Check Procedure for Mechanical Sieve Shakers

for

AASHTO Test Methods T27 and T30

and

ASTM Test Methods C136 and D5444

Procedure Designation: IHP-2

Equipment required to perform the check:

1. A stack of sieves conforming to ASTM E11 and consisting of sieves taken from the following list that would be applicable to the samples being tested on a regular basis:
    a. 1 1/2 in.
    b. 1 in.
    c. 3/4 in.
    d. 5/8 in.
    e. 1/2 in.
    f. 3/8 in.
    g. 1/4 in.
    h. No. 4
    i. No. 8
    j. No. 10
    k. No. 16
    l. No. 20
    m. No. 30
    n. No. 40
    o. No. 50
    p. No. 60
    q. No. 80
    r. No. 100
    s. No. 140
    t. No. 200
2. A lid and pan for the sieve stack.
3. If the stack of sieves mentioned in No. 1 above is not comprised of sieves having standard circular frames with 8-in. or 12-in. diameters, a second set of sieves having standard circular frames with 8-in. or 12-in. diameters, and the same opening sizes as selected for the stack in No. 1, shall be available and utilized for the hand-shake described in the procedure. A lid and pan that will fit each sieve used for this purpose shall also be utilized.
4. A timer with a readout to at least the nearest second.
5. A balance with a capacity of 20 kg and readable to at least the nearest 0.1 g.
6. An oven capable of maintaining a temperature of 110 ± 5°C.

Procedure

1. A. If the masses retained after mechanical shaking will be determined by weighing the material in the sieves, weigh all of the sieves to be used in the mechanical shaker stack, and record these amounts on the record in Cells E22-E42. Or,
1. B. If the masses retained after mechanical shaking will be determined by weighing the material in a tared container, enter zeros on the record in Cells E22-E42.
2. Obtain the minimum amount of material as required for the applicable test method(s) based on the maximum particle size.
    a. If the sample needs to be reduced by splitting or quartering, as permitted by the applicable test method(s), to avoid overloading the sieves, and this is also how samples will be tested during daily operations, only one of the reduced representative portions will need to be tested. A note about this shall be added to the Comments section of the record. This reduced specimen will be considered the test sample for step 3.
3. Dry the test sample in the oven to constant mass at a temperature of 110 ± 5°C.
4. Determine and record the mass as the original total sample mass before wash in Cell G19.
5. If samples will be washed during daily operations, perform a wash in accordance with the relevant test method(s), and record the oven-dry mass after wash in Cell L19. If a wash is not necessary, copy the value from Cell G19 into Cell L19.
6. Form the sieve stack with the sieves to be used during daily operations, with the pan at the bottom.
7. Introduce the sample into the sieve stack and place the lid on top.
8. Place the sieve stack into the shaker.
9. A. If the sieving sufficiency check is not being performed for D6913, and the shaker does not have an established shake time, set the sieve shaker to shake for 6 minutes. If the shaker already has an established shake time, set the sieve shaker to shake for 1 minute less than the established length of time to confirm whether a shorter time can be used.
9. B. If the sieving sufficiency check is being performed for D6913, set the shaker to shake for 10 minutes.
10. Record the desired shake time that was set in Step 9 in Cell H13.
11. Start the reference timer and the shaker at the same time.
12. At the moment of completion of mechanical shaking, stop the reference timer and record this time on the record in Cell H14.
13. A. If the masses retained will be determined in the sieves and pan, weigh each sieve and pan with the material in them, and record these amounts on the record in Cells F22-F42.
13. B. If the masses retained will be determined in a tared container,
    a. Tare the container on the balance,
    b. Transfer the material from the sieve or pan to the container, and determine the mass.
    c. Return the material to the sieve it was taken from.
    d. Repeat this process for each sieve and the pan, although you are finished with the material retained in the pan at this point.
    e. Record these amounts on the record in Cells F22-F42.
14. If the mechanical sieving operation was performed using standard circular sieves of manageable size, proceed directly to step 15. But if the mechanical sieving operation was performed using standard circular sieves that are too large or nonstandard sieves such as tray sieves, material from each sieve shall be transferred in suitable increments to standard circular sieves of manageable size, with step 15 being repeated for each increment.

15. Tare the pan that will be used to collect the material that passes during the hand-sieving operation.
16. Secure the pan and a lid to the uppermost sieve, and perform the following hand-sieving operation:

    > Hold the individual sieve, provided with a snug-fitting pan and cover, in a slightly inclined position in one hand. Strike the side of the sieve sharply and with an upward motion against the heel of the other hand at the rate of about 150 times per minute, turn the sieve about one sixth of a revolution at intervals of about 25 strokes. In determining sufficiency of sieving for sizes larger than the 4.75-mm (No. 4) sieve for test methods T27, T30, C136, and D5444, limit the material on the sieve to a single layer of particles.

17. Record the mass that passed the sieve during the hand-sieving operation by weighing the material in the tared pan.
18. Return the material to the respective sieve.
19. Repeat the process described in Steps 16 and 17 for each sieve in the stack.
20. Record these values in Cells H22-H41.
21. Confirm that all of the boxes with Satisfactory/Failure possibilities indicate "Satisfactory." This includes Cells J22-J41, L22-L41, M22-M41, and L47 and L48, depending on the applicable test methods.
22. If everything is satisfactory, the check procedure is complete. Finish filling out the record with all of the other required information (name of technician, date of check, etc.).
23. When the sieving sufficiency check is not being performed for D6913, complete the procedure in the following way:
    a. If a failure is noted for any of the sieves for any of the relevant test methods—but the difference in total and cumulative masses is satisfactory for all relevant test methods—and the time of shake was less than 10 minutes, increase the time of shake by 1 minute and repeat the procedure beginning at Step 2.
    b. If a failure is noted for any of the sieves for any of the relevant test methods, and the time of shake was 10 minutes or longer, it may be prudent to decide that all samples of this type of material must be hand-sieved. Follow the corrective action procedure for nonconformities discovered during equipment activities and decide whether a longer shake time should be attempted for this type of material. If shake times longer than 10 minutes are attempted, increase the time of shake by 1 minute and repeat the procedure beginning at Step 2. Documentation of the corrective action plan, records of the failures occurring at shorter shake times, and evidence that specimen degradation is not occurring shall be included with the sieving sufficiency check record that has passing results.
    c. If a failure is noted for the difference between the initial total sample mass and the post-shake cumulative mass for any of the relevant test methods, take the appropriate action:
        i. If the cumulative mass is too high, make sure the shaker is clean of particles and excessive dust and, after making sure the sieves are clean of all material, repeat the procedure beginning at Step 2 with the same shake time. If repeating the test does not fix the problem or the cause of the problem is not apparent, follow the corrective action procedure for nonconformities discovered during equipment activities and take the decided course of action.
        ii. If the cumulative mass is too low, make sure that all of the material has been removed from the sieves and observe the sieve shaker during operation to see if

material is being lost from the sieves while in operation. Repeat the procedure beginning at Step 2 with the same shake time if the cause of the difference is apparent or it is thought that the action taken may have corrected the problem. If repeating the test does not fix the problem or the cause of the problem is not apparent, follow the corrective action procedure for nonconformities discovered during equipment activities and take the decided course of action.

24. When the sieving sufficiency check is being performed for D6913, complete the procedure in the following way:
    a. If a failure is noted for any of the sieves, repeat the procedure beginning in Step 2 with a 15-minute shake time.
        i. If the 15-minute shake time passes, this can be identified as the required shake time.
            1. However, if a shake time between 10 minutes and 15 minutes is desired, repeat the procedure beginning in Step 2 using a time between 10 minutes and 15 minutes to see if the shorter shake time will pass. If the shorter shake time passes, the shorter shake time can be identified as the required shake time.
        ii. If the 15-minute shake time fails, repeat the procedure beginning in Step 2 with a 20-minute shake time.
            1. If the 20-minute shake time fails, then the mechanical sieve shaker shall be considered inadequate for sieving. It shall either be repaired or discarded. If repaired, repeat the sieving sufficiency procedure from the beginning to determine the required shake time.