Annex E (normative)

Procedure for examination of measuring device and supply apparatus for continuous fixed mixer

E.1 General

This Annex specifies the procedure for examination[1)] and evaluation of measuring device and supply apparatus for continuous fixed mixer according to cement, water, fine aggregate, coarse aggregate and admixture.

Note[1)] This standard is mainly applied for the test of type verification of continuous fixed mixer or for the measuring calibration, however it may be applied for the calibration on site or calibration check.

E.2 Testing instrument

E.2.1 Scale

The scale shall measure with accuracy to 0.1 % of the mass of each specimen shown in the test of E.4.

E.2.2 Container

The container shall have enough capacity to store each specimen shown in the test of E.4 and be sufficiently firm. The container for water and admixture shall be a watertight.

E.3 Specimens

The specimens shall be cement, water, fine aggregate, coarse aggregate, chemical admixture and admixture. The chemical admixture shall be conform to JIS A 6204 or the corrosion inhibitor conform to JIS A 6205. The admixture shall be the fly-ash conform to JIS A 6201, the expansive additive conform to JIS A 6202, the ground granulated blast-furnace slug conform to JIS A 6206 or the silica fume conform to JIS A 6207.

E.4 Test method

The test shall be carried out by following procedure according to cement, water, fine aggregate, coarse aggregate, chemical admixture and admixture.

a) Set the dial, valve or the like of the measuring device or supply apparatus to specified scale.

b) Load the measuring or supplying specimens into storage tank to 9/10 of nominal volume.

c) Move measuring device and supply apparatus of continuous fix mixer for specified hours continuously and discharge specimens into the container. Measure the mass of the specimen.

d) Repeat the procedure of c) 20 times until the 1/10 of nominal volume of specimen remains in the storage tank.

E.5 Calculation

E.5.1 Mean value of measurements and coefficient of variation

The mean value of twenty mass measurements or coefficient of variation which obtained by the procedure given in b) to d) of E.4 for each setting scale of the measuring dial, valve or the like shall be calculated by the following formula and round off to three digits of significant figures.

$$\overline{x} = \frac{1}{n}\sum_{i=]}^{n} x_i$$

where, $\overline{x}$: mean value

x_i : measurements

n : number of measurements = 20

$$s = \sqrt{\frac{1}{n}\sum_{i=]}^{n}(x_i - \overline{x})^2}$$

where, s : standard deviation

$$v = \frac{s}{\overline{x}} \times 100$$

where, v : coefficient of variation (%)

E.5.2 Variability of the mean value for the measurements

Obtain the mean value of the first five measurements and the last five measurements of twenty mass measurements which obtained by the procedure given in b) to d) of E.4 for each setting scale of the measuring dial, valve or the like and calculate the variability of each mean value by following formula and round off to three digits of significant figures.

$$\Delta\overline{X} = \frac{\overline{x}_1 - \overline{x}_2}{\overline{x}_1 + \overline{x}_2} \times 100$$

where, $\Delta\overline{X}$: valuable of the mean value of five measurements (%)

$\overline{x}_1$: larger value for the mean value of five measurements

$\overline{x}_2$: smaller value for the mean value of five measurements

E.6 Evaluation

The coefficient of variation of twenty measurements of each specimen obtained in E.5.1 and E.5.2 and the variability of the mean value of five measurements shall be an indicator shown the procedure of measuring device and supply apparatus for continuous fixed mixer.

When the value shall not exceed the value shown in Table E.1, the procedure of the measuring device and supply apparatus for continuous fixed mixer shall be judged as satisfactory.

TableE.1 Coefficient of variation of twenty measurements of specimen (%) and variability of the mean value of five measurements (%)

Types of specimen	Coefficient of variation of twenty measurements (%)	Variability of the mean value of five measurements (%)
Water	0.6	1
Cement	1.3	2
Aggregete	2	3
Chemical admixture	2	3
Admixture	1.3	2

E.7 Record

The record shall be as follows.

a) The class, type and name of the continuous fixed mixer.

b) The nominal capacity of the storage tank

c) The date, weather, temperature and humidity of the testing day

d) The name of testing agency

e) The setting scale of measuring dial, valve or the like

f) The name, class[2)], name of manufacturer or the location of production of specimen

g) The maximum size, grain size, density and water absorption of aggregates

h) The percentage of surface moisture

i) The twenty measurements, mean value and coefficient of variation

j) The first five and the last five measurements, mean value and the variability of the mean value (%)

k) The evaluation of the performance of measuring device and supply apparatus for continuous fixed mixer

Note[2)] For cement, chemical admixture and admixture, the product name may be used.

Annex F (normative)

Procedure for examination of mixing efficiency of continuous fixed mixer

F.1 General

This Annex specified the procedure for examination of mixing efficiency of continuous fixed mixer and its evaluation.

F.2 Sampling of specimen

After the mixer discharge as same quantity as the standard disposal volume shown in Table F.1, the specimen shall be sampled at the first time. The amount of specimen shall be 100 L or over. Then either after discharging concrete for four minutes or after discharging 1000 L, any of the specimen which less amount of discharging shall be sampled 100 L or over.

Table F.1 Standard disposal volume of mixer

Capacity for mixing (m^3/h)[a)]	Mixing hours (seconds[)b)]	Standard disposal volume (L)
10	13 to 16	50
15	13 to 16	50
20	13 to 16	70
25	13 to 16	70
35	15 to 18	90
45	15 to 18	100
55	15 to 18	120
Note[a)] The mixing capacity calculated by the time which materials passing through the mixer part [b)] The time which materials passing through the mixer part		

F.3 Test items

According to two sampled specimens, test for following five items shall be carried out.

F.3.1 Variability of air content

When prescribed hours have passed since the specimen discharged from the mixer, the air content shall be measured in accordance with JIS A 1128. Obtain the absolute value for the variability of air content by measuring two specimens and it shall be judged as the variability of air content (%).

F.3.2 Variability of slump

When prescribed hours have passed since the specimen discharged from the mixer, the slump shall be measured in accordance with JIS A 1101 at the same time of measuring air content. Obtain the absolute value for the variability of slump by measuring two specimens and it shall be judged as the variability of slump (cm).

F.3.3 Variability of bulk density of mortar

Measure the bulk density of mortar for two specimens in accordance with JIS A 1119 to obtain the variability of the bulk density of mortar (%).

F.3.4 Variability of unit coarse aggregate content

Measure the unit coarse aggregate content for two specimens in accordance with JIS A 1119 to obtain the variability of the unit coarse aggregate content (%).

F.3.5 Variability of compressive strength

Obtain the compressive strength in accordance with JIS A 1108 and according to compressive strength of two specimens, calculate the variability of compressive strength (%) by following formula.

$$\Delta f_c = \frac{f'_{c1} - f'_{c2}}{f'_{c1} + f'_{c2}} \times 100$$

where, f'_{c1} : larger value of the compressive strength

f'_{c2} : smaller value of the compressive strength

F.4 Evaluation of mixing efficiency

The variability of air content (%), the variability of slump (cm), the variability of bulk density of mortar in concrete (%), the variability of unit coarse aggregate content (%) and the variability of compressive strength (%) obtained in F.3 shall be the indicator for the mixing efficiency of continuous fixed mixer. When the value shall be less than the value shown in Table F.2, the concrete shall be judged as mixing homogeneously

Table F.2 Mixing efficiency

Items	Tolerance
Variablity of air content (%)	1
Variability of slump (cm)	3
Variebility of bulk density of mortar in concrete (%)	0.8
Variebility of unit coarse aggregate content (%)	5
Variebility of compressive strength (%)	7.5

F.5 Record

The record shall be as follows.

a) The class, type and name of the continuous fixed mixer.
b) The date, weather, temperature and humidity of the testing day
c) The name of testing agency
d) The maximum size of coarse aggregate (mm), class of aggregate and grain size.
e) The mix proportion
f) The sampling method and sampling amount of specimen
g) The variability of air content (%)
h) The variability of slump (cm)
i) The variability of bulk density of mortar (%)
j) The variability of unit coarse aggregate content (%)
k) The variability of compressive strength (%)
l) The evaluation for the mixing efficiency of continuous fixed mixer