

## Unified Elastic Recovery Specification SEAUPG Binder Task Group Recommendation

Don Siler  
Asphalt Technologist  
Marathon Petroleum Company

## Why ER Testing

- Ensure agency polymer is being used.
- Ensure minimum amount is being used.
- Empirical performance enhanced.
- Considered best method currently available.



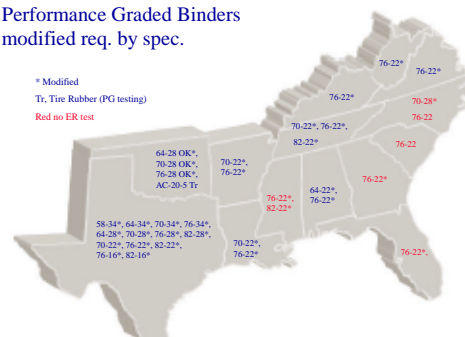
## ER Challenges

- Various methods being used,
  - AASHTO T-301
  - ASTM D 6084-A
  - ASTM D 6084-B
- Little consistency between states methods
- Cannot compare results between states
- Cumbersome on supplier supplying various states from one source

## Performance Graded Binders modified req. by spec.

\* Modified  
Tr, Tire Rubber (PG testing)

Red no ER test



Southeastern Asphalt User/Producer Group, Binder Task Group  
Elastic Recovery DOT Survey  
Return By: February 15, 2007

Identify State:		Office Location:		Austin Headquarters	
Person filling out survey:		Ph.:		e-mail:	
Remarks					
Do you Spec. Elastic Recovery:	Yes <input type="checkbox"/>	No <input type="checkbox"/>			
Do you Spec. any other test for polymer	Yes <input type="checkbox"/>	No <input type="checkbox"/>			
Material tested	Original Binder	RTFO			
Method	AASHTO T301	ASTM 6084 A	ASTM 6084 B		
Test Temperature	25C	10C	Other		
Mold sides	Straight side	V side	Other		
Elongation	10 cm	20 cm elongation	Other		
Hold time prior to cut	5 minutes	Cut immediately	Other		
Calculations	Please show example:				
Other items not specified:					

Indicate your selection by placing an X in the box to the right of the item.  
Provide remarks that defines why you are using what was selected. Return To: [DBSilver@marathonpetroleum.com](mailto:DBSilver@marathonpetroleum.com)

Southeastern Asphalt User/Producer Group, Binder Task Group  
Elastic Recovery DOT Survey  
Return By: February 15, 2007

Identify State:		Office Location:		Austin Headquarters	
Person filling out survey:		Ph.:		e-mail:	
Remarks					
Do you Spec. Elastic Recovery:	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>			
Do you Spec. any other test for polymer	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>			
Material tested	Original Binder	RTFO			
Method	AASHTO T301	ASTM 6084 A	<input checked="" type="checkbox"/> ASTM 6084 B		
Test Temperature	25C	10C	<input checked="" type="checkbox"/> Other		
Mold sides	Straight side	V side	Other		
Elongation	10 cm	20 cm elongation	Other		
Hold time prior to cut	5 minutes	Cut immediately	<input checked="" type="checkbox"/> Other		
Calculations	Please show example:				
Other items not specified:					

Indicate your selection by placing an X in the box to the right of the item.  
Provide remarks that defines why you are using what was selected. Return To: [DBSilver@marathonpetroleum.com](mailto:DBSilver@marathonpetroleum.com)

## Observations

- Test:
- Method: 2 - D6084A, 7 - T301
- Aging: 4 - Original Binder, 5 - RTFO
- Sides: 2 - V side, 7 - Straight Side
- Temperature: 2 - 10C, 7 - 25C
- Elongation: 4 - 10 cm, 5 - 20 cm
- 5 states do not perform ER: FL, GA, MS, NC, SC
- 3 states perform phase angle: FL, GA, SC

## Survey results Current Methods

State:	AL	AR/TN	TX	TX AC	KY	LA	VA/WV	OK
Method	T301	T301	6084A		T301	T301	T301	6084A
Aging	O	O	O	O	R	R	R	R
Sides	SS	SS	SS	VS	VS	SS	SS	SS
Temp	10	25	10	10	25	25	25	25
Elong	20	20	10	20	10	10	20	10
Hold	5	5	0	5	5	0	5	5

## Specification

State:	AL	AR	TN	TX	TXAC	KY	LA	VA	WV	OK
PG82-22, min			70	60						
PG76-22, min	50	50	65	50		75	60	70	70	75
PG70-22, min		40	45	30			40			65
Other test	IR		SP			IR	FD			
FTIR	yes					yes				
FD							0.30			
SP, C			53/57/66							

## AI WCTG Study

- Method 1 (M1)
  - Original, 10°C, V-shaped Sides, 20 cm Elongation, 5-min Hold
- Method 2 (M2): *AASHTO T301, ASTM D6084 – Method B*
  - RTFO, 25°C, Parallel Sides, 20 cm Elongation, 5-min Hold
- Method 3 (M3)
  - RTFO, 25°C, Parallel Sides, 20 cm Elongation, No Hold
- Method 4 (M4): *ASTM D 6084 – Method A*
  - RTFO, 25°C, Parallel Sides, 10 cm Elongation, No Hold

### AI WCTG Study

Binder	Koch PG 70-28			
Method	M1	M2	M3	M4
Aging	Orig	RTFO	RTFO	RTFO
Sides	V	Parallel	Parallel	Parallel
Temp.	10	25	25	25
Elong.	20	20	20	10
Hold	5	5	0	0
Average	80.2%	88.0%	91.9%	90.9%
1s	3.5%	3.1%	1.5%	4.3%
1s%	4.4%	3.5%	1.7%	4.7%
d2s	10.0%	8.6%	4.4%	12.2%
d2s%	12.5%	9.8%	4.8%	13.4%
Labs	23	24	23	23

### AI WCTG Study

Binder	Crown PG 70-28			
Method	M1	M2	M3	M4
Aging	Orig	RTFO	RTFO	RTFO
Sides	V	Parallel	Parallel	Parallel
Temp.	10	25	25	25
Elong.	20	20	20	10
Hold	5	5	0	0
Average	67.3%	76.9%	82.9%	81.3%
1s	3.5%	1.9%	2.7%	5.3%
1s%	5.2%	2.5%	3.3%	6.5%
d2s	9.9%	5.4%	7.8%	15.0%
d2s%	14.7%	7.0%	9.4%	18.5%
Labs	23	25	25	25

### AI WCTG Study

Binder	Cenex PG 70-28			
Method	M1	M2	M3	M4
Aging	Orig	RTFO	RTFO	RTFO
Sides	V	Parallel	Parallel	Parallel
Temp.	10	25	25	25
Elong.	20	20	20	10
Hold	5	5	0	0
Average	81.6%	88.7%	91.7%	91.0%
1s	2.1%	1.4%	2.8%	3.7%
1s%	2.5%	1.6%	3.1%	4.1%
d2s	5.8%	4.0%	8.1%	10.5%
d2s%	7.2%	4.5%	8.8%	11.6%
Labs	26	27	27	27

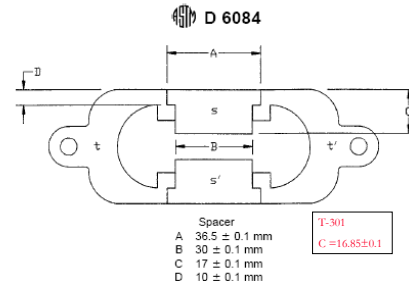
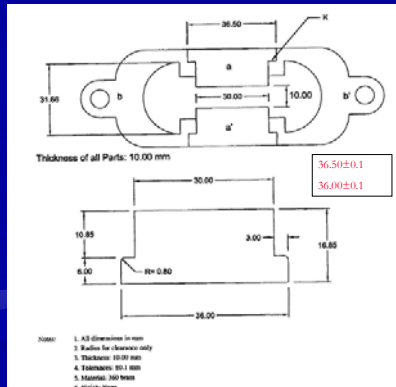


FIG. 1 Mold for Ductility Test Specimen



### AASHTO T-301

- 4.5. *Testing*—At the start of the test, the water in the tank of the testing machine shall cover the specimen both above and below and shall be at least 25 mm. Attach the clips to the pins or hooks of the force adapter and the testing machine and pull the clips apart at 5 cm/mm ± 5.0 percent, until the briquet has been elongated to 20 cm. After 20 cm has been reached, stop the ductilometer, and hold the specimen in its elongated position for five minutes. After five minutes, sever the specimen at its center with a pair of scissors and allow the specimen to remain in the ductilometer, undisturbed, for one hour. At the end of one hour, release the ductilometer from the drive mechanism and retract the half sample until the ends of the severed sample just touch. Read the ductilometer pointer and record the value.

## SEAUPG Proposed Method

- AASHTO T 301 (with corrections),
  - Section 4.5, mold should be attached to the force adapter and the testing machine.
  - Mold Dimensions (under review by AASHTO)
- RTFO Binder (same residue as MSCR)
- Straight Sided Molds
- 25C (77F) test temperature
- 20 CM Elongation
- 5 minute hold (will have lower results than 0 hold)
- 1 hr recovery
- Read elongation to nearest 0.25 cm, report % to nearest whole

## Recommendation

- Adopt unified ER methodology
- Perform Round Robin Testing with DOT's, Suppliers.
- Send Letter to AASHTO Ron Horner ND DOT
  - requesting editorial correction to T-301
  - paragraph 4.5 and mold dimensions.

**Asphalt is**

*durable  
 versatile  
 fast  
 quiet  
 smooth  
 safe  
 cost-effective  
 100% recyclable*

