Iso)	$T_{fluid} = 86^{\circ}\text{C}$

Table 10: Dates of Details of Temperature Increase

fluid Volume Expelled:
325 mL

5 Begin Creep Test

5.0.4 Date:

5.0.5 Data Sample Rate:

Event	Value	Comment
ISCO Pump Volume (Pre Pressure Increase)	380.0	Plan -> Inj 210 mL total
ISCO Pump Pressure (Pre Pressure Increase)	10 psi	ISCO rate ~ 2 mL/min
Begin Pressure Increase	Time: 15:11	End test
End Pressure Increase	Time:	- Jacket Tear
ISCO Pump Volume (Post to Pressure Increase)		
ISCO Pump Pressure (Post Pressure Increase)		
ISCO Pump Flow Rate (Post Pressure Increase)		

Table 11: Details of Test Initiation