ASPHALT BINDER CONTENT OF ASPHALTIC CONCRETE MIXTURES BY THE IGNITION FURNACE METHOD

(A Modification of AASHTO T 308)

1. SCOPE

1.1 This procedure describes the method for determining the percent asphalt binder content of asphaltic concrete mixtures, by use of an ignition furnace. The aggregate remaining after ignition can be used for sieve analysis, as indicated in Section 6.

1.1.1 This procedure does not address the use of reclaimed asphalt pavement (RAP) in asphaltic concrete mixtures. **See Arizona Test Method 428 when testing is to be performed on asphaltic concrete mixtures containing RAP.**

1.2 This test method involves hazardous material, operations, and equipment. This test method does not purport to address all of the safety concerns associated with its use. It is the responsibility of the user to consult and establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.

1.3 See Appendix A1 of the Materials Testing Manual for information regarding the procedure to be used for rounding numbers to the required degree of accuracy.

1.4 A listing of subsequent Sections and Figures in this procedure is given below:

2. APPARATUS

2.1 Requirements for the frequency of equipment calibration and verification are found in Appendix A3 of the Materials Testing Manual. Apparatus for this test procedure shall consist of the following:

2.1.1 Ignition Furnace - a forced-air ignition furnace that heats the sample by the convection method. The furnace must be capable of heating to temperatures up to 538 °C (1000 °F), and able to maintain a given temperature at ± 5 °C (± 9 °F). The furnace shall have an internal weighing system thermally isolated from the furnace chamber and accurate to 0.1 gram. The balance shall be capable of weighing a 3500 gram sample in addition to the sample baskets. A data collection system shall also be included so that the sample mass loss can be automatically determined to an accuracy of 0.1 gram and displayed during a test. The furnace shall provide a printout that includes, as a minimum, the initial sample mass, sample mass loss, test time, and test temperature. The furnace shall provide an audible alarm and indicator light when the sample mass loss does not exceed 0.01 percent of the total sample mass for three consecutive one minute intervals. A filter capable of reducing emissions to an acceptable level shall also be incorporated into the furnace. The furnace shall be vented into a hood or to the outside and be set up properly so that there are no noticeable odors escaping into the laboratory. The furnace shall have a fan with the capability to pull air through the furnace to expedite the test and to reduce escape of smoke into the laboratory. The furnace shall be equipped so that the door cannot be opened until testing is complete.

2.1.2 Stainless Steel Perforated Baskets - the baskets shall be an appropriate size that allow the samples to be a thickness which allows air to flow up through and around the sample particles. The sample shall be completely enclosed with screen mesh, perforated stainless steel plate, or other suitable material. Screen mesh or other suitable material with openings of No. 8 has been found to perform well.

2.1.3 Stainless Steel Catch Pan - of sufficient size to hold the sample baskets so that aggregate particles and melting asphalt binder falling through the screen mesh are caught.

2.1.4 Oven(s) - capable of heating to temperatures up to 350 °F, and able to maintain a given temperature at the tolerances specified herein.

2.1.5 Scale(s) or balance(s) - capable of measuring the maximum mass to be determined and conforming to the requirements of AASHTO M 231, except the readability and sensitivity of any balance or scale utilized shall be at least 0.1 gram.

2.1.6 Safety Equipment - safety glasses or face shield, high temperature gloves, and long sleeve jacket. Additionally, a heat resistant surface capable of withstanding 1200 °F and a protective cage capable of surrounding the sample baskets shall be provided.

2.1.7 Miscellaneous Equipment - a pan larger than the sample basket(s) for transferring samples after ignition, spatulas, bowls, spoons, and wire brushes.

2.1.8 Mixing apparatus - Mechanical mixing is recommended; 20 quart capacity mixer is required. (Hand mixing may be performed if desired.)

2.1.9 Thermometer - with a temperature range of 50 to 500 °F.

2.1.10 Hot plate - capable of heating to temperatures up to 350 °F, and able to maintain a given temperature at ± 5 °F.

2.1.11 For performing sieve analysis, apparatus as specified in Arizona Test Method 201.

3. SAMPLING

3.1 For preparing calibration samples, obtain representative samples of aggregates in accordance with Arizona Test Method 105. Samples shall be sufficiently large to provide enough material for calibration testing. The samples shall be adequately dried, if necessary, to a free-flowing condition in the portion passing the 4.75 mm (No. 4) sieve.

3.2 For testing field samples of asphaltic concrete, obtain a representative sample of the freshly produced mix in accordance with Arizona Test Method 104. Obtain representative test samples, in accordance with the appropriate sections of Arizona Test Method 416, for the determination of moisture content (if required) and asphalt binder content.

3.2.1 The size of the asphalt binder content test sample shall be within ± 150 grams of the sample size used for calibration and must also conform to the mass requirement shown in Table 1. When the mass of the test sample exceeds the capacity of the equipment used, the test sample shall

be divided into suitable increments, tested, and the results appropriately combined.

TABLE 1	
Size of Test Sample	
Nominal Maximum Aggregate Size (See Note)	**Mass of Sample, grams**
1-1/2 in.	4000 – 4500
1 in.	3000 – 3500
3/4 in.	2000 – 2500
1/2 in.	1500 – 2000
3/8 in.	1200 – 1700
No. 4	1200 – 1700
Note: The smallest sieve opening through which the entire amount of material, by specification, is permitted to pass.	

4. CALIBRATION

4.1 Asphalt binder content results may be affected by the type of aggregate and binder in the mixture. A calibration factor for the asphalt binder content must be established for each mix design. Certain aggregate types may result in an unusually high calibration factor and erroneous gradation results due to aggregate breakdown. Such mixes should be calibrated and tested at a lower temperature as described in Subsection 4.14.

4.2 Dry the aggregate samples to constant mass at 290 ± 10 °F. Allow the material to cool.

4.3 Screen the aggregate stockpile samples and separate into individual sizes for No. 8 and larger, and minus No. 8 material.

Note: In lieu of screening the aggregate sample for each individual stockpile, a bulk-batched sample may be used as described in Subsection 4.3.1.

4.3.1 Using the aggregate stockpile percentages shown in the mix design composite, the material from the individual stockpiles may be bulk-batched in a single sample of an adequate amount of material necessary to prepare the required calibration samples. Screen the bulk-batched material and separate into individual sizes for No. 8 and larger, and minus No. 8 material.

4.4 Using the individual sizes of aggregate for No. 8 and larger, and minus No. 8 material, as obtained either by screening the material from the individual aggregate stockpiles or by screening the the bulk-batched sample, weigh up four aggregate samples representative of the mix design gradation without mineral admixture. These samples will be used for a gradation check, two calibration samples, and a butter mix. The appropriate type and quantity of mineral admixture (by weight of aggregate) shall be added to the aggregate, and thoroughly blended. The weight of the gradation check sample shall conform to the requirements of Table 1. The weight of the two calibration samples and the butter mix shall be such that when the required amount of asphalt binder is added, they conform to the requirements of Table 1.

4.5 Using the aggregate and mineral admixture sample prepared for the gradation check, perform a gradation analysis according to Section 6 to determine the actual gradation. The gradation shall be representative of the mix design gradation with mineral admixture. If the gradation is not representative of the mix design, four new aggregate and mineral admixture samples shall be prepared.

4.6 Using the remaining three aggregate and mineral admixture samples, two calibration samples and a butter mix are prepared as described below at the design asphalt binder content. The asphalt binder grade and type shall be the same as will be used in the asphalt concrete mixture to be tested during production. Heat the samples to the laboratory mixing temperature prescribed in the mix design. (See Note following Subsection 4.7). Allow the samples to cool. Weigh and determine the mass of each sample to the nearest 0.1 gram. If mass is lost during the heating of the samples, do not add make-up material, as this will change the gradation of the samples. The percent asphalt binder content is based on the mass of total mix. For each sample, the weight of asphalt binder to be used is determined by the following:

$$\left[\begin{array}{c}\text{Weight of}\\ \text{Asphalt Binder}\end{array}\right] = \frac{\left[\begin{array}{c}\text{Weight of Aggregate}\\ \text{and Mineral Admixture}\end{array}\right]}{100 - \left[\begin{array}{c}\text{Percent of}\\ \text{Asphalt Binder}\end{array}\right]} \times \left[\begin{array}{c}\text{Percent of}\\ \text{Asphalt Binder}\end{array}\right]$$

4.7 All bowls, sample pans, and mixing tools shall be preheated to approximately the laboratory mixing temperature prescribed in the mix design. At the time mixing of the samples begins, the temperature of the asphalt binder, aggregate, and mineral admixture shall be in accordance with the prescribed laboratory mixing temperature $\pm$ 5 °F. Each individual

sample shall be thoroughly mixed. All samples shall be mixed at the same mixing temperature ± 5 °F.

Note: If the mix design laboratory mixing temperature is not specified, a temperature of 300 ± 5 °F shall be used for mixes which do not use asphalt-rubber, and 325 ± 5 °F for asphalt-rubber mixes.

4.8 Preheat the ignition furnace to 538 ± 5 °C (1000 ± 9 °F), or as modified in Subsection 4.14. Do not preheat the sample basket.

4.9 Weigh and record the mass of the basket assembly to the nearest 0.1 gram.

4.10 The freshly mixed samples may be placed directly in the sample basket assembly. If the samples are allowed to cool, they must be reheated in a 290 ± 10 °F oven for 25 minutes.

4.11 Test samples in accordance with Subsections 5.6 through 5.14.

4.12 If the difference between the measured asphalt binder content of the two samples exceeds 0.07, repeat the test using two additional samples, and from the four results discard the high and the low values.

4.13 Subtract the actual asphalt binder content for each of the two samples from their respective measured asphalt binder content. The asphalt binder content calibration factor is the average of the two resultant values expressed in percent by mass of the asphalt mixture.

4.14 If the asphalt binder content calibration factor exceeds ± 1.0 percent, lower the test temperature to 482 ± 5 °C (900 ± 9 °F) and repeat the test to determine a new calibration factor. If the calibration factor continues to exceed ± 1.0 percent, lower the test temperature to 427 ± 5 °C (800 ± 9 °F) and repeat the test to determine a new calibration factor. Use the calibration factor obtained at 427 ± 5 °C (800 ± 9 °F) even if it exceeds ± 1.0 percent.

4.15 Perform a gradation analysis on the residual aggregate as indicated in Section 6. Subtract the actual percent passing the No. 200 sieve for each sample from the measured percent passing the No. 200 sieve (as determined in Subsection 4.5). Determine the average of the two values. If the resultant average value is greater than ± 0.50, an aggregate gradation correction factor (equal to the resultant average value) for the

passing No. 200 material may be applied to the production field sample test results.

5. PROCEDURE

5.1 The moisture content of the asphaltic concrete shall be determined in accordance with Arizona Test Method 406. The moisture content sample shall be obtained at the same time and subjected to the same treatment prior to testing as the asphalt binder content test sample. As an alternate to performing the moisture determination, the test sample may be dried to a constant mass in an oven at 290 ± 10 °F.

5.2 Preheat the ignition furnace to 538 ± 5 °C (1000 ± 9 °F), or to the alternate temperature determined during the calibration (Subsection 4.14). Do not preheat the sample basket. Record the furnace temperature set point prior to the initiation of the test.

5.3 Record the asphalt binder content calibration factor, determined in accordance with Subsections 4.12 through 4.14, for the specific mix to be tested.

5.4 Weigh and record the mass of the basket assembly to the nearest 0.1 gram.

5.5 Obtain the asphalt binder content test sample in accordance with Subsection 3.2, ensuring that the size of the test sample is within ± 150 grams of the sample size used for calibration and that the test sample conforms to the requirements shown in Table 1.

5.6 Evenly distribute the test sample over the center of the sample basket(s) and level the material. Use a spatula or trowel to pull material approximately one inch away from the outside edge of basket(s).

5.7 Weigh and record the mass of the sample and basket assembly to the nearest 0.1 gram.

5.8 Calculate and record the initial mass of the sample to the nearest 0.1 gram.

5.9 Set the ignition furnace controller print mode to give a printout of the test data required in Subsection 2.1.1. Input the initial mass of the sample into the ignition furnace controller. Verify that the correct mass has been entered.

5.10 Open the furnace door and place the sample and basket assembly so that it is centered in the chamber. After assuring that the sample basket assembly is not in contact with any wall, close the door. Initiate the test by pressing the start button. This will lock the furnace door and start testing.

5.11 Allow the test to continue until the stable light and audible stable indicator indicates the test is complete. The test is deemed complete when the measured mass loss does not exceed 0.01 percent of the sample mass for three consecutive one minute intervals. If required, press the stop button. This will unlock the furnace door and cause the printer to print out the test results.

5.12 Open the furnace door and remove the sample and basket assembly. Allow the sample to cool 30 ± 5 minutes in the basket assembly. Weigh and record the mass of the sample and basket assembly after ignition to the nearest 0.1 gram.

5.13 Calculate and record the mass of sample after ignition to the nearest 0.1 gram.

5.14 Calculate and record the corrected asphalt binder content of the sample, to the nearest 0.01%, as follows:

$$\%AC = \left[\frac{W_i - W_A}{W_i} \times 100 \right] - C_F - \%M$$

Where: %AC = measured (corrected) asphalt binder content in percent by mass of the sample
W_i = mass of the sample prior to ignition
W_A = mass of the sample after ignition
C_F = asphalt binder content calibration factor, percent by mass of the sample
%M = percent moisture in the sample

Note: During calibration, C_F and %M are zero.

5.14.1 If an ignition furnace correction (tank stab correction) is made, the %AC determined in Subsection 5.14 is adjusted by that correction.

5.15 Attach the original printed ticket to the back of the card.

5.16 Empty the contents of the baskets into a flat pan. Use a small wire sieve brush to ensure that any residual fines are removed from the

baskets. Take care not to lose any material, as this will affect gradation results.

5.17 If needed, perform a gradation analysis of the residual aggregate according to Section 6.

6. SIEVE ANALYSIS OF AGGREGATE

6.1 If required, the aggregate shall be subjected to sieve analysis as described below. The coarse sieving shall be performed in accordance with Subsection 6.2, and the fine sieving in accordance with Subsection 6.3. The quantity of material on a given sieve at the completion of sieving shall not exceed the amount shown in Table 2.

TABLE 2

Sieve Size	Maximum Mass Allowed (grams/sq. in.)	Maximum Mass Allowed (grams)	
		8 inch Diameter Sieve	12 inch Diameter Sieve
1-1/2”	25	---	2827
1”	18	---	2036
3/4”	14	---	1583
1/2”	10	---	1131
3/8”	8	---	905
1/4”	6	---	679
No. 4	5	---	565
No. 8 and smaller	4	201	452

6.2 The coarse sieving of the aggregate shall be performed as follows:

6.2.1 Weigh and record the mass of the sample to be sieved to the nearest gram. Place sample on the top sieve of a nest of 12 inch sieves. The nest of sieves shall consist of sieves starting with the smallest size sieve that 100% of the material will pass, down through and including the No. 8 sieve and pan. Place lid on nested sieves and screen the material by either mechanical or hand shaking, until not more than 0.5 percent by mass of sample passes any sieve during one minute.

6.2.2 Weigh and record separately, to the nearest gram, the mass of the material retained on the individual sieves and in the pan. The material retained in the pan is recorded as the minus No. 8 material.

6.2.3 Do not discard any of the sieved material until the sum of the individual masses is compared to the mass of the sample prior to sieving. If the difference between the two masses is less than or equal to 1.0% of the mass of the sample prior to sieving, an adjustment in mass shall be made on the sieve which has the largest mass retained, except no adjustment shall be made on the minus No. 8 material. If the difference is greater than 1.0%, the sample shall be recombined, resieved, and carefully reweighed.

6.2.4 Determine the coarse sieve factor by dividing 100 by the total mass sieved. Record the factor to six decimal places.

6.2.5 The percent passing for each sieve in the coarse sieve analysis is determined by multiplying the mass retained on that sieve by the coarse sieve factor, and subtracting the result from the unrounded % passing for the next larger sieve. Values for "mass retained multiplied by the coarse sieve factor" and "percent passing each sieve" shall be determined and used in the calculations to six decimal places. The percent passing value for each sieve is recorded in the sieve analysis to the nearest percent.

6.2.6 As a check on the coarse sieve analysis, multiply the mass of minus No. 8 material by the coarse sieve factor. The result of this calculation, rounded to the nearest percent, should be the same as the value for percent passing the No. 8 sieve determined in Subsection 6.2.5 above.

6.2.7 The material passing the No. 8 sieve is split, if necessary, to obtain a minimum 500 gram sample for fine sieving; however, the sample size may be less than 500 grams if a minimum of 500 grams is not obtained from coarse sieving. If less than 800 grams passes the No. 8 sieve, the entire amount shall be subjected to fine sieving. The mass of the sample for fine sieving is recorded to the nearest gram as mass of pass No. 8 split.

6.3 The elutriation and fine sieving of the pass No. 8 material shall be performed as follows:

6.3.1 Subject sample to elutriation through a No. 200 screen either by hand or mechanical washing.

6.3.2 Dry sample to constant mass, allow to cool, then weigh and record the dry mass to the nearest gram.

6.3.3 Place sample on the top sieve of a nest of fine sieves. The nest of sieves shall consist of sieves starting with the No. 10 sieve, down through and including the No. 200 sieve and pan. Place lid on nested sieves and screen the material by either mechanical or hand shaking, until not more than 0.5 percent by mass of sample passes any sieve during one minute.

6.3.4 Weigh and record separately, to the nearest gram, the mass of material retained on the individual sieves and in the pan.

6.3.5 Do not discard any of the sieved material until the sum of the individual masses is compared to the mass of the sample prior to sieving. If the difference between the two masses is less than or equal to 1.0% of the mass of the sample prior to sieving, an adjustment in mass shall be made on the sieve which has the largest mass retained, except no adjustment shall be made on the minus No. 200 material. If the difference is greater than 1.0%, the sample shall be recombined, resieved, and carefully reweighed.

6.3.6 Determine and record elutriation to nearest gram by determining the difference between the dry mass and the mass of the pass No. 8 split.

6.3.7 Determine a factor for calculating the fine sieve analysis by dividing the percent passing the No. 8 sieve (recorded to the nearest percent) by the mass of pass No. 8 split. Record the factor to six decimal places. If all the pass No. 8 material from coarse sieving was subjected to elutriation and fine sieving, a fine sieve factor is not determined. Rather, the coarse sieve factor is utilized and the calculation of the percent passing each sieve is continuous through the entire sieve analysis.

6.3.8 The percent passing for each sieve in the fine sieve analysis is determined by multiplying the mass retained on that sieve by the fine sieve factor, and subtracting the result from the unrounded % passing the next larger sieve, with the exception of the percent passing the No. 8 which has previously been recorded to the nearest percent. Values for "mass retained multiplied by the fine sieve factor" and "percent passing each sieve" shall be determined and used in the calculations to six decimal places. The percent passing value for each sieve is recorded in the sieve analysis to the nearest percent, except the percent passing the No. 200 sieve is recorded to the nearest 0.1 percent.

6.3.9 As a check on the fine sieve analysis, the mass of material passing the No. 200 sieve is added to the elutriation mass, and this total is multiplied by the fine sieve factor. The result of this calculation, rounded to the nearest 0.1 percent, should be the same as the value for the percent passing the No. 200 sieve determined in Subsection 6.3.8 above.

6.3.10 If an aggregate gradation correction factor is utilized, the percent passing the No. 200 sieve shall be adjusted by subtracting the correction factor determined in Subsection 4.15.

6.4 Other methods may be used that differ from that specified in Subsections 6.2 and 6.3 above to determine % passing each sieve, so long as the method utilized has been proven to give equivalent results. However, any procedure which includes recording percent retained values prior to completing the calculation of all percent passing values is not allowed.

7. REPORT AND EXAMPLE

7.1 Report test information on the Asphaltic Concrete Tabulation – Ignition Furnace laboratory card. An example for the testing performed on a field sample is shown in Figure 1. Only the portion of the laboratory card relevant to the ignition furnace test is used for the example. A blank Asphaltic Concrete Tabulation – Ignition Furnace laboratory card is shown in Figure 2.

7.1.1 Mass of basket assembly.

7.1.2 Mass of sample and basket assembly.

7.1.3 Calculated initial mass of the sample.

7.1.4 Mass of sample and basket assembly after ignition.

7.1.5 Calculated mass of sample after ignition.

7.1.6 Asphalt binder content calibration factor.

7.1.7 Percent moisture from moisture test, if one was performed.

7.1.8 Corrected percent asphalt binder content.

7.1.9 Elapsed time of test.

7.1.10 Name of the operator.

7.1.11 Sample test date.

7.1.12 Design percent asphalt binder content.

7.2.13 Ignition furnace set temperature.

7.2.14 If determined, the sieve analysis of the residual aggregate (corrected for passing the No. 200 sieve if applicable).

ARIZONA DEPARTMENT OF TRANSPORTATION
ASPHALTIC CONCRETE TABULATION – IGNITION FURNACE

USE CAPITAL LETTERS

LAB NUMBER	ORG NUMBER	MATL	TYPE	PUR-POSE	TEST LAB	SIZE	SIZE %
13-0098	7777	AC	34	A	P		

TEST NO.	LOT OR SUFFIX	SAMPLED BY	MO	DAY	YEAR	TIME
4	3	A. JONES	04	22	13	1525 MILITARY TIME

SAMPLED FROM	LIFT NO.	RDWY	STATION
ROADWAY - 8' Lt. of ℄	2	EB	5550 IF MILEPOST, INPUT DECIMAL

ORIGINAL SOURCE	PROJECT ENGINEER / SUPERVISOR	PROJECT NUMBER	TRACS NUMBER
BLUE RIVER PIT	B. Smith	F-088-8 (88)	H088801C

REMARKS

416 Special Mix

EXAMPLE

COARSE FACTOR 045455 = 100 / COARSE SIEVE TOTAL

WEIGHTS RETAINED		% RET	% PASS	SPECS
3"				
2 1/2"				
2"				
1 1/2"				
1"		0	100	
3/4"	96	4	96	
1/2"	439	20	76	
3/8"	132	6	70	
1/4"	172	8	62	
#4	160	7	55	
#8	207	10		
-#8	994	✓	45	
Total	2200	= i (Rounded)		

Weight of Pass # 8 Split 509 = p

FINE FACTOR 088409 = % Pass #8 / Wt. of Pass #8 Split

WEIGHTS RETAINED		% RET	% PASS	SPECS
#10	56	5	40	
#16	34	3	37	
#30	101	9	28	
#40	127	7	21	
#50	19	2	19	
#100	83	10	9	
#200	29	4		
-#200	2	✓ r	5.3	
Total	451	q = Dry Weight		
Elutri-ation	58	= p - q		

r - s = 5.9 Corrected % Pass No. 200

% Pass No. 200 Correction Factor (±) − 0.6 s

IGNITION FURNACE
ARIZ. 427 ☒ ARIZ. 428 ☐

a. Wet Mass of Moisture Sample	1026.2	g
b. Dry Mass of Moisture Sample	1024.0	g
c. Moisture Content (ARIZ 400) [(a - b) / a] x 100	0.21	%
d. Mass of Basket Assembly	4473.6	g
e. Mass of Sample and Basket Assembly	6790.3	g
f. Initial Mass of Sample (e - d)	2316.7	g
g. Ignition Furnace Set Temperature	538	°C
h. Mass of Sample and Basket Assembly After Ignition	6674.0	g
i. Mass of Sample After Ignition (h - d)	2200.4	g
j. Uncorrected Asphalt Binder Content [(f - i) /f] x 100	5.02	%
k. Asphalt Binder Content Calibration Factor (±)	+ 0.28	%
l. Ignition Furnace Correction (Tank Slab Correction) (±)	− 0.30	%
m. Corrected Asphalt Binder Content (j - k - c - l)	4.83	%
n. Design Asphalt Binder Content	4.70	%
o. Elapsed Time of Test (minutes)	79	

COMPACTION
Marshall = M Gyratory = G Core = C ☐

RICE
Sample Max. Sp. Gr. (Gmm)
Sample Max. Density [(Gmm) x (62.3)] pcf

MARSHALL
Average Bulk O.D. Sp. Gr. (Gmb)
Average Bulk Density [(Gmb) x (62.3)] pcf
Air Voids = %
[1 - (Average Bulk Density / Max Density From Rice Test)] x 100
Stability lbs
Flow 0.01 in

GYRATORY
Average Relative Density (% Gmm) at Ndesign pcf
Air Voids = %
100 - [Average Relative Density % (Gmm) at Ndesign]

WHITE ☐
YELLOW ☐
BLUE ☐

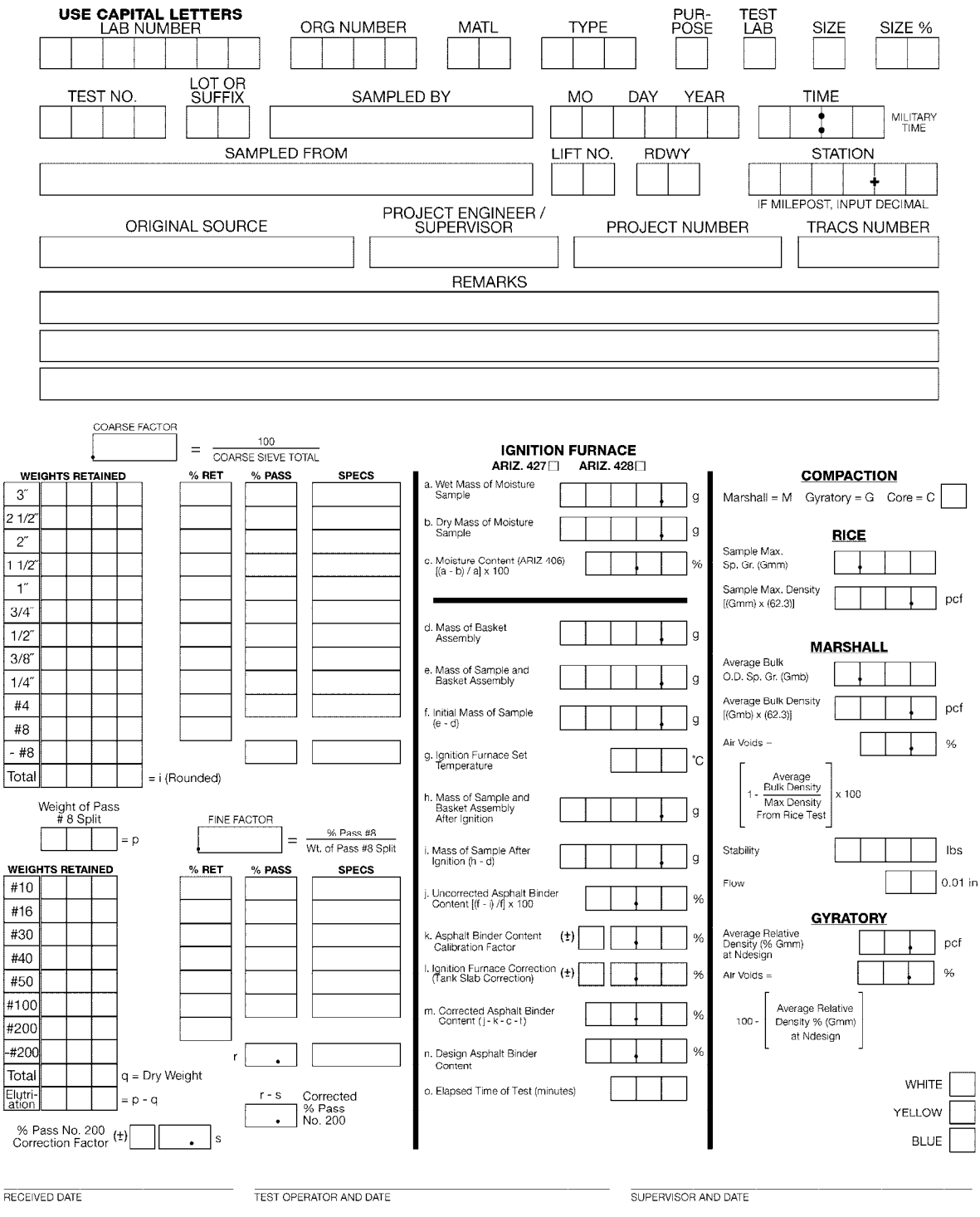
RECEIVED DATE	TEST OPERATOR AND DATE	SUPERVISOR AND DATE
04-22-13	S. Clement 04-23-13	H. Finn 04-23-13

44-9372 R03/13

SEE BACK ALSO

FIGURE 1

ARIZONA DEPARTMENT OF TRANSPORTATION
ASPHALTIC CONCRETE TABULATION – IGNITION FURNACE



RECEIVED DATE | TEST OPERATOR AND DATE | SUPERVISOR AND DATE

44-9372 R03/13

SEE BACK ALSO

FIGURE 2